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EPIDEMIOLOGIC PROFILE OF THE INITIAL COVID 19 PATIENTS AT A DESIGNATED COVID HOSPITAL IN SOUTH TAMIL NADU

Community Medicine

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ABSTRACT

BACKGROUND: COVID-19, caused by SARS CoV-2 has caused a worldwide pandemic since its origins in December 2019. The spectrum of the disease ranges from asymptomatic infection to severe respiratory illness causing mortality in severe cases. Person to person spread through respiratory droplets appears to be the most common route of spread.
AIM & OBJECTIVE: This study aims to assess the demographic profile of COVID-19 patients. In addition, measures of transmission probability are determined using travel history and contact tracing.
SETTINGS AND DESIGN: This study was done at a Government medical college in South Tamil Nadu over four months among patients who were RT-PCR positive for SARS CoV-2.
METHODS AND MATERIAL: A questionnaire from NCDC for COVID-19 patients was used for collecting demographic and clinical details. Travel history and contact tracing were obtained using telephonic interviews and in person interviews.
STATISTICAL ANALYSIS USED: Data was entered using MS-Excel and analysed using R studio version 3.6.3.
RESULTS: Majority of the patients belonged to 20 to 49 years of age. Around 14.6% were symptomatic with fever and sore throat being predominant. Diabetes and hypertension were the most associated comorbidities. A positive contact history was present among 46.58% of the cases. The secondary attack rate was 25.03% and **R_0 was 2.76**
CONCLUSIONS: The absence of a positive contact history and the preponderance of asymptomatic cases seem to contribute to the spread of the disease and impede control efforts. Hence, a multi-pronged approach including community participation, active surveillance systems and legal measures would be of great impact in slowing disease spread.

KEYWORDS

COVID-19, Epidemiology, Contact tracing, Secondary attack rate, Basic reproductive number

BACKGROUND:

The corona virus belongs to a family of viruses that may cause various symptoms such as pneumonia, fever, breathing difficulty, and lung infection(*WHO | Novel Coronavirus – China*, n.d.). These viruses are common in animals worldwide, but very few cases have been known to affect humans. The World Health Organization (WHO) used the term 2019 novel corona virus to refer to a corona virus that affected the lower respiratory tract of patients with pneumonia in Wuhan, China on 29 December 2019(CDC, 2021; Li et al., 2020; WHO, n.d.-c). The WHO announced that the official name of the 2019 novel corona virus as corona virus disease (COVID-19)(WHO, n.d.-b) The 2019 novel corona virus (2019-nCoV) or COVID-19 as it is now called, rapidly spread worldwide to more than 100 countries and affected millions of people. As on June 28, 2021 around 180,654,652 confirmed cases of corona virus disease 2019 (COVID-19) and 3,920,463 confirmed deaths have been reported from 176 countries, regions and territories. India has reported 3,02,99,814 confirmed cases as of 28.06.2021(WHO, n.d.-d)

Human-to-human transmission via droplets as well as through contact with fomites seems to be the critical route of the virus spread. Since 80% of the infected population are either asymptomatic or have mild disease, people have been going to their workplaces and even traveling internationally. Nevertheless, even though the virus is causing mild disease in many, the course of illness may be severe, leading to hospitalization and even death in elderly or those with co-morbid conditions(Centre for Disease Control, 2021)

Aim & Objectives:

1.To study the demographic profile of COVID-19 patients in Kanyakumari district.
2. To find out travel history and contact tracing of Covid-19 patients.
3. To calculate the measures of transmission probability among those patients.

Study settings and design:

This is a descriptive study of the first 1009 COVID-19 infected patients confirmed with Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) and admitted to our medical college hospital in Kanyakumari district from 15.03.2020 to 15.7.2020 (four months).

MATERIALS AND METHODS:

Individuals with respiratory symptoms or with travel history to countries with COVID-19 patients over the previous last 14 days or who exposed themselves to a COVID-19 positive patients in the community were subjected to RT-PCR and those found to be positive were admitted to our hospital. Details on epidemiological and clinical features were collected using a pre-tested, semi-structured questionnaire obtained from NCDC(NCDC, 2020). Data collected included age, sex, nationality, travel history, contact history, symptoms, co-morbidities and duration of hospital stay. This was collected using medical records, telephonic and in person interviews.

STATISTICAL ANALYSIS USED:

Data was entered in Microsoft Excel. Analysis was made using R studio version 3.6.3(R Core Team, 2020). Numerical data was presented as mean with standard deviation. Categorical data was summarized as percentages. The summarized data was presented as tables and figures. Unpaired t test was used to compare numerical data between groups after checking for normality using Q-Q plots. Chi square test was used to compare proportions between groups. The results were presented with 95% confidence intervals. P value of less than 0.05 was considered statistically significant.

Ethical considerations: Clearance was obtained from the Institutional Ethics Committee and the Scientific research Committee. Informed consent in the local language was obtained from the study participants. Due attention was paid regarding the privacy and confidentiality of the study participants at all stages from data collection till analysis and manuscript writing.

