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Original Research Article

Incubation period of COVID-19: analysis of COVID-19 cases admitted in a tertiary care center, northern district of Kerala, India

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ABSTRACT

Background: Coronavirus disease 19 (COVID-19) started as pneumonia of unknown cause detected first in Wuhan, China in December 2019 and spread as a pandemic affecting more than 200 countries worldwide. The most common symptoms of COVID-19 are fever, dry cough, breathing difficulty and tiredness. The median incubation period is about 5 days as per current understanding. The present study was done to estimate the median incubation period of COVID-19 cases admitted in a tertiary care center in north Kerala.
Methods: This cross-sectional study included COVID-19 cases admitted in a tertiary care center during three months study period.
Results: The median incubation period of COVID-19 was estimated to be 4 days (interquartile range 7). It was also found that females, those persons with comorbidities and those who got infected by local transmission had a longer mean incubation period compared to males, those without comorbidities and imported cases, respectively.
Conclusions: The median incubation period of COVID 19 was estimated to be 4 days. Factors like presence of comorbidities, gender, type of transmission were found to affect incubation period, but further studies are needed to have a thorough understanding.

Keywords: COVID-19, Incubation period, India, Kerala

INTRODUCTION

Severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) is a novel virus with pandemic potential and fatal consequences. The current understanding is that majority of COVID-19 transmission occurs as droplet contamination of mucosa (mouth and nose) or conjunctiva and also through fomites in the immediate environment around the infected person.[1] The incubation period of COVID-19 is estimated to be 1-14 days, most commonly around 5 days.[2]

COVID-19 started as pneumonia of unknown cause detected first in Wuhan, China in December 2019. The outbreak was declared a public health emergency of international concern on 30 January 2020.[3] Globally more than 116 million people have been infected with SARS-CoV-2 and COVID-19 has resulted in more than 2 million deaths worldwide.[4] In India, more than 11 million people were infected and more than 1.5 lakh individuals lost their life to COVID-19.[5] The number of corona cases in Kerala has crossed 1 million and death toll crossed 4300.[6]

The most common symptoms of COVID-19 are fever, dry cough, breathing difficulty and tiredness. Some patients also present with aches and pains, nasal congestion, sore throat or diarrhea.[2] The symptoms are usually mild and begin gradually and 80% recover from the illness without the need of hospital admission. Elderly, persons with

other disease condition like diabetes, hypertension, cardiac disease, cancer or other chronic illness are at higher risk of developing serious illness.[2]

The knowledge regarding incubation period of COVID-19 in Kerala scenario will be useful for planning quarantine and isolation measures. The present study was done to estimate the median incubation period of COVID-19 cases admitted in a tertiary care center in north Kerala. An effort was also made to identify factors influencing incubation period.

METHODS

The present cross-sectional study was done to estimate the incubation period of COVID-19 cases admitted during 7 March, 2020 to 7 June, 2020 in a tertiary care center in north Kerala. All patients admitted in the hospital during study period and diagnosed to be COVID-19 positive by reverse transcriptase polymerase chain reaction (RT-PCR) were contacted over phone for data collection. Patients who were very critical and unable to communicate for detailed history taking were excluded from the study. Data was also collected from hospital records. Information gathered included demography, travel history, date of last contact with a COVID-19 patient, date of symptom onset, date of swab collection and past medical history. Data was entered using Microsoft excel and analyzed using statistical package for social sciences (SPSS) version 16. The variables were summarized as mean with standard deviation (SD), median with interquartile range (IQR) and frequency with percentage. Inferential statistical tests like independent sample t-test were used as appropriate to test association.

Ethical considerations

The study was conducted after obtaining ethical clearance from institutional research and ethics committee. The study was registered in clinical trial registry of India (CTRI) and registration number was CTRI/2020/08/026962. The personal details of patients were used only for study purpose and confidentiality was maintained.

Operational definitions

Date of exposure

In the case of patients with travel history, the date of arrival in Kerala was considered as date of last exposure. In the case of primary contacts who acquired disease, the date of exposure was taken as the date on which the patient had last contact with the positive case.

Incubation period

The incubation period is the period between date of exposure and date of symptom onset.[2]

Primary contact

Individuals who were in close proximity (within 1 meter, more than 15 minutes) to a confirmed case without mask, or had close interactions (within 1 meter, more than 15 minutes) with a confirmed case without mask.[7]

Date of symptom onset

Date of onset of first symptom, which may be fever, cough, sore throat, tiredness, diarrhea, myalgia, breathing difficulty.[2]

Selection criteria

Individuals who were asymptomatic at the time of swab collection and individuals who did not have definite asymptomatic phase between date of exposure and date of testing were excluded while estimating median and mean incubation period.

