Contact Tracing of COVID -19 Cases for Early Detection of Infection in Tertiary Care Hospital, Pune

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ABSTRACT

Background: World Health Organization (WHO) declared COVID-19 as Public Health Emergency of International Concern (PHEIC) on 30th Jan 2020 and later declared it as pandemic on 11th March 2020. Community surveillance plays a significant role in the prevention of the spread of disease. The government of India's focus has been on community surveillance activities which mainly comprises contact tracing and quarantine.

Objective: To explore high risk and low-risk contacts of confirmed COVID-19 patients admitted to a Tertiary Care Center, Pune. To find out the secondary attack rate of COVID-19 cases and To study demographic characters of COVID-19 cases.

Methods: Observational cross-sectional study was done in the Tertiary Care Center, where isolation of suspected cases and management of COVID-19 positive patients was done. Details about patients such as age, sex, residence, history of contact with COVID-19 patient, history of travel to COVID-19 affected case was taken by taking the interview. Data were analyzed by Epi-info version 7.2.1.0. The statistical Tests used was the chi-square test.

Results: Male patients were more as compared to females. There was a significant association between co-morbidities and deaths of COVID-19 patients. Family members were the most affected contacts of cases (63.16%). 23 families have secondary cases in their homes. The highest secondary attack rate was found to be 83.33% in 2 families.

Conclusion: Family members were the most affected contacts of cases (63.16%) followed by health care workers. There was no significant difference between deaths among male and female cases. 23 families (19%) had secondary cases in their homes. The secondary attack rate ranged from 9% to 83.33%, with a median of 24.26%.

Key Words: COVID-19 patients, Contact tracing, High risk, Low risk, Secondary attack rate

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus- Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a new type of Coronavirus. India reported its 1st case of COVID -19 on 30th January 2020. It was a travel-related case from Wuhan, China. This began in Wuhan city, China at the end of December 2019 and had spread to the rest of the world. World Health Organization (WHO) declared COVID-19 as Public Health Emergency of International Concern (PHEIC) on 30th Jan 2020 and later declared as pandemic on 11th march 2020.¹

India is also reporting an increasing number of cases all over the country. There are 20 existing and 22 potential hotspots

identified in India.² Among 215 countries and territories, there are 30,730,571 cases worldwide involving and two international conveyances, with the numbers increasing every day.³ In India, about 53, 12,537 cases and 85, 650 deaths were reported, whereas 11,67,496 cases and 31,791 deaths in Maharashtra as of 19.9.20. Pune having 2, 53,554 cases and 5133 deaths as of 19.9.20 and ranked as 1st district with the highest cases in Maharashtra.⁴

Recently it was questioned by high ranked officials of the World Health Organization (WHO) whether social distancing or lockdowns are sufficient to stop the SARS-CoV-2 outbreak. Possibly additional measures are needed, for example, active tracing of contacts in combination with the isolation of infected contacts.⁵ Contact tracing is defined

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as the identification and follow-up of persons who may have come into contact with an infected person.⁶ The period of communicability is estimated with the current data to be from 2 days before the onset of symptoms and up to 2 weeks after onset. Hence the initial few asymptomatic days turns out to be a crucial period in containing the spread of infection. By the time a COVID-19 patient is diagnosed and isolated, there are quite a several primary and secondary contacts. The government of India focus has been on Community Surveillance activities which mainly comprises Contact Tracing and Quarantine.^{7,8} So the present study aims to explore high risk and low-risk contacts of COVID-19 cases from a tertiary care setting in Pune, Maharashtra.

MATERIAL AND METHODS

Study design

This is an observational cross-sectional study done in a tertiary care centre, where isolation of suspected cases and management of COVID-19 positive patients was done. Ethics Committee approval was taken before the conduction of the study.

Study Population

All COVID-19 laboratory-confirmed cases admitted in Tertiary Care Center from 2nd April 2020 to 1st May 2020 and their contacts. Subject Eligibility-All COVID-19 patients with positive reports by RT-PCR for COVID-19 admitted in Tertiary Care Center from 2nd April 2020 to 1st May 2020 and their contacts.

Inclusion criteria

All the laboratory-confirmed COVID -19 positive cases admitted to the Tertiary Care Center.

