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EDITED BOOK

International Web Conference on

COVID-19 Second Wave: Challenges for Sustainable Development (CCSD 2021)

Editors

Dr. Ashok K. Verma
Dr. Arvind B.Chavhan
Dr. Jayvardhan V. Balkhande
Dr. Sadguru Prakash

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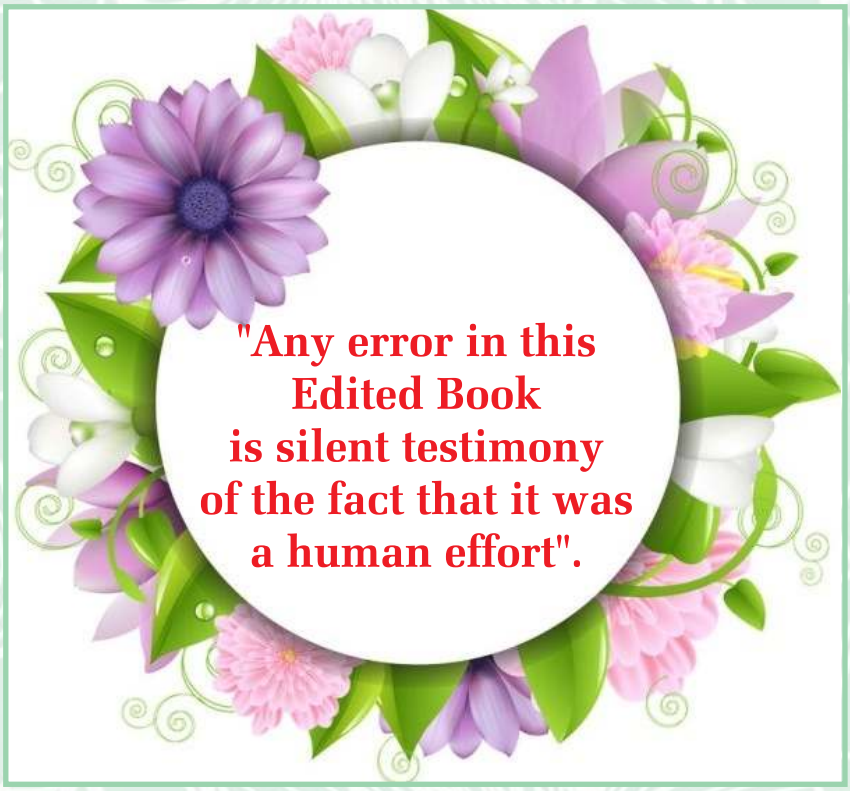
"Any error in this
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is silent testimony
of the fact that it was
a human effort".

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INTERNATIONAL WEB CONFERENCE

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Preface

The COVID-19 outbreak is a global financial and public health crisis. Socio economic growth has shown a steep drop during its first wave that become more severe during its second wave and is predicted to continue the same considerably in the near future to a great extent on a long-term basis, as gains in the tourism, aviation and extractive sectors, among others, are completely wiped out.

COVID-19 tells us that scientific cooperation is a key when dealing with global public health issues. The unavailability of testing kits and other Personal Protective Equipment (PPE), inadequate training of healthcare workers, lack of adequate facilities for the treatment of COVID-19 infected patients, are all factors that have unfortunately contributed to undermining the image and capacity of the scientific community to innovate and to meet the pressing needs at hand.

COVID-19 tells us that continued education must be ensured when so many children today cannot go to school. Education is one of the biggest casualties in fight against the pandemic all over the world especially in developing countries. The immediate and long term consequences of school closures will inevitably further exacerbate inequalities and disparities in the education sector.

The main aim of the conference was a step forward to provide a platform for interaction and deliberations among scientists, researchers, academicians and policy makers from different parts of the country on such important aspects and issues about the COVID-19 pandemic second wave along with in-depth discussion/ possible challenges and solutions on sustainable development. It included about 23 sub themes.

The current edited book entitled 'COVID-19 Second Wave: Challenges for Sustainable Development ' is the outcome of International Web Conference (CCSD 2021) organized from 13th to 15th September 2021. This edited book contains articles/chapters contributed by the author (s). The author (s) is responsible for plagiarism, if any. The views expressed by the authors are their own and the Editorial board is in no way responsible for the same. The editorial board/publisher bears no responsibility, if any error or omission has inadvertently crept in the published text. Although utmost care has been taken to make the book free from error but a few errors may creep in, for which we would like to extend due apology in advance.

With profound regards.

Prayagraj
31st October, 2021

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COVID-19 Second Wave: Challenges for Sustainable Development (CCSD 2021)

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Role of Vitamin-D in Prevention and Treatment of Covid-19 Infection - A Mini Review

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ABSTRACT

COVID-19 caused by SARS-COV-2 virus has become a global pandemic causing great number of deaths. This review aims to provide a scientific view on the protective role of Vitamin –D in the protection of GOVID- 19 infection. It is found that there is a significant relationship between mortalities caused by this infection and Vitamin- D. It is observed that the most vulnerable group are the aging population with Vitamin-D deficiency. The outbreak of COVID-19 seems to occur mainly in cold winter time compared to summer. The supplementation with Vitamin-D to maintain serum concentrations may be of benefit in treatment and prevention of COVID-19 infection and other respiratory disorders.

Keywords: COVID-19, Vitamin-D, mortality, prevention.

INTRODUCTION

Vitamin-D is a essential lipid-soluble vitamin and steroid hormone, produced endogenously with the effect caused by the ultraviolet radiation on skin or available from exogenous food sources or dietary supplements. vitamin-D is the name given to a group of vitamins vitamin-D2(ergocalciferol, found in plants) and vitamin-D3(cholecalciferol, found in animal tissues).These are pharmacologically inactive and are converted into active compounds by hydroxylation in liver and then in kidneys.

Dietary sources for vitamin-D includes animal products like red meat, oily fish, egg yolks, and liver, fortified foods. Some Mushrooms also acts as a source of vitamin-D if it is grown in ultraviolet light (cordwell, et al., 2018). In adults the standard dose for prevention of vitamin-D deficiency is 10 micrograms daily (joint formulary committee British National Formulary).

Role of vitamin-D in immunity and viral infection

Vitamin-D is the pluripotent that has the capability to modulates the innate and the adaptive responses (Rezaei,2018). it plays an important role in the proliferation and immunomodulation of cells. It also affects several immune pathways by enhancing the protective properties of the mucous membranes of the body and also inhibits the excessive inflammation. Immunocytes such as macrophages, B and T lymphocytes, neutrophils and dendritic cells express vitamin-D receptors (VDR) that enable the action of vitamin-D The active metabolite of vitamin-D leads to the activation of VDR that can form Retinoid X Receptor(RXR) heterodimer that inturn influences the proteins of the innate and adaptive immune system (chunet al., 2014).

Vitamin-D has its role in providing the immunity is kept into 3 classes which includes physical barrier, innate immunity, and also in the adaptive immunity system.

Vitamin-D and role as physical barrier

Vitamin-D is required to maintain tight junctions, gap junctions and ita dherens junctions through E-cadherin(Grantet al., 2020) among the cells the epithelial cells are thereby enhances the physical barrier which is the first barrier to encountered by the pathogen.

Vitamin-D and innate immunity

Innate immunity includes the production of both pro-inflammatory and anti-inflammatory cytokines has been demonstrated with the association in several autoimmune disease. It also plays an important role in the production of the antimicrobial peptides, like cathelicidins and defensins. Cathelicidins are known to have anti-microbial, bacterial, viral and also fungal properties.

Vitamin-D and adaptive immunity

Vitamin-D modulates adaptive immunity by promoting type 2 T helper cells to produce cytokines. It also plays an important role in regulation of immune responses mediated by macrophages and dendritic cells that are the first host of defence (Bruce et al. 2010). Vitamin-D insufficiency has been linked to the increased incidence of the asthma exacerbation due to triggering by viral infections in both children and adults. Vitamin-D supplementation has also been seen to increase the CD4+ T cell count in HIV infections.

Some recent reviews have demonstrated some pathways by which vitamin-D decreases the risk of microbial infections. It follows different mechanisms in reducing the risk of viral infections. .Vitamin-D decreases the risk of COVID-19 infections (Grant, et al.,2020). It comprises and maintains the cell junctions, and gap junctions increases cellular immunity by decreasing cytokine storm with the influence of interferon and tumor necrosis factor and regulates the adaptive immunity by inhibiting T-helper cell type 1 responses and stimulates the T cells induction. Vitamin-D supplementation has also found to enhance the CD4+ T cell counts. Several invitro studies demonstrated that vitamin-D plays a important role in local "respiratory homeostasis" by stimulating the exhibition of the antimicrobial peptides.

Vitamin-D inhibits the production of pro-inflammatory cytokines and augments that of anti-inflammatory cytokines(Gombartet al., 2020). It promotes immunoglobulin and complement mediated phagocytosis which stimulates the maturation of the monocytes to macrophages

Several studies have reported the potential impact of vitamin-D supplementation in the patients suffering with COVID-19, experimental reports have shown that the vitamin-D has a role in decreasing the risk of the COVID-19, including the fact that the outbreak had occurred in winter season (the time when serum vitamin-D levels are low), and the fact that the vitamin-D deficiency contributes to the acute respiratory distress syndrome and case-fatality rates increasing with the age and with disease comorbidity, both of which are associated with a lower vitamin-D concentration It seems possible that vitamin-D prophylaxis may decrease the severity of illness caused by COVID-19, especially in settings where hyopovitaminosis is common. Vitamin-D prevents cytokine storm and subsequently decreases the ARDS that is commonly the cause of mortality in the COVID-19 infection. The pathology involves a complex interaction between COVID-19 and the immune system. However, vitamin-D has multiple immunomodulation actions by maturing the macrophages and prevents the macrophages to release too many inflammatory cytokines and chemokines.

RESULTS AND DISCUSSION

It is observed from the evidences given by many studies that higher serum levels of vitamin-D is associated with a low risk of microbial infections including covid-19 and other respiratory tract infections.

Renin-angiotensin-converting enzyme 2 is an enzyme that protects the lung against COVID-19 (Iliee t al., 2020). Vitamin-D enhances the expression of ACE2. It has been observed that vitamin-D decreases the acute lung injury in the mice by modulating the effects on the renin-angiotensin system and the ACE2 or angiotensin signalling pathway (Panarese et al., 2020)

The COVID-19 causes the vascular injuries in body. The vitamin-D promotes the vascular endothelial repair by the increasing the production of the vascular endothelial growth factor (Tianet al., 2020). Viamin-D scarcity increases the risk for thrombosis, endothelial dysfunction and pathological changes to vascular system.A cohort study had demonstrated the protective effects of the combined vitamin-D, Mg and vitamin-B12 against clinical deterioration of COVID-19.vitamin supplementation has shown as the safe and effective in preventing acute respiratory tract infections (Martineau et al., 2017). In patients who had severe vitamin-D deficiency also experienced the maximum benefits from the supplementation.The authors also noticed the protective role of the vitamin-D was high in subjects with a baseline serum levels of vitamin-D <25 nmol/l compaired to those who had >25 nmol/l of vitamin-D concentration. the increased production of glutathion spares the use of vitamin C, which has potential antimicrobial activities,and has been suggested to prevent and treat COVID-19 infection (Grant et al., 2020)

The vitamin-D also has a role in the SARS-CoV-2 infection on the basis that it has an impact in the innate and adaptive immunity, effects the cardiovascular system, derangement the immune response and its prothrombotic effects.

Other evidence that supports the possible role of the vitamin-D in COVID-19 is on the basis that the occurrence of the COVID-19 is during the winter season where the outcome of the source of the vitamin-D is less, less number of the cases were identified in the southern hemispheres

when compared to the Northern latitudes where they have high mortality ratein these areas. The elderly, also happen due to the low vitamin-D levels. This is because as the age increases the vitamin-D levels falls, this could be mainly due to the less exposure of the sunlight and due to the cutaneous synthesis which is the main contributor to the vitamin-D in body.(Simiao etal.,2021) The Scandinavians have a high quantity of fish and dairy products as their diet which are the source of the vitamin-D so these people have the less vitamin-D insufficiency rates 15-30% and has less severe COVID-19 when compared to Italy, Greece and Spain where VDI rates are around 70-90% and the disease is severe in these countries.

From southeast Asia, a study was conducted on the total of the 780 patients who were infected with the COVID-19 in Indonesia (Raharusun ,et al., 2020) , reported that significant comorbidity in 80% of the patients were with the vitamin-D deficiency.

A large observational population study from Israel compared the risk of COVID-19 infection with prevalence to vitamin-D deficiency in 200 localities.Theresearchers found that there is a significant correlation between the risk of COVID-19 with the low levels of the vitamin-D where the risk was highest with severe deficiency (Israel et al., 2020)

The recent observation that C-reactive protein, a surrogate for vitamin-D status was associated with the severity of COVID-19 (Daneshkhahet al., 2020). They concluded that the higher levels of the CRP will be risk for the severe COVID-19. The findings indicated associated with the deficiency of the vitamin-D were majorly related to the increased that CRP levels in patients with higher levels of vitamin-D was lowered than the patients with a serum level lower than 30 ng/ml. also the severity of COVID-19 infection in the patients with vitamin-D sufficiency was lower when compared with the other patients.

Previous studies have revealed that vitamin-D has a potent role in neuroprotective effect through several independent mechanisms (Garcion,2002). Vitamin-D stimulates the expression of brain-derived neutrophic factor (BDNF), neutrophin-3 (NT3), glial neurotrophic factor, and also neurotrophin receptor p75 in neurons, glial cells, and schwan cells. Neurotrophin induction underlies the neuroprotective effect of the vitamin-D in brain. The immunomodulating properties of vitamin-D represents the mechanism for the activity of immunosupressent and also for the protecting the neurons. Vitamin-D has been reported to promote that the migration, differentiation of oligodendrocyte, progenitors and enhances the remyelination of the neurons for the improvement of neurotransmission in the diseased rats (Gomez-Pinedo , et al., 2020). There are some clinical trials of the vitamin in prevention and treatment of neurological diseases by utilizing the neuroprotective effects.

Clinical evidences

A preliminary information study from Philippines on 212 reported COVID-19 patients, found that the severity of the infection is a highly correlated to the vitamin-D levels (MarkAlipio., 2020). Authors have found that 85.5% of patients with an adequate status of vitamin D (>30 ng/ml) showed a moderate disease, while a 72.8% of patients with vitamin D3 deficiency According to this study, the patients with vitamin D3 levels in the categories, 20–30 and <20 ng/ml, were 12.55 times and 19.12 times more likely to die from COVID-19, respectively, as compared with COVID-19 patients with sufficient levels of vitamin D_3. The main conclusion is that, even after controlling the age, sex and comorbidities, deaths were 10.12 times more likely in patients with vitamin D_3 deficiency than in patients with normal vitamin D_3 levels (Raharusun et al., 2020).

A limited cohort observational study with 43 cases in Singapore have found that a treatment of COVID-19 patients with an oral doses of vitamin D_3 (1.000 IU), Mg (150 mg), and vitamin B_{12} (500 µg) significantly reduced the application of the subsequent oxygen therapy compared to controls (3/17 vs. 16/26, $p = 0.006$) (Tan et al., 2020). Furthermore, such drugs combinations have protected against the clinical deterioration ($p = 0.041$) even after adjustment of the confounders (age, sex and comorbidity)

Severe COVID-19 patients and patients with pre-existing medical conditions were reported to have low levels of vitamin D_3 (Mohamed Bouikrane et al., 2020). A retrospective observational study with 186 positive cases and 2717 negative controls in Belgium have demonstrated a low median for vitamin D_3 in the COVID-19 patients compared to the control subject ($p = 0.0016$) (De Smet et al., 2020). A retrospective cohort study with 780 cases in Indonesia showed that below-normal vitamin D_3 levels and the pre-existing medical condition in the older and in the male cases have higher odds death. Moreover, the vitamin D_3 status has a strong relationship with COVID-19 mortality if it adjusted for age, sex and comorbidities (Raharusun et al., 2020). The similar retrospective study in Europe with many cases have showed that the reduced risks for both COVID-19 cases and the mortality are possibly associated with the sunlight and vitamin D_3, as well with the latitude as an indicator (Stephan Warland 2021).

Conclusion

The study shows that the Vitamin-D deficiency is associated with increased risk of Covid-19 infections.

It is evident from the data that the vitamin D is beneficent in COVID-19. Since the higher plasma concentrations with the vitamin D is better for the protection of various viral and respiratory infections, it is reasonable to suggest that the regular supplementation of vitamin D to the people who are at their higher risk for the development of various respiratory infections that also includes COVID-19 need to be considered as serious.The intensity of infammatory response is also higher in vitamin-D deficient patients who were infected with the COVID-19.Furthermore, vitamin D_3 has several other beneficial roles in preventing rickets, improving the general health, and also reducing the mortality rate caused due to its deficiency. The evidences linking Covid-19 and Vitamin-D indicates the significance of this vitamin. Much more research and attention should be paid to the importance of this vitamin status for the immune system and respiratory infections. Specific dietary advice and supplementation can help to prevent the disease.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Delta Variant: Its Transmissibility and Prevention

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ABSTRACT

Coronaviruses (COVID-19) are a wide range of viruses that causes various transmittable diseases from normal cold to high adverse disease like Severe Acute Respiratory Syndrome (SARS-CoV). Many people suffer from COVID 19 virus will face different type of respiratory problems causes severe diseases. These viruses are zoonotic in nature i.e. transmitted between people and animals. Viruses has one or more number of variants due to their ability of constantly mutating. SARS-CoV-2 variants of the coronavirus are making a great concern in many countries. Several variants such as Alpha, Beta, Gamma and Delta are COVID variants which spread easily among peoples and cause severe infection. Nowadays, among these, Delta variant is a common coronavirus variant in the United states which is highly contagious than prior variants and causes serious disease. In a study, it is found that the viral consignment of Delta variant is around 1000 times more than the original COVID 19 variants among infected people with this variant. This Delta variant has become the major variant in most of the world in a very short period of time. Transmission of Delta variant is mostly occurred in non-vaccinated people at a faster rate than fully vaccinated people. Peoples with lower immune system and weaker are at higher risk of affecting with this variant. Fully vaccinated people may also infect by delta variants and transmits the diseases to others. Those peoples are with symptomatic breakthrough infection. Delta variants also slows down the efficiency of COVID 19 antibodies which is formed due to vaccine. This variant is transmitted at a very faster rate, almost more than twice speed as earlier variants. It is an area of concern that if fully vaccinated people with asymptomatic infections can transmit the diseases to other peoples. Almost similar amount of viral material found in non-vaccinated and fully vaccinated people in case of Delta variants. However, in other variants, amount of viral material was low in infected vaccinated people than non-vaccinated. Vaccines are found highly effective in reducing the transmission of viruses and also against the Delta variant with giving good protection from these severe diseases.

Keywords: COVID 19, Delta Variant, Infection, Transmission, Vaccine.

INTRODUCTION

Coronaviruses (COVID-19) are a group of viruses which is caused by Severe Acute Respiratory Syndrome (SARS-CoV). The disease caused by coronaviruses is at first recognized in Wuhan city, China in December 2019, thus it has been termed as COVID 19. It is a transmittable disease that can cause infection related to respiratory problems from minor to fatal in mammals and birds. Many people suffer from COVID 19 virus will face different type of respiratory problems from normal cold to high adverse diseases. This virus is transferred from an infected person to healthy person via coughing or sneezing and direct contacting with him/her. This virus can survive up to several hours on the surface however, hand wash with simple antiseptics can destroy it. It shows normal symptoms like cough, fever and difficulty in breathing to severe infection like pneumonia. These are most common symptom of common cold which is also related to COVID 19 symptoms. Due to this reason, testing is necessary to take further action against the common cold or COVID 19. Peoples who will infect with minor sickness from this virus, will regains their health without the need of extra treatment. But in some severe cases, special medical treatment will be required. Those peoples who have already their medical issues, and contains different type of diseases are expected to develop severe infection more probably. People with this virus becomes highly infected and sick or die at any time.

In India, for the first time in January 2020, COVID 19 cases were found in Kerala, when three medical students

returned from Wuhan, the place where the COVID had arisen (Andrews et al., 2020; Narasimhan, 2020). On 25th march, lockdown was announced in whole country due to increased cases of COVID continuously. The second wave of COVID 19 was entered in March 2021 in India, which was highly terrific than first wave. In the second wave, lack of medical stocks, oxygen demands, scarcity of beds and vaccines in hospitals were found (Michael, 2021). India recorded the highest cases of COVID 19 from April 2021 onwards. Scientists reported that the coronavirus might reach an endemic stage in India instead of fully vanishing (Manral, 2021). In August 2021, Swaminathan stated that India learns to live with the coronavirus when somehow it reaches the endemic stage (Bhaduri, 2021). Vaccination is started on 16 January 2021 in India through AstraZeneca (Covishield vaccine) and Covaxin. After some time, two vaccines were also permitted for backup in urgent situations i.e. Sputnik V and Moderna (Livemint, 2021). India delivered more than 500 million COVID vaccines till 17th August 2021.

Viruses has the tendency to evolve uninterruptedly through the process of mutation. In genetic terms, when virus replicate their genome, it mutated one or more than one time, these genetic mutations of a novel virus forms the variants of the novel virus. Viruses like coronaviruses and influenza viruses mutate continuously and unevenly because of error in replication and enter into the host immune system with replication. These random mutations can cause virus to enter into the host cells and antibodies, promote the potential for infection. Presently, SARS-CoV-2 virus, which have been developing everywhere in the world, has numerous variants that cause coronavirus diseases. In these variants, there are 4 dominant variants of SARS-CoV virus which spreads around the world.

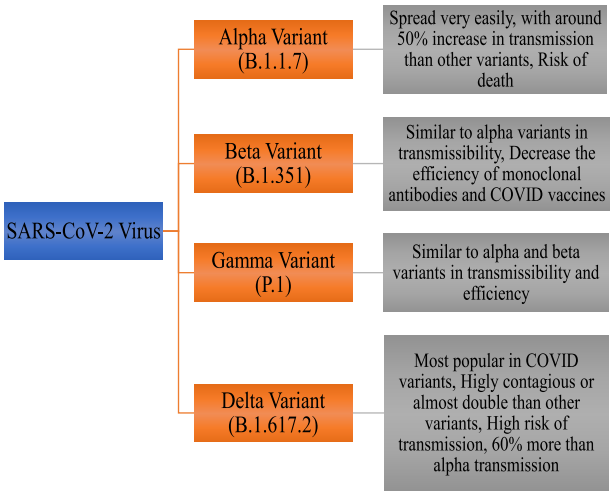


Fig.1: It represents the several variants of SARS-CoV-2 virus that cause coronavirus diseases.

Different type of COVID Variants

Alpha Variant

It is previously called UK Variant and legally denoted as B.1.1.7, as it is originated in United Kingdom and Kent for the first time. It is COVID variant of SARS-CoV-2 virus which cause coronavirus diseases. This variant spread very easily and has around 40-60% transmissibility rate compared with its novel virus. It is distinguished for having high mutation rate than normal. This variant can also cause high possibilities of hospitalization and death.

Beta Variant

This variant is also called as South Africa variant and legally denoted as B.1.351, as it is originated in South Africa. It can enhance the trans mission rate around 50% than other COVID variants and spread more all around. The variant also decreases the efficiency of monoclonal antibodies and vaccines as shown in Fig 1.

Gamma Variant

It is also known as Brazil Variant as name denoted its origin of place and legally mentioned as P.1. This variant is almost similar to alpha and beta variants in its transmissibility and spreading around the world. It also declines the efficiency of COVID antibodies or vaccine with monoclonal antibodies formed by earlier infection.

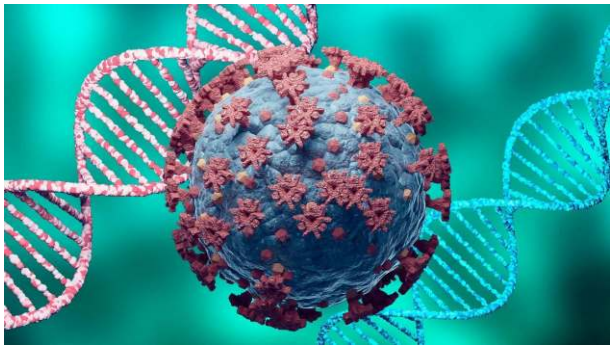
Delta Variant

It is known as Indian Variant as it is originated in India and legally denoted as B.1.617.2. This variant is most dangerous variant among all variants of SARS-CoV-2 virus. Now it is most common in U.S. and in the whole world. The Delta variant is highly contagious in nature or almost double than prior variants of COVID and spread in much easier way around everywhere. This variant is 60% more transmissible than other variants and is dominant all over the world. It can cause high risk of infection in non-vaccinated people. However, fully vaccinated people also transmit the diseases to other people with their symptomatic breakthrough infections. This variant also supress the effect of monoclonal antibodies and vaccine formed by early COVID infection.

Delta Variant as the Most Dangerous Variant

This variant is 50% more transmissible than all other COVID variants and spread almost up to 80-90 countries and becomes the most dominant strain of the coronavirus diseases. According to Eric Topol which is a founder and director of a research institute in California, Delta variant has higher transmissibility rate than any viral variant we cannot ever imagine. And this could be a very bad combination. It has some special features which permits it

to enter any defense immune system. This Delta variant has a number of mutations present on the spike protein, which protects the SARS-CoV-2 virus by covering in the form of crown like structure. The mutations present on spike protein alter the structure of spike which resulted in no binding of antibodies to the variants reported by Markus Hoffmann, diseases biologist in Germany. Delta variant is considered as a variant of concern by WHO as its potential to infect people very rapidly and its increased transmissibility among peoples to cause a serious problem.



Delta Variant and Its Mutation 'Delta Plus'.
Source*: https://www.thequint.com/author/559251/priyanka-rudrappa*

In a study of China, it is found that the viral consignment of Delta variant is around 1000 times more than the original COVID 19 variants among infected people with this variant. Peoples infected with Delta variant generate more viruses than those who infected with the novel strain of the virus i.e. SARS-CoV-2, and easily transmitted among peoples. It becomes the most dominant variant in all around the world since late 2020. In a study of U.K., where this Delta variant accounts for almost around 80-90% COVID cases, show symptoms almost similar to the different variants of COVID. The symptoms shown by people infected with Delta variants were not serious symptoms and common as Fever, headache, runny nose, common cold, cough etc. Other symptoms which were found uncommon are loss of smell, difficulties in hearing, gastric problems and also blood clots which leads to severe cell death. A lot of researches are going on the Delta variant and its severe infection with high risk of hospitalization and death.

Characteristics of Delta Variant

- **Highly Contagious**
  Delta variant is highly transmissible in nature or it can say that it is double than earlier variants of SARS-CoV-2 virus which cause the coronavirus diseases.
- **Constantly Mutating**
  The Delta variant of COVID 19 is constantly and rapidly mutating and these mutations are not good. It is a great concern that this variant evolves more with these mutations and increases its transmissibility, causing serious infection and diseases or can break the shield of COVID vaccines. Its transmission becomes easier due to mutation in the host cells.
- **Causes serious infection among non-vaccinated people**
  Delta variant causes serious infection and diseases among non-vaccinated people. According to a study conducted from Canada and Scotland, peoples who infected with Delta variant were hospitalized more probably than those who infected with other variants of COVID. And the maximum number of cases recorded in the hospitals were from non-vaccinated people
- **Non-vaccinated peoples become the cause of major concern**
  Those peoples who are expected to be infected more probably and are non-vaccinated is at a great risk of infected with this virus and can spread the diseases to others. Those peoples who are fully vaccinated and still they get COVID infection are recognized as breakthrough infections, which is not as much as in non-vaccinated people. Fully vaccinated peoples who are infected with Delta variant are with symptomatic breakthrough infections, those people can spread the virus to others. Although CDC (Centrals for Diseases Control and Prevention), collecting their data whether people who are fully vaccinated with asymptomatic infection can spread the diseases to other.
- **Fully vaccinated people infected with Delta variant and has breakthrough infections can transmit the virus to others for a shorter time**
  For earlier variants, peoples who were fully vaccinated and had breakthrough infections founds lesser amount of viral material than non-vaccinated people infected with the variants of COVID. And in people who were infected with Delta variants in both non-vaccinated or fully vaccinated, equal amount of viral material has been found. Although, as with earlier variants, the quantity of viral material might be reduced rapidly in fully vaccinated people than non-vaccinated people. It clearly shows that fully

vaccinated people will transmit the diseases for a shorter period of time than non-vaccinated people.

Transmissibility of Delta Variant

As we had discussed earlier in this chapter about the transmission rate of Delta variant is far more than other COVID variants and almost its double in rate. Transmission of this variant is more than 50% of alpha variant which resulted in easier spreading of this virus among peoples. According to an epidemiologist Benjamin Cowling in the Hong Kong University, that fusion of a large number of viruses and their small incubation period makes them highly contagious in nature. It is a valid explanation to justify the transmission rate of Delta variant. The complete amount of viral material in the respiratory tract of host means that its super transmission process to infect more people at a higher rate. The small incubation period of viruses makes them difficult to trace in individuals in different countries. **Contact tracing** is a process of finding all peoples who encounters the COVID patients and in contact with them for last one or two weeks. So, with the help of contact tracing, we can track infected peoples and isolate them. It is stated by Cowling that "Keeping all things aside, it's hard to stop Delta variant".

Prevention and Controls

The one such possible way to reduce or stop the transmission of Delta variant is to ready the people for proper vaccination and give them the advice of physical distancing, wearing masks, being isolated as much as can, proper handwash after touching anything outside and many more. The WHO officially permits the COVID vaccines to everyone and called it highly effective against the Delta variant to prevent the serious infection and sickness. It is utmost important for everyone to vaccinate himself/herself as soon as possible and if the vaccination comprises two doses, then fully vaccinate yourself by taking both dose of COVID vaccine against the COVID 19. It is the best way to protect yourself from any prior COVID infections.

Although, vaccines protect and prevent people from COVID variants, but no vaccine give hundred percent guarantee against the different COVID variants. Some people can affect with the Delta variant after being fully vaccinated himself/herself. This infection is called as breakthrough infection as we discussed earlier. Those few peoples who have been fully vaccinated and have COVID infection, are likely to show some minor symptoms. So even after fully vaccinated, you have to take extra care for yourself if you are living in a red zone area of COVID 19. You have to consult your doctor first, if you are facing COVID symptoms even after fully vaccinated. There are some prevention and controls against Delta or any kind of COVID variant:

- To prevent the transmission, you have to well-informed yourself first about this virus and diseases.
- Isolate yourself with others as much as can to avoid any kind of infection.
- Wearing masks in public area, regular handwash or using sanitizer after touching anything outside.
- Vaccinate yourself and follow the COVID guidelines.
- Practice respiratory decorum such as coughing into a bent hand and if you feel unhealthy then stay at your home and self-isolate yourself.
- Avoid travelling and unnecessary wandering and if go then maintain physical distancing with other.
- Use surgical masks like N95 which is good for health care, if available.
- Avoid sharing your personal things like pillow, bedsheets, hanky, glasses etc. if you are feeling unhealthy or sick.
- Avoid public transports, sharing bike ride, and taxis, if you are unwell.
- Always keep in mind that any person can transmit the diseases, even if they have no symptoms and they do not know that they are infected with COVID variant.
- If you have serious medical issue or severe infection, immediately consult your doctor and get tested.

COVID Vaccines Against Delta Variant

COVID vaccines have an important role in preventing the virus and diseases. No vaccine is 100 % effective against the Delta variant and some have breakthrough infection even after getting vaccinated. Virus can transmit from these vaccinated people with breakthrough infection to others but for shorter time period. But this virus can infect people at a greater speed in case of Delta variant. The area where there is shortage of vaccination or low vaccination is at higher risk of being affected with this Delta variant. Vaccination is the most important step to protect yourself, your family and relatives. Vaccination on large scale will decrease the transmission rate of the virus and prevent them to be develop in a new variant. CDC announces the

vaccination is necessary for the person have age 12-year-old or more than that have to vaccinated soon. It is reported that complete vaccination is helpful in preventing the risk of hospitalization and death but its ability to neutralize the effect of Delta variant is low when compare with the novel coronavirus. According to a report published in *Nature,* assessed that the Delta variant is sensitive against the monoclonal antibodies, healing serum and serum of antibodies formed after vaccination. A report resulted that N-terminal domain and receptor binding domain of any antibodies which is used as a defense system against Delta variant, binds with the domain of spike protein and leads to reduced binding and neutralize the Delta virus up to some extent. Spike protein of SARS-CoV-2 virus is the major mark for COVID vaccines and antibodies. Due to binding of antibodies or vaccine to their spike protein domain, resulted in neutralization of Delta variant infection. So, if mutation is arising constantly on spike protein, it changes the form of spike protein and it is ineffective against the serum of antibodies which is formed from prior variant. In response to the new mutation, a new antibody is formed to develop immune system against this new variant. However, Delta variant contains a combination of large number of mutations which is highly problematic and dangerous that is not recognized by normal antibodies.

Preventing Transmission is Important to Control the COVID Variants

If the virus is continuously and unevenly mutating, it evolves as a new variant every time. To stop the mutations of these viruses, and infections, we have to prevent the transmission of these variants. “The more they infect the people, the more they getting chance of mutating in them and the more they selected as the best mutated version of the improved virus” is said by Dr. Vaughn Cooper, ASM's Council Director and evolutionary biologist. So, it has to be stopped, this is the only key to controlling the new variants. And vaccination is the best way to contribute in this prevention.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Protection of rice with *Moringa oleifera* during critical economic conditions of Covid pandemic

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ABSTRACT

Rice is the staple food of India and research into rice, is crucial for the development of technologies that will increase productivity for farmers who rely on rice for their livelihood. The Covid - 19 pandemic has been affecting the entire food system and has laid bare its fragility. Closing of borders, restrictions of trade and confinement measures have been preventing farmers from accessing markets and selling their products. In this condition the storage of the food grains is the important matter of concern. Rice stored grains are continuously infested and damaged by its major pests like *Sitophilus oryzae* and others. The damage caused by the pests can reduce the nutritional and economical value of the rice, and this is a extensive dissipation for the economic conditions. The eco-friendly plant protectant *Moringa oleifera* was used as the bio protectant for the rice grains. The bio-insecticidal and repellent effect of *Moringa oleifera* leaves was assayed against the insect pest *Sitophilus oryzae*. *Moringa oleifera* leaves, showed 86.7% and 83.3% mortality against larvae after 6 days of exposure. After 10 days of exposure, 90% and 80% residual mortality was also obtained against larvae of *Sitophilus oryzae*. Repellency of 93.94% against *Sitophilus oryzae* adults was recorded. Larval damage on grains treated with *Moringa oleifera* leaf powder was as low as 3.33% and *Moringa oleifera* had the lowest LD50 of 21.71. So *Moringa oleifera* leaf powder as a good alternative for the control of rice insect pests and manage the damage to contribute in economy of India in this Covid - 19 pandemic.

Keywords: Rice, *Moringa oleifera*, Covid-19, Economic conditions.

INTRODUCTION

Rice is the staple food of India and research into rice, is crucial for the development of technologies that will increase productivity for farmers who rely on rice for their livelihood [1]. India is the major rice producing country and it produces 26% rice of the world, accounted for over 1.8 trillion Indian rupees in the Indian economy in fiscal year 2018 [2]. By seen through the nutritional value of rice it is used in meal as brown rice and white rice and many other rice forms are used for consumption eg. puffed rice, instant or rice flakes, canned rice, rice straw for cattle feeding. The Covid - 19 pandemic has been affecting the entire food system and in this pandemic trades are restricted so Indian farmers are unable to access markets and selling their products timely [3-7]. In this conditions of the long time storage, rice grains suffer heavy losses due to attack of insect pests like *Sitophilus oryzae* [8,9]. It has been reported that heavy infestation can cause a large scale losses to rice if insecticide is not applied. The risk of using synthetic insecticides to the environment, human health [10,11], and the emergence of new genera of pests resistant to that kind of drugs[12], have led to attention in natural compounds [13-16]. The study is aimed at evaluating the effects of *Moringa oleifera* leaf [17,18] against *Sitophilus oryzae.* and reduce the losses to support Indian economy in this pandemic situations of Covid-19.

MATERIAL AND METHODS

Site of experiment

Laboratory trials were conducted at the Department of Zoology A. N. D. N. N. Mahavidyalaya, Kanpur (U. P.) India.

Collection of plant leaves and powder preparation

Moringa oleifera leaves were collected from a local farm at Kanpur and air dried for 3 weeks under shade. The dried leaves were then pulverized into powder using a mechanical blender and the powder sieved with a mesh size of 710 µL to obtain fine powder.

Preparation
The plant powder (100 g) was weighed and put into a non-transparent reagent bottle and then dissolved in acetone yielding 90 µL/mL, 45 µL/mL, 22.5 µL/mL, 11.3 µL/mL, and 5.6 µL/mL respectively.

Collection and culture of insects
The eggs, larvae and adults, *Sitophilus oryzae* were collected from infested stock of rice grains using fine camel hair brush into petri dishes lined with filter paper. The collected eggs, larvae and adults were placed separately in plastic containers and the larvae provided with fresh rice grains until adults emerged. Adults that emerge were allowed to mate at random and provided with rice grains for oviposition. Eggs laid on grains were transferred into plastic containers lined with filter paper and covered until larvae emerged. The 1st instar larvae that emerged were fed with fresh rice grains until the next instars of F2 larvae from the population were then used for the assays. Insect colonies were established under controlled laboratory condition of (22-32°C & 68-85% R.H.)

Laboratory Experiments
Contact toxicity
Toxicity method was adopted described by Maa and Liao [19] with slight modifications. The various concentrations of the plant extracts were topically applied on 10 larvae using a pipette. After which the treated insects were then transferred into a transparent plastic container with rice grains. 10 adults in the infested grains were counted using a hand lens. After which the grains containing the adults were treated with the extracts and placed in a transparent plastic container lined with filter paper. Each treatment had 3 replicates with control. Mortality was counted after 24 hours. An insect was considered dead when it doesn't respond to probing using a blunt probe.

Residual toxicity
The method of Ogbonna et al. [15] was used with slight modifications. Rice grains were treated with various concentrations of the plant extract and placed in petri dishes lined with moist filter paper and allowed to air dry for 3 hours. 10 larvae were introduced into the petri dishes while for the adults, 10 Individuals were introduced. Mortality was counted after 24 hours. An insect was considered dead when it doesn't respond to probing using a blunt probe.

Repellency
Rice grains treated with various plant extracts and untreated were placed in lined petri dishes for each treatment. 10 adults and 10 larvae were introduced into separate petri dish and left for 24 hours. The numbers of adults and larvae found on the treated and untreated leaves were recorded.

Damage assessment
Damage in grains caused by larvae and adults were assessed by weighing the grains and infested grains and then scoring on a scale of no damage to total damage and then converted to percentages.

Data Analysis
Data collected from the laboratory were analyzed. Statistical designs was Complete Randomized Design (CRD). Count data were transformed into percentages and analyzed at 5% probability level. Probity analysis was also done and used to determine the LD50 of the different treatments while Mortality in the control was corrected using Abbott's formula[20].

No of survival in control - No of survival in treatment x 100 / No of survival in control

RESULTS

Contact toxicity effect of extract of *Moringa oleifera* leaves against *Sitophilus oryzae*.
After 6 days of exposure, the highest percentage mortality of 86.7% was recorded at 90 µL/mL while the least concentration of 5.6 µL/mL recorded lowest mortality of 16.7%. Control in both assay gave 0.00% mortality [Fig 1]. The analysis of variance showed that the concentrations were significantly different in both assay (ANOVA: F.pr < 0.001, P < 0.05). The mean separation showed that the highest concentration of 90 µL/mL of extract was significantly higher than the control. The LD50 and LD90 of extract were 21.71 and 110.69 µL/mL.

Residual toxicity effect of extract of *Moringa oleifera* leaves against *Sitophilus oryzae*.
After 10 days of application of the extract, the highest percentage mortality of 90% was recorded at 90 µL/mL while the least concentration of 5.6 µL/mL recorded lowest mortality of 10% [Fig 2]. Control gave 0.00% mortality. The analysis of variance showed that the concentrations were significantly different (ANOVA: F.pr < 0.001, P < 0.05). The mean separation showed that the highest concentration of 90 µL/mL of extract was significantly higher than the control.

Damage in rice grains caused by *Sitophilus oryzae* treated with extract of *Moringa oleifera* leaves
Rice grains treated with extract of *Moringa oleifera* leaf at the highest concentration of 90 µL/mL recorded a

damage of 3.33% while the least concentration of 5.6 µL/mL recorded the highest damage of 59.67%[Table 1]. Control recorded a 100% damage. The analysis of variance showed that there is a significant difference (ANOVA: F.pr < 0.001, P < 0.05) in the concentrations used. The mean separation showed that the highest concentration of 90 µL/mL was significantly lower than the control.

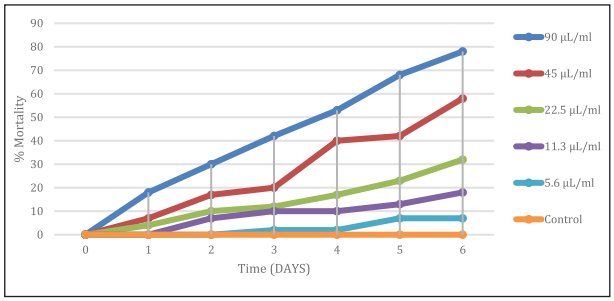

Fig. 1: Percentage mortality of *S. oryzae* after 6 days of exposure to extract of *Moringa oleifera* leaves.

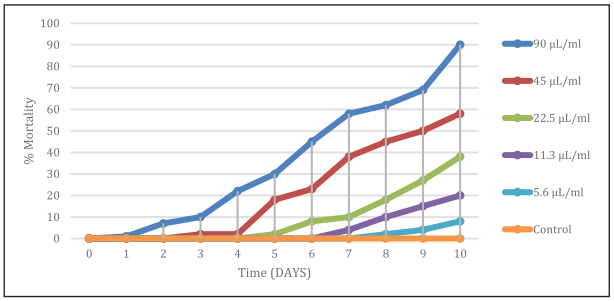

Fig. 2: Percentage mortality of *S. oryzae* after 10 days of exposure to extract of *Moringa oleifera* leaves.

Table 1: Percentage damage on rice grains caused by *S. oryzae* treated with extract of *Moringa oleifera* leaves.

Conc. (µL/mL)	R1	R2	R3	Mean % Damage ± SE
90	0.00	0.00	10.00	3.33 ± 3.33
45	20.00	20.00	30.00	23.33 ± 3.33
22.5	30.00	30.00	40.00	33.33 ± 3.33
11.3	50.00	60.00	50.00	53.33 ± 3.33
5.6	60.00	60.00	70.00	63.33 ± 3.33
control	100.00	100.00	100.00	100.00 ± 0.00

Table 2: Mean percentage repellency effect of aqueous *Moringa oleifera* leave extracts against *S. oryzae*.

Conc. (µL/mL)	Mean % Repellency ± SE
90	93.94 ± 6.06
45	58.12 ± 4.27
22.5	43.35 ± 5.93
11.3	27.78 ± 2.78
5.6	25.33 ± 4.53

DISCUSSION

The different concentrations of extracts of *M. oleifera* leaves showed some bio-insecticidal properties and repellent effect against *Sitophilus oryzae*. It was observed that increase in concentration and time led to increased mortality of insect. The high mortality recorded when extract of *M. oleifera* leave was used could suggest that more of the active ingredients found in *M. oleifera* are important for damage control. The result also suggests that the effectiveness of *M. oleifera* leaves depend on the concentration applied. Labh (2020) [21] also worked on *M. oleifera*. The higher concentration recorded higher percentage repellency and mortality when compared to lower concentrations. The extent of insect pest damage in rice grains and loss of weight in grains and were significantly reduced when treated with the different concentrations of extract of *Moringa oleifera* leave as compared to the control.

Repellency effect of extract of *Moringa oleifera* leaves against *Sitophilus oryzae.*

Mean percentage repellency increased with increase in concentration of the different extracts. The highest concentration of 90 µL/mL recorded a repellency of 93.94% while the least concentration of 5.6 µL/mL gave a repellency of 25.33%[Table 2] .

