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Original Research Article

Containment of a cluster of COVID-19 to prevent impending community transmission: experience from a rural area in South India

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ABSTRACT

Background: On 23 July 2020, COVID-19 contact tracing cell was informed of a laboratory confirmed case of COVID-19 with substantial number of contacts. The current scenario under investigation is an example for a large outbreaks amenable to containment. If not contained immediately and effectively it may pass on to large community transmission.
Methods: Epidemiological investigation and contact tracing was carried out to identify the source and contacts of a confirmed case of COVID-19 reported on 22 July 2020. A semi-structured questionnaire prepared by COVID-19 contact tracing cell, Government Medical College (GMC), Palakkad was used to collect data on clinical characteristics, likely source of exposure and contacts made by the index case. High risk and low risk contacts were contacted over telephone to ensure quarantine, testing on 8th day (both for high risk contacts) and symptom monitoring.
Results: Total of 55 high risk contacts were identified, 15 of which were of high risk exposure. All 15 high risk contacts were kept in quarantine with testing on day 8 after last exposure. 7 new cases occurred among 15 the high risk contacts of which one turned out to be suspected primary, 5 secondary cases of index case and one secondary case of the suspected primary case. All secondary and low risk contacts were kept under symptom surveillance, and did not develop COVID-19.
Conclusions: Timely case notification coupled with complete and effective contact tracing and quarantining has contained the cluster and prevented it from emerging as large community transmission.

Keywords: COVID-19, Cluster, Community transmission, Contact tracing, Risk assessment, Quarantine

INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease that has spreads rapidly throughout the world. In March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic.[1] The pandemic has severely impacted health systems, economic and social progress throughout the world. Countries, including India, have taken strong measures to contain the spread of COVID-19 through better diagnostics, treatment, and preventive measures. Until a substantial immunity is obtained by the population, testing, isolation, tracing of contacts and keeping the high risk in quarantine would be needed to control the spread of infections. On 22 July 2020, the COVID-19 contact tracing cell, Government Medical College (GMC), Palakkad received information of a confirmed case of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) in an elected gramapanchyat member with a substantial number of contacts. The current scenario under investigation is an example for a large outbreaks amenable to containment. If not contained immediately and effectively it may pass on to large community transmission. The current study was an epidemiological investigation with objectives of tracing the source and contacts and managing the contacts appropriately so as to contain the transmission.

METHODS

We adopted a descriptive study design. The study was undertaken in a rural panchayat of Palakkad district from 22 July-31 August 2020. The participants in the study were the index case which was reported by the district health authority and the contacts as mentioned by the index cases. All the primary and secondary contacts identified by contact tracing were included in the study. Upon tracing the contacts, we classified them as high or low risk based on the level of risk. The index case was interviewed regarding clinical characteristics, possible sources of exposure during the 14 days prior to symptom onset, and contacts made over 2 days prior to symptom onset until the day of reporting of result with their risk assessment, using a semi structured questionnaire developed by COVID-19 contact tracing cell, GMC, Palakkad, Kerala. All the high and low risk primary contacts were contacted over telephone. High-risk contacts were advised to be in quarantine for 14 days after the last day of exposure, with reverse transcription - polymerase chain reaction (RT-PCR) testing after 7 days, according to the Kerala Directorate of Health Services' guidelines.[2] Low-risk contacts were told to keep a daily symptom diary and limit their social mobility. In addition, high-risk and low-risk contacts were contacted on a daily basis to ensure quarantine and symptom observation. Contact information's were also sent to the primary health centre. We obtained oral informed consent from the participants before data collection. Furthermore, the study was approved by institutional ethics committee, GMC Palakkad. All the collected data was coded and entered in Microsoft excel and analysed using statistical package for the social sciences (SPSS) version 2020. All the qualitative variables were expressed as percentages.

