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COVID-19 PANDEMIC: FLAWS DURING SECOND WAVE, PREVENTION STRATEGIES TO AVOID THIRD WAVE

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ABSTRACT

Corona virus disease is a life threatening disease caused by SARS-CoV-2 virus which shredded many lives in the world. The infected persons are manifested with mild to moderate respiratory symptoms and usually get recovered without requiring special treatment when diagnosed at an early stage. But in some cases, patients are becoming seriously ill and needs medical attention especially in elderly people and co-morbid people. Anyone can get sick with COVID-19 and become seriously ill or die at any age. As there is a huge loss in the global economy due to the pandemic and high mortality rate especially during the second wave in countries like India, the idea of this article is to focus on the mistakes occurred during the second wave and possible prevention strategies to reduce the risk of third wave.

INTRODUCTION

Corona viruses are a family of viruses that can cause respiratory illness in humans. They get their name, "corona," from the many crown-like spikes on the surface of the virus. Severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) and the common cold are examples of corona viruses that cause illness in humans. The new strain of corona virus, COVID-19, was first reported in Wuhan, China in December 2019.

The virus has since spread to all continents (except Antarctica).

How virus spreads:

Contagion means the communication of disease from one person or organism to another by close contact. The principal mode by which people are infected with SARS-CoV-2 (the virus that causes COVID- 19) is through exposure to respiratory fluids carrying infectious virus.

Exposure occurs in three principal ways:

- Inhalation of very fine respiratory droplets and aerosol particles.
- Deposition of respiratory droplets and particles on exposed mucous membranes in the mouth, nose, or eye by direct splashes and sprays.
- Touching mucous membranes with hands that have been soiled either directly by virus- containing respiratory fluids or indirectly by touching surfaces with virus on them.
- People release respiratory fluids during exhalation (e.g., quiet breathing, speaking, singing, exercise, coughing, sneezing) in the form of droplets across a spectrum of sizes 1-9. These droplets carry virus and transmit infection.
- The largest droplets settle out of the air rapidly, within seconds to minutes.
- The smallest very fine droplets and aerosol particles formed when these fine droplets rapidly dry, are small enough that they can remain suspended in the air for minutes to hours.

Transmission of SARS-CoV-2 from inhalation of virus in the air farther than six feet from aninfectious source can occur

- Enclosed spaces with inadequate ventilation or air handling within which the concentration of exhaled respiratory fluids, especially very fine droplets and aerosol particles, can build-up in theair space.
- Increased exhalation of respiratory fluids if the infectious person is engaged in physical exertion or raises their voice (e.g., exercising, shouting, and singing).
- Prolonged exposure to these conditions, typically more than 15 minutes **[1]**.

Other indirect routes of transmission

Indirect routes of transmission include coming into contact with contaminated surfaces (called fomites) as a result of contagious droplets falling on these surfaces. When someone touches an infected surface and then touches their face (close proximity to mouth, nose, and eyes), the risk of the virus entering the body is significantly increased **[2]**.

Is Covid-19 an end to Human Race?

- Corona virus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus.
- Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

Modes of transmission of COVID-19 virus

The Government of India has recently issued a warning regarding the third wave of corona disease. It is estimated that the third wave of corona is more dangerous than the first 2 waves. Third Wave, you may face fever, cough, shortness of breath, and breathing difficulties. Precautions needed to stay safe from covid-19.

- Wash your hands thoroughly with soap.
- If you are going out, be sure to apply the mask and use a hand sanitizer. Do not touch your face or mask frequently.
- Make a distance of at least 2 yards from the infected. When coughing, cover the mouth with a handkerchief. If your health is already weak then stay home.
- Do not smoke and stay away from other lung weakening activities.
- Do not go out of the house without any necessary work **[3]**
- As lockdowns are relaxed, the virus will spread. Two scientists Campbell and Omura discovered the drug Ivermectin, which was found to be effective against a number of parasitic infestations. Ivermectin is safer than commonly used medicines like Ibuprofen, paracetamol, penicillin and aspirin. Ivermectin is far more effective than other more expensive drugs. Ivermectin is also used as a preventive medicine for those who are at high risk of infection, Ivermectin should be given to all those who are not vaccinated or are partially vaccinated **[4]**.
- The possibility of the third could not be wished away as long as human hosts are available for infection and the only way to reduce this vulnerability is through safe practices and vaccination. Personal behavior (masks, distancing and hygiene), vaccination and tracking, and containment are three pillars that stop the chain of virus transmission **[5, 6]**.
- Corona viruses belonging to the alpha corona virus and beta corona virus genera represent a group of both human and animal viruses, causing respiratory or gastrointestinal infections
- In humans corona viruses were