CONCLUSION

The study has proven the contact toxicity of extracts of *Moringa oleifera* leave against *Sitophilus oryzae* in the laboratory. Generally, it was observed that the highest concentration of 90 µL/mL of the extract was more significantly effective. It also showed the residual toxicity and repellency of extracts of *M. oleifera* leave, against *Sitophilus oryzae* in the laboratory. So the study

suggests that the *M. oleifera* leaf extracts can l protect the rice grains from *Sitophilus* oryzae and other insect pest that visits the stored rice grains thereby leading to increase in yield of rice grains. This management can prevent the staple food of India to be damaged and contribute in Indian economy and serving a plate to big population of India in this pandemic condition.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Impact of COVID-19 on Environment Health: A Boon or Bane

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ABSTRACT

The new Coronavirus disease is also known as COVID-19 is communicated globally in an exceptionally brief timeframe, as it was started from Wuhan city of China in late 2019. To lessen the conceivable impact of COVID-19, a lockdown exercise has been applied in numerous nations like China, India, Italy, Spain, Brazil. Power plants and offices had to shut down their functioning during the covid-19 pandemic. Private and open transportation usage also diminished remarkably. This incited a lessening in the concentration of Nitrogen dioxide (NO2), carbon outflow, and particulate material that have a diameter of less than 2.5µm particularly in regularly smoggy cities like Delhi in India, and due to there is a huge improvement in the nature of air. Water bodies have been cleaned and the streams Ganga and Yamuna have seen a huge improvement. Apart from the positive effect on nature, the novel coronavirus has additionally created a negative effect like reduction in the reuse of things which leads to the water as well soil pollution. More visible reduction of air pollution remains to be seen if the lockdown remains prolonged. Nevertheless, such a reduction is expected to be temporary because the levels are likely to go up again once the circumstance gets back to normal. Nature has given enough time for everyone to think over this.

Keywords: COVID-19, air quality, waste, positive effect, contamination.

INTRODUCTION

A new contagious respiratory disease (COVID-19) emerged in Wuhan city of China in December 2019 (Gautam and Hens 2020). This disease is named after its causing agent named Severe Acute Respiratory Syndrome Corona-Virus 2 (SARS-CoV-2). This virus has high transmission efficiency due to which it spread to different corners of the world in a very short time. Along with high transmission efficiency, the death rate of the Corona novel virus also enough high to create a panic in the whole world. Due to an exceptional increase in COVID-19 cases, World Health Organization (WHO) has pronounced the COVID-19 infection as a 'worldwide emergency' on 11 March 2020. Before the end of March, the administration of different nations put their nations on lockdown to lessen the possible impact of the novel coronavirus (COVID-19). Till the beginning of June 2020, 215 nations are influenced by coronavirus illness having more than 6.2 million cases, with 374,229 approved around the world (WHO 2020). In India, the first COVID-19 positive case was reported in January 2020 and till today, more than 10 million cases of COVID-19 are recorded in India, and in the world, this number reaches more than 100 million. This pandemic had badly affected the whole world in all fields. Due to high transmission efficiency, people are put quarantine and are advised to maintain social distance which affects the world socially. This pandemic also affects our society economically, a large portion of people lose their jobs. Moreover, this pandemic also disturbs our education system. COVID-19 also affected our world ecologically but it influenced nature in both positive and negative ways. Under the positive impact, COVID-19 helps nature to regain its original form like it helps to minimize both air and water pollution. But this pandemic also negatively impacts nature. During this pandemic period, medicinal and plastic waste increase which causes both soil and water pollution. This pandemic also affects people mentally. During this period, different companies and factories are closed due to which the world's economic status disturbed. So, conclusively, this pandemic affects the world economy negatively but for nature, this period affects nature more positively in comparison to negative.

Positive effect

The overall confined human exercise with nature during this COVID 19 crisis time has appeared as a heaven for the earth. After the episode of COVID-19, ecological

boundaries like ambient air and water quality in streams are re-establishing. The wildlife is sighting in the sky and mother earth is going to its unique state. India has consistently been a center point of pollution with an enormous population and polluting industries. This prompting high air quality value record (AQI) in every single significant city. Delhi is considered among the most contaminated megacity dependent on the earth's execution record (WHO, 2016). For the last numerous years, a particulate matter 2.5 obsession is recorded incredibly excessive in Delhi and this is far past beyond what many would consider possible as demonstrated by National Ambient Air Quality Standards(Mohan and Kandya,2007; Kumar et al., 2017). Many serious health problems occurred due to the high-intensity air contamination (Heal et al., 2012; Dholakia et al., 2013) like respiratory and lung diseases, pneumonia, and intense asthma, and so on (Rizwan et al., 2013). The Indian Council of Medical Research has proclaimed the society's well-being crisis for the National Capital in 2017 due to the general prosperity crisis (Chowdhury et al., 2019). In any case after lockdown action due to COVID-19, the nature of air has begun to improve. Air contamination across various cities particularly in New Delhi decreased to half. Air contamination over northern India has recorded a 20-year-low for this session (NASA, 2020). There is a decline in the assembly of nitrogen dioxide (NO2) and Particulate Matter that has a size of under 2.5µm in the principle urban zones (ESA, 2020; CAMS, 2020,). The climate specialists foresee that ozone-depleting substances like greenhouse gas discharge could drop to a degree (Global Carbon Project, 2020). It in general showed positive impact on environment (Verma and Prakash, 2020; Kumari and Shukla, 2020; Roy and Chaube, 2021).

Apart from it, during this pandemic period, total CO2 emission also decreased due to strict lockdown guidelines imposed by various countries. Due to strict lockdown guidelines, factories and companies are closed, and also a reduction in vehicles is observed. Along with it, fewer cases of burning of waste material in open-air were observed. According to a report by Statista, in the year 2020, there is a drop of 6.3% in the carbon dioxide emission as compared to the previous year. A maximum reduction in CO2 emission is reported in Spain, where a nearly 15% decrease is observed. In India, an 11.7% decrease in carbon dioxide emission is observed. This data shows that during this pandemic period, low CO2 is released into the air which leads to better air quality and low air pollution

S. No.	Country's Name	% Change in CO2 emission (as compared to 2019)
1.	Spain	-15.7
2.	United State	-13.1
3.	India	-11.7
4.	Germany	-11.4
5.	United Kingdom	-10.9
6.	Italy	-10.3
7.	France	-10.3
8.	China	-1.4
9.	World	-6.3

Source: Carbon Monitor *as of 30 September

Source: https://energy.economictimes.indiatimes.com

Other environment-related parameters e.g., water quality in the stream have begun offering a positive hint towards reinstating. For many years, government authorities and environmentalists have been trying to clean up Yamuna and Ganga river. The greatest activity, 'Namami Gange' was propelled in June 2014with a financial plan of Rs 20,000 crore to revive the National River Ganga. Aside from various projects and funds, the Ganga still runs debased. However, the progressive lockdown activity in India due to the outbreak of Coronavirus has turned out to be a boon for the polluted environment. As indicated by continuous water observing information of the Central Pollution Control Board (CPCB), the water of the Ganga was found clean after many years which is deserving of washing and propagation of untamed life and fisheries. Nature has cleaned the waterway all alone because of Less man-made exercises.

The tourism sector is a growing business that influencing the world both economically and ecologically. This sector provides job and financial help to a large portion of the population but if we see its ecological influence it causes a great threat to the world ecosystem by damaging both animal and plant diversity. It causes a different kind of pollution due to increased human trafficking. These tourists throw their waste in the open that result in both soil as well as water pollution. But due to the COVID-19 pandemic, the tourism sector is badly affected economically. But if we consider ecological factors, it is like a golden opportunity for these tourist places to restore themselves. A great decrease in tourist number is observed in the last year in the months from March to December. This results in a reduction in water and air pollution that is ecologically favorable for our earth. According to a report of the United Nations World Tourism Organization (UNWTO), a nearly 72% decrease in international tourist travelers was reported in a month from January to October 2020 as compared to last previous year in the same duration. Only in the Asia continent, a decrease of around 82% is reported in tourist arrival.

International Tourist Arrival			
S. No.	**Region**	**% Change arrival (in comparison with the previous year)**	
		2019 (Jan. – Oct.)	**2020 (Jan. – Oct.)**
1.	Europe	+3.9	-68.5
2.	Asia and the Pacific	+4.1	-82.3
3.	Americas	+1.5	-67.7
4.	Africa	+2.0	-68.6
5.	Middle East	+8.3	-73.4
6.	World	+3.7	-71.9

Source: World Tourism Organization (UNWTO)© *Provisional data

So due to this reduction in tourist arrival, water sources and air quality of these places improves to some extent.

Noise pollution in its simplest definition is described as the undesirable sound that is produced by any of human activities like transport or industry etc. Before this pandemic, this type of pollution was common in human life that has some impact on human health as any other pollution like water or air pollution. More predominantly this pollution affects human mental health which causes diseases like stress, anxiety, heart disease or auditory disease, and even loss of hearing ability. During the COVID-19 pandemic, a decrease in personal as well as commercial vehicles are observed due to lockdown restrictions all over the world which results in a reduction of noise pollution. Along with it, noise pollution due to crackers during festivals, marriage, and sports celebration, also reduced significantly. It also improves the air quality. Loudspeakers, used in marriage functions and other functions, are also reduced during this pandemic. All these factors help to lower noise pollution. This reduction in noise pollution results in the better mental health of people also helps to maintain their concentration power.

Negative effect

Apart from the constructive outcome of the environment, the new coronavirus generated the negative one. All the ecological results of the emergency have not been sure. Extreme cuts in horticulture and fishery trade levels have prompted the age of natural waste. This waste is left to spoil, levels of methane (CH4) discharge, ozone harmful substances are dependent upon to increase in the pandemic emergency. The age of inorganic and natural

waste is increased by a wide range of environmental issues for example air and water contamination, soil disintegration, and deforestation (Mourad, 2016; Schanes *et al.*,2018). Waste reusing has always been a genuine natural issue for the entire world (Liu *et al.*, 2020*).* Reusing efforts an effective and common way to decrease pollution, preserve biodiversity (Varotto and Spagnolli, 2017; Ma *et al*., 2019). The Volume of unrecyclable waste has altogether risen. During the pandemic crisis, most of the nations have quite reusing programs in a portion of their urban areas, as experts have been stressed about the danger of COVID-19 outspread in reusing focuses. Single-utilize plastic items, in the line of sight over ecological worries in recent years, are the endeavors to stop the spread of the infection. Numerous restaurants won't utilize reusable cups during the COVID-19 pandemic crisis because of the danger of spreading COVID-19.

To forestall the spread of coronavirus diseases clinical waste is rising. Healthcare facilities utilize explicit sorts of clinical supplies, including dispensable veils and gloves, which have caused a fast increment in biomedical waste. While this is a significant measure during the crisis to forestall the spread of COVID -19, it adds to the plastic waste issue. A huge number of gloves and veils being utilized at that point discarded after everyday use on streets and agribusiness land. During the episode of COVID -19, Wuhan's Hospitals conveyed an ordinary of 240 metric huge amounts of clinical waste every day, which is a six-fold increase. Masks, gloves, hand sanitizer bottles, and other coronavirus waste being found on our seabed and washed up on our beaches (Calma, 2020).

CONCLUSION

COVID-19 is a worldwide pandemic and genuine threat to human wellbeing which terminates financial activities while contamination is reducing and nature is recouping itself. Mother earth is going to its unique state. COVID-19 has drastically reduced anthropogenic activities on the environment, but also add its cup. It will make both constructive outcomes and negative aberrant impacts on nature. The face masks made of propylene; the personal protective equipment used by health persons during the pandemic are all plastics. Plastic stays in the environment for a very long time, which is hazardous to the environment. The positive effect on the environment might be transitory. Earth is, by all means, regains during COVID-19 lockdown but the effect on waste stays a worry. A couple of years prior, districts and organizations have made move to decrease single-use plastics. In the view of the COVID-19 pandemic, those undertaking are being eased back, as the interest for filtered water, face covers, hand sanitizer essentially increases. After COVID-19, we have to comprehend that a developing economy needs to regard the conveying limit of nature.COVID-19 pandemic is an emergency that influences everybody.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Physical distancing and Psychological Impacts of COVID-19: Challenges and its Response

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ABSTRACT

COVID-19 is the major problem in the whole world since last two years that completely shrink the human health as well as world's economy. It is a contagious viral disease caused by SARS-CoV-2 and its first case was found in China in December, 2019. In the last two years this disease spread in nearly all parts of the world and till today more than 30 million cases are recorded overall. Countries like USA, India and Brazil are major impacted by this disease due to high spreading nature which results in lockdown in all corners of the world. It is transmitted from one person to other person through air via sneezing, coughing etc. which accounts for its high spread nature. Therefore, to control the spread of this disease, not only medical treatment but social awareness is also important among the people. So along with the use of mask and sanitizers, it is also advised to maintain the maximum physical distance from one another so that its transmission can be control. But this creates a problem in a dense city like Delhi, Mumbai and California where people have don't enough space to maintain proper physical distance. Apart from its impact on health and economy, it also affects the psychological thinking of people. During the initial days of lockdown, it helps the people to get some psychological stability because people get some time for their family and loving one, which they can't afford in normal busy schedule, but after some time it starts to affects the people's psychological behavior because they can't go outside and live their normal lives. They have to spend the time inside the house which feels like a bird captured in a cage. Longer lockdown creates frustration, anxiety and tiredness among the people which starts to affects their mental health as well as their social behavior. Student and adult society are most affected by this psychological disturbance because they continue to their normal social life. People start to spend their lot of time at online sites which is also a major reason for their stress.

Keywords: COVID-19, lockdown, physical distance, psychological behavior, transmission.

INTRODUCTION

COVID-19 is an airborne disease that spread via air from one person to other person through sneeze, coughs or direct contact. It is caused by the SARS-CoV-2 (Severe Acute Respiratory Syndrome Corona Virus 2). Due to its very high spreading rate, a huge number of people got infected by this disease. First case of COVID-19 was believed to be detected in the Wuhan city of China, in December, 2019 (Ghosh *et al*., 2020) and till date it spread to nearly all countries of world. According to latest data, more than 30 million cases are recorded in the world overall and also spreading rapidly. In India, first case of COVID-19 was recorded in Kerala in January, 2020. Due to high spreading nature, most of countries announce lockdown to control its spread which affects people both economically as well as psychologically. Different methods are discussed at both global and local level to reduce the spread rate like use of mask, sanitizer and vaccines. Apart from these, social distancing also reported as an important method to control the transmission of COVID-19 from one person to other. Physical distance is applicable in rural area or low-density cities but in the high-density cities, people are not able to maintain it, due to which it becomes very difficult to control its transmission at community level.

COVID-19 affects the people both economically as well as mentally. It builds up a psychologically pressure on private employers and student sector due to lockdown. A huge numbers of people loss their job due to low economy that cause stress in them. Along with economical impacts, people also going through mental stress and depression which result into lower productivity. This pandemic also

increases the medical waste like syringe, mask and others due to single time use. Apart from the negative impacts, COVID-19 pandemic also has a number of positive on society and environment. Due to this pandemic, people find some time to spend with their loving ones. It also has a positive impact on environment because due to lockdown their factories and manufacture companies are closed as well as, there is also very less traffic on road which reduces all kind of pollution like water pollution, air pollution and noise pollution (Venter *et al*., 2020). So we can say that pandemic has improves the both water as well as air quality at global level. In overall it can be said that at the individual level, pandemic has more negative effect but if we talk about at global level or ecological level, it has some points also.

Corona virus can spread through different means including cough, sneeze or close contact, due to which it is necessary to take precaution to stop its transmission from one person to other. On infection, different body organs are affected by this virus, out of which lung is most affected organ. This is because of the reason that corona virus has spike structure on their surface, that are glyco-proteineous in nature which bind to the ACE2 receptors, present on alveolar region of lung (Letko *et al*., 2020). Apart from lungs, nose, respiratory tract and throat also got affected which results into severe condition of patients. Along with all these, its symptoms are also reported in gastrointestinal, nervous and cardiovascular systems (Gu *et al*., 2020; Zheng *et al*., 2020; Pezzini and Padovani, 2020). Different symptoms of COVID-19 disease are listed below:

- Sore throat
- Headache
- Body pain
- Fever
- Cough
- Loss of senses like smell and taste
- Runny nose

To stop this transmission and control this disease, different preventions are advised which helps control it. Different medical methods are discussed like proper use of mask, hand sanitizer and vaccines. But along with these methods, some social awareness about this disease also required to make people aware about the seriousness of this disease and to discuss the spread and control means of this disease. Different methods to prevent its spread are discussed below:

1) Proper use of mask: Masks are uses to cover the mouth and nose part and as we already discussed, corona virus spread from one person to other person via air droplets, so it is a good option to control its spread. But due to lack of awareness, people ignore the use of mask which is not a good sign, so it is necessary to make people aware about its use; also it is also necessary for government to make it compulsory in public place.

2) **Use of sanitizers:** Sanitizers are also a good method to control this disease from transmission. Corona virus also transmitted through handshaking, so use of sanitizers to clean hands before handshaking prevents its spread.

3) **Avoid physical contact:** Physical contact with infected person is considered as major reason for the spread of this virus. So, it is necessary to maintain a minimum distance from infected person and avoid any kind of physical contact with them.

4) **Vaccine:** Vaccines are the means to boost the immune system against a particular disease. In a very short period of time, a number of vaccines are synthesized to boost our immune system against corona. Covishield and Covaxin are the vaccines which have a high efficacy rate and in many countries, it is most important tool to control disease spread.

5) **Awareness:** COVID-19 pandemic also affect the people mentally along with the physically. A number of myth are there among the people for this disease which cause unnecessary fear among the people, so it is required to make people aware about the facts and to educate them, especially in rural region.

6) **Physical distancing:** It is most important method to control the spread of this virus because in the crowded cities like Delhi and Mumbai, people are not able to maintain a proper distance which results into high spreading. To maintain a minimum social distance, government also announces lockdown so that people do not comes out of their houses and this spread of virus can be breaks.

7) **Avoid sharing:** Sharing of clothes, hanky, and towel also spread virus from infected person to non-infected person. Because corona virus spread through droplets form, so during sneezing and cough, these personal things become infected with viruses and can be

transmitted to other person. So, to restrict transmission of virus, it should be avoided the use of other's things.

8) **Consult with doctor:** There are a number of rumors and myths about corona virus and this pandemic. So to avoid such things, people should consult with doctor before using any kind of medicine or home remedies.

9) **Yoga and meditation:** Yoga and meditation also seems to be effective in stress relieving and maintaining a positive mindset during COVID-19 pandemic (Sahni *et al*., 2021).

In this way, there are a number of method through which we can take a control on disease spread at large scale. It is necessary that people think about these points and should follow the guideline to control this pandemic.

Physical Distancing: An important tool in COVID-19 Pandemic

It is most advisable thing that is discussed during this pandemic because to avoid the transmission of corona virus from one infected person to other non-infected person, it is advisable that people should maintain social distancing from one other. According to Centre for Disease Control and Prevention, we should avoid a travelling or visit to a crowdy place during pandemic. They also suggest that we should also maintain the physical distance of minimum 6 feet from each-other at a public place. An infected person should also maintain physical distance from its friend-circle and family people. This method can be easily adopted in less populated cities but in a high-densed cities, where people does not have enough space to live and work, this method become very difficult of follow. It becomes a great challenge for the people of these cities to maintain the physical distance from each-other. To imply the social distance different advisories are given by the government, out of which some are given below which, can helps people to maintain physical distance (As per the guideline of Ministry of Health and Family Welfare, Government of India):

- Avoid gathering of people at marriage or any celebration function.
- Follow social distancing in public transport like bus or train.
- Avoid working of complete staff or workers at office or factories.
- Maintain social distance at shops, markets and malls.
- Masks are compulsory at public place.
- Closure of school and universities, gyms, social and cultural temples etc.
- Postponed any political, social, cultural or educational programs to avoid gathering of many people.

As we discussed, physical distancing helps to control the spread of disease but it also has negative impacts on people's life, as well their mental state. Human is a social animal and for its survival it depend on other people along with other animal. But in this pandemic period, people become physical distanced from other people and they can't move out due to lockdown restriction. Due to these restrictions, he become caged in their house which builds up a mentally pressure on them. Psychological impacts of COVID-19 and physical distancing are also discussed, later in this chapter. In the crowdy cities like Delhi, Mumbai and others, social distancing become a basic need to control the spread of virus, because in these cities people does not have enough space to follow the physical distancing guidelines. According to the data of Census, 2011, population density of New Delhi is around 4,000 people per km^2. So, in a city like New Delhi where a large portion depends on daily income, it becomes very difficult to maintain physical distance.

Apart from the problem of space, physical distancing also leads to mental disturbance, negativity and loneliness in some people due to lack of communication. It als o leads to domestic violence. Due to the reason of physical distancing, lockdown is forced into maximum region of world. Because of lockdown maximum universities, schools, companies, factories and private offices are closed. Closure of school put a negative impact on the life students as well teachers because they are not able to continue their study. They have to depend on online study to complete their studies due to which they spend a lot of time on social sites and mobiles. Daily workers are not able to go to factories and companies due to their financial state became very poor.

But if we see the positive impact of physical distancing, people become socially close to each-other. It also creates a lot of opportunities for the people on internet. People become more familiar with the use of internet. Online education become a basic need in this pandemic due to which it is a good opportunity for individual educator and teacher to show their ability through online platform and to enhance the reach of their skill to maximum people. Employees can also work from home in this pandemic due to which it becomes easier for them to maintain their professional as well as social life.

This COVID-19 pandemic also gives a lot of opportunity to the new entrepreneur to start their own new business on online platform. People starts to move from offline market to online shopping which create new options for the app developers. Along with this, online transaction also sees a huge rise in this pandemic period. According to a report of United Nations Conference on Trade and Development (UNCTAD), due online purchasing and selling of goods and services, share of e-commerce at global retail trade increases from 14% to 17% in 2020 in last three years. So, on seeing both positive and negative impact of physical distancing, it can be concluded that it have has both type of impact and it moves the society from offline to online platform.

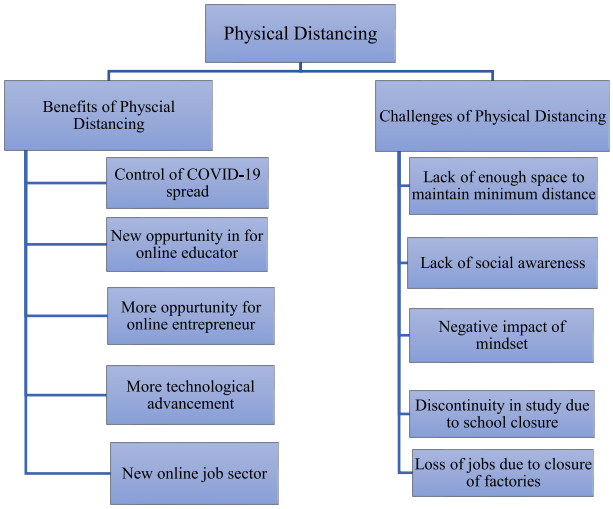

Fig. 1 : Physical distancing: Benefits and Challenges.

Psychological impact of COVID-19 Pandemic:

As we already discussed in this chapter, COVID-19 pandemic has both negative and positive impact on the social as well as economical life of people, it also affect the people psychological. In the psychological way, it has both bad and good impact on human mentality. If we talk about the initial phase of COVID-19 pandemic, lockdown was imposed in different countries of world, including India. During this starting phase of lockdown, if we talk about the psychological side, it has some positive impact on people. This is due to the reason because in this lockdown people get the time to spend with family and loving ones. People start to work through online mode due to which they get some extra time to spend with their family which they can't afford before the pandemic period because of their busy schedule.

But these facts are true only for financially stable families, on the other side; it has a very bad psychological impact on those people who are doing small business or those who does not have permanent income source. These include vegetable seller, fruit seller and other who work at small scale to earn their income. COVID-19 pandemic has bad impact on psychology of these people, because they are worried to get food and other necessary daily-use item for their family. Due to these points, these people get depressed and anxiety. It has very bad impact their mentality which also affects their behavior as well as health.

If we talk about the student community, this pandemic most badly affect their life psychologically. Due to lockdown restriction, schools are closed, because of which many students are not able to continue their study. Due to pandemic, most of schools moves to online teaching platform, but not all students can afford it due to their weak financial state. Student gets depressed because of which they can't continue their study (Islam et al., 2020). Students lost their valuable period of life which is also a reason of anxiety for them. Many students left their schooling in midway because they have to support their family in this pandemic period. Pandemic also have some positive effect on educational society because it moves the educational system from offline platform to online mode. Now student and teachers are become aware about the new technologies which improve their knowledge and also gives them more option to study.

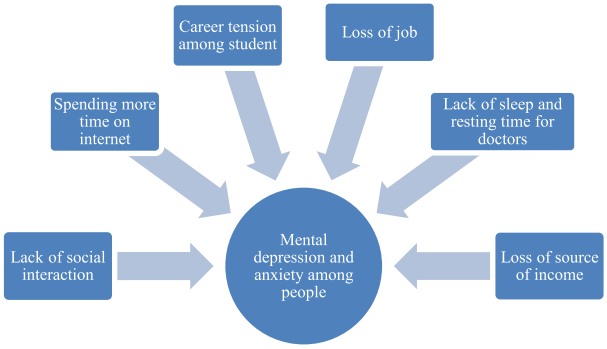

Fig. 2 : Reasons for mental stress and depression during pandemic.

In this pandemic, doctors and nurses are arises as most influenced profession out of all. They work day and night to control this pandemic. But in this pandemic time, their life gets badly affected. At many places, they also physically assaulted which hurt them both physically as well mentally (Ghosh, 2018). At many places, they are also verbally abused and threatened. Reason for these kinds of attacks includes false information, fear and anxiety about corona virus as well as lack of trust on health workers. This kind of incidence has a bad effect on

psychology of health which also affects their working productivity (Iyengar *et al*., 2020). They does not get enough time to sleep and rest which make them mentally tired which is major reason for depression and anxiety. So, it is necessary to take care of these health workers because they are the main pillar that works with their best to control this pandemic.

In this period of time, due to lack of physical communication with others, people starts to spend their maximum time on social sites and internet. Internet becomes an essential part of today's worlds but people also wastes a lot of their productive time on this platform. Due to spending most of time on social sites, people now get disconnected with their family and relatives. Now every person has their own personal and social life which affects their social behavior. People do not have good communication with their own family because they can't spend enough time with them. In this pandemic, spending much time on these sites also make them more aggressive and anger. It also makes them to feel more loneliness and depressed which ultimately affect their social behavior and work (Morrison, 2017). Teenager is most affected group of society due to this pandemic effect.

In this way, we can conclude that this pandemic affect the people life badly mentally. It increases the cases of depression and anxiety in population. People are mentally tired and feel lonely. People are worried about their future and health due to corona virus and pandemic. It affects the study as well business of people, which make them mentally disturbed. So in this period of time it is very important to care of mental state. Following method can helps to reduce the mental disturbance (CDCAP):

- Spend more time with family.
- Exercise regularly.
- Take break from reading or watching news channel.
- Do not believe on misinformation and rumors.
- Try meditation and yoga.
- Eat healthy and balanced diet.
- Regularly consult with doctors.
- Try to do other activity to divert mind from pandemic.

Summary

COVID-19 pandemic affect the people's life badly both economically and mentally. Also it has some positive impacts, but on a conclusive manner, it has more negative impact on society. In this pandemic period, people are gets physically distanced from each-other which leads to lack of communication, that is also a reason for metal disturbance. Along with this, physical distancing is also problem for poor countries which does not have enough medical and residential equipment. COVID-19 pandemic also affect the people psychologically. Due to lack of social interaction and spending more time on internet, people are affected by depression and anxiety. Apart from it, tension about career and health are also affects their mental state. So in this during this period of pandemic, it is necessary to take care of physical as well as mental health.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Challenges and Opportunities in Education Sector during Pandemic Period

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ABSTRACT

Education is the basic need in the modern time which strengthens moral and ethical values in any society. Education is the mean which not only helps people to get some degree or jobs, but it is more than that. It provides a path to people to live their life, to be a responsible person in their society and to make this planet a better place. Since the many centuries, education has been a part of our lives and many ancient records and manuscripts are present which describe the presence and evolution of educational centres like gurukuls, in past history. Even in the modern time, education is the main pillar of any country which defines the current as well as future vision of that country. But since the last two years, education sector has been badly affected by COVID-19 pandemic. It shrunk the traditional culture of education and shifted the teaching method from offline interaction to online mode. For a developed country, this impact is not too much, but for an undeveloped country or a developing country, this pandemic badly affected their education structure. In these countries, resources are not available to all students to continue their study via online method. Due to this reason, a large number of students had to leave their study in the middle to do some work for their family due to economic crisis. But on the other side, this pandemic also opened a number of new opportunities in the educational sector. It helped in modernization of the old education system, because new technologies have been implemented in education to enhance its reach to maximum learners. It also gives an opportunity to those educators who are not previously linked to any recognized institute, to show their efficiency. This also increases the content or subject material available for the students to enhance their productivity. So, we can say that this pandemic has negatively impacted the educational sector but it also opened up a large of opportunities for the people.

Keywords: COVID-19, education, opportunity, students, technology.

INTRODUCTION

Education is the main sector of the economy in the country, on which the future of students depends. It helps people become better citizens and may show the difference between good and bad. But since the last two years, education sector has been badly affected by COVID-19 pandemic. The global outbreak of this pandemic has spread all over the world; negatively affect mostly all countries. The outbreak was first recognized in December 2019 in Wuhan, China. The countries across the world advised the public to be very careful. Community care strategies have included handwashing, wearing masks, physical distancing, and avoiding mass gathering. Isolation and stay-at-home strategies have been introduced as necessary actions to flatten the curve and control disease transmission (Sintema, 2020). The education is one of the sectors globally severely affected by this outbreak. The sudden closure of educational institutions because of virus has prompted the authorities to adopt replacements to traditional learning methods in difficulties to confirm that students are not left without studying and to avoid the spread of the epidemic. The traditional teaching method has now been replaced by computers, i-pods, mobiles, smartphones, tablets, etc. which have transformed learning method. Information and communication technologies have easy the learning process through the development and management of online content. Almost all schools and colleges around the world had to stop face-to-face education and more than two billions students were forced to continue their studies online.

Most countries were neither prepared for this crisis nor ready for effective online learning. The research work was also hampered badly. The closure of universities and colleges, not only affected students, teachers and their families, but also created social and economic problems around the world. The formal education with the support of electronic resources is called as e-learning. With the spread of the virus, traditional learning system had been changed by e-learning, as public assemblies in educational institutes were seen as an chance for the virus to spread and so prohibited by authorities. Although this is a unique situation in the history of education, virus had formed many opportunities to move out of the difficult classroom learning system into a new era of digital system. It was used as an opportunity to train existing teaching staff to adopt the advanced technology and develop technologically advanced institutions to enhance digital learning in the future.

The next challenge was to conduct examinations. Due to the evolving situation of the pandemic, it was problematic to conduct exams in the month of May/June, 2020 and even after that. Another problem with the online exams was that all students were not connected to online mode. A large number of universities in the world conducted exams by offering several choices such as online, offline, blended or other alternative forms of examinations. In this regard, the University Grant Commission has authorized examinations for the final year of undergraduate and postgraduate students across the universities and colleges in India. The main goal was to keep students busy through online interaction. It was difficult to find one acceptable digital platform for this interaction. All available digital platforms were used depending on the availability and knowledge of the teachers and students. It was challenging for all teachers and students to practice online teaching-learning during the pandemic period. Despite the best efforts of universities and colleges, there are many complaints from students. About 30% students complained of not having the internet access and the device (computer/smart phone) for online learning. As stated, while online teaching method seemed to be the finest way of learning in pandemic period, but this change was not possible in some rural context because of the lack of connectivity (Dube, 2020). Therefore, even if the teachers are willing to get trained in online instructional tools or want to take up any learning initiatives, their students would face difficulty in receiving online mode of teaching because of connectivity problem which could ultimately limit the benefit of online education.

Universities discontinued face-to-face learning and recommended online learning method (Crawford *et al*., 2020). Many universities have frozen exchange programmes, internships, trainings and project works and have offered alternatives in the form of online activities. This is a force requirement under lockdown due to pandemic outbreak, but cannot be continued in some courses. The universities may consider to temporarily discontinuing courses with few students and reducing the number of elective courses. Alternatively, the curriculum can be split into online and offline modes to restrict student entry to the campus on a large scale. It will also reduce the workload for both students and teachers. COVID-19 has given us a challenge, which may be turned into opportunity through proper planning in colleges and universities. A number of changes in colleges and universities are expected to take place in the future. Compared to developed countries, developing countries have been found to face many problems in e-learning method such as poor network connectivity, not proper knowledge about the communication technology and poor content development (Aung and Khaing, –2015). In developed countries, e-learning method such as videos and many innovative technology is not so familiar to many educators, even at the level of higher education level (Aljawarneh –2020; Lara *et al*., –2020; Lizcano *et al*., –2020). It has been contended that students who use online method as learning, are not so much participate in joint educational activities, consultations with others, and connections between students and teachers, compared to their counterparts in face-to-face settings (Dumford and miller, 2018). Shuey (2002) discussed the challenges that university educators face in adapting to the online setting without any negative effect on content knowledge and connections between students and teachers.

At the start, the teachers and the students did not know how to handle this situation of sudden crisis that forced the educational institutes to be closed. But later, lockdown has taught how to cope with such COVID-19 pandemic. Due to COVID-19, many challenges and opportunities have been formed in educatio nal institutes to support their technological knowledge and infrastructure (Pravat, 2020). The lockdown has given a hope for educators to continue their education by online method. The teachers interact with students via internet, delivered lectures through live video conferencing by different Apps like Zoom, Google meet, Microsoft teams etc. Changes and challenges can be turned into opportunities that will provide quality education during this indefinite period.

Negative impact of COVID-19 on education

Due to COVID-19 outbreak, education is the most negatively effected sector and some of them are as below (Jena, 2020):

- **Learning activity disturbed:** Classes have not been going regular and exams at various levels have been postponed. Boards have postponed the annual exams and admission tests.
- **Effect on employment:** Most recruitment has been postponed due to the pandemic. Placements for students may also be affected with companies. Unemployment rate was increased due to this pandemic. In India, there is no recruitment in Govt. sector and fresh graduates fear withdrawal of their job offers from private sectors due to the current situation. As unemployment rises, education gradually declines as people struggle for food rather than education.
- **Untrained educators for e-learning-** Not all educators are good at it or at least not all of them were prepared for this sudden transition from face to face learning to online learning. Most of the teachers just give lectures on video platforms such as Zoom, Google meet etc. which may not be real online learning without any dedicated online learning platform. The major obstacle in the implementation of online teaching is the resistance in redesigning the course by the existing teaching staff. This is mainly because most of them are not familiar with technology and have found it very difficult to change existing practice.
- **Reduced global employment opportunity-** Some may lose their jobs in other countries and the passed out students may not get their job outside India due to travel restrictions caused by this pandemic. Many Indians returned home after losing their jobs overseas due to COVID-19. Hence, the fresh students who are likely to enter the job market shortly may face difficulty in getting suitable employment. Many students who have already got jobs through campus interviews may not be able to join their jobs due to lockdown.
- **Increased parental responsibility for educating their wards:** Some educated parents are capable to teach but some may not have the sufficient education level to teach their children in the home.
- **Loss of nourishment due to school closure:** School meal programme of the Government of India i.e. mid-day meals which is aimed to provide better the nutritional food to school-age children across the country. The closure of schools has serious implications on the daily nutrition of students as the mid-day meal schemes have temporarily been closed. Various studies have shown that mid-day meals are also an important factor for increased enrolment in the schools.
- **Access to the digital world:** Since many students have poor or no internet access and many may not have enough money to buy computer, laptop or supporting mobile phones, so online learning may form a digital division between students. According to various reports, the lockdown has great effect on poor students in India as most of them are not capable to study online,. Thus the online method during pandemic may increase the gap between rich and poor.
- **Access to global education**: Education sector has suffered a lot due to the pandemic. Large number of Indian students studying at abroad universities, specifically in worst affected countries by COVID-19 pandemic, has to leave those countries and if this happen continues, in the long run, demand for international higher education will decline considerably.
- **Delayed fee payment of schools and colleges:** During this lockdown most of the parents will face unemployment, so they cannot pay the fee during this pandemic period, which negatively affected the private schools.
- Acquiring knowledge only on a theoretical basis, no knowledge of practical skills.
- Problems associated with the security of online learning system, in addition to other problems that are associated with the improper use of technology (Gautam, 2020; Mukhtar *et al*., 2020).
- The main disadvantage of e-learning is the lack of important personal connections between students and teachers and also between classmates (Somayeh *et al*., 2016).

Positive impact of COVID-19 on education

While the outbreak has produced a lot of negative impacts on education, educational institutions in India have taken up the challenges and are struggling to provide unhindered student support during the pandemic. The Indian education system has given the opportunity to move from traditional system to online system. The positive impacts are (Jena, 2020):

- **Moving to Blended Learning:** COVID-19 has enhanced the adoption of digital technologies for education. Educational institutions moved towards blended mode of learning. It encouraged all teachers and students to become more technology savvy. New ways of delivery and assessments of learning opened immense opportunities for a major transformation in the area of curriculum development and pedagogy. It also gives access to large pools of learners at a time.
- **Increase in use of Learning Management Systems:** Increase in use of this systems by educational institutions became a great demand. It opened a great opportunity for the companies those have been developing and strengthening learning management systems for use educational institutions (Misra, 2020**).**
- **Use of soft copy learning material increased:** In lockdown situation, students could not collect the hard copies of study materials and therefore, most students used soft copies of materials for study.
- **Improved collaboration:** A new opportunity has emerged in which collaborative teaching and learning can take new forms. Collaborations can also occur between faculty/teachers around the world to benefit each other (Misra, 2020**).**
- **Enhanced online meetings**: Due to pandemic, greater increase in teleconferencing, virtual meetings, webinars and e-conferencing opportunities
- **Increased Digital Literacy**: The pandemic situation has prompted people to learn and use digital technology and has led to increased digital literacy.
- **Improved the use of electronic media for sharing information**: Learning materials are are easily distributed to students, and related issues are resolved via e-mail, SMS, phone calls and various social networks such as WhatsApp or Facebook.
- **Worldwide exposure**: Teachers and students get the opportunities to connect with peers from all over the world.
- **Better time management**: Students can more effectively manage their time in online education during pandemics.
- **Demand for Open and Distance Learning (ODL):** During the pandemic situation most of the students favoured ODL mode because it encourages self-study giving opportunities to learn from a variety of resources and personalizes learning according to their needs.

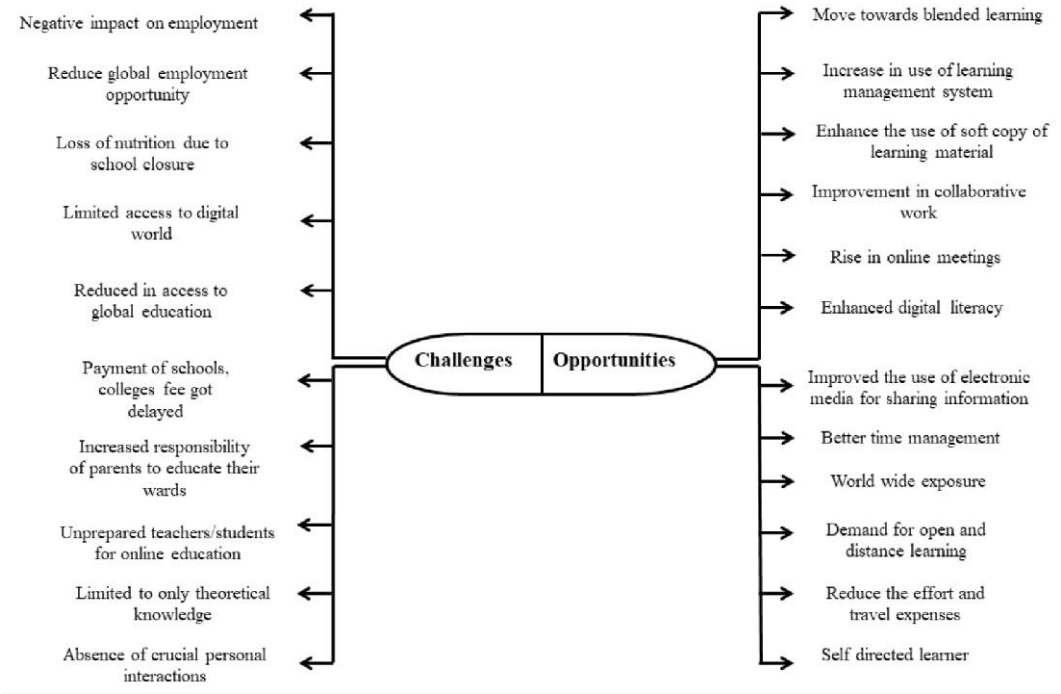

Fig.: Challenges and opportunities in education sector during Covid-19 period.

- Many users of e-learning see that online learning ensures that e-learning can be simply accomplished, and the learner can easily access the teachers and teaching materials (Gautam, 2020; Mukhtar et al. 2020).
- It also helped in reducing the struggle, travel expenses and other expenses that accompany traditional learning. E-learning reduced significantly the administrative effort, preparation and lectures recording, attendance, and leaving classes.
- Teachers and students see that online learning system encouraged pursuing lessons from anywhere and in difficult conditions that prevent them from reaching universities and schools. The student becomes a self-directed learner and learns simultaneously and asynchronously at any time.

Before the outbreak, though the online education practices were emphasized by the various educational stakeholders yet, it was never an entire shift of online teaching in the mainstream of higher education which resulted into the beginning of new challenges as well as opportunities simultaneously. According to the findings from the ECAR Study of Undergraduate Students and Information Technology 2019, about 70% of students favour mostly or completely face-to-face learning environments (Gierdowski, 2019). Despite its negative impacts on the Hospitality and Tourism education, the COVID 19 pandemic situation has helped uncover the opportunities of alternative teaching and learning methods. Instructors have sought numerous active learning strategies to enhance student engagement and satisfaction in a virtual format; industry practitioners have designed customized virtual internships; and students have adopted the new mode of learning including Zoom classes, online discussion, and virtual group projects (Park and Jones, 2021; Zhong *et al*., 2021).

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Aggression on Human Consciousness in Covid Pandemic by Marketers

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ABSTRACT

Basic instincts of food, sleep, procreation and fear compels a person to act for maintaining Homeostasis but only survival is not the necessary for human beings they want growth in growth and Prosperity by fulfilling wants which they receive from the society. In the present era of information communication and technology Human wants are escalating line pile of garbage in their mind and Indian spiritual value of consideration like equality, informality is lagging behind. Human beings are now a days living only to acquire those men made things which are created to provide health, comfort and happiness. Technology in the form of information has filled up the consciousness of human beings in such manner that they do not have the space for thinking welfare of others and self realisation to attain ultimate purpose of existence as a human beings in this planet. Fordric Mitche German philosopher said it earlier that human being line to suffer and service to find some meaning in the suffering is seen proved when we find conflict hatred suicide battle craving anger greed, ego in society and people wants solution from courts, police and psychologist. Indian ancient wisdom of devotion love affection and care about environment is depleting and struggle for existence for exploitation is become Mantra of success and these mind set is effectively and efficiently being utilized by modern marketer through promotion of quality of life through manmade things. This highlights the role of modern market in enhancing struggle for manmade things.

Keywords: Homeostasis, inoculation.

INTRODUCTION

Human beings are living in bio-sphere became it provide the factors (like aiv, water food light darkness) that are necessary for survival and growth civilization taught us that human endeavor has removed the barriers of water light fire rain and made this planet a beautiful place of living which can sustain the load of increasing population by effective and efficient utilization of natural resources. In economies we study that human wants are unlimited and natural resources are limited that's why massive exploitation result in the form of cyclones, Tsunami, Acid Rain, depletion of ozone layer and contamination of biosphere by pollutants. Pollutants effects on physiology and psychology of human body and its effects are seen in behaviour of peoples. Business which provide those man-made things by procurement processing and distribution that have utilities which satisfy the need and wants of human beings that provide health happiness and comfort.

Marketing is a subject in business that helps in facilitating exchange by arousing wants. All marketing activities are confined to providing right product and right price with right promotion at right place where prospective customers are found. Human wants are being shaped in a way that people are loosing their discretion at the time of making decision regarding their purchase. Several modern of promotional measure is being used due to advent of technologies that has inserted the information in every mind. Promotional information alters the human mind by inserting a cause that need to be satisfied by exchange. Human psychology is now a essential subject for modern marketer in planning their promotional message that are very attentive induce interest cultivate desire and compels them to purchase. Every facts of human activities like work. Communication travelling purchase food preparation serving social behaviour entertainment health and nutrition medical care holidays

vacations have an answer in the human mind due to these promotional invasion deeply positioned by marketers via every human being wants to maintain homeostasis against the adversities of environment in which they live to attain health in body and peace in mind, but mind is always in the battle feed which is being attached by arrows of information send by marketers about the utilities of their offerings hence a common mans mind is become a always pregnant women which near give birth and this lead to frustration anxiety and despondent which are clearly visible in their behaviour.

