



Covid 19 pandemic: Impact on masses and prevention knowhow

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Abstract

Today the whole world is facing a very difficult time due to corona virus which initially originated in Wuhan city of China. In China an unusual pneumonia was noticed earlier which later recognized as a pandemic. There have been two events in the past wherein crossover of animal corona viruses to humans has resulted in severe disease, one was SARS-CoV and the other was MERS-CoV. The genetic sequence of the COVID19 showed more than 80% similarities to SARS-CoV and 50% to the MERSCoV. Corona viruses are enveloped positive sense single-stranded RNA virus belongs to a large family in which all strains of the family do not have virulent capacity. World Health Organisation has classified COVID-19 as a β CoV of group 2B. Structurally, SARS-CoV-2 has four main structural proteins and several accessory proteins through which it enters into the cell. This virus enters the through ACE2 receptors, which are found on various organs in human body. After entering into one body, it enters to another body via transmission through sneezing, coughing etc. People who have had diabetes, chronic respiratory disease, cardiovascular disease, or even high blood pressure and cancer are at higher risk of coronavirus.

Keywords: covid 19, pandemic, respiratory disease, transmembrane serine protease, WHO

Introduction

From the beginning of 2020, the whole world is going through very difficult time due to severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), commonly known as novel coronavirus (2019-nCoV) or COVID 19. It is a rapidly spreading virus which originated from the Wuhan City of China and spread to the rest of the world. In the month of December 2019 in a hospital in Wuhan city, in China an unusual pneumonia was noticed with a link to an animal market that sells poultry, fish and other animals to the public (Xu *et al.*, 2020) [30]. This animal market was the Huanan seafood wholesale market. Environmental samples from the Huanan sea food market were also tested positive, signifying that the virus originated from there (Singhal and Tanu, 2020) [22]. The number of cases started increasing exponentially, some of which did not have exposure to the live animal market, suggestive of the fact that human-to-human transmission was occurring (Huang *et al.*, 2020) [6]. On December 31st 2019, China notified the outbreak to the World Health Organization and on 1st January the Huanan sea food market was closed (Singhal and Tanu, 2020) [22]. It is highly contagious in nature and unpredictable. World was never prepared for this kind of pandemic, where we are in a race of developing a vaccine and its spread. But up to this time the virus from the Wuhan city to other cities of china, and from other cities to different countries of the world had arrived. In this review, we are going to provide basic information about coronavirus for those people who are from biological field as well as for those who are from non-biological field.

History

There have been two events in the past two decades wherein crossover of animal beta corona viruses to humans has resulted in severe disease. The first such instance was in 2002– 2003 when a new coronavirus of the β genera and with origin in bats crossed over to humans via the

intermediary host of palm civet cats in the Guangdong province of China. This virus designated as severe acute respiratory syndrome corona virus, affected 8422 people mostly in China and Hong Kong and caused 916 deaths (mortality rate 11%) before being contained (Chan *et al.*, 2003) [3]. Almost a decade later in 2012, the Middle East respiratory syndrome coronavirus (MERS-CoV), also of bat origin, emerged in Saudi Arabia with dromedary camels as the intermediate host and affected 2494 people and caused 858 deaths (fatality rate 34%) (Memish *et al.*, 2020) [12]. The genetic sequence of the COVID19 showed more than 80% identity to SARS-CoV and 50% to the MERSCoV, and both SARS-CoV and MERS-CoV originate in bats (Rothan *et al.*, 2020) [18]. The COVID-19 most likely developed from bat origin coronaviruses. Another piece of evidence that supports the COVID-19 is of bat origin is the existence of a high degree of homology of the ACE2 receptor from a diversity of animal species, thus implicating these animal species as possible intermediate hosts or animal models for COVID-19 infections (Wan *et al.*, 2020) [28].

