Community Section

Epidemiological Profile and Clinical Outcome of COVID-19 Patients in a Tertiary Care Hospital, Pune, India

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ABSTRACT

Introduction: The COVID-19 caused by Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2), has spread throughout the world from its place of origin in Wuhan city of China. From origin in December 2019 till May 2021, this disease affected 222 countries in the world with 152,534,452 confirmed cases. As on May 2021, India is the second worst affected country in the world.

Aim: To know the epidemiological profile and clinical outcome of COVID-19 positive patients to help in understanding the disease dynamics.

Materials and Methods: It was a cross-sectional, record based study at a tertiary care hospital. All the COVID-19 laboratory confirmed positive patients admitted from 15th June, 2020 to 15th September, 2020 were included in the study. Sample size was 1146. All the required data regarding patients were collected and analysed subsequently with the help of percentages, Z-test for proportion, Chi-square test and Odds ratio.

Results: The mean age of the patients was 47.06±17.4 years ranging from 1 to 92 years. Males were significantly higher in numbers than females. 30.19% patients had some or other co-morbidities. 89.8% patients were discharged and 9.2% patients died. More number of deaths occurred in higher age group and highest death rate was seen in the patients who had multiple co-morbidities.

Conclusion: The study concludes that most of the COVID-19 patients were middle aged and males were significantly more affected than females. Most of the patients were asymptomatic at the time of admission. It can be concluded that maximum patients had favourable clinical outcome as around 90% patients being discharged and case fatality rate was 9.2%. High rate of mortality was significantly associated with higher age and presence of co-morbidities.

INTRODUCTION

In December 2019, a new respiratory tract infecting agent emerged in Wuhan city of China, known as SARS-CoV-2 (Severe Acute Respiratory Syndrome-Coronavirus-2) [1-3]. World Health Organisation (WHO) under International Health Regulations declared this outbreak as a "Public Health Emergency of International Concern" (PHEIC) on 30th January 2020. WHO subsequently declared COVID-19 as a pandemic on 11th March, 2020 [4]. From origin in December 2019 till May 2021, this disease affected 222 countries in the world with 152,534,452 confirmed cases. As on May 2021, India is the second worst affected country in the world [5].

In India, since the beginning highest cases were found in the state of Maharashtra [6]. Pune city from Maharashtra emerged as a Corona capital with 1,61,945 confirmed cases in August 2020 and remained the number one district in Maharashtra till date with highest number of cases and deaths [7]. Most people infected with the SARS-CoV-2 will experience mild to moderate respiratory illness and recover without requiring special treatment. But people with co-morbidities may land up in serious illness or it may lead to mortality in the affected individuals [8]. As part of a comprehensive strategy, case identification, isolation, testing and care, and contact tracing and quarantine, are critical activities to reduce transmission and control the epidemic [9].

As the disease has evolved, our knowledge regarding the disease aetiology, pathogenesis, diagnosis, treatment and prevention has also evolved. Various data generated from various parts of the world have helped the researchers and scientists to analyse the information related to the coronavirus. Evidence generated through different research studies have helped in decision making and there has been a lot of improvement in case management as well as it has

helped in clearing the present misconceptions about the disease through the time period [10]. Thus, there is a need of generating evidence related to COVID-19 disease in all the possible aspects.

Study objective:

- To study the epidemiological profile of COVID-19 positive patients admitted in the tertiary care hospital.

- To know the clinical presentation and outcome of these patients.

MATERIALS AND METHODS

The study design was a cross-sectional, record based study at Smt. Kashibai Navale Medical College and GH, Pune, Maharashtra, India. The study was retrospective in aspect where all required data were taken from the Medical Records Department (MRD) of a tertiary care hospital. All medical records of patients were stored in electronic data form. Data of COVID-19 positive patients admitted in the hospital from 15th June, 2020 to 15th September, 2020 were taken for the study. COVID-19 Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) was used for diagnosis of COVID-19 disease. Various data regarding patients like demographic data, clinical presentation and their outcome was collected through preformed questionnaire and analysed.

Permission for data collection from MRD and conduct of study was obtained from head of the institute. Institutional Ethical Committee approval was taken prior to study (Ref. SKNMC/Ethics/App/2020/684 dated 15/10/2020). Confidentiality and anonymity was maintained throughout the study.

Inclusion criteria: All the COVID-19 laboratory confirmed positive patients with the COVID-19 RT-PCR test who were admitted in the tertiary care hospital during 15th June, 2020 to 15th September,

2020 i.e. three months duration were included in the study. Total 1146 patients were included in the study.

Exclusion criteria: Patients admitted with suspected COVID-19 infection during the above duration were excluded.

