ABSTRACT

**Background:** COVID-19 pandemic is the unprecedented medical emergency which needs constant study and in depth monitoring of the ground situation.

**Summary:** COVID-19 is the once in a century event which has already devastated millions and millions of lives. The containment of the COVID-19 is a great challenge as the extremely high virulent nature and capability of producing lethal clinical outcome is creating hindrance. Preventive measures are supposedly more beneficial than curative treatment therefore they must be promoted.

**Conclusion:** Preventive measures and its efficacy should be studied and popularize so that more people can adopt them. Also complacency must be addresses which is the reason behind the resurgence of new spurt of cases.

**Keywords:** Coronavirus 2019; COVID-19 Pathophysiology; Long Covid; Pandemic.
1. INTRODUCTION

Coronavirus disease 2019 or COVID-19 is the major disease pandemic that is haunting the world from past more than one year. The pandemic has proven unprecedented in many ways. The scale and extent to which the pandemic has been successful in reaching is tremendous. No other pandemic was such destructive and devastating than COVID-19 in almost past hundred years of human civilizational history. As of February 19, 2021, 110,498,364 COVID-19 infections have been reported from across the world and 2,446,014 case fatalities have reported from more than 200 regions of the world due to COVID-19 related complications [1].

The unprecedented nature of the pandemic was recognized by the World Health Organization and title of pandemic was given to COVID-19 which was unprecedented as no other pandemic was so devastating to be one [2]. United States of America, India, Brazil, Russian federation, united kingdom France are the top countries having more than half of case infections and case fatalities of total infections and fatalities [3]. The resurgence in new cases after decline in cases is attribute to new mutated strain reported from United Kingdom, Brazil and South Africa [4]. The pathophysiology of COVID-19 needs to be studied thoroughly so that it can be contained effectively and as soon as possible [5]. The condition of long COVID-19 needs to be studied so that proper measures can be designed for future scenarios.

2. HISTORY OF CORONAVIRUSES

The menace that the novel coronavirus has spread through its capacity of producing severe clinical outcomes and high virulent nature makes it a once in a century medical calamity [6]. No such event in the past hundred years of human civilization has been so ruckus creating as COVID-19. Many people think that the novel coronavirus is new virus and it is discovered with the outbreak of COVID-19. But in fact, coronaviruses were discovered long ago in mid-1960. In Europe back then, there was a prevalence of cough and cold along with fever among people residing in some countries of Europe. When the cases started surging and almost every person were tested for some disease. The testing then discovered that there is new virus that has not been yet documented yet. Though the virus was extremely passive and not causing any harm to the infected person. But the study was necessary for scientific purposes.

Various antibodies test have been done and almost all the people were found to have antibodies in Tests conducted all over Italy. This meant that they were infected by the virus and now body has developed immunity for them. The virus was named as coronavirus of human version. Bats and other wild animals were known to be the harbor of these virus and after spill over event, it got transmitted to the humans via intermediate animals. The shape of the virus was crown shaped which were spike proteins. Many of the people until the end of 20th century did not even knew that they were harboring the viruses in their respiratory tracts. The non-lethal virus was completely adapted to live in human body without producing any harmful impacts. But the viruses are notorious for mutation. Viruses keeps on mutating all along their span. In fact they are considered as quasi living which means they are inactive when no host is available and gets activated when they get one. Viruses are the link between living and non-living organisms. But the perception of non-lethal virus about the coronaviruses changed after the outbreak of severe acute respiratory syndrome (SARS) in the year 2003 [7]. It was caused by the mutated variant of coronavirus namely SARS-COV. It was the first time when coronaviruses registered themselves as lethal viruses killing many people who got infected. More than 7700 people were infected and registered case fatalities were standing at 774 which almost 10 percent of the total infected people. The contagious nature of the virus also made it more difficult to control. As no evidence of coronaviruses being lethal was available, it was considered as wakeup call and scientific and research fraternities started doing researches around the disease outbreak. After that in the year of 2012, another outbreak of Middle Eastern respiratory syndrome (MERS) also struck the world which was also caused by the mutated strain of coronavirus. In this outbreak there was seen massive case fatality rate of whooping 34 percent of the total infections which was unprecedented. Although the disease outbreak was contained in restricted geographical area, many patients which were suffering from various other diseases also known as underlying chronic disease illnesses were progressing into acute respiratory distress syndrome from which the treatment becomes less effective and chance of developing severe clinical outcomes increases manifold. This also accelerated the research work done by the scientific and medicinal community around the world as disease outbreak developed one of the severe clinical outcomes. The fact that viruses...
has been and are notorious for carrying out mutations has been again proved by then virus. The coronavirus disease 2019 or COVID-19 is another such example of mutation which is the modified and mutated version of SARS-COV which had caused the outbreak of severe acute respiratory syndrome (SARS) [8].