RESULTS

Total COVID-19 cases admitted in the tertiary care hospital during the study period were 72, of which 7 cases did not fit to selection criteria. Among the rest 65 cases, only 40 had symptoms, rest were asymptomatic, hence not included while calculating median and mean incubation period.

Among the study population, 33 (50.8%) were males and 32 (49.2%) females. Majority of the cases were from Kannur district (53.8%) and rest from Kasargod (44.6%) and Kozhikkode (1.5%) districts of Kerala.

It was seen that 70.8% of COVID-19 patients had history of recent (within 14 days of symptom onset) international or interstate travel. Among those with travel history, 76.9% were international travelers.

The mean age of the study participants was 34.58 years (SD=18.22) and median age was 33 years (IQR=24).

It was also observed that 60% of patients had one or other comorbidity like diabetes mellitus, hypertension, coronary heart disease. The percentage of COVID-19 patients who required ICU admission was 20%.

The median incubation period of COVID-19 was estimated to be 4 days (IQR 7) and mean incubation period was 6.72 days (SD 6.62).

Table 1 shows the factors influencing incubation period of COVID-19. The present study found that the mean incubation period was shorter for males compared to females. It was also found that persons with comorbidities had a longer incubation period for COVID-19 compared to those without any comorbidities. The current study also found that persons with travel history (imported cases)

had a shorter incubation period compared to those without travel history (local transmission cases).

Table 1: Factors affecting incubation period of COVID-19 (n=40).

Variables	Frequency	Mean incubation period	P value
Gender			
Male	22	4.68	0.046*
Female	18	9.22	
Comorbidity			
Present	23	8.48	0.025*
Absent	17	4.35	
Recent international/interstate travel history			
Present	26	4.19	0.004*
Absent	14	11.43	

*Statistically significant by independent sample t-test.

DISCUSSION

Among the study population, 33 (50.8%) were males and 32 (49.2%) females and the mean age of the study participants was 34.58 years (SD=18.22) and median age was 33yrs (IQR=24). The majority of the patients were males (62%) and median age of the study population was 44.5 years in a study done among 181 cases in China.[8]

In the present study, the median incubation period of COVID-19 was estimated to be 4 days (IQR is 7) and mean incubation period was estimated to be 6.72 days (SD=6.62). The current understanding is that incubation period of SARS-CoV-2 infection ranges between 1-14 days and the median incubation period is 5 days.[5,8]

The present study found that incubation period was more than 14 days for 6 individuals out of 40 (15%). In a study in China by Qin Jing et al the median incubation period was estimated to be 8.13 days and it was also found that 10% of the patients developed symptoms after 14 days of infection.[9] A review study on incubation period also implied that 101 out of every 10,000 cases will develop symptoms after 14 days of active monitoring or quarantine.[10]

A review by Baum explains that most patients who become symptomatic do so within 11 or 12 days and the vast majority within 14 days.[11] Estimated median incubation time for fever was 5.7 days. Using a 7 day monitoring period for high risk cases, the chance for missed cases was estimated to be 21.2 per 10,000 and using 14 days monitoring for high risk cases, the chance for missing was 1 per 10,000 patients.[11]

As per WHO, majority (80%) of patients with COVID-19 develop mild or uncomplicated illness, but approximately 15% develop severe disease requiring hospitalization and oxygen support and 5% require admission to intensive care unit (ICU).[12] Severe cases of COVID-19 may be complicated by acute respiratory distress syndrome, sepsis, septic shock, multi-organ failure, including acute kidney injury and cardiac injury. Older age and comorbid conditions are risk factors for mortality. Children with COVID-19 usually have milder symptoms compared to adults and present with fever and cough.[12] In the present study, 60% of patients had one or other comorbidity like diabetes mellitus, hypertension, coronary heart disease and 9 out of 40 COVID-19 patients required ICU admission (22.5%). The higher percentage of ICU admission seen in the present study might be because the study was done in a tertiary care center.

Limitations

The present study was done in a tertiary care center, so bias might be present because patients with more severe disease are admitted to tertiary care center. Since this was a single center study, sample size was limited in number. The date of arrival in Kerala was taken as the last date of exposure among imported cases. This might have created some bias in the estimation of incubation period among imported cases.

CONCLUSION

The median incubation period of COVID 19 was estimated to be 4 days. Factors like presence of comorbidities, gender, type of transmission were found to influence incubation period, but further studies are needed to have a thorough understanding.

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