associated with mild respiratory infections until the outbreak of severe acute respiratory syndrome (SARS) in 2002 and Middle East respiratory syndrome (MERS) ten years later. Highly pathogenic corona viruses can cause these severe diseases due to the fact that they can infect the lower respiratory tract for instance the lung tissue, whereas the corona viruses associated with the common cold and mild infections, infect the upper respiratory tract, like the nose and throat. In severe cases significantly depleted lymphocyte numbers have been observed and could suggest that the infection may be associated with cellular immune deficiency, but the mechanisms of significant lymphocyte reduction remains unclear age distribution and diversity of COVID-19 cases

Airborne transmission

Airborne transmission is defined as the spread of an infectious agent caused by the dissemination of droplet nuclei (aerosols) that remain infectious when suspended in air over long distances and time. Airborne transmission of SARS-CoV-2 can occur during medical procedures that generate aerosols "aerosol generating procedures". WHO, together with the scientific community, has been actively discussing and evaluating whether SARS-CoV-2 may also spread through aerosols in the absence of aerosol generating procedures, particularly in indoor settings with poor ventilation?

The physics of exhaled air and flow physics have generated hypotheses about possible mechanisms of SARS-CoV-2 transmission through aerosols. These theories suggest that 1) a number of respiratory droplets generate microscopic aerosols (<5 μm) by evaporating, and 2) normal breathing and talking results in exhaled aerosols. Thus, a susceptible person could inhale aerosols, and could become infected if the aerosols contain the virus in sufficient quantity to cause infection within the recipient. However, the proportion of exhaled droplet nuclei or of respiratory droplets that evaporate to generate aerosols, and the infectious dose of viable SARS-CoV-2 required to cause infection in another person are not known, but it has been studied for other respiratory viruses.

One experimental study quantified the amount of droplets of various sizes that remain airborne during normal speech. However, the authors acknowledge that this relies on the independent action hypothesis, which has not been validated for humans. Another recent experimental model found that healthy individuals can produce aerosols through coughing and talking, and another model suggested high variability between

individuals in terms of particle emission rates during speech, with increased rates correlated with increased amplitude of vocalization. To date, transmission of SARS-CoV-2 by this type of aerosol route has not been demonstrated; much more research is needed given the possible implications of such route of transmission.

Experimental studies have generated aerosols of infectious samples using high-powered jet nebulizers under controlled laboratory conditions. These studies found SARS-CoV-2 virus RNA in air samples within aerosols for up to 3 hours in one study and 16 hours in another, which also found viable replication-competent virus. These findings were from experimentally induced aerosols that do not reflect normal human cough conditions.

Some studies conducted in health care settings where symptomatic COVID-19 patients were cared for, but where aerosol generating procedures were not performed, reported the presence of SARS-CoV-2 RNA in air samples, while other similar investigations in both health care and non-health care settings found no presence of SARS-CoV-2 RNA; no studies have found viable virus in air samples. Within samples where SARS-CoV-2 RNA was found, the quantity of RNA detected was in extremely low numbers in large volumes of air and one study that found SARS-CoV-2 RNA in air samples reported inability to identify viable virus. The detection of RNA using reverse transcription polymerase chain reaction (RT-PCR)-based assays is not necessarily indicative of replication- and infection-competent (viable) virus that could be transmissible and capable of causing infection.