3. PATHOPHYSIOLOGY OF COVID-19 AND ITS MECHANISM

The coronavirus disease 2019 or COVID-19 has been creating ruckus all over the world. The disease outbreak turned pandemic has taken more than two million lives which has never happened in the past hundred years of human civilizational history. The COVID-19 pandemic initiated its fateful course from the Wuhan city of Hubei province in China. Since then it has affected millions of people adversely affecting their lives in a negative ways. The pathophysiology then becomes extremely necessary to be studied so that novel coronavirus can be contained. Coronavirus got its name from the shape that it takes. It has spike proteins that gives its crown shape from which it got its name. Initially it was not known that virus can get transmitted through human to human and all movement of people were facilitated and continued. After considerable amount of time, it was established that the coronavirus disease 2019 or COVID-19 can be transmitted through humans. The disease was discovered in the month of December 2019 and the shape of the virus was crown shaped hence the disease was named as novel coronavirus disease 2019. The novelty of the virus was so astonishing that no treatment was available and ad hoc treatment according to the situation of the infected patients was and is being administered. Also the influx of patient was extremely high due to the highly contagious nature of the virus and hospitals and COVID-19 care facilities were overwhelmed [9]. The capability of the novel coronavirus of producing severe clinical outcomes also worsened the condition so much so that more than two million people lost their lives due to COVID-19 related complications. The novel coronavirus is Ribonucleic acid (RNA) genome having 26 to 32 kilobases in size. The family to which the coronavirus belongs is coronaviridae which have four different genera. They are alpha coronavirus (α COV), beta coronavirus (β COV), gamma coronavirus (γ COV) and delta coronavirus (δ COV). They are found in abundant quantity generally in bats and several rodents which harbors the virus’s colonies. The human coronaviruses are the effects of spillover effect. In spillover effect the coronavirus gets transmitted to the humans from harboring animals like bats via an intermediate species such as pangolins. This is the supposition of the COVID-19 origin theory in which wet market in Wuhan city of Hubei province in China have been the origin spot where live animals of wild and exotic nature are traded for human consumption [10].

Novel coronavirus has been successfully established to be transmitted from human to human. Bodily openings like mouth, nose and eyes are the entry points for the novel coronavirus to get transmitted. Novel coronavirus then transfers itself through nose to various organs. The humans have Angiotensin-converting enzyme 2 (ACE 2) receptors which acts as gateway to the novel coronavirus. The ACE 2 receptors are present on various crucial organs systems like heart, lungs, liver and several other organs. The spike proteins gets attached to the ACE 2 receptors and gains entry in to the host cell. Then virus started to replicate itself and spread to various parts of the body. The viral load in the body increases day by day after infection. Various tests are employed to test the COVID-19. Reverse transcript Polymerase chain reaction (RT PCR) test is considered as golden standard for the detection of COVID-19. It basically works on reverse transcription process and extracts the Deoxyribonucleic acid (DNA) from virus Ribonucleic acid (RNA). It amplifies the RNA sample up to critical threshold (ct) values. Less the ct value more is the viral load and vice versa. For the RT PCR test, swab samples are collected by trained medical professionals in which swab from nose and throat are collected and tested. Dereliction while taking swabs can obtain inconclusive or negative result in such case re testing is advised. Other test which are done in COVID-19 detection are rapid antigen test, antibodies test, point of contact test and saliva test. Most of them are in initial stages. Antibodies test is generally done to check the prevalence of the disease pandemic in a particular regions. Randomized sampling is done to check the antibodies in the blood samples. More antibodies detected means the disease has been affected in that region. The measures can be rectified according to the results. Mass serological surveys are being done to check the disease prevalence especially in congested urban clusters [11].
4. INCUBATION PERIOD AND SYMPTOMS OF COVID-19