Structure

Corona viruses are enveloped positive sense RNA viruses ranging from 60 nm to 140 nm in diameter with spike like projections on its surface giving it a crown like appearance under the electron microscope; hence the name coronavirus (Singhal and Tanu, 2020) [22]. They are single-stranded RNA viruses that can infect not only humans, but also a huge variety of animals as well (Kooraki *et al.*, 2020) [10]. Coronaviruses belongs to a large family (four genera namely alpha, beta, gamma, and delta), but all strains of the family do not have virulent capacity (Peiris *et al.*, 2003) [16]. Out of seven strains of CoVs three strains namely, SARS-CoV, MERS-CoV and SARS-CoV 19 (covid 19) are found to be fatal because they cause severe clinical sickness, whereas the other four strains such as HKU1, NL63, OC43 and 229E CoVs are not that much fatal and only cause mild

clinical symptoms in patients (Paital *et al.*, 2020) [15]. World Health Organisation (WHO) has classified COVID-19 as a β CoV of group 2B (Hui *et al.*, 2020) [7]. A sample isolation from pneumonia patients who were some of the workers in the Wuhan seafood market found that strains of SARS-CoV-2 had a length of 29.9 kb (Wu *et al.*, 2020) [29]. Structurally, SARS-CoV-2 has four main structural proteins including spike (S) glycoprotein, small envelope (E) glycoprotein, membrane (M) glycoprotein, and nucleocapsid (N) protein, and also several accessory proteins (Jiang *et al.*, 2020) [8, 9]. The spike or S glycoprotein is a transmembrane protein with a molecular weight of about 150 kDa found in the outer portion of the virus. This S protein is a homotrimer glycoprotein, which is cleaved by the host cell furin-like protease into 2 sub units namely S1 and S2. Part S1 is responsible for the determination of the host virus range and cellular tropism with the receptor binding domain make-up while S2 functions to mediate virus fusion in transmitting host cells (Astuti and Indwiani, 2020). The nucleocapsid known as N protein is the structural component of CoV localizing in the endoplasmic reticulum-Golgi region that structurally is bound to the nucleic acid material of the virus. Because the protein is bound to RNA, the protein is involved in processes related to the viral genome, the viral replication cycle, and the cellular response of host cells to viral infections. Another important part of this virus is the membrane or M protein, which is the most structurally structured protein and plays a role in determining the shape of the virus envelope. The last component is the envelope or E protein which is the smallest protein in the SARSCoV structure that plays a role in the production and maturation of this virus (Schoeman *et al.*, 2019) [20].

Transmission of COVID 19 into the human body

This virus can enter the human body through its receptors, ACE2 which are found in various organs such as heart, lungs, kidneys, and gastrointestinal tract, thus facilitating viral entry into target cells. The process of CoV entering into the host cell begins through the attachment of the S glycoprotein to the receptor, the ACE2 in the host cells (such as in type II pneumocytes in the lungs). The entry and binding processes are then followed by fusion of the viral membrane and host cell. After fusion occurs, the type II transmembrane serine protease (TMPRSS2) that is present on the surface of the host cell will clear the ACE2 and activate the receptor-attached spike-like, S proteins. Activation of the S proteins leads to conformational changes and allows the virus to enter the cells. Furthermore, entered-SARS-CoV-2 will subsequently release its genomic material in the cytoplasm and become translated in the nuclei. The genomic material released by this virus is mRNA that is ready to be translated into protein (Astuti and Indwiani, 2020). Once the virus binds to the host cell surface, it multiplies using the general viral pathway and causes severe blockage of lungs and air passages resulting in respiratory obstruction and death of patients (Vickers and Neil, 2017). Several efforts to develop vaccines are underway, but the WHO estimates it will take 18 months for the COVID-19 vaccines to be available (Jiang *et al.*, 2020) [8, 9]. Up to that time it's our duty to stay safe. COVID-19 does not affect everyone in similar way. This has been indicated that people with lower hygiene level and in contact with larger number of people are more susceptible and are at greater risk. . There are some important factors, which increase the risk of

