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EPIDEMIOLOGICAL PROFILE OF SARS-COV-2 INFECTION- WAVE I & II IN A TERTIARY CARE GOVT. HOSPITAL IN CHENNAI, SOUTH INDIA -A DESCRIPTIVE STUDY.

KEY WORDS: COVID-19, Epidemiology, Wave I and II,

Chennai, Tertiary care hospital

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Introduction: The COVID-19 pandemic poses a great challenge to public health system worldwide and India too. It is vital to study the epidemiology of SARS-CoV2 infection thereby to plan, control and combat the pandemic.

Materials And Methods: This study aimed to describe the epidemiological profile of COVID-19 patients in a government tertiary centre during wave I and II. All the patients who were tested positive for RT-PCR were included.

Results: Totally 21,865 (I wave) and 24,763 (II wave) were studied. The most common age group affected was 20 to 39 years (53.2%) with mean age 42.6 years and 43.5 years during second wave. About 65.5 % and 51.8% of the population were symptomatic during first and second wave respectively-fever (63.4%), cough (42.6%) and breathlessness (27.6%). About 52.0% had at least one co morbidity-DM (28.6%), Hypertension (25.1%) during the first wave and only 17.9% had anyone co morbidity during second wave. Secondary attack rate was found to 1.2% (I wave) and 1.8% (II wave). Overall recovery was favorable with case fatality was observed to be 2.5% in wave I and that in wave II was 1.4%.

Conclusion: Understanding the trends in the characteristics of SARS-CoV 2 infection will help us to manage the pandemic even in future in limited resource setting.

BACKGROUND

ABSTRACT

SARS-CoV-2 or COVID-19 is a novel strain of corona virus. Its outbreak was recognized in early December 2019 in Wuhan province of China¹. SARS –CoV-2 is a large family of single stranded RNA viruses that can be isolated in different animal species. COVID -19 shows some particular pathological, epidemiological and clinical features which are not completely understood to date as well as its wide and high transmission in the community². It contains emerging and reemerging pathogenic characteristics which have raised great public health concern². It primarily presents as an acute respiratory infection. The spectrum of symptoms may vary from asymptomatic to severe respiratory distress³.

COVID-19 was declared as a global pandemic by WHO on March 11, 2020⁴. According to World Health Organization as on 1st October 2021, COVID-19 has affected more than 233.5 million individuals worldwide, of which 33.8 million belong to India⁴. A disease of such vast magnitude warrants a detailed and comprehensive study for adequate control and if possible prevention^{5,6}. India reported its first case on 30th January 2020 in a medical student who travelled from Wuhan^{7,8} . In a developing country like India, a pandemic that has a high rate of infectivity poses a plethora of issues among our population, such as maintaining social distancing and adequate hand hygiene. The increased population density and insufficiency in availability of healthcare facilities makes the control of this pandemic a challenge. Tamil Nadu recorded its first laboratory-confirmed COVID-19 case on 5th March 2020⁷. The earliest clusters of locally acquired cases emerged in March in Chennai and surrounding coastal districts of eastern Tamil Nadu⁹.

Of all districts, Chennai ultimately experienced the highest cumulative incidence of COVID-19, totaling 102,199 cases (204.6 per 10,000 population) by 1st August 2020. There was a decreasing trend in the propagation of the Pandemic in India till December 2020, further steep decline in disease transmission till February 2021 following which, was another great rise in Covid cases from March 2021 till July 2021 marking the Wave II which was a greater challenge to Public Health system. Ranking third among the highest to report daily cases of infection in India necessitate epidemiological studies to understand the pattern and control the infection⁹. This study helps to identify the burden, pattern and distribution of cases reporting to a Government tertiary care hospital in Chennai.

Objectives:

- To describe the epidemiological profile of RT-PCR positive COVID-19 patients admitted in Kilpauk Medical College and attached COVID care centres during the period of March 2020 to December 2020 and March 2021 to July 2021.

- To compare various epidemiological indices between the above two time periods.

