



TO STUDY OF EPIDEMIOLOGICAL PARAMETERS INCLUDING SOCIAL DISTANCING MEASURE IN COVID-19 PANDEMICS

Community Medicine

**Dr. Dungraram
Beniwal***

Department of Community Medicine, Armed Forces Medical College *Corresponding Author

**Dr. Raju Ram
Bishnoi**

Department of Oral Medicine and Radiology, Darshan Dental College, Udaipur, Rajasthan

ABSTRACT

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) causes Coronavirus disease of 2019 (CoVID-19) is an acute respiratory disease. CoVID-19 is ongoing out break disease, was encountered in China and declared as pandemic by World Health Organization in March of 2020. CoVID-19 is an enveloped virus with single stranded positive sense RNA. Transmission occurs primarily through respiratory droplets. Sputum formation, dry cough, pyrexia, breathing problem is some of clinical manifestations of CoVID-19. The best way to prevent CoVID-19 is by maintaining social distance. Reverse transcriptase polymerase reaction (rRT-PCR) is mainly used for diagnosing this disease. Ritonavir, Chloroquine are the most effective antiviral compounds towards CoVID-19. The social distancing measures such as cultural, personal and governmental have been discussed along with retrofitting measures

KEYWORDS

CoVID-19, ssRNA, RT-PCR, Social distancing and Chloroquine.

INTRODUCTION

Any emerging infectious disease is an infectious disease whose existence has been on increase through the past 20 years and could increase in the next decades. Emerging infections account for about 12% of all human pathogens [1]. These emerging infectious diseases are being caused by Human coronaviruses (HCoV), namely Severe acute respiratory syndrome coronavirus (SARAS-CoV), Middle East Acute Respiratory Syndrome Coronavirus (MEARS-CoV) and recently noticed Severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) [2]. CoVID-19, named after the year 2019 in which its occurrence is first traced, causing an ongoing out-break of lower respiratory tract disease, was first identified in Wuhan, China and declared as a Pandemic by World Health Organization, on March 11, 2020 [3].

This Pandemic is leading to world-wide health problem, having its spread in 205 countries, disturbing the global socioeconomic conditions as well as spreading fears of short supply of essential food items, pharmaceuticals, and electronic gadgets [4]. Schools, Educational institutions and Universities have to be closed on a nation-wide in about 195 countries affecting about 1.5 billion students [4].

Dry cough, fever and sore throat are some mild symptoms developed in Majority of SARS-CoV2 infected patients. However, some of the patients have developed different lethal complications including organ collapse, pulmonary oedema, severe sepsis and acute pneumonia [3].

Various social distancing measures - some short term and long term measures are proposed for prevention of the CoVID-19 at present and also to ensure personal, family and public hygiene in future.

OBJECTIVES

1. Study of epidemiological parameters related to COVID-19
2. To assess the distribution of factors with respect to Social Distancing measures among COVID-19 pandemic situation.

ETIOLOGY

CoVID-19 is a disease caused by the member of beta coronavirus like SARS-CoV and MERS-CoV [5]. These viruses are large pleomorphic, spherical particles, enveloped by bulb shaped surface peplomers, similar to crown. HCOVs generally contains single stranded positive sense RNA genome and about 27 to 34 kilobases.

The genetic material size is reported to be one of the largest of all RNA viruses [6]. Human coronaviruses shows two types of proteins, namely structural such as envelope (E), nucleocapsid (N), matrix (M) and spike (S) and nonstructural protein viz. RNA dependent RNA polymerase (RdRp) [7].

LIFECYCLE

Lifecycle of Human coronavirus starts with attachment of host cell

receptor with their glycoprotein spike (S). Entry of virus particle into host takes place by endocytosis with help of protease of host [8, 9]. The RNA strand of Human coronavirus shows methylation at 5' end and polyadenylation towards 3' end, which permit the RNA genome to attach ribosome of host for translation process, which leads to synthesis of long polyprotein [10]. A large number of non-structural proteins combine to form multiple protein replicase-transcriptase complex and also called replicase-transcriptase (RdRp) protein, which helps in synthesis of RNA strand (negative sense) from positive sense RNA [11]. Subsequently, the negative sense strand act as a template to transcribe smaller sub genomic positive RNAs which are used to synthesise all other proteins, namely structural and accessory proteins. Furthermore, this negative sense strand serves for replication of new positive stranded RNA genome, which becomes the genetic material of progeny viruses. The newly formed viral structural envelope (E), spike (S), and matrix (M) proteins travel along the secretory pathway into the golgi compartment. The matrix proteins control protein-protein interactions that are required for assembling of viruses. Newly formed viruses are then released from the host cell through secretory vesicles by exocytosis [12, 13].