How promotion works

Promotion word is derived from French word promotion meaning move forward for development of something for acceptance. It helps marketers to create a distinctive place in customer mind for increasing awareness and generate sale. While designing promotional strategy modern marketers uses all the means by which human consciousness can be shaped positively towards their offerings therefore very scientific approach is required in creating message choosing media deciding promotional budget and selecting target customers and measuring and evaluate the result of their planned promotional strategy. In marketing several tools of promotion are used line advertising. Publicity sales promotion personal selling and direct marketing that incorporate all the media tools available like print, audio indoor out door media, transit media. It enabled audio/video social media through which interactive communication is being used now a days that helps in increasing the immediate response. A persuasive communication works in human consciousness via there stages before purchase.

1st Stage Creating attention – Audio or Video print to attract consciousness Cognitive.

2nd Stage Cultivating Interest – It is affective stage in which customer liking and preferences start favouring marketers offer.

3rd Stage Arousing Desire – Consciousness move to want the marketers offer and slow strong conviction to purchase.

4th Stage initiating Action – Strong behavioural action is mode to obtain marketers offer by action to purchase.

Creating Attention

Indian's know the process of creating attraction in our day to day activities of doing work for economic gains or sharing thaughts with in society or worshiping god. A very common method is used from ancient times to attract others by CREATIVE DIZRUPTION by breaking existing pattern of behaviour through a highly creative message. In Covid period (2019-2021) these attraction can be seen while every products and services related with health hygiene and sanitation were promoted is such a way that they give some thing more that their reason of purchase earlier. Hygiene and sanitation promotion claims to kill 100% virus. several nutritional medicines which were consumed only by doctors proscriptions are promoted to attract human consciousness as immunity boosters for those common man who do not know about immunity. Consuming protein vitamins and mineral more than their necessary level may cause health problems but in Covid pandemic through extensive promotion consumers attraction were enhanced.

Cultivating Interest

Interest means liking and preferences which are changed with age income, occupation social concerns as psychographic variables but basic instinct of fear does not change and it was massively exploited by marketer during covid pandemic. Peoples struggle for storing the oxygen cylinder (without any patient of covid) increased sales of Hygiene and sanitation goods and services. Using face mash in the homes and unnecessarily using medicines (Allpathic Ayurvedic Homeopathic and Unani) Heavy promotion on all available media tools has helped in forming favourbale attitudes regarding safety against the fear of covid infection that was most relevant in pandemic.

Arosing desire

Desire is explained in ancient Hindu religion as one of the essential component of sub conscious mind along with anger greed infatuation ego and Jealousy. A Maslow in need hierarchy model of motivation said that human beings can be motivated to search satisfaction in a hierarchy of physiological – safety social esteem and at last search for knowing their reason of existence by self actualization. Modern marketers by their innoculative message pierce in the sub nocuous mind to trigger desire for obtaining their offering for the benefits they would receive like safety against the fear generated by marketers Promotional messages has aroused the demand of hard sanitizers face mask, nutritional food and vitamins. A shortage of vitamin C tablets and capsules were noticed which every Indian can obtain it in their staple food containing lemons and green vegetables.

Initiate Action

Human beings make their purchase according to necessities and it is exhibited in four ways the (1) habituated/routine (2) variety seeking, (3) Dissonance

reducing and (4) problem solving and in such a pandemic (Covid) It is observed that routine or is converted as problem solving purchase action by infusing fear of being infected of covid virus and solutions of this fear are being provided by marketers. Psychological initiators by well crafted promotional messages has elicited a sense of urgency that has motivated consumers to take their purchase action.

Concluding observations

The human brain with its capability to carry out tremendously complex functions is indeed an amazing instrument. Limbic system of the brain concerned with emotional reactions and the aggression urge. Modern business organization works on the principle of value which is a method to determine customer needs and deliver a product or service to satisfy them there for customer is the source of the value creation in any society is best served by maximizing value delivered to customers. Targeting customer value as the overriding message of the firm goes a long way to ensure that a firm meets with enduring success but in covid pandemic business firms had not developed the value by conceptualization is first stage of value creation comprises the generation of ideas leading to value enhancement, construction is pulling parts of a product or components of a service together in a total value package and last commutating value which includes finding more Bayer for the product by suggesting multiple use for it. Peter Drucker said that essence of marketing is to create customer. The value envisioned in the conceptualization stage and given substance to in the construction stage has to be communicated to the customer and advent of information technology has opened many ways to inform persuade and remind customer for marketers offerings. Through communication various appeals are generated in the customer mind by arousing their consciousness for safety against covid and multiple utilities for enhancing nutrition hygiene and sanitation being offered as product of exchange the abstract idea of marketing was confined discovering and satisfying human need and wants is now a days replaced with sensing work necessities can be triggered searching what can be sold serving where enter customer are found and satisfying what expectation that was generated by promotion and present pandemic this new marketing concept was effectively and efficiently implemented by modern marketers.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Physical distancing and Psychological Impacts of COVID-19 on College and University Students: Challenges and its responses

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ABSTRACT

With the spread of covid-19, WHO, CDC, NHS, and MoHFW recommended physical distancing and closing educational institutions to reduce the risk of transmitting the virus. Sudden transition in the virtual mode of learning, physical distancing, rumors through social media, media and other means, more screen time, and altered habits negatively impacted the mental health of students. The current study focuses on the psychological effects, challenges faced and responses, of psychosocial factors like physical distancing that emerged due to Covid-19 on college & university students. The study sample consisted of male & female students, ages ranged from 19 to 25 years (M = 22.74, SD = 6.13), a total of 2140 students. For data collection, a mixed-method approach is used having face to face interactions in clinics, online counseling to assess the stress & depression, Health Questionnaires & Self-Reports, Generalized Anxiety Disorder-7, rating scales for Behavior analysis, Warwick-Edinburgh Mental Well-being Scale to assess perceived stress, anxiety, depression, and mental well-being, respectively. Data analysis shows that 42.7% of students have either anxiety or depression. 71.7% of students reported poor well-being. 36.7% of students had fear of getting infected with Covid-19; a majority of students had cognitive dissonance in myths and truths about Covid-19. 37.9% of students invested their time in watching TV or reading Covid-19 related news and information on various platforms including social media. 56.2% of students reported with slight to a marked increase in the use of social media. A marginalized difference between anxiety and depression is reported by males and females however expression of fear of separation was more in males than females. Lack of social interaction has played a role in causing stress, depression, and anxiety (GAD) related mental health issues in students. The majority of students faced imbalances in hormones & neurotransmitters.

Keywords: Psychological, Physical distancing, Anxiety, Depression, Stress, pandemic, covid-19.

INTRODUCTION

WHO recommended social isolation and physical distancing as Covid-19 emerged and the Government of India imposed lockdown in the first wave, in the second wave however central government have not imposed countrywide lockdown but state governments-imposed lockdowns as containment measures at the local level, but in both situations, people are required staying at home. The psychological impact of psychosocial factors is a theme in various studies but now it is more focused due to the pandemic. The long-term impacts of the pandemic on the mental health of people are yet to be fully uncovered, but in the short-term impact, a majority of people experienced negative mental health symptoms like insomnia or hypersomnia, irritability, stress, and anxiety. Studies show that the social distancing as preventive measure in early preparedness decreased the transmission by decreasing the contact rates between susceptible individuals (Roy et al., 2020). Following strict regulations educational institutions including colleges and universities were completely closed which made students staying at home, this physical distancing and misinformation through social media, media & other means affected the mental health of students and educators negatively. There was a sudden transformation from the physical classroom to the digital classroom. More screen time and altered habits impacted mental health. The human brain is evolved to live in social groups& wired for social interaction; epidemiological studies show alternation in brain chemistry due to

physical distancing, social isolation, discrimination, disrupted sleep & routines, intimate partner's mental state, etc. According to World Health Organization (WHO, 2004), mental health is "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can make a contribution to his or her community". Young adult college students faced more mental challenges, including academic pressure, employment pressure, and family pressures. The current study focuses on the psychological effects, inevitable challenges faced &their responses due to psychosocial factors like physical distancing that emerged due to Covid-19 on college & university students.

Traumatic stress, anxiety, and depression interfere with sleep. The majority of students faced sleep disturbance as a diagnostic symptom of depressive conditions. Sleep is associated with health and well-being (Goldsmith et al., 2006; Horne, 2006; Vandekerckhove & Cluydts, 2010). Albert Ellis (1993, 1999), a prominent psychologist who developed a theory known as rational emotive behavior therapy, believed that emotional disturbance results not from reality but from irrational thinking. Depression is characterized by feelings of hopelessness and helplessness.

Adversity like pandemic due to covid-19 made 40% of the population suffer from the common mental disorders due to lockdown (Grover *et al.,* 2020). Physical distancing and isolation in context to pandemic caused by covid-19 are associated with significant mental health problems including depressive symptoms, anxiety, stress, sense of loneliness, fear, sleep disturbances, anger, etc. There is variation in the impacts of pandemic on university students due to differences in their cognitive competencies, knowledge, attitude and practices towards prevention of Covid-19 (Srivastava & Reddy, 2020).Due to the closing of educational institutions students have to stay at home but it was quite hard for students to engage themselves in domestic activities, chores, or studies throughout whole day. The student community at educational institutions has diversity and social networks including intimate friendship relationships. Not only for students but also for parents it was a harassing experience to channelize children energy into what can they do to productively engage their child at home and all this changed lifestyle of parents and children (Verma, 2020). In a survey conducted by Varshney *et al*. (May, 2020) in India, 33% of participants reported a significant psychological impact of covid-19 lockdown in the first wave, and this psychological impact was higher in younger children and females.

Controlling one's own behavior is something that is exercised by people who are high on self-esteem, mindful & compassionate. Perhaps there is a need that this ubiquity should come, but how much it could be believed that a person will control the event or his/ her behavior on events that make things uncontrollable. Pandemic changed loving relationships, catastrophic events, or pandemics due to the covid-19 increased rate of domestic violence (Campbell, 2020). Staying at home continuously has changed the behavior pattern of the general population, students in early adulthood being in the age of growth & hormonal changes faced more behavior controlling issues. A number of researches and literatures are available about the impacts of Covid-19 on environment, society, education, and children and so on (Kumari & Shukla, 2020; Verma and Prakash, 2020; Roy and Chaube, 2021) but little work is done regarding its psychosocial impacts. A cross-sectional study on Asian university students (Chinna *et al.,* 2021) shows a higher level of anxiety experienced by female students than male students, and as a coping strategy majority of students used acceptance and social support. Cognitive competencies and life skills have a significant role in coping with such adversities. During the pandemic, college and university students have been suffering from extreme negative mental health issues like anxiety, depression, and stress but even after college and university reopening some students were suffering from minor negative health issues due to readjustment problems, academic losses, domestic, and financial issues (Ren *et al.,* 2021). Female students are reported more concerned and prone to psychological issues, urban & rural students also have a difference in the impact of the pandemic, despite adversity, and there is a collective increase in awareness regarding mental health among the student population (Moghe *et al.,* 2020). Overall, unprecedented efforts by educational institutions to practice physical distancing or social distancing to mitigate the spread of the disease resulted in a change in behavior patterns, and shutdown day-to-day functioning impacted individual mental health. A variance is reported in psychosocial and emotional responses in students to these inevitable challenges precipitated due to pandemics.

Aim of the Study

There are multiple studies that show the association between pandemics and mental health from the general population to professionals. Various studies reported a substantial increase in depression, stress, loneliness,

domestic violence, and anxiety-related mental issues in people. With the shutdown of educational institutions, students were forced to stay at home away from the physical &social network of peer groups, peer learning transformed in a digital way with lack of resources, inadequate training on digital classroom & ethics somewhere impacted student well-being. All these were the inevitable challenges for the student community and responses to these inevitable challenges, and abilities &skills in coping with stress, depression-related issues in gender differences needed to be studied. The current study is a step in this direction to study the psychological impact of covid-19 on the mental health of students in higher education. This study aimed to evaluate the psychological impact of physical distancing in lockdown due to Covid-19 first & the second wave with an objective to assess the prevalence of psychological inevitable challenges perceived and responses precipitated due to social distancing in college & university students. Increased screen time, internet connectivity, lack of peer support & social distancing, and social media played a buffering role in developing psychotic symptoms. The study has basically descriptive and correlational design to assess the detrimental effects of the pandemic caused due to covid-19 on the mental health of students in higher education that altered their social, emotional, and cognitive development.

Limitations of the Study

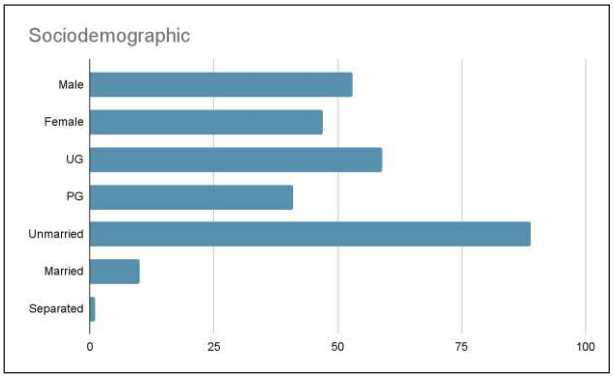
The study has some limitations; the sample includes participants in early adulthood, a greater number of participants studying in undergraduate classes. The research includes participants from Haryana and Delhi-NCR regions. Pieces of evidence collected from both covid-19 waves through offline/ online modes, so may have time and resource constraints. As most of the rating scales are self-rated so data may be biased from respondents as self-rater bias. Longitudinal data is taken from the documentary evidence in the clinical reports and procured from participants, somewhere systemic assessment data may be lacking in longitudinal data.

Participants & Design

For data collection, a mixed-method approach is used having four methods employed. Some qualitative methods were adopted like face-to-face interactions in clinics and online counseling to assess the stress & depression, PHQ-9 & Self-Reports, GAD-7, rating scales for Behavior analysis, WEMWBS to assess perceived stress, anxiety, depression, and mental well-being, respectively. The study sample consisted of male & female students whose ages ranged from 19 to 25 years (M = 22.74, SD = 6.13), a total of 2140 students

Summary:

Descriptive statistics and regression analysis are reported in tables. Anxiety is taken as a criterion variable (DV) and separation distress, isolation, academic impairment,



Graph 1: Socio-demographic profile of Participants

Table 1: Descriptive Statistics for Predictor Variables and Correlations to Criterion Variable Anxiety (Based on DSM-5).

Predictor Variable	M	SD	SE	φ	p
Distress due to separation	4.21	0.90	0.19	0.68	.046
Reluctance of being alone	4.13	0.87	0.17	0.71	.048
Impairment in academics	6.12	1.17	0.25	0.96	.038
Nightmares of separation	4.78	0.94	0.20	0.60	.032
Clinging behavior	5.13	1.09	0.23	0.94	.042
Fatigues & Restlessness	3.97	0.81	0.13	0.67	.049
Muscle tension	3.88	0.79	0.12	0.59	.073
Sleep disturbances	5.98	1.13	0.24	0.96	.039
Inattention & Irritability	4.93	1.07	0.16	0.96	.038

behavior aspects, sleep disturbances, nightmares, fatigue, muscle tension, inattention, and irritability are taken as predictors' variables (IV). The *p-value* in regression analysis indicates a significant correlation of predictor variables to criterion variables.

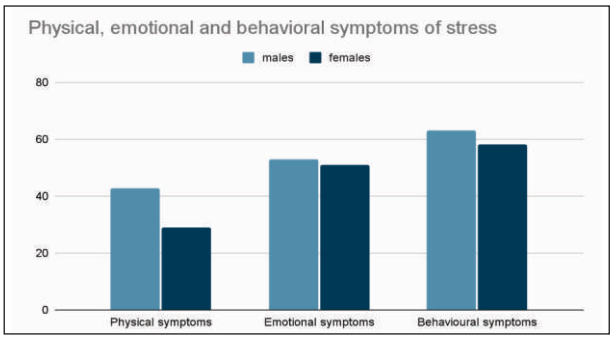
Out of the total population of the participants, 53% were male students and 47% were female students. The students studying in undergraduate classes were 59% of the population and students studying in post-graduate classes were 41% of the population. In marriage status, a majority of students about 89% of the population were unmarried, 10% were married and only 1% of the population was separated.

Responses from participants through clinical interactions, online counseling, and questionnaires based on predictor variables were gathered and analyzed on the basis of 7-point rating scale. The values in the table reflects predictor variable-wise average score and p-value. Diagnostic criteria are adopted as per DSM-5, diagnostic features as predictor variables specify the degree of anxiety faced by participants. There was a marginalized difference between anxiety reported by males and females; however, expression of fear of separation was more in males than females. GAD-7 score and clinical data, online counseling data reports reflect that 20.3% of female students reported extreme to mild anxiety whereas 18.9% of male students reported anxiety issues, prevalence 2-4 months. 23.3% of students reported mild anxiety and 15.9 % of students reported severe anxiety issues. A total of 39.2 % of students had anxiety varying from mild to severe. P-value and phi coefficient values show a positive correlation between

Table 2: Descriptive Statistics for Predictor Variables and Correlations to Criterion Variable Depression (Based on DSM-5).

Predictor Variable	M	SD	SE	φ	p
Frequent temper outbursts	5.43	0.93	0.20	0.94	.053
Depressed mood	5.17	0.92	0.20	0.96	.057
Diminished Interest	5.16	0.92	0.20	0.95	.038
Weight loss	4.09	1.18	0.23	0.93	.053
Weight gain	4.76	1.17	0.23	0.94	.049
Feelings of worthlessness	5.78	0.95	0.19	0.98	.039
Insomnia	5.05	0.91	0.21	0.94	.051
Hypersomnia	4.93	1.04	0.22	0.91	.048

The table reflects the data collected from participants in the clinic, online counseling, and self-rating reports, score from HDRS (HDS-SIV, Ham-D) is converted in the range of 7-points, mean & standard deviation are calculated for data analysis purposes. Diagnostic criteria are adopted as per DSM-5, diagnostic features as predictor variables specify the depression faced by participants. Phi coefficient value and p-value show correlation between predictor variables and criterion variables, higher values for predictor variables positively correlated with the extremeness of criterion variable. PHQ-9 Depression, clinical, and online counseling data reflects 11.7% of students had depression. 9.6 % of students reported chronic irritability & frustration verbally or in behavior more than three times a week. 12.5 % of students reported depressed mood with subjective feelings like sadness, emptiness, and hopelessness, etc., with loss of pleasure almost in all activities. 7.6% of students reported weight loss, 24.8% of students reported weight gain, 4.7 % of students reported feelings of worthlessness occasionally. 8.2% of students reported insomnia and 33.9% of students reported hypersomnia.



Graph 2: Physiological, Social, and Psychological Symptoms of Stress

WEMWBS score and behavior rating scale data is modified and grouped into three categories to find the average number of participants who felt physical, emotional, and behavioral symptoms of stress and poor mental well-being. 42.7 % of male students and 28.9 & of 76.4% of students were reported with moderate to higher levels of stress.

Discussion & Findings

The purpose of this study was to gain a better understanding how psychosocial factors like physical distancing/ social distancing due to lockdown imposed in covid-19 pandemic impacted higher education students adversely. The result of this research provides supporting evidences that mental health of college & university students was negatively impacted in covid-19 pandemic. Following are the key findings:

1. 42.7% of students had either anxiety or depression; however more students reported anxiety issues than depression. There was a marginalized difference between anxiety & depression reported by males and females however expression of fear of separation was more in males than females.
2. 7.6% of students reported weight loss, 24.8% of students reported weight gain and 4.7 % of students reported feelings of worthlessness occasionally.
3. 71.7% of students reported poor well-being, 8.2% of students reported insomnia and 33.9% of students reported hypersomnia
4. 36.7% of students had fear of getting infected with Covid-19; a majority of students had cognitive dissonance in myths & truths of Covid-19.
5. 37.9% of students invested their time in watching TV or reading Covid-19 related news/ information on various platforms including social media.
6. 56.2% of students reported with slight to a marked increase in the use of social media.

Conclusions

As the brain is wired to connect, lack of social interaction has played a role in causing stress, depression, and anxiety (GAD) related mental health issues in students & having intimate partner relations at colleges/ universities, academic worries, family & self-expectations boosted negative mental health issues. The majority of students faced imbalances in hormones & neurotransmitters that are connected with mental health. Although the generality of the current results must be established by future research, the present study has provided clear support for the theoretical and practical implications of various psychosocial theories. This study reveals that the mental health of college & university students is negatively impacted by social factors, physical distancing caused by the covid-19 pandemic, and students faced inevitable challenges & negative psychological responses to deal with such adverse conditions. Kumar (2021) studied the same on educators.

Suggestions

- This finding suggests that there is a need for expanding& strengthening mental health education, guidance and counseling services to student in the higher educational institutions. Education institutions should adopt post covid-19 interventions to provide psychological support to students.
- There is a need to develop resilience & flexibility from adolescence age and co-curricular in college and universities should be designed to enhance cognitive competence & life skills
- Training to deal with feelings of self-helplessness and self-burnout should be provided from childhood.
- Coming out from highly neglecting mental sufferings habituation and transforming from worrier to warrior is very important for developing cognitive competency.
- Developing a higher level of controlling behavior with secondary control is needed for high self-esteem. More is needed for the awareness of parenting styles.
- Further studies could be conducted on student empowerment at the ground level, developing independence through developing higher-order thinking skills from childhood are the most needed initiatives.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Delta Variant-Transmission and its Consequences in India

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ABSTRACT

Viruses constantly change through mutation. A variant has one or more mutations that differentiate it from other variants in circulation. As expected, multiple variants of SARS-CoV-2 are documented globally throughout this pandemic. To inform local outbreak investigations and understand national trends, scientists compare genetic differences between viruses to spot variants and the way they're associated with one another. Delta variant, also referred to as lineage B.1.617.2 and Indian variant may be a variant of lineage B.1.617 of SARS-CoV-2, the virus that causes COVID-19. It was first detected in India in late 2020. The World Health Organization named it the Delta variant on 31 May 2021 First identified in India, Delta Plus has now been found in the U.S., U.K., and nearly a dozen other countries. India has labeled it a variant of concern, but the Center for disease control and prevention of U.S health department and WHO haven't. The Delta variant, also referred to as B.1.617.2, can spread more easily, consistent with the U.S. Center for Disease Control and prevention. The strain has mutations on the spike protein that make it easier for it to infect human cells. That means people could also be more contagious if they contract the virus and more easily spread it to others. It is now the dominant strain within the U.S. The Delta variant causes more infections and spreads faster than earlier sorts of the virus that causes COVID-19. It might cause more severe illness than previous strains in unvaccinated people. In fact, researchers have said that the Delta variant is about 50% more contagious than the Alpha variant, which was first identified within the U.K., consistent with The Washington Post. Alpha, also referred to as B.1.1.7, was already 50% more contagious than the first coronavirus first identified in China in 2019. Public health experts estimate that the typical one that gets infected with Delta spreads it to 3 or 4 people , as compared with one or two people through the original Corona virus strain, consistent with Yale Medicine. The Delta variant can also be ready to escape protection from vaccines and a few COVID-19 treatments, though studies are still ongoing. Scientists are still tracking the info to work out how deadly it's . Based on hospitalizations within the U.K., the Delta variant does seem to be more likely to steer to hospitalization and death, particularly among unvaccinated people, consistent with a recent study published in The Lancet. Now vaccine makers are testing booster shots to seek out if they will better protect against the Delta variant and other variants that emerge in coming months. Covid-19 cases, symptoms of Delta tend to be a touch different than other strains, but that doesn't necessarily mean the associated symptoms are more severe. Fever, headache, pharyngitis and runny nose are common, while cough and loss of smell aren't . Other reports link Delta to more serious symptoms, including hearing disorder , severe gastrointestinal issues and blood clots resulting in tissue death and gangrene. Research is ongoing to work out if Delta infection is related to increased hospitalization and death. One early study assessing the risk of hospital admission in Scotland reported that hospitalization is twice as likely in unvaccinated individuals with Delta than in unvaccinated individuals with Alpha. Therefore as it is the variant of concern in India so the present study is aimed to discuss the virus transmission and prevention thoroughly.

Keywords: Delta Variant, Transmission, prevention.

INTRODUCTION

The Delta variant was behind the deadly second wave of the coronavirus in India that killed thousands and infected lakhs during March to May .Viruses have tendency to change through mutations which leads to the formation of a variant of the respective Virus . A variant has one or more mutations that differentiate it from other variants of the virus in circulation. So during the Covid-19-pandemic, as it was expected, multiple variants of SARS-CoV-2 have been documented in India and globaly. To inform local outbreak investigations and understand national trends, scientists compare genetic differences

between viruses to identify variants and how they are related to each other. The World Health Organization (WHO) classifies variant viruses as Variants Of Concern (VOC) and Variants of Interest (VOI); classifications made by certain country of the virus may differ from those of WHO because the importance of variants may differ by location. To assist with public discussions of variants, WHO proposed using labels consisting of the Greek Alphabet, e.g., Alpha, Beta, Gamma, as a practical way to discuss variants by non-scientific audiences.

Delta variant, also known as lineage B.1.617.2 and Indian variant is a variant of lineage B.1.617 of SARS-CoV-2, the virus that causes COVID-19. It was first detected in India in late 2020. The World Health Organization named it the Delta variant on 31 May 2021 First identified in India. India has labeled it a Variant Of Concern (VOI), but the Center for disease control and prevention of U.S. health department and WHO haven't. The Indian SARS-CoV-2 Genomics Consortium (INSACOG), jointly initiated by the Union Ministry of Health and the Department of Biotechnology (DBT) with the Council for Scientific and Industrial Research (CSIR) and the ICMR, is a consortium of 28 national laboratories to monitor the genomic variations in SARS-CoV-2.

The Delta variant, can spread more easily, according to the U.S. Center forDiseaseControl and prevention. The strain has mutations on the spike protein that make it easier for it to infect human cells. That means people may be more contagious if they contract the virus and more easily spread it to others. It is now the dominant strain in the U.S. The Delta variant causes more infections and spreads faster than earlier forms of the virus that causes COVID-19. It might cause more severe illness than previous strains in unvaccinated people. In fact, researchers have said that the Delta variant is about 50% more contagious than the Alpha variant, which was first identified in the U.K., according to The Washington Post. Alpha, also known as B.1.1.7, was already 50% more contagious than the original coronavirus first identified in China in 2019.

Discussion

The Delta variant was first identified in India in December 2020 and led to major outbreaks in the country. It then spread rapidly and is now reported in 104 countries, according to a CDC tracker. [1]Public health experts estimate that the average person who gets infected with Delta spreads it to three or four other people, as compared with one or two other people through the original coronavirus strain.[2]The Delta variant may also be able to escape protection from vaccines and some COVID-19 treatments, though studies are still ongoing. Scientists are still tracking the data to determine how deadly it is. Based on hospitalizations in the U.K., the Delta variant does seem to be more likely to lead to hospitalization and death, particularly among unvaccinated people.[3].The Delta variant is believed to have fueled the second wave of COVID-19 infections in India in April-May. That surge saw up to 400,000 people infected in the country, and for a while it claimed about 4,000 lives per day. [4] While the second wave has waned and much of India has returned to a degree of normalcy, with lockdowns lifted and large crowds back in the streets and markets. There is currently no evidence of any new Delta sub-lineage that is of greater concern than Delta.According to INSACOG; Delta continues to be the dominant lineage for new cases across all parts of India in recent samples and remains the most rapidly rising lineage globally that is responsible for multiple outbreaks, including across Southeast Asia, which shows the fastest growth in new cases globally. COvID-19 cases, symptoms of Delta tend to be a little different than other strains, but thatdoes not necessarily mean the associated symptoms are more severe. Fever, headache,sore throat and runny nose are common, while cough and loss of smell are not. Otherreports link Delta to more serious symptoms, including hearing impairment, severegastrointestinal issues and blood clots leading to tissue death and gangrene.

One early study assessing the risk of hospital admission in Scotland reported that hospitalization is twice as likely in unvaccinated individuals with Delta than in unvaccinated individuals with Alpha the variant of concern in India (VOI). Covid-19 remains a mild disease in the vast majority of children, and there's no evidence that Delta is changing thatRegions with high vaccination and strong public health measures, such as Singapore, continue to do well.

A study by the Indian Council of Medical Research (ICMR) has confirmed that most of the clinical cases in vaccine breakthrough were infected with the Delta variant but only 9.8 per cent cases required hospitalisation, while fatality was found to be restricted to 0.4 per cent.

The data for higher infectivity of Delta continues to grow with the secondary attack rate in household contacts being almost double for Delta, when compared to Alpha (Public Health England, July 9 update). The other VoC continue to be very low in India and are declining relative to Delta globally.

According to INSACOG- the Indian SARS-CoV-2 Genomics Consortium, the efforts taken to reduce transmission and vaccination remain critical in respect to the Public measures in India.A growing spectrum of mutations is seen in the Delta background in the UK, the US and India.The most frequent spike protein mutations, other than K417N (AY.1/AY.2), seen in the UK are G446V and P251L. In India, A222V and K77T have been reported as possible markers of sub-lineages. The Delta variant has mutations in its spike protein, which helps it bind to the ACE2 receptors present on the surface of the cells more firmly, making it more transmissible and capable of evading the body's immunity.Previous research into the A222V mutation for either transmissibility or immune escape was negative. In case of the K77T mutation, it has previously been reported in a cluster of Delta that spread to Asiatic lions in a zoo, and seen in sequences from Tamil Nadu, but has no known impact on transmission or immune escape in humans.

The Indian SARS-CoV-2 Genomics Consortium (INSACOG), jointly initiated by the Union Ministry of Health and the Department of Biotechnology (DBT) with the Council for Scientific and Industrial Research (CSIR) and the ICMR, is a consortium of 28 national laboratories to monitor the genomic variations in SARS-CoV-2. The Delta variant was primarily responsible for the second wave of COVID-19 in the country, accounting for over 80 per cent of new casesaccording to Dr. N. K. Arora, co-chair of Indian SARS-CoV-2 Genomics Consortium , the cases may go up if a new, more infectious variant comes.The variant is also around 40-60 percent more transmissible than its predecessor, Alpha variant, and has already spread to more than 80 countries, including the UK, the US and Singapore.

The Delta Plus variantAY.1 and AY.2has so far been detected in 55-60 cases across 11 states, including Maharashtra, Tamil Nadu, and Madhya Pradesh and is still being studied for its transmissibility, virulence, and vaccine escape character .It emerged in Maharashtra and travelled northwards along the western states of the country before entering the central and the eastern states. There are studies that show that there are some mutations in this variant that promote syncytium formation.Besides, on invading a human cell, it replicates faster. It leads to a strong inflammatory response in organs like the lungs. However it is difficult to say that disease due to delta variant is more severe. The age profile and the deaths during the second wave in India were quite similar to that seen during first wave.The Delta Plus variantAY.1 and AY.2has so far been detected in 55-60 cases across 11 states, including Maharashtra, Tamil Nadu, and Madhya Pradesh. AY.1 is also found in countries like Nepal, Portugal, Switzerland, Poland, Japan but AY.2 is less prevalent. The variant is still being studied for its transmissibility, virulence, and vaccines escape characteristics.

On some parts of the country still witnessing a spurt in the number of cases, though there is a significant dip in the number of cases in most parts of the country, some regions are witnessing a high-Test Positivity Rate (TPR) particularly in the north-eastern part and several districts in the southern states, most of these cases could be due to the Delta variant.

A virus begins infecting a part of the population, which is most susceptible and also exposed to the infection. It diminishes after it successfully infects a large proportion of the population and strikes back when the immunity developed in the people post-natural infection fades.Theremaybe seen rise in number of cases if a new, more infectious variant comes. In other words, next wave will be driven by a virus variant to which significant proportion of population is susceptible. And any future waves will be controlled and delayed if more and more people get vaccinated and most importantly, people follow COVID-Appropriate Behaviour effectively, especially till a substantial part of our population gets vaccinated.

People need to focus on vaccination and adherence to Covid appropriate behaviour to manage COVID-19. Therefore there is a need to keep a strict vigil on the emergence of variants of concern and outbreaks so that they can be contained before they spread to a larger region.

The Indian SARS-CoV-2 Genomics Consortium (INSACOG) is a consortium of 28 laboratories for whole genome sequencing in the context of COVID-19 pandemic and was established on December 26, 2020 for India. The idea is to have a strong network of laboratories to do genomic surveillance of the SARS-CoV-2 and correlate whole genomics sequencing (WGS) data with clinical and epidemiological data to see whether or not a variant is more transmissible, causes more severe disease, escaping immunity or causing breakthrough infections, affecting vaccine efficacy, and diagnosed by current diagnostic tests.

The National Center for Disease Control (NCDC) analyses this data. The entire country has been divided into geographical regions and each lab is given the responsibility of one particular region. There are formed

near about 180 -190 clusters in country. Regular random swab samples and samples of patients who develop severe illness, vaccine breakthrough infections, and other atypical clinical presentations, are collected and sent to regional laboratories for sequencing. The current capacity of the country is to sequence over 50,000 samples per month.

The new mutations/variants of concern are cultured and scientific studies are undertaken to see the impact on infectiousness, virulence, vaccine efficacy and immune escape properties. Children have a more robust innate immune response than older adults. That typically enables kids to successfully counter the infection before it's had a chance to spread to the lungs to cause pneumonia and the inflammatory cascade that can be life-threatening in seniors. It's also possible that the routine pediatric immunizations that younger children receive boost their innate immune response.

The Delta variant is inherently more transmissible and, therefore, will be more contagious between children, between adults, and between adults and children and vice versa. Studies and modelling of transmission patterns indicate that younger children and adolescents play a lesser role in spreading SARS-CoV-2 at a population level, and that prioritising vaccination in older age groups yields more population-level protection against Covid.Symptoms of the Delta variant are similar to those seen with the original coronavirus strain and other variants, including a persistent cough, headache, fever, and sore throat.[5]

At the same time, COVID-19 patients in the U.K. have reported that some symptoms are slightly different for Delta, according to data from the ZOE COVID Symptom Study[6]. Cough and loss of smell seem to be less common. Headache, sore throat, runny nose, and fever seem to be more common.

Scientists are still tracking the data to determine how deadly it is. Based on hospitalizations in the U.K., the Delta variant does seem to be more likely to lead to hospitalization and death, particularly among unvaccinated people.People who haven't been fully vaccinated against COVID-19 are most at risk.
Kids and younger adults who haven't been vaccinated may be susceptible as well. In the U.K., children and unvaccinated adults under age 50 were 2.5 times more likely to become infected with Delta, according to a recent study published by Imperial College London.[7] Scientists are looking at how the Delta variant can cause breakthrough cases, or infections among people who are fully vaccinated. So far, they seem to be rare.

A consortium of Indian labs involved in genome sequencing to identify and track the spread of various coronavirus variants told the government that Delta Plus appears to have three worrying characteristics: Increased transmissibility; more capacity to attack lung cells; and a potential reduction in monoclonal antibody response — or, put simply, possible resistance to vaccines and immunity gained through previous infection.

According to Epidemiologists the focus should be on gathering more data through by the use of rapid sequencing and solid epidemiological research experts are already warning about a possible third wave within weeks. As the data accumulated for the Delta plus variant is not enough to decide called Delta Plus as being more dangerous or concerning than the original Delta variant.[8]

India has worked recently to accelerate its vaccination program, but a large share of its 1.3 billion people, including all minors who aren't yet eligible for shots, would still be vulnerable to another wave of infections. Nearly7million cases were reported for the month of May and Maharashtra being the epicenter for the second wave , where is situated the economic capital of India went into Lockdown To break the chain . and the vaccination for elders more than 45 years was started and then in the month of May it was opened to anyone elder than 18 year.

But then country faced the shortage of Vaccine doses. So the vaccine production capacity was increased to 100million doses from 70millon doses of Covishield Vaccine by Serum Institute of India.The fear is that the spread of Delta Plus, or any other new variants, could make things worse, and fast but the government's own COVID-19 experts have insisted that there's no need to panic.

Conclusion

Though there was crisis during the second wave of Covid-19 by delta Variants in India.Vaccines are effective against these variants and effective therapeutics are available as Indian Government look in to the Health facilities and increased the number of health facilities continues to monitor all variants circulating within the countryand also applied countrywide restrictions which helped to bring down the no cases.

The Delta variant causes more infections and spreads faster than earlier forms of the virus that causes COVID-19. It might cause more severe illness than previous strains in unvaccinated people.

Vaccines continue to reduce a person's risk of contracting the virus that cause COVID-19, and also continue to be

highly effective at preventing hospitalization and death, including against this variant. Fully vaccinated people with breakthrough infections from this variant appear to be infectious for a shorter period.

So Get vaccinated and wear masks indoors and in public spaces to reduce the spread of this variant.

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People receive COVID-19 vaccines during a vaccination drive in Mumbai, India, June 21, 2021.ANSHUMAN POYREKAR/HINDUSTAN TIMES/GETTY

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Study of Impact of COVID-19 Pandemic on Education State Maharashtra, India

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ABSTRACT

The first case of the Covid-19 pandemic was confirmed on 9 March 2020 in Pune district, state Maharashtra, India. In Maharashtra total confirmed cases are 59, 54, 508 as of 17 June 2021. May 8th, 2020, in India, 56,342 total positive cases have been reported. Maharashtra state located in western region of India, its population is 112, 372, 972. The population makes up to 9% 0f total population of India and second largest population of state Uttar Pradesh., the Maharashtra declared lockdown on 13 March after the outbreak an epidemic in the cities of Mumbai, Navi Mumbai, Pune Nagpur (Epidemic Diseases Act, 1897). The Central government and Maharashtra state governments are taking several measures also formulating several wartime protocols to control the Covid-19 pandemic disease. In the India government implemented a 55-days lockdown throughout the country that started on March 25th, 2020, to reduce the transmission of the virus. Impact of Covid -19 on education also transport, tourism, economic effects migrant workers affected in Maharashtra, India.

Keywords: Impact Covid -19, Pandemic, SARS coronavirus, Maharashtra, India.

INTRODUCTION

People with chronic conditions are strangely prone to Covid-19 are hospitalize, intensive care admissions, and mortality, compared to those without chronic conditions (Thienemann F et.al; 2020 and Hamer M et.al; 2020). They may be show adverse health impacts from delayed or foregone care during the Covid-19 pandemic continues to increase, particularly in lowland middle- income countries such as India, it imposes enormous costs on individuals, communities, health systems, and economies (Coronavirus disease 2019 ; Kumar SU et al; 2020). Some report indicates mental health problems during the pandemic. According to Chudasama et. al; 2020 and Su Z Et.al; 2020 diabetes, chronic obstructive pulmonary disease, and hypertension were the most impacted. In Maharashtra total confirmed cases are 59, 54, 508 as of 17 June 2021. May 8th, 2020, in India, 56,342 total positive cases have been reported. The largest single day spike 68,631 cases. The highest peak in all of India was reported on April 18, 2021. Maharashtra is a main hotspot for nearly total cases in India is 22.35 % o also about 30.55 % of all deaths (Coronavirus disease 2019 and Wee et al; 2020) On10 May 2021, the state's case fatality rate is nearly 1.49% (COVID-19, ICMR) Pune is the most affected city in Maharashtra, about 930,809 cases as of May 10, 2021 COVID (Cases In Maharashtra In 24 2020) hours About half of the cases in the state observed from the Mumbai Metropolitan Region (MMR). Government of Maharashtra declared lockdown on 13 March, the occurrence an epidemic in the cities of Mumbai, Navi Mumbai, Pune (PMC & PCMC limits) and Nagpur, which enabled it to forcibly hospitalize everyone with suspected symptoms. This study assess impacts of Covid19 pandemic on people the education, transport, tourism, economic Maharashtra, India also it shows effect on environment

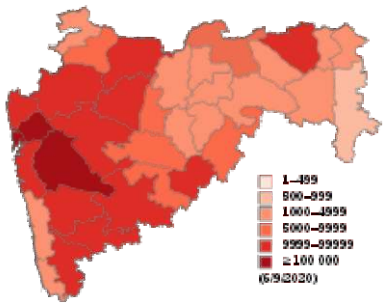

Figure 1: Map of districts with confirmed cases in Maharashtra.

Methodology

The present study was performed by reviewing the available published literatures, case studies, and different government and non-government organizations information from their reports and official websites. Literatures were collected from the database of Wikipedia, Science Direct, Springer, PubMed, Tailor and Francis, ICMR.ISI Web of Knowledge, Research Gate, and Google Scholar but not in a systematic manner. From a large number of studies, this study compiles and presents the data and information which are relevant to understand the Impact of Covid-19 on the education sector of India and the challenges and opportunities that can be gained from it a search of literature was conducted to find useful information, pertaining to the paper. The internet was used for acquiring useful research papers, having a connection with the objectives of this paper, as accessing online databases kept in the institute was rendered impossible due to closure of the institute due to the lock down. The internet (and Google Scholar) was used as a resource for acquiring research papers having a connection with the objectives of this paper. Search keywords used for this purpose were Covid -19 pandemic, Corona virus, Wuhan Coronavirus, Effect of the pandemic on students, teachers and institutions, Effect of the pandemic on educational policy decisions by the Government, Challenges and opportunities presented by Covid -19,e-learning, online learning and distance learning solutions for delivery.

Impact on Education

The covid-19 pandemic affect on educational systems in India. Impact of closures of school cause serious disruptions in academic activities, as well as in career plans. As part of efforts to battle covid-19 in India closed down schools. According to UNESCO - United Nations Educational, Scientific and Cultural Organization monitoring, over 100 countries implemented nationwide closures, impacting over half of the world's student population (UNESCO, 2020a). Maharashtra government cancelled all the exams from grades 1–8 to make it easier to contain the corona virus outbreak among school students. Maharashtra state is leading the prevention of Covid -19, with other States and Union Territories like Delhi setting up field hospitals on the lines of those here. Chief Minister said “Hospitals with all required facilities have been set up in Mumbai and Thane. All this amazing work could be completed because of the hard work of the administration and all related people. The e-launched the 100th Covid-19 testing centers in the State in Mumbai at GT Hospital (JUNE 2020). “In the wakeof the virus it was considered dangerous for schools, restaurants, meeting halls, cinemas, theaters and other places with heavy human presence to stay open and thus a general quarantine order was enforced in cities and towns in the affected countries. Schools were closed and children were asked to stay in their homes for their health. This was observed in the then United States for the greater health of the children (Alexandra M et.al; 2009). However, there was much resistance against the enforcement of quarantine in many cities, particularly in the case of New York City wherein attempts to prevent gathering of people in large numbers ran into resistance from the local populace and many businesses and establishments refused to close down their doors. (Nancy Tomes, PhD, 2010).

Impact of Covid -19 on the teachers and the students in education

Schools, colleges and universities have asked their teachers and professors to make use of online learning methods and tools like Google Video, Skype, Zoom, Facebook live, YouTube etc for to take lectures and to complete the course of content. Teaching by the use of the online mode has become a time-honored reality in the current Covid -19 pandemic. So, the necessary base which will support online teaching has not been completing available in proper terms. It means that the present group might suffer due to the difficulties in adjusting to the new condition of online education. The online method of receipt, delivery of education has not been developed on an same basis, throughout the country in the all schools, colleges and universities, so avenues created for this purpose likel

- DD Network of Educational channels,
- Online learning platforms e.g. SWAYAM, etc.

It is helpful for to delivery of education also it is not a main tool of delivery of education. It is different to see the teacher's live presence in the classroom ideal. Between the live interaction of teachers and student is helpful for to clear thought and difficulties this is difficult to conversion from the offline classroom to the online classroom as the level of quality, is dependent on the quality of the internet connection.

- The nature of the recording device being used to record the lecture like dedicated

- video camera,
- web camera,
- smartphone camera, etc.,

Audio recording media – dedicated microphone with USB mixer/processing interface, in - built microphone in smartphone etc.

Negative impact of Covid -19 on Education

1. School provides essential for learning, when school are closed students are disadvantaged of opportunities for their growth and development.
2. Most of the students depend on meals provided by schools for food and healthy nutrition, so it's compromised as a result of school closures for coronavirus.
3. For digital learning good internet connectivity is necessary because of lack of access the technology or good internet connectivity for continued learning during the time of school closures by Covid -19.
4. For the development of children social communications and socializations it is essential to learning, development and creativity considering the fact that educational institutions are play important role, also for social activity and human interactions, school closures can divest youth from this.
5. The students, generally do not take the entire whole of their notes and study material to their home, they are facing a difficulty as they have to complete their curriculum in the lack of their study material and have to make do with locally procured materials of study. it cannot be taken for granted that all the academic institutions in the country have made arrangements for running of online classes.
6. The emergency transition from the offline route to the online one has its own share of unique challenges (Kirsty et.al; 2018). Students have to weather through a set of unique problems and challenges caused by the Covid 19 pandemic. A student generally feels relaxed in a classroom as he is in the company.
4. Covid -19 has created a disruption in the routine, ordinary lives of students, teachers and institutions; Delhi University (Arnab Kundu et.al; 2018,) has discovered that the students have their own doubts and concerns about the examinations that will be conducted at the end of the course of lock down.

