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Spread and Incubation Period of Coronavirus: A Review

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Abstract

The Novel Corona Virus (2019 — n COV) has been causing an upsurge of pneumonia which is of viral origin that began in Wuhan, China. Covid-19 is a highly transmittable disease and a viral infection caused by a strain SARS-CoV-2 which has now spread around the world. COVID-19 contains a single-stranded (positive-sense) RNA associated with a nucleoprotein within a capsid containing matrix protein. The virus is a spherical, pleomorphic enveloped particle bearing club-shaped glycoprotein projections. Intermediate source of origin is not known, therefore, bats could be responsible as the primary reservoir. Transmission can also occur through families in their immediate environment around that particular infected person. Several healthcare workers and the patients who are admitted in the hospital are at higher risk of acquiring the infection. Most patients have a lack of access to Healthcare and preventive measures such as masks and sanitizers. This article discusses the various modes of spread and incubation period of the virus as well as approaches for containing the virus to cope with this viral outbreak.

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INTRODUCTION

Coronaviruses belong to the Coronaviridae family in order Nidovirales. Covid-19 is an infectious zoonotic infection, the most recently discovered pandemic, it is known to be caused by the SARS-CoV-2 strain. It represents a causative agent of a potentially fatal disease that is now becoming a great global concern (Huang *et al.*, 2020). Previous outbreaks of coronavirus include Severe Acute Respiratory Syndrome (SARS)-CoV and the Middle East Respiratory Syndrome (MERS)-Cov. On February 11, 2020, there began an unexpected flare-up of a potential coronavirus, Novel Coronavirus (COVID-19), named by WHO (Wu and McGoogan, 2020). Coronaviruses under a microscope, they are enveloped viruses, and they contain positive single-stranded large RNA that can infect not only humans but also a large range of animals where it gains its zoonotic property of transmission. The genome size ranges from 26 Kb— 32 Kb. The first clinical sign of COVID 19, which is related to SARS-CoV-2 shows the determination of pneumonia. There is also a proportion of individuals who remain asymptomatic throughout the infection after being infected and are a potential threat to their surroundings (Du *et al.*, 2009). Pneumonia manifests in the second or third week since the acquisition of the infection. A recent investigation confirmed that this pandemic may double the number of individuals who are affected every 7 days and that each infected person can spread the infection to 2.2 other persons on

an average scale (Wang *et al.*, 2020). The present study discusses the aspects of the new coronavirus and about methods to contain it. The study aims to provide a review regarding the rate of spread of this contagious infection and methods to contain it. The study receives various literature that has been published and discusses every aspect of Covid-19.

MATERIALS AND METHODS

Structure of COVID-19

COVID-19 contains single-stranded positive-sense RNA associated with a nucleoprotein within a capsid. The capsid is composed of a matrix protein. The virus is observed as spherical and pleomorphic enveloped particles bearing glycoprotein projections that are club-shaped. Some also contain HE-protein (Brundha *et al.*, 2019). The virus genome consists of peculiar differentiating features such as an N- terminal fragment with a spike protein. The surface projections are bulbous. An article published in 2020, by Leila. M, stated that, for the virus to enter into a cell following the initial process, the spike protein has to be permed by an enzyme called protease, similar to that of SARS-CoV (Mousavizadeh and Ghasemi, 2020).

Mode of the spread of COVID 19

According to current evidence, the COVID-19 virus is mainly transmitted between people through respiratory droplets (>5 – 10 um) in diameter and other contact routes. In an analysis of 75,465 COVID-19 cases recorded in China, the airborne transmission was not reported (Brundha and Nallaswamy, 2019). Transmission of the virus COVID-19 can happen by direct contact with people who are infected or are carriers of the virus. It can also happen through indirect contact with any surface present in the immediate environment of the infected person or with any object used on the infected person such as a stethoscope or a thermometer (Timothy *et al.*, 2019). The main mode of transmission is through droplets, and this could occur when a person is in close-ranged contact of at least 1m with a person who has symptoms of COVID 19 such as respiratory problems such as coughing or sneezing.

Hence, the person is prone to having their mucosae of mouth and nose or conjunctiva if eyes exposed to infective droplets during respiration (Chan *et al.*, 2020). Transmission can also take place via families present in the environment surrounding the infected person. Certain precautions that can be taken to avoid the risk of spread of COVID-19 are to wash hands often using soap and water, or using alcohol-containing hand sanitizers and disinfectants frequently. People should always maintain a safe distance from anybody who is showing symptoms of COVID-19 or coughing and sneezing. One should avoid touching their eyes, nose and mouth. If there is a cough of recurrent slight fever and difficulty during breathing, one must call a doctor in advance and seek medical attention.