Recent clinical reports of health workers exposed to COVID-19 index cases, not in the presence of aerosol-generating procedures, found no nosocomial transmission when contact and droplet precautions were appropriately used, including the wearing of medical masks as a component of the personal protective equipment (PPE). These observations suggest that aerosol transmission did not occur in this context. Further studies are needed to determine whether it is possible to detect viable SARS-CoV-2 in air samples from settings where no procedures that generate aerosols are performed and what role aerosols might play in transmission.

Outside of medical facilities, some outbreak reports related to indoor crowded spaces have suggested the possibility of aerosol transmission, combined with droplet transmission, for example, during choir

practice, in restaurants or in fitness classes. In these events, short-range aerosol transmission, particularly in specific indoor locations, such as crowded and inadequately ventilated spaces over a prolonged period of time with infected persons cannot be ruled out. However, the detailed investigations of these clusters suggest that droplet and fomite transmission could also explain human-to-human transmission within these clusters. Further, the close contact environments of these clusters may have facilitated transmission from a small number of cases to many other people (e.g., super spreading event), especially if hand hygiene was not performed and masks were not used when physical distancing was notmaintained **[7]**.

Symptoms

Covid-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.

Most common symptoms: Fever, Dry cough, Tiredness.

Less common symptoms: Aches and pains, Sore throat, Diarrhea, Conjunctivitis, Headache, Loss of taste or smell, A rash on skin, or discoloration of fingers or toes.

Serious symptoms: Difficulty breathing or shortness of breath, pain in chest or pressure.

Variants of Covid-19 virus

- Viruses constantly change through mutation, and new variants of a virus are expected to occur. Numerous variants of the virus that causes COVID-19 are being tracked in the United States and globally during this pandemic.
- All COVID-19 tests can detect all variants, but they will not tell you which variant you have.
- Most variants cause similar symptoms to that of Covid-19 but some of them may be dreadful.

Different types of variants are

Alpha – B.1.1.7 - First identified: United Kingdom

Beta – B.1.351 - First identified: South Africa

Gamma – P.1 - First identified: Japan/Brazil

Delta – B.1.617.2 - First identified: India

These are known as *Variants of Concern (VOC)* **[8, 9]**

Double mutant Covid-19 virus:

- A new “double mutant” variant of the corona virus has been detected from samples collected in India. Where two mutations come together in the same virus, may be more infectious or less affected by vaccines.
- The new variant, which has a so-called double mutation, is thought to be

fueling India's deadlier new wave of infections that has made it the world's second worst-hit country, surpassing Brazil, and has already begun to overwhelm

- The new variant, called B.1.617of SARS-CoV-2, was initially detected in India with two mutations — the E484Q and L452R. It was first reported for 1st time late last year in India.
- The two mutations are found in the virus's spike protein. The spike protein helps the virus to bind itself to the human cell's receptors and gain entry into a host cell. Other countries also reported double mutant variants across the world.
- The L452R mutation has been found in fast spreading variants in California (B.1.427 and B.1.429). It can increase the binding power of spike proteins with ACE2 receptors on human cells, making it more transmissible. L452R can also potentially enhance viral replication.
- The E484Q mutation is similar to E484K, a mutation found in the United Kingdom (lineage B.1.1.7) and South Africa (B.1.351) variants of the corona virus.
- Together, E484Q and L452R are more infectious, and can evade antibodies.
- Studies suggest they are more contagious, and more deadly while another drives re-infections **[10]**.

Where 1st Double mutant case was reported in India?

- It was first reported from Maharashtra. In January, 19 samples from various districts were sequenced, and B.1.617 was found in four. In February, 234 samples were sequenced from 18 districts, and 151 samples — from at least 16 districts — had this variant. And in March, as many as 65 of 94 samples had it.
- So far, Amravati, Nagpur, Akola, Wardha, Pune, Thane, Aurangabad, and Chandrapur districts have presented strong evidence of the presence of B.1.617. Fewer samples were sequenced in other districts, and the variant was found in some. Sequencing is pending for more samples **[11]**.
- The double mutants modestly reduced sensitivity to BNT162b2 mRNA vaccine-elicited antibodies, referring to the Pfizer vaccine.
- The research group has also studied a sub-lineage of the variant, which has three strains – **L452R, E484Q,** and **P681R**. The last one of these (**P681R**), virologists said can lead to increased tissue damage and more pathogens **[12]**.

