

Pandemic Repercussion of Novel Coronavirus Disease (Covid-19) Outbreak to the People with Underlying Chronic Disease

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Abstract: The emerging of recent pandemic outbreak of nCOVID-19 in Wuhan bowed into a public health emergency of international concern. Coronavirus is one of the major pathogens that primarily targets the human respiratory system, the previous cases of Coronavirus (CoVs) outbreak include the severe acute respiratory syndrome (SARS)-CoV and the Middle East respiratory syndrome (MERS)-CoV in 2002, 2012 respectively and current emergence of novel coronavirus disease (nCovid-19) whereby series of cases caused by an unidentified pneumonia disease outbreak in Wuhan, Hubei Province, China in December 2019, with total active cases 1,047,965 in the world as of 8th March, 2020, with no antiviral drugs or vaccine, and become deterrent to people with underlying medical problems, especially older people with cardiovascular disease, diabetes, chronic respiratory disease, and cancer, that are more likely to develop serious illness as well as children with age less than ten. This current review will focus on the people suffering from nCovid-19 due to underlying chronic disease and find the research gap from several articles as well as the solution to the problem.

Keywords: Novel coronavirus-2019, Pandemic repercussions, Underlying Chronic disease.

INTRODUCTION

The pandemic outbreak of Coronavirus disease (COVID-19) are common all over the world and is known to cause severe respiratory tract infections, CoVs is the second most common cause of cold among humans, belongs to a group of RNA viruses that causes disease in mammals and birds, until the emergence of SARS in 2002 and MERS in 2012 which caused major outbreak causing pneumonia. Presently, a novel coronavirus was identified in Wuhan, China, December 2019, named Covid-19. Subsequently, the experts of the International Committee on Taxonomy of Viruses (ICTV) named it as SARS-CoV-2 virus, and later caused the SARS outbreak (SARS-CoVs) due to its similarity, and become the major pathogens of the present respiratory disease outbreaks, with single stranded RNA (+ssRNA) virus, and can be isolated in different animal species [Perlman, S. *et al.*, 2009]. Later, the WHO declared it as a Public Health Emergency of International Concern [Daga, M.K. *et al.*, 2020]. However, the US Center for Disease Control and Prevention (CDC) Response team on COVID-19, made a clear statement on the incidence of patient with Covid-19 underlying health conditions, thus, patient are at higher risk of becoming critically ill, the response Team highlights on the data from confirmed cases that were reported from all 50 United States between February 12th-28th March, 2020. Those patients that are at high risk factors of chronic infection with lung disease, diabetes, cardiovascular disease,

chronic liver disease, neuro developmental disability, pregnancy, current and ex smoker status, as well as chronic renal disease are in frontline to easily suffer the repercussion of present Covid-19 [S. U. P. Now, 2020]. As of March 28th, 2020 the US recorded 122,653 COVID-19 cases to CDC, with data available of patient with underlying health conditions, based on the data obtained 7162 (5.8%) cases, among which 2692 (37.6%) of patients had one or more underlying condition or risk factors. Also, out of the previous mentioned data, 457 COVID-19 patients required to be admitted at intensive care unit, while a total of 358 (78%) had an underlying health condition. Conditions such as diabetes mellitus, chronic lung disease, and cardiovascular are the most commonly reported disease. A research conducted by [Pradesh, U. *et al.*, 2020], based on preliminary findings in the United State of America, suggest that individual with underlying health conditions or other recognized risk factors with respiratory infections appear to be in danger with severe disease from COVID-19 infection compare with persons in normal conditions [Jennifer, M, 2020]. However, the clinical history of some patients with particular characteristics of the virus disease normally start with fever, dry cough range within 5-7 days, while older patients with already lung impairment begin to experience shortness of breath and increased respiratory rate, while in more weak patients with

dyspnea may appear with onset of symptoms, and for those who do not have basic respiratory impairments or other frequent condition, the symptom may appear later [Lu, R. *et al.*, 2020]. Recently, scholarly attention has been focused at identifying the risk factors from death of COVID-19. A study based on 72314 cases in China indicated that the case-fatality rate (CFR) tend to be higher among those with older age, pre-existing cardiovascular disease, diabetes and hypertension compared to other patients [A. S. Review, 2009],[Camp, P.G. *et al.*, 2007].