RESULTS

The index case was a 50 years old woman, an elected Gramapanchayat member. She was symptomatic on 17 July 2020, and was reported positive for COVID-19 by RT-PCR testing on 23 July. A detailed contact tracing was done for her to identify the probable source of infection and contacts she had made during 2 days prior to onset of symptoms until the date of reporting positive.[3]

She had attended a panchayat board meeting on 07 July. She worked in her panchayat office on 10 July and 13 July and attended a Zilla panchayat meeting on 15 July when she had close contact with three people two of whom were later confirmed positive on 04 August 2020. On the 16 July and 17 July, she went to work and attended a farewell party for a panchayat secretary on 17 July; on the same day, a new panchayat secretary took over the job. She experienced a minor fever and sore throat on 17 July. A swab was taken for rapid antigen testing, on 18 July, result of which came out negative. A second sample was taken and forwarded to the nearest tertiary care centre in neighbouring district for RT-PCR analysis on the same day. She attended the inauguration of a first line treatment centre in her panchayat the next day, during which she met and discussed about some projects with personnel of other departments and senior authorities as well as meeting school officials. On 22 July 2020, the RT-PCR result became positive. She was placed under home isolation.

Following the declaration of the result, 55 primary contacts were traced, 15 of whom were high risk contacts. 32 secondary contacts were identified and monitored for symptoms.

Socio-demographic and clinico-epidemiological characteristics of the contacts

Out of the total 87 contacts, 55 (63.2%) were primary contacts, 15 (17.2%) were of high risk exposure. All the high risk contacts were kept in quarantine (63.2%) and others were monitored for symptoms. Six of the high-risk primary contacts and one secondary contact were found to be positive upon testing on day 8 from their last contact (8%), and all of them were asymptomatic. During the period of observation 6 secondary contacts (6.9%) developed symptoms but were tested negative for COVID-19 by RT-PCR. Baseline socio-demographic and clinico-epidemiologic characteristics of contacts of the index case is given in Table 1. Figures 2 and 3 gives distribution of contacts according to level of risk and presence of symptoms.

Table 1: Baseline socio-demographic and clinic epidemiological characteristics of contacts of the index case (N=87).

Variable	Number (%)
Age (years)	
Mean±SD	38±18.6
Gender	
Male	61 (70)
Female	26 (30)
Socio economic status	
APL	77 (88.5)
BPL	10 (11.5)
Type of contact	
Primary	55 (63.2)
Secondary	32 (36.8)
Level of risk	
High	15 (17.2)
Low	72 (82.8)
Symptom	
Present	6 (6.9)
Absent	81 (93.1)
Management of contacts	
Home quarantine	15 (17.2)
Symptom monitoring and testing	72 (82.8)
Outcome	
Positive	7 (8)
Negative/non tested	80 (92)

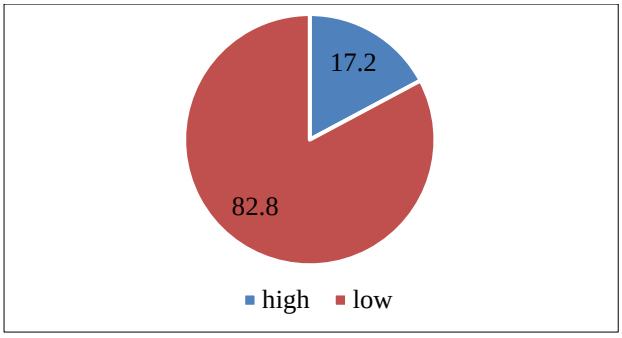

Figure 1: Distribution of contacts according to level of risk (n=87).

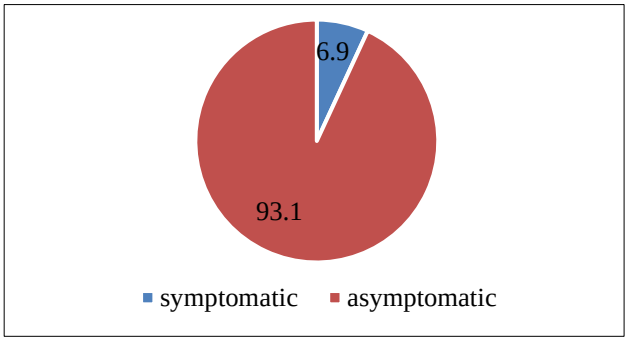

Figure 2: Distribution of contacts according to presence of symptoms (n=87).