Positive impact of Covid -19 on Education

1. It is said that light follows the dark like the day after the night and thus, there are a few opportunities (Nurul Islam et.al; 2015) that can be gained from the challenge of Covid 19 on the education sector in India. A 'Blended classroom' is an environment where learning is done using both the offline and online methods and techniques of teaching.

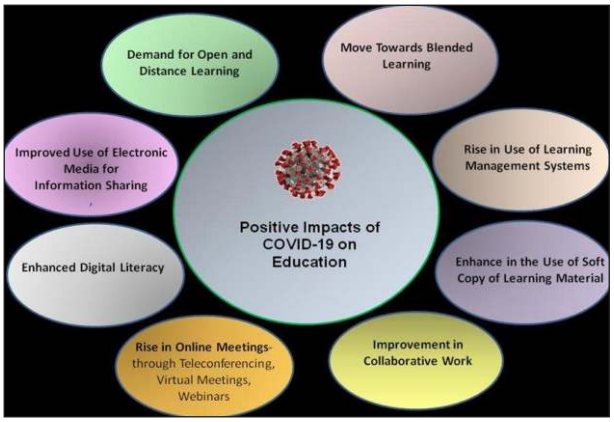

Figure 2: Positive impact of Covid -19 on Education.

2. The role of a teacher will improve in the future, due to their efforts to weather through the current crisis and

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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COVID-19: Highlights, Transmission and Impact of Second Wave in India

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ABSTRACT

COVID-19 is a pandemic came after almost 100 years of Spanish flu. This pandemic is so severe that whole world including developed countries are at their knees to treat people. The first wave is trial phase of virus in which everyone is scared and taking utmost care and precautions. In medical field, there is no specific treatment protocol as this is a new virus and no one know how to treat and what to use for treatment. In second wave, it's a known pandemic and doctors have some trial medicines to treat people, however, it is not 100 percent curable. Doctors only manage the symptoms. In India, second wave shows the loopholes in Indian medicine system especially in government sectors by lack of beds and oxygen. In second wave government is not willing to go for lockdown, however, some sort of lockdown like conditions are there in every state. COVID-19 is a pandemic which worsen the life of every people either they are sufferer of disease or sufferer of economic conditions produced by lockdown and economic disbalance. This article highlights the COVID-19 symptoms, sex related effects, possible treatment line and government initiatives to heal the people in many ways.

Keywords: Covid-19 second wave, pandemic, India, transmission.

BACKGROUND

There is a new world health's lethal crisis which afraid the public with spread over of COVID-19 (Coronavirus) in all environment. Since December 2019, when Corona virus emerged in hunan seafood market at Wuhan, South China and rapidly spread through-out the world, the virus News has been Announced a public health emergency of International concern by World Health Organization (WHO). We here make summarize the current trending clinical characteristics data to guide the level of COVID-19 about Prevention, Diagnosis, Treatments and Prevention of COVID-19. In this article, we isolated the data from Different Research Reports, WHO Notifications and other various source. Across the world this disease has caused varying degrees of fever. Patient shows various and some common symptoms mainly fever, cough, sore throat, breathlessness, weakness, etc. among others. The disease is being cured from common and general treatment, symptomatic treatment and by using the antiviral medicine. It is essential to identify the potential cases as quick as possible and identify the suspected persons from the confirmed cases of Coronavirus, and also prevent the community transmission of infection to other persons and health care department.

Corona viruses are a very huge family of viruses which may can cause disease in animals as well as in humans .Totalseven type of corona-viruses can produce infection in Animal and human community around the world but mainly people get infected from these 4 types of human coronaviruses which are following:-(i) 229E (ii)NL63 (iii)OC43 and (iv)HKU1.

They usually cause a infection in our lungs or we can say like respiratory infection ranging from the common cold to more serious and lethal diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) and the most recently discovered coronavirus (nCOVID-19) causes infectious disease. The WHO originally called this infectious disease Novel Coronavirus-Infected Pneumonia(NCIP) and the virus had been named 2019 novel corona-virus (2019-nCoV). At that time an outbreak of COVID-19 caused by the 2019 novel coronavirus (SARS-CoV-2) began in the city Wuhan, Hubei Province, China in December 2019, the current outbreak is officially

declared a pandemic. The virus is typically and quickly spread from one person another by respiratory droplets which is produced during coughing and sneezing. It is considered most infectious and dangerous when people are symptomatic, but the other hand transmission may be possible before symptoms comes in patients. Time from exposure and symptom is generally between two and 14 days or we can say that the virus incubation period is about 14 days. Common symptoms include like fever, cough, sneezing and Breathlessness. Severecomplications are also include like pneumonia, throat pain and acute respiratory syndrome and sometime Asthma. Currently, there is no specific antiviral medicine treatment ,but After the sucess of our Biotechnology department of our India ,We now have two useful vaccine which also have a good efficacy rate (i) Covishelid and (ii) Covaxin and before this we also do some efforts consist of symptom abolition supportive therapies , and we also Recommended preventive measures includes washing our hands with soap, covering the mouth with Mask(N95) when coughing, maintaining Approx 2-meter (6feet) distance from other people and monitoring ourself and Self Quarantine for fourteen days for people who suspect if they are infected. The standard device of diagnosis is by reverse transcription-polymerase chain reaction or (rRT-PCR) from a throat cotton swab. The infection can be also diagnosed by a combination of symptoms, risk factors and a chest CT scan and X-rays showing features of pneumonia or the penomonial patches inside the lungs.

ORIGIN AND TRANSMISSION OF COVID-19

The starting cases of COVID in human found in year 1965 by Tyrrell and Bynoe. They observed and find that they could find and isolated a virus named B814. It was firstly observed in human embryonic tracheal organ by the cultures and obtained from the respiratory or breathing tract of an adult with a common cold symptom and some sneezing. The primary or in starting cases were seen in Wuhan City of Hubei Province China in December 2019, and have been found the linked the Wuhan Seafood Market (South China) and the infection has been will be spread in several countries around the world. The novel coronavirus originated from the Hunan seafood market at Wuhan, well in the South China where dogs, bats, snakes and other animals are sold, and rapidly spread up to All over the world. The source of SARS-CoV-2 is not confirmed, but the sequence is based on analysis suggested bats as the main reservoir. The recombination of DNA was have a spike glycoprotein which attached SARS with the RBD of one more Beta CoV, there could also be the reason for cross-species transmission and quick infection. The virus that can causes coronavirus disease (COVID-19) is a highly and very quickly transmittable and can cause pathogenic viral infection and mainly transmitted by the contact with respiratory droplets of an infected person rather than through the air or that's why this disease are Airborne type of disease startlingly people can infect by coronavirus disease 19 (COVID-19) from others who are already infected. A single cough patient can spreader up to 3,000 droplets at a time. These droplets can settle on other people cells, and covering the surfaces around them, however, several smaller particles will stay suspended within the air. the virus is also spread form excretion in fecal matter, thus anyone who not washing their hands properly after using the toilet, bathroom could contaminate anything they will be touch like many pulmonary viruses, including swine flu, Covid-19 can be spread by close contact with small and fine droplets releasing from the infected individuals' upper respiratory tract secretions e.g. sneezing very hard, common cold or frequently coughing, mucus secretion from the nose and phlegm through mouth. That is why we have to stay away more than 2 meter (6 feet) and also away from a person who is ill from these type of symptoms and have sign of some pulmonary disease. The virus can also be transmitted from the surface contamination when these droplets land on objects and surfaces and ground around the person and other individuals touching these objects or surfaces and also touching their eyes, nose or mouth after touching that, then these people infected from this COVID-19.

REPLICATION

Disease begins when the virus enters into the host cell, the virus particle is decoated and their spike protein attached from the complementary host cell's receptor. After attaching with that, a proteolytic enzyme of the host cell cleaves and activates the receptor-attached from the spike macromolecule. Depending on the host cell's proteolytic enzyme available, cleavage and activation process will enable cell entry by the process of endocytosis or direct fusion of the viral outer coat or envelope with the host cell membrane. The chemical or molecule structure of Covid 19 RNA consists of 5' methylated head and 3' polyadenylated tail, thus through the RNA attaches to the free ribosomes inside the host cell and try to make a viral protein. This lead to the process of translation (protein synthesis) and starts begins the formation of a long polypeptide chain. That formed protein has its enzyme (Proteases) which break that long polyprotein into multiple non-structural proteins. Coronaviruses, are the family of viruses that have pricky spikes protein coats that projected out from their surface. They have enveloped

RNA viruses, are characterized by club-like or a crown like spikes that projected out from their surface, they have a unique replicating process inside the cells. These viruses are the cause many type of diseases in mammals and Aves leading to variety and species in cows and pigs and can also cause the upper pulmonary infection in humans beings which may be lethal for us .

SYMPTOMS

Maximum patients infected with this virus were all experience common cold and flu like symptoms, while few of them people was seems remains Asymptomatic. 80% of patient will show very low symptoms of that disease. Adults and the youth have the best immunity power to fight against the infection of covid , but the demerit is that they are more likely to spread the infection. A recent study perform about in 140 patients at the Zhongnan Hospital of Wuhan University , south china , then identified more various types of symptom, which lead to a disease known as nCOVID-19. Most of the patients or approx 99.9% of the patients developed a fever with an extremely high temperature, whereas more than half of the patients experience fatigue and a dry cough and continuous pain in the throat area . About 75% of the patient developed a dry cough and breathlessness. Research from our DBT India and CSIR and DRDO observes that around 80% of coronavirus cases are have very low symptoms, around 25% of the patients have infected severe and critically ill. As per daily bases the breakdown of coronavirus symptoms showed how symptoms progress among show in the typical patients, how the disease, COVID-19, goes from bad to worse, and then lethal to leads death.Day 1 After infection:- In the starting days of the symptoms, the patient suffering from fever with general weakness , muscular pain, and a dry cough and little bit pain in the throat. Few of the patients may experience nausea and diarrhea a few days before the symptoms.Day 5 after infection :- Patients may suffered from the breathing problem like breathlessness specially if they are Already have some pre-existing pulmonary health condition. eg.Asthma , COPD etc.Day 7 After infection:- According to the CSIR and DBT Of India study, these are the symptoms of the patients that lead the patient to be already admitted in the hospital.

Day 8 After infection :- On the 8th day, patients (15%, according to the ICMR) develops acute respiratory distress syndrome (ARDS), a condition where the fluid fills up in the lungs and surround by the alevoli this is mostly lethal. This usually happens in severe or in critical cases.Day 10 After infection:- The progressive nature of the disease leads to worsening of the symptoms and at this stage the patient is shifted in to the ICU. Patients with milder symptoms probably have more abdominal and intestinal pain and loss of appetite. Only a small fraction dies. The current mortality rate is around 1.56%. Day 17 After infection:- On the average, after two to 14 days patients who recover are discharged from the hospital. But on the other hand, it's difficult to find out the symptoms in the starting days of the infection. This is mainly seems after 5-6 days. identified symptoms by ICMR have ranged from mild to critical illness and death for confirmed coronavirus disease 2019 cases. Emergency warning symptoms of COVID-19 needs medical attention immediately, continuous heavy pain or constriction pressure on the chest, include difficulty in breathing, The severer condition leads to the Pneumonia, and the incubation period is to be determined about 14 days as the virus is recently identified. As per the new information, symptoms could appear as soon as three to five days after infected from the ncov to as long as 13 to 15 days later. Recently published research by CSIR and ICMR and DRDO and also DBT and found that on average, the incubation period is about 14 days.

TREATMENT OF COVID-19

1. General Treatment

A confirmed patient of COVID 19 needs complete rest or set it on the permanent bed rest and also some supportive treatment, ensuring daily calorie and water intake to decrease the risk of dehydration. Water can balance the electrolyte and homeostasis need to maintain along with the of monitoring vital signs and oxygen need or keeping respiratory tract unobstructed and inhaling oxygen (to prevent deficiency of O_2 maintain the SpO_2 level) in more severe cases; also measuring blood count (CBC), C-reactive protein, urine test (KFT), and other blood biochemical indexes (hemogram) including liver function (LFT),and also perform myocardial enzyme spectrum, and coagulation(blood coagulation or thrombin test)function according to patient's conditions. Chest imaging or ultra sound test should be continuously reexamined for identifying the level of damage in the lungs and blood gas analysis should be performed when required (SPO_2 level).

2. Oxygen Therapy

The chances of hypoxia (lack of O_2 inside the body tissue) are continuously increased as the virus targets to our lungs. Nasopharangeal catheter, mask oxygen should be immediately provided to the patient for recovery the amount of the Oxygen in the body cells. And In the major emergency conditions, Non-invasive and invasive mechanical ventilation (Ventilator) should be provided to the patient.

3. Boost Your Immune System and proper vaccination

On the prime of the basic illness prevention and real defense against disease is a strong immune system or high immunity. People bodies are better able to fight off disease when thier immune system and developing rate of WBC are running and people should put to get their perfect body shape. This is a time to focus on all the health habits properly. And we can should take the proper vaccination on time as per guidance our Indian government and the Ministry of health, should take the vaccine covishelid or either covaxin at the proper time interval.

DEATH RATE CLASSIFIED BY AGE, HEALTH AND SEX IN SECOND WAVE

WHO Director-General, Tedros Ad-hanom Ghebreyesus, said that globally, about only 3.4% of reported cases or patients Covid-19 cases have died. UK governments said a very best analyzed result was that the Mortality rate was only 2% or lower than 2%". However, it varies on a different class's range of factors such as general health, age, sex, etc. In the first mega survey there are more than 44.000 cases comes from China, the mortality rate was ten times higher in the very old age persons compared to the middle-aged peoples. The mortality rates were lowest for the age under the 30s there have been just only eight deaths in 4,500 cases. And mortality were at least five times more common among individuals with Hyperglecemia, Hypertension or cardiovascular or respiratory problems. There was even a very higher number of deaths rates among men compared from women. Coronavirus death Rate by Age Group:-mortality Rate = Number of deaths÷Number of cases = Probability of death if infected by the virus (%), or in Many studies and survey that shows the death rate increases with the age Child under 9 years of age seem to be largely unaffected, either with no or general symptoms or none have died due to COVID-19 infection. While people over the age of 80 to 90 years and those with long term or chronic diseases are the most vulnerable. The mortality rate starts to moving upward for those people who over 50 years of age. Those people under 50 years who are infected have a death rate is only 0.40%, and those people are 50-59 years it's 1.3%. For those people are 60-69 years it's 3.60%, and for 70 to 79-year-olds people it is 8.00% and for those people are over 80 years of age, it is approx 14.8%.

Covid-19 mortality rate by sex ratio

Across the world death toll from the Coronavirus increase, the evidence is growing that more mans are becoming quickly and critically ill or dying from the coronavirus more than women. But still its numbers slightly varies country to country. Scientists are still not completely confirmed but on overview average, men are more involve in health-damaging activities such as drinking alcohol and smoking cigarettes and weeds more than women Show mortality sex difference.

Corona virus death Rate by Health Conditions

Details collect and made information by Centres for Disease Controlling and Prevention and lot of other studies gradually increase and clear that risk of severe and critical illness and death rate increasing with time period of age. Adults and also old age peoples and not have better medical conditions have a higher risk to become infected. Among after the young adults at age 60 or older, more than half of them also have a serious and critical medical condition rising to about nearly 2/3 of people age 80 and older.]Old age people and young adults with serious and critical illness, such as Hyperglecimia (diabetes), cardiovascular disease, and pulmonary disease, have a higher risk of becoming severely and critically ill if they are infected with the nCov19. The death rate for those people who not have any pre-existing conditions is just approx. 1%. Centres for Disease Control and Prevention has given some specific guidance for people who lies into these categories.For those with cardiovascular disease the mortality rate is just about 10.5%, for diabetes mortality rate is 7.3%, for Chronic respiratory disease (such as bronchial asthma and seasonal asthma and chronic obstructive pulmonary disease [COPD]) it is about 6.3%, for hypertension condition (high blood pressure) the mortality about approx 6.0% and the cancer mortality death rate is about 5.6%.

PREVENTION FORM COVID-19

1. Wear the face mask properly
2. Maintain the social distancing approx 2meter(6 feet)
3. Always use the hand rub with the 70% to75% of Alcohol
4. Take the vaccine on time
5. Always take away from infection suspect who have server cough and fever.

IMPACT OF SECOND WAVE IN SOCIETY AND HEALTH SYSTEM

The second wave is more dreading as compared to first wave of COVID-19 as seen in every corner of India in every state and every district. The social system is drastically affected by second wave of COVID-19. The persons avoided in going relationship and even to meet their neighbors. Even in joint families every one is scared

to sneezing and cold to any member of family. The restrictions are impacted on marriages and community gatherings by state governments for 20 peoples and the most critical case is of only few peoples in case of death of a known person where you want to go but helpless. In case of health system which is very weak in India, almost every state is helpless as the number of cases are more than expectations. Hospitals are full and lack of oxygen and beds take toll of death of many citizens. The doctors tried their best but the number of affected persons are much more far beyond the limits of hospitals. Overall we can say the second wave is dreadful as compared to first wave for which peoples were also responsible as they do not follow the COVID-19 protocols like wearing mask and keeping distance.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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The Impact of Second Wave of COVID-19 on Women Rag Pickers in India

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ABSTRACT

Coronavirus illness 2019 (COVID-19) is a communicable illness caused by the coronavirus 2 (SARS-CoV-2) that affects acute respiratory syndrome. In December 2019, the first known case was discovered in Wuhan, China. This pandemic has not abated, and the second wave of COVID-19 has wreaked havoc in India, with spiraling cases, diminished supplies of important treatments, and an increase in deaths. Rag pickers were on the front lines of COVID-19 prevention teams because they managed the city's waste while exposing themselves to infection and disease. They provide numerous benefits to the city, such as reducing the amount of waste for incineration and preventing waste from collecting on streets, shops, railways, homes and other places, thereby maintaining human safety. Rag pickers are currently facing significant health and financial risks in India. Most people haven't been able to go out and collect waste since the pandemic began. The large percentage of their income come from selling trash and recyclable materials to scrap dealers, but these junk shops were also closed due to the country's ongoing crisis. Many rag pickers are facing starvation and poverty as a result of lack of work.The severe impact of the pandemic on their life and livelihood means that, wherever possible, rag pickers were stepping out for work, regardless of protection for their own safety and health. The objective of this study is to highlight the impact of the second wave of COVID-19 among women rag pickers, as well as the risk factors they faced during pandemic. The major electronic databases including UGC and Web of Science journal articles were searched and analyzed for conducting the study. We therefore in this review, summarize that the government must recognize the importance of rag pickers and include them in frontline workers protection and insurance plans. Their livelihood must be improved, and have routine checkups and access to essential medicines. The government should also work to ensure provision of protective gear such as masks, gloves, stick and boots, as well as sanitation products for them.

Keywords: Waste pickers, COVID-19, SARS, second wave, contagious disease, scrap dealers.

BACKGROUND

Coronavirus illness 2019 (COVID-19) is a communicable illness caused by the coronavirus 2 (SARS-CoV-2) that affects acute respiratory syndrome. In December 2019, the first known case was discovered in Wuhan, China. This pandemic has not abated, and the second wave of COVID-19 has wreaked havoc in India, with spiraling cases, diminished supplies of important treatments, and an increase in deaths [1].

The pandemic has caused significant global social and economic systems, resulting in the worst global recession since the 1930s' Great Depression [2]. It has resulted in massive supply problems, which have been exacerbated by panic buying, agricultural disruption, lack of food, and lesser pollution emissions. Many educational institutions and public places have been closed in partially or entirely, and many events have been canceled or rescheduled. False news has spread through social media and the mass media, exacerbating political tensions. The pandemic has brought up problem of racial and geographic discrimination, health equity, and the need to strike a balance between public health and economic imperatives and individual rights [1].

COVID-19 symptoms can range from inconsequential to life-threatening. Patients over the age of 65 or have certain diseases are more likely to develop serious disease. The disease spreads when people inhale and exhale in contaminated air containing droplets and small airborne particles. The risk of inhaling these is largest when people are close next to each other, but the virus can spread over longer distances, especially indoors. Transmission can also happen through infectious material or liquids on a rare occasion. People can be infectious for up to 20 days after contracting the virus, and they can spread it even if they don't show any symptoms [1].

Social isolation, wearing face masks in public, ventilation and air-filtering, covering one's mouth when sneezing or coughing, hand washing, sanitizing surfaces, and quarantining people exposed or symptomatic are all suggested precautionary measures. Since December 2020, a number of vaccines have been distributed in a number of countries. Treatments are aimed at alleviating symptoms, but researchers are working on developing antiviral drugs. Travel bans, lockdowns, business closures, workplace risk controls, testing protocols, and systems for identifying infected contacts have all been implemented by authorities around the world [1].

Rag pickers, also known as waste pickers, and scavengers, perform important sanitation and waste management tasks. They help to strengthen economic growth, improve public health and safety, and ensure environmental protection [3]. Informal waste collectors are frequently among the most vulnerable people in society of the urban poor. Most of the rag pickers are migrants and comes from lower castes. Furthermore, they frequently live in improvised, overcrowded settlements without access to basic services, employment benefits, insurance, and other social security procedures as a result of social discrimination and the nature of their work [4].

Rag pickers are on the front lines of the fight against COVID-19 because they manage the city's waste while also exposing themselves to infection and disease [4]. In this pandemic, however, gathering, collecting, and sorting what others throw away greatly increases the health risk. Their jobs require them to be in close contact with other people and are exposed to a lot of germs. Rag pickers manage substances, such as hazardous material, that may be infected with coronavirus [3]. Nonetheless, these workers rely on their essential daily earnings [5]. Stopping work to stay at home may push their families into extreme poverty. When they are able to leave their homes for work, they are harassed by the police.

IMPACT OF COVID-19 ON WOMEN RAG PICKERS

According to a Dalberg study from 2018, India has over 5 million sanitation workers. Washing of residential restrooms, government public toilets, sewers and septic tanks, drainages, rail tracks, rag picking, segregation and so on are all common forms of sanitation work in both urban and rural areas [6]. Rag pickers are at a greater risk of infection due to a shortage of personal protective equipment and other workplace protective measures. More than 90% of rag pickers interviewed said that they had lost their jobs as a result of the lockdown [7].

According to a report from the International Labour Organization (ILO), the pandemic poses a major threat to the livelihoods of 1.6 billion workers in the informal economy [8].

During the Delhi lockdown, a recent study of female rag pickers found that the majority of respondents had difficulty going out to collect waste because police were patrolling the streets. Many rag pickers have returned to work since the lockdown ended, but they now appear to be facing a new threat: caused by a virus without any safety gear. According to the study, rag pickers faced a severe shortage of food as well as barriers to accessing medical supplies and healthcare facilities. Because of the pandemic's severe impact on their lives and livelihoods, rag pickers are stepping out for work whenever possible, despite the lack of protections for their own safety and security. Another issue for waste pickers is handling domestic garbage from houses, as most people in India do not separate their garbage into wet and dry waste, increasing the risk of hazardous materials being mixed in with domestic garbage [4].

Women were disproportionately affected not only by adverse shocks to earnings and livelihood, but they were also less prepared to deal due to the lower coverage under employee benefits, health coverage, as well as other support policies due to the increased representation of female rag pickers among the unorganized workforce. During the pandemic, many women faced increased workload, which made it difficult to manage domestic duties and take care of children. Due to lockdown restrictions and the COVID-19 risk, many women were unable to bring their children to work due to the global epidemic situation [5].

PLIGHT OF RAG PICKERS

Pawan (anonymous), a migrant worker from Gorakhpur, Uttar Pradesh, who collects trash from over 100 homes, said that “Even though we put our life in danger every day, we wouldn't get the same respect as doctors. Our work is still not considered essential service.” Pawan is one of

India's 40 lakh unorganized rag pickers and state-employed waste picker, who form the backbone of the waste management. Despite providing important healthcare services to houses, clinics, and apartments, the majority of waste handlers work without any safety equipment's, have no social protection, and face widespread discrimination, but they keep our cities clean.

Waste infected with body fluid from hospitals, quarantine centers, and home quarantine for suspected Covid-19 patients presents a challenging task for waste treatment authorities, garbage collectors, and rag pickers alike, as even loosely thrown away masks, gloves, cotton swabs, and needles from houses may be likely carriers of the virus, even before a person is diagnosed as Covid-19 positive. All of it will end up as waste material that must be properly disposed of in Common Bio-Medical Waste Treatment Facilities (CBWTF) [8].

The Central Pollution Control Board (CPCB) released guidelines for dealing, treatment, and safe waste disposal produced during treatment, diagnosis, and quarantine of confirmed or suspected Covid-19 patients in March, and then revised them in April. Despite the fact that India already has Bio-Medical Waste Management Rules (BMW), 2016, the revised guidelines were issued simply to ensure that garbage produced during diagnosis and treatment of coronavirus patients is disposed of in a scientific manner, given the virus's infectious nature [8].

Kiran Devi, 55 year, had never imagined that she would have to live through such a difficult time in the aftermath of the COVID-19 outbreak. The restrictions on movement imposed as a result of the lockdown have harmed her family in numerous ways. “The lockdown has had a significant impact on us. I have four children, and feeding them all during this difficult time is a challenge. Because of the lockdown we have been forced to stick in our houses for about two months, without work, money, or access to food, we can't leave,” said Kiran Devi [9].

COVID 19 has revealed a number of previously unknown stories. The real heroes of India's waste crisis have received far less recognition and respect what they deserve. Amar Rabi Das (40), a rag picker from the slum of Dallupura near Noida, has a touching story to tell. He migrated to Noida from Bihar fifteen years ago in search of work in production plants and industrial companies. But unfortunately, due to lack of work and job insecurity, he was forced to resort to rag-picking [9].

Amar was single when he started working as a rag picker, so he could handle it. But now he is responsible for a family of five, and rag picking isn't helping to feed his family during the lockdown. Rag pickers survive by gathering, sorting, and separating waste and then trading it. The majority of them sleep in railway track, bus stations, metro station or in front of stores in cities. Even so, they were able to manage their lives in those conditions until the Coronavirus disease struck [9].

PREVENTION MEASURES FOR COVID-19 IN THE WORKPLACE

Implementation of national and state guidelines

Various Government agencies issued national-level guidelines and advisories in the COVID-19 context that addressed sanitation workers' safety. Table 1 contains a list of these.

Table 1: COVID-19 related National Level Guidelines and advisories for sanitation worker's safety.

Ministry/Agency	Name of Advisory/ Guidelines document	Aspects related to Sanitation Workers covered
Ministry of Housing and Urban Affairs (MoHUA)	Safe and sustainable Wash services	● Provision and use of PPE ● Spreading awareness about hand and respiratory hygiene ● If necessary, assistance with essential supplies for unorganized sector workers Good personal hygiene, safe Personal protective Equipment reuse and disposal, drinkable water, toilet facilities, and other amenities at waste and recycling management facilities.
Ministry of Health and Family Welfare (MoHFW)	Safe and sustainable Wash services	● Types of personal protective equipment (PPE) to be worn by sanitation workers when disinfecting public spaces ● Guidelines for use of masks

	Personal protective equipment (PPE) should be used |in a reasonable manner.	PPE types and specifications for sanitation workers in various healthcare settings, such as hospitals, quarantine centers, and so on.
Central Pollution Control Board (CPCB)	Managing, treatment, and waste disposal produced during COVID-19 treatment, diagnosis, and quarantine	• Waste handling, treatment, and disposal protocols • The role of ULBs (Urban Local Bodies) and other organizations • Personal Protective Equipment (PPE) Disposal

Source: [7]

The city must assist rag pickers in protecting themselves and their livelihoods as they return to work:

- The government must recognize their importance and include them in frontline worker protection and insurance plans. Help them improve their livelihood and protect their health.
- The government should work to ensure the provision of protective equipment such as masks, gloves, and shoes, as well as hygienic products.
- Government should work to ensure that rag pickers have access to proper health screenings, necessary medicines and routine check-ups.
- Proper waste handling and disposal system.
- COVID-19 preventative measures training, with an emphasis on work-related hazard, Personal protective equipment use, and disposal or recycle of waste. All workers should receive hands-on instructions with visual aids and small reference manuals.
- To Ensure a Social Protection System for Urban Informal Workers.
- A national database is used for enumeration and registration.
- Enhance the already-existing boards for unorganized workers.
- Independent worker boards are formed.
- In urban slums, community-led vaccination campaigns provide door-to-door vaccination.
- More worker canteens and community kitchens should be established.
- Establish help desks for complaints and information, a ration card registration drive.
- Participation of non-profits institutions, collectives, and unions in decision-making [10].

CONCLUSION

Some of the study's major findings are the result of systemic issues that have existed in the country for decades and have been exacerbated by the COVID-19 pandemic. While immediate and long-term structural measures are required in the COVID-19 context, the global epidemic also offers an opportunity for bigger and more powerful actions and greater responsibility of stakeholders at all levels. The study also discusses the additional vulnerabilities that female sanitation workers, as well as informal sanitation workers face. This emphasizes the importance of providing equitable and inclusive support to such marginalized groups, which must be a key element of any policy, programmatic, or research initiatives aimed at sanitation workers. State and local governments must take immediate COVID-19-related measures. Efforts to improve workplace health and safety.

It is concerning that neither the central nor state governments have taken into account to provide any assistance to rag pickers. Under the National Food Security Act (NFSA), the central government has only issued one circular, which states that a registration drive must be started up to ensure coverage of all eligible identified persons from the most vulnerable and financially poorer groups of the society, including garbage collectors. Governments must make it feasible for rag pickers to follow public health guidelines for the benefits of these workers and their communities. Right now, income support, water accessibility, sanitizer, and the provision of safety instruments are all critical. Access to primary health care and social protections is also important [11].

To reduce the risk of exposure for garbage collectors, public education about the importance of properly segregating domestic hazardous garbage to prevent any infected product from being collected with recyclables is

critical. This is particularly important because the virus can survive on some materials for days. It's also crucial to comprehend the extent to which the informal workforce is vulnerable. It is in the best interests of the country if these groups are formalized as much as possible and given top priority for relief during times of crisis.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Impact of Corona Virus Disease-19 (SARS-CoV-2) On Human Organ Systems: A Systematic Review

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ABSTRACT

Present review is based on the previous scientific studies, and data collected, compiled and interpreted since the onset of Corona virus disease (COVID-19) pandemic in India and across the globe. The virus belongs to Coronaviridae family that encompasses alpha, beta, gamma and delta strains. SARS-CoV-2 is a beta corona virus that belongs to Orthocoronavirinae subfamily and comprises a 29903 base single stranded RNA genome which is surrounded by spike shaped membrane glycoproteins. Most of the preliminary studies and data indicate that Corona virus damages not only the respiratory tract but also other organ systems of the human like cardiovascular system, hepatic system, renal system, immune system, and nervous system leading to multiple organ failure and many related co-morbidities that occasionally result in high mortality rate. The primary target of the virus is respiratory tract where it gains invasive entry by interacting with a specific receptor namely Angiotensin converting enzyme 2 receptor (ACE2) present on the surface of respiratory tract. ACE2 is also expressed in vascular epithelial cells, lung epithelial cells, renal tubular epithelia cells, leydig cells in testes, and gastrointestinal tract (GIT). The virus severely damages the respiratory system and causes acute respiratory distress syndrome (ARDS). Upon gaining the entry in different organ systems the virus starts high levels of inflammatory responses resulting in release of interferons, TNF-alpha, interlukines (IL-6.IL-10, IL-1beta), Chemokines and colony stimulating factors which is turned in to cytokine storm thereby kicking a cascade of devastation. Earlier studies indicate that the virus exhibits the wide range of neurological manifestations including Cerebro-vascular implications, acute polyneuropathy, headache, encephalopathy, encephalitis, seizures, hypogeusia as well as some non specific symptoms. Likewise it results in many serious complications in kidney, lever, cardio-vascular system and GIT. However more studies are needed to authenticate the impact of the virus in the different organ systems of human.

Keywords: ACE2, Cytokine storm, Neuro-invasion, immune response, acute respiratory distress syndrome.

INTRODUCTION

Severe Acute Respiratory Syndrome (SARS)-CoV-2 virus belongs to the Coronaviridae family that encompasses alpha, beta, gamma and delta strains. SARS-CoV-2 is a beta corona virus that belongs to the Ortho-coronavirinae subfamily and comprises a 29903 base single-stranded RNA genome which is surrounded by spike-shaped membrane glycoproteins (Pennisi *et al.,* 2020; Kumari and Shukla, 2020). The glycoprotein located on the outer surface forms a three-dimensional structure in the receptor-binding domain of the host cell that facilitates the viral anchorage (Zou *et. al.,* 2020) The corona viruses are pleomorphic with a diameter ranging 80 to 120 nm. The genome of the virus is single-stranded RNA, the largest known genome, with a length of 30kb. The genome of corona virus codes for four proteins; spike (S) protein that gives it crown shape; and binds to host cell; a small and hydrophobic envelope protein(E); membrane protein(M); (Fig.1) which plays a crucial role in the assembly of virus and nucleo-capsid which is strongly associated with RNA (Vargas *et al.,* 2020). Structurally, SARS-CoV-2 has a defined structure comprising of 14 binding sites that interact with the human Angiotensin-Converting Enzyme - 2(ACE-2) receptor (Fehr *et al.,* 2015; Yuan *et al.,* 2017). It has shown positive impact on environment (Verma and Prakash, 2020; Roy and Chaube, 2021).

The primary reports on the pathogenecity of SARS-Cov-2 indicate that the virus more or less invades the multiple organ systems of the human body including respiratory tract, gastro-intestinal tract, immune system, cardiovascular system, renal system, and nervous system and causes the damage to these organs. In the present article a meta-analytical study has been done the impact of the virus on the different organs of the body. The primary target of the virus is respiratory system and immune system while in long term it severely impacts heart, liver and kidney of the infected persons.

Impact of COVID-19 on the respiratory system:

The SARS-CoV-2 pandemic beginning in early 2020 has caused millions of deaths from severe COVID-19 lung injury and respiratory failure, often complicated by multi-system injury. While infection can present in myriad ways, SARS-CoV-2 is largely transmitted by aerosolization and typically causes symptoms of fatigue, malaise, fever, cough, sore throat, and dyspnea from pneumonitis, hypoxemia, and respiratory failure. People of all ages and backgrounds are afflicted. Risk factors for poorer outcomes include older age, obesity, male sex, diabetes, hypertension, cardiovascular disease, smoking, cancer, autoimmune disorders, and other chronic diseases. Those with limited reserve, particularly in lung function, have the worst prognosis. While COVID-19 has been described as an atypical form of ARDS(Acute Respiratory Distress Syndrome), the issue remainshighly controversial, as pathophysiologic similarities with ARDS from other causes outnumber any differences. In many ways, the advent of COVID-19 as a trigger for ARD Shasre opened many questions on the pathophysiology of ARDS itself (Swenson *et al*., 2021).

The pathogenesis of COVID-19 Lung injury involves directviral damage and a host defense response with thrombotic and inflammatory reactions in the lung and elsewhere. The alveolar epithelium and vascular endothelium express angiotensin- converting enzyme 2 (ACE-2), to which the virus attaches and then is internalized along with the membrane-bound ACE-2. Consequently, cellular damage ensues and evolves to interstitiale demand alveolar fluid filling, similar to the process of alve-olar flooding in ARDS. Autopsy data, reflecting advanced disease, revealtypicalARDS features, including exudative proliferative and fibrotic phases of diffuse alveolar dam- age, hyaline membranes, alveolar and interstitial edema, atypical pneumocyte hyperplasia, alveolarhemorrhage, infarction, endothelialcell injury, and capillary congestion with microthrombosis and dilation. Notably, there is greater vasculopathy, including macro- and micro-thrombosis, endothelial cell injury, vascular dilation, and aberrant angiogenesis in COVID-19 and the earlier SARS injury than with H1N1 influenza and ARDS. However, lung biopsies in early COVID-19do not show the marked vascular pathology noted at autopsy. Limited broncho-alveolar data demonstrate a more monocyticandlymphocytic predominance in the air space typical of viral pneumonias compared with the dominantly neutrophilic cell population in ARDS. Understanding the respiratory pathophysiology of COVID-19 lung injury and ARDS is fundamental to better clinical care and support(Swenson *et al.*, 2021).

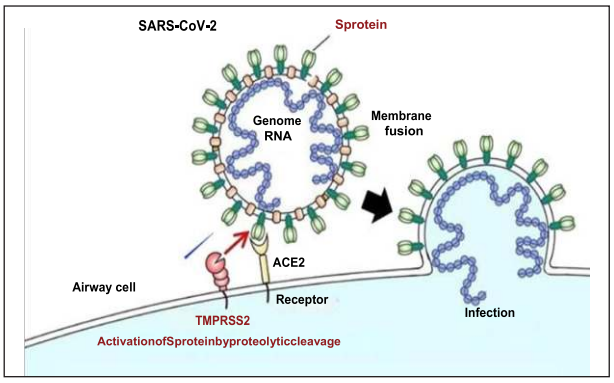

Figure 1: The structure of corona virus and its possible entry within cell (Adapted from Hunt et.al. 2020; www.eurekalert.org).

Impact of COVID-19 on Immune system:

Anactivation of immune cells has been noted in COVID-19, which might lead to effective anti-viral immune responses and clearance of viral infection. In particular, cells of the adaptive immune system, such as Band T cells, have been suggested to have a key role in driving anti-viral immunity. Antigen- specific anti body production by human Bcells as well as Tcell-specific memory responses can be induced by SARS-CoV-2 infection. In severe cases, SARS-CoV-2 infection leads to death of activated immune cells. Major determinants of the host's innate immune response are dictated by the cell tropism of the virus and its ability to circumvent innate immune responses. With the identification of SARS-CoV-2 and based on its close relationship with the SARS coronavirus (SARS-CoV), it became quickly clear that the surface receptor for SARS-CoV, the angiotensin-converting enzyme 2 (ACE2), was also a major cellular entry point for SARS-CoV-2. Similar to SARS-CoV, SARS-CoV-2 employs the cellular serine protease TMPRSS2 for S protein priming. Most recently, Neuropilin1 (NRP1) was identified as an important cofactor for entry, particularly in cells with low level

ACE2 expression. Several other proteases including Fur in have also been indicated as co-factors (Schultze and Aschenbrenner, 2021). Although the percentage of naivehelper Tcells ($T_H$cells) is increased inpatients with COVID-19, memory helper Tcell numbers are decreased. Additionally, patients with severe COVID-19 have reduced numbers of regulatory Tcells (T_{reg}cells), a cellsub set that suppresses pro-inflammatory immune responses via cell–cell contacts and produces anti-inflammatory cytokines such as IL-10 and TGFβ (Neurath, 2021).This reduction in T_{reg} cell numbers has been suggested to contribute to hyper inflammation and the cytokine storm syndrome in patients in intensive care with higher plasma levels of various cytokines, including IL-2,IL-7,IL-10,granulocytecolony-stimulating factor (G-CSF), CXCL10,CCL2, CCL3 and tumournecrosis factor (TNF) (Schultze and Aschenbrenner, 2021). A nearly study in patients reported that type I IFNs were either not detected (particularly IFNb) irrespective of diseases ever it yorat lower levels(IFNa)in plasma mainly derived from patients with severe disease. These observations were further extended by illustrating a lack of expression of genesen coding type IIFNs in peripheral blood mononuclear cells (PBMCs) of COVID-19 patients and an early buttransient wave of ISG (interferon stimulated gene) expression in blood-derived immune cells, which correlated with an early burst of IFNa, likely of lung origin. A longitudinal analysis confirmed an early peak with subsequent decline of IFNa and IFN-1 in mild-to-moderate COVID-19, where as levels further increased particularly during these cond week in severe patients (Schultze and Aschenbrenner, 2021). The dynamics of type IIFNs in severe patients is in line with findings in a murine model of SARS-CoV-2 infection illustrating that typeII FNs do not control SARS-CoV-2 replication *in vivo* but are significant drivers of pathologic responses.

Accumulating evidence indicates that SARS-CoV-2 is targeting the type IIFN system at multiple steps there by strongly interfering with a well-orchestrated interplay between antiviral and pro inflammatory innate and adaptive defense mechanisms within the immune system. Studies with more in-depthlongitudinal profiling and stratification by disease severity are warranted to clarify the questions surrounding the nature of the early IFN response to SARS-CoV-2.

Impact of COVID-19 on Gastro-intestinal tract:
Reformatting required:
Although initial data suggested rare involvement of the gastro intestinal tract in COVID-19, more recent findings have highlighted the fact that gastrointestinal symptoms, such as abdominal pain, loss of appetite and diarrhoea,arepresentin30–70%ofpatients (Neurath, 2021).Aparticularlyhighprevalenceofgastrointestinalsymptoms is noted in patients with cancer and COVID-19 in general. For instance, in one study, 36 of 395 hospitalized patients with COVID-19 had an active malignancy (Neurath, 2021). Interestingly, gastrointestinal symptoms might be caused by direct infection of the intestinal tract, as tongue epithelial cells, pharyngeal cells, stomach cells and epithelial cells of the small and large intestine all express ACE2).The highest expression levels of ACE2 with apicalco-expression of TMPRSS2 are detected in human intest in alepithelial cells of the terminalileum. Infection of human intestinal epithelial cells was confirmed by studies in organoids, where by SARS-CoV-2 infection led to the induction of a viral response programme and the production of infectious viral particles. However, it should be noted that SARS-CoV-2m RNA rather than live viruses have been detected in stool of patients with COVID-19 (Neurath, 2021) suggesting that gastrointestinal infection might be self-limiting.

In addition, SARS-CoV-2 infection might directly affect the liver and bile ducts as cholangiocytes and, to a lesser extent, hepatocytes express ACE2 and TMPRSS2. Consistently, upto 60% of patients with COVID-19 have elevated liver enzymes and exhibit abnormal liver function at clinical presentation. Liver enzymes (alanineam inotransferase, asparta team inotrans-ferase) are particularly elevated in patients with severe COVID-19, although this observation might beat tributable to systemic inflammation, medication, hypo-perfusion, and comorbidities or co factors (such as alcohol consumption) (Neurath, 2021).

Impact of COVID-19 on cardiovascular system:
Case reports of probable COVID-19-induced myocarditis claim the direct myocardial injury by SARS-CoV-2. Myocardial injury has been a remarkable finding, which contributes to worse prognosis in most patient cohorts with COVID-19 so far and being reported in >50% of deceased patients in most included studies(Lazaridis *et al.,* 2020). The exact underlying mechanism for the COVID-19-mediated myocardial damage is not clear; however, the following hypotheses are the main mechanisms considered so far (Lazaridis *et al.,* 2020): Direct ACE2-mediated myocardial cellinvasion; As already described, high ACE2 expression is detected in car- diac tissue, and may therefore facilitate cellular entry of the virus resulting in endothelial dysfunction and myocardial damage. In particular, ACE2 is widely expressed in cardiomyocytes, cardiac pericytes, and

coronary endothelial cells. Therefore, SARS-CoV-2 could directly enter cardiomyocytes and provoke myocardial injury. Furthermore, pericytes, which are perivascular mural cells with high ACE2 expression, have been suggested as target host cells by SARS-CoV-2. Considering the essential role of cardiac pericytes in maintaining endothelial cell function in capillary vessels, their infection could lead to coronary microvascular dysfunction and cardiac injury. SARS-CoV-2 has also been shown to infect human blood vessel organoids *in vitro*.Recent pathology reports provided the evidence of direct endothelial cell infection and diffuse endothelial inflammation, which could suggest the induction of "endotheliitis" and endothelial dysfunction, potentially contributing to the destabilization of coronary plaques, atherothrombosis, and vascular disease. (Lazaridis *et al.*, 2020). Systemic inflammation could further stimulate tissue-resident macrophages and leukocyte adhesion molecule expression on the endothelial cells of preexisting atherosclerotic lesions, enhancing their propensity to be disrupted and cause an acute coronary syndrome. Elevated circulating cytokines can also activate the microvascular endothelium, provokingdys function of the coronary micro vasculature, and consequent my ocardialischemia and injury.

Impact of COVID-19 on renal system:

The kidney is one of the main targets attacked by viruses in patients with a coronavirus infection. According to several investigations, SARS-CoV causes proteinuria and renal impairment or failure. The SARS-CoV was identified in the distal convoluted tubules of the kidney of infected patients. The kidney tissue and its cells are targeted massively by the coronaviruses due to the abundant presence of ACE2 and Dpp4 receptors on kidney cells (Motavalli *et al.*, 2021). These receptors are characterized as the main route of coronavirus entry to the victim cells. Renal failure due to massive viral invasion can lead to undesirable complications and enhanced mortality rate. COVID19 might lead to tubular injury via infiltrating renal parenchyma by pro-inflammatory cells.