Brief History of Coronavirus

Human Coronavirus (HCoV) was first described in the 1960s for patients with the common cold (Pneumonia) that cause fatal respiratory disease in humans. Since the early 1970s, an array of pathological conditions in domestic animals have been attributed to CoV infections [Taylor, P. *et al.*, 2015]. But with the exception of infectious bronchitis virus (IBV), that causes avian infectious bronchitis in chickens [Cavanagh, D, 2007]. canine respiratory coronavirus (CR-CoV), which causes respiratory disease in dogs and mouse hepatitis virus (MHV) can cause a progressive demyelinating encephalitis in mice, other CoV infections normally result in gastrointestinal symptoms, like; transmissible gastroenteritis coronavirus (TGEV), bovine coronavirus (BCV), feline coronavirus (FCoV), canine coronavirus (CCoV), and turkey coronavirus (TCV) are known to cause enteritis in their respective hosts [Weiss, S.R. *et al.*, 2005], and now bring the emergence of Nobel Covid-19 based on epidemiological evidence that initially suggested a reported cases in China. December, 2020 with a history of exposure to the Huanan seafood market [Lu, R. *et al.*, 2020].

Coronavirus Disease (Covid-19)

According to WHO COVID-19 is an infectious disease caused by a newly discovered coronavirus, the disease are causes by respiratory infection (flu) with sign of cough, fever, and more severe cases, difficulty in breathing, and also spread primarily through contact with an infected person through cough or sneezing as well as affecting those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer [O. P. Symptoms, 2020]. Below are some pathogenesis of a few coronavirus disease infection:

Human Coronavirus

The emergence of SARS CoV consist of two prototypes human Coronaviruse namely; OC43 and 229E, both etiologic agents of the common

cold and had long been speculation about the association of human coronavirus (H-Cov) with more serious human diseases such as multiple sclerosis, hepatitis, or enteric disease in newborns. Recently, the new identified SARS-CoV, which was shown to cause a severe acute respiratory syndrome was the first example of serious illness in humans caused by coronavirus [Resta, S. *et al.*, 1985].

Murine Coronavirus

Murine coronavirus is one of the coronavirus families that infect mice. It has an enveloped like structure, positive-sense, single-stranded RNA virus which enters a host cell by binding to the CEACAM1 receptor [Peptidases, C. P, 2020]. They used laboratory strains that primarily infect the liver and the brain and provide immune-mediated demyelinating disease that develops late after infection [Rothan, H.A. *et al.*, 2020][Su, S. *et al.*, 2016].

Porcine Coronavirus

The porcine CoV is a Transmissible gastroenteritis virus that was recognized in 1946, and is one of the major cause of viral enteritis and fetal diarrhea in swine flu and it mortality resulting in significant economic loss.

Avian Coronavirus

Avian coronavirus infects birds and causing an associated disease infection of bronchitis and it is highly infectious. Avian pathogen affects the respiratory tract, gut, kidney and reproductive systems of chickens [Milek, j. *et al.*, 2020], and also replicate in other tissues like kidney, oviduct and the gut [Saif, L. J, 2020]

Feline Coronavirus

Feline coronavirus is a positive-stranded RNA virus that composed of two biotypes; Feline enteric coronavirus (FeCoV) that commonly found in multicat environments in an asymptomatic carrier state causes seroconversion, and feline infectious peritonitis virus (FIPV) that has less common variant of FeCoV, with less ability to replicate in macrophages, causing a severe lethal disease and immune mediated pathology [Casella, M. *et al.*, 2020]

