Review Article

COVID-19 – RESURGENCE AND VACCINATION

ABSTRACT:

BACKGROUND: COVID-19 is raging through different countries in what is popularly known as second wave. Parallels can be drawn between second waves of COVID-19 and Spanish flu considering massive infectivity and case fatalities.

SUMMARY: Coronavirus disease 2019 is the disease which has becoming more ferocious day by day. As it was thought after lowering in infection cases, it is not over yet. Viruses, especially coronaviruses are notorious for mutations and novel coronavirus has presented its notoriety by mutating into double mutant strain which is wreaking havoc in second most populous country that is India. The health care infrastructure is almost collapsed and cannot cater such huge demand. Vaccinations must be the utmost priority as it has been found to be effective in severe cases.

CONCLUSION: Mutations needs to be monitored closely. Ramping up of health care infrastructure through public as well as private efforts can help a lot. Spreading authentic information can be the antidote for vaccine hesitancy. The herculean task of containing the deadly virus is not only on hospital care facilities but also on people.

KEYWORDS: COVID-19, MUTATION, DOUBLE MUTANT, VACCINE, HEALTH CARE, SECOND WAVE.

Comment [MF1]: The abstract is a synonym for the summary, so I would like to reformulate the abstract in the form of one section and not split into two headings if it fits with the policy of the magazine

INTRODUCTION

Coronavirus disease 2019 or COVID-19 is the disease caused by the member of coronaviridae virus family names as novel coronavirus. The name coronavirus was inspired by the structure of spike proteins on the novel coronavirus. Since its initiation and spread form Wuhan city of Hubei province in China, the disease spread has reached all the inhabited places on earth. The devastation was so huge that the World Health Organization (WHO) has declared it as pandemic, upgrading its status from public health emergency of international concern. As of May 1, 2021, 151,634,732 infection cases of COVID-19 has registered and 3,184,440 case fatalities have been registered all over the world(1). United States of America, India, Brazil, France, Turkey and Russian Federation are the leading countries with more than half of infection cases and case fatalities due to COVID-19 related complications(2). The recent event of second wave which is resurgence in COVID-19 infection cases in India is contributing the most in daily infection cases. More than 400000 cases has been registering each day from single country of India(3). The mutation which is one of the reason of second wave in countries like India is the reason behind the recent massive surge. Fatigue if following preventive measures resulted in to mass defiance of rules and guidelines. Unlike the first wave, this time almost majority of the cases were transmitted by asymptomatic group of people. The health care infrastructure has been stretched to its limit and lack of manpower along with medicines and equipment's are some of the challenges that are being faced by the health sector.(4) Ambiguity in testing standards and benchmarks is one of the reason behind surge in false negative tests of people showing symptoms of COVID-19. Vaccination has been faster in countries which pre ordered the vials for its citizens. Other countries are on the mercy of WHO and other global initiatives on equality in vaccine distribution. Major producers like India is itself reeling under massive pressure of rising infection cases.

REASONS FOR RESURGENCE IN COVID-19 CASES

Coronavirus disease 2019 (5)which has overstepped its unfortunate existence has completed more than a year still there is no sign in visible range about complete eradication of the pandemic. In fact there is reporting of increased number of cases all over the world. This is termed as second wave of the COVID-19 pandemic. The first wave being the initial period of the pandemic. Looking back to the history of pandemics that had occurred, latest being the Spanish flu of 1918-1920, there is a documented evidence about the second and third waves of the pandemic.(6) The first wave was not the reason the disease outbreak was called the pandemic. It was the second wave, in which the mutated version of the virus ravaged the camps and adversely affected the troops as it was just after First World War. The concept is that, initially after the outbreak it will spread and peak followed by downfall for certain period. It will seem like thee pandemic is left behind but then another wave will hit with much harder impact and will be proved more lethal and deadly than the previous ones. Same prediction has been proven true by the coronavirus disease 2019. The second wave is more deadly, more rapidly spreading and affecting all age groups. More cases are being registered than the first wave's peak and the health care infrastructure has been completely collapsed. In fact governments and health authorities are thinking upon re imposing the non-pharmacological measures like lockdown, movement restrictions, marking containment zones, closure of all the non-essential activities and so on. Same as the first wave, these measures are only employed due to helplessness as no other