Furthermore, it has been discovered that inflammatory cells like CD56+ natural killer cells, CD4+ T cells, and CD68+ macrophages, can exist in the renal interstitium. Subsequently, the unlimited activation of these immune cells may finally promote epithelial cell apoptosis, induce microvasculature alteration, and stimulate fibrosis (Motavalli *et al.*, 2021). Additionally, expression of C5b-9, identified also as membrane attack complex is lacking in normal kidneys. Nonetheless, the formation of C5b-9 complexes has been revealed to stimulate renal parenchymal cells to produce reactive oxygen species (ROS), release pro-inflammatory cytokines, and kidney damaging pro-fibrotic factors (Motavalli *et al.*, 2021). Since the kidney is the most susceptible organ tohypoxia, inadequate blood flow may cause AKI (Acute kidney inflammation) (ischemic ATN (Acute tubular necrosis)) and ischemia can motivate HIF-1 (hypoxia-inducible factor 1) and then ROS creation of mitochondrial dysfunction. Cumulative evidence demonstrated that HIF-1 triggers genes that stimulate the synthesis of fibrous connective tissue which impedes the kidney's ordinary function and improves effector T cell function, including elevation of cytolytic activity and producing inflammatory cytokine while ROS annihilates the molecular ingredients of nephron prompting a cells injury and/or death. It is noteworthy, direct virus invasion to the interstitium and renal tubular or glomerular cells is probable, ever since the straight cytopathic effect of the virus on numerous kidney cells has been distinguished in former investigations. A large amount of data from previous studies display that, the glomerulopathy resulting from coronaviruses was reported to be low, while immune complexes deposition of viral elements or virus-induced specific immunological abnormalities is possible. Furthermore, the preva-lence of kidney disorders in patients with COVID19 more frequent, and this virus can directly penetrate human renal cells and is related to greater morbidity and mortality.

Impact of COVID-19 on nervous system

Individuals infected by SARS-CoV-2 exhibit many short terms and prolonged neurological impairments depending upon the severity of infection which may be in the form of neuropsychiatric, neuroanatomical, neurophysiological, neurobehavioural or neurochemical changes with early or late symptoms. Alterations in mental status characterized by confusion, agitation, disorientation and somnolence which are collectively defined as encephalopathy have been reported in COVID-19 infections (Ladecola, *et al*., 2020). Delirium is considered to be the most common psychiatric symptom in the acute phase of the infection which may be due to inflammatory response or due to direct interaction of the virus with brain cells. Inflammatory responses produce IL-6,IL-10,TNFs,IL-1beta that may breach the BBB (Blood brain barrier), activate microglia and astroglia leading to an imbalance in neurotransmitter and delirium (Vargas *et al.*, 2020, Tripathi *et al.*, 2020). Glial cells in aged infected brains are reported to be more prone to the neurotoxic response. This neuro-inflammatory response may result in stoke, neurodegenerative disorders, ischemia, and aging. Recent transcriptiomic studies have confirmed the over expression of ACE-2 in the middle temporal gyrus and posterior singulate gyrus of the brain (Vargas *et al.*, 2020). Hence it is postulated

that proinflammatory responses of cytokine storm and other mediators of glial cells and immune cells may be the leading cause of neurodegenerative disorders which are primarily manifested in form of symptoms like headache, encephalopathy, encephalitis, seizures (Tripathi *et al.*, 2020)**.**

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Covid-19 and Its Impact on Education in India

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ABSTRACT

Coronavirus disease 2019 or novel coronavirus known as SARS-CoV-2 and named by World Health organization (WHO) as COVID-19 which is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in Wuhan, China. The first SARS-CoV-2 positive case in India was reported in the state of Kerala on January 30th, 2020. Currently, there are no specific therapeutic medicine for the treatment of this disease, and effective treatment options remain very limited. Here we describe the results of a programme that aimed to rapidly discover lead compounds for clinical use, by combining structure-assisted drug design, virtual drug screening and high-throughput screening. Coronaviruses infect humans and other animals and cause a variety of highly prevalent and severe diseases, including severe acute respiratory syndrome (SARS). Although the vaccines have been shown to reduce Covid-19 symptoms and serious illness, their ability to prevent coronavirus transmission has been unclear. Kevin Dunbar, Gavin Dabrera and their colleagues at Public Health England in London looked for cases in which someone became infected with SARS-CoV-2 after receiving a dose of either vaccine (R. J. Harris et al. Preprint at Knowledge Hub https://go.nature.com/3e3iu1i; 2021). They then Stay-at-home orders and broad societal changes have greatly altered the degree of day-to-day social interactions and work schedules during the COVID-19 pandemic. The first case of the COVID-19 pandemic in India was reported on January 30, 2020. As on May 17, 2020, the Ministry of Health and Family Welfare, Government of India has reported 90927 confirmed cases from 33 states with 2872 deaths. Though India is in complete lockdown since March 24, over the weekend there is a rapid increase in COVID-19 cases in some states in India notably from Maharashtra, Gujarat, Tamil Nadu, Delhi, Madhya Pradesh and few other states. The rapid increase over the weekend in the month of May has created some kind of panic in India. The government and other civil bodies are making efforts to mitigate the spread of this virus. Because of the closure of the schools, many students were suffering from not having enough food for their survival. There is always a delay or cancellation of exams, which leads to confusion for many students and there is no room for curriculum. Most of the school-going children are involved in child labour to support their families. This pandemic has not only affected the students but also the Low-budget institutions and schools, resulting in close-down the same. There are both positive and negative matters happening around us amid the Covid-19.

Keywords: Covid-19, education, pandemic, India.

BACKGROUND

No one would have guessed that a virus-like Covid-19 would come and creates havoc condition, it will alter the lifestyle of people. Due to Covid-19, many changes came to our world and it took some time for everyone to adopt the new normal. The Covid-19 impact was everywhere, which resulted in the closure of Schools and other educational institutions. Initially, most of the governments have decided to temporarily close the schools to reduce the impact of Covid-19. Later it was reopened for a few grades, which increased the number of infection rates and then closed again. Though schools are closed, students are attending their classes through various education initiatives like online classrooms, radio programs and other. Though it is a good thing happening on the other side, there are lots of students who didn't own the resources to attend the online classes suffer a lot. Many students are struggling to obtain the devices

required for online classes. Teachers who are all experts in Blackboard, Chalk, books, and classroom teaching are really new to this digital teaching, but they are adopting the new methods and handling it. But on the negative side, many teachers are looking for an alternative job to economical support for their families.

Educated parents are supporting their children throughout the pandemic, but we require to understand that there are some illiterate parents and their feeling of helplessness to help their children in their education. There are students in India who came to school just because they can get food. The great midday meal scheme has helped many children who couldn't bring their food from the home to get their nutrition.

There is a lot of chance that the education of female children and transgender children will affect, as their parents may see, the financial and opportunity costs of doing so. Technology paves the way for education, thus helping the students and teachers to connect virtually through online classrooms, webinars, digital exams, and so on. But the sad truth is that it is not available to many students all over the nation due to electricity problem, mobile recharge vouchers, network problem, voice problem, eye sickness problem, listening abnormalities and many other health problems.

Everything is happening for the well-being of the students so that they can stay safe at home without getting affected by the life-threatening virus. We are not ready for this, but it came, so we have to go through this together, but we have to update the infrastructure and should think of ways to undertake the situation and providing education to every child in the pandemic situation if we face something precisely like this in the future to aid the forthcoming generation. Stay home. Stay safe. The current worldwide epidemic has wreaked havoc on one of the most important systems i.e., education. Education is undeniably crucial in contributing to a country's welfare and an individual's growth, but it has been jeopardized by the emergence of Covid -19. It had a huge impact on the lives of millions of kids. There have been a number of severe targets that have had to be met since the lockdown was implemented. Education was also hampered by the economic crisis, which reduced its output. According to studies, the epidemic has denied almost 32 crore students of an education. This is being referred to as a national crisis, with an increase in unemployment as a result. In March 2020, a nationwide lockdown was imposed, forcing some schools and colleges to close and instructing students to abandon the usual classroom teaching style. This resulted in an immediate increase in innovation and technology, which the teachers used to finish the curriculum. However, due to a lack of infrastructure, productivity suffered. Remote learning was not available in every family; according to the Global internet network research, just 24% of households had a consistent internet connection, while other remote areas remained unreachable. As a result, the government was forced to ensure that sufficient benefits and monetary funds were provided.

Let us not ignore the impact on girls, who have recently begun to defy educational conventions and have been seen dropping out of schools in large numbers. In extreme circumstances, the fall rate of poverty was recorded at 8% of GDP, resulting in additional reasons such as unemployed families who couldn't afford fees and resources being forced to stop their children's education due to debts, and so on. Boys were requested to work as daily wage employees, while girls were assigned to home tasks, prompting the government to ask a series of questions in order to stimulate emergence. In response to the situation in Karnataka, chief minister B.S. Yeddyurappa established government -sponsored funds to assist low-income students and their families. Early pension benefit, lunch facility, fee processing, and other financial aid were all incorporated in the majority of the amended schemes. Similarly, several sections of India have received support from the government as well as non-governmental organizations and funds.

According to ASER (Annual Status of Education Report), they have demonstrated with verifiable data that parents, even in rural areas, have showed full interest in their children's education despite the minimal resources available to them. As a result, this demonstrates a promising aspect of the educational system in terms of raising government awareness in order to meet their demands. On the plus side, with the increased use of webinars, conferences, and financial aid through volunteer organizations, things have definitely improved over time. The COVID-19 has resulted in schools shut all across the world. Globally, over 1.2 billion children are out of the classrooms. As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. Research suggests that online learning has been shown to increase retention of information, and take less time, meaning the changes coronavirus have cau sed might be here to stay.

This clearly proves that, based on the estimated losses due to the effect of SARS on tourism (retail sales lost around USD 12–18 billion and USD 30–100 billion was lost at a global macroeconomic level), we cannot estimate the

impact of COVID-19 at this point. it has now been estimated that India's GDP by the International Monetary Fund has been cut down to 1.9% from 5.8% for the FY 2021. The financial crisis that has emerged owing to the worldwide lockdown reflects its adverse effect on several industries.

Table: Current 2020 status of reported positive coronavirus disease cases in India (State-wise).

S. no.	State name/UT	Confirmed cases*	Cured/ discharged/ migrated	Death
1	Andhra Pradesh	1,847	780	38
2	Andaman and Nicobar Islands	33	33	0
3	Arunachal Pradesh	1	1	0
4	Assam	54	34	1
5	Bihar	550	246	5
6	Chandigarh	135	21	1
7	Chhattisgarh	59	38	0
8	Delhi	5,980	1,931	66
9	Goa	7	7	0
10	Gujarat	7,012	1,709	425
11	Haryana	625	260	7
12	Himachal Pradesh	46	38	2
13	Jammu and Kashmir	793	335	9
14	Jharkhand	132	41	3
15	Karnataka	705	366	30
16	Kerala	503	474	4
17	Ladakh	42	17	0
18	Madhya Pradesh	3,252	1,231	193
19	Maharashtra	17,974	3,301	694
20	Manipur	2	2	0
21	Meghalaya	12	10	1
22	Mizoram	1	0	0
23	Odisha	219	62	2
24	Puducherry	9	6	0
25	Punjab	1,644	149	28
26	Rajasthan	3,427	1,596	97
27	Tamil Nadu	5,409	1,547	37
28	Telengana	1,123	650	29
29	Tripura	65	2	0
30	Uttarakhand	61	39	1
31	Uttar Pradesh	3,071	1,250	62
32	West Bengal	1,548	364	151
Total number of positive cases reported in India		**56,342***	**16,540**	**1,886**

Data source: available from Ministry of Health and Family Welfare, India (https://www.mohfw.gov.in/).

Preventive measures

An easy way to decrease SARS-CoV-2 infection rates is to avoid virus exposure. People from India should avoid traveling to countries highly affected with the virus, practice proper hygiene, and avoid consuming food that is not home cooked. Necessary preventive measures, such as wearing a mask, regular hand washing, and avoiding direct contact with infected persons, should also be practiced. The Ministry of Health and Family Welfare (MOHFW), India, has raised awareness about the recent outbreak and taken necessary action to control COVID-19. Besides, the MOHFW has created a 24 h/7 day-a-week disease alert helpline (+91-11-23978046 and 1800-180-1104) and policy guidelines on surveillance, clinical management, infection prevention and control, sample collection, transportation, and discharging suspected or confirmed cases. (https://www.mohfw.gov.in/pdf/Traveladvisory.pdf).

India is known for its traditional medicines in the form of AYUSH (Ayurvedic, Yoga and Naturopathy, Unani, Siddha, and Homeopathy). The polyherbal powder Nilavembu Kudineer showed promising effects against dengue and chikungunya fevers in the past. With the outbreak of COVID-19, the ministry of AYUSH has released a press note "Advisory for Coronavirus," mentioning useful medications to improve the immunity of the individuals. Currently, according to the ICMR guidelines, doctors prescribe a combination of Lopinavir and Ritonavir for severe COVID-19 cases and hydroxychloroquine for prophylaxis of SARS-CoV-2 infection. In collaboration with the WHO, ICMR will conduct a therapeutic trial for COVID-19 in India. The ICMR recommends using the US-FDA-approved closed real-time RT-PCR systems, such as GeneXpert and Roche COBAS-6800/8800, which are used to diagnose chronic myeloid leukemia and melanoma, respectively. In addition, the TruenatTM beta CoV test on the TruelabTM workstation validated by the ICMR is recommended as a screening test. All positive results obtained on this platform need to be confirmed by confirmatory assays for SARS-CoV-2. All negative results do not require further testing. Antibody-based rapid tests were validated at NIV, Pune, and found to be satisfactory; the rapid test kits are as follows:

(I) SARS-CoV-2 Antibody test (Lateral flow method): Guangzhou Wondfo Biotech, Mylan Laboratories Limited (CE-IVD);

(ii) COVID-19 IgM&IgG Rapid Test: BioMedomics (CE-IVD);

(iii) COVID-19 IgM/IgG Antibody Rapid Test: Zhuhai Livzon Diagnostics (CEIVD); (iv) New coronavirus (COVID-19) IgG/IgM Rapid Test: Voxtur Bio Ltd, India;

(v) COVID-19 IgM/IgG antibody detection card test: VANGUARD Diagnostics, India;

(vi) Makesure COVID-19 Rapid test: HLL Lifecare Limited, India; and

(vii) YHLO SARS-CoV-2 IgM and IgG detection kit (additional equipment required): CPC, Diagnostics. As a step further, on the technological aspect, the Union Health Ministry has launched a mobile application called "Aarogya Setu" that works both on android and iOS mobile phones. This application constructs a user database for establishing an awareness network that can alert people and governments about possible COVID-19 victims.

Future Perspectives

Infections caused by these viruses are an enormous global health threat. They are a major cause of death and have adverse socio-economic effects that are continually exacerbated. Therefore, potential treatment initiatives and approaches need to be developed. First, India is taking necessary preventive measures to reduce viral transmission. Second, ICMR and the Ministry of AYUSH provided guidelines to use conventional preventive and treatment strategies to increase immunity against COVID-19. These guidelines could help reduce the severity of the viral infection in elderly patients and increase life expectancy. The recent report from the director of ICMR mentioned that India would undergo randomized controlled trials using convalescent plasma of completely recovered COVID-19 patients. Convalescent plasma therapy is highly recommended, as it has provided moderate success with SARS and MERS; this has been rolled out in 20 health centers and will be increased this month (May 2020). India has expertise in specialized medical/pharmaceutical industries with production facilities, and the government has established fast-tracking research to develop rapid diagnostic test kits and vaccines at low cost. In addition, the Serum Institute of India started developing a vaccine against SARS-CoV-2 infection. Until we obtain an appropriate vaccine, it is highly recommended that we screen the red zoned areas to stop further transmission of the virus. Medical college doctors in Kerala, India, implemented the low-cost WISK (Walk-in Sample Kiosk) to collect samples without direct exposure or contact. After Kerala, The Defense Research and Development Organization (DRDO) developed walk-in kiosks to collect COVID-19 samples and named these as COVID-19 Sample Collection Kiosk (COVSACK). After the swab collection, the testing of

SARS-CoV-2 can be achieved with the existing diagnostic facility in India. This facility can be used for massive screening or at least in the red zoned areas without the need for personal protective equipment kits. India has attempted to broaden its research facilities and shift toward testing the mass population, as recommended by medical experts in India and worldwide.

Publicly available data sets were analyzed in this study. This data can be found here: https://www.mohfw.gov.in/ and https://www.icmr.gov.in/.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Potential of Phytochemicals Derived from Indian Medicinal Plants in Combating COVID-19 Infection

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ABSTRACT

Since last two years pandemic caused by Corona virus is succeeding unexpectedly inflicting pandemic of consecutive waves across the world. Owing its capacity to mutate in stronger form, making the prevention and manipulate measures essential. Remedial benefits of medicinal plants are documented to humans since prehistoric time period. As they play an important role in curing human diseases attributed to presence of bioactive compounds known as phytochemicals. Since India is well known for its legacy of medicinal plants, and traditional Indian medicine system together with Ayurveda, Siddha, Unani etc. have proven the capacity to deal with numerous diseases caused by infectious agents including viruses. This chapter provides detailed information on a variety of Indian medicinal plants, as well as their potential as antiviral and immunomodulatory treatments, which could be used to treat COVID-19 infection.

Keywords: Antiviral, medicinal plant, COVID-19 infection, immunomodulatory.

BACKGROUND

Viruses are ubiquitous in nature and ever-increasing numbers of viral diseases are matter of great concern. Traditionally, viral infections were treated with readily available antiviral regimens, which had unfavourable medical results. The growing concerns of refractory viral infections that are resistant to available treatment techniques are a serious health concern. Due to the rising prevalence of viral diseases, particularly resistant viral strains, available healing techniques must be enhanced, in tandem with the development of safe and low–side–effect antiviral medicines to combat persistent viral infections. Infectious diseases are the leading cause of death on the world, and their prevalence has been steadily increasing in recent years (Singh et al 2020). In late 2019 the whole world is entangled by the COVID-19 deadly viral ailment because of intense acute respiration syndrome corona virus-2 (SARS-CoV-2), people are dying in heaps day through day, and without an actual medication, it seems unfeasible for the bringing this worldwide health calamity to a stop.

The medicinal plant legacy is widely regarded in the literature as a priceless resource provided by nature for the treatment of many human metabolic and infectious disorders (Singh et al 2021). Plants and their phytochemicals have been used as a vital source of medications for ages. Phytochemicals have been, and continue to be, a major source of novel chemical entities for the development of effective therapies for a variety of human diseases, including infectious disorders. Owing to their stability, clinical specificity and easy availability from renewable natural sources, phytochemicals are gaining attention of medical community as well as pharmaceutical industries. In conventional medicinal systems plants and their photochemical' have always been the major source of management in primary healthcare system of various communities in the world. In ancient literature the practices of uses of medicinal plants for curing human have been well documented (Pal and Shukla 2003, Mazid et al 2012, Samal 2016). The use of medicinal plants dates back over 5000 years, with archaic

evidence of traditional medication use in Indian, Chinese, Egyptian, Roman, and Greek cultures (Samal 2016). Long-term evolution through numerous experiments and trials has resulted in today's plethora of information on plant life's medicinal usefulness (Petrovska 2012). Due to which human understand preventive and/or therapeutic potential of medicinal plants resides within the bark, seeds, fruits and different parts of the plants (Petrovska 2012). However, the utilize of customary medicines usually depends on the both accessibility of local natural resources and confined knowledge among local persons (Awas and Demissew 2009, Agisho et al 2014, Tadesse et al 2018). According to the World Health Organization, traditional medicines are used by 80 percent of the African population to maintain their health. India has long been home to a variety of medicinal plants and has a long history of traditional treatment systems. Ayurvedic medicine from India is well-known around the world for its medicinal properties (Gangola et al 2017). Indian forests are rich reservoirs of health beneficial medicinal plants and accounting for about 90% of Ayurvedic curative plants (Tadesse et al 2018). Prehistoric Indian literature, Rigveda, Charak Samhita, Atharvaveda, and Sushruta Samhita, narrate regarding the treatment of diseases using medicinal plants (Dhawan et al 1980; Dhawan 2005, 2012; Samal 2016). According to an estimate 6,000,000 plant species are considered to beof medicinalvalue in India (Samal 2016). Indians have used ethno-medicinal plants to treat diabetes, intestinal disorders, parasitic infections, skin disorders, gastrointestinal disorders, neurological disorders, piles, skeletal diseases, and viral infections, among other ailments (Vanden et al 1986; Dhawan 2005, 2012, Mazid et al 2012, Mishra and Singh 2012; Mintah et al 2019). According to a report from National Medicinal Plants Board (Ministry of AYUSH, Government of India), in addition to their remedial uses, medicinal plants are also an important source of income for a large part of the Indian population (Pandey et al 2013). As a result, novel therapy strategies to fight the effects of COVID-19 can be developed using traditional Indian medicinal plant traditions.

Indian Medicinal plants with their anti-viral activity

For the duration of the outburst of several epidemic viral diseases, traditional plants and their phytochemicals were reported to be utilized in global medicinal practices. The Indian Traditional System of Medicines is lone amongst the oldest traditional practices within the world has shown the great promises to manage this health disaster. There are numerous India medicinal plants, which are reported as antiviral and immune stimulant since ages in Indian medicinal practices were tested to treat and cure the viral infections (Narkhede et al 2014, Idrees et al 2021, Anand et al 2021, Ahmad et al 2021). List of some selected Indian medicinal herbs screened for anti-viral properties based on Traditional Knowledge Documentation was compiled by several groups of researchers (Pal 2002, Indian Materia Medica Vol: 1 published in year 1976, Chopra et al 1956; Mukherjee 2003, Kalyani and Kamaruz 2013, Ganjhu et al 2015, Dhama et al 2018, Tiwari et al 2018). In various experimental and clinical studies, the therapeutic potential of some medicinal plants in the eradication and management of various viral diseases such as influenza, human immunodeficiency virus (HIV), herpes simplex virus (HSV), hepatitis, and coxsackie virus infections has been demonstrated (reviewed by Akram et al 2018). Phytochemicals such as alkaloids, phenolic compounds, saponins, flavonoids, lignans, quercetin, catechins, and polysulphates, as well as other bioactive components of plants that make them an effective healing alternative against viral infections, are also thought to have a role in virus suppression (Jassim and Naji 2003; Ojo et al 2009; Sohail et al 2011, Pathak and Baishya 2013; Dhama et al 2018, Akram et al 2018). In a review article by Dr. BN Dhawan (2012) 242 Indian plants were reported to have antiviral activities (CDRI's biological screening program). All of the examined plants are members of 11 distinct families, with researchers assigning grades to each family according on their antiviral activity: Euphorbiaceae>Fabaceae>Asteraceae>Fagaceae>Myrtaceae>Rubiaceae>Rosaceae>Caesalpineaceae>Lamiaceae>Lauraceae>Anacardiaceae (Dhawan 2012). In conclusion, the author claims that 38 herbs are effective against HIV (Dhawan 2012). Further anti-HIV and anti-hepatitis activities of *Phyllanthus species* (Family-Euphorbiacae) has been reported by researchers (Ahmed and Verma 2008, Mehrotra et al. 1990). The viral cell cycle, production of HIV antigens, and cytopathogenicity generated by virus were all found to be inhibited by polysaccharide isolated from the bark of *Rhizophora mucronata* (Premanathan et al 1999). Fiore et al. (2008) suggested antiviral activity of *Glycyrrhiza spp.* against a number of human pathogenic viruses e.g.HIV1, SARS related Coronavirus, hepatitis B virus, vaccinia virus and vesicular stomatitis virus. Further investigation into its mode of action revealed that it lowers virus transportation to the membrane and sialylation of hepatitis B virus surface antigen hinders fusion of the viral membrane of HIV-1 with the cell by reducing membrane fluidity (Fiore et al. 2008). It as well provoked interferon gamma in T cells and inhibited the phosphorylating enzymes in the infection by vesicular stomatitis virus (Fiore et al. 2008).

Azadirachta indica embraced an extensive record of use in Indian traditional medicines, has shown broad spectrum antiviral activities on viruses such as vaccinia, Buffalo pox, chikunguniya, herpes, measles etc (Dhawan 2012). Active components of it are as azadirachtin,nimbidol, sodium nimbinate, gedunin, salannin, quercetin, nimbolinin, nimbin and nimbidin, are reported for their anti-viral activities (Alzohairy 2016). Diarylheptanoids extracted from *Alpinia officinarum* were suggested to contain a wide range of anti-viral actions against respiratory syncytial virus (RSV) poliovirus, measles virus, and/or HSV-1 (Konno et al 2011). Pillai et al (2018) detailed the findings of *in vitro* and *in vivo* studies of both extracts and pure compounds of *A. officinarum* indicated an ample array of effective bioactivities together with noteworthy anti-viral properties. Plants such as *Acacia nilotica, Avicenna marina, Cissus quadrangularis, Ipomea carnea, Aristolochia bracteolate, Trigonella foenum-graecum, Prosposis chilensis, Trebulus terrestris, and Maerua oblongifolia* have all been shown to have antiviral activities against Newcastle disease and fowlpox viruses (Mohamed et al 2010). So far a range of plants documented to possess the anti-viral and immunomodulatory properties by several researchers are summarized in Table 1.

Indian Medicinal plants with their effective anti-COVID 19 activity

Natural medicines are used by the majority of Indians to treat various problems since they are less expensive, easier to get, and have no negative effects. In literature Indian medicinal plants and their phytochemical constituents are well known to have antiviral properties, this could give assist in designing novel alternative and supplementary treatment for Covid-19. Recently some plants of Indian origin have been quoted to have anti COVID-19 action (Anand et al 2021, Divya et al 2020, Khanna et al 2020, Logeswari et al 2020, Joshi et al 2020, Maurya and Sharma 2020, Gautam et al 2020, Adithya et al 2021). Devpura et al. (2021) conducted a randomised placebo-controlled pilot medical evaluation of the efficacy of an ayurvedic treatment routine on COVID-19 positive individuals. Giloy Ghanvati (dosage 1g; *Tinospora cordifolia*) and Swasari Ras (dose 2g; traditional herbo-mineral formulation) were administered orally to the patients in the treatment group twice a day for 7 days, along with 0.5 g each of ashwagandha (*Withania somnifera*) and Tulsi Ghanvati (*Ocimum sanctum*). On day 1 and day 7 of the trial, serum levels of inflammatory molecules such as interleukin-6 (IL-6), tumour necrosis factor-α (TNF-α), and high sensitivity C-reactive protein were measured. Reduced levees were found in the treatment group. This chapter summarizes the anti-COVID characteristics of many traditional Indian medicinal plants and their active components, as proven by experimental and *in silico* research (Figure 1).

Allium sativum (Family: Liliaceae, Alliaceae; Common name: Garlic, Lahsun)

Nurtured all over India and its health benefits have been known to humans for millennia. Garlic functions as an immunomodulator by activating cells like NK cells and macrophages (Chakraborty and Majumder 2020). *A. sativum* induces cytokine secretion and increases CD4+ and CD8+ cells (Donma and Donma, 2020). According to Shojai et al. (2016), a concentration of 0.1 ml of garlic clove extract had *in vivo* inhibitory effects against SARS-CoV-1 growth, perhaps due to the extract's capacity to block off viral structural proteins. Garlic's phytochemical alliin demonstrated the highest binding capacity with the SARS-CoV-2 (6LU7) target protein (Pandey et al. 2021). Garlic phytochemicals and the serine-type protease found in SARS-CoV-2 establish hydrogen bonds in the active site areas of the virus, reducing COVID-19 eruption (Khubber et al 2020). As a result, it might be considered a COVID-19 infection preventative measure.

Andrographis paniculate (family- Acanthaceae; Common name: Kalmegh, chiretta)

Chiretta also known as "the king of bitter things," is a well-known Indian medicinal plant with a variety of pharmacological effects. Traditional medicine currently employs *A. paniculata* to treat common ailment from a variety of infectious causes, as well as a health tonic (Hossain et al. 2014). Andrographolide, a diterpenic lactone of the isoprenoid family renowned for its broad-spectrum antiviral effects, is an essential bioactive component of *A. paniculata* (Rao et al. 2004, Gupta et al. 2017). *In silico*, andrographolide was recently predicted to have substantial anti-SARS-CoV-2 efficacy by specifically targeting the host Angiotensin Converting Enzyme 2 (ACE2) receptor and viral components, such as RNA-dependent RNA polymerase, main protease, 3-CL protease (3CLpro), Papain-like proteases (PLP), and spike protein (Lakshmi et al 2020, Enmozhi et al 2020, Linda et al 2020, Murugan et al 2020). Shi et al. (2020) used an enzyme-based assay to show that andrographolide has an inhibitory effect on Main protease (Mpro). Furthermore, Kanjanasirirat et al (2020) used a phenotypic cell-based immunofluorescent assay in African green monkey kidney cells to reveal the anti-

SARS-CoV-2 action of chiretta extract and andrographolide. Further Sa-Ngiamsuntorn et al (2021) also investigated the anti-SARS-CoV-2 activity of *A. paniculata* extract and andrographolide in infected human lung epithelial cells. The findings suggest that *A. paniculata* and andrographolide could be developed as a monotherapy or in conjunction with other successful medications to treat SARS-CoV-2 infection.

Azadirachta indica (Family: Meliaceae Common name: Neem)

The *A. indica* tree found throughout India. Neem leaves extract and its bioactive compounds have potent antiviral and several major health beneficial effects in human. Previous studies have shown that neem and its phytochemicals play an important role in scavenging of free radicals' generation and thus prevent the pathogenesis of several diseases. *In silico* study by Sharon and colleagues (2020) documented that numerous neem bioactive compound such as azadiradione, epiazadiradione, nimbione, and vepnin were potential inhibitor against of Mpro protein. Through molecular docking and molecular dynamics simulation study Baildya et al. (2021) reported the inhibitory potential of neem extracts on PLpro. It was further suggested by researchers that phytochemical desacetylgedunin showed the highest binding affinity towards PLpro. A study by Balkrishna et al (2021) revealed that active constituents of *A. indica* have potential to target SARS-CoV-2 by hindering its replication process. Borkotoky and colleague (2021) used docking and simulation approaches to identify small molecule inhibitors of SARS-CoV-2 membrane (M) and envelope (E) proteins, both of which are required for virus assembly and budding. A total of 70 neem compounds were virtual screened against these two proteins and further scrutinized with molecular dynamics simulations, resulting in the identification of a few common compounds with strong binding to both structural proteins, indicating that bioactive components. The findings of study indicated that *A. indica* have the potential to inhibit virus functionality (Borkotoky and Banerjee 2021). Using Neem capsules a pilot; double-blind, randomized controlled clinical trial was conducted by Nesari et al (2021). Researchers discovered that those who took Neem capsules had a lower risk of contracting COVID-19, indicating that it could be used as a preventative medication. The findings call for more research in both experimental and clinical studies.

Curcuma longa (Family: Zingiberaceae; Common name: Turmeric, Haldi)

Plants of the genus of *C. longa* are cultivated in many areas in the India. In Indian cuisines haldi is mostly used as an important spice, a natural food coloring, and flavoring agent. Since centuries, being an integral part of Indian culture, haldi has been widely used in Ayurveda, Unani and Siddha medicine systems. So far treatment with it has been investigated in preclinical and clinical studies. Curcumin (diferuloylmethane, a natural polyphenolic substance) was found to be effective in controlling immune and excessive inflammatory responses due to viral infection. Curcumin has the potential to regulate innate immune response by acting on NOD-like and Toll-like signaling pathways to promote interferons production, activate and balance T-cells, and regulate the inflammatory response by inhibiting PI3K/AKT, NF-κB and MAPK signaling pathways (Chen et al 2020, Babaei et al 2020). All these biological processes and pathways have been well documented in COVID-19 infected cases (Chen et al 2020, Babaei et al 2020). Das et al. (2021) reported that curcumin can neutralize the entry of SARS-CoV-2 viral protein and thus inhibit infection. *In silico* screening suggested that bioactive compounds from *C. longa* could be useful against Mpro viral protein inhibition (Gupta et al 2021). According to Adem et al (2020) bioactive diacetylcurcumin also have been found to be more effective on Mpro compared to Nelfinavir (a drug against HIV). Zahedipour et al (2020) used *in silico* approach and successfully demonstrated the binding of curcumin to Receptor Binding Domain (RBD) site of viral S protein along with the viral attachment sites of ACE-2 receptor. Researchers also demonstrated that it can effectively suppress pulmonary edema and fibrosis-associated molecular pathways related to COVID-19 infection (Zahedipour et al 2020). The prospective of curcumin and its derivatives as SARS-CoV-2 spike protein inhibitors was also recognized in a molecular docking study done by Patel et al (2021). Findings of Chen et al (2020) suggested that curcumin along with vitamin C and glycyrrhizic acid was useful in regulating immune response to fight COVID-19 infection and inhibit undue inflammatory responses to check the onset of cytokine by virus infection. Immunity and protective defense against COVID-19 infection boosted in many hospitalized patients in India by the supplementation of curcumin with vitamin C and Zinc (Manoharan et al 2020). Therefore, *C. longa* could be used as a preventative tool in the fight against COVID19 dissemination.

Glycyrrhiza glabra (Family: Papilionaceae; Fabaceae; Common name: Yashtimadhu, Mulethi, Licorice)

Punjab, Jammu & Kashmir, and South India are among the places where it is grown. Glycyrrhizic acid, found in the roots of mulethi plant, has been identified as an active antiviral molecule with antiviral action against human and animal corona viruses (Cheriyedath 2021, Zhong et al

2020). Mulethi contains three orally effective antiviral components which inhibit Mpro, S-proteins, 3CLpro and PLP of SARS-CoV-2 (139). Mulethi extract inhibits SARS-primary CoV-2's protease, and glycyrrhizin has a high binding affinity relative to other licorice ingredients (Zhang et al 2020). The pharmacological activity of glycyrrhizin was discussed by Luo et al. (2020), which binds to ACE-2 and inhibits endogenous accumulation of ROS and production of interferons. Glycyrrhizin can inhibit 3CL protease and Mpro activity of SARS-CoV-2at 30 and 2000 µM concentrations as suggested by van de Sand et al. (2021).

Nigella sativa (Family: Ranunculaceae; Common name: Kalonji, Black Cumin, and Small Fennel)
Assam, Punjab, Bengal, and Bihar are among the states where *N. sativa* is grown. Concerning the therapeutic properties of *N. sativa* "There is a solution for every sickness except death in the black cumin," the Prophet Muhammad claimed, while the Holy Bible called black cumin a "curative black seed" (Maideen 2020). Terpenes such dithymoquinone, carvone, thymoquinone, limonine, trans-anethol, and p-cymene, indazole alkaloids like nigellidine and nigellicine, and isoquinoline alkaloids like nigellicimine, nigellicimine-N-oxide, and α-hederin are among the bioconstituents found in black cumin (Khan and Afzal 2016). Thymoquinone has been shown to inhibit the SARS-CoV-2 protease and to have superior antagonism to ACE 2 receptors in studies (Badary et al 2021). In a study of various *in silico* investigations were reviewed by Koshak and Koshak (2020), found that phytochemicals from *N. sativa* have a medium to exceptional affinity for SARS-CoV-2 enzymes and proteins, indicating that they have anti-COVID potential.

Ocimum sanctum (Family Labiatae; Common name: Tulsi)
Medicinal properties of *O. sanctum* are well elaborated in traditional Indian medicine Ayurvedic, Unani, and Siddha. Tulsi is known as the "Elixir of Life" in Ayurveda because of its healing powers for a variety of human health problems (Cohen 2014). Tulsi leaves contain bioactive phytochemicals such as phenolics, flavonoids, phenylpropanoids, essential oil, fixed oil, terpenoids, coumarins, and fatty acid derivatives. Methanol and dichloromethane extracts of *Ocimum* species exhibited antiviral activities against several human viruses (Caamal-Herrera et al. 2016, Tang et al. 2012, Ghoke et al 2018). Bioactive constituents of tulsi (tulsinol and dihydrodieugenol-B) inhibit COVID-19 key protease and papain like protease, and also possess ACE2 blocking properties with immunomodulatory features (Varshney et al 2020, Mohapatra et al 2020). The flavonoids and polyphenolic acids in tulsi ethanolic extract, particularly luteolin-7-O-glucuronide and chlorogenic acid, have been shown to bind covalently to the active residue Cys145 of SARS-Mpro and inhibit the viral enzyme irreversibly while being monitored *in silico* (Mohapatra et al. 2020). In addition, three phytochemicals from tulsi, vicenin, ursolic acid, and isorientin (4'-O-glucoside 2''-O-p-hydroxybenzoagte), were predicted to inhibit the activity of SARS-CoV-2 Mpro in a molecular docking and molecular dynamic modelling analysis (Shree et al 2020).

Piper nigrum (Family: Piperaceae; Common name: Black Pepper, kali mirchi)
P. nigrum grown in the Western Ghats of India, in the states of Karnataka, Maharashtra, Assam, and Kerala. It is referred to as the "King of Spices." Black pepper's polyphenol piperine is linked with a variety of therapeutic qualities. Peperine extracted from black pepper, according to Choudhary et al. (2020), is beneficial against COVID virus proliferation because it can prevent RNA packing inside the capsid protein. Furthermore, it included phenolic chemicals kadsurenin L and methysticin, which were effective in blocking COVID-19's primary proteases (Davella et al. 2021). More research is needed to determine whether it can be used as an anti-COVID agent.

Tinospora cordifolia (Family-; Common name-Amrita, Giloi)
Herbaceous plant found in tropical India and the Andaman Islands. Because of its high flexibility, it is known as the nectar of life. *T. cordifolia* well reported to possess antioxidant, anti-bacterial, antiviral and immunomodulatory properties. It may activate the Nrf2 pathway, which leads to the overexpression of antioxidant enzymes, inducing the adaptive response to oxidative stress. (Arunachalam et al 2021). By inhibiting PI3K/Akt, activating AMPK and sirtuins, and downregulating PI3K/Akt, it can also diminish the NF-κB signalling pathway (Arunachalam et al 2021). Documented immunomodulatory properties of giloi are due to occurrence of phytochemicals viz. magnoflorine, tinocordiside, syringin, 11- hydroxymustakone, N-methyl-2-pyrrolidone, Nformylannonain, cordifoliosideand, berberine (Saha and Ghosh 2012). Bioactive cordifolioside reduce immunomodulator cytokine (TGF-β and TNF-α) and might play pivotal role as inhibitor for SARS-CoV-2 (Manne et al 2021). Sagar and Kumar (2020) investigated the binding effectiveness of bioactive components of giloi viz. berberine, isocolumbin, magnoflorine and tinocordiside, using *in silico* tools against four SARS-CoV-2 targets viz. RBD

(6M0J), surface glycoprotein (6VSB), RNA dependent RNA polymerase (6M71) and Mpro (6Y84). Outcomes of the study revealed that all the four photochemical have high binding efficacy against selected four targets (Sagar and Kumar 2020). A new molecular docking and molecular dynamics investigation has found that berberine can limit viral replication by controlling the function of the 3CLpro protein (Chowdhury 2020). According to the results of another docking investigation, bioactive tinosponone, derived from giloi, is a powerful inhibitor of SARS-major CoV-2's protease, with the best binding affinity of -7.7 kcal/mol (Krupanidhi et al 2021). In conclusion, *T. cordifolia* has the potential to be a useful herb in the treatment of COVID-19 infection.

Withania somnifera (Family-Solanaceae; Common name- Ashwagandhaa)
Grown and farmed in India's arid and semitropical regions. In terms of its aphrodisiac effects, ashwagandha signifies "the fragrance and vigour of a horse." Ashwagandha's antioxidant and immunomodulatory properties have been studied for over two decades, and it has been found to be beneficial in increasing immune response and lowering viral multiplication (Agarwal et al 1996, Grover et al 2011, Kashyap et al 2020). *W. somnifera* root includes alkaloids such as withanine, psuedowithanine, somnine, somniferinine, and withaferin A, which can be used as an anti-inflammatory treatment (Dar et al 2015, Ingawale et al 2021). Phytochemicals of *W. somnifera* are suggested to increase nitric oxide synthase activity of macrophages, reduce IL-1, IL-6 and TNF and reinstate immune homeostasis, it be capable of a possible entity for the cure of SARS-CoV2 (Dar et al 2015, Ingawale et al 2021, Chopra et al 2021, Saggam et al 2021). Balkrishna and coworkers (2020) reported that withanone docked the binding interface of ACE 2- RBD complex, reduced the electrostatic factor of binding free energies of ACE2-RBD complex and destabilized the salt bridges at the interface centre. Furthermore, withanone reported to inhibit viral replication via dual inhibition of COVID-19 spike glycoprotein and 3CLpro (Patil et al (2021). Another *in silico* study reported compound withanoside V and somniferine as inhibitor of the activity of SARS-CoV-2 Mpro to combat COVID-19 virus (Shree et al 2020, Tripathi et al 2021). Additional, in a molecular docking study withanolides, a group of bioactive compound isolated from *W. somnifera*, reported as promising anti-viral efficacy phytochemicals against COVID-19 (Khanal et al 2021). In this study withanolides (G, I and M) showed the highest binding affinity with PLpro, 3CLpro, and spike protein, respectively (Khanal et al 2021). In one more molecular docking study different protein targets of SARS-CoV-2 namely NSP15 endoribonuclease and RBD of prefusion spike protein were targeted (Chikhale et al 2021). The study's findings revealed that phytochemicals, withanoside X, and quercetin glucoside, have beneficial interactions at the binding sites of specific proteins. Furthermore, withanoside X, which has the highest binding free energy (ΔGbind = -89.42 kcal/mol), has been proposed as the most effective virus inhibitor (Chikhale et al 2021). As a result, ashwagandha could be effective as a therapeutic adjuvant for COVID-19 treatment at various phases.

Zingiber officinalis (Family: Zingiberaceae; Common name: Ginger Adarak)
Native to Southeast Asia; in India mostly grown in Kerala, West Bengal, Andhra Pradesh, Uttar Pradesh and Maharashtra parts. Ginger is used as a frequent traditional medicinal plant having a broad ray of proven health beneficial capabilities, such as antibacterial, antioxidant, antiviral, analgesic and antipyretic properties. Ginger's phytochemical 6-gingerol was found to have the highest binding affinity with numerous targets of SARS-CoV-2, including viral protease, RBD, and viral proteases, making it a promising option for drug discovery against COVID-19 (Rathinav el et al 2020). Further *in silico* analysis suggested beta-sesquiphellandrene, another phytochemical from ginger, has effective inhibitory effect on spike protein of SARS-CoV-2 (Joshi et al 2020).

Miscellaneous Evidences:
Srivastava et al. (2020) evaluated 18 different species of Indian medicinal herbs in order to find strong COVID-19 inhibitors in an *in silico* analysis. The examined plant's lipophilicity, aqueous solubility, and binding affinity virus inhibition potentials were as follows: harsingar>aloevera>giloy> turmeric > neem > ashwagandha >redonion>tulsi> cannabis > black pepper. Joshi et al. (2020) developed a phytochemical library containing 318 phytochemicals identified in 11 plants and reported to have antiviral, antibacterial, and antifungal activities. Virtual screening was performed on the phytochemical library against molecular targets as ACE2 and Mpro. Plant phytochemicals such as *C. longa, O. gratissimum, Syzygium aromaticum, Piper longum, Phaseolus vulgaris, Artemisia absinthium, and Inula helenium* exhibit higher binding energy with Mpro and ACE-2, according to the findings of this molecular docking study (Joshi et al. 2020). Another study also used molecular docking technique to investigate bioactive phytochemicals found in tulsi, haldi, giloy, ginger, cloves, lemon, ashwagandha, and ginger against Corona (Maurya and Sharma 2020). The phytochemicals were

docked with viral capsid spike and protease to investigate their antiviral properties, and they were discovered to be capable of suppressing different stages of COVID infection as well as target proteins. Shree et al. 81 discovered that compounds derived from *W. somnifera, T. cordifolia, and O. sanctum* may bind to SARSCoV-2 Mpro and inhibit viral transcription plus replication.

Table 1: Indian medicinal plants experimentally proven for antiviral properties.