The incubation period of the virus

The signs and symptoms of coronavirus disease 2019 could start to appear from 2 to 14 days since exposure. The recorded time after exposure and before the manifestation of symptoms is known as the 'incubation period' (Prashaanthi and Brundha, 2018). Cheng VC, in his article published on January 18, 2020, he estimated the median incubation period of COVID-19 to be of 5.1 days and expects that nearly all people who are affected or have symptoms will show up as infected after around 12 days of infection. Active monitoring by COC, in the US, is said to be a period of 14 days as of now. From exposure to the start of infectiousness could be shorter than the incubation period that is estimated. The estimate suggests 101 out of 10000 cases can develop symptoms after 14 days from exposure to infection, similar to SARS (Cheng *et al.*, 2020).

Symptoms of COVID-19

Covid-19 affects people in various ways. Many of the infected people will only develop only a mild to moderate ranged sickness and could get better without hospitalization. The most commonly seen symptoms are fever that is recurrent, cough and tiredness. Symptoms that are less common are sore throat, pain, diarrhoea, rashes, and conjunctivitis (Li *et al.*, 2020). The serious symptoms recorded in various patients affected severely are difficulty in respiration, severe chest pain or pressure intermittently, loss of smell, taste, speech or moment. People with slight or few symptoms are suggested to manage their health at home if healthy (Kumar and Brundha, 2016).

Risk factors and complications

Traveling from our residence in an area with an ongoing community spread of COVID-19 should be avoided. Close contact with 2m with an affected person is also a major risk factor. An article published on March 21, 2020 (Hassan *et al.*, 2020) discussed several complications that were also seen in patients who had tough recovery including pneumonia, breathing troubles, multiple organ failures such as kidney failure, heart problems, blood clots, acute kidney impair along with additional viral or bacterial infections due to disturbance in the natural microbial flora of the body.

Challenges faced during the pandemic

N. Greenburg and colleagues set out various measures to cope with the challenges faced during the situation of progressing danger in their article on March 26 2020 (Greenberg *et al.*, 2020). In January 2020, the National Health Commission of China added Covid-19 disease to the category of group B infectious diseases after its discovery. According to the characteristics of dental, environmental settings, the risk of cross-infections is very high between the patients and Dental practitioners and assistants because there is close proximity between the patient's oral cavity and the practitioner making transmission feasible (Harsha and Brundha, 2017). Current observations suggest that healthcare workers and other patients in the hospital are at higher risk of the infection than most others who stay home or don't work under these environments. Most patients have a lack of access to Healthcare and preventive measures such as masks and sanitizers (Hannah *et al.*, 2019). The hospitals lack funding and also have lesser amenities for healthcare workers such as protective gears etc.

So far, several control measures have been taken cautiously in order to lower the risk and possibilities of transmission of which are expected to provide early diagnosis of prior infection and effective supportive care for the infected patients (Preethikaa and Brundha, 2018). A series of clinical trials are being carried out currently in various labs to investigate interventions that are potentially more effective and useful for diminishing complications of the disease for example drugs such as Remdesivir, lopinavir/ritonavir (del Rio and Malani, 2020). Based on the scale of the outbreak and the speed with which it's spread has progressed over the period of lock down has left several states in India in need of funds to fight the virus outbreak. States are slashing salaries, demanding an increase in borrowing limits and fund transfers from the center as tax revenues and reserves had been drying up. The World Bank then approved $1 billion as emergency funds for India. The financial agency also said that the funds should be used to support better screening procedures and contact tracing and laboratory diagnostics, among other expenditures.

RESULTS AND DISCUSSION

The study provided detailed reports and recent advances that have been approached during this break and its course. WHO has advised people to avoid the patient's close contact with farm animals and wild animals which may be carriers of the disease due to high risk of transmission. The people of an area are also advised to cover coughs and sneezes with protective gears such as masks and gloves to prevent aerosol transmission. Frequent washing of hands is also considered a safety precaution (Shreya and Brundha, 2017). Governments and other public bodies have encouraged preventive measures during the incubation period that stretches from 10 to 14 days (Kalaiselvi and Brundha, 2016).

In an article by, (Hand *et al.*, 2018), an outbreak of a severe respiratory illness associated with the human coronavirus in a long term care facility of Louisiana was recorded. The outbreak of SARS was classified as an 'epidemic' with causative organisms SARS-CoV. The statistical results showed that 6 out of 20 cases, the patients developed pneumonia. 3 out of 20 cases, the patient's condition worsened and led to death. The mode of spread was nosocomial and caused severe respiratory diseases. The most common symptoms were cough (95%) and chest congestion (65%).