MATERIALS AND METHODS:

A hospital-based Descriptive Cross-sectional study was conducted in Government Kilpauk Medical College, Chennai which is a tertiary care hospital in Chennai, founded in 1960. It has four hospitals attached to it viz - Govt. Royapettah Hospital, Govt. Thiruvotteshwarar Hospital of Thoracic Medicine and Govt. Peripheral Hospital K.K Nagar and Anna Nagar. In the light of Covid pandemic, a COVID OP had been set up along with separate isolation wards for stable patients and ICU for sick patients. It is equipped with the state of art infrastructure having 850 COVID beds which in turn included 283 Non-oxygen beds, 427 oxygen beds, 140 ICU beds and 50 ventilator beds. Covid Care Centres are secondary level centres for clinically mild, very mild or COVID suspect cases. Government Kilpauk Medical College has 13 centres situated in and around 10 km of the main campus and had 2000 COVID beds totally. The secondary data which has been reported periodically to the government for surveillance system was used in this study. An unlinked anonymous analysis was done and hence individual consent form has not been obtained. Patients found to be RT-PCR positive COVID-19 infection among Out-patients and inpatients in Government Kilpauk Medical College and its COVID care centres during May 2020- December 2020 and March 2021 to July 2021. No specific exclusion criteria were used and we have included all the patients who found to be RT-PCR positive among both OP and IP during the specified time period. The data was collected using a semi- structured questionnaire adopted from the Epidemiological case sheet (Form 1B) of National Health Mission which includes demographic details, questions related to symptomatology, Comorbid conditions,

Exposure history, Travel history and clinical course of the disease. Case Definitions are according to the guidelines provided by the Department of Ministry of Health and Family Welfare, India.

RESULTS:

The total number of study population was 21,865 during the first wave which included 10,833 (49.5%) patients from the tertiary centre and 11,032 (50.5%) from the secondary level Covid Care Centers.



During the second wave between March 2021 to July 2021, there were totally 24,763 cases.

Age, Sex And Place Distribution:

Age of the patients ranged from 1 day to 99 years and Mean age was found to be 40.8 years, median 39.0 years. The most common age group affected was between age 20 to 39 years (53.2%). There was a decline in mean age from March 2020 (44.6 years) to December 2020 (40.6 years) and during second wave it was 43.5 years.

Table 1: Age Distribution

	First wave	Second wave	
Mean age	40.8+/-16.8 years	43.5=/-19.6 years	
Age group	Frequency (%)	Frequency (%)	
0 to 10 years	634 (2.9)	428 (1.7)	
11 to 20 years	1663 (7.6)	1521 (6.1)	
21 to 30 years	4747 (21.7)	5777 (23.3)	
31 to 40 years	4703 (21.5)	5456 (22.0)	
41 to 50 years	4091 (18.7)	4840 (19.5)	
51 to 60 years	3236 (14.8)	3977 (16.6)	
61 to 70 years	1751 (8.0)	1849 (7.5)	
71 to 80 years	1008 (4.6)	787 (3.2)	
Above 80 years	29 (0.1)	128 (0.5)	
Total	21865	24,763	



Fig. 1 Sex Distribution



Fig.2 Zone Wise Distribution Of Cases During The First Wave www.worldwidejournals.com Out of the total study population, 61.6% were males and 38.4% females. There was not much differences in the sex distribution over time. 56.4% and 43.5%.Only 44 (0.4%) of them were from countries other than India. 52.3% of them were patients residing in the nearby Zones (Zone VII, VIII and X) and the rest came from various other places across Chennai.Few (166,0.6%) came from other districts as well.

Clinical Symptoms And Presence Of Co Morbidity:

During the first wave, 65.5 % of the population were symptomatic and among the symptomatic patients, the most common symptom was found to be fever (63.4%) followed by cough (42.6%) and breathlessness (27.6%). During the second wave, 51.8% of the patients were symptomatic and the proportion of symptoms were almost the same.

Table No.2 Distribution Of Clinical Symptoms

Symptoms*	First wave (n=14322)	Second wave (n=12,827)
Fever	63.4%	60.1%
Cough	42.6%	44.7%
Respiratory distress	27.6%	32.8%
Sore throat	14.5%	17.3%
Diarrhoea	2.74%	3.1%

About 52.0% of the study population had at least one co morbidity, the most common being Diabetes mellitus (28.6%) followed by Hypertension (25.1%) during the first wave. During the second wave, only 17.9% of those affected had one or more co morbidity.

Table No.3 Distribution Of The Co-morbidity

Comorbidity	First wave (n= 11370)	Second wave (n= 4,433)
Diabetes Mellitus	28.6%	34.5%
Hypertension	25.1%	27.1%
Coronary Artery Disease	6.9%	3.4%
Bronchial Asthma/COPD	4.9%	3.5%
Chronic Kidney Disease	3.5%	2.8%
Hypothyroid	2.4%	1.2%
CVA	1.7%	0.8%%
Seizure	0.3%	0.1%

Source Of Infection And Secondary Attack Rate:

About 3042, 28% of them had travel history to other states or countries. 16% had contact history with a confirmed case of SARS-CoV-2 infection. The mean number of contacts tested per index case was 7.3 (interquartile range, 2 to 9) Secondary attack rate estimates ranged from 1.2% (0.1 to 3.1%).