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measure has been found to be effective in containing the viral spread of the COVID-19. All the scheduled events connected to academics, sports, non-essentials, celebrations, religious ceremonies have suspended and deferred as the second wave, which is also called as tsunami which highlights its grave nature, hits several countries. There are several reasons which are being attributed to the resurgence of cases in huge number of COVID-19. Mutations in the viral strain, negligent behavior of the people and lax implementation of COVID-19 appropriate behavior, collapsed health care infrastructure are some of the reasons behind second wave. Each has its own significance and offers valuable insights about the weaken link which needs to be strengthen.

MUTATIONS IN NOVEL CORONAVIRUS

Coronavirus is not new to the world as it has caused the previous disease outbreaks of sever acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome (MERS) in 2003 and 2012 respectively. But the history of coronaviruses even predates these outbreaks(7). The first strain of coronavirus has been identified in mid-1960, when unknown flu hits certain area of Europe. Back by then it was harmless and does not even produced symptoms. Therefore it was not in limelight until it caused the SARS outbreaks in several East Asian countries which had caused considerable amount of fatalities. The researches then started to work more extensively about the behavior of the virus and its impact on various aspect of human life. Another outbreak in gulf countries also gave impetus to in-depth study on coronavirus which mainly belongs to coronaviridae family. One thing has been established after years of researched which is that viruses are extremely likely to be mutated after a while. This makes them last much longer as they get adapted according to the host. After the outbreak of COVID-19 in Wuhan city of the Hubei province in China, the symptoms has been considerably changing which indicates the mutations in the viral strain(8). Different geographies can have different strain. Even one unit of landmass which is also known as country can have different strains of the virus. Continuous mutations can occur in the viral strain. Some of them are minor and does not affect the functioning of the virus. But the major ones affects the functioning of the virus and can seriously alter the outcomes caused by the infection. Some countries like India, which is among the worst hit countries in the second wave, have reported several mutations harboring in the same geography. Some of the infamous strains which has caused more infections includes Californian strain from USA, Kent or UK variant, south African variant and Brazilian variant(9). These strains have further mutated according to local geography and are contributing to increases infection cases and fatalities all over the world. India, which is registering more than 300000 cases a day of COVID-19 infection have ben found to be infected by mostly double mutant and triple mutant novel coronavirus. Researchers have noted that major mutations like those of UK or South African lineages can be more deadly. Double mutation which is a combination of two mutations can escape the immunity produced by the body and can evade the antibodies produced for the same this can explain the re infections among the previously infection patients of COVID-19. B.1.617 variant has been classified by WHO as variant of interest (VOI), which is categorization for variant that causes unprecedented and fast surge in infection cases. The worst hit state of Maharashtra of India has reported E484Q and L452R variants more in proportion of over all cases. These can increase the infectivity of the virus. This explains the penetration of infection among so called immune population that is young adults. The combination of E484Q and L452R can produce lethal clinical outcomes among infected persons. A recent observation

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by World Health Organization (WHO) has found that the double mutant variant of the viral novel coronavirus strain has been reported from 17 countries, which is a serious cause of concern. Although there is lack of clear evidence in linking the recent surge in cases and mutations in the novel coronavirus, more study has to be done to know in-depth about the viral behavior(10).