Data of 1146 patients were gathered from Medical Records Department (MRD). Secondary data about age and sex distribution, geographical distribution, presence of symptoms, data regarding various co-morbidities and clinical outcome of the patients was extracted from MRD. The study investigators checked the data and reviewed it for any missing data/inconsistent data. Necessary corrections were done with the help of staff from MRD.

STATISTICAL ANALYSIS

Data was collected and entered in Microsoft Excel spread sheet after coding. It was further processed and analyzed using Epidemiological Information (EPI-INFO) TM Version 7 Software. Mean, percentage, proportion and standard deviation was calculated based on type of data. Appropriate tests of significance like Z test for proportion, Chi-square test, Odds ratio were used. A p-value of <0.05 was considered as statistically significant.

RESULTS

Total of 1146 patients were included in the study. The mean age of the patients was 47.06±17.4 years ranging from 1 to 92 years. Maximum patients were in the age group of 41 to 60 years. Total number of males were 705 (61.5%) and females were 441 (38.5%). Males were affected significantly more than females (z=10.969, p-value <0.001) [Table/Fig-1].

Age distribution (in years)	Gender distribution		Total (%)
	Male n (%)	Female n (%)	
≤20	37 (3.22)	31 (2.71)	68 (5.93)
21-40	209 (18.24)	146 (12.74)	355 (30.98)
41-60	278 (24.26)	170 (14.84)	448 (39.10)
61-80	168 (14.66)	86 (7.50)	254 (22.16)
> 80	13 (1.13)	8 (00.70)	21 (1.83)
Total	705 (61.52)	441 (38.48)	1146 (100)

[Table/Fig-1]: Age and gender distribution of study subjects (n=1146).

As per the geographic distribution of these patients, 616 (53.75%) patients were from urban area of Pune district, 509 (44.42%) were from rural area of Pune district and 21 (1.83%) were from area out of Pune District. Total 616 (53.8%) patients were asymptomatic at the time of admission while 530 (46.2%) were symptomatic or critical at the time of admission. Patients on ventilators at the time of admission were 47 (4.1%).

In the study, out of total 1146 patients, majority 800 (69.81%) patients had no co-morbidities. A 97 (8.46%) patients had diabetes mellitus and 82 (7.16%) patients had hypertension. Total 65 (5.67%) patients had both diabetes mellitus and hypertension, 67 (5.85%) patients had multiple co-morbidities and 35 (3.05%) patients had other single co-morbidities [Table/Fig-2].

In the clinical outcome of patients, 1028 (89.8%) patients were discharged, 106 (9.2%) died, 7 (0.6%) were Discharged Against Medical Advice (DAMA) and 5 (0.4%) were referred to other COVID care centres [Table/Fig-3].

Chance of death was significantly associated with the higher age group (χ^2=129, p<0.001). No deaths were seen in <20 years age group [Table/Fig-4].

Deaths among males were 71 (66.98%) and among females were 35 (33.02%). Gender was not significantly associated with mortality (χ^2=1.54, p=0.213). Maximum deaths (97.21%) were associated with co-morbidities. Only 2.79% deaths occured in the group without co-morbidities. Among the various co-morbidity groups, highest mortality was observed in the multiple co-morbidities group (Odds

Clinical outcome / Co-morbidities	Discharge n (%)	Death n (%)	Odds ratio (95% Confidence interval)	p-value
No co-morbidity*	766 (97.21)	22 (2.79)		
Multiple co-morbidities	40 (59.70)	27 (40.30)	23.50 (12.31-44.86)	<0.001
Hypertension with diabetes	49 (75.38)	16 (24.62)	11.37 (5.61-23.02)	<0.001
Hypertension	64 (78.05)	18 (21.95)	9.79 (4.99-19.19)	<0.001
Diabetes mellitus	86 (88.66)	11 (11.34)	4.45 (2.08-9.49)	<0.001
Other single co-morbidities#	23 (65.71)	12 (34.29)	18.17 (8.02-41.10)	<0.001