Bovine Coronavirus

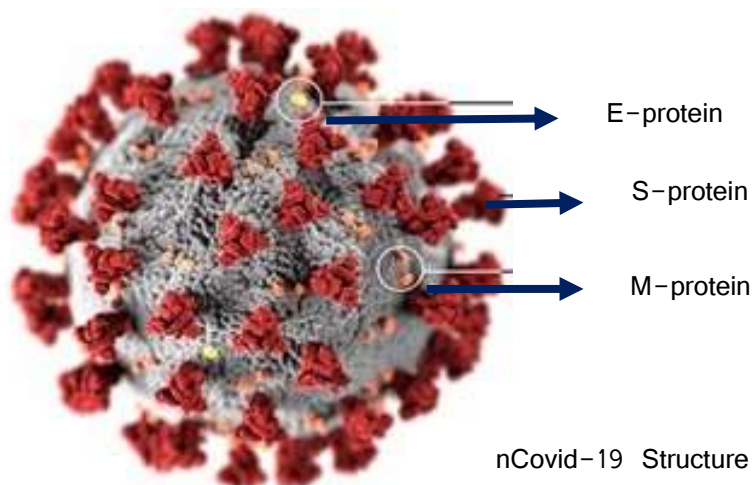
The BCoV is a ubiquitous virus worldwide as measured by serology and causes both respiratory and enteric disease, including calf diarrhea, winter dysentery in adults, and respiratory infections in cattle of all ages, and those with shipping fever. Currently, the virus has no specific vaccines

available to prevent the associated disease [Wang, L. et al., 2020]

Structure of Covid-19

According to the developers, the inner structures of the COVID-19 virus are currently under investigation and incorporated into a new visualization form. However, the three-

dimensional (3D) model of the surface coronavirus (COVID-19) has been developed, created by Fusion Animation, and the new model is available in public databases for scientists to use in the development as well as treatments to combat the condition [Targets, D, 2020]. The 3D structure consists of the following components:



<https://www.drugtargetreview.com/news/58816/novel-antiviral-compound-proposed-as-covid-19-therapeutic/>

Spike (S) Protein (PDB code – 6CRV)

Is a multifunctional molecular machine that mediates coronavirus entry into host cells. It first binds to a receptor on the host cell surface through its S1 subunit and then fuses viral and host membranes through its S2 subunit [Li, F, 2016].

Envelope (E) Protein (PDB code – 5X29)

The Coronavirus (CoV) envelope (E) proteins play multiple roles during infection, and virus morphogenesis, and also in the case of severe acute respiratory syndrome (SARS) CoV, pathogenesis. E proteins are small (74-109 amino acids), and consist of two distinct structural domains that is longer than typical hydrophobic domain and a charged cytoplasmic tail [Venkatagopalan, P. et al., 2020].

Membrane (M) Protein (PDB code – 3I6G)

Is the component of viral envelope that play a central role in virus morphogenesis and assembly via its interactions with other viral proteins which is located between endoplasmic reticulum and Golgi complex [Uniprotkb, P. et al., 2018].

Evolutionary Trend of Covid-19

The early research regarding the existence of COVID-19 shows that the corona virus disease may have jumped from bats to human [Zhou, P. et al., 2020]. The findings is not unprecedented since the viruses from bats shown to 'jump' the species barrier frequently to infect new species [Li, G. et

al., 2018]. Similarly, by going with recent research articles and reviews that goes with same view, the wet animal market had been implicated in the SARS-CoV outbreak of 2002–2003, and subsequently the early 2019-nCoV infections is also related to the seafood market with wildlife trading, but the circumstance shows by the virus which crossed species barrier that infect humans remains to be identified [Sun, J. et al., 2020]. Based on recombination analysis and phylogenetic trees of some paper review, it was found that the 2019-nCoV shares a most recent common ancestor with Beta CoV/RaTG13/2013 (EPI_ISL_402131), the viruses are in the same cluster and may result of convergent evolution or complex recombination events involving at least two virus species with differing evolutionary history and is supported by reconstructing maximum likelihood phylogenetic trees [Lam, T.T.Y. et al., 2020].