TRANSMISSION

There are few studies at present that define the pathophysiological characteristics of COVID-19, and there is great uncertainty concerning its mechanism of spread. Present studies indicates that the transmission is similar like that of Human coronaviruses, which are transmitted from human to human through respiratory fomites [3]. The World Health Organisation and U.S. Centres for Disease Control and Prevention (CDC) state that it is mainly spread during the intimate or close contact and by respiratory droplets coming out when diseased persons cough or sneeze, with a closer contact of not more than 1 to 2 meters [14, 15].

There are few studies at present that define the pathophysiological characteristics of COVID-19, and there is great uncertainty concerning its mechanism of spread. Present studies indicates that the transmission is similar like that of Human coronaviruses, which are transmitted from human to human through respiratory fomites [3]. The World Health Organisation and U.S. Centres for Disease Control and Prevention (CDC) state that it is mainly spread during the intimate or close contact and by respiratory droplets coming out when diseased persons cough or sneeze, with a closer contact of not more than 1 to 2 meters [14, 15]. Droplets which come out while coughing without mask may moves up to 4.0 to 4.5 meters. SARS-CoV 2 may also spread by touching contaminated surfaces and feces. The spread of SARSCoV 2 is more when the individuals are asymptomatic. Based on ambient temperature and humidity in the environment, these deadly viruses can be active up to four hours on the surfaces coated with copper, for one full day on cardboard surface and for up to three days on stainless steel and plastic surfaces [16].

SYMPTOMS

Symptoms vary from person to person with CoVID-19, following an incubation period of 1-14 to 21 days. It may produce fever or no symptoms.

However, it can also lead to serious illness and may be fatal.

Common symptoms include Fever (99%), Sputum Production (27%), Dry Cough (59%), Fatigue (70%), Joint Pains (14.8%), Sore Throat (13.9%), Headache (31%), Vomiting (40%) and Diarrhoea (3.8%) and Respiratory Distress (Figure-1) [17].

SI No.	Symptoms	(%)
01.	Fever	99%
02.	Fatigue	70%
03.	Dry Cough	59%
04.	Vomiting	40%
05.	Headache	31%
06.	Expectoration	27%
07.	Joint Pain	14.8%
08.	Shore Throat	13.9%
09.	Diarrhea	3.8%

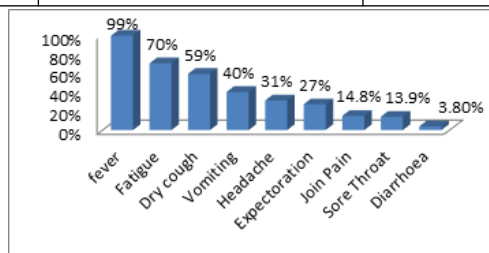


Figure 1. Symptoms and its percentage of CoVID-19

Human coronaviruses primary infects epithelial cells within the lung. The virus is capable of entering macrophages and dendritic cells leading to an abortive infection [18]. Despite this, infection of these cells types may be important in inducing cytokines that may contribute to disease, called cytokine storm syndrome which then leads to multiple organ failure [19].

PREVENTION

To prevent the spread of CoVID-19, World Health Organisation and U.S. Centres for Disease Control and Prevention have announced some precautions. They have recommended avoiding movement to high risk regions, contact with individuals who are asymptomatic and the consumption of meat from places with known CoVID-19 outbreak [20].

Good personal hygiene, washing hands with detergents and alcohol based sanitizers, wearing surgical masks around mouth and nose, avoiding touching the nose, eyes or mouth with contaminated hands and sneezing or coughing into a tissue and putting the tissue directly into a waste container are the other actions that prevent the spread of CoVID-19. Social distancing measures are also recommended to prevent transmission [3, 15], which are discussed below.