catching the virus. Close contact among those people who are living in urban areas with respect to those who are living in rural areas with more space. Large families have more chance to get affected and bring the virus home with respect to those who live alone. Smokers are also at high risk because of obvious reasons and effect of smoking on lungs. Staying at home is a challenge for those who live in small crowded houses without outdoor space. By touching those surfaces that are touched by an infected person and have virus on that such as doorknobs of public toilets, chair-tables at restaurants, library etc. and then immediately touching his own mouth, nose, or eyes. This time the health care workers are at maximum risk, because they are directly exposed to corona virus. Every day they are coming in contact with symptomatic and asymptomatic patients, Physical contact with wet and contaminated objects should be considered in dealing with the virus, especially agents such as faecal and urine samples that can potentially serve as an alternative route of transmission (Assiri *et al.*, 2013) [1].

Symptoms

The most common symptoms at onset of COVID-19 illness are fever, cough, and fatigue, while other symptoms include sputum production, headache, haemoptysis, diarrhoea, dyspnoea, and lymphopenia. The period from the onset of COVID-19 symptoms to death ranged from 6 to 41 days with a median of 14 days (Wang *et al.*, 2020) [6, 28]. Firstly, this period depends upon the status of patient's immune system. People who have had medical problems of diabetes, chronic respiratory disease, cardiovascular disease, or even high blood pressure and cancer are at higher risk from coronavirus (Giannis *et al.*, 2020 [5], Zheng *et al.*, 2020) [32]. Secondly, on the age, it has been seen that people with higher age are more susceptible to this virus. It is important to note that there are similarities in the symptoms between COVID-19 and earlier beta coronavirus such as fever, dry cough, dyspnea, and bilateral ground-glass opacities on chest CT scans (Rothan *et al.*, 2020) [18]. However, COVID-19 showed some unique clinical features that include the targeting of the lower airway as evident by upper respiratory tract symptoms like rhinorrhoea, sneezing, and sore throat (Assiri *et al.*, 2013) [1]. In addition, based on results from chest radiographs upon admission, some of the cases show an infiltrate in the upper lobe of the lung that is associated with increasing dyspnea with hypoxemia (Phan *et al.*, 2020) [17]. The clinical manifestations range from abnormal Computer Tomography scans of the chest in asymptomatic or mild cases to severe respiratory distress in acute cases according to a report by European Centre for Disease Prevention and Control. According to that report, the most common symptoms were headache (70.3%), loss of smell (70.2%), nasal obstruction (67.8%), cough (63.2%), asthenia (63.3%), myalgia (62.5%), rhinorrhea (60.1%), gustatory dysfunction (54.2%) and sore throat (52.9%); fever was reported by on 45.4% of the 1420 patients observed (Roy *et al.*, 2020).

Effect of COVID 19 on society

Globally as on Aug 19, 2020 there have been 21,989,366 confirmed cases of Covid 19, including 775,893 deaths, reported to WHO [WHO]. This data shows that lakhs of people have been deceased, and more than two crore have been infected by COVID-19. And rest of people who are not

infected, are at risk of infection by this virus. Only in a period of few months, the world has changed completely. The global economy has shrunk roughly around 1 percent in 2020 due to the corona virus pandemic, a reversal from the previous forecast of 2.5 per cent growth (Mitra *et al.*, 2020)^[13]. The tourism sector is facing an unprecedented challenge from Covid 19. As transportation is associated with it, has almost crashed. In most of the countries, schools, colleges and universities are closed. But education is a need of students so teaching is moving online, on an untested and unprecedented scale. Not only teaching, assessments are also moving online, with a lot of trial and error and uncertainty for everyone. Large number of important assessments and assignments has simply been cancelled. Use of air conditioners has been minimized by the people as it has become the source of the transmission of virus. If one person is infected, chance of others getting the infection is high as everyone is inhaling the same air. People dealing with diabetes, high blood pressure, obesity and many more conditions are unable to go for a morning and evening walk routine. Many people become jobless because of financial crisis in private sector due to this pandemic lockdown. It has given a severe impact on global and national economies irrespective of the level of virus impact on the people of individual nations. The novel corona virus has no border, no religion and spread beyond cast and creed. It is highly contagious in nature and easily unpredictable. World was never prepared for this kind of pandemic, where we are in a race of developing a vaccine against its spread (Kumari and Shukla, 2020)^[11]. The migration of workers to their native places has also triggered panic buttons; as they are crucial for both harvesting operation and post-harvest handlings of produce in storage and marketing centres. The COVID-19 is a massive disaster in both the ways health-wise as well as economy-wise. Negative and large effects of COVID-19 will pull the economy several years back and government needs to take measures for this in an aggressive way. Government will have to consider present as well as future policies for dealing this situation. It is going to hamper agriculture, business and economy (Verma and Prakash, 2020)^[25].