Major threats with double mutant virus

- As its infection rate is high, and it infects more people and becoming a major threat.
- It can also enter a healthy body and defeat its strong immunity system.
- A study has revealed that corona virus that is spreading at this time ruins the lungs within 2 to 3 days and the patient has to be hospitalized. Whereas, before, this did not happen. Earlier, the virus used to attack the lungs in limited cases only and it used to take 7 to 10 days **[13]**.

Can vaccination protect from double mutant?

- According to studies the people who vaccinated with any vaccine have protection against the double mutant variant (**B.1.617**) **[14]**

Why people neglected vaccination in early days?

- The usefulness of vaccinations to save lives (prevent severe disease) was not drilled into people. The vaccine roll-out, its rationale was not explained to people. People invent imaginary theories to fill the vacuum of authentic information.
- Many deaths after vaccination were reported but the government did not move fast in explaining the causality. That made many suspicious. Lack of trust and suspicion of non-scientific motivations added to the confusion.
- Even others came with natural medicines like Ayurveda which made many people to lose the trust in our government.
- In all developed countries, all vaccine side-effects (called AEFI, adverse events following immunization) are listed and serious ones investigated, and information made available in the public domain. This is not done in India. So many people feel unsafe for vaccination **[15]**.

Why a drastic rise in Covid-19 cases seen in India?

- Human health has never been given the attention that it deserves in India. The general standard is 300 hospital beds per lakh population; India has 50/lakh, in company with the poorest countries of the world. Bangladesh has 80/lakh. By bed availability, India's rank is 155 among 167 countries. India's health management system deserves a very thorough review and revision.
- We are in the midst of elections, cricket matches and Kumbh Mela. The decisions to allow or promote these were political and done without consulting public health experts.
- Elections, if conducted with all due precautions, are not likely to trigger

surge in cases. But what preceded elections in India, the rallies and massive meetings, definitely put a huge number of people at risk of getting infected and worse, spreading it. Elections were announced when the coronavirus infections were occurring daily in large numbers. During February-March, it was in the range of 20,000 per day over a few weeks. Everyone knew that it was like a smoldering fire, which would flare up. If it was constitutionally mandated at that time, the governments (Union and state) and Election Commissioners should have strictly stipulated all Covid-appropriate disciplined behavior. Not stipulating such conditions was unfortunate and inappropriate on the part.

- India has exported over 5.84 crore Covid-19 vaccines to 70 countries against 3.48 crore it administered. Now, Indians are in dire need of vaccines.
- Many people have violated the major safety rules to be followed in public places like keeping physical distance and wearing mask in a proper way **[16]**.

Preventive measures to be taken

- Preventive measures include physical or social distancing, quarantining, and ventilation of indoor spaces, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize the risk of transmissions **[17]**.
- Clean your hands often
- Cough or sneeze in your bent elbow – not your hands!
- Avoid touching your eyes, nose and mouth
- Limit social gatherings and time spent in crowded places
- Avoid close contact with someone who is sick
- Clean and disinfect frequently touched objects and surfaces **[18]**.

Why there is a spread/ community transmission even after intermittent lockdown measures

The following are the major facts in the spread of the virus.

- The primary reason for the rise in cases is a rampant violation of COVID protocols. From the end of last year, we have seen how people have been careless about following COVID protocols and this rise in cases is no surprise.
- The other factor can be the various mutations of the virus, some of which may have been more transmissible than others. However, a more in-depth understanding of the mutant strains and their virulence is needed by conducting genome sequencing of more samples.