Study conduct

The patients visiting Flu OPD and casualty were examined and the swab was collected from suspected patients and was sent to National Covid-19 laboratory, Tertiary care Hospital, Pune for testing. After confirmation of the positive result for COVID -19, the patient was transferred to the isolation ward of COVID -19 positive cases. The information of COVID 19 admitted patients was collected in a proforma. Details about patients such as age, sex, residence, history of contact with COVID-19 patient, history of travel to COVID-19 affected case was asked by taking the interview. Patients were assured about confidentiality. In the case of critical patients, the help of the Medical Social superintendent was taken and information was collected from the patient's relatives. An attempt was made to identify all household members, social contacts, contacts at

the workplace and contacts in health care settings- having contact with a confirmed case 2 days before the onset of symptoms (in the positive case) and the date of isolation (or maximum 14 days after the symptom onset in the case). In an asymptomatic case, a contact person was defined as -someone who had contact with the case within 2 days before collection of the sample (which led to confirmation) to 14 days after the sample was taken. It is done as per recent guidelines uploaded on the NCDC website.⁹ Based on information collected, the contacts were classified as high-risk or low-risk as below.

Classification and Definition of Contacts⁹

High-risk contacts

Persons who have touched body fluids of patients like respiratory secretions, blood, vomit, saliva, urine, faeces. Who had direct physical contact with the body of the patient without PPE; those who have touched/cleaned the linens, clothes or dishes of the patients who lives in the patient's household. A person nearby (within 1 meter) of the confirmed case without precautions.

Those passengers within 1 meter of a conveyance with a symptomatic person, who tested positive for COVID-19 afterwards for more than 6 hours.

Low-risk contacts

Persons sharing the same class for school/worked in the same room/similar and not having a high-risk exposure to a confirmed case of COVID-19; who has travelled in same bus/train/flight etc; not having a high-risk exposure. About 234 laboratory-confirmed cases occurred from 2 April 2020 to 1 May 2020. Casewise line listing of COVID-19 patients was prepared and updated every day. Contact tracing of the positive cases was done within 2 hours. The contacts were advised to monitor their health and watch for symptoms of fever, cough, and difficulty in breathing within 28 days of the last exposure to the patient. The asymptomatic high-risk contacts were advised to do their test at the tertiary Care Center. If he or she develops symptoms, as defined, the contact must wear a mask, self-isolate at home, and inform the local health authority.¹⁰

The secondary attack rate (SAR), defined as the probability that an infection occurs among susceptible people within a specific group (i.e., household or close contacts), can indicate how social interactions relate to transmission risk.¹¹

Statistical Analysis

Data Analysis- Data was entered in MS-Excel and presented using tables, bar diagram and pie chart. was analyzed using Epi info version 7.2.1.0. P-value < 0.05 is considered as significant.

RESULTS

Table 1 shows the age and sex-wise distribution of COVID-19 cases. Males were more i.e.56.41% whereas females were 45.58%. The age- group most commonly affected was 45-60 years for males and 30-45 years for females. The least affected age- the group was 75-90 years for both sexes. There was no case above 90 years. The mean age of cases was 46.03. The minimum age was 4 months and the maximum age was 85 years.

As shown in Figure 1, the highest number of COVID-19 cases occurred in Bhavani Peth (20.08%) and Kasba Vishrambag wards (20.08%), Yerwada (14.95%) constituted about 2/3rd cases. Least number of cases occurred in Nagar road (0.42%),cantonment(1.71%),Sinhgad road(0.85%) wards. Bhavanipeth, Kasbapeth, Yerwada were declared as hot spot areas in the city and containment activities were strengthened by Municipal Health authorities.

Table 2 shows, history of contact with COVID-19 cases was seen in 31 males and 39 females. This difference was statistically significant with a chi-square value of 5.29 and a p-value of 0.02.

Table 3 shows, male deaths were 24.24 % of all male deaths and 13.67% out of total deaths. whereas female deaths were 25.49% of all female deaths and 11.11% of total deaths. There was no significant difference between deaths in male and female.(Odd's ratio= 0.95,95% C.I.-0.53-1.69)

There were a total of 2067 contacts of 234 confirmed COVID-19 cases; of which 134 were unknown. Table 4 depicts sex-wise distribution. Out of total 1933 contacts of COVID patients, female contacts were more than male i.e.52%.