Effect of COVID 19 on environment

Before covid 19, the impact of pollution on the environment was very high. Expansion of cities, fast development of infrastructure, industrialization, horns of vehicles, etc., all were contributing to increase the pollution level. All these activities are the growing concern for the nation. Approximately one million people died in 2015 due to ambient particulate matter (PM) pollution alone in India. PM, the most dominant pollutant, in major parts of India has major contributions from vehicles, residential, energy, industrial and dust (Sharma *et al.*, 2020)^[21]. According to WHO (2018), 4.2 million premature deaths were reported in the year of 2016 due to ambient air pollution (Gautam *et al.*, 2020)^[4]. It is stated and proved in several studies that anthropogenic activities are considered as one of the key drivers of pollution in all spheres of the environment (Yunus *et al.*, 2020)^[31]. But due to lockdown normal life has become standstill since last week of March, 2020. Since people's movements and industrial activities are closed down for weeks, it is expected that pollution loads to the environment also get decreased. As expected, in a matter of days, the carbon emissions level has dropped significantly

(Stone, 2020)^[24]. During the lockdown period, the major industrial sources of pollution that affect aquatic ecosystems, such as industrial wastewater disposal, crude oil, heavy metals, and plastics, have shrunk or completely stopped. The Ganges, a sacred but severely polluted river in India, turns cleaner at several places during the nationwide lockdown period. While these improvements in environment tell us that pollution are temporary, and the current level of pollution in the atmosphere is much lower than the pre-COVID-19 period (Yunus *et al.*, 2020)^[31].

Precautions

After knowing most of the facts about covid 19 it become mandatory to reduce person to person transmission to control the current outbreak. Special attention and efforts should be made to protect ourselves and our families. A guideline has been already published for the medical employees, health care providers, and public health individuals and researchers who are interested in working in the coronavirus (Mossa-Basha *et al.*, 2020)^[14]. Some important things that we should keep in mind in the current scenario of covid 19 are Frequent hand washing: frequent hand washing by using soap and water for at least 20 seconds should be done. Sanitization: in unavailability of soap and water, 70 percent alcohol based sanitizers should be used properly. Use of mask: whenever going outside in public places one should necessarily wear the mask. After coming back the mask should be washed with soap and water before using again. Healthy food and exercise: always eat healthy food and fruits with regular exercise that make our immune system strong. Staying at home and avoiding crowded places without necessary need reduces the chance of infection. Awareness should be required from each and every section of society. University students have better understanding towards prevention of Covid-19 (Srivastava and Reddy, 2020).

Conclusion

In the present review, authors conclude that the disease profile of COVID-19 is dynamic and continues to rapidly evolve. There are still many questions that are pending about COVID-19. As it is evident through our literature survey, COVID 19 is one of the most destructive pandemic to the world in the year 2020. It is caused by the corona virus, which enter into the human body through ACE2 receptor found on various organs, thus facilitating viral entry into the target cells. Most of the people think that there is only one positive effect of this pandemic and that is reduction in pollution level due to restricted human activities. The time going on is really crucial for infants and older people because their immune system is not so strong that an adult have. As we all are aware that there is no vaccine or specific medicines have been invented till date, so the only cure is social distancing and cleaning hands frequently. Now it's our duty to keep ourselves safe not only for us, but also for our families, and for that we must have the correct information about the coronavirus through which we can deal with it.

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pandemic and have submitted a manuscript for publication.

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