Na. Zhu et al., published an article on February 20, 2020 (Zhu *et al.*, 2019) where they provided details to the group of patients with pneumonia of an unknown cause in December 2019, originating from the Wuhan- seafood market. An unknown beta coronavirus was also brought up about previously through an unbiased sequencing in the samples from those patients. The cells used were human airway epithelial cells in order to locate the novel coronavirus, named 2019n-COV, 7th member of the coronavirus family. The identified virus was 70 to 90nm diameter and was declared a pandemic.

A recent investigation by (Mcmichael *et al.*, 2020), February 27 showed the initiation of COVID 19 into a long term care facility in Washington, resulted in cases among 81 residents wherein 23 persons died. COVID 19 can cause severe sickness and death, especially in older adults and people with chronic health conditions due to their immuno compromised health in their state of being (Ravichandran and Brundha, 2016). 129 cases were of less virulent strain. It was the limitation of ineffective infection control, prevention, and staff members who lacked amenities and facilities that contributed to the intra and inter-facility spread (Balaji and Brundha, 2016).

A contradiction was brought about in the studies published by Gong, et al., 2020 wherein the demanding medical services and the accessibility of medical care became one of the outstanding contradictions during the COVID 19 outbreak (Gong *et al.*, 2020). A major population suffers from poor health literacy which again continues to spread the virus without preventive measures (Shenoy and Brundha, 2016). Lack of competencies leaves the outbreak at a higher

risk. Isolation of these strains remains, thereby seen as the most effective measure and precaution for the containment of COVID 19 disease.

Therefore, for treating COVID 19 disease, supportive, symptomatic treatments and oxygen therapy is required and advised as well. Patients affected with a slight infection require early supportive treatment which is gained by the use of ECMO, acetaminophen drug, various nutritional supplements such as vitamins and antibacterial therapy (Ferdioz and Brundha, 2016). ECMO is referred mainly to patients diagnosed with refractory hypoxemia. Preventive measures should always aim at optimizing self-isolation or patient isolation and infection control protocol as a safer alternative (Brundha, 2015).

CONCLUSION

The COVID 19 is a declared pandemic which is spreading across the world at a fast pacing rate. It has caused a high rate of infections and deaths when compared to the number of infections caused by SARS and MERS. Based on RO values obtained, it is said that SARS-CoV-2 is seen to be more infectious than SARS or MERS. Immunocompromised patients and old age people are at a greater risk of severity or fatality than young, healthy individuals hence preventive measures must be tightened around them. As of now, there are ongoing clinical trials to develop suitable vaccines to cure this SARS-like virus. This study shows that if preventive measures are taken to keep away from infected people, the disease would be very well contained. If not, it can contaminate and affect furthermore a large scale of the population for which may be difficult to provide supportive treatment too.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

REFERENCES

Balaji, S., Brundha, M. P. 2016. Awareness of About Breast Cancer among Dental Surgeons. *Journal of pharmaceutical science and research*, 8(8):797–800.

Brundha, M. P. 2015. A comparative study- the role of skin and nerve biopsy in Hansen's disease. *Journal of Pharmaceutical Sciences and Research*, 7(10):837–844.

Brundha, M. P., Nallaswamy, D. 2019. Hide and seek in pathology- A research on game-based histopathology learning. *International Journal of Research in Pharmaceutical Sciences*, 10(2):1410–1414.

Brundha, M. P., Pathmashri, V. P., Sundari, S. 2019. Quantitative Changes of Red Blood cells in Cancer Patients under Palliative Radiotherapy-A Retrospective Study. *Research Journal of Pharmacy and Technology*, 12(2):687–687.

Chan, J. F., Yuan, W., Kok, S., To, K. H., Yuen, K. Y. 2020. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *The Lancet*, 395(10223):30154–30163.

Cheng, V. C. C., Wong, S. C., To, K. K. W., Ho, P. L., Yuen, K. Y. 2020. Preparedness and proactive infection control measures against the emerging novel coronavirus in China. *Journal of Hospital Infection*, 104(3):254–255.

del Rio, C., Malani, P. N. 2020. 2019 Novel Coronavirus—Important Information for Clinicians. *Journal of the American Medical Association*, 323(11):1039–1039.

Du, L., He, Y., Zhou, Y., Liu, S., Jiang, S. 2009. The spike protein of SARS-CoV - A target for vaccine and therapeutic development. *Nature Reviews Microbiology*, 7(3):226–236.

Ferdioz, J., Brundha, M. P. 2016. Awareness of style. *International Journal of Pharmaceutical Sciences Review and Research*, 40(1):30–32.

