Journal of Research in Medical and Dental Science
2022, Volume 10, Issue 9, Page No: 20-24

Available Online at: www.jrmds.in
eISSN No. 2347-2367: pISSN No. 2347-2545

Prevalence and Infectivity of Asymptomatic Covid-19 Disease

Shweta Mathew, Abhishek Ingole*, Ashok Mehendale

Department of Community Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences (Deemed to be University), Sawangi (Meghe), Wardha, Maharashtra, India

ABSTRACT

The new coronavirus pandemic which began in late 2019 has spread across almost all nations, affecting and causing innumerable deaths around the world. From the beginning of the coronavirus pandemic in December of 2019, it has wreaked havoc and posed significant hurdles in several nations throughout the world. However, there is mounting evidence that many people infected with the COVID 19 virus are asymptomatic or have just minor symptoms, but can still spread the virus to others. However, the extent of severity, modes of transmission as well as the prevalence of such asymptomatic cases are yet to be determined.

Some studies show that the coronavirus disease 2019 virus is transmitted mainly through airborne droplet inhalation, which are produced from the coughing or sneezing of an infected person. Fomites and dust particulates are also considered to be other less significant means of spread. A patient is said to be infected with the COVID-19 virus if he/she tests positive when their throat swabs are subjected to a nucleic acid test (RTPCR). The absence of the typical COVID-19 symptoms is said to contribute to the rise in the number of cases. This is due to the fact that individuals who are asymptomatic are unaware that they are infected, and therefore do not get tested, making them more likely to spread the virus to those around.

Screening for asymptomatic infections is challenging, which makes national prevention and control of the epidemic more difficult. This article examines the attributes, treatment, and consequences of asymptomatic COVID-19 infections in the hopes of facilitating an early and effective prevention as well as control of this serious public health concern around the world.

Key words: SARS-CoV-2, COVID-19, Epidemiological attributes, Asymptomatic infections, Viruses

HOW TO CITE THIS ARTICLE: Shweta Mathew, Abhishek Ingole, Ashok Mehendale, Prevalence and Infectivity of Asymptomatic Covid-19 Disease, J Res Med Dent Sci, 2022, 10 (9):20-24.

Corresponding author: Abhishek Ingole

e-mail✉: ingole.abhishek@gmail.com

Received: 22-August-2022, Manuscript No. JRMDS-22-72606;

Editor assigned: 24-August-2022, PreQC No. JRMDS-22-72606(PQ);

Reviewed: 07-September-2022, QC No. JRMDS-22-72606(Q);

Revised: 12-September-2022, Manuscript No. JRMDS-22-72606(R);

Published: 19-September-2022

INTRODUCTION

Infectious diseases pose a significant worldwide health problem, killing 15 million people each year. Although the proportion of deaths caused by infectious diseases has decreased, a number of novel infectious diseases have lately been found and documented. The epidemic of pneumonia caused by the new coronavirus began spreading in a city in China, namely Wuhan, at the end of December 2019. In the month of February 2020, the WHO gave this illness a name, called as COVID 19, which stands for coronavirus disease 2019. From the very beginning of the COVID 19 pandemic in December of 2019, it has wreaked havoc and posed significant hurdles in several nations throughout the world. So far, more than 3,000,000 cases have been reported around the world, with a total of over 200,000 deaths [1,2]. The World Health Organization (WHO) subsequently announced a worldwide public health issue that required immediate attention.

By May 2020, the overall number of infected patients had peaked at 4.4 million. As a result, schools and universities, corporate centers, public transportation, and other socialization were restricted in order to limit the spread of COVID-19 and alleviate the pressure on health-care facilities. The virus responsible for the COVID-19 disease is a positive-sense enveloped single-stranded RNA virus with six open reading frames that code for structural proteins such as surface (S), envelope (E), membrane (M), and nucleocapsid N proteins.

The organism causing COVID-19 has been found to be and referred to as SARS-CoV-2, which shares a resemblance to SARS-CoV to a high degree. Direct transmission from human to human is the main mode of spread with this

virus, as it is with SARS-CoV. Some other means by which the virus can spread are by dust particulates and fomites, as well as through close unsafe contact between the already infected and the newly affected individual. According to some primary data, air is not known to be a substantial transmission route for coronavirus disease 2019; nonetheless, it may be envisaged if such aerosol-generating operations are carried out in medical facilities. The live virus has been documented in a small number of clinical investigations, and faecal transmission has been observed in certain individuals. Furthermore, it is yet to be determined whether the faecooral route is a reliable route of transmission for the COVID-19 virus. In contrast to SARS which is said to be transmitted during the symptomatic period, the COVID-19 virus is argued to spread even when there are no clinical symptoms present. However, whether or not asymptomatic carriers are infectious remains debatable for the time being.