Incidence of Covid-19

Based on Epidemiological findings of eight patients out of nine study conducted, the history of Covid-19 exposure to the Huanan seafood market in Wuhan, shows that they are exposed to the infection source at the market, because one of the patient that never visited market, he stayed in a hotel near the market before the onset of the disease indicate that either the droplet transmission possibility or was infected by unknown source. But evidence of clusters infected family members and healthcare workers has

confirmed the presence of human to human infection [Wang, L. *et al.*, 2020][Cheng, S.C. *et al.*, 2020]

Pathogenesis

The severe symptoms of COVID-19 associated with an increase numbers and rate of fatalities especially in the epidemic region of China, January 22, 2020, the China National Health Commission reported the details of the first 17 deaths and January 25, 2020 the death cases increased to 56. The percentage of death reported earlier with 2684 COVID-19 cases was approximately 2.84% as of Jan 25, 2020 and the median age of the deaths was 75 (range 48–89) years [Driggin, E. *et al.*, 2020]. The pathogenesis of COVID-19 infection targeting respiratory system with severe pneumonia include, RNAemia, acute cardiac injury, high erythrocyte sedimentation rate and D dimer were also observed [Lei, J. *et al.*, 2020].

Symptoms

The sign of COVID-19 infection emerge within an incubation period of approximately 5.2 days [Zhou, L. *et al.*, 2020]. The inception period of symptoms that result in death ranged from 6 to 41 days with a median of 14 days. Mostly, the period depend on, age of patient and their immune system status as well as patient with >70yrs old compared with those under the age of 60 [Perlman, S. *et al.*, 2009]. Presently, the most common symptoms that instigate COVID-19 are; fever, cough, and fatigue, while other symptoms include sputum production, headache, haemoptysis, diarrhea, dyspnoea, and lymphopenia. The symptomatic transmission of COVID-19 case is a case that developed signs and symptoms compatible with the virus infection [H. P. Q, 2020].

Asymptomatic Cases

Asymptomatic simply refers to transmission of the virus from a person, who does not develop symptom. up to date, there has been no documented evidence of asymptomatic transmission, though cases have been reported as part of contact tracing efforts in some countries [Chan, J.F.W. *et al.*, 2020]. Based on the data published from epidemiology and virologic research provide an evidence that, the COVID-19 is primarily transmitted from symptomatic group to others who are in close contact through respiratory droplets, either by direct contact with infected persons, or by contact with contaminated objects and surfaces [Burke, R.M. *et al.*, 2020]. However, the findings are supported by detailed experiences shared by technical partners through WHO global expert networks, and give

presentations by Ministries of Health. The clinical and virologic studies that have been collected repeatedly from biological samples has confirmed that patients whose provide evidence that show mild symptomatic sign of the COVID-19 virus is highest in upper respiratory tract (nose and throat) early in the course of the disease [Woelfel, R. *et al.*, 2020].

Covid-19 Quarantine System

The system is an implementation of isolation or movement of activities to persons who are not infected, but are believed to have been exposed to infected individual's for the purpose of public gathering, international travelling or as a result of preventing the diseases transmission, by monitoring and introducing the quarantined system in their homes, and they may also be quarantined within community based facilities [Guidelines for Quarantine]. Below are some of groups people suspected to be exposed and to be quarantine:

- An individual or a group of persons who are exposed at a large public gathering or conveyance during international travel.
- A wider population or geographic level basis.
- Segregation of COVID-19 suspects, as early as possible and to be kept in a place with social amenities such as Lighting, ventilation, heating, electricity, ceiling fan in an isolated environment design by the authority concern.

Clinical Manifestation

Most of the domestic and wild animals, including camels, cattle, cats, and bats, may serve as hosts for Coronaviruse, generally, Coronaviruse do not spread among humans but are mainly spread through close contact with infected individual via respiratory droplets from cough or sneezing. With regard to COVID-19, early infection with some patients were reported to have link with Huanan Seafood Market in Wuhan, China, due to animal-to-person transmission, and later cases were reported within medical staff and others with no history of exposure to that market or visiting Wuhan, which was taken as an indication of human to human transmission [Adhikari, S.P. *et al.*, 2020]. The latest guidelines from Chinese health authorities suggest three main transmission routes for COVID-19 that include droplets transmission (occur when an infected person coughs or sneezes), contact transmission (occur when a subject touches a surface or object contaminated with the virus) and aerosol transmission occur when respiratory droplets mix into the air forming aerosols and may cause infection into the lungs when inhaled in high dose

in a non-cross ventilated environment [Jin, Y. H. et al., 2020].