During the second wave, 12% had travel history and 26% had contact history with a confirmed case. Mean number of contacts tested per index case was 9.6 (IQ range 4 to 13). Secondary attack rate estimates ranged from 1.8% (1.1 to 2.5%).

Outcome:

During the first wave, out of 21,865 study population, 31% got discharged after treatment, 64.9% were sent for home isolation on OP basis, 1.6% got transferred and 544 patients died. For 5663 patients, clinical outcome was not available. Case fatality rate was found to be 2.5% and found to be higher between May 2020 to August 2020 accounting for 71.7% of total deaths. During second wave, out of 24,763 study population, 37.6% got discharged after treatment, 57.9% were sent them for home isolation on OP basis, 2.8% got transferred and 336 patients died. The case fatality rate was found to be 1.4% and during the months of April and May 2021, 257 patients died, accounting for 76.5% of total deaths during the second wave.



Fig. No. 2 Month Wise Distribution Of Deaths



Fig. No. 3 Month wise Case Fatality Rate

Risk Prediction:(During FirstWave)

Table No.4 Age Distribution Vs Presence Of Symptoms

Age in vears	N	Sympto matic %	Asymptomatic%	O.R(C.I)
0-10 years	785	16.4	83.6	1
10-20	2058	18.2	81.8	1.1(0.5-2.4)
years				
20-30	5874	27.1	72.9	1.8(0.9-3.7)
years				
30-40	5805	29.9	70.1	2.1(1.1-4.3)
years				
40-50	5054	34.1	65.9	2.6(1.3-5.3)
years				
50-60	4011	44.1	55.9	4.02(2.1-7.9)
years				
60-70	2176	55.8	44.2	6.4(3.3-12.4)
years				
70 years	1244	62.7	37.3	8.6(4.4-16.6)
and above				

There is increasing odds of symptom presentation as age increases. Mean age among symptomatic was 44.81 years and asymptomatic was 36.38 years (p=0.001). Males have significantly higher odds of symptomatic presentation (OR=1.13 95% CI 1.11 to 1.23) compared to female patients. Patients with comorbid conditions have significantly higher odds of symptomatic presentation (OR =5.8 95% CI 5.3 to 6.3) compared to cases without co-morbidity.

DISCUSSION:

SARS-CoV-2 is one of the virulent pathogens causing severe acute respiratory illness in humans. Case studies from China had demonstrated COVID-19 to be a respiratory illness with a wide spectrum ranging from mild illness (81%), severe respiratory distress (14%) to critical illness in five per cent with a case fatality rate of $2.4\%^{1.2}$. Globally, Considerable disparities in both demographic and clinical patterns have been reported between countries across different continents. This descriptive study was conducted to focus the clinical profile and outcomes of initial COVID-19 patients during wave I and II in a tertiary care Govt. Hospital in Chennai, South India. In this study, the mean age of the patients in wave I was found to be overall 40.8 years, median age 39 years while during second wave it was 43.5 years compared to those in China(Median age-56 years)^{1.2}. Shiv Lal Soni et al reported Median age to be 33 years from North India¹⁰ while Gupta N et al reported it to be Mean age of 40.3 years¹¹. Banke Lal Sherwal et al reported the inter-quartile range for age to be 33-60 years in their study conducted in Delhi while the mean age was 48 years¹². In this study, in wave I the secondary attack rate was 1.2% (0.1 % -3.1%) while in wave II it was 1.8% (1.1% - 2.5%).