Initially, there were four categories that the cases of COVID-19 fell under. These were namely, mild, moderate, severe and critical [3]. Nevertheless, with the progression of the ongoing global pandemic, it has been brought to light that a large number of these cases are asymptomatic and yet have the ability to spread the virus to others. A COVID-19 infection is considered to be asymptomatic when the nucleic acid of the virus is detected in the nasal and/or oropharyngeal samples of patients by reverse transcriptase polymerase chain reaction (RTPCR), but do not show any obvious clinical signs on examination or any typical changes seen in imaging studies such as lung CT scans [4].

The number and gravity of the negative impacts of this global pandemic necessitates the creation of robust monitoring programmes that are integrated with laboratory preparation. Diagnostic laboratory testing is critical in detecting novel viruses quickly and accurately. Presently, RTPCR testing is the most commonly utilized approach for COVID-19 diagnosis. However, up to 30% of COVID-19 patients had tests which came back with false negative results. This might be owing to the collection of an incorrect or inadequate sample, to improper sample transportation and storage conditions, or to the collection of the sample at a late stage in the course of the disease. Serology testing, on the other hand, may be able to fill this void, as the presence of antibodies against the COVID-19 virus may indicate that the individual is in their convalescent phase or has achieved immunity against the virus. Furthermore, IgM can be found during the initial stages of the illness.

Controlling COVID-19 requires early detection of an infected person and cutting off the route of spread. Due to the lack of evident clinical indications and a lack of preventative awareness, a large proportion of individuals with asymptomatic infections avoid consulting a physician for medical help, contributing to COVID-19's rapid spread. As a result, preventing and controlling infections of this nature is a huge challenge that requires more global attention.

Infectivity

In-depth studies of the prevalence of infections not associated with any symptoms will aid researchers better comprehend the epidemiological potential of COVID-19 transmission and the disease's nature in its true form. A lot of research has been done on the occurrence of asymptomatic infections, but each one has its own set of drawbacks. First and foremost, in the early stages of the outbreak, due to a lack of knowledge of asymptomatic illnesses and poor detection capabilities.

According to some researchers, a person stands high on the risk scale if he has had direct exposure to confirmed or suspected cases of the disease within a confined area [5]. In one study in Wuhan, 1391 children under the age of 15 were surveyed to check who had been in direct exposure to people with confirmed or suspected disease [6]. The prevalence of subclinical illness in the pediatric age group is lower as compared to the rest of the population, which is believed to be due to children's unique immune response and ACE2 levels [7]. These studies suggest that asymptomatic infections have a high propensity to disseminate the virus, and such individuals have a high propensity to start another series of viral outbreaks. As a result, detecting asymptomatic infections is critical for early COVID-19 prevention and control around the world.

The duration of time between being exposed to the virus for the first time and the symptomatic manifestation is called as the incubation period, during which infected individuals are contagious and may spread the virus [8]. Owing to the lack of any obvious clinical signs, asymptomatic illnesses do not possess a special incubation. Even so, a new research study showed evidence of similarities between the viral load in an asymptomatic individual and that of a symptomatic patient, pointing at the potential for silent infections to transmit the virus, which could very well occur during the initial phases of the disease [9]. Although a positive result in the nucleic acid testing of the sample tells us that the viral load has hit a maximum limit, infectivity is mostly determined by the reproductive status of the virus [10].

A clinical study has proved that patients who recovered from the COVID-19 disease showing no signs evident of the disease on clinical examination were found to have tested positive for SARS-CoV-2 using highly sensitive methods that detected the presence of viral nucleic acid, but they had not transmitted the virus to others to cause further infections [11,12]. However, anyone with an asymptomatic infection should undergo 14-day quarantine. More research is needed to determine the period of infectivity in asymptomatic patients. Additional care must be given to those infected persons who are advised to stay in isolation for a time period due to their positive test result.

Distribution

The most common source of infections of such asymptomatic nature are those who have been in close

direct contact with patients that have either been diagnosed with or is suspected of having an illness, and family clusters have previously been documented. Acquaintances, work partners and those who have coinciding paths with diagnosed or suspected patients are also considered high-risk demographics. One case study showed that in a family of three, all but one showed clinical symptoms despite all of them testing positive for COVID-19. According to another family cluster account, the first family member was completely healthy, with no clinical indications such as a high fever or cough, and had no underlying comorbidities. He had only visited the local hospital with complaints of pruritis. Despite claims by the patient that he had not been to the areas affected by the epidemic, further investigation revealed that he had been in direct contact with some relatives in Hubei province around 7 days prior to the start of symptoms. The patient's immediate family and close contacts underwent CT scans which all came back normal, however, each one of them tested positive on the nucleic acid tests. Even if there are no symptoms, close relatives of COVID-19 patients should be constantly observed and evaluated to eliminate any infection. These examples also illustrate the importance of conducting a thorough epidemiological study to avoid overlooking potential sources of infection.