- India needs to increase RT-PCR tests rapidly to identify active cases and isolate them from healthy people. The new variant spreads easily and quicker than any other variant .The number of COVID patients admitted in the hospital has increased substantially
- COVID-19 infections are increasing, mainly due to poor adherence to COVID protocols such as mask-wearing and maintaining physical distancing. After the number of active cases started dropping late last year, people were careless enough to celebrate festivals, go to busy and crowded markets without masks.
- No Social distancing: Transmission of COVID-19 occurs when people are exposed to virus-containing respiratory droplets and airborne particles exhaled by an infected person. Those particles may be inhaled or may reach the mouth, nose, or eyes of a person through touching or direct deposition (i.e. being coughed on). The risk of infection is highest when people are in close proximity for a long time, but particles can be inhaled over longer distances, particularly indoors in poorly ventilated and crowded spaces. In those conditions small particles can remain suspended in the air for minutes to hours. Touching a contaminated surface or object may lead to infection although this does not contribute substantially to transmission. People who are infected can transmit the virus to another person up to two days before they themselves show symptoms, as can people who do not experience symptoms. People remain infectious for up to ten days after the onset of symptoms in moderate cases and up to twenty days in severe cases.
- No proper vaccination: Mutated variants of the virus with a higher infection rate, pandemic fatigue, and increasing COVID-inappropriate behavior are cited as reasons for the second wave. The beginning of the vaccination program on 16 January 2021 gave a sense of complacency. The government's message of not letting the guard down is diluted by the huge election rallies in recent weeks with nobody wearing masks.

How to prevent transmission

The overarching aim of the Strategic Preparedness and Response Plan for COVID-19*(1)* is to control COVID-19 by suppressing transmission of the virus and preventing associated illness and death. To the best of our understanding, the virus is primarily spread through contact and respiratory droplets. Under some circumstances airborne transmission may occur (such as when aerosol generating

procedures are conducted in health care settings or potentially, in indoor crowded poorly ventilated settings elsewhere). More studies are urgently needed to investigate such instances and assess their actual significance for transmission of COVID-19.

To prevent transmission, WHO recommends a comprehensive set of measures including

- Identify suspect cases as quickly as possible, test, and isolate all cases (infected people) in appropriate facilities;
- Identify and quarantine all close contacts of infected people and test those who develop symptoms so that they can be isolated if they are infected and require care;
- Use fabric masks in specific situations, for example, in public places where there is community transmission and where other prevention measures, such as physical distancing, are not possible;
- Use of contact and droplet precautions by health workers caring for suspected and confirmed COVID-19 patients, and use of airborne precautions when aerosol generating procedures are performed;
- Continuous use of a medical mask by health workers and caregivers working in all clinical areas, during all routine activities throughout the entire shift;
- At all times, practice frequent hand hygiene, physical distancing from others when possible, and respiratory etiquette; avoid crowded places, close-contact settings and confined and enclosed spaces with poor ventilation; wear fabric masks when in closed, overcrowded spaces to protect others; and ensure good environmental ventilation in all closed settings and appropriate environmental cleaning and disinfection **[19]**.

Suggested Solutions to stop the spread

- The only solution is a rapid increase in vaccinations. In January, before the vaccination program was launched, the target was to vaccinating Indians in the priority category numbering 300 million (consisting of 10 million healthcare workers, 20 million frontline workers, 140 million above 45 years and suffering from co-morbidities and 130 million above 60 years) by (later extended to August) 2021. Since the vaccines need two-doses, this meant 600 million vaccinations in five months, over and above the normal vaccination drives covering children, pregnant women, and for other infectious diseases.
- To date, 80 million vaccinations have been given; the current rate is approx. 3 million daily. At this rate, the target of 600 million doses for the priority population by July or August cannot be met. If it is assumed that for the 800 million Indians above 18 years that need 1.6 billion doses, at

the current rate, vaccinations would continue till November 2022!

- Currently, there are about 50,000 45000 vaccination points with a target of 100 vaccinations each. However, because of reluctance and lack of effective communication strategies, the off take is much less at many centers. In addition, there is wastage of vaccines, estimated at 7 percent nationally and reflecting wide variations among states
- The government blamed the resurgence on crowds and a lack of mask-wearing among the population since businesses reopened in February. Images of large crowds without masks attending weddings and social gatherings circulating online led to suggestions that people had become .But critics accuse the government of putting politics before public health by hosting rallies that are likely to be super spreader events **[20]**.