Phylogenetic Analysis of Covid-19

Several review article of phylogenetic analysis with reference to the World Health Organization has classified COVID-19 as β CoV of group 2B [Seafood, H. et al., 2020]. Also, ten genome sequences of COVID-19 patient was obtained, and nine were exhibited with 99.98% sequence identity. Likewise, another review showed 99.8–99.9% nucleotide identity isolates from five patients and the sequence results revealed the presence of a new beta-CoV strain. The genetic sequence of the that showed more than 80% identity to SARS-CoV and 50% to the MERS CoV, and later shows both SARS-CoV and MERS-CoV were originated from bats. From the evidence analysed, the phylogenetic analysis indicates that COVID-19 belongs to the genus betacoronavirus with a single open reading frame on gene, and proved its origin by which SARS CoV infects humans, bats, and wild animals [East, M. et al., 2020].

Spread Route OF Covid-19

Based on the large number of infected people that were exposed to the wet animal market in Wuhan City that live animals are routinely sold, it is recommended that COVID-19 likely to be zoonotic origin. Though efforts have been made to search for a reservoir host or intermediate carriers from which the infection may have spread to humans. But the initial reports already identified two species of snakes that may likely be a reservoir of the virus. However, till date of this review, there has been no consistent evidence of coronavirus reservoirs other than mammals and birds [Tools, A, 2020].

Repercussion/Danger of Covid-19

Based on current available information and clinical expertise, the danger of Covid-19 is more fatal to those people with underlying condition such as older adults and people of any age who have serious chronic medical conditions might be at higher risk for severe illness from COVID-19 [Centers for Disease Control and Prevention, 2020]. Because, economically the danger associated with the coronavirus across the globe, slamming healthcare systems, forcing closure of borders and led to economic collapse, the world truly is unaware of which direction it's headed in, by going with current condition, as Italy, China and Iran remain the worst countries affected by the virus, the entire world is coming to terms with the severe financial impact that the virus will bring in

the near future. Nearly all sectors worldwide have been impacted by the coronavirus which originated in Wuhan, China. Be it airlines, the food industry, sports or entertainment, the virus has managed to hit various nations where it hurts most [Us, W. W, 2020]

Prevention

Preventive measures are the current strategy to limit the spread of cases. Because an epidemic will increase as long as R_0 is greater than one, control measures must focus on reducing the value to less than one [Perlman, S. et al., 2009]. Preventive strategies are focused on the isolation of patients and careful infection control, including appropriate measures to be adopted during the diagnosis and the provision of clinical care to an infected patient. For instance, droplet, contact, and airborne precautions should be adhere during specimen collection, and sputum induction should be avoided. An effort by WHO and other organizations have issued some of the following general recommendations; by Avoiding close contact with people suffering from acute respiratory infections, frequent wash of hands, especially after contact with infected people or their environment, avoiding unprotected contact with farm or wild animals, avoid public gatherings, use of portable hand sanitizer, masks, eye protection, gowns, and gloves to prevent transmission of the pathogen [Report of the WHO-China, 2020]. Other prevention also include:

- To ensure the efficiency of infection prevention and control measures in various health sectors.
- To ensure the efficacy of entry and exit screening.
- Restriction of movement, Social distancing, School and workplace closures, quarantine system.

CONCLUSION AND RECOMMENDATION

In conclusion, based on the review, it has shown that patient with underlying chronic disease with asthma, high blood pressure, older age people are at high risk of danger that suffer most, on the fatal risk of Covid-19 infection, likely due to their less active immune system. However, further research need to be carried out to find the research gap associated between the healthy patient and those with underlying problem and find the possible outcome to tackle the mortality rate of the patient with chronic disease due to Covid-19 pandemic infection.

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