Gong, J., Ou, J., Qiu, X., Jie, Y., Chen, Y., Yuan, L. 2020. A Tool to Early Predict Severe 2019-Novel Coronavirus Pneumonia (COVID-19): A Multicenter Study using the Risk Nomogram in Wuhan and Guangdong, China. *MedRxiv*, 6(1):7515–7515.

Greenberg, N., Docherty, M., Wessely, S. 2020. Managing mental health challenges faced by healthcare workers during a covid-19 pandemic. *British medical journal*, 368:m1211.

Hand, J., Rose, E. B., Salinas, A., Lu, X., Sakthivel, S. K., Schneider, E. 2018. Severe Respiratory Illness Outbreak Associated with Human Coronavirus NL63 in a Long-Term Care Facility. *Emerging Infectious Diseases*, 24(10):1964–1966.

Hannah, R., Ramani, P., Brundha, M. P., Sherlin, H. J., Ranjith, G., Ramasubramanian, A. 2019. Liquid Paraffin as a Rehydrant for Air Dried Buccal Smear. *Research Journal of Pharmacy and Technology*, 12(3):1197–1197.

Harsha, L., Brundha, M. P. 2017. Prevalence of dental developmental anomalies among men and women and its psychological effect in a given population.

Journal of Pharmaceutical Sciences and Research, 9(6):869–873.

Hassan, S. A., Sheikh, F. N., Jamal, S., Ezeh, J. K., Akhtar, A. 2020. Coronavirus (COVID-19): A Review of Clinical Features, Diagnosis, and Treatment. *Cureus*, 12(3):e7355.

Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y. 2020. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, 395:497–506.

Kalaiselvi, R., Brundha, M. P. 2016. Prevalence of hysterectomy in South Indian population. *Research Journal of Pharmacy and Technology*, 9(11):1941–1941.

Kumar, M. A., Brundha, M. P. 2016. Awareness about nocturia-A questionnaire survey. *Research Journal of Pharmacy and Technology*, 9(10):1707–1709.

Li, J., Zhang, C., Wu, Z., Zhao, H. 2020. The Mechanism and Clinical Outcome of patients with Corona Virus Disease 2019 Whose Nucleic Acid Test has changed from negative to positive, and the therapeutic efficacy of Favipiravir. *Trials*, 21(1):488.

Mcmichael, T. M., Clark, S., Pogosjans, S., Kay, M., Lewis, J. 2020. COVID-19 in a Long-Term Care Facility. *Morbidity and Mortality Weekly Report*, 69(12):339–342.

Mousavizadeh, L., Ghasemi, S. 2020. Genotype and phenotype of COVID-19: Their roles in pathogenesis. *Journal of Microbiology, Immunology and Infection*, pages 1–5.

Prashaanthi, N., Brundha, M. P. 2018. A Comparative Study between Popplet Notes and Conventional Notes for Learning Pathology. *Research Journal of Pharmacy and Technology*, 11(1):175–175.

Preethikaa, S., Brundha, M. P. 2018. Awareness of diabetes mellitus among general population. *Research Journal of Pharmacy and Technology*, 11(5):1825–1825.

Ravichandran, H., Brundha, M. P. 2016. Awareness about personal protective equipment in hospital workers (sweepers and cleaners). *International Journal of Pharmaceutical Sciences Review and Research*, 40(1):28–29.

Shenoy, P. B., Brundha, M. P. 2016. Awareness of Polycystic Ovarian Disease among females of age group 18-30 years. *Journal of Pharmaceutical Sciences and Research*, 8(8):813–816.

Shreya, S., Brundha, M. P. 2017. Alteration of Haemoglobin Value in Relation to Age, Sex and Dental Diseases-A Retrospective Correlation Study. *Research Journal of Pharmacy and Technology*, 10(5):1363–1363.

Timothy, C. N., Samyuktha, P. S., Brundha, M. P. 2019. Dental pulp Stem Cells in Regenerative Medicine – A Literature Review. *Research Journal of Pharmacy and Technology*, 12(8):4052–4052.

Wang, D., Hu, B., Hu, C., Zhu, F., Liu, X. 2020. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *Journal of the American Medical Association*, 323(11):1061–1061.

Wu, Z., McGoogan, J. M. 2020. Characteristics of and Important Lessons From the Coronavirus Disease 2019 Outbreak in China. *Journal of the American Medical Association*, 323(13):1239–1239.

Zhu, N., Zhang, D., Wang, W., Li, X., Tan, W. 2019. A Novel Coronavirus from Patients with Pneumonia in China. *New England Journal of Medicine*, 382(8):727–733.