Plants (Botanical name)	**Family**	**Common name in Hindi**	**Anti-viral against**	**Reference(s)**
Andrographis paniculata	Acanthaceae	Kalmegh, green chiretta	Influenza, HIV-1,	Lin et al. 2018; Chen et al 2009, Calabrese et al 2000, Wintachai et al 2015, Wiart et al 2005
Allium sativum	Alliaceae	Lahsun	influenza B, HIV (type 1), vesicular stomatitis virus, herpes simplex virus (types 1 and 2), coxsackievirus species, gammaretrovirus	Chakraborty and Majumder, 2020
Alpinia officinarium	Zingiberaceae	Chinese ginger	H1N1, respiratory syncytial virus (RSV) poliovirus, measles virus, HSV-1	Sawamura et al 2010, Konno et al 2011, Pillai et al 2018
Avicenna marina	Acanthaceae	grey mangrove	Fowl pox	Mohamed et al 2010
Azadirachta indica	Meliaceae	Neem	Vaccinia, Buffalo pox, chikunguniya, herpes, measles	Dhawan 2008
Calotropis gigantean	Apocynaceae	Madar	Influenza	Parhira et al 2014
Cinnamomum cassia and Cinnamomum verum	Lauraceae	Daalacheenee	HIV-1, HIV-2	Premanathan et al 2000
Chrysanthemum mori-folium	Asteraceae	Guladaudee	HIV-1	Lee et al 2003
Cissus quadrangularis L.	Vitaceae	Harajora	HSV-1 and 2	Balasubramanian et al 2010
Curcuma longa	Zingiberaceae	Haldi	Dengu, Zika virus Chikungunya virus Vesicular stomatitis virus Human respiratory syncytial virus	Ichsyani et al 2017, Mounce, et al 2017, Gao et al 2019, Von Rhein et l 2016, Yang et al 2016, 2017
Gardenia sp.	Rubiaceae	Gandhraj	Influenza	Wang et al 2006
Glycyrrhiza glabra	Fabaceae	Mulethi	Japanese encephalitis, Polio	Badam 1994, 1997
Hibiscus sabdariffa	Malvaceae	Gangura, Lal ambary, Patwa	Measles	Sunday et al 2020
Hypericum mysorense and Hypericum hookerianum	Hypericaceae	Mysore St Johns Wort	HSV-1	Vijayan et al 2004
Moringa oleifera		Shajna, Drumstick	Influenza, polio, HIV, HSV, HBV, EBV	Xiong et al 2021, Adamu et al 2020, Biswas et al 2020
Nigella sativa	Ranunculaceae	Kalonji, Black cumin	Newcastle, hepatitis C virus (HCV)	Barakat et al 2013
Ocimum sanctum	Lamiaceae	Tulsi	Vaccinia	Dhar et al 1968

Phyllanthus amarus	Euphorbiaceae	Bhoomi Amla	Polio	Harikumar and Kuttan, 2006
Punica granatum	Puniaceae	Anar	Influenza, HSV, HSV-3 (Varicella Zoster Virus)	Vidal et al 2003, Zhang et al 1995, Divyadarshini et al 2019
Rhizophora mucronata	Rhizophoraceae	Asiatic Mangrove	HIV	Premanathan et al 1999
Sorghum bicolor	Poaceae	Jowari, jowar great millet	HSV-1	Filho et al 2008
Swertia chirata	Renunculaceae.	chirata	HSV-1	Verma et al 2008
Tinospora cordifolia	Menispermaceae	Guduchi, Amrita, Gilo, Giloe	dengue, herpes, HIV, chikungunya	Sharma et al 2019
Vitex trifolia	Lamiaceae		SARS-CoV	Liou et al 2018
Usnea complanta	Parmeliaceae	Old man's beard, or beard lichen	HSV-1	Vijayan et al 2004
Withaniasomnifera	Solanaceae	Ashwagandha	herpes simplex virus type 1 (HSV-1 virus), Hepatitis C Virus	Kambizia et al 2007; Mofed et al 2020
Zingiber officinale	Zingiberaceae		Hepatitis C	Sookkongwaree et al 2006

Conclusion

India has long been known for its diverse biodiversity and wide range of medicinal plants, which can be found anywhere from the Himalayas to the sea, deserts to rain forests. The status of Indian medicinal plants and their phytochemicals, as well as their diverse preventive/therapeutic advantages against human viruses, including COVID 19, were revealed in this article. Exploring the scientific basis of bioactive medicinal plants is a requirement for realising the concept of evidence-based phytotherapy. The AYUSH medical system focuses on basic natural therapies for improving and developing a robust immune system in order to combat the covid virus. However, further experimental and clinical trials are needed to offer definitive evidence of Indian medicinal herbs' therapeutic effectiveness. The safety of phytotherapeutic techniques must also be explored, in addition to their efficacy.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Impact of COVID-19 Pandemic on Mental Health and Sociality: Some aspects

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ABSTRACT

COVID-19 comes with several negative health impacts specially those related with mental problems, the depth and scope of which are greater than any other natural and manmade calamity leading to prolonged stress and uncertainty. Depression, sleep problem, more probability of intimate partner violence, child abuse, and neglect and ultimately linked to suicide are some major complications that are make boil by heavy alcohol consumption. The suspension of fertility treatments due to the COVID-19 pandemic has a variety of psychological impacts on women whose treatments were cancelled. Healthcare workers are also struggling with a suite of mental-health challenges during the COVID-19 pandemic. In addition, Hourly service workers and their children are also in the grip of COVID-19 pandemic that swiftly and substantially worsened their mental health mental health especially those experiencing multiple hardships. Having a pet was linked to maintaining better mental health and reducing loneliness. Also, nature around one's home may help mitigate some of the negative mental health effects of the COVID-19 pandemic. It is concluded that protecting natural environments in urban areas is important not only for the conservation of biodiversity, but also for the protection of human health.

Keywords: COVID-19, Mental health, Alcohol consumption, Pet, Biodiversity.

Introduction

COVID-19 pandemic has affected all arena of life. Their health consequences cannot be limited only to illness, cough, breathing problems, and fatigue etc. that exist along with a person suffering from it. Due to lack of efficient treatment method many preventive steps have been taken by respective governments across the world. These preventive measures include strict lockdown of several days, travelling restrictions, social distancing and individual isolation, wearing face masks, hand wash, use of alcohol based sanitizer and other hygienic strategies. All these restriction and hygienic measurements deviated individual's behavior and psychology from normal. This deviation cannot be limited to individuals who are suffering from COVID-19, but all the peoples of a society, because preventive advices are applicable to all. Strict lockdown of several days, travelling restrictions, social distancing and individual isolation, adversely affected normal daily routine of all the sections of a society. Heavy downfall in economic activity pushes peoples specially those who are at the border line of poverty to go in financial crisis. Sudden rise in public health demand created huge pressure on health sector. Both health service seekers as well as health worker come under physical as well as mental threat under these circumstances. During these panic situation scientists across the world studied behavioral and psychological outcomes of COVID-19. Although these studies are not final and new things are coming every day, these findings are enough to say how drastically this pandemic affected mentality of peoples. Present chapter aim to focus to describe some aspects of impact of COVID-19 pandemic on mental health and subsequently on sociality. This will provide us information about problems and some insight how we get rid of it. Some aspects of impact of COVID-19 pandemic on mental health may be described under following heads.

A) Psychological distress, anxiety, family violence, suicidality, and well being during the COVID-19 lockdown

COVID-19 pandemic comes with severe domestic and global negative economic impacts (Verma and Prakash, 2020). The quantum of this impact is greater than we have

faced earlier with natural disasters and terrorist attacks. Hence cases of stress and uncertainty are also more. Due to unavailability of treatment, respective authorities imposed strict lockdown to control spread and affectivity of COVID-19 virus across the world. This preventive measure certainly helps a lot to manage this pandemic. However, this success was not without cost, both economic and social. Demographical studies show that adult participant of the study group experienced mental distress during the lockdown, along with some form of 'silver linings'. Participant of the surveys claimed moderate to severe psychological distress and moderate to high levels of anxiety (Kumar, 2021). Almost 40 per cent said their level of well-being is low. Thus strict lockdown brought a significant psychological toll. Substantially increased rates of distress were seen among those who lost their jobs or experienced a reduction in work during this period. Persons comparatively more vulnerable toward COVID-19 or poor health status as per their past diagnosis regarding mental illness were found more prone to mental distress. Suicidal thoughts were also noticed in some individuals during lockdown, although more peoples reported similar thoughts months ago prior to this panic period. In a study carried out in Sweden, it was found that having lower income, lower level of education, unmarried, born in low- or middle-income countries are some independent factors related to an elevated risk of dying from COVID-19. Men were found to have more than twice as high a risk of dying from COVID-19 than women.

A separate study found that 27.8% of U.S. adults had depression symptoms as of mid-April, compared to 8.5% before the COVID-19 pandemic. Increase in depression symptoms were recorded among all demographic groups. Persons having less income and accordingly savings were more likely to have depression symptoms. Income and savings are the most dramatic predictors of depression symptoms during this panic time. Similar conclusions have been drawn in studies conducted in Asian countries especially on healthcare workers and college students. Persons already at risk due to fewer social and economic resources, before COVID-19, were more likely to report probable depression. It is clear that inequity might increase during this time and that health gaps might widen. These findings make us to think to create a society where people have fair wages, so as families have some money for future use. In addition equitable policies and practices are the need of time. Policymakers should think about universal health insurance without any term and conditions.

Many older adults were found to feeling more stress of COVID-19 in comparison to younger adults in a study conducted with two age group those aged 60 to 70 and adults 71 and older. About 40% of 60- to 70-year-old respondents said they felt moderately or very stressed and felt out of control of their lives. This subgroup reported more increase in some unhealthy behaviors, such as drinking more alcohol and eating more than usual. But the older subgroup, those 71 and older, seems to be handling stress better than their younger counterparts. Researchers added that they have life experiences and coping mechanisms that we generally ignore a possible reason behind this comfort. Due to cut off with social distancing, younger adults were observed to experiencing more exacerbated feelings of loneliness. To overcome this, they are using a wider range of communication tools to stay in touch. Internet helps a lot in this connection, although it is hard to replace human contact.

A separate study is telling a different story about persons over 70 who were advised to 'cocoon' as part of public health measures to curtail the spread of the COVID-19 virus. This study was based on data provided by ALONE, telephonic friend service provider in USA. Befriending service was continued during lockdown with volunteers calling and sending regular texts to older people with health and well-being tips and practical supports. It was recorded that55% of callers were from the over 70s, and most of living alone. Most were found to taking about negative emotions, including suicidal ideation during the pandemic and requested support for their physical health, befriending, and emotional and mental health needs. The data clearly showed that social distancing and cocooning increased the levels of loneliness and social isolation in older people. This may have a negative effect on the well-being of older adults.

B) The situation of health care workers during COVID-19 pandemic-

Healthcare workers are at greater risk than the general public of experiencing health problems such as depression during COVID-19 pandemic. Healthcare professionals reported enough symptoms of depression to be diagnosed with clinical depression with confidence. Whether a physician or a supporting staff of a hospital, all are at risk for mental-health problems. Researchers conducted an online survey of 90 healthcare workers such as physicians, nurses and medical technicians, hospital administrators and compared with who did not work in healthcare. Healthcare workers reported higher levels of stress, anxiety and tiredness, as well as lower feelings of control over their lives. Furthermore the healthcare workers were found to doing less to prepare themselves for future stresses or adverse events. This study clearly shows that healthcare workers are at much higher risk

right now of negative outcomes, such as depression. Another study adding more to this by saying that health care workers specially nurses have a higher prevalence of SARS-CoV-2 infection than non-health care workers. The study conducted on 546 health care workers with direct patient exposure and 283 non-health care workers with no direct patient contact., found that participants most likely to test positive for COVID-19 were nurses, workers taking care of multiple patients with suspected or confirmed COVID-19. In addition nurses who worked in a hospital with a higher proportion of infected patients of other cases are also vulnerable. It is important to note that intensive care unit workers were found to have lowest rates of infections among the health care workers, possibly because of more consistent use of personal protective equipment (Balwan *et al*., 2021).

Apart from health care workers COVID-19 pandemic swiftly and substantially worsened mental health of hourly service workers and their children also. Study conducted on parents of young children working in hourly service-industry positions in retail, food service or hotel industries focuses light on catastrophic effect on such low income peoples. Parents shown to have quick deterioration in their own mental well-being. They reported more frequent "negative moods" after lockdown announcement. The majority of respondents experienced multiple hardships, including household job loss (60%), income decline (69%), care-giving burden (45%) and illness (12%). Mental health was worst among those who suffered all four hardships in case of both parents and children. Researchers suggested that pediatricians should screen for mental health problems with particular attention to children whose families are especially more vulnerable to this economic and health crisis. Government should provide more support for such families, through restarting expanded unemployment insurance benefits. Along with this increasing the generosity of the food security programs is in demand.

C) Suspension of fertility treatments during lockdown has mental health impacts-

The suspension of fertility treatments due to lockdown restrictions created a variety of psychological impacts on women whose treatments were cancelled. This situation was found more worst to those who were running for intrauterine insemination (IUI) and in vitro fertilization (IVF), which require many in-person appointments to complete. Study regarding this recorded 86% of respondents to have negative impact on their mental health and 52% clinically significant depression symptoms. It was also observed that age, education, income, numbers of children were nothing to play with this mental health crisis. However, lower levels of defensive pessimism, greater infertility acceptance, better social support and less avoidance of infertility reminders were all associated with condition of mental health. It was suggested that good social support was very effective for women cope with this difficult time.

D) Child anxiety during unlock process-

Stress is not the case only with lockdown, but unlocks process also. Psychologists highlighted that health anxieties can be sparked by changes like returning to school after prolonged period spend at home. It is advised that young people need time to readjust routine that was before lockdown and to deal with emotions after such a prolonged period at home. It is also added that parents and teachers need to be aware of signs such as excessive hand washing, and reassurance-seeking about health-related worries.

Tummy ache, sleeping problems and avoidance to normally enjoyable activities are signs of stress in children affected by health related anxiety. Apart from this excessive hand-washing, exaggerated avoidance of touching objects for fear of picking up the virus, or repeated reassurance seeking from adults are also signs of stress and worry. These signs are important because children are not always in position to verbalize their concerns. So it is suggested that marked changes in behavior should be noticed by parents. Teachers should also care about behavioral changes and aware of children activity. It was also found that health anxieties in children may be triggered by illness of responsible person of the family or other health-related worries. In this situation it is advised that parents and teachers to seek professional help where needed. Cognitive behavioral therapy (CBT) can be an effective treatment to such children and young people's health anxieties. Also school returning children and young people need to have the opportunity to catch up, not just academically, but also socially and emotionally.

D) Alcohol use during pandemic situation-

Excessive alcohol use is a common outcome of stress. High mortality rate due to COVID-19 leads to loss and grief in peoples. Widespread social disruption and isolation at one side and less social support and access to medical care due to stay-at-home orders and restrictions ignited peoples for alcohol consumption.

Study carried out in London, UK shows that social isolation during lockdown is a risk factor for increased alcohol consumption among peoples. Those previously abstinent also started to drink. Similar results were found

in study conducted in Australian where 30.8% of participants endorsed drinking more than normal during lockdown period. Sleep disruptions, changes in eating behaviors, and higher levels of depression and stress have been noticed in persons who lost jobs due to lockdown restrictions. Similar situations have been noted in USA, where psychological distress as a result of COVID-19 pandemic found to be significantly associated with alcohol use. Women were pronounced to alcohol consumption than men.

Health problems such as high blood pressure, stroke, liver disease and cancer are found to be associated with heavy alcohol consumption. In addition alcohol-impaired accidents and driving fatalities are also very common. Depression, sleep problem, more probability of intimate partner violence, child abuse, and neglecting are common outcomes of heavy alcohol use those ultimately lead to suicide. All these alcohol-related health and social consequences are a substantial economic burden globally. To get rid of this better public health messaging system together with treatment plans are required.

Overall impact of COVID-19 on alcohol use is still incomplete. Multi dimensional approaches encompassing both social and medical factors are required to overcome this unwanted rise in alcohol consumption. As early we are able to assist individuals in limiting their alcohol need, the better chance we have of preventing severe psychosocial and health consequences of alcohol overuse as an important comorbidity of COVID-19.

E) Effect of lockdown on fitness strategies-

Because of the COVID-19 pandemic, most university authorities closed campuses across the globe transitioned from face-to-face classes to remote learning. Such changes together with social distancing guidelines drastically altered social interactions. Lockdown restrictions also limited our access to fitness facilities, parks and gymnasiums.

It appears that those who were most physically active before the pandemic get most negatively affected. But these active individuals successfully utilized the fitness facilities that were closed when the pandemic hit. Surprisingly individuals who were less active before the pandemic increased their physical activity. It was argued that elimination of a daily commute left them with more time for physical activity. It is also possible that they started walking just to get out of the house for a bit. In contrast to this increase in sitting by over an hour per day was found to be associated with a range of health complications, such as cardiovascular disease, diabetes and even a greater risk of dying earlier. It was suggested that it is necessary for us to maintain positive health behaviors despite these challenges. Try to minimize sitting for extended periods of time, and when possible, add in some exercise at home or outside.

F) Social dilemmas about protective measures

In a study it was trying to know how the behavior of others influences individual decision-making, as a part of social dilemma. It was observed that a belief about COVID-19, such as disease is dangerous or feelings of vulnerability have little impact on whether or not an individual takes up protective measures. The peoples who believe that precautions taken by others mean that they do not need to take their own were found to least likely to adopt precautionary measures. It was observed that level of education, family environment, age and the number of cases declared in the region do not influence behavior. Most of the people have mindset that "If no one else is doing it, why should I be the only one making the effort? Another factor that negatively influenced is that your own contribution is pointless compared to the size of the danger. Study came to the conclusion that more social contacts the participants have, the more they felt vulnerable, even though this did not inspire them to adopt the correct actions.

It can be said that social dilemmas influence behavior. Psychosocial approach is important before conveying any information about COVID-19 so as not to miss the intended goal.

G) A regular dose of nature may improve mental health during pandemic

An online questionnaire survey carried out in Tokyo, Japan, quantified the association between five mental-health outcomes (depression, life satisfaction, subjective happiness, self-esteem, and loneliness) and two measures of nature experiences (frequency of green space use and green view through windows from home).It was pointed out that green space use and the existence of green window views from the home were associated with increased levels of self-esteem, life satisfaction, and subjective happiness, as well as decreased levels of depression and loneliness. It was suggested that nearby nature can serve as a buffer in decreasing the adverse impacts of a very stressful event on humans. Therefore protecting natural environments in urban areas is important not only for the conservation of biodiversity, but for human health also.

H) Pets as an important companion for better mental health and reducing loneliness during lockdown

Some studies found that having a pet aided to maintaining better mental health and reducing loneliness. This benefit

did not found to differ with species. So cats, dogs, fish, all are important in this regard. Persons who did not had any pet animal started bird-watching and feeding them in garden. Most of the respondents in these studies said their pet helped them to cope emotionally with the lockdown and helped to keep them fit and active. However respondents were also worried about their animals during lockdown. Restrictions on access to veterinary care and thought that who would look after their pet if they fell ill, were their common problems. This study also demonstrated potential links between people's mental health and the emotional bonds they form with their pets. It is important to note that researchers alarmed regarding clinical significance of this study and did not warrant any suggestion that people should acquire pets to protect their mental health during the pandemic.

Conclusion

It is clear that impact of COVID-19 pandemic on mental health and subsequent sociality is multi dimensional and deep. This pandemic has affected all sides of life of everyone. Some may be more affected than other, but no one can ignore this truth. Millions of peoples lost lives across the globe, but what it left in mind are many folds. All sects of society have its own story about this disastrous time. Peoples who were already struggling hard for livelihood were found more affected in comparison to those better ones in all dimension whether economic or social . This economic and social bad condition ultimately leads to mental health consequences. Some abuses of the society such as heavy alcohol consumption get triggered during this panic situation. Ultimately alcohol related health and social related ill consequences have been well documented. Health workers and peoples whose treatments get suspended due to strict lockdown were also gone through mental disorders. Mental health consequences are not restricted to only to lockdown restrictions but beyond this. Lockdown conditions has imprinted a lot in mind, that get reflected during unlock. To cope with these adverse mental health conditions pet animals and greenery around us help to some extent.

This is not the whole picture but only a glimpse what was happening around us during these days. These warn us how we care of us in future. Entire world has to think about happiness of the people's not just economy. Policies should be for people's welfare.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Impact of COVID-19 on Rice Farmers of Odisha and Jharkhand

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ABSTRACT

Corona-virus disease (COVID-19) is an infectious respiratory disease caused by the Severe Acute Respiratory Syndrome coronavirus-2 (SARS-COV-2). Due to rapid increase in the COVID-19 cases, the first nationwide lockdown was announced on 24th March, 2020 in India. The lockdown was extended in several phases in different states with restriction as per the situation. The lockdown of COVID-19 pandemic affected all sectors including agriculture sector in the country. A study was undertaken with the objective of assessing the impact of COVID-19 over rice farmers of Odisha and Jharkhand states. Hundred percent farmers of Jharkhand state reported higher price of inputs like fertilizer and pesticides, sixty nine percent farmers of Odisha reported unavailability of inputs like fertilizers and pesticides in the market and hundred percent farmers of both the states reported less profit in the COVID-19 pandemic. The cost of cultivation of rice farmers of Odisha and Jharkhand states increased due to increase in the price of input supply material and hiring charges of farm implements resulted in the reduction of their income which ultimately affected the sustenance of farm families of these states.

Keywords: Rice, impact, COVID-19, Odisha, Jharkhand, rice farmers.

Introduction

Corona-virus disease (COVID-19) is an infectious respiratory disease caused by the Severe Acute Respiratory Syndrome coronavirus-2 (SARS-COV-2). First case of COVID-19 was reported in December 2019 from China in the world. In India, the first case of COVID-19 was reported in January, 2020 from Kerala. Till now, the virus has been spread to 223 countries and more than 23 crore people were infected and more than 47 lakhs were died due to infection with COVID-19. In India, more than 3.36 crore persons were infected and more than 4.47 lakh persons were died due to it. Out of total cases worldwide, 14.48% infected cases and 9.38% deaths recorded from India. First case of COVID-19 in Odisha and Jharkhand states was reported during March, 2020. In Odisha till now more than 10 lakh persons were infected and more than 8 thousand persons were died due to COVID-19, which is about 3% of infected cases in Odisha. In Jharkhand, total infected cases were more than 3.4 lakh and the deaths reported due to be more than 5 thousand, which is about 1% of total infected cases in Jharkhand.

Due to rapid increase in the COVID-19 cases, the first phase of nationwide lockdown was announced on 24th March, 2020. After the first phase of lockdown, the lockdown was extended in several phases in different states with restriction as per the situation. As a result of lockdown due to COVID-19 pandemic, it affects all sectors including agriculture in the country. A study was undertaken with the objective of assessing the impact of COVID-19 over rice farmers of Odisha and Jharkhand. Data was collected from selected rice farmers of Jajpur, Ganjam, Bhadrak districts of Odisha and Ranchi district of Jharkhand.

Rice Production Scenario

The area (million ha), production (million tons) and productivity (t/ha) of rice in India from 1950-51 to 2019-20 is given in Fig. 1. The rice area is increased from 30.8 to 43.7 million hectare. The rice production is increased from 20.5 to 118.9 million tons. Rice yield increased from 0.67 to 2.72 tons/hectare. In India, rice area increased about 1.5 times, rice production increased six times and rice yield was increased four times during last seventy years.

The area (million ha), production (million tons) and yield (t/ha) of rice in Odisha state from 1960-61 to 2019-20 is given in Fig. 2. In Odisha, the rice area, production and

yield is increased from 3.78 million ha; 3.67 million tons and 0.97 tons/ha, respectively in 1960-61 to 3.94 million hectare, 8.36 million tons and 2.12 tons/ha, respectively in 2019-20. The rice area is almost constant during last sixty years but the rice production and yield is increased about 2.1 times.

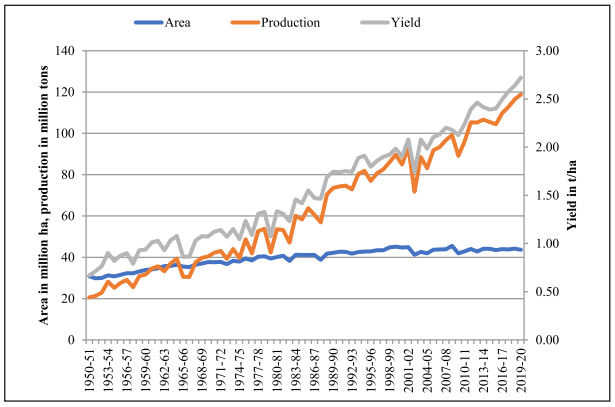

Fig. 1: Area, production and productivity of rice in India from 1950-51 to 2019-20.

Jharkhand state was part of Bihar state and it was carved out of Bihar in 1999. The rice area is changed from 1.48 million hectare in 2000-01 to 1.36 million hectare in 2019-20; rice production increased from 1.64 million tons in 2000-01 to 3.01 million tons in 2019-20 and rice yield increased from 1.11 tons/ha to 2.22 tons/ha in 2019-20. The rice area of Jharkhand during last 20 years i.e. from 2000-01 to 2019-20 is almost constant, while rice production and yield is increased about1.8 to 2 times during that period (Fig. 3).

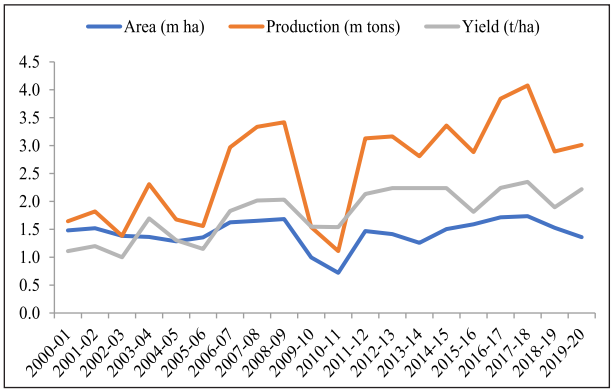

Fig. 3: Area, production and productivity of rice in Jharkhand from 2000-01 to 2019-20.

Effect ofCOVID-19 on Rice Farmers of Odisha

The data was collected from rice farmers of Jajpur, Ganjam and Bhadrak districts of Odisha and the problems faced by the rice farmers due to lockdown of COVID-19 were identified. Unavailability of quality seed for sowing was reported by 51% farmers. Most of the shops were

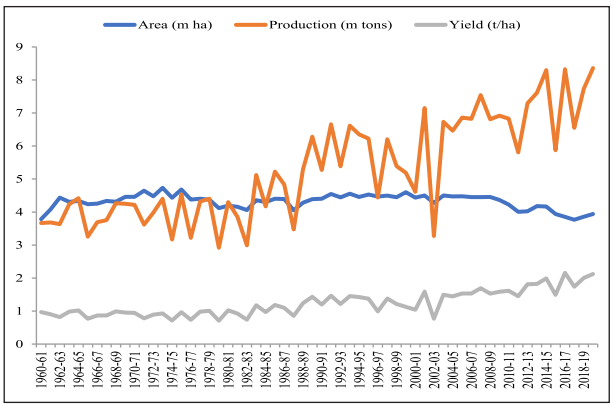

Fig. 2: Area, production and productivity of rice in Odisha from 1960-51 to 2019-20.

closed due to fear of COVID-19. Therefore, 69% farmers reported unavailability/shortage of fertilizers, pesticides. About 44% farmers reported that labourers were not available for performing different agricultural operations like transplanting, weeding, harvesting etc. Labourers were fearing that they will get infected with COVID-19 if they will go to field. Around 20% farmers reported that agricultural farm implements were not available for performing agricultural operations. Due to non-availability of labours and implements, 42% farmers reported delay in transplanting. The hiring charges of implements were also raised due to shortage of implements. Labour charges were also increased due to limited availability of labourers. Due to increase in the price of input supply material (seed, fertilizers, etc.), farm implements and labour charges, the cost of cultivation of rice increased substantially. Even 2% of the respondents reported that they kept their land follow due to fear of getting infected with COVID-19, if they ventured out to farm (Fig. 4).

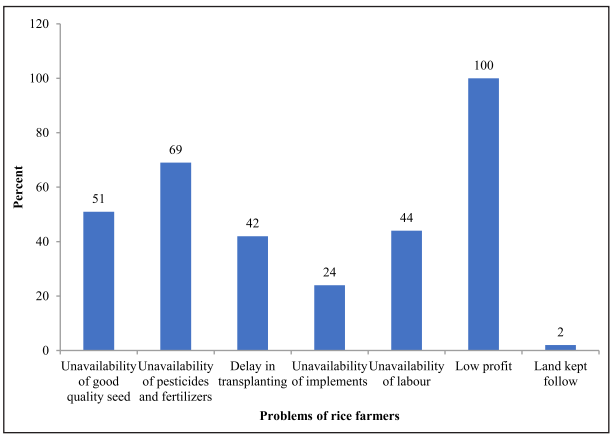

Fig. 4: Problems faced by rice farmers of Odisha during COVID-19 period.

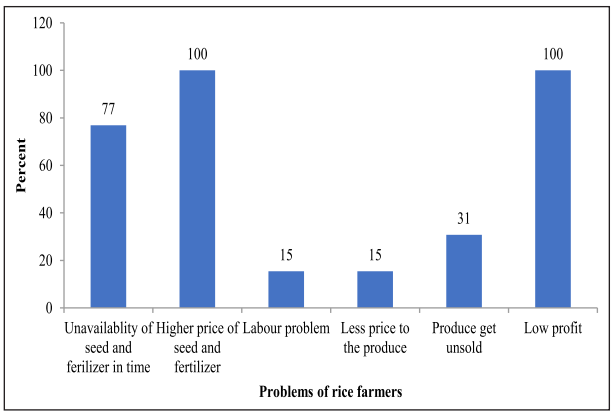

Fig. 5: Problems of rice farmers of Jharkhand during COVID-19.

Effect of COVID-19 on Rice Farmers of Jharkhand

The data was collected from the farmers of Ranchi district sustenance of farm families.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Impact of Covid 19 on Environment and Life

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ABSTRACT

This paper follows the enlisted impact of the pandemic in various fields and phases of life such as · Natural Environment · Social Environment & Psychological Environment. *Natural Environment* : Our environment is an ecosystem where all living creatures and non-living components interact with each other continuously. Both are interrelated, a slight change may interrupt their interrelationship. While the Covid-19 Pandemic is wreaking havoc from December 2019 to date, there are pros and cons to the same such as • Environment, wildlife recouped after a few weeks of lockdown and started rejuvenating itself in various ways • Air quality improved during the lockdown. · India's carbon dioxide emissions fell by around 1% in the year 2020 • In India dissolved oxygen levels have increased from 22 March 2020 to September 2020 in rivers. *Social & Psychological Environment*: As schools were closed, our social environment and psychological environment were adversely affected. During the pandemic, a major spike in suicide cases was seen. Mental health and psychiatric symptoms were very prominently visible, Corona phobia was observed as one of the key by-products of a pandemic.

Keywords: COVID-19, IEA-2019, SARs-CoV-2.

Introduction

The environment is a geographical area where all living creatures and non-living components interact with each other in a natural system. Both are interrelated to each other, a slight change may interrupt their interrelationship. An environment is an interdisciplinary approach, all the science, social science, and humanities make our interrelationship with the natural system. Some other things also involve making the environment are physical, chemical, and other natural forces.

According to P.Gisbert: Environment is anything that immediately surrounded an object and exerting direct influence on it. Anything which exists in our system directly or indirectly affected by our environment. In this way, the environment can be classified into four types:

1. Natural Environment
2. Artificial Environment
3. Social Environment and
4. Psychological Environment

The natural environment includes; the natural resources, land, the surface of the earth, and water, mountain, ocean, weather, climatic factors, season and it also includes biological conditions such as plant and animal along with their complexities. When the natural environment gets disturbed due to some weather change, potential illness, and global climate change contributes to death globally. For example- Poor weather conditions alone can contribute 28% of the motor vehicle accident. More than 8,000 deaths occurred in the United States from 1979 to 1999 due to exposure to heat. On the other hand from 1979 to 2002, 689deaths per year accounted due to cold weather, hypothermia.

If the natural environment gets changes, it will lead to the death of living beings and can be responsible for economic loss also. The natural environment includes natural conditions, forces, and objects which directly influence life but are not influenced by man.

The artificial environment represents the man-made structure, modeling of buildings, bridges, roads, and other human-made structures. Man-made structure or human-made modified structure has been made by man not nature for example- artificial satellite. The impact of the artificial environment as our planet continuous to warmer day by day. For example- In 2016, climatic change impact, there

were 772 disaster events happened which triples the number that occurred in 1980.

The social environment is a concept of social class or social environment change. Although the people have different nature of work they do but work in unity. There are different types of social environments like family, religion, permanent social group, temporary social group, government, and political organization. The basic foundation of the social environment is healthy; if the health will deteriorate the whole social environment gets change. (I. Clement, (2014).

The interplay between individual and their surrounding from psychological environment. In other words when the natural environment and artificial or man-made environment interplay with each other, it influences each individual of the community and shapes their lifestyle along with their psychological view. The impact of the Psychological environment always human-related problems, he gets from the surrounding environment such as different types of pollution, noise pollution is one of the prominent pollutions due to density and crowd of the city. Stress-related illness is also very common in people.

The environment is a broader concept, comprises the interaction of all living creatures with their immediate climate, weather, and natural resources that directly or indirectly affect human survival and his economy. A slight change in our environment is visible in our lifestyle.

PANDEMIC

In our present scenario Pandemic is one of the environmental-based problems which affect not only our natural environment but it has affected our psychological environment also. An epidemic is a disease that affects a large number of people within a region. Where as when epidemic spread over multiple

continent than it is known a Pandemic. For example- when COVID-19 was limited to Wuhan, China, it was an epidemic, but the geographical spread of the disease turns into Pandemic. The human population from ancient times faced conflict with the environment; some devastating diseases is a plague, smallpox, malaria, cholera, tuberculosis, influenza HIV/AIDS which affects the human population. In 1918 due to Spanish flu or influenza 50 million people around the world killed. Pandemic spreads in the entire world due to newly built transportation and global trade network. (Christian W. McMillen,2016).

CORONAVIRUS DISEASE 2019(COVID 19):

Corona virus disease 2019 (COVID-19) is a highly contagious disease caused by severe acute respiratory syndrome corona virus2 (SARS-CoV-2) (Gorbalenya et al, 2020). It was first seen in December 2019 in Wuhan, China (Lu et al., 2020; Zhu et al. 2019). The outbreak was declared a Public health emergency of international concern on 30 January 2020. On 11 February 2020, WHO announced it as a new corona virus disease: COVID-19. Soon WHO announced COVID-19 outbreak a pandemic on 11 March 2020. A Coronavirus is a large group of families that ranges from the common cold to more severe disease. This type of virus strain is a new strain has not previously been identified in humans.

IMPACT OF COVID 19 ON ENVIRONMENT

Humans started destroying nature in ancient times, manipulated the environment for their use. Results into the demand of the large population, industrialization, and civilization. The detrimental effect soon observed because of urbanization of community and industrialization: Air pollution, Climate change, Ozone layer depletion, global warming, depletion of groundwater level, change of biodiversity, and ecosystem. The result of global warming is increasing the concentration of greenhouse gases (CO2, CH4,N2 O, etc.) (Bremer et al., 2019 coutts et al., 2010).

But after the unusual outbreak of COVID 19, all the metropolitan cities and villages in the whole world underwent complete or partial lockdown for a long time from a few weeks up to a few months. All government and private sector banned the free movement of their citizens couldn't travel across the country to avoid community transmission. Various industries were not functional, all international and national travels were cancelled. Due to the lesser demand for power in industries, the use of conventional energy sources has been decreased. The changes in environment and wild life is the impact of pandemic upon the lives of human around the world. It was a global thread and developed overwhelming results (Wang et al. 2020). However, there are pros and corns on the life of human. Some of the positive and negative impact appeared after lockdown. The satellites images show miraculous change in the environment which shows positive impact of COVID-19.

In china a drop of 25% in CO2 emission with 30% Nitrogen Oxide emission was observed during lockdown (Lau et al. 2020). Energy related CO2 emission in India was 1.8 as per SDG report 2020. Before the COVID-19 pandemic of 2020 emission of carbon dioxide were rising by about 1% per year over the previous decade (Friedlingstien, P. et al. 2019; Jakson, R.B et al 2019) with no growth in 2019 (Peter's, G.P et al global CO2 emissions in 2019) IEA 2019. Due to less traffic restrictions on business and human activities, NO2 concentration level reduced which indicates that

anthropogenic activities may be managed to reduce air pollution. In India six pollutant NO2, SO2, PM10, PM2.5,CO and Ozone are decreased during lockdown period (Sharma et al. 2020).

However the water quality of rivers of India including Ganga, Cauvery, and Yamuna etc. improved during lockdown (Dutta et al. 2020). The environmental noise was reduced due to complete lockdown. The shy animals started wandering in the city, their pollution also increased at that time. Cranes (Stork Crane) increased by 15% in a year in Purvanchal revealed by the report of the wild life trust.

Pandemic shown negative inevitable effect on the economy and all parts of human society. It is interesting to mention that COVID pandemic evidence the direct effect on mental health and psychiatric symptoms. However the COVID-19 Pandemic restrict world in self isolation and quarantine which established risk factor with psychological impact World Health Organization. Mental health and psychosocial consideration during COVID-19 outbreak World Health Organization 18 March 2020.

The Corona virus pandemic has become a serious region for the potential spike in suicides, exacerbated by social isolation and guide lines fear and unemployment and financial factor corona phobia is by- product of the pandemic where people have an excessive fear of contracting corona that impacts on the impairment in daily life function (Arora et al. 2020) during the pandemic time social distance and limited contact with the friends and relatives, social media become the best platform to connect people. However, social distancing has changed the day to day life for many people which put a disturbed mental health (COVID-19 victoria new 31 March 2020 retrieved 15 April 2020).

The pandemic has affected the educational system around the world which disrupt the education of students, this affects over 1.5 Billion Students worldwide (UNESCO 04 March 2020 retrieved 29 march 202). Those students who are in higher education universities have also been impacted as they didn't stop the classes but rather switch to online classes the survey of these students shows that mental problems arise due to the change mode of education (Aristovnik A, et al. 2020).

Conclusion

The environment has rejuvenated to a large extent that should set a positive impact on global climate change. However there are pros and corns of COVID-19 on the human life. COVID-19 has emphasized improving the interrelationship between human and nature. The negative impact of the COVID-19 disturbed the social life, of human and has affected our future also in various ways like psychological problems, occupational loss, un-employment.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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COVID-19 Pandemic: New Challenges for Environmental Sustainability in Developing Countries

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ABSTRACT

Coronavirus disease-19 (COVID-19), produced by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a global pandemic, giving rise to a serious health threat globally. The global Covid-19 pandemic is a setback for sustainable development and compromise the world commitment to the 2030 Agenda for Sustainable Development. The measures taken to control the spread of the virus and the slowdown of economic activities during lockdown have significant effects on the environment. Therefore, this review discuss the indirect positive and negative impacts of Covid-19 pandemic towards sustainable environment. This study indicates that, the pandemic situation significantly improves air quality in different cities across the world, reduces the emission of greenhouse gases, and decreases water and noise pollution, which may help in the restoration of the ecosystem. In addition, there are also some negative impact of Covid-19, such as increase of medical waste, haphazard use and disposal of disinfectants, mask, and gloves; and burden of untreated wastes continuously endangering the environment. It points to the fact that the net effect has been positive; in terms of reduction in greenhouse emissions, oil exploration activities, and pollution. It is expected that the proper implementation of the proposed suggestion might be helpful for the global environmental sustainability.

Keywords: Covid-19, Environment, Sustainability.

Introduction

WHO released a pneumonia outbreak of unknown cause on January 5, 2020 (WHO, 2020). On February 11, 2020 WHO named the disease Covid-19 (formerly known as the "2019 Novel Coronavirus"), which is caused by a coronavirus. Coronaviridae Study Group (CSG) of the International Committee on Taxonomy of Viruses (ICTV) named it SARSCoV-2 on February 11, 2020 and recognized this virus as a sister clade to Severe acute respiratory syndrome coronaviruses (SARS-CoVs). Covid-19 disease has spread over 219 countries and territories, infected more than 126,852,304 people, and caused at least 2,782,183 deaths as of March 27, 2021. Covid-19 presents an unprecedented challenge to public health, food systems, economic and social disruption and also environment in diverse ways.

The pandemic has impacted in both positive and negative ways to all the four dimensions of sustainable development: economic, social, education and environmental. Countries which have successfully navigated the crisis have generally implemented policies which will accelerate these transformations in the direction of sustainability, while countries which have failed to rise to the challenge have reinforced patterns which will make sustainable development harder to achieve in the future. The highest priority of every government must remain the suppression of the pandemic, through non-pharmaceutical interventions and global access to vaccines. There can be no sustainable development and economic recovery while the pandemic is raging.

Thus, pandemic has forced the shutdown or lockdown of many physical activities and social activities worldwide, including transportations and educational institution. The direct effects of these measures were felt in the economy, as well as in key institutions within society and educators (Kumar, 2021); however, there were also indirect results

from these changes. Thus, this review article focuses on these indirect effects, towards sustainable environment.

POSITIVE IMPACT OF COVID-19 ON ENVIRONMENT

Globally, the Covid-19 pandemic affected the environment, placing a strain on the economy and all parts of human society. It provided many positive impacts on environment (Verma and Prakash, 2020a; Roy and Chaube, 2021). The positive impact includes reduced air, water and noise pollution, better growth of vegetation, short-term disruption in wildlife trafficking and ecosystem restoration etc. due to reduction in human pressures on the natural ecosystem because of the lockdown of social and economic activities. Despite this, prevailing problems such as indiscriminate exploitation of wildlife resources, tourism revenue loss, staff absenteeism and poor performance, increased human dependence on natural resources, disruptions in field and research work, and species monitoring would persist. The Covid-19 pandemic affected the conservation program funding in most countries. Our world is changing, and the conservation community must be ready to respond appropriately.

Reduction in air pollution and GHGs emission: During covid-19 pandemic energy demand in business and commerce area has been reduced which ultimately reduced the air pollution in urban areas (Rume and Islam, 2020). This resulted in better air quality in areas notorious for poor air quality, as well as improved visibility in such regions. It was observed that during pandemic situation, air quality significantly improves in different cities like New Delhi, which are known to be one of the highly polluted cities with an Air Quality Index (AQI) ranging from 500-600ppb (this range is supposed to be hazardous and causes severe health emergencies) magically swooped down to 50ppb AQI. Thus, the most discernible, and arguably positive impact on the environment as a result of Covid-19, has been a reduction in greenhouse emissions from sources of transportation; most notably, air and road transport (Baldasano, 2020; Lian et al., 2020), which account for a substantial portion of pollution. Not only the air became purer but also the endangered flora and fauna started healing itself back to normal. Clear blue skies and empty roads were the rarest of sites in many cities, since vehicular disruption was halted for several hours rather days.

Reduction in water pollution: Water pollution is a common phenomenon of a developing country like India where domestic and industrial wastes are dumped into rivers without proper treatment. During the lockdown period, the major industrial sources of pollution have shrunk or completely stopped, which helped to reduce the pollution load. For instance, the river Ganga and Yamuna have reached a significant level of purity due to the absence of industrial pollution on the days of lockdown in India. This improvement of water quality of Ganga River was due to 500% reduction of sewage and industrial effluents (Somani et al., 2020). It is also found that, the concentration of pH, electric conductivity (EC), DO, BOD and chemical oxygen demand (COD) has reduced almost 1–10%, 33–66%, 45–90%, and 33–82% respectively in different monitoring stations during the lockdown in comparison to the pre-lockdown period (UPCB, 2020).

Reduction of noise pollution: Noise pollution is the elevated levels of sound, generated from different human activities (e.g., machines, vehicles, construction work), which may lead to adverse effects in human and other living organisms (Goines and Hagler, 2007). Usually, noise negatively effects on physiological health, along with cardiovascular disorders, hypertension, and sleep shortness of human (Kerns et al., 2018). Noise pollution has adverse impacts on wildlife through the changing balance in predator and prey detection and avoidance. For instance, noise level of Delhi was reduced drastically around 40–50% during covid-19 lockdown period (Somani et al., 2020). Due to reduction of vehicle movement during the lockdown period, the noise levels of Govindpuri metro station (Delhi) is reduced 50–60 dB, from 100 dB (Gandhiok and Ibra, 2020).

According to the Central Pollution Control Board (CPCB, 2020) of India, noise level of residential area of Delhi is reduced 55 dB (daytime) and 45 dB (night) to 40 dB (daytime) and 30 dB (night) respectively. As a result, city dwellers are now enjoying the chirping of birds, which usually ranges from 40-50 dB (Gandhiok and Ibra, 2020). The wildlife also breathed a moment of relief because of the deserted roads and the near-silent ambience all around, as a result of which various wildlife animals were witnessed wandering around in the cities.