Figure 2 shows the distribution of contacts of COVID-19 cases. About 1428(68.09%) contacts were high-risk contacts, whereas 639(30.91%) contacts were low risk out of 1933 known contacts. While the degree of severity of contacts could not be ascertained in 134 contacts. The ratio of patients to no. of contacts was 1:8.33

Figure 3 shows ward wise distribution of contacts of COVID-19 cases. Most of the contacts were from Kasba vishrambag - followed by Dhole Patil road-21.38%, Bhavani Peth-15.72%Yerwada- 10.74% Ghole road- 7.98%.

Figure 4 shows the age-wise distribution of contacts. The most common age-group was 31-45, followed by 16-30, then 0-15 etc. and >90 yrs contacts were only 3.

Table 5 shows that most of the contacts were from family i.e. 63.16%, followed by Nurses-15.26%, Doctors- 8.95%. Others included persons who came in contact in the market, shop etc. While 3.57% were neighbours.

Among 23 families (19% out of 121 families which were followed for 14 days after the primary case occurred), second-

ary cases of COVID-19 occurred. The secondary attack rate was ranging from 9% to 83.33%, with a median of 24.26%. A secondary attack rate of 25% and 33.33% was found in 4 cases each, followed by 20% in 3 cases. Secondary attack rate of 50 and 66.66% was found in 2 cases each and it was 9%,14.28%,18.18%,23.07%,23.52% and 80% in 1 case each.

DISCUSSION

Sexwise distribution of cases shows that males were more commonly affected by COVID-19 than females in tertiary care hospital. Similar findings were seen in a Delhi study.¹² 45-60 years age-group was more affected for males and 30-45 years for females. The average age for cases was 46.03 years and the minimum and maximum ages for cases were 4 months to 85 years respectively. These findings were similar to a study done by Kaiyuan Sun, China.¹³ The number of men was 2.4 times that of women in the deceased cases in the study done by Jian Min Jin.¹⁴ In the present study, deaths among males were 1.23 times than of females . There was no significant difference between sex and deaths due to COVID-19.

COVID-19 cases were spread over 16 wards under Pune Municipal Corporation with most of the cases in Bhavani Peth, Kasbapeth,vishrambag and Yerwada, wards. Whereas contacts of these cases were also mostly from Kasbapeth, vishrambag, Dhole Patil Road, Bhavani Peth and Yerwada. There was no significant difference in the history of contacts and the sex of the cases.

Female contacts were more as compared to males. Family contacts were more, followed by health care workers, others; neighbours were least affected. The most common age group among contacts was 31-45yrs. When the secondary attack rate was calculated among 23 families(19% out of 121), it was ranging from 9% to 83.33%, with a median of 24.26%. With most common was 25% and 33.33% found in 4 families each. A multi-city household study in Saudi Arabia found the non-primary attack rate to be 4% (95% CI:2-7%).¹⁵ Details of SAR in household contacts were assessed from each study by K. Shah in the systematic review; found to be ranging between 4.6 and 49.56%.¹⁶

CONCLUSION

The age- group most commonly affected was 45-60 years for males and 30-45 years for females. Family members were more affected contacts of cases (63.16%) followed by health care workers. The ratio of patients to no. of contacts was 1:8.33. There was no significant difference between deaths and sex of cases. 23 families (19%) had secondary cases in their homes. The secondary attack rate ranged from 9% to 83.33%, with a median of 24.26%.

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Ward Wise Corona Contacts
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Yorwadi-Kaleas Chhanori 222

Nager Road-Warjeonsheri 33

Aundh-Baner 0

Bhandarku Pathi 325

Ghole Pathi 442

Bhandarku 8

Kothrud-Bavdhan 0

Warje-Karvenagar 5

Banhag Road 17

Chinchwad East 0

Chinchwad West 0

Kothrud-Vandharni 0

Wankar-Ramkali 0

Hadapsar-Mundhane 91

Outside Pune 12

Pune Rural 36

Total Contacts 2067

*Figures are dynamic and are modified based on daily updates

A 3D pie chart illustrating the distribution of risk levels. The chart is divided into two segments: a large blue segment representing 'High risk' at 69%, and a smaller orange segment representing 'Low risk' at 31%.

Risk Level	Percentage
High risk	69%
Low risk	31%

Age Group	Number of Respondents
0-15	333
16-30	473
31-45	509
46-60	301
61-75	85
76-90	17
>90	3

Figure 4: Agewise distribution of contacts.