RESULTS & DISCUSSION:

Age and Gender: Majority of the patients belonged to age group 20 to 49 years with the highest in the age group 30 to 39 years. The mean age of the population was 37.98 years. Around 58.39% were males and

41.61% female with a male preponderance. As per table 1, there was no significant difference in the mean age of males and females. (p value: 0.3486)

Table 1: Age and Gender (n=1009)

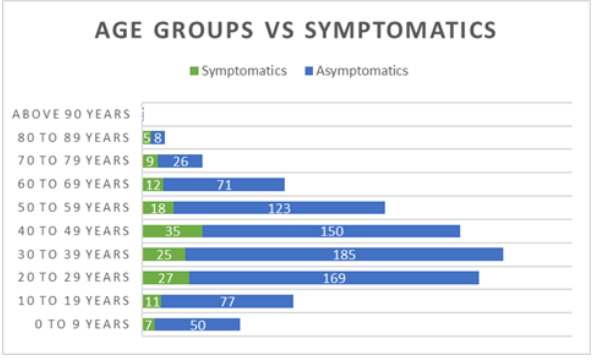
Gender	Mean age (yrs)	Std. error	95% Confidence interval	Mean difference
Male	37.35	0.89	35.59 to 39.11	1.068 (95% C.I -3.30 to 1.167)
Female	38.42	0.71	37.01 to 39.83	

In a population-level observational study by Sun et al(Sun, 2020) among 507 patients with COVID-19 including 364 from mainland China and 143 from outside of China, 281 (55%) patients were male and the median age was 46 years, which can be compared to our study where 58.39% were males. However median age in our study was 37 years. In a study by Bhandari et al(Bhandari et al., 2020) in a tertiary care centre in Jaipur, male patients constituted 66.66% of total patients and majority of the patients (80.90%) were below 60 years of age. In a study by Aggarwal et al(Aggarwal et al., 2020) in a tertiary care centre in New Delhi, the median age of cases was 54.5 years and 59.3% of them were males similar to our study.

Symptoms and co-morbidities: Majority (85.40%) were asymptomatic around 14.6% were symptomatic. In a study done by Bhandari et al(Bhandari et al., 2020) in Jaipur,33.33% patients were completely asymptomatic in contrast to our study where 85.4% were asymptomatics.

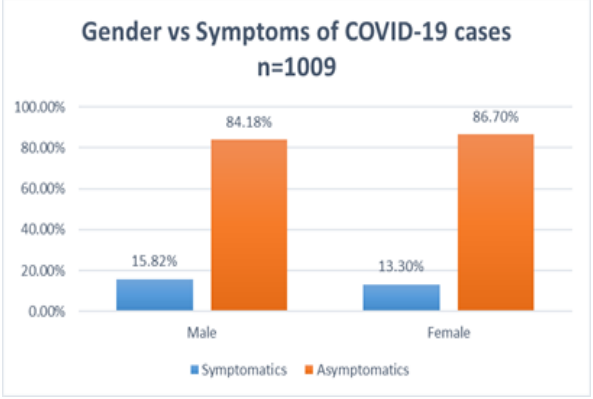
The age distribution of symptomatics and asymptomatics is given in figure 1.

Figure 1: Age distribution vs symptomatics (n=1009)



The gender distribution of symptomatics and asymptomatics is given in figure 2. There was no significant association between gender and symptoms (Chi.square 1.2623, p value 0.267).

Figure 2: Gender vs symptoms (n=1009)



Among the symptomatics in our study population, the most common symptoms were fever (57.72%) and cough (28.19%) followed by sore throat (19.46%), and breathlessness (16.11%). The prevalence of various symptoms is summarised in table 2. In the study done by Bhandari et al(Bhandari et al., 2020) in Jaipur, among those who were symptomatic, cough was the most common symptom (85.71%) followed by fever (78.57%), myalgia (64.28%), headache (28.57%) and dyspnea (28.57%).

Table 2: Symptoms among the study population (n=149)

Symptoms	n	%
Fever	86	57.72
Sore throat	29	19.46
Breathlessness	24	16.11
Cough	42	28.19
Vomiting	3	2.01
Myalgia	23	15.44
Loose stools	5	3.36
Loss of smell	4	2.68

Co-morbidities were present among 17.35% of the cases. The commonest was Diabetes (11.79%) followed by hypertension (7.43%). Around 1.89% had heart disease. Other less common co morbidities include Chronic renal disease (0.40%), Asthma (0.50%), hypothyroidism and liver disease.

Around 14.28 % had underlying co-morbidity in the form of hypertension, 9.5% had diabetes mellitus, 9.5% had hypothyroidism followed by chronic kidney disease or coronary artery disease. In a study done by Aggarwal et al(Aggarwal et al., 2020) in New Delhi ,68.8% of the patients had one or more co-morbidities. Diabetes mellitus 16(50%), hypertension 11(34.4%) and chronic obstructive airway disease 5(15.6%) were the most common co-existing illnesses(Aggarwal et al., 2020).