NEGATIVE IMPACT OF COVID-19 ON ENVIRONMENT

The negative impacts are difficult waste management, increased organic and non-recyclable wastes due to Covid-19. The drastically increasing amounts of domestic, electronic and medical wastes are major challenges before us (Verma and Prakash, 2020b). The segregation, processing, and disposal of increased biomedical waste generation is major threat to public health and environment and also a serious challenge for health care system in India.

Used masks, gloves, PPE kits, face shields, single-use surgical face masks, nitrile gloves and tissues when discarded untreated, pose a serious negative effect on environment. The used PPE kits are highly infectious and becomes a threat to human health, as well as terrestrial, and marine ecosystems, if they are not scientifically handled and disposed. Proper disposal of PPE kits is important to promote environmentally sound management of waste. As the new SARS coronavirus 2 with fomite-borne dissemination, their disposal is often being carried on along with the non-infectious household or other waste from residential areas where color-coded bins are difficult to be found.

Central Pollution Control Board (CPCB), Ministry of Environment, Forest and Climate have published regulations for the management of waste generated during treatment, diagnosis and quarantine of Covid-19 patients in India. In these guidelines use of double layered bags, compulsory labelling of bags and containers as "Covid-19 waste," regular disinfection of dedicated trolleys, maintaining of separate records of waste generated from COVID-19 centers. Hospitals and related institutions should increase their capacities to mobilize and store the bio medical waste. The use of chemical disinfectant spray, microwave disinfectant technique, incineration methods (for solid waste) may be used to disinfect the PPE kits, clothes and larger areas i.e. shopping malls, hospital premises/wards, and isolation centres etc. Yellow colour bags are used for solids, chemicals, beddings, blood and body fluid, red bags are used for gloves and bottles, blue bags are used for broken glassware and metallics waste. The strategy of identify, isolate, disinfect, and safe treatment practices is the effective for safer management of Covid-19 waste management. The role of community and community medicines becomes significant (Balwan *et al*., 2021). Besides, it has negative impacts on education (Srivastava *et al*., 2020; Srivastava and Reddy, 2020).

Increased online shopping for home delivery, ultimately increase the amount of household waste from shipped package materials. Huge amount of disinfectants applied on roads, commercial and residential areas affects the quality of environment. We don't know when we will get rid from Covid-19, so this is the right time to make collective efforts and strategies for environmental sustainability because it is must for sustainable and inclusive development (Verma, 2019). To achieve this, sustainable industrialization, proper waste management, waste water treatment, biomedical waste management and promoting sustainable livelihood is must. Chaos and the negative effects of the Covid-19 pandemic may have made a catastrophic future seem less remote and action to prevent it more necessary and reasonable. However, it may also have the opposite effect by having minds focus on more immediate issues of the pandemic rather than ecosystem issues such as deforestation.

Currently, there are many relevant questions that remain unanswered due to the limited understanding of the interactions between Covid-19 and the global environment, such as the role of environmental change on disease transmission, the impact of human activity and lifestyle change on the environment, and environmental concerns during a long-term battle against Covid-19. Thus, the environmental response to the Covid-19 pandemic can help us to better understand the interplay between human and nature, and has drawn great attention from the academic community and from policy makers.

SUGGESTIONS AND CONCLUSIONS

It is assumed that, all the above impact on environment is short-term. So, it is high time to make a proper strategy for long-term benefit, as well as sustainable environmental management. Therefore, some possible suggestions are proposed for global environmental sustainability.

- For Sustainable industrialization, it is essential to shift the industries in some specific zones, keeping in mind that waste from one industry can be used as raw materials of the other.
- To reduce emissions, it is necessary to encourage people to use public transport, rather private vehicles. It is not only environment friendly but also beneficial for health.
- Use of renewable energy like solar, wind, hydropower, geothermal heat and biomass can reduces the energy demand and also reduces the GHGs emission that can lower the demand of fossil fuels like coal, oil, and natural gas, which can play an important role in reducing the GHGs emissions.
- To control the challenges of water pollution, both industrial and municipal wastewater should be properly treated before discharge.
- To reduce the burden of wastes and environmental pollution, both industrial and municipal wastes should be recycled and reused.
- To reduce the carbon emission, it is necessary to change the behavior in our daily life

The Covid-19 pandemic has unintentionally caused effects on sustainable environment. The restrictions in social, educational and economic movement have had a positive

effect, with reductions in transportation and commerce, which contribute the significant reduction in emission of greenhouse gases. At the same time, ecological hotspots, where human activity is usually common, have enjoyed an improved environmental quality, enabling wildlife and other life forms to thrive efficiently. Thus the reduction of GHGs emission, lessens water pollution and noise, and reduces the pressure on the tourist destinations, which may assist with the restoration or healing of the ecosystem. For this reason, we can conclude that the Covid-19 outbreak and ensuing pandemic have been beneficial to the environment management.

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COVID-19 and Online Education: Challenges and Opportunities

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ABSTRACT

The COVID-19 pandemic has wreaked havoc on every aspect of society by affecting the human life in every aspect including education. The pandemic has forced the shutdown of many physical activities worldwide, including educational. It has significantly disrupted the education sector which is a critical determinant of a country's economic future. This situation leaves educational institutions no choice but to migrate from to face-to-face classes to online mode of education. Approximately 320 million learners are affected in India during COVID-19. Both the positive and negative impacts of COVID-19 pandemic situation have been observed on education system of India. It has changed the traditional education system to the modern educational technologies model by switching from face to face teaching to online teaching. Education and technologies always come together, but with the pandemic it took new level. Although this can be seen as forced transition, but at the time only fusible solution.

Keywords: COVID-19, Online learning.

Introduction

WHO released a pneumonia outbreak of unknown cause on January 5, 2020; on February 11, 2020 WHO named the disease COVID-19 (formerly known as the "2019Novel Coronavirus"), which is caused by a coronavirus and again on March 2020 WHO has declared COVID-19 as a pandemic after assessment of the rapid spread and severity of the deadly virus across the globe that has posed a contemporary threat to humanity (WHO, 2020). Merriam-Webster Online Dictionary (2020) referred to pandemic as “an outbreak of a disease that occurs over a wide geographic area and affects an exceptionally high proportion of the population”. Social distancing is conscious increment in the physical gap between people in order to curb dissemination of disease (Red Cross, 2020). A telling example of the disruption caused by COVID-19 is the temporary closure of educational institutions worldwide to control the spread of corona virus. During the first wave of COVID-19, teaching-learning was affected globally with over 1.37 billion students studying from the safety of their homes. Most countries and higher education institution were compelled to adapted alternate teaching-learning strategies to save the lives of student and semester or year loss of students' and also the lives of people engaged teaching and administration of the educational institution. Though initially everyone (politicians, administrators, teachers, parents and students) was highly confused about the possible mode teaching to be adopted for imparting education during this adverse situation. However, national regulators recommended technology-enabled learning in the form of online education. Covid-19 has positive impact on environment but negative impact on education (Verma and Prakash, 2020; Roy and Chaube, 2021).

Online learning is the use of Internet and some other important technologies to develop materials for educational purposes, instructional delivery and management of program (Fry, 2001). Thus it is web based education. It can be synchronous like online chatting, zoom conferencing or online networked teleconferencing

as well as asynchronous like email (Hrastinski. 2008). This is invariably confused with digital learning, which is a wider term encompassing learning through a large range of digital technologies such as computers, mobile devices and the internet. Thus online learning (often used interchangeably with e-learning) is a form of distance education that involves using technology as the mediator of the learning process, and that teaching is entirely delivered through the internet (Siemens *et al*., 2015). During this pandemic situation online teaching becomes the most accepted mode of teaching and adapted by primary to higher level of institution in India as well as abroad. Almost every university, college and school were conducted webinars to create awareness about the usefulness of online delivery of education, including student's proctored assessment and evaluation.

COVID -19 and on line Education:

The COVID-19 has resulted in school, college and universities shut all across the globe and as these educational institutions are closed children are out of the classroom (Kumar, 2021). To keep the children learning many countries has implemented remote education programme and many are exploring alternative ways to provide continues education using technologies such as Internet, T.V and Radio. Thus In terrible times brought by COVID-19, to ensure the continuity of education for students, face-to-face classes have been moved online, ushering a new version of online learning in which lectures, lessons, and all learning activities are conducted remotely.

For sure this time can be called an era of technology, but out of 7.5 billion people on the planet only 4.1 billion have internet connection, not mentioning the access to computers and software packages. The other issue with the e- learning is that some of the stuff and students needs to be trained to use the technologies that they are been given. This task requires some time to fully get use to the new approaches and, thus, further delay of teaching occurs. This cannot be the common problem, but added to wider issue this might have some impact.

In developed societies, online learning is not new. It is part of the curriculum and students are generally familiar with different aspects of online learning through the use of Moodle, Blackboard, and other learning management systems. However, in developing societies like India, online learning is not common but Government of India has recommended moving to online learning as a stop-gap arrangement to evade any disruptions in academic calendars. The Ministry of Human Resource Development (HRD) on March 21, 2020 also shared various free Digital e-Learning platforms for students to capitalize on to continue their learning during this COVID-19 pandemic situation. In particular, learners in the most marginalized groups, who don't have access to digital learning resources or lack the resilience and engagement to learn on their own, are at risk of falling behind. While the benefits of online learning are manifold, there are still many roadblocks in the way ahead towards making education an entirely digital (online) phenomenon.

Challenges of Online Teaching

One of the many challenges faced by the students during COVID-19 pandemic situation is loss of learning by face-to-face classes and migration towards online learning to continue their education. This sudden transition from blackboard teaching to online mode of delivery of education was abrupt, drastic and posed unique challenges not only to students but also to teachers, administrators, as well as education leaders because of its newness. Many teachers need to be trained in digital technology so that they become friendly and comfortable in teaching through online mode.

Even though online learning is not a novel phenomenon, this sudden transformation into online learning has posed substantial challenges for educational activities globally, and particularly in developing countries like India. A large population of our country resides in villages where internet facilities are either lacking or very poor. Hence, Key challenges are related to technological infrastructure and digital competence, socio-economic factors (educational inequality), assessment and supervision, heavy workload, and compatibility of some subjects such as sports sciences require physical interactions.

While the educational community have made concerted efforts to maintain learning continuity during this period, students have had to rely more on their own resources to continue learning remotely through the Internet, television or radio. In India, online learning has been more or less failure throughout this pandemic period, due to the fact that the educators are unsupported and they lack the practical experience of teaching online through technology.

On the other hand, not all students have the technology infrastructure at home to support their ongoing learning. In fact many of them are economically backward and is not completely equipped with utilities like fast internet, uninterrupted power supply and electronic devices, so rural population are find it difficult to support their education without internet or a learning tablet.

Students could not stay focused on their studies as many of them live in small houses and congested areas where there is continuous noise disturbing in their online classes. Poor internet connectivity restricted the proper communication between students and teachers. Sometimes students get themselves connected but at the same time they are busy doing something else. Many times there is only one way of communication, as the teacher is unable to make eye contact with students as their video remains off.

Poor infrastructure and inadequate knowledge of digital technology was also a hurdle in online teaching. Although there have been improvements regarding basic infrastructural facilities but many rural areas in India are still grappling with these challenges to make education completely digital or online.. It is imperative to consider the availability of the right devices to every student for accessing digital content. Not a lot of people in rural India have access to personal laptops or computers, and smart phone screens are not conducive to long learning hours. Also, data packs and their costs can be a big deterrent for learners, especially for live classes. Hence, the learning remains restricted with the limited availability of technological devices.

Peer interaction among the students is missing and long hours of continuous sitting facing the mobile or computer screen also having adverse effects on mental and physical health. Even a bigger challenge was to teach practical based subjects through online mode. Besides these challenges teaching online on digital platforms allows teachers to interact with their students up to some extent and ensuring the safety of both. We need to invest in training of teachers to improve their efficiency and develop infrastructure for better connectivity. Online content is accessible across time and space. Course content can be accessed from any place with internet connectivity. Self-paced courses help accommodate the busy schedule of students and professionals.

Online teaching can negatively influence on health of learners but indeed this negative influence on health comes from social distancing. Pandemic can negatively affect these student with special educational needs. It might occur that the changes could negatively influence on their ability to scope the learning challenges. However these negative effect are not related to the education, but can be counted as a result of closure, parents labor increase is an outcome of pandemic.

Even if all the stakeholders of education did not have positive attitude towards technology for transaction of education, teachers had to undergo digital transformation overnight, i.e. shift from blackboard to computer screen, overcome camera inhibition and forego privacy for the sake of their students. Above all, their role changed from hand holding to screen holding. Former President of COL, Sir John Daniel is credited with the view that the change should not have occurred without preparedness, i.e. training of human capital and availability of infrastructure were pre-requisites for delivery of quality education. Thus with increasing awareness, acceptability of online classes or courses and availability of better internet facility at least we continued to learn and now after one and half year of pandemic we are better prepared to take the challenges.

Opportunities

Although there have been overwhelming challenges for educators, schools, institutes and the government regarding online education from a different angle, there are several opportunities created by the COVID-19 pandemic for the unprepared and the distant plans of implementing e-learning system. It has forged a strong connection between teachers and parents than ever before.

Children with disabilities need additional and special support during this ongoing emergency. The use of online platforms such as Google Classroom, Zoom, virtual learning environment and social media and various group forums like Telegram, Messenger, WhatsApp and WeChat are explored and tried for teaching and learning for the first time ever to continue education . This can be explored further even after face-to-face teaching resumes, and these platforms can provide additional resources and coaching to the learners. Teachers are obliged to develop creative initiatives that assist to overcome the limitations of virtual teaching. Teachers are actively collaborating with one another at a local level to improve online teaching methods.

Online learning has some advantages, like flexibility, interactivity, self-pacing and opportunities, the current increase in its adoption by universities, colleges and educational institution is born of their desire to direct their actions toward alignment with both local and global practices and policies to overcome the spread of Covid-19 pandemic and maintenance of academic calendar. Universities and other educational platforms have responded to the pandemic with quick digital transformation of their educational activities. Apart from the educational and economical roles of universities, Wang and Zha (2018) also recognized the social roles of universities as the world battle for the eradication of the pandemic. According to Manifesto (2020), Greg Flanik, Chief Information Officer of Baldwin Wallace University in Ohio, stated that online learning provide a transparent roadmap for stakeholders of education to create novel market for instructional delivery and the longer the pandemic lasts, the more likely online learning becomes a general acceptable mode of teaching and learning.

There are incomparable opportunities for cooperation, creative solutions and willingness to learn from others and try new tools as educators, parents and students share similar experiences (Doucet *et al.*, 2020). Many educational organizations are offering their tools and solutions for free to help and support teaching and learning in a more interactive and engaging environment. Online learning has provided the opportunity to teach and learn in innovative ways unlike the teaching and learning experiences in the normal classroom setting.

Conclusions and recommendations

COVID-19 pandemic caused shutdowns of education systems and thus creating the largest impact on students, approximately 94 percent of total students around the world. In conclusion, online education in developing countries like India was not well-established before the COVID-19pandemic. In a sense, COVID-19 is a silver lining in the crisis. It provides a strong impetus for the digital transformation of education across different levels and also provides an opportunity to concerned education stakeholders to explore the pros and cons of online learning, potentially paving the way for greater adoption of ICT in the post-COVID-19 period. Online learning during COVID-19 has obviously brought about many challenges for educators, students, school administrators, and parents, among other stakeholders.

In India, about 32 crore learners stopped to move schools/colleges and all educational activities brought to an end. The shutting down of schools and the decision of shifting traditional classrooms to digital platforms is not only increasing learning inequality among children, but also pushing a large number of children out of school due to the digital divide. Other than learning, the absence of schooling would also have a long-lasting effect on the health and nutrition of children. The outbreak of COVID-19 has taught us that change is inevitable. It has worked as a catalyst for the educational institutions to grow and opt for platforms with technologies, which have not been used before. The education sector has been fighting to survive the crises with a different approach and digitizing the challenges to wash away the threat of the pandemic. Hence, the policy maker has also put forward a set of long-term measures that the government should implement in the due course of time.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Obesity may act as an Susceptibility Element for COVID-19 Infection Severity; An Perspective Analysis

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ABSTRACT

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) originated in China and has stretched out worldwide, generated a global pandemic. Obesity may a play crucial part in the deterioration of SARS-CoV-2 infection. A literature search was performed using multiple literature databases for relevant articles published prior to November 2020. Obesity is linked with ACE2 over expression, high CRP level, inflammation-induced cytokine release, hence imposed further risk for COVID-19 severity. Linkage regarding the clinical features of COVID-19 positive cases with obesity is still incomplete. In current review we have addressed shared biomarkers between COVID-19 and obesity. In addition, the potential drug candidates for COVID-19 patients with obesity-related underlying disorders have been discussed. The interesting connotation between coronavirus infections and these endocrine and metabolic pathways will have an imperative influence on the overall treatment of severe COVID-19. People with obesity are allied with substantial rises in illness and death from COVID-19. We have addressed various mechanisms that could jointly explain this impact. A chief alarm is likelihood of vaccines non-effectiveness for the people with obesity. The study of disease prevalence and progression among the population will have a much-improved understanding of the true link of the COVID-19-contagion and the obesity epidemic and its management.

Keywords: SARS-CoV-2 infection, obesity, biomarkers, ACE2, CRP.

Introduction

Identification of risk aspects for morbidity and mortality caused by SARS-CoV-2 infection is essential to define prevention approaches along with targeting high-risk people for possible therapeutics. Covid-19 ailment, caused by SARS-CoV-2 contagion comprises a range of complaints; beginning with infection without any symptoms to ascetic pneumonia categorized by acute respiratory damage in about 20% of patients transfer to intensive care units (ICUs) [1]. Obesity and overweight are allied expressively with an amplified risk of comorbidities like type 2 diabetes, metabolic syndrome, fatty liver diseases, psychological disturbance, premature death, and cardiovascular diseases [2]. All around the world, persons having obesity are at present at high threat for developing serious problems of COVID-19 due to the added risk of the prolonged diseases that obesity drives –[3]. Although the prevalence of obesity in China is not so high as compared to the US and Saudi Arabia when obesity is demarcated by BMI. Type 2 diabetes showed a similar rate of prevalence in China and the USA, while BMI is higher in the USA and Saudi Arabia as compared to that of China. In Saudi Arabia, the prevalence of obesity in males and females was found to be 44% and 28% respectively. On the other hand, the percentage of overweight women and men was reported to be 71% and 66 % respectively [4]. This will have considerate insinuations for the health care system. People with obesity if developing COVID-19 will necessitate extra care, laboriousness patient management, needs additional bariatric beds in the hospital, more difficult` intubations, extra problematic to attain an imaging

diagnosis (due to weight restrictions on imaging machines), more challenging to manage as well as transference by nursing staff, and resembling pregnant patients in ICUs, they might not be fighting fit when prone –[3]. It is possible to have a collision of the dualistic public health epidemics in countries having a prevalence of obesity and COVID-19 interrelating to additional strain health care systems.

Methodology

PubMed, google scholar, medrxiv and LitCovid were explored via the search terms coronavirus-BMI, inflammation -SAR-CoV, CRP-SAR-CoV2, 2020- SAR-CoV2 drug targets, Obesity-hypertension-COVID-19, SARS-CoV-2-obesity-shared biomarkers, obesity-COVID -19, for studies published prior to November 30, 2020, and manually searched the citations of relavent manuscripts for extra related information. Ongoing or completed clinical trials with overweight and obesity patients were recognized using the disease search term coronavirus contagion and obesity on ClinicalTrials.gov, the Chinese Clinical Trial Registry, and the International Clinical Trials Registry Platform. We selected articles relevant to obesity and COVID 19 complications.

Literature review

3.1. Obesity may act as an independent risk factor for COVID-19 transmission.

Obesity altered the immune system functioning and induced enduring inflammation, besides mechanical complications in breathing and increased oxygen requirements, which even worst with old age. Previous studies confirm that obesity is allied with severe influenza outcomes [5]. Obesity-associated conditions appear to deteriorate the consequence of COVID-19, the Centers for Disease Control and Prevention (CDC) identified that people with diabetes and heart disease have a higher risk of COVID-19 problems [6]. People with obesity are more vulnerable to respiratory illnesses, comprising colds (frequently rhinoviruses, as well as coronaviruses) than normal-weight persons. People with obesity showed not only the increased frequency of influenza infection but also an intensification of bacterial pneumonia and tuberculosis [7]. A 2009 report on the H1N1 flu pandemic, revealed that individuals with obesity were twofold expected to be hospitalized among state residents. They reported that H1N1 flu-infected patients with obesity were not simply at a higher risk of severe impediments but stay contagious for an extended period. Scientists believe that obesity changes the body's immune reactions and leading to chronic inflammation [8]. This clues that individuals with obesity, if detected with COVID-19, might put an even added pressure on an already anxious set of circumstances. Obesity has been designated as a probable reason for greater than usual per-capita COVID-19 death ranges in New Orleans. A CDC report found that more than six percent of COVID-19 related deaths were in patients with preexistent comorbidities [9]. So far, more than twenty investigations evaluated the link amid people with obesity and COVID 19, all but two of which disclosed that persons with obesity considerably intensify the risk of COVID 19 infection [10]. A study conducted in Denmark revealed that the occurrence of overweight and persons with obesity was lesser in SARS CoV 2 positive individuals than SARS CoV 2 test negative people (8.6% vs. 9.9%).[11] The data may be partial as body mass status was recorded at hospital checkout. A research employed data of U.K. Biobank (n = 285 817) to demonstrate that overweight amplified the danger of COVID 19 by 44.0% and people with obesity have nearly two-fold risk (RR = 1.97; 95% CI, 1.46–2.65; $p <$ 0.0001)[12]. The authors verified only a less propotion of people (0.5%) for COVID 19, a key inadequacy of this exploration. A pooled data examination exhibited that the odds of people with obesity being COVID 19 positive were 46.0% (OR = 1.46; 95% CI, 1.30–1.65; $p < 0.0001$) greater than those of people with no obesity [10]. Furthermore, obesity in infancy and adolescence can be a threat element for more vulnerability and severity of COVID-19 and is accompanying with dietary, cardiac, respiratory, renal, and immunological variations, which may intensify the difficulties of SARS-CoV-2 infection. The prerequisite for communal isolation can have the effect of triggering or deteriorating obesity and its comorbidities, and pediatricians requirement to be responsive of this issue [13]. These findings suggest that obesity may be an additional factor in COVID-19 transmission.

COVID-19 mortality factors

A retrospective, multicenter cohort study from Jinyintan Hospital and Wuhan Pulmonary Hospital China indicated that 54 people died and 137 survived out of 191 laboratory-confirm COVID-19 patients. In lethal cases of COVID-19, the high percentage of underlying comorbidities comprising hypertension (48% vs 23%), diabetes (31%vs 14%), and coronary heart disease (24%vs 1%) were recorded when matched with survivors, respectively[14]. Center for disease control published that amid 178 (12%) adult COVID-19 patients with statistics on preexisting ailments as per March 30, 2020, 89.3% had more than one underlying disorders; the predominant were hypertension (49.7%), obesity (48.3%), prolonged lung ailments (34.6%), diabetes mellitus (28.3%), and

cardiovascular diseases (27.8%). These statistics evidence that old patients with underlying medical illness showed a high rate of COVID-19 contraction and hospitalization ——[15]. The association amid obesity and severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has not been well studied therefore understanding the association amongst obesity and the seriousness of the illness will be of foremost therapeutic importance.

Shared biomarkers for COVID-19 and Obesity

1. Obesity, inflammation, and SARS-CoV-2

People with obesity are with the predicament of metabolic inflammation that stimuli increase the discharge of cytokines [16]. Amidst COVID-19, a cytokine disruption has been involved in the various tissue impairment in patients with the advance phase of infection [17]. The coherent production of pro-inflammatory cytokines in individual with obesity might advance COVID-19 disease severity. Metabolic inflammation weakening the immunity, dipping the body's capacity to challenge the contagion, undermine the therapeutic procedures, and extending the improvement. The worldwide range of coronavirus spread and its new mutative strains have been a severe challenge for public health [18]. Abdominal obesity is allied with imperfect lung ventilation, consequential in declined oxygen permeation of the blood [19]. Moreover, the aberrant discharge of adipokines and cytokines i.e., TNF-alpha and interferon illustrate a prolonged low-level inflammation specific to abdomen obesity, which influences immune reactions and have consequences on the lung parenchyma and bronchi [20]. Overall, it seems probable that obesity may be an autonomous risk element for SARS-CoV-2. Obesity-persuaded inflammation is manifested by aggravated stimulation of immune cells, comprising neutrophils, macrophages, and T helper cells, leading to the assembly of pro-inflammatory cytokines, whereas concurrently subduing anti-inflammatory cells and declining the assembly of adiponectin, predisposing to numerous cellular stresses like endoplasmic reticulum (ER) stress, oxidative stress, and mitochondrial dysfunction [21]. Obesity-persuaded inflammation is also a threat aspect in the pathogenesis of insulin resistance, cardiovascular diseases, type 2 diabetes mellitus (T2DM), and metabolic syndrome. It is also allied with the expansion of additional diseases such as renal ailments, psoriasis, cancer, and polycystic ovary syndrome (PCOS) [22]. These are probable mechanisms by which obesity could modify COVID 19 risk, severity, and transmission prospective.

2. C-reactive protein (CRP)

C-reactive protein (CRP) is an acute-phase protein indicator of subclinical inflammation associated with cardiovascular and metabolic disorders. During tissue damage and/or acute inflammation, CRP is secreted by the liver in reaction to trigger by tumor necrosis factor-α, and interleukin-6 [23]. The adipose tissue can act as an endocrine organ and produce several pro-inflammatory cytokines, such as interleukin-6 (IL-6), tumor necrosis factor (TNF-alpha), and C-reactive protein (CRP) [24]. In 862 pneumonia patients, it was observed that the 108 subjects with severe pneumonia had increased levels of CRP ($P<0.05$). Multivariate logistic regression assessments found a direct association between severe pneumonia with an increase in CRP level, body temperature, expectoration, and age ($P<0.05$) [25]. A prospective study including 500 patients with respiratory symptoms indicated that CRP was specific in detecting pneumonia (area under the curve 0.84, 95% CI 0.82–0.87). Serum CRP may be a suitable marker for detecting pneumonia without chest X rays [26], as it is very important to distinguish severe cases and treat them with appropriate manner '[27]. Therefore, the CRP level can act as an indicator of acute respiratory symptoms in COVID-19 patients without chest radiograms as the medical identification of pneumonia is occasionally difficult since chest radiographs are frequently unspecified. The cross-sectional investigation of laboratory-confirmed COVID-19 subjects admitted at a health institute in New York City amid March 1, 2020, and April 2, 2020, indicated that various risks among critical illness risks. The report indicated very high ferritin (>2500 (OR 6.9, 95% CI, 3.2-15.2), and CRP levels (>200 (OR 5.78, 95% CI, 2.6-13.8) in among other risk factors [28]. They have performed multivariable logistic regression to recognize jeopardy influences for adverse upshots. In the critical cases of COVID-19, the highest risk factors were age >65 and obesity and CRP>200. A population-based cross-sectional study showed that 1929 patients undertaking a medical inspection in a preventive treatment clinic (age, 50+/-10 y; 63% males), CRP cut point (>10 mg/l) was set as an indicator of obvious infection or inflammation. They found that individuals with obesity had noticeably greater CRP levels in contrast to normal-weight individuals irrespective of metabolic syndrome status. They documented BMI, triglyceride levels, HDL cholesterol levels (contrariwise), and fasting glucose as independently linked to CRP levels. Yet, BMI liable for 15% of the fluctuations in CRP levels [29]. IllÁn-GÓmez *et al*. estimated the inflammatory mediators in bariatric surgery cases having fatal obesity [30]. Intensity of IL-6 prominently declined after 1 year of surgery, IL-6 connected considerably with BMI ($r = 0.53$, $p < 0.001$), and IL-6 was allied with amplified intensities of CRP and triglyceride (TG) ($p = 0.005$, $p < 0.001$; respectively) in overweight subjects in comparison to

normal-weight participants [31]. Equally, Dayal *et al*. recognized the function of anthropometric factors with CRP in Indian kids. They indicated that for every 1.0 unit upsurge in BMI, CRP ratio amplified by 37% (95% CI: 1.23–1.53, $p < 0.001$) '[32]. Another study including 61 post-menopausal women (age, 56.4±5.2 years) with obesity (body mass index, 35.6±5.0 kg/m^2) evidence that plasma CRP levels were certainly linked with overall body fat (r=0.36, P<0.005) and intra-abdominal body fat area (r=0.30, P<0.02) measured by dual x-ray absorptiometry and CT scan respectively. Substantial associations were observed amongst plasma CRP and triglyceride levels (r=0.33, P<0.009), and glucose clearance (r=−0.29, P<0.03) [33]. Besides obesity, incessant increase of serum CRP in the developing phase of critical respiratory infections rises the danger of advancement to a critical illness state. These findings are evocative of further inflammatory burden in COVID-19 and patients with obesity, because it may possibly increase the risk of myocarditis-allied cardiac effects[34].

3. Angiotensin-converting enzyme-2 (ACE2)

ACE2 is a homologous enzyme of ACE[35], expressed all over the body like in the kidney, heart, liver, brain, spleen, intestine, placenta. However, is it exceedingly expressed in the kidney and cardiovascular and gastrointestinal systems, and shows reduced expression in the lymphoid tissue lung, and the central nervous system [36, 37]. Obesity can upregulate the ACE2 receptor, the anticipated receptor for any of the SARS-CoV [38]. Coronaviruses own greatly glycosylated cell surface protein with two distinctive functional domains (S1 and S2) which are expected to facilitate the virus infiltration into the host cells. The ACE2 receptor offers a human cell-binding site for the S protein for the SARS-CoV, the coronavirus NL63, and now SARS-CoV-2 [39, 40]. Less attention has been paid to the complication of obesity in the spread of the SARS-CoV-2 and the mortality frequency of COVID-19 [41]. Network database and re-analysis of public data identified that the ACE2 expression is more prominent in adipose tissue than lung tissue, which points out adipose tissue to be extra susceptible to SARS-CoV-2. Studies indicated that the expression of ACE 2 on adipocytes and adipose progenitor cells was equal between an individual with obesity and normal weight, but individuals with obesity showed more adipose tissues to intensify the amount of ACE2-expressing cells [42]. Further in animal models, it was observed that compared to underweight females, female mice with obesity had amplified expression of ACE2 on adipose tissue [43, 44]. People with obesity have upregulated ACE2, making obese and COPD patients more susceptible to COVID-19. This upsurge in affinity may permit the easier individual-to-individual transmission of the virus and may add to an upper expected R0 for SARS-CoV-2 than the prior SARS virus. Hence it is hypothesized that reducing creations of Ang II with an ACE1 or hindering Ang II–AT1R functions with an ARB proliferates the formation of Ang-(1–7) by ACE2 and initiation of the Mas receptor (MasR), which reduces fibrosis and inflammation and as a result offsets lung damage – [45]. Conversely, studies revealed an influence of ACE blockers or ARBs on ACE2 expression or functions in the lung are uncommon. Investigations unsuccessful to validate that upregulation of ACE2 occurs in reaction to ACE inhibitors or ARBs in humans and animals. Much concentration should be paid to articulate decisions from observational studies and support the rapid commencement of clinical trials –[45].

4. Obesity, hypertension, and COVID-19

Hypertension and obesity remained the greatest common comorbidities observed in patients who were admitted with symptoms of COVID-19 [46]. Investigation of underlying risk factors among COVID-19 points out that individuals with hypertension included 20–30% of all patients and up to 58.3% of cases in the intensive care unit (ICU) and have been accountable for 60.9% of demises caused by COVID-19 [47-49]. Previously, it was recognized that Obesity and hypertension are the most communal comorbidities for former coronavirus infections, for instance, severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS-CoV) [50]. Therefore, in the current pandemic, the metabolic syndromes may induce supplementary severe symptoms and mortality, there are some other detailed systematic features in coronavirus infections that need severe attention. The prevalence of hypertension is very high amongst patients with obesity (>60%) responsible for 78% of hypertension occurrence in men and 64% of hypertension frequency in women. With each 5% increment in weight gain, there is 20-30% chance of increase the risk of developing hypertension. CDC report indicated that the overall incidence of hypertension in US adults is 29%, extending from 7.5%–63% across various age groups. The prevalence of hypertension amid COVID-19 positive cases were approximately 50% (range across age groups = 18%–73%), while the occurrence of obesity was 48% (range across age groups = 41%–59%). Also, the incidence of several underlying conditions identified through COVID-NET was comparable to those for ailing influenza patients recognized through FluSurv-NET during influenza periods: 41%–51% of patients had cardiovascular ailments (apart from hypertension),

39%–45% had an enduring metabolic disease, 33%–40% had obesity, and 29%–31% had chronic lung sickness ——[51]. Concurrent studies stated possible mechanisms linking hypertension in patients and metabolic complications with upper-body obesity. Metabolic variations in adipose tissue results in a transformed discharge of adipokines such as angiotensinogen, dipeptidyl peptidase 4 (DPP-4), aldosterone stimulating factor, resistin, leptin, IL-6, and TNF in patients with obesity. These aspects contribute to hypertension, insulin resistance, and hypertriglyceridemia. Number of investigations manifested adaptive immune, and dysfunctional innate, and inflammatory responses in patients with obesity that develops vascular dysfunction and the pathogenesis of hypertension.

Potential drug implications

While waiting for the antidote against SARS-CoV-2, the management of COVID-19 will be principally centered on supportive care and medication of complications. COVID-19 is not primarily a metabolic disease, nonetheless, metabolic management of lipid levels, glucose, and blood pressure should be crucial in these patients. The captivating association among coronavirus contagions and the endocrine and metabolic conduits will have an imperative influence on the overall treatment of severe COVID-19. The renin-angiotensin system (RAS) has a crucial role in the incidence and progress of hypertension, and ACE inhibitors (ACEIs) and angiotensin receptor antagonists (ARBs) are the leading antihypertensive drugs prescribed by the existing guidelines. Presently, to our information, sparse or no medical data is indicative of precise benefits or risk from consuming ACE inhibitors, ARBs, or renin-angiotensin-aldosterone structure antagonists in COVID-19 —[52]. A collaborated statement by AHA, HFSA, and ACC approves the sustained use of these medications in COVID-19 cases in acquiescence with existing clinical recommendations [53]. Targeting RAAS can recover numerous pathophysiological constituents of obesity-associated hypertension, including modulating SGLT2 or SNS excessive activation and inclining GLP-1 intensities [54]. The Losartan (angiotensin receptor inhibitor) can decline serum uric acid levels; however, other such blockers have not the same effects. GLP-1 analogs and DPP-4 inhibitors may have been used as a supplementary treatment for hypertentiveT2DM cases. Due to the intricate pathophysiology of treatment-resistant hypertension, the proper regulation of hypertension in patients with obesity is the main concern to clinicians. Aldosterone antagonists and regulation of malformed SNS activation by renal denervation are developing as novel modalities for managing of treatment-resistant hypertension. Initial management with angiotensin II receptor blockers (such as losartan or telmisartan) or recombinant ACE2, might be suitable to improve ACE2 and Mas system with respect to pathways intervened by angiotensin receptors. Therefore, active regulation of these metabolic factors might signify a precise and systematic method to preclude and improve the influence of this virus by decreasing the indigenous inflammatory reactions and hindering its cellular entrance [18]. Management of cardiovascular problems should be planned carefully using therapies based on guidelines [55]. The prescription of antiplatelet agents, β-blockers, ACE inhibitors, and statins are endorsed for acute CVD events —[56]. Theoretically, statins can restraint systemic inflammation, benefit further alleviate plaques, and preclude a viral-persuaded plaque deterioration, which can prime to serious coronary conditions. The cytokine storm linked with COVID-19 is anticipated to plays a role in the advancement of ARDS and fulminant myocarditis, and employing immune-modulators to limit these hyperinflammatory reactions might be advantageous in reducing the number of deaths[57].

Besides western medicine/ Conventional medicine that is currently a topic of controversy because of risk factors associated with various drugs, the focus should be given to supplementary dietary approaches in the case of COVID-19 patients with obesity. Plenty of literature evidence the antiviral [58, 59], immune booster [60], antidiabetic [61], anti-obesity [62], and anti-inflammatory [63] potential of *Nigella sativa* seeds (Black seeds). Black seeds are part of functional food, that are commonly used in Asian and Arab world. Black seeds are part of Arab herbal medicines and also Chinese herbal medicine. Currently, black seeds are given as hot decoction as a supplement to COVID-19 patients in Saudi Arabia. Similarly, the Composite diets, especially the Dietary Approaches to Stop Hypertension (DASH) diet This diet is packed with nutrients from fruits, vegetables and retains a sufficient quantity of sodium, omega-3, and omega-6 fatty acids, and have reported positive effects in the management of hypertension[64].

Discussion

The anomalous discharge of adipokines and cytokines typifies a chronic low-grade inflammation representative of abdominal obesity, which may harm immune reactions and deteriorate the lung parenchyma and bronchi [65]. Therefore, obesity may be a sovereign threat element for SARS-CoV-2. COVID-19 pandemic is presently spreading globally, including the US and Gulf countries, where obesity is highly predominant[66, 67]. Till the date,

no documentation proof verifies the association amid obesity and severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) in the clinical reports. Little attention has been focused on obesity and its complications in either the transmission or death frequency by COVID-19. We believed that cross-sectional population-wide studies will be performed in each country to evaluate the impact of body mass index (BMI) on the link between BMI, inflammation, oxidative stress, immune system, and COVID-19 prevalence and disease severity among SARS-CoV-2 infected patients with overweight and obesity. This will also help to estimate the requirement for invasive mechanical ventilation (IMV) in intensive care for COVID-19 cases. The analysis of anthropometric parameters, C-reactive Protein (CRP), Cytokine level, oxidative stress biomarkers, ACE2 antibody levels in COVID-19 patients with obesity will help to understand the prevalence and mechanism of disease progression among people with obesity. Investigation of metabolic disease markers, cytokines, and other factors in COVID-19 obese and normal-weight patients help to understand the mechanism of disease progression and virus targets. The study of disease prevalence and progress among the population will have a much better understanding of the true link of the COVID-19-pandemic and the obesity epidemic. Furthermore, ACE2 is hyper-activated in adipose tissues of Obese people whereas it is prevalent that SARsCoV2 also use ACE 2 receptor for replication hence determining the level of ACE 2 in obese COVID-19 patients will provide true scientific evidence of the link of obesity with potential to contract SARS-CoV-2 [68]. Investigation of these aspects will help to specifically understand the risk factors associated with obesity among COVID positive patients. This will give real scientific evidence of the association between obesity and the increase in the severity of COVID-19 disease.

Concluding remarks

Active surveillance is both urgent and essential to predict and mitigate the emergence of COVID-19 in humans. However, underlying metabolic syndrome increases the chance of increasing disease severity among SARS-CoV-2. The study of COVID-19 prevalence among the population with obesity will help to clinically understand the disease progression among the obese population and provide a direct comparison of underlying mechanisms in people with obesity versus normal weigh COVID-19 patients. As WHO describes obesity as an independent risk factor for the COVID-19, and many published clinical study providing scientific evidence of the direct link between obesity and disease severity among COVID-19 patients. We theorize that immune dysfunction in people with obesity could lead to a longer duration of COVID 19 virus shedding, conceivably cumulative the transmission potential of persons with infection. Such studies will give novel findings that will increase scientific knowledge. Furthermore, it is of utmost importance to aware the population about the risk factors associated with obesity, as due to quarantine and lockdown the risk of developing obesity and weight gain is now much more in adults as well as children. Dealing children with suspected or confirmed COVID-19, health specialists should check excess weight, guide on fitness in periods of isolation, monitor for comorbidities and guaranty uninterrupted cure. COVID-19 is not surely not a metabolic illness, but metabolic regulation of glucose, lipid levels, and blood pressure should be crucially monitored.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Discovery of Vaccines for Covid and It's Exertion in Body

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ABSTRACT

Year 2020 was very revolutionary for the development of vaccine not only in India but also in Word in 222 years of history first time so many platforms developed a large number of vaccines for prevention by the so many infectious viruses, we found various antigens for vaccines and they are designs with the help of bioinformatics and computers for facing such challenges in future. We can do genetic sequencing of such type of emerging viruses which is causing significant harm to animals and human beings. At present, there are various alternative methods to design and develop effective and safe new generation vaccines based on bioinformatics approaches through reserve vaccinology, immunoinformatic and structural vaccinology.

Keywords: Vaccinology, Protein Vaccine, RNA Vaccine, DNA Vaccine.

Introduction

Regulatory institutions approved first adenovirus vectored vaccine for only Ebola virus in last few years. Now there are three approved adenovirus vectored vaccines are available for SARS-COV-2. In the last 2 decades, there has been growing interest in mRNA-based technology for the development of prophylactic vaccines against infectious diseases. Technological advancement in RNA biology, chemistry, stability and delivery systems have accelerated the development of fully synthetic mRNA vaccines. NOVAVAX. Company developed a technique for protein vaccines by the mixing of spike protein in the cells of insect wings. The NOVAVAX vaccine contains a small piece of 1 of the proteins in the SARS-COV-2 virus that causes Covid 19. The idea behind the Novavax vaccine is that we can develop immunity for the virus and avoid covid-19 infection by exposing our immune systems to only this small subsection of viruses.

Subunit Vaccine: A sub unit vaccine uses a single component of virus to establish immunity. In other words, the vaccine is made from a single part of a pathogen-a subunit-rather than the whole pathogen itself (@Thesharedscope #novavax #covid19). It may be called as piggyback or second generation vaccine (Ashok, 2017).

In clinical trials, these types of vaccines were also equivalent to mRNA vaccines for prevention of infectious diseases. In August 2021, the government of India granted emergency use authorization to a covid 19 DNA vaccine. Pharmaceutical firm Zydus, Cadila in partnership with India's department of Biotechnology, developed the 3-dose intradermal vaccine, called Zycov-D, which is authorised therefore use in people aged 12 years or older.

The vaccine contains plasmid DNA, circular strands of genetic material that enter to the host cells' nuclei, where they are converted into RNA (mRNA). The mRNA then travels out of the nuclei in the cytoplasm and is translated into the Sars-COV-2 spike protein as in now familiar mRNA vaccines (Abbasi, 2021).

Only vaccines are a right way to fight against this pandemic but there are threats due to several new variants which are developing day by day. Moderna, BioNTech, Pfizer manufactured Beta variants vaccines and

completed their clinical trials. Now a days scientists are trying to develop universal vaccines which will be effective on all variants. We know that SARS, MERS and Sars-COV-2 viruses are developed within last two decades, so it's a great chance to develop several infections in humans through animals.

Corona Virus has 4 families/variants that are alfa, beta, gamma, delta. Sars-COV-2 is a beta corona virus. All seven corona viruses which are infecting human beings are belonging to family's alpha or beta. Due to large genetic diversity of Corona Virus, it is very critical to develop 1 vaccine for all variants. 10 other DNA vaccines are in clinical development against novel corona virus, according to the World Health Organization's Covid 19 tracker. Pennsylvania-based INOVIO is initiating a phase 3 trial of capital INO-4800, its plasmid DNA Vaccine candidate against Sars-COV-2. According to company projection, INO-4800 should be stable at room temperature for more than a year. US Walter Reed Army Institute of Research expect to announce that they have developed a vaccine that is effective against covid 19 and all its variants, even omicron, as well as preventions Sars-Origin Viruses that have killed millions of people, world wide

The achievement is the result of almost two years of work on viruses. The army lab received its first DNA sequencing of the covid 19 virus in early 2020. Very early, Walter Reed infectious diseases branch decided to focus on making a vaccine that would work against not just the existing strain but all of its potential variants as well (Science and tech December 21, 2021). Walter Reed's spike Ferritin Nanoparticle, covid-19 vaccine or SpFN, Completed animal trials earlier this year with positive results. Phase 1 of human trials, wrapped up in month of December 2021 again with positive results.