SOCIAL DISTANCING MEASURES

Social distancing as the name indicates is to maintain social distance, which is a physical distance of 3-12 feet (or 1-4 m) between two adjacent persons in a social setting. Edward T. Hall, an American anthropologist has given the interpersonal distances as intimate distance, personal distance, social distance, and public distance in a physical setting. It also includes refraining from touching the surfaces which might have got in contact with multiple persons. The residence time of, disease causing microbes varies, depending on material surface and ranges from an active time of 4 hours to 4 days, as already mentioned in this paper.

Social distancing as the name indicates is to maintain social distance, which is a physical distance of 3-12 feet (or 1-4 m) between two adjacent persons in a social setting. Edward T. Hall, an American anthropologist has given the interpersonal distances as intimate distance, personal distance, social distance, and public distance in a physical setting. It also includes refraining from touching the surfaces which might have got in contact with multiple persons. The residence time of, disease causing microbes varies, depending on material

surface and ranges from an active time of 4 hours to 4 days, as already mentioned in this paper. Virus will be active for 10 minutes on human hands, before it gets onto face through own hands and then into nasal way, eyes or mouth, which can be controlled by maintaining personal hygiene. Social distancing measures, which are useful to prevent CoVID-19 spread, from human to human, in Indian conditions are discussed below.

As a first and foremost measure of implementing the social distancing, one can avoid shake-hands as gesture of wishing but instead can revive the Indian way of wishing by saying Namaste, with two hands folded. Infact, to shake the hand, one will move closely, or otherwise, the routine movement with 1.5 to 2 m distance continues. Another measure could be to avoid the physical contact while performing the monetary transactions at multiple levels viz. vegetable or fruit markets, grocery stores, petrol bunks and others.

Fortunately, in India we have digital payment platforms introduced, in practice, to avoid the cash payments. And extensive use of contact-less credit and debit cards may be promoted at point of sale (POS) machines without handing over the cards to the merchant. Also, the cleanliness drives like Swachh Bharath Mission, now widely practiced in India, have further proved beneficial in containing the spread of germs as it ensured and stressed the need of proper community and personal hygiene. Existing arrangements and facilities that we are continuing to use prior to the onset of CoVID-19 are to be equipped with social distancing facilities, which may require additions or alterations. Certain conventional designs in home and office furniture pose challenge in achieving contactless usages. There is an urgent need in retrofitting the furniture in homes, offices, business and public places in order to minimize the need for touching the items with hands, whereby the social distancing would be achieved not only to prevent the present CoVID virus but the future mutations, if any. Most of the Indians use hand kerchief or traditional mini towel or towel itself, on their head, shoulder or in trousers.

Masking the face to close, nose and mouth with that, immediately, when they are about to enter a social gathering and removing it as per comfort, and wearing goggles, specs for eyes protection would be a better measure, in prevention, till the protecting equipment or gadgets comes into practice.

Changes in cultural habits, eating habits and social behavior with (due approval of religious preachers) are to be taught first during the lockdown period, in order to brace up the people at large to face the challenging situations. Further, certain on-line platforms should be utilized in ensuring the cognizance of the people in abiding the lockdown rules. For instance, the citizens should be made to login with their Aadhar identity numbers to learn about social distancing measures – with an aid of videos, text and audio messages and should prompt them to take a pledge to the effect. Those citizens who have complied with the pledges may be allowed on to the streets, workplaces for attending their essential requirements. The messages shall be also given wide publicity through electronic and social media. The abiding citizens may be issued with soft or hard copy or token cards for accessing the public roads, transportation and common spaces. practices at public utility spaces.

Only these volunteers are made eligible for further employment in any department. Social distancing should be immediately enacted in fundamental responsibilities of citizens for strict compliance. Open defecation and spitting on the roads should be included in public nuisance activities and the offenders should be punished.