Problems faced by public during covid-19:

A world pandemic threat COVID-19 mitigation is crucial to the human life and for reducing distortion of livelihood. The COVID-19 pandemic has swept into more than 200 countries with considerable confirmed cases and deaths and has caused public panic and mental health stress (Huang & Zhao, 2020). Most of the nations across the world have implemented complete lockdown with stringent social distancing measures for breaking the chain of transmission. The current outbreak of COVID-19 is heavily impacting the global health and mental health. Despite all resources employed to counteract the spreading of the virus, additional global strategies are needed to handle the related mental health issues (Torales et al., 2020). This outbreak is leading to additional health problems such as stress, anxiety, depressive symptoms, insomnia, denial, anger and fear globally. To protect people and prevent the spread, it is critical that public mental health paradigms and measures are used.

On 30 January 2020, India reported first case of COVID-19 and the numbers have risen steadily since then, albeit at an alarming rate in the final days of March. Aiming to control community transmission, the world's largest democracy world's largest nationwide lockdown since 24 March 2020. The country remains vulnerable towards COVID-19, given the high population density, socioeconomic fabric and overstretched health-care infrastructure.

Lockdown as an option:

The total lockdown was the only immediately available, best and ideal

solution to the control COVID-19 pandemic in India. The Indian government has responded appropriately, adequately and quickly to the COVID-19 pandemic at multiple levels. The lockdown has helped India in buying crucial time: time for extensive contact tracing, time to ramp up testing and most crucially, time to prepare our health system, increasing its health-care infrastructure and preventing it from overwhelming, as it happened in Italy, the United States and Spain. The lockdown is an effective strategy for containing the spread of infection. However, this is very challenging with added difficulty for larger sections of the society. The social distancing is very difficult for many households in India, especially slum areas; the daily-wage earner has to earn daily money to keep family alive, and people with existing mental health illnesses face severe issues.

A long-time lockdown may lead to psychosocial difficulties for vulnerable population and consequently lead to stress, anxiety, frustration, boredom and depression and even suicidal idea and attempts. Also highlighted the mental health needs of vulnerable groups, including those with severe mental illness, learning difficulties and neurodevelopment disorders, as well as socially excluded groups such as prisoners, the homeless and refugees. Nevertheless, the burden of this infection global mental health is currently neglected even if it may challenge patients, general population as well as policy makers and health organizations and teams **[21]**.

Although pediatric cases have been reported, their symptoms are mild, most of the infected individuals are 30 years old and older suggesting that the elderly are especially at risk of developing more severe symptoms and even more at risk of death due to COVID-19Infection during pregnancy has also been reported. The third wave of corona virus is likely to hit India in the month of August **[22]**.

Continue social distancing; Follow masking and sanitation orders; get vaccinated; understand the symptoms and know how to prevent third wave could be significantly buffered by expanding vaccination. Were vaccines to be rolled out in a way to cover 40% of the population, with two doses until August, it could reduce symptomatic incidence by around 55%. Less than 20% of Indians have got at least one dose of the vaccine and only 4% fully vaccinated. There is also the vexing matter of breakthrough infections that is those contracting the infection in spite of being vaccinated. COVID-19 affects different

people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization **[23]**.

Probiotics are live microorganisms that are generally added to foods or used as a supplement to the diet to confer a health benefit. However, there is currently no evidence to support the use of probiotics to help prevent or cure COVID-19.The immune system requires the support of many nutrients. It is recommended to consume a variety of foods for a healthy and balanced diet, including whole grains, legumes, vegetables, fruits, nuts and animal source foods. There is no single food that will prevent you from catching COVID-19.

Several testing methods have been developed to diagnose the disease. The standard diagnostic method is by detection of the virus' nucleic acid by real-time reverse transcription polymerase chain reaction (rRT-PCR), transcription- mediated amplification (TMA), or by reverse transcription loop-mediated isothermal amplification (RT-LAMP) from a nasopharyngeal swab. Preventive measures include physical or social distancing, quarantining, and ventilation of indoor spaces, covering coughs and sneezes, hand washing, and keeping unwashed hands away from the face. The use of face masks or coverings has been recommended in public settings to minimize the risk of transmissions **[24]**.