Dynamics of transmission

Of the total 7 contacts who later tested positive, one (case no. 1) turned out to be the primary case in the cluster. He reported travel and stay at capital city from 06 July to 10 July. He remained asymptomatic throughout the course of disease. It would be probably from him that the index case received the infection, as both of them were working together in the office on 10 July and 13 July. The index case later became symptomatic and turned positive when swab was collected for RT-PCR on 18 July. There were 5 secondary cases (5 primary contacts turned positive) for the index case, i.e. case numbers 2, 3, 4, 6 and 7. One positive case was identified as secondary to exposure to the suspected primary case. Thus in the cluster the suspected primary case has infected 2 of its primary contacts (one being the index case) and 5 of its secondary contacts through the index case. In all the cases the exposure was reported to be of more than 15 minutes within one metre's distance with cloth mask on. Characteristics of the new cases in cluster is shown in Table 2. The dynamics of transmission is shown in Figure 3.

All the 32 high risk secondary contacts of the index case were negative following testing during their quarantine.

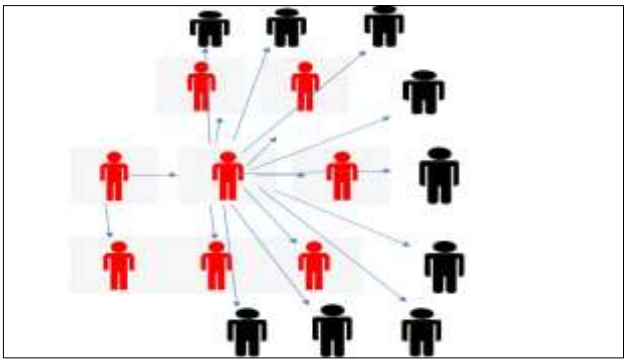

Figure 3: Dynamics of transmission among high risk primary contacts in the cluster.

Table 2: Characteristics of other cases in the cluster.

Case no.	Occupation	Presence of symptom	Probable events of exposure	Level of exposure
1	Panchayat office	Nil	Travel to capital city during 6-10 July	High risk
2	Panchayat office	Nil	Duty at panchayat on 17 July 2020	High risk
3	House of index case	Nil	Work at index case's house from 15-19 July	High risk
4	Community health worker	Nil	Contact with index case on 18 July during swab collection	High risk
5	Community leader	Nil	Contact with suspected primary case on 13 July at panchayat office	High risk
6	Bank	Nil	Contact with index case on 23 July at inauguration function	High risk
7	Village office	Nil	Contact with index case on 15 July	High risk

DISCUSSION

In the evolution of COVID-19 pandemic, India is expected to pass through the phases of: travel related case reported in India; local transmission of COVID-19; large outbreaks amenable to containment; wide-spread community transmission of COVID-19 disease and; India becomes endemic for COVID-19.[4] Local transmission will lead to clustering of cases in time and space, epidemiologically linked to a travel related case or a positive case that has links to a travel related case. The current scenario under investigation is an example for the third phase of large outbreaks amenable to containment If not contained immediately and effectively it will pass on to the large community transmission.

Cases of COVID-19 reported in the panchayat office constitute an institutional cluster. Centre for Disease Control also defines cluster for non-health care work site as two or more laboratory-confirmed COVID-19 cases among workers at a worksite with onset of illness or if asymptomatic, a positive test result within a 14-day period, who are epidemiologically linked (have a potential connection in time and place) at the worksite.[4] According to guideline of Directorate of Health Services Kerala, institutional cluster is defined as more than or equal to two cases of locally transmitted cases in an institution like hospital/office within 14 days.[3] The present cluster which was identified by a symptomatic case in it unveils the presence of 2 cases, an asymptomatic primary and secondary case each in the office (case no.1 and 5). The other cases cite examples for onset of community transmission.