IRRESPONSIBLE BEHAVIOR BY PEOPLE

Along with mutations as supposed reasons behind the recent surge in COVID-19 infections, irresponsible human behavior is also behind it. Various guidelines has been issued by WHO and local health authorities time to time about the appropriate behavior which needs to be inculcate to safeguard ourselves from the deadly infections. Various preventive measures and non-pharmacological interventions (NPI) has been listed to ensure the containment of the viral infection which has no established course of treatment till date due to its novelty(11). These measures are expected to be followed extremely religiously as there are no other effective means available. In the first wave of the COVID-19, people followed most of the measures reluctantly as they were new to them, but got hands on it after some time. But after some time after cases of the infection of COVID-19 were reported less in number, people started to take for granted the pandemic. The defiance of rules and guidelines which mandates masks and physical distancing at public places were a common practice. Also in some cases, the natural fatigue of following restrictive rules was exploited for political gains. In fact some groups, of course for political gains, denied even the existence novel coronavirus which was a disastrous aspect. Uneducated and low literate people took this bait and started to defy the rules(12). Also in the later phase of first wave, various religious, cultural, ritualistic processions and gatherings were found to be happening along with political rallies and meetings. This also lowered the fear about the deadly disease and people were in fool's paradise thinking that the pandemic of COVID-19 is far left behind. Governmental authorities and law enforcement agencies were also loosen their noose and gave somewhat free hand to all these happenings. All these have accumulated to widespread mutation and spread of the disease through masses. Also, flight restrictions were eased up and international flights were started for short duration, resulting in mutation of international lineage which has greater stability. Now in the worst hit country of India, it was added by many countries as no fly country seeing the massive surge of the cases. WHO stated that the strain of Indian lineage was found in at least 17 countries which is a serious cause of concern(13). Mutations also provided the infection to people having already infected and cured which indicates the evasion of the antibodies. Also in the first wave, the asymptomatic carriers of the novel coronavirus were not proven to be transmitting the disease. But as the reckless behavior kicked in, these people infected as many people as they came in contact with, unknowingly. This time in second wave, the original number of infected patients is far more than the reported numbers as most of the patients are reluctant to report the disease due to lack of bed and are preferring at home medical consultation and service(14).

COLLAPSED HEALTH CARE INFRASTRUCTURE

The most important aspect of the containment of any epidemic or pandemic like COVID-19 is capable health care infrastructure which can cater the demand which is generally increased during such events. In case of COVID-19, in first phase, the health care infrastructure was almost on the brink of collapse as the cases risen rapidly. But forced lockdown and effective

containment measures along with strengthening current health care infrastructure were among key contributors in saving the health sector. But the vehemence by which the second wave of COVID-19 has struck, it completely collapsed the health care infrastructure especially in middle and low income countries like India(15). In India, the health care infrastructure is ailing with massive lack of beds, shortage of sophisticated infrastructure like ICU accommodations, shortage of oxygen supply, lack of medical professionals and so on. All the hospitals and health care facilities are completely overwhelmed. Patients have to travel hundreds and thousands of kilometers to get bed and hospital accommodation. Need of medicines which are helping to cure the COVID-19 patients are all time high. Shortage of blood plasma of recently cured patient of COVID-19 can be felt. Drugs like Remdesivir, Fabiflu are on peak demands and black marketing has been started only to make condition worse. Tsunami of messages on social media as well as on various platforms only indicates how situation is graver than before. In the first phase, the extra facilities like stadiums, rail coaches and malls converted to COVID-19 care facility were sparingly used as infection cases were not as much, therefore these facilities were lying vacant. Now the condition has reversed and almost all the facilities around the national boundary has been showing full accommodation. This time, the need of sophisticated medical care is required is far more than the first wave. There is already reported shortage of oxygen cylinders, ICU beds and the demand of these care is going through the roof. There is also reporting of false negative test result of RT-PCR (Reverse Transcript Polymerase Chain Reaction) tests in large numbers. As the person with active infection get test results negative, he or she can transmit the infection even to greater number of people. In some cases, the person showing standard symptoms of COVID-19 is also getting the test results negative creating confusion among masses. Although the RTPCR tests are not meant to be 100 percent accurate but the margin of error has been exceeded way back. There are several reasons attribute to this topic. The surge in swab givers is so huge that the demand is barely met as there are already lack of manpower in hospitals and pathology labs. Many medical professionals and swab takers are over worked and exhausted and can commit manual error unknowingly by taking swab incorrectly. Also viral load may take time to show up, average time being 5 days, meanwhile the test results can be negative creating false sense of security. Capacity of the tests has been already exceeded and there little to no supervision resulting in substandard test facilities. The standard and quality of test kits are also in question as the price has been dropped by considerable amount. Also the minimum critical threshold (ct) value for test to be negative have found to be varying creating ambiguity. It seems that no lessen has been taken from the insights provided by 1918 Spanish flu pandemic about the destructive power of second wave.