Management of existing resources can also play a vital role in combating the spread of the communicable diseases such as (a) provisioning of sensor based hand washing basins in public spaces at every 10-15 minutes walking distances, (b) alternate occupancy of the seats in public transport vehicles to maintain social distancing, (c) similar practice may be adopted while occupying the train berths and (d) implementation of home delivery systems for supply of essential goods, which avoids gathering of more persons at market places, further the practice may also boost the employment opportunities. The ATMs, which are used for currency, can be also used as oxygen supplying places and if any person with breathing difficulty can use it and with geo-tagging, necessary ambulance facility should reach it, when activated so. Innovative ideas should be sought from the citizen scientists in order to cope with the situation. Implementation of such

ideas may also generate employment perspectives and start-ups.

DIAGNOSIS AND TREATMENT

Diagnosis of SARS CoV2 can be done by real time reverse transcription polymerase chain reaction (RT-PCR) or computed tomography (CT) imaging [21]. Enzyme linked immunosorbent assay (ELISA) kits for detection of IgM and IgG antibodies towards nucleocapsid (N) and other SARS-CoV2 proteins have also been available more recently [22].

For CoVID-19, at present no effective antiviral treatment or vaccine is available. Antipyretic therapy such as paracetamol is the first step treatment for pyrexia. Administration of immediate oxygen therapy is suitable for Patients with severe acute respiratory infection [23]. Renal replacement therapy (RRT) should be recommended for patients with acute kidney injury (AKI). Conservative and rational antibiotic regimens must be followed to avoid bacterial and fungal infections in patients during the middle and later stages of the disease [24].

Several compounds like interferon- α , lopinavir, ritonavir, chloroquine which were previously approved for treatment of other viral diseases like SARS are being investigated for use in treating CoVID-19 [25].

Oseltamivir, a neuraminidase inhibitor is currently being used by medical staff in China [23]. Patients with acute immune reactions can be treated with Glucocorticoids. In children, methylprednisolone should be limited to 1-2mg/kg/day for a maximum of five days [24].

CONCLUSION

The newly evoked coronavirus in Wuhan city in China has already a health concern since 2002, when the last outbreak of these types of viruses (SARS), causing more than 700 deaths and 8500 cases in hospitals. Besides, another outbreak is MEARS that affected more than 2500 persons. Globally, the number of CoVID-19 cases has continued to increase, and is currently placed at 2,227,622 laboratory confirmed cases with over 1,50,623 deaths. Further research, in this context is required to help the correct mechanism of human to human as well as animal to human transmission to promote the invention of virus specific vaccine. Symptoms vary mild to severe but are typical of other viral illness. The best prevention of CoVID-19 is to avoid sources of exposure. The most affected by CoVID-19 are Old aged and those persons with pre-existing chronic medical conditions, with suppressed immunity.

Ongoing studies are evaluating the efficacy of remdesivir, chloroquine, hydroxychloroquine, lopinavir, ritonavir as potential therapies. The social distancing measures such as cultural, personal and governmental have been discussed along with retrofitting measures to be followed for the prevention of CoVID-19.

ACKNOWLEDGMENT: Nil

REFERENCES:

- [1] Fan Wu, Suzhao, Bin Yu et al., "A new coronavirus associated with human respiratory disease in China. *Nature*. Vol. 579, pp.255-269, 2020.
- [2] D.S.Hui, I.E. Azhar, T.A. Madani, F.Ntoumi et al., "The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health-the latest 2019 novel coronavirus out break in Wuhan, China. *International Journal of Infectious Diseases*. Vol.91, pp. 264-266, 2020.
- [3] CatrinSchrabi, Zaid Alsafi, Niamh Oneill, MehdiKhan, Ahmed Kerwan et al., " World Health Organization declares global emergency: A review of the 2019 novel coronavirus (CoVID-19). *International Journal of Surgery*. Vol. 76, pp. 71-76, 2020.
- [4] Michael McAleer, "Prevention Is Better Than the Cure: Risk Management. *J.Risk Financial Management*. Vol. 13, Issue. 46, pp. 1-5, 2020.
- [5] A.E. Abdo, "Anti-HCV, nucleotide inhibitors, repurposing against CoVID-19. *Lifesciences*. Vol. 248, 2020.
- [6] C.Goldsmith, K. Tatti, T. Ksiazek et al., " Ultrastructural characterization of SARS coronavirus. *Emerg Infect Dis*. Vol. 10, pp. 320-326, 2004.
- [7] D.N. Valencia, " Brief Review on CoVID-19: The 2020 pandemic caused by SARS-CoV2. *Cureus*. Vol. 12, Issue. 3, 2020.
- [8] Fang Li, WenhoiLi, MichaelFarzan, C.H. Stephen, " Structure of SARS Coronavirus Spike Receptor-Binding Domain Completed with Receptor. *Science*. Vol. 309, Issue. 5742, pp. 1864-1868, 2005.
- [9] Cui J, Li F, Shiz, "Origin and evolution of pathogenic coronaviruses. *Nat Rev Microbiol*. Vol. 17, pp. 181-192, 2019.
- [10] K. Kevin, K. Marjolein, S.H.E.. Van et al., "SARS-Coronavirus Replication Is Supported by a Reticulovesicular Network of Modified Endoplasmic Reticulum. *PLOS Biology*. Vol. 6, Issue. 9, 2008.
- [11] A.Zumla, D.Hui, S.Perman, "Middle East Respiratory Syndrome. *Lancet*. Vol. 386, pp. 995-1007, 2015.
- [12] S. Zhiqi, X. Yanfeng, B. Linlin et al., " From SARS to MERS, thrusting coronaviruses into the spot light. *Viruses*. Vol.11, Issue. 59, 2019.
- [13] S.C.Sawicki, D.L.Sawicki, S.G. Siddell, "A contemporary view of coronavirus transcription. *J Virol*. Vol. 81, pp. 20-29, 2007.
- [14] Hao Hong, Yuan Wang, T.C. Hung, C. Jung Chan, "Clinical characteristics of novel coronavirus disease 2019 (CoVID-19) in newborn, infants and children. *Pediatrics* and Neonatology. Vol. 10, 2020.
- [15] W.F.J.Chan, S.Yuan, K.H.Kok et al., "A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person to person transmission: A study of a family cluster. *Lancet*. Vol. 395, pp. 514-523, 2020.
- [16] Guj, B.Han, J. Wang, "Gastrointestinal manifestations and potential fecal-oral transmission. *Gastroenterology*. Vol. 10, 2020.
- [17] Sijia Tian, Nan HU, Jing Lou, Kun Chen et al., "Characteristics of CoVID-19 infection in Beijing. *Journal of Infection*. Vol. 80, Issue. 4, pp. 401-406, 2020.
- [18] J.S.Pearis, C.M.Chu, V.C.Chang, et al., "Clinical progression and viral load in a community out break of coronavirus-associated SARS pneumonia : a prospective study. *Lancet*. Vol. 361, pp. 1767-1772, 2003.
- [19] Hassan Naji, "Clinical characterization of CoVID-19. *European Journal of Medical and Health Sciences*. Vol. 2, Issue. 2, pp. 1-5, 2020.
- [20] B. Peter, TamasTekeli, ZsoltVizi, Attila Denes, A.B. Ferenc, R. Gergely , "Risk assessment of Novel coronavirus CoVID-19 out break outside China. *J.Clin.Med*. Vol. 9, Issue. 2, pp. 571, 2020.
- [21] M.Wang, R.Cao, Zhang, Yang, Liuj, et al., "Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro. *Cell Res*. Vol. 30, Issue. 3, pp. 269-271, 2020.
- [22] Kit San Yuen, ZiWeiye, Sin Yee Fung, et al., "SARS-CoV2 and CoVID-19 : The most important research questions. *Cell Biosci*. Vol. 10, Issue. 40, pp. 1-5, 2020.
- [23] D.Wang, BoHu, Chang Hu, et al., "Clinical characteristics of 138 hospitalised patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. Vol. 323, Issue. 11, pp. 1061-1069, 2020.
- [24] K.Liu, Y.Y.Fang, Y.Deng, et al., "Clinical characteristics of Novel coronavirus cases in tertiary hospitals in Hubei Province. *Chin Med J*. Vol. 10, 2020.
- [25] M.Martinez, "Compounds with therapeutic potential against novel respiratory 2019 Coronavirus. *Antimicrob Agents Chemother*. Vol. 1, 2020