It is important to remember that only the index case was symptomatic out of the eight (12.5%). This is consistent with the findings of numerous previous research studies conducted around the world, which show that more than half of the patients are asymptomatic.[5-7] According to the World Health Organization, roughly 80% of COVID-19 cases are asymptomatic.[8] This denotes it is critical to conduct meticulous contact tracing when a positive case is identified. To control the spread of COVID-19, interventions need to break the chains of human-to-human transmission, ensuring that the number of new cases generated by each confirmed case is maintained below 1 (effective reproduction number <1). Contact tracing is the process of identifying, assessing, and managing people who have been exposed to a disease to prevent onward transmission. When systematically applied, contact tracing will break the chains of transmission of an infectious disease and is thus an essential public health tool for controlling infectious disease outbreaks. Interventions must interrupt the chains of human-to-human transmission to control the spread of COVID-19, ensuring that the number of new cases created by each confirmed case remains below 1 (effective reproduction number 1). The process of finding, diagnosing, and managing people who have been exposed to a disease in order to avoid further transmission is known as contact tracing. Contact tracing, when used correctly, can interrupt the chains of transmission of an infectious illness, making it an important public health tool for reducing epidemics. COVID-19 contact tracing entails identifying people who may have been exposed to the virus and following up on them daily for 14 days after the last point of exposure.[9]

Contact tracing must be followed by risk assessment of the contacts. For this level of contact is assigned as high and low risk. Those who live in the same household as the case, anyone in close proximity (within 1 metre) of the confirmed case without precautions, touched or cleaned the patient's linens, clothes, or dishes, had direct physical contact with the patient's body including physical examination without PPE, and passengers in close proximity (within 1 metre) of a conveyance with a symptomatic person who later tested positive for COVID-19 or touched body fluid are all considered high-risk contacts. Any contact that does not meet the criteria for a high-risk encounter falls into the low-risk category.[3]

Negative rapid antigen test results was a missed diagnosis in the current cluster. A false negative result is often accompanied by a false sense of security. False negative results occur due to the varying sensitivity, and such incidents are quite likely to occur.[10-12] Rapid antigen negatives can nevertheless be infected. In a symptomatic person with a negative antigen test, RT-PCR should be immediately followed. Until the RT-PCR result is obtained, all attempts should be made to isolate a symptomatic person. In the current cluster, the index case was found to be attending social gatherings after receiving a negative rapid antigen test result, which should be avoided.

For the index case, 54 primary contacts were identified which included both 14 high and 40 low risk contacts after excluded the suspected primary case. The secondary attack rate (SAR) is defined as the probability that an infection occurs among susceptible people within a specific group (i.e., household or close contacts).[13] 5 out of 14 high risk primary contacts of index case have turned positive in the cluster giving secondary attack rate of 35.7%. This can provide an indication of how close social interactions relate to transmission risk. Among the 40 low risk contacts none turned positive (0% SAR).

None of the secondary contacts of index and suspected primary case were diagnosed COVID-19 positive. Investigation was followed by active surveillance for cases and contacts in the identified geographic zone by the local PHC and expanded testing to all suspect cases, high risk contacts and SARI cases. We collected details of Influenza like illness cases from the PHC area for the month and no abnormal surge or spatial-temporal clustering of cases was noted ruling out possibility of a large community transmission. This indicates immediate case notification coupled with subsequent tracing of all the contacts, quarantining, testing and symptom monitoring and active surveillance to identify further cases has prevented the cluster from evolving as a large community transmission.

Limitations

Self-reported information about symptoms, clinical characteristics an adherence to quarantine could not be verified by examinations/visits.

CONCLUSION

A cluster of cases have been reported from the Panchayat, which started as an institutional cluster, with transmission to immediate community contacts. All primary contacts identified have been quarantined and tested. 7 new cases reported among high risk contacts of which one turned out to be suspected primary case. All positive cases were kept

in home isolation and negative high risk contacts completed the quarantine. All secondary contacts were followed up for symptom monitoring and testing, none turned positive. Active case surveillance was carried out in the area for one more month. This could prevent the emergence of a large community transmission.

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