The incubation period of coronavirus disease 2019 or COVID-19 varies between 2 days to 14 days. Generally the average is taken as 5 to 6 days. If the viral load is high then the symptoms are shown in first few days of infection. Also other medical factors such as age, comorbidity also affects the incubation time. There are two types of case of COVID-19. Symptomatic and Asymptomatic cases. Asymptomatic cases are the cases in which the infection does not show any symptoms. Either they are detected when their acquaintance are detected as positive or they have strong innate immune response in which symptoms are not shown and body gets adapted to the virus. In symptomatic patients, varied ranges of symptoms are shown. This includes mild symptoms such as cough and cold along with fever. Complicated symptoms includes diarrheas, hypoxia, progression in acute respiratory distress syndrome, brain fogging in which there is momentary confusion while making decisions, loss of taste and smell, headache, fatigue, muscle pain. Severe symptoms includes COVID-19 pneumonia which is considered as the worse symptom to have because in most of cases it develops into fatal clinical outcome [12].

5. CLINICAL MANIFESTATION OF COVID-19

Clinical manifestation of COVID-19 is aspect which needs to be studies in depth because of lack of available knowledge. The clinical manifestation of the COVID-19 is different in different age groups and sections of society. The uncertain nature of the virus makes it difficult to project or predict any outcome and course of the pandemic. The symptoms has been changed in the due course of the virus. Only few trends have been successfully identified till date. Comorbidity or underlying medical illness and its relation to clinical outcomes post COCVID-19 infection is one of them. Comorbid patients have higher chance of both getting infected with COVID-19 and producing severe clinical outcomes post infection which requires sophisticated medical devices such as ventilators and oxygen support to deal. Major chunk of more than two million casualties have been contributed by comorbid patients. Various comorbidities like obesity, diabetes mellitus, hypertension, geriatric illnesses, cardiovascular diseases, renal ailments, liver cirrhosis, and so many more disease which are common among people due to lifestyle changes has been proving deadly in COVID-19 pandemic [13]. These people with mentioned diseases are already going through weak immune system phase of the life and coronavirus exploits the same fact. Also cross medication among COVID-19 treatment and ongoing comorbidity treatment can worsen the situation. Some comorbidities like diabetes mellitus and cardiovascular disease are notorious to show fatal clinical outcome if combined with COVID-19. Also old aged patients, pregnant women, infants are at higher risk of getting infection. Novel coronavirus basically attacks on weak immune system of the human body and exploits the lack of innate immune response. All these people also known as high risk category or vulnerable people are undergoing immunosuppressive state which makes them a soft target of COVID-19. Effective management of these people becomes difficult as the need of extra care arises in such cases. In case of other age groups the outcomes varies according to various aspects attached to the situation. Young adults, particularly ranging from 20 to 45 years are said to be least effective age groups affected by COVID-19. In fact, most cases are reportedly asymptomatic and most of the cases do not even know that they got infected by COVID-19 [14]. The string innate immune system response is said to have been behind this fact. These age group is at its peak level of innate immunity and they are well protected from various infections internally. But generalizations of this fact may prove wrong as case fatalities from this age group has been reported due to comorbid condition among these age groups. The geriatric group have been most affected as they are at lowest level of innate immune’s system response level. They need extra attention as the chance of developing severe clinical outcome is high among this age group [15].