In our study, majority about 65.5% of patients were asymptomatic during first wave as in comparison to about 58% were asymptomatic as reported by Shiv Lal Soni et al¹⁰. In wave II, we observed only 48.2% were asymptomatic among the admission. Among the symptomatic patients, fever was the most common symptom about 63.4% followed by cough and respiratory distress while Shiv Lal Soni et al reported three-fourth of symptomatic patients had fever and half of them had respiratory symptoms¹⁰. So any symptomatic with fever has to be observed, isolated and screened for COVID infection to interrupt the transmission among their contacts. In our study, it was observed that increasing age had a significant association with symptomatic presentation as well as Male gender had higher odds of symptomatic presentation as reported by Shiv Lal Soni et al¹⁰. Among the co-morbid conditions, in our study at least 52% had at least one comorbidity, Diabetes mellitus leading among them to be 28.6% in wave I and 34.5% to be wave II followed by Hypertension, Coronary artery disease. Banke Lal Sherwal et al also reported the most common co-morbid condition in their study to be Diabetes (20.1%) and Hypertension $(19.2\%)^{12}$. In this study, Patients with co-morbidities had significant higher odds of symptomatic presentation. Comorbidities like Diabetes Mellitus, Hypertension, cardiac, renal diseases and malignancy with COVID-19 have been reported to have poor prognosis¹² as observed in our study too. In this study, overall recovery from the illness was favorable for recovery and discharge in wave I with case fatality was observed to be 2.5% and that in wave II was 1.4%. Laxminarayan et al reported the case fatality rate in subcohort in Tamil Nadu and Andhra Pradesh to be 2.06% with risk of death increasing with age and associated with Male gender and co-morbidities[®]. Banke Lal Sherwal et al reported in their study conducted in North India that case fatality rate was 1.4% to 3.6%¹². In comparison with wave I and II, the comorbidities were the prognostic factors for recovery as well as mortality. In wave II, the case load and burden was sudden with more month-wise mortality than that observed in wave I in our setting. Increasing age is one of the significant factors to predict outcome and survival of COVID-19 patients. Simona Iftimie et al reported in their comparative study on first and second waves of COVID-19 in Spain that preparedness helped in reduction of hospital stay, intensive protocol based treatment and lower case fatality rate in wave II than wave I^{13} .

Controlling the source of infection, early diagnosis, isolation of cases and suspects, supportive care, preventive measures like sanitation, social distancing, wearing masks, vaccination have to be taken into consideration to curb the spread of this Pandemic of COVID-19^{14,15}. Indeed it is to be stressed that Protocol based triage and management of cases resulted in better outcome and case fatality in COVID-19 patients. Hence it is the need of the hour to remain vigilant in the constant study and research of characteristics of COVID-19 disease, treatment protocol and disseminate results to scientific world to combat the pandemic COVID-19.

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REFERENCES:

- Huang C, Wang Y, Li X, Ren L et al. Clinical features of Patients infected with 2019 novel Corona Virus in Wuhan, China. Lancet 2020;395(10223):497-506.
- Chen J. Pathogenicity and transmissibility of 2019-nCoV- a quick overview and comparison with other emerging viruses. Microbes and Infection.2020;22(2):69-71.
- Cheng ZI, Shan J. Novel Coronavirus: where we are and what we know. Infection.2019;2020:1-9.
- www.covid19.who.int;WHO Coronavirus (COVID 19) Dashboard; retrieved as on 1 October 2021 5.54 pm CEST.
- Qin X, Qiu S, Yuan Y et al. Clinical characteristics and treatment of patients infected with COVID-19 in Shishou, China; Infection:2020(9).
 Reza Shahriarirad, Zohre Khodamoradi. Epidemiological and clinical
- Reza Shahriarirad, Zohre Khodamoradi. Epidemiological and clinical features of 2019 novel Coronavirus diseases (COVID-19) in the South of Iran. BMC Infectious Diseases (2020) 20:427-430.
 Ministry of Health and Family Welfare. GOI.cited on 2020 Sep 25. Available
- Ministry of Health and Family Welfare. GOI.cited on 2020 Sep 25. Available from:https://www.mohfw.gov.in.
- Andrews MA, Areekal B, Rajesh KR et al. First confirmed case of COVID-19 infection in India. A case report. Indian J Med Res2020;151:490-2.
- Laxminarayan et al. Epidemiology and transmission dynamics of COVID-19 in two Indian states. Science 370, 691–697 (2020).
- Shiv lal Soni. Demographic and clinical Profile of patients with COVID-19 at a tertiary care hospital in North India. Indian J Med Res 153; Jan (2021):115-125.
- Gupta N, Agarwal S et al. Clinical and Epidemiological profile of the initial COVID-19 patients at a tertiary care centre in India. Monaldi Arch Chest Dis 2020;90:193-6.
- Banke lal Sherwal et al. Trends and clinic-epidemiological profile of COVID-19 patients at a designated COVID-19 hospital in Delhi. North India. J Fam Med & Primary Care. IP: 106(2):6261-6266.
- First and second waves of Coronavirus disease-19: A comparative study in hospitalized patients in Reus, Spain. PLOS ONE/https://doi.org/10.1317/ journal.pone.0248029.March(2021).
- R.Verity, L. C. Okell, I. Dorigatti et al., "Estimates of the severity of coronavirus disease 2019: a model-based analysis," *The Lancet Infectious Diseases*, vol. 20, no. 6, pp. 669–677, 2020.
- Win A. Rapid rise of COVID-19 second wave in Myanmar and its implications for the Western Pacific Region. QJ.2020; hcaa290. https:// doi.org/10.1007/ s10461-019-02470-3PMID:33095232.