Clinical signs and symptoms may vary largely on an individual basis. Asymptomatic infections have been shown to be more prevalent among the youth and middle-aged population with normal physical function and no comorbidities, according to research. Asymptomatic carriers were observed to be more widespread in middle-aged persons in Shenzhen and a minority of younger people in Nanjing. Over all else, age and physical condition may have a role in the severity of the disease, which is linked to varied immunological responses and other possible pathologies.

Pathogenesis

SARS-CoV-2, like SARS-CoV, infects cells by utilizing angiotensin-converting enzyme 2 (ACE2) as its receptor. Because the degradation of angiotensin II by ACE2 is critical in the pathophysiology of severe respiratory failure following a viral illness, there is a strong correlation between the binding ability of ACE2 and the severity of the viral illness. As a result, it was hypothesized that a lower level of ACE2 and a reduced binding capability with SARS-CoV-2 would be a crucial contributor in the lack of clinical symptoms in silent infections. In asymptomatic individuals, the SARS-CoV-2 invasion has been observed to elicit just a particular modest immune response. However, more samples should be obtained and tested, and a relative assessment of ACE2 for different types of patients affected by COVID-19 should be undertaken and compared, since this would assist to clarify its pathophysiology.

Prevention and control

COVID-19 is primarily transmitted by droplet and direct contact, as well as high-concentration particulates. Droplet transmission happens when persons in close proximity consume or takes in air droplets generated during a ough or a sneeze of an infected individual. The successful isolation of the live viral vector from pharyngeal swabs differs significantly from SARS, implying the ongoing nature of viral multiplication in the upper respiratory tissues and that the COVID-19 virus is much more efficient in being spread via active pharyngeal virus shedding, in comparison to SARS-CoV.

A German research group discovered that although a small number of people infected by the coronavirus disease complained of minimal to no symptoms, their throat swabs showed presence of live viruses following a nucleic acid detection test. This implies that the virus could have been released and easily spread to the people around them through droplet transmission after a cough or a sneeze. Therefore, it is suggested that adopting measures such as donning protective shields and masks, can prevent the spread of infection to a certain extent.

Due to the absence of obvious clinical indications of the disease in asymptomatic patients, they do not seek medical attention. We can only acquire information about the infection through immunology or nucleic acid testing technologies; as a result, the exact source of such infections cannot be successfully recognized, making prevention and control extremely difficult. Anyone who has had prior contact to a COVID-19 patient should compulsorily undergo an RTPCR test. A person who is infected but has no symptoms should be subjected to a two-week quarantine period [13]. Following the expiration of this period, the individual can be relieved from isolation if two consecutive nucleic acid tests having an interval of 24 hours between them, come back with a negative result. If a person develops any symptoms during the quarantine period, they must be hospitalized right away.

We must also keep in mind the high risk of the RTPCR test showing a false negative result, which could result in a missed diagnosis or delay in getting a proper diagnosis [14]. Therefore, for people who are highly suspected of being affected by the coronavirus disease 2019, a combination of recurrent isolating the virus through nucleic acid testing and pulmonary CT imaging evaluation should be performed in order to achieve effective control of the pandemic [15].

Treatment and outcomes

According to the most recent Chinese health-care standards, suspected and confirmed COVID-19 patients must mandatorily undergo treatment in isolated hospitals equipped with proper facilities for isolation and quarantine. Various lines of management are: (1) supportive management such as strict evaluation of vital signs and treating accordingly and (2) symptomatic line of management. (2) Administration of antiviral medications: Those individuals who test positive through the RTPCR testing can be administered various antiviral medications such as interferon, lopinavir/ritonavir, ribavirin, Chloroquine phosphate, and others [3]. For

severe cases, assisted ventilation and rehabilitative plasmapheresis are used. (4) Treatment with traditional Chinese medicine.

The right line of management of asymptomatic COVID-19 infections is a source of controversy. Antiviral medication, according to some researchers, could speed up viral clearance in silent illnesses. Some reports suggest that asymptomatic carriers can be effectively treated with quarantine and close monitoring. Studies also show that after using aerosolized interferon (IFN) a2b along with two tablets of lopinavir/ritonavir (200mg/50 mg) twice a day for ten days, viral nucleic acid tests remained positive, indicating that these antiviral medications were ineffective [16]. In addition, after antiviral treatment, adverse effects such as liver impairment were found [17]. As a result, antiviral medications are not currently recommended for silent infections; nevertheless, further clinical research may be required to prove their efficacy. So far Until previously, quarantine and close monitoring are thought to be the best treatment options for these subclinical infections.