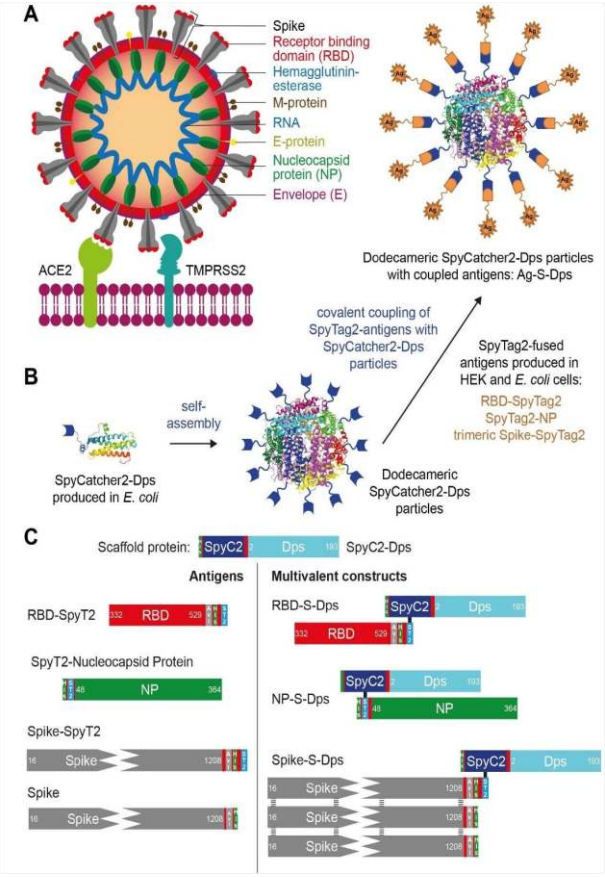
The Immune System: Body's Defense against Infection

To understand how COVID-19 vaccines work, it helps to first look at how our bodies fight illness. When germs, such as the virus that causes COVID-19, invade our bodies, they attack and multiply. This invasion, called an infection, is what causes illness. Our immune system uses several tools to fight infection. Blood contains red cells, which carry oxygen to tissues and organs, and white or immune cells, which fight infection. Different types of white blood cells fight infection in different ways:

- **Macrophages** are white blood cells that swallow up and digest germs and dead or dying cells. The macrophages leave behind parts of the invading germs, called "antigens". The body identifies antigens as dangerous and stimulates antibodies to attack them.
- **B-lymphocytes** are defensive white blood cells. They produce antibodies that attack the pieces of the virus left behind by the macrophages.
- **T-lymphocytes** are another type of defensive white blood cell. They attack cells in the body that have already been infected.

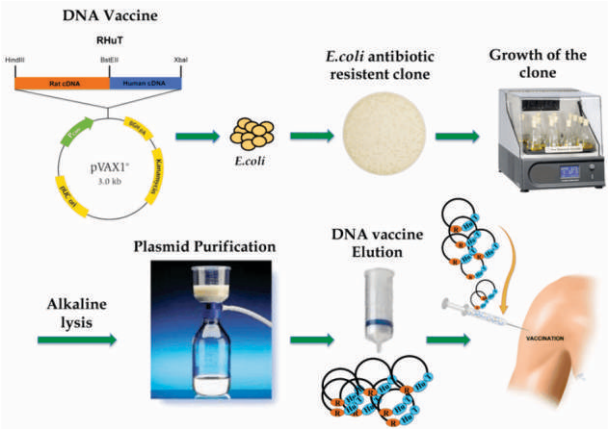
The first time a person is infected with the virus that causes COVID-19, it can take several days or weeks for their body to make and use all the germ-fighting tools needed to get over the infection. After the infection, the person's immune system remembers what it learned about how to protect the body against that disease.

The body keeps a few T-lymphocytes, called "memory cells," that go into action quickly if the body encounters the same virus again. When the familiar antigens are detected, B-lymphocytes produce antibodies to attack them. Experts are still learning how long these memory cells protect a person against the virus that causes COVID-19.

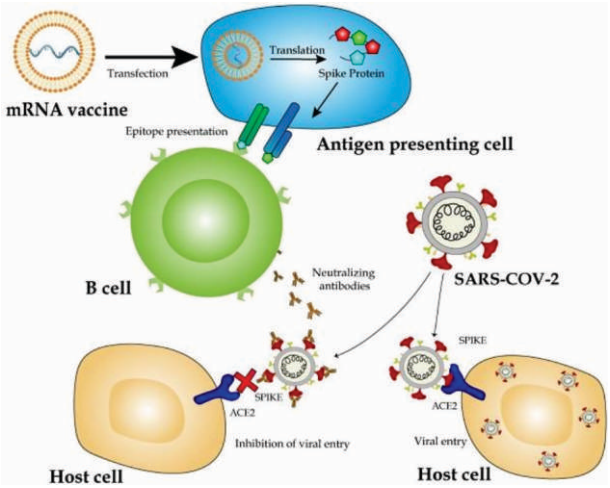


Protein Vaccine

Overview of the multimerisation strategy employed and the antigens and scaffold used. A) Cartoon representation of SARS-CoV-2 binding to a human cell membrane. B) Schematic diagram of the Sulfolobus islandicus Dps and SpyCatcher2-based display and multimerisation strategy employed in this study. C) Diagram of the proteins used in this work. SpyC2 is the SpyCatcher2 domain and SpyT2 is the peptidic SpyTag2 that becomes covalently linked to SpyC2 upon simple mixing. Stabilized, trimeric Spike/Spike-SpyT2 contained on average only one SpyT2 tag in order to avoid uncontrolled oligomerisation when coupled to Dps.



mRNA Vaccine (Park *et al.*, 2021)



DNA Vaccine (Marchini *et al.*, 2013)

How COVID-19 vaccines work

COVID-19 vaccines help our bodies develop immunity to the virus that causes COVID-19 without us having to get the illness.

Different types of vaccines work in different ways to offer protection. But with all types of vaccines, the body is left with a supply of "memory" T-lymphocytes as well as B-lymphocytes that will remember how to fight that virus in the future.

It typically takes a few weeks after vaccination for the body to produce T-lymphocytes and B-lymphocytes. Therefore, it is possible that a person could be infected with the virus that causes COVID-19 just before or just after vaccination and then get sick because the vaccine did not have enough time to provide protection.

Sometimes after vaccination, the process of building immunity can cause symptoms, such as fever. These symptoms are normal and are signs that the body is building immunity. Talk to a doctor about taking over-the-counter medicine, such as ibuprofen, acetaminophen, aspirin (only for people age 18 or older), or antihistamines for any pain and discomfort experienced after getting vaccinated**.**

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Impact of Covid-19 Pandemic on Environment and Biodiversity

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ABSTRACT

The ongoing pandemic caused by COVID-19 virus has paralysed everyday life across the globe. To limit spread of infection, the Government of various countries issued a Nation-wide lockdown, with increase in COVID cases, more and more biomedical wastes were also produced. With a halt in manufacturing industries and automobiles plying, air pollution levels drops drastically and rare animal sightings were recorded by the media. Water Pollution levels were also recorded to be on the down trend.

Keywords: Covid-19, Environment, Biodiversity.

Introduction

The threat of a public health crisis in the form of a pandemic with the advent of the 2019 novel Corona Virus (2019-nCoV) also dubbed as SARS-CoV-2 has spread fast from its provenance in Wuhan City of Hubei Province of China to the entire world in a matter of weeks (Roy *et al.*, 2020; Roy and Chaube, 2021). The SARS-CoV-2 viral particles are spherical and have mushroom shaped protein called spikes protruding from their surface, giving the particle a crown like appearance (Kumari and Shukla, 2020). The spikes bind to the human cells and allowing virus to gain entry. The spike protein of novel corona virus shares 98% sequence identity with the spike protein of bat coronavirus. The researchers found that spike protein of SARS-CoV-2 binds to the cellular receptor called angiotensin converting enzyme 2, which is entry point into human cells (Verma and Prakash, 2020).

WHO released a pneumonia outbreak of unknown cause on January 5, 2020 and on February 11, 2020 named the disease COVID-19, which is caused by a coronavirus (WHO, 2020 a, b). The International Committee on Taxonomy of Viruses (ICTV) named it SARSCoV-2 on February 11, 2020 and recognized this virus as a sister clade to Severe acute respiratory syndrome coronaviruses (SARS-CoVs) (Alexander et al., 2020; Zhou *et al*., 2020; WHO, 2020 c).The SARS-CoV-2 virus causes this illness and belongs to the Genus Betacoronavirus of the Family Coronaviridae (ICTV, 2019). Initially cases of the infection were reported by the WHO China Country Office on December 31, 2019 with unknown etiology of pneumonia in Wuhan city, China (WHO, 2020 d).

As of December 13, 2020 there are 7,04,76,836 confirm cases that becomes double as of march 25, 2021 (WHO, 2020 e). Actual number of cases are not known but increasing cases becoming a challenge to human being. However, the vaccination has been started and is successful but it will take some moretime be completed. Since vaccination has not been completed, prevention is the best way to avoid COVID-19.

COVID-19 cases are much higher due to interhuman transmission in areas where social distancing is not maintained. The virus can infect through air, contact to the saliva or mucus of an infected person, fomite, fecal-oral, blood, mother to child, and animal to human and can enter the body through eyes, nose, or mouth. The infection can be reduced by protecting itself with some precautions as frequent hand wash, avoid touching hands to eyes, mouth & nose, maintain social distance and maintaining respiratory hygiene (WHO, 2020 f).

It infects mainly the respiratory system and cause mild to severe illness or even death. COVID-19 infection can

decrease the number of lymphocytes, white blood cells, and cause progressive respiratory failure owning to alveolar damage (Zhou *et al*., 2020). Common symptoms of COVID-19 are fever, tiredness, dry cough, aches and pain, sore throat, headache and sometimes diarrhoea, nausea or runny nose and in severe condition, difficulty or shortness of breathing, chest pain and pressure and loss of speech and movement (WHO, 2020 g). In recently reported cases patient losing their olfactory ability during the infection (Moein *et al*., 2020). The virus has three main mutant with named as clade G (variant of the spike protein SD614G), clade V (variant of the ORF3a coding protein NS3- G251), and clade S (variant ORF8-L84S) (Mercatelli and Giorgi, 2020).

In December 2020, a new variant of SARSCoV-2 "VOC 202012/01" has been identified from the United Kingdom. This new variant with 14 mutant has been reported in 31 other countries/territories/areas of the five WHO regions as of December 30, 2020 (WHO, 2020 g). This variant is more transmissible than previous with an estimated increase of between 40% and 70% in transmissibility (WHO, 2020 h). During the lockdown period, all unnecessary activities become shut to reduce gathering of peoples. It also helps to prevent the spreading of this virus by assisting people to avoid getting in contact with an infected individual and contaminated area. This helps to break the chain of SARS-CoV-2 infection and limit the infection in that area. It also helps to significantly reduce COVID-19 cases and to develop sufficient medical facilities such as infrastructure, medicine supply etc. in emergency cases.

The threat of a public health crisis in the form of a pandemic with the advent of the 2019 novel Corona Virus (2019-nCoV) also dubbed as SARS-CoV-2 has spread fast from its provenance in Wuhan City of Hubei Province of China to the entire world in a matter of weeks (Roy *et al.*, 2020; Roy and Chaube, 2021). The SARS-CoV-2 viral particles are spherical and have mushroom shaped protein called spikes protruding from their surface, giving the particle a crown like appearance (Kumari and Shukla, 2020). The spikes bind to the human cells and allowing virus to gain entry. The spike protein of novel corona virus shares 98% sequence identity with the spike protein of bat coronavirus. The researchers found that spike protein of SARS-CoV-2 binds to the cellular receptor called angiotensin converting enzyme 2, which is entry point into human cells (Verma and Prakash, 2020). It showed psychosocial impact (Srivastava and Reddy, 2020; Kumar, 2021).

COVID-19 and Environment:

From the beginning of civilization, human beings gradually started manipulating the nature for its own benefit. In order to satisfy the demand of increasing population industrialization and urbanization became inevitable, and the obvious significance was proved to be detrimental on the global climate changes. The desire to drive the nature as per their own whims and desire, human beings started destroying the nature in numerous ways. As an inevitable consequence environment pollution has become a big issue of the present day. It is obvious that environmental pollution will change the distribution and burden of various vector borne infectious diseases including bacterial and viral diseases (Prakash, 2020).

But, due to the unusual outbreak of COVID-19, all local and central administrations restricted the free movement of their citizens outside their home. Various industries are not functioning and all types of travels like airplanes, rails, bus and private vehicle are restricted or cancelled. Due to non-functioning of industries, industrial waste emission has decreased to a large extent. Vehicles are hardly found on the roads resulting almost zero emission of green-house gases and toxic tiny suspended particles to the environment. Minimal activity from industrial sites, factories and construction sectors has minimized the risks for toxins to escape, in turn improving air quality. As such, aviation emissions, which accounted for 2.4% of global CO_2 emissions in 2018, according to the Environmental and Energy Study Institute (EESI) have dropped significantly (Prakash and Srivastava, 2020). Even NASA satellites from outer-space show the significant reductions in air pollutants, which supports Eco Watch's observation that the novel coronavirus pandemic has delivered the silver lining of decreased air pollution.

Significant falls in carbon emission in China (18%) and in US (nearly40%) has been reported during lock down period. China has witnessed a drastic reduction in emission of NOx, CO_2 and various hydrocarbons during the coronavirus lockdown (2020) as compared to the values last year (2019). Eastern and central China areas showed a significant reduction (10-30%) in NO_2 levels (Kulshrestha, 2020). According to Plumer and Popovich (2020), lockdown due to COVID-19, significant reduction in the air pollution in major cities of United State of America. The lockdown is a highly sustainable approach to reduce the noise and injection of tropospheric and stratospheric pollutants.

Due to lesser demand of power in industries, use of fossil fuels or conventional energy sources have been lowered considerably. Ecosystems are being greatly recovered. In

many big cities the inhabitants are experiencing a clear sky and clear river water for the first time in their lives. After the lockdown, a variety of birds are seen in the localities. The pollution level in tourist spots such as forests, sea beaches, hill areas etc. is also shrinking largely. Ozone layer is also reported to be healing. The pandemic has displayed its contrasting consequence on human civilization, in the sense that, on one hand it has executed worldwide destruction, but created a very positive impact on the world environment on the other hand. Thus the lockdown act as a healing dose for climate change, ozone depletion, human health, brown haze etc.

COVID-19 and Biodiversity

Biodiversity refers to the existence of a wide variety of plant and animal species in their natural environments or the diversity of plant and animal life in a particular habitat (Ashok, 2016; Verma, 2017a; Prakash and Srivastava, 2019). Ecological balance is necessary for widespread biodiversity (Verma, 2017b). Biodiversity is necessary for the survival of all the organisms including humans (Ashok, 2017; Verma, 2018). Biodiversity loss has severe effect on ecsystem and sustainable development (Kumar and Verma, 2017; Verma, 2019). Nature always favours and promotes the diversity and coexistence among all the organisms by providing suitable environment to all. Human always try to control the environment and its own society in order to get conducive ambience. But due to overexploitation of natural resources, increased anthropogenic activities and human centric environmental approach, we are facing global warming and COVID-19 like unprecedented threats. So, we have to develop environment centric approach to utilize the natural resources in such a manner so that we can achieve the inclusive and sustainable development with coexistence of all other species of organisms of the globe. The lockdown therefore provided us an opportunity to shift our ideology from anthropocentric or human centric worldview to eco-centric worldview.

Due to lockdown, a large number of birds including vultures are clearly started to appear. Insect pollinators have appeared in abundance on crops and other plants. All these are good indication for ecological balance and biodiversity. Almost total lockdown due to COVID-19 outbreak has minimized the anthropogenic activities including overexploitation of natural resources. The major human population is bound to live in th eir homes, automatically prevented to cause various types of pollution. The surrounding environment is reflecting clean and green. We all are observing a clean environment where almost all animals including birds etc. have stated to flourish. Almost all humans are feeling healthy without any major clinical problems.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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Covid-19 Pandemic: Challenges for Education and Environment

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ABSTRACT

Coronavirus disease 2019 (COVID-19) is an infectious disease that causes respiratory illness in human and has now become a major challenge for all over the world. In spite of all their efforts to restore the nature during the last few decades, humans could only move a few steps forward. But during the last few months, consequences of the COVID-19 Pandemic have successfully recovered the environment to a large extent that should definitely set positive impact on global climate change. The COVID-19 spread around the world and severely affected the world's education, economy, social interactions and other global impacts. We have come across one of the most daunting problems of the modern times, which is, educational crisis. One of the many challenges faced by the students due to COVID-19 is loss of learning. Distance learning has been a failure throughout this period, due to the fact that the educators are unsupported and they lack the practical experience of teaching online through technology. On the other hand, not all students have the technology infrastructure at home to support their ongoing learning. Many of them are economically backward and find it difficult to support their education without internet or a learning tablet.

Keywords: COVID-19, Environment, Education, Lockdown.

Introduction

The outbreak of the new coronavirus infection, COVID-19 (coronavirus disease 2019) was initiated from the Hunan seafood market in Wuhan, Hubei Province of China in December 2019. It is a communicable viral disease and quickly spread globally. So the World Health Organization (WHO) declared it as a pandemic on 11, March, 2020. It is caused by a single stranded RNA virus known as SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2). The SARS-CoV-2 viral particles are spherical and have mushroom shaped protein called spikes protruding from their surface, giving the particle a crown like appearance (Kumari and Shukla, 2020; Roy *et al.,* 2020). The SARS-CoV-2 pandemic beginning in early 2020 has caused millions of deaths from severe COVID-19 lung injury and respiratory failure, often complicated by multi- system injury. Severe Acute Respiratory Syndrome (SARS)-CoV-2 virus belongs to the Coronaviridae family that encompasses alpha, beta, gamma and delta strains. The virus particles are spherical and have mushroom shaped protein called spikes protruding from their surface, giving the particle a crown like appearance. The spike binds to the human cell receptor called 'Angiotensin' converting enzyme 2. Studies showed that virus takes entry to the respiratory mucosa by Angiotensin receptor 2 (ACE2) present in lower respiratory tract in abundance (Singhal, 2020) mainly in type-2 alveolar cells. The same receptor is used by SARS-CoV (Zhou et al., 2020). It has 10 to 20-fold higher binding affinity then SARS. Due to high binding affinity it transmit human to human very quickly (Ankita and Sangeeta, 2020; Roy and Chaube, 2021).

Covid-19 and Environment:

Global pandemic has caused a devastation. Lives are lost and even the environment is been polluted at high rates. The Personal protective Equipment kits as face masks, gloves, goggles, gowns, and aprons are essential items to help protect individuals from exposure to pathogens and contaminants and for that reason it is been used by everyone, extensively by frontline health and sanitation communities to reduce the chances of contracting the

disease. The used PPE kits are highly infectious and becomes a threat to human health, as well as terrestrial, and marine ecosystems, if they are not scientifically handled and disposed. Proper disposal of PPE kits is important to promote environmentally sound management of waste. The present methods available for its disposal are landfill and Incineration. These methods may help but it is not in line with sustainability. On a long run they have depleting effect on the environment and biodiversity (Arya, 2021; Prakash, 2021). The biodiversity loss is a big problem (Verma, 2016; Kumar and Verma, 2017. There is a need for the world to move towards sustainable development and achieve sustainability (Verma, 2021). There are many scientist and environmental enthusiasts who are looking into innovative methods of disposal of these wastes created by the pandemic. It showed positive effects on environment and biodiversity. The latter is significant for ecological balance and human survival (Ashok, 2017 & 2018).

COVID -19 presents an unprecedented challenge to public health, food systems, economic and social disruption and also environment in diverse ways. The COVID -19 pandemic and resulting restrictions, imposed to fight the spread of disease, have provided some short term positive but long term negative impacts on environment. The positive impact includes reduced air, water and noise pollution, better growth of vegetation, etc. The negative impacts are difficult waste management, increased organic and non-recyclable waste. The drastically increasing amount of domestic and medical waste is one of the key negative outcomes of COVID – 19. Increased biomedical waste generation is a major threat to public health and environment. Used masks, gloves, PPE kits, face shields and tissues when discarded untreated, pose a serious negative effect on environment. Increased online shopping for home delivery, ultimately increase the amount of household waste from shipped package materials. Huge amount of disinfectants applied on roads, commercial and residential areas affects the quality of environment. We don't know, when we will get rid from COVID -19, so this is the right time to make collective efforts and strategies for environmental sustainability. To achieve this, sustainable industrialization, proper waste management, waste water treatment, biomedical waste management and promoting sustainable livelihood is must.

Lockdown due to COVID-19 reduced transport activities which results in less energy consumption and lower oil demand. These changes in transport activities and oil demand exert a significant impact on the environmental quality. NASA (National Aeronautics and Space Administration) and ESA (European Space Agency) released fresh evidence which suggests that environmental quality improved and the emission of NO_2 reduced up to 30%. NASA collect the data using OMI (Ozone Monitoring Instruments) on its AURA satellite. While, ESA collect the data through Sentinel-5P satellite using TROPOMI (TROPO spheric Monitoring Instrument). NASA and ESA release satellite images of various countries before and after lockdown. As such, aviation emissions, which accounted for 2.4% of global CO_2 emissions in 2018, according to the Environmental and Energy Study Institute (EESI) have dropped significantly (Prakash and Srivastava, 2020).

On the other hand, environmental pollution across the world has been greatly mitigated after the outbreak of COVID-19 due to the implementation of lockdown, travel bans, and stay-at-home advice, which has had a positive impact on the global environment despite the economic and social disruptions caused. Based on current knowledge on COVID-19, a second wave may be followed by third, especially when our society is gradually getting back to normal after the primary attempt to gain control of COVID-19. Nonetheless, the consequence of the long-term battle against COVID has barely been elaborated. Currently, there are many relevant questions that remain unanswered due to the limited understanding of the interactions between COVID-19 and the global environment, such as the role of environmental change on disease transmission, the impact of human activity and lifestyle change on the environment, and environmental concerns during a long-term battle against COVID-19. During growth and development, environmental ethics should be followed (Verma, 2019).

COVID-19 and Education:

The Covid-19 pandemic has affected educational systems worldwide, leading to the near-total closures of schools, colleges, universities and other educational institutes. School closures impact not only students, teachers, and families, but have far-reaching economic and societal consequences. The impact was more severe for disadvantaged children and their families, causing interrupted learning, compromised nutrition, childcare problems, and consequent economic cost to families who could not work.

School closures negatively impact student learning outcomes and When schools are closed, many children and youth miss out on social contact that is essential to

learning and development. The disadvantages are disproportionate for underprivileged learners who tend to have fewer educational opportunities beyond school. Student dropout rates tend to increase as an effect of school closures due to the challenge of ensuring all students return to school once school closures end. Schools are hubs of social activity and human interaction. When schools close parents are often asked to facilitate the learning of children at home and can struggle to perform this task. This is especially true for parents with limited education and resources.

In response to school closures caused by COVID-19, UNESCO recommends the use of distance learning programs and open educational applications and platforms that schools and teachers can use to reach learners remotely and limit the disruption of education. But due to lack of access to technology or fast, reliable internet access can prevent students in rural areas and from disadvantaged families. Lack of access to technology or good internet connectivity is an obstacle to continued learning, especially for the students belonging to poor families background. The disruption in education and learning could have long-term consequences on the quality of education, though the efforts made by teachers, school administrations, local and national governments to cope with the unprecedented circumstances by e-learning.

Several universities have asked their faculties to keep giving online classes and supplying reading material through emails and other media. In a nutshell, for more mature students, the traditional class room education is turned into e-class room education system. This is a global turning point for adopting this new 'e-education system and `Work from Home' culture. It showed psychosocial impact on educators and students suffered drastically (Srivastava and Reddy, 2020; Kumar, 2021).

The e-education will have impact on research and its procedures. During e-education, one cannot accumulate practical experience of real laboratory work like handling of apparatus and instruments etc. Hence, the degree holder of science by e-education will be useful only for teaching, online demonstrations, model creation, online material designing and modeling etc. Most colleges and universities will be deprived of good students and funds, which may result in abandoned physical campuses. As a result, the number of excellent research centers may be reduced, leading to reduced quality and quantity of formal research. Funding patterns for research as well as the priorities for future research areas will be affected and changed.

The sudden shift to online learning without any planning especially in countries like India where the backbone for online learning was not ready and the curriculum was not designed for such a format has created the risk of most of our students becoming passive learners and they seem to be losing interest due to low levels of attention span. Added to this is that we may be leaving a large proportion of the student population untouched due to the digital divide that is part of many developing nations including India (Srivastava *et al.*, 2020).

Online learning is a special kind of methodology and not all teachers are trained for imparting online classes. So, most of the teachers are just conducting lectures on video platforms such as Zoom which may not be real online learning in the absence of a dedicated online platform specifically designed for the purpose. There is a risk that in such a situation, learning outcomes may not be achieved and it may be only resulting in engaging the students.

During the present pandemic situation, most of the universities and colleges will shift to a model of blended learning where both face to face delivery along with an online model will become a norm. A great opportunity will open up for those companies that have been developing and strengthening learning management systems for use by universities and colleges.

There is a great opportunity for universities and colleges to start improving the quality of the learning material that is used in the teaching and learning process. Since blended learning will be the new format of learning there will be a push to find new ways to design and deliver quality content especially due to the fact that the use of learning management systems will bring about more openness and transparency in academics.

There is a new opportunity where collaborative teaching and learning can take on new forms and can even be monetized. Faculty members/ teachers can deliver online courses to even students from competing institutions. Collaborations can also happen among faculty/teachers across the nation to benefit from each other. Finally, it is expected that there will be a massive rise in teleconferencing opportunities which can also have a negative impact on the travel.

A large number of academic meetings, seminars, conferences and webniears will move online and there is a possibility that some new form of an online conferencing platform will emerge as a business model.

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Covid-19 Second Wave: Challenges for Education and Disaster Management

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ABSTRACT

Coronavirus disease (Covid-19) is an infectious disease caused by the SARS-CoV-2 virus. Spreading rate of mutated corona virus (delta variant) during second wave was very fast. Most of the people infected with the COVID-19 virus experienced mild to moderate to severe respiratory illness. Although patients in the second wave were younger but the duration of hospitalization and case fatality rate were lower than those in the first wave. During first wave of Covid-19 it was observed that persons above 55 years of age and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease and cancer were more susceptible to develop serious illness but in second it was observed that person between 30 to 55 years along with old age and younger people suffering from hypertension, diabetes and respiratory diseases were more susceptible to this covid-19 virus. The most frequent signs and symptoms in both waves were fever, dyspnea, pneumonia, and cough, and the most relevant comorbidities were cardiovascular diseases, type 2 diabetes mellitus, and chronic neurological diseases. Every country has lost its human resources due to covid-19 virus which not only disturb the social life but economic conditions are also very badly affected. Now we use the resources so rapidly that may create economic imbalance in future. The psychological effect is an essential component of disaster management of infectious pandemics.

Keywords: Covid-19, Education system, Disaster management.

Introduction

COVID-19 is a highly contagious lower respiratory tract infection which can be transmitted through droplets or by touching surfaces contaminated during coughing or sneezing from both symptomatic and asymptomatic person. Patients who are highly contagious are called super spreaders (Kumari and Shukla, 2020). They can quickly infect multiple individuals within a range of 2 m. The symptoms of COVID-19 disease include fever, cough, myalgia, and fatigue, and appear after an incubation period of 2-14 days (Verma and Prakash, 2020a). The period between exposure to virus and beginning of its symptoms of the disease in our body is known as incubation period (Prakash and Srivastava, 2020). However, the majority of infected subjects are carriers without clinical symptoms. Over time additional symptoms that are frequently associated with COVID-19 infection have been identified, such as loss of smell and taste (anosmia and dyspepsia) (Roy *et al.*, 2020; Roy and Chaube, 2021).

The COVID – 19 pandemic affected many people in its both first and second wave. Now a days, human civilization is passing through the most critical juncture of this millennium. Its existence is being challenged by the emergence of COVID -19. In the middle of March 2021, the second wave started and on April 09 the highest numbers of cases have been identified in India. Its second wave was more hazardous in which many people lost their lives. COVID -19 presents an unprecedented challenge to public health, food systems, economic and social disruption and also environment in diverse ways. During this time several countries globally enforced the temporary closure or lockdown of all non-essential shops and services besides supermarket and pharmacies. In most of the countries the workers with a high risk of infection

are asked to work from home as most of the places were under lockdown. The COVID-19 has resulted in school and college shut all across the globe and as schools, colleges and university are closed children are out of the classroom. This paper highlights few impact of COVID-19 on Education system in and mental health of people.

The COVID -19 pandemic and resulting restrictions, imposed to fight the spread of disease, have provided some short term positive but long term negative impacts on environment. The positive impact includes reduced air, water and noise pollution, better growth of vegetation, etc. The negative impacts are increased organic and non-recyclable waste and also to difficult the dispose of these wastes. The drastically increasing amount of domestic and medical waste is one of the key negative outcomes of COVID – 19. Disposal of covid and electronic waste is a big challenge (Verma and Prakash, 2020b). Increased biomedical waste generation is a major threat to public health and environment. Used masks, gloves, PPE kits, face shields and tissues when discarded untreated, pose a serious negative effect on environment. Increased online shopping for home delivery, ultimately increase the amount of household waste from shipped package materials. Huge amount of disinfectants applied on roads, commercial and residential areas affects the quality of environment. Community medicine has played big role during pandemics (Balwan *et al.*, 2021). We don't know when we will get rid from COVID 19, so this is the right time to make collective efforts and strategies for sustainability in all the fields.

Covid– 19 and Education: Covid-19 impact was everywhere, which resulted in the closure of educational institutions globally. Outbreak of COVID-19 has taught human that the change is inevitable. The lockdowns in response to COVID-19 have interrupted conventional learning. Government has recommended moving to online learning as a stop-gap arrangement to evade any disruptions in academic calendars. While the educational community have made concerted efforts to maintain learning continuity during this period, students have had to rely more on their own resources to continue learning remotely through the Internet, television or radio. In particular, learners in the most marginalized groups, who don't have access to digital learning resources or lack the resilience and engagement to learn on their own, are at risk of falling behind. While the benefits of online learning are manifold, there are still many roadblocks in the way ahead towards making education an entirely digital (online) phenomenon. It is the fact that rural population is not completely equipped with utilities like fast internet, uninterrupted power supply and electronic devices (Srivastava *et al*., 2020; Kumar, 2021). There have been improvements regarding basic infrastructural facilities but many rural areas in India are still grappling with these challenges to make education completely digital or online. It is imperative to consider the availability of the right devices to every student for accessing digital content. Not a lot of people in rural India have access to personal laptops or computers, and phone screens are not conducive to long learning hours (Srivastava and Reddy, 2020). Also, data packs and their costs can be a big deterrent for learners, especially for live classes. Many students either don't have personal laptops/smartphones or they are available for a limited time. Hence, the learning remains restricted with the limited availability of technological devices.

Covid-19 and Disaster Management:
There is no doubt that the COVID-19 pandemic is a major stressor that is impacting mental health worldwide. The human experiences encountered during the COVID-19 pandemic may be potentially damaging psychologically, physically, socially, and spiritually. They cause a crisis of conscience. The majority of people were ordered to stay at home for long periods and work from there except those having essential jobs such as in food delivery, pharmacies, healthcare work, and jobs in basic social infrastructure. This caused reduced physical activity, which has negative effects on mental health in the community because physical activities directly reduce general negative emotions. This further affects the usual ethical human autonomy of choice. However, ethical considerations are different in disasters, as under such circumstances one should save as many patients as possible even if it affects some personal rights. This is an ethical situation faced by acute care physicians during triage.

The COVID-19 pandemic is having a major impact on the global economy. The stock market fell by 35% by April 2020 (Mohamud *et al.*, 2021). It has caused the most severe economic recession of the last hundred years, with tremendous damage to jobs and savings, especially for young workers. It is anticipated that gross domestic product (GDP) will be reduced by 9.1% in a single wave COVID-19 pandemic and 11.5% in a double wave pandemic.

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Reinstating our Ecosystems to ensure Human Survival

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ABSTRACT

Humans as well as plants and animals coexist on this planet. This is possible only because they are all co-dependent and have regular interactions. They share their space with each other and influence each other in almost all aspects. This is a known fact that we are a part of our environment although humans tend to think otherwise. There are other components to it too but our behaviour is negligent towards the remaining components of our ecosystems. We are destroying our ecosystems injudiciously. Lack of proper utilization of resources, lack of proper conservation and appropriate restoration of our ecosystems will lead us to a bleak future.

Keywords: Ecosystem, Covid-19, Human survival, Pandemic.

Introduction

Ecosystems are multifaceted. They regulate our climate, control pest and diseases, provide us with food, water, raw materials, absorb our waste materials, provide livelihood, support our health and enrich our culture (1). The way in which we are using our planet in present times is alarming as we would need nearly 1.6 Earths to continue and this is putting our future generations at risk (2).

Pandemic and Ecosystems

It is clearly evident that COVID-19 pandemic has terribly affected people's health, lives and livelihoods. On the contrary it has also had a noticeable positive impact on our environment in just few months. Reduced economic and transport activities has resulted in short term cleaner air, reduced carbon emissions and less noise (3).

During the recent pandemic human mobility considerably reduced and its effects were easily visible on the human wildlife interactions. We have incidents where nature changed and urban environments saw animals which were unexpected or were hidden from view till now. The animals in the oceans also became more visible and interactive due to reduction in noise pollution levels and traffic over sea (4).

On the other hand, the pandemic has also created new challenges for animals residing in urban areas like Rats, Birds, Monkeys because they were reliant on the food which was either discarded or provided by humans (5). Another facet to decreased human mobility comes in the form of danger to animals. Due to reduced human presence endangered species like Rhinos have been exposed to the risk of poaching (6).

Reversing Damage to Biodiversity

To reduce the loss of biodiversity first step should be to stop the loss of natural habitats followed by conserving whatever remains and further restore degraded ecosystems (7). The IUCN Red List has mentioned that 85% of all the species which are under threat are only because of the loss and degradation of their natural habitat (8). According to a study we can save 60% of expected species extinction. For that basic requirement includes careful spatial planning, make executable plans to restore about 15% off our converted lands and stop further conversion of natural ecosystems (9).

The loss of our biodiversity can be slowed if we take care of proper restoration of ecosystem. We can enlarge the extent of habitats and work on strategies to increase

species diversity. When complex internal interactions within the ecosystem will slowly merge they will support the recovery of a large number of species populations. The populations thus emerging will have increased resilience and the biodiversity loss will be slowly reversed (1).

Restoration approaches

To restore our ecosystems holistically we can apply a lot of tactics. Effectively managing these approaches will slowly make the results visible on a bigger scale. The ecology of a place could be evidently either degraded, damaged or destroyed but can be restored by supporting the recovery of a degraded terrestrial, freshwater or marine ecosystem (10).

To take care of the restoration of forest and landscape it is important to reverse the degradation of soil, areas under agriculture, natural forest and watersheds. This will make them ecologically functional and generate goods and services which may be of benefit to multiple stakeholders. It will help increase the revenue and have ecological, social as well as economic functionality (11).

Aquatic ecosystems which involve large oceanic marine ecosystems or small rivers and ponds suffer equally like forest and landscape. They are largely affected by direct and indirect impacts of fishing, spills, effluents, and improperly managed aquaculture. It is very important to minimise this impact and bring them to an initial state so that the biological life is relieved from periodic stress (12). Another approach can be of reintroducing species to ecosystems from where they have been lost. They can be re-established and slowly the flora- fauna, fauna- fauna or flora-flora interaction dynamics would be further reinstated (13).

Principles for successful restoration

If we plan to do successful restoration, we have to bring about a balance between our economic priorities and environmental concerns (14). Having a healthy ecosystem is as important as having options for economic growth and generating livelihood for people. Although the ecosystems need to be secured but we also have to focus on livelihoods, food and water security, international trade, poverty removal etc. (15)

It is imperative that all the plans which are related to restoration need to involve international collaborations. It is important that they should be implemented across the globe. They need to involve all land and sea related activities, include public and private partnership as well as local and rural communities so that they can be effective and result oriented (16).

It has been estimated that approximately 28% of the world's land surface and 37% of all remaining natural land is managed by indigenous people. They have been using sustainable methods to maintain their inhabitations and play a vital role in conservation and restoration agendas (17). It has become crucial for us to integrate environmental economic planning so that the public expenditure patterns and improved ecosystems can be harmoniously maintained. It is necessary to effectively implement plans which can create a balance between nature and humans. To achieve this goal, firstly ecosystem-based livelihoods can be generated along with their sustainable use. Secondly if private sector utilizes environment for their use then they should be under strict regulatory framework, have strong finance mechanism and public private partnerships (16). Thirdly it is very important for communities and civil society to incorporate task force and increase vigilance.

Last but not the least support needs to be provided for the maintenance of security systems and their restorations. People should be also be encouraged to be involved voluntarily so that our future generations can benefit and appreciate the sustaining capacity of our ecosystems (18).

CONCLUSIONS

The term ecosystem restoration actually talks about reviving degraded ecosystems to their pre degraded situation and conserving them for the future. We have nearly eight types of ecosystems which include forests, farm lands, grasslands and savannah, rivers and lakes, oceans and coasts, towns and cities, and peatlands and mountains.

Covid-19 pandemic can be credited to bring a stop to the fast-running human life. It also bought a new understanding too. With the observed changes we can be sure that minor variations in our lifestyle can produce a far-reaching effect. It can benefit our ecosystems, as well as us (19). Different methods by which ecosystems can be re-established include: controlling erosion, reforestation, removal of non-native species and weeds, revegetation of disturbed areas, reintroduction of native species and range improvement for targeted species.

Ecosystems are resilient by nature and have huge regenerative abilities. All we need to do is have a holistic approach. We all need to have a global undertaking on a huge scale so that a significant difference can be observed. Balanced ecosystems are necessary for human survival and sustainable development (20, 21). If we can sustainably reclaim and restore our biodiversity then we can be sure to get rid of huge amount of greenhouse gases

from the atmosphere, retrieve degraded terrestrial and aquatic ecosystems thus providing a guarantee for a better and healthier environment which will support life (22).

Natural environments support us and need our protection. It is important for us to understand that we don't own the planet but belong to it.

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COVID-19 SECOND WAVE: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

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COVID-19 Pandemic and Indian Scenario

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ABSTRACT

The coronaviruses are a large family of viruses that cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS), and Severe Acute Respiratory Syndrome (SARS). The coronaviruses are zoonotic, and SARS-CoVs were transmitted from civet cats to humans. However, the most recently erupted COVID-2019 disease is due to SARS-CoV-2 infection transmitted from human to human supposed to come from bats. The common signs of infection include respiratory symptoms, fever, cough, and breathing difficulties. In more severe cases, infection can cause pneumonia, acute respiratory problems, kidney failure and even death. The WHO notified information and guidance regarding the current outbreak of COVID-19 that was first documented from Wuhan, China, on 31st December 2019. This SARS-CoV-2 is currently affecting about 34365219people in India anddue to continuous effort India has successfully developed and manufacturing the two native COVID-19 vaccines, Covaxin and Covishield.

Keywords: COVID-19, SARS-CoV-2, Contagious Disease, Vaccines.

Introduction

The coronavirus disease-2019 (COVID-19) formerly to be known novel coronavirus- 2019 (2019-nCoV) disease caused by SARS-CoV-2 (severe acute respiratory syndrome coronaviruses-2) is a member of coronavirus family that has never been encountered earlier so far (Kumari and Shukla, 2020). Like other coronaviruses, the new and troubling 2019-nCoVs usually originate in animal hosts. The Severe Acute Respiratory Syndrome (SARS) is caused by coronaviruses that came from animal also (Roy *et al.,* 2020). In 2002, SARS spread virtually unchecked to 37 countries, caused global pandemic, infected more than 8,000 people and killed over 750.

Coronavirus infected person has many common symptoms such as fever, cough, myalgia, tiredness, pneumonia and complicated dyspnea, whereas less common reported symptoms include headache, diarrhea, hemoptysis, runny nose, and phlegm-producing cough. To control this pandemic, precautionary measures should be taken to slow down the transmission of the COVID-19 including identification or tracing, isolation or quarantine, follow-up of contacts to break the chain or tracking, environmental disinfection or sanitization, use of personal protective equipment to reduce multiple infections during health care and social services, treatments through medicine/, immunity boosters, Ayurveda / therapy, decoctions, and so on (Balwan *et al.,* 2021). It has shown huge impact on education and environment (Srivastava *et al.,* 2020; Verma and Prakash, 2020; Roy and Chaube, 2021; Shukla, 2021).

The emerging coronavirus can cause pneumonia and in severe cases there can be organ failure (WHO, 2020a). As this is viral pneumonia, antibiotics are of no use; even the antiviral used against ebola and flu will not work. The recovery will depend on the strength of their immune system (Dan *et al*., 2020). Many of those who have died were already in poor health. The global coronavirus outbreak has put Indians on guard. Over 70% of Indians say they are alert and taking necessary precautions against COVID-19, the disease spread by the novel coronavirus strains, according to a survey conducted by

local circles, a community-led social media engagement platform (Dan *et al*., 2020). It also proves that this virus spread quickly human to human by transmission through close direct contact, aerosol and droplets generated by coughing and sneezing (Upadhyay, 2020).

EPIDEMIOLOGY OF COVID-19 IN INDIA

The novel coronavirus COVID-19, SARS-CoV-2 virus is affecting over 220 countries of the world and has infected more than 240 million people out of which, more than 4.5 million have lost their lives, as of September, 2021, making it one of the deadliest pandemics in history. The epidemiology of COVID-19 has been little studied during early spread season. Waves of infection pass through communities during the winter months, and often cause small outbreaks in families, schools, etc. and very soon covered entire world (Kumar *et al.*, 2020). The immunity does not persist, and subjects may be re-infected, sometimes within a year (Kumar *et al.*, 2020). The virus is usually transmitted via inhalation of contaminated droplets, but it may also be transmitted by the hands to the mucosa of the nose or eyes.

The India may have only three confirmed cases of coronavirus in February, 2020 andall the three coronavirus confirmed patients were belonging from the southern Indian state of Keralabut Indians were not taken any chances for its further spread. The six Indian nationals onboard the quarantined Diamond Princes Cruise Ship have also tested positive. The Indians, expect the government to more stringently monitor travelers coming India from epicenter or likely to be epicenter. However, 53% feel the government is currently not doing enough to keep tabs on travelers from South-East Asian countries. At the same time, Indians want their government to continue being a world leader in humanitarian efforts. Nearly 83% of the respondents felt that India should ramp up production of facial tissues, masks, toilet paper, and drugs and supply them to countries in need. During survey as much as 16% of Indians say their closer home businesses are feeling the heat of the contagion. On 11th March 2020, WHO declared the novel coronavirus disease (COVID-19) outbreak as a global pandemic (an epidemic that has spread worldwide affecting a large number of people) (WHO, 2020b). On the same day, the Prime Minister of India, constituted a high-level Group of Ministers to review, monitor and evaluate the preparedness and measures taken regarding management of COVID-19 in the country. Government of India has invoked powers under the Epidemic Diseases Act, 1897 to enhance preparednessand containment of the virus and declared COVID-19 a 'notified disaster' under the 'Disaster Management Act 2005'. The Prime Minister's Office (PMO), MoHFW and Cabinet Secretary are closely monitoring the situation round the clock and all the states and UTs of India have been advised to invoke the provisions under 'Section 2 of the Epidemic Disease Act 1897', which includes special measures to be taken by the Centre to “prescribe regulations as to dangerous epidemic disease” by 14th March 2K20. The Central Government has declared the COVID-19 outbreak in the country a "notified disaster", in a move called "a special one-time dispensation", to provide compensation and aid to infected people and the families of those who died due to the virus. Mr. NarendraModi,Hon'ble Prime Minister of India, in exercise of the powers under 'section 6(2)(i) of the Disaster Management Act, 2005', issued an order for State/UTs prescribing lockdown for containment of COVID-19 epidemic in the country for a period of 21 days with effect from 25th March, 2020 to 14th April, 2020 which further extended in many steps for about 1.5 years. Meanwhile several precautionary measures were taken by the Indian Government for combating the COVID-19. The efforts were outstanding and appreciated by the WHO as well. As for as Indian scenario of COVID-19 concerned, about 34365219 infected cases were recorded as of September, 2021. Out of these about 33775000 cases recovered successfully with about 461300deaths due to COVID-19. The current situations in Indiahas worsened due to non-compliance of people to the rules and regulations pertaining to COVID-19. These regulations are the proper use of masks and the sanitization of hands for at least 20 seconds with the use of soap and water.

Currently nearly 140625 active cases also hospitalized for their successful treatment. The continuous effort of Indian Govt. has resulted in the successful manufacturing of two native COVID-19 vaccines (Covaxin and Covishield) and administered about 100 cores of vaccine doses by September, 2021.

CONCLUSIONS

According to the WHO, coronaviruses are a family of viruses that cause common cold, severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS) etc. The World Health Organization declared the coronavirus outbreak a Global Public Health Emergency which later on declared as Pandemic by the WHO on 11th March, 2020. The continuous effort of Indian Government resulted the successful development and manufacturing of two native COVID-19 vaccines (Covaxin and Covishield) and subsequently administered

about 100 cores of vaccine doses by September, 2021 under the mission Pan-India COVID-19 vaccination dedicated to the 152nd birth anniversary of Rasthrapita Mahatma Gandhi and 75th Azadi ka Amrit Mahotsav.

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