This recommendation is meant to reduce the spread of the disease by asymptomatic and pre-symptomatic individuals. Masks are also strongly recommended for those who may have been infected and those taking care of someone who may have the disease. When not wearing a mask, the CDC recommends covering the mouth and nose with a tissue when coughing or sneezing and recommends using the inside of the elbow if no tissue is available. When soap and water are not available, the CDC recommends using an alcohol- based hand sanitizer with at least 60% alcohol. For areas where commercial hand sanitizers are not readily available, the WHO provides two formulations for local production. After being expelled from the body, corona viruses can survive on surfaces for hours to days. Deep cleaning and other surface sanitation have been criticized as hygiene theater, giving a false sense of security against something primarily spread through the air. The amount of time that the virus can survive depends significantly on the type of surface, the temperature, and the humidity. Corona viruses die very quickly when exposed to the UV light in sunlight.

Surfaces may be decontaminated with 62–71 percent ethanol, 50–100 percent isopropanol, 0.1 percent sodium hypochlorite, 0.5 percent hydrogen peroxide, and 0.2–7.5 percent povidone-iodine. Other solutions, such as benzalkonium chloride and chlorhexidine gluconate, are less effective. Ultraviolet germicidal irradiation may also be used **[25]**.

Covid-19 Third Wave

Vaccines can reduce severe illness but not infection; Infectious disease experts say that there is no significant difference between transmission risks from vaccinated or unvaccinated individuals. The current COVID-19 vaccine does significantly reduce the severity of the disease and consequent mortality. This is the biggest advantage of vaccination. But if one were to compare the naturally infected group with the vaccinated group; the naturally infected group has better immune protection (longer duration, and lower re-infection rate) than the vaccinated group.

Number of waves doesn't matter: the timing of the third wave in India can be predicted and July-August was predicted as the arrival time of the wave while the peak may come in October. The impact of the wave will not be the same across the country, as vaccination coverage, exposure to the virus is different. The severity of the third wave will not be like that of the second wave. It will be a "blunted" wave compared to the devastating second wave, according to the scientist Gautam Menon **[26]**.

Challenges ahead of third wave

India's stuttering vaccination program is a best key to prevent third wave. A month's long export ban on Indian-made vaccines has left the rest of the emerging world struggling to fend off the Delta variant. It hasn't helped India all that much either. The government has tried to bully vaccine manufacturers into providing doses on the cheap. To ensure the companies can invest in more capacity, they've also allowed them to sell to the private sector at higher prices. There are a number of infectious diseases. Some of them take epidemic or pandemic proportions such as Covid-19 and swine flu. This crest-trough pattern of the spread of an epidemic or pandemic is called a 'wave. There are some other diseases that follow a seasonal wave pattern, such as the HKU1 corona virus.

New Strain could be a cause for third wave

Recently a new strain Delta A.Y.4.2 has been identified. The newest mutation of the SARS-COV-2 virus, 'AY.4.2' is a sub-lineage of the Delta variant of the

infectious virus. It is being currently dubbed as the 'Delta Plus' variant. As per the data from various leading scientists hailed from Columbia University, there were around 75 AY lineages of corona viruses. The question of concern is whether, AY.4 is one such sub-variant which is rapidly branching out, and most particularly, deemed to be steadily rising in parts of the UK, which is seeing a drastic spike in Delta variant cases for the past few months. As many as 63% of the new cases reported during the previous month were identified to have AY.4.2 variant sequenced. Further, the AY. 4.2 sub lineages have also been traced in parts of Europe, including Denmark and Germany, having been first identified in the month of July. Researchers have raised fears that the lineage, belonging to the fast-spreading Delta variant could be very infectious, and cause repeat surges across the world **[27]**.

CONCLUSION

The possibility could not be wished away as long as human hosts were available for infection and the only way to reduce this vulnerability was through safe practices and vaccination. The best time to change our behavior is now and maintains all the necessary protocols for the benefit of the society.

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