Travel history: Travel history was present among 28.5% of the COVID positive cases. Among them, 4.56 % had travel history outside India and the remaining 24% had travel history within India during the past 1 month from the time of testing positive. Around three-fourths of those with International travel history hailed from Arab countries such as Saudi Arabia, Dubai, Qatar and Kuwait. Among those with travel history within India, Delhi and Mumbai were the common places. Intra state travellers were mostly from Chennai and Madurai. In a study done by Bhandari et al(Bhandari et al., 2020) in Jaipur, most of the patients (71.40%) were either foreigners or had a history of foreign travel. This contrasts our study where only 4.56% had travel history outside India.

Contact history: History of contact with confirmed COVID-19 case was present among 470 cases(46.58%). The contact history of the confirmed COVID-19 cases is summarized in table 3. With regards to the source of contacts, household contacts and neighbourhood contacts constituted around 50% of the total sources.

Table 3: History of Contact with COVID-19 case (n-1009)

H/o Contact with COVID-19 cases6	n	%
Lab confirmed case of COVID-19	470	46.58%
Not known	373	36.97%
No contact	166	16.45%

Measures of transmission probability:
Parameters such as secondary attack rate and basic reproductive number were calculated to study the transmission probability of COVID-19.

Secondary attack rate: The chances of susceptible population getting infected within the incubation period, after exposure to a known COVID-19 case was calculated as the proportion of high-risk contacts who were tested positive out of the total number of high-risk contacts. When expressed as a percentage, it was calculated to be 25.03%.

$$\frac{\text{Number of high risk contacts tested positive}}{\text{Total number of high risk contacts}} = \text{SAR} = \frac{569}{2273} * 100 = \mathbf{25.03\%}$$

Basic reproductive number R_0
Spread to contacts from COVID-19 positive individuals. Each infective primary case was linked on an average to 2.76 secondary cases. So Basic reproductive number R_0 was found to be 2.76.

$$\frac{\text{Total number of primary cases+Number of high risk contacts tested positive}}{\text{Total number of primary cases}} = R_o = \frac{892}{323} = \mathbf{2.76}$$

This can be compared to early reports from China which showed that basic reproductive number for COVID-19 was 2.2(Li et al., 2020). This translates to every 10 cases infecting additional 22 cases. This is a little lesser than our study where 10 people infected an average of 27 persons in total.

Liu et al.(Liu et al., 2020) found that average R_0 was 3.8 (1.4–6.49) in

their review of 14 studies. This study also showed that even in the same geographic region, different R_0 values can be calculated by using different methods and assumptions. It seems that we need more data to determine more accurate R_0 value.

Case fatality rate: Among the 1009 cases, there were 9 deaths. The case fatality rate was 0.79%.

Overall case fatality rate was 6.3% according to WHO situation report as of April 13, 2020(WHO, n.d.-a) Mortality associated with COVID-19 is a multifactorial process and underlying diseases and health care burden as well as ages could be related to higher mortality(Ji et al., 2020).

Outcome and mean duration of hospital stay:
The outcome data for 1009 cases is given in table 4. The mean duration of hospital stay and the median duration were 9.62 days and 9 days respectively. The longest duration reported was 38 days.

Table 4: Outcome of COVID-19 cases admitted in Kanyakumari district (n=1009)

Outcome	Freq.	Percent
Deceased	8	0.79
Discharged	572	56.69
Under treatment	429	42.52

CONCLUSION:

The age group of 20 to 49 years was mostly affected with a slightly male preponderance. Majority of the cases during the initial months of the outbreak were asymptomatic. Diabetes and hypertension were the most commonly present co-morbidities. Around one-fourth of the cases had a travel history. Around half of the cases could not be traced back to a confirmed COVID-19 case. The case fatality was low during the initial months of the COVID-19 pandemic. Every day we learn new data about the current pandemic of COVID-19. Since the outbreak has not been over yet, the updates should be followed closely to monitor the disease and the risk factors as well as therapy modalities.

Recommendation & Future perspectives:
Community involvement and participation and cooperation with the government is of utmost need to achieve the end result. We also need to be sensitive to the needs of the poor and vulnerable ensuring that their food and other basic necessities are met. Police and enforcement authorities need to be sympathetic while being firm, and good communication about do's and don'ts is important. We also recommend that the scholarly community conduct further research to provide valid information to manage this kind of public health emergency in both the short-term as well as long-term.

The epidemiology of COVID-19 provides a better understanding about the pattern of disease growth and spread. The high potential of COVID-19 causing infection from human to human may be neutralized by following social distancing and sanitization. Governments may impose lockdown and curfew for strict implementation of social distancing to reduce the spread of the infection. Worldwide surveillance system needs to be improved by use of artificial intelligence and information technology.

Limitations:
This study was performed in a single centre at a tertiary care hospital in South Tamil Nadu. Hence the generalizability of the conclusions may not be applicable on a large scale.

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