VACCINATION

The most desired and sought after measure is vaccine. As the COVID-19 is the novel disease in various aspects, there was no medicine available to treat the infection. Therefore vaccines were the only hope for people around the world to get rid of the deadly disease. The wait was over approximately at the start of the year 2021 where several candidates were done conducting trials. The approvals from the health care agencies all over the world were quick in nature and many candidates were deployed. As the vaccination was decided to be carried out in phased manner, according to risk associated with the age group and work place associated risks like medical professions, comorbid patients and elderlies along with frontline workers were vaccinated first. As it was barely completed, the second wave of COVID-19 struck. Fortunately, most of the

health care workers got their jabs with no significant adverse impact and are being utilized in second wave(16). Many developed countries are stockpiling their vaccine vials which is creating hindrance in vaccination of other nationals. The main challenge in vaccination is manpower along with availability of vials. The initial hesitancy created by rumors and misinformation which came along with Infodemic, has somewhat died down among people due to awareness generated by government and various non-governmental organizations. Vaccine hesitancy has come down but not completely eradicated. The response was initially weak from the public but it took upside turn. But the irony is that now vaccines are not available according to the demand. Two doses are being administered generally of popular vaccine candidates in time interval of 28 to 56 days. But due to shortage of the vials, those who got their first jab are now stranded and left disappointed due to lack of vials. Various studies have found that, vaccines tremendously helps in softening the critical clinical outcomes among patients. Also the requirement of sophisticated medical equipment's like ICU accommodation, ventilator and oxygen support system is less among vaccinated population. On can still test positive for COVID-19 even after vaccination but it is not a serious cause of concern as it is a normal phenomenon. Also the vaccine hesitancy is still looming and more vigorous and repetitive campaign is needed to remove nay hesitancy about vaccination at all levels especially in rural areas where the people are more prone to misinformation. COVAX, an initiative taken by various agencies like CEPI, GAVI and WHO has mandate to ensure equality in vaccine distribution all around the world(17). A number of studies reflect on related aspects of Covid (18-24). But the initiative was somewhat late as long way ago, wealthy and developed countries has given orders of vaccines exceeding to their population requirement. But considering optimistic point of view, the initiative will help poor countries where otherwise vaccine would take years to reach, making the situation graver.

CONCLUSION

The recent surge is mainly due to reckless behavior from government as well as people's part. At least now all the preventive measures and rules must be followed religiously. Preventive measures are the only viable solutions for both governments and layman to fight the deadly pandemic. Not only clinical impact but there are long term implications of the COVID-19 infection. Also health care infrastructure needs rapid upgradation and investment from both public as well as private sector. Mutations needs to be monitored closely and all the evasions must be taken into account while formulizing the vaccine formula. Vaccine hesitancy can be done away with, by creating awareness among people especially in rural areas. Also sufficient amount of vaccines must be produced to cater the demand or otherwise the vaccination center would get converted into super spreading venue. Ramping up the vaccination drive is the need of the hour as vaccines have positive impact in critical cases which can ease up some burden on health care infrastructure. Prevention is always better than cure in diseases like COVID-19, therefore every step must be taken to ensure safeguard of all people from the viral infection.

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