During isolation, a few persons with asymptomatic infections may become symptomatic, but the disease will resolve on its own in the majority of these patients. A study of 24 asymptomatic individuals found that none of them developed serious disease or died, with 18 (75%) of them being virus-free following antiviral treatment, 9 (37.5%) being discharged, and 9 (37.5%) being observed for some time in the hospital. Therefore, they should only be released following two consecutive negative results with an interval of 24 hours between the two. One patient in particular, was COVID-19 positive following two consecutive negative tests. There have been instances where a patient tests positive after being discharged. In order to prevent such occurrences in the future, all patients should be advised to continue isolation and undergo RTPCR testing post-discharge. It is suggested that quarantine and continued health monitoring and inspection for progression of disease should be carried out for 14 days after discharge, with follow-up hospital visits at frequent intervals in the second and fourth weeks.

CONCLUSION

The coronavirus disease 2019 is a novel contagious illness that has spread to more than 2 million people in a variety of nations worldwide. Clinical manifestations and level of severity of COVID-19 vary, and some people have reported being asymptomatic. According to the findings of this study, many COVID-19 infected people exhibit no symptoms, and the infection may be spread throughout the incubation phase. As a result, asymptomatic individuals are regarded as carriers and a possible source of infection in the population.

This article analyzed the epidemiological characteristics and preventative measures of patients with an asymptomatic COVID-19 infection. However, there is a paucity of scientific evidence, and the precise characteristics of such infections must be elucidated. Furthermore, more study on the epidemiological implications of COVID-19 asymptomatic patients is needed. In conclusion, thorough epidemiological research and laboratory testing can help identify patients who are asymptomatic. Subjecting high risk individuals to screening tests, such as close contacts, particularly in one confined space with positively diagnosed or suspected infected patients, is indicated to achieve effective prevention and control of the risk of COVID-19 disease, which will aid in the successful early control of this global pandemic.

REFERENCES

1. https://www.who.int/emergencies/diseases/novel-coronavirus-2019
2. WHO. Clinical management of severe acute respiratory infection (SARI) when COVID- 19 disease is suspected. 2020.
3. National Health Commission of People's Republic of China. Diagnostic and treatment plan of Coronavirus disease 2019. 7th Edn. 2020.
4. WHO. Laboratory diagnostics for novel coronavirus. 2020.
5. Chen Y, Wang AH, Yi B, et al. The epidemiological characteristics of infection in close contacts of COVID-19 in Ningbo city. Chin J Epidemiol 2020; 41.
6. Lu X, Zhang L, Du H, et al. SARS-CoV-2 infection in children. N Engl J Med 2020; 382:1663e5.
7. Chen J. Pathogenicity and transmissibility of 2019-nCoV-A quick overview and comparison with other emerging viruses. Microb Infect 2020; 22:69-71.
8. Gao WJ, Li LM. Advances on presymptomatic or asymptomatic carrier transmission of COVID-19. Chin J Epidemiol 2020; 41:485e8.
9. Zou L, Ruan F, Huang M, et al. SARSCoV-2 viral load in upper respiratory specimens of infected patients. N Engl J Med 2020; 382:1177.
10. Shen M, Zhou Y, Ye J, et al. Recent advances and perspectives of nucleic acid detection for coronavirus. J Pharm Anal 2020; 10:97e101.
11. Wolfel R, Corman VM, Guggemos W, et al. Virological assessment of hospitalized patients with COVID-2019. Nature 2020; 581:465-469.
12. An JH, Liao XJ, Xiao TY, et al. Clinical characteristics of the recovered COVID-19 patients with redetectable positive RNA test. Med Rxiv 2020.
13. Gao WJ, Zheng K, Ke J, et al. Advances on the asymptomatic infection of COVID-19. Chin J Epidemiol 2020; 41:990-993.
14. Lan L, Xu D, Ye G, et al. Positive RT-PCR test results in patients recovered from COVID-19. JAMA 2020; 323:1502.
15. Ai T, Yang Z, Hou H, et al. Correlation of chest CT and RT-

PCR testing in coronavirus disease 2019 (COVID-19) in China: A report of 1014 cases. Radiology 2020; 200642.

16. Chen J, Ling Y, Xi XH, et al. Efficacies of lopinavir/ritonavir and abidol in the treatment of novel coronavirus pneumonia (in Chinese). Chin J Infect Dis 2020; 38:86e9.
17. Luo SH, Liu W, Liu ZJ, et al. A confirmed asymptomatic carrier of 2019 novel coronavirus (SARS-CoV-2). Chin Med J 2020; 133:1123-1125.