6. CONDITION OF LONG COVID-19

As the COVID-19 pandemic has completed more than a year, many trends have been reported which were backed by empirical data and were found to be accepted among wide range of researchers. One such trend is of long COVID-19. Long COVID is the condition of persistence of symptoms of COVID-19. Various symptoms has been reportedly continuing even after the treatment and discharge from COVID-19. Many patients from all over the globe have been
complain lately regarding persistence of cough cold and fever, intermittent loss of taste and smell. Fatigue and reduction in physical capacity. Muscle pain along with brain fogging also have been reported from various patients who got their treatment done and reports negative. After medical analysis, some internal abnormalities like myocarditis, weakening of heart muscles and alveoli, reduction in diffusion of carbon monoxide levels, difficulty in breathing were registered. This was surprise to the patients but not to the medical fraternity as they were expecting such symptoms as the precedent of SARS AND MERS outbreaks were similar [16]. In SARS and MERS outbreak, there was a post illness follow up checkup for twenty four months and the persistence of symptom hypothesis was established. Several health care professionals and workers along with laborors were unable to resume their pre illness jobs with same physical strength and vigor. Aldo psychological impact had been seen in SARS and MERS outbreak which has been also reported by COVID-19 patients. Anxiety and depression among patients were common as they spent long time in isolation and in quarantine while in treatment. No meeting with family members and loved ones were allowed due to contagious nature of the virus. This made the patients especially pregnant women and elderlies anxious as they are already in their immune suppressive state. Athletes and persons related to sports background are more anxious as they were already unable to practice due to movement restrictions and lockdown. They need to be physically fit for best performance. Also the persistence of COVID-19 symptoms and physical reduction capacity made them more anxious as it will affect their career prospects [17].

7. CAUTION AND PREVENTION

There are two parts in any outbreaks that happens in any particular situation. First the curative [art and then the preventive part. Focusing only on treatment part serves the least results. It needs the supplement of preventive part. Especially in case of pandemic of unprecedented scale and nature like COVID-19, it is wiser to follow preventive measures than going for curative measures. Various nuances like comorbidity, old age, immunosuppressive state like pregnancy and infancy along with other illnesses, long COVID-19 condition, collapsing health care infrastructure makes the case more strong for the preventive part. Mere following of some preventive measures can make person free from all these harmful consequences attached to COVID-19 and can help in recovering from the pandemic situation, a medical emergency which is snowballed into economic and social emergency [18]. Various measures prescribed by World Health Organization (WHO) and various competent health authorities around the world has suggested few preventive measures which can be used to safeguard oneself from the infection. The non-coercive measures such as wearing of masks, physical distancing of minimum distance, sanitizing hands regularly, easting proper diet, taking prophylactics can be the best way to deal with the pandemic. These measures are tried and tested in previous outbreaks of SARS and MERS along with Ebola, and were found to be extremely effective in containing the viral spread. SO far in COVID-19 pandemic these measures has saved millions of lives which were at risk. Therefore it is necessary to follow these measures for the betterment of the situation [19]. Many related studies were reported including by Mahapatra et. al [20] Mandwar et. al [21] and Mehta et. al [22]. Nanotkar et. al. reflected on importance of social distancing [23]. Patil et. al. reported about impact of COVID pandemic on adaptive learning strategies in medical education system [24]. Related articles were reported by Patnaik et al. [25] Quazi et al. [26] and Joseph et. al. [27] Gaidhane et. al. reported on depression, anxiety and stress among the general population in the time of covid-19 lockdown [28]. Lakhkar et. al. reported on impact of COVID on children and pregnant women [29] Impact of Covid was pronounced in patients with existing comorbidities like diabetes [30-35].

8. CONCLUSION

COVID-19 is an unprecedented medical emergency which needs utmost steps to be contained. All the studies must aimed at inferring proper conclusions so that trajectory of the pandemic can be somewhat explained. Ling COVID-19 can be a headache for long term and needs proper rehabilitative care so that cascading effects can be avoided. Preventive measures which are already tried and tested can be used a social vaccine till full roll out and analysis of medicinal vaccine is done. This preventive measure will immensely help in containing the viral spread.

CONSENT

It is not applicable.
ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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