[Table/Fig-2]: Table showing association of co-morbidities and clinical outcome (n=1134).
*12 patients (DAMA and Referral patients) who are in no co-morbidity group are excluded as they could not be followed up. So, total 788 patient's outcome has been mentioned out of total 800 in no co-morbidity group. #Other single co-morbidities=Cancer; Respiratory diseases like asthama, COPD; Stroke; Coronary artery disease; Renal diseases; Hypo/Hyperthyroidism; Dementia; Polytrauma etc.; p-value <0.05 considered significant
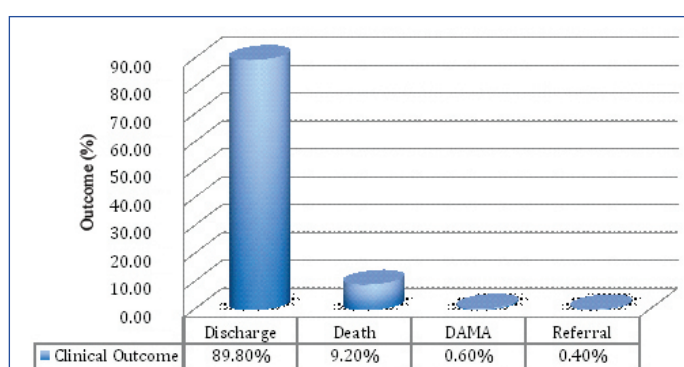
[Table/Fig-3]: Figure showing clinical outcome of patients (n=1146).

Age distribution (in years)	Total patients group n (%)	Total deaths group n (%)
≤20	68 (100)	0 (0)
21-40	355 (100)	3 (0.85)
41-60	448 (100)	33 (7.37)
61-80	254 (100)	62 (24.41)
>80	21 (100)	8 (38.10)

[Table/Fig-4]: Age-wise distribution of mortality (n=1146).

Ratio (OR)=23.5, Confidence Interval (C.I.)=12.31-44.86, p<0.001). Most significant single co-morbidity associated with death was hypertension (OR=9.79, C.I.=4.99-19.19, p<0.001) followed by diabetes (OR=4.45, C.I.=2.08-9.49, p<0.001) [Table/Fig-2].

DISCUSSION

The mean age of the patients was 47.06±17.4 years ranging from 1 to 92 years and total number of males were 61.5% and females were 38.5% with male preponderance with a statistically significant difference. In study done in Pune by Tambe MP et al., [2], majority i.e., 109 (55.4%) were between the age group of 31-60 years; mean age was 45.8±17.3 years; ranging from four months to 85 years and there was a slight male preponderance with M:F ratio of 1:1.2. Also in the study in North India by Mohan A et al., [11],the mean age of the patients were 40.1±13.1 years, with 93.1% males. Similar findings were seen in the study done by Gupta N et al., [12] in tertiary care hospital in Delhi, where the mean age of the population was 40 years with a slight male predominance and also in the Sherwal BL et al., study [13] where the median age of participants was 48 years (09-95 years) and men to women ratio was 3.4:1 with a statistically significant difference. The findings can be attributed to the theory that middle-aged people are at more risk of exposure as they go out to work/ jobs or for other household work. Same reason can explain

more male preponderance as they have higher risk of exposure than females. Bwire GM [14] mentioned that the biological differences in the immune systems do exist between men and women which may impact the ability to fight an infection including SARS-2-CoV-2 and author also quoted "Generally, females are more resistant to infections than men, and this is possibly mediated by several factors including sex hormones and high expression of coronavirus receptors (ACE 2) in men but also life style, such as higher levels of smoking and drinking among men as compared to women. Additionally, women have more responsible attitude towards COVID-19 pandemic than men. This may reversibly affect the undertaking of preventive measures such as frequent hand washing, wearing of face mask, and stay at home orders [14].

As per the geographic distribution of these patients, 53.75% patients were from urban area of Pune district, 44.42% patients were from rural area of Pune district and 1.83% were from area out of Pune District. Most of the patients were from the same district and few were referred from outside district for better management as this is a tertiary care hospital.

Majority i.e. 53.8% patients were asymptomatic at the time of admission while 46.2 % were symptomatic at the time of admission. Tambe MP et al., [2] mentioned 22.8% patients were asymptomatic from exposure to admission whereas Mohan A et al., [11] in North India mentioned a significant proportion of patients had no symptoms (44.4%). Majority of the patients were symptomatic in studies done by Gupta N et al., [12] and Sherwal BL et al., [13]. WHO also states most people infected with the COVID-19 virus will experience mild to moderate respiratory illness [8].

In the study, majority i.e. 69.81% patients had no co-morbidities while 30.19% had some or other co-morbidity. Most common co-morbidity found was diabetes mellitus (8.46%) followed by hypertension (7.16%), 5.67% patients had both diabetes mellitus and hypertension and 5.85% patients had multiple co-morbidities. In a study by Tambe MP et al., [2] done in Pune, 52.8% had no history of any co-morbidity while 47.2% reported one or the other co-morbidity; hypertension being the most common one followed by diabetes. Mohan A et al., [11] found co-morbidities present in 15.9% patients, of which diabetes mellitus was the most common similar to present study. Sherwal BL et al., [13] study also showed 38.6% had various preexisting co-morbidities, most commonly diabetes mellitus (35.0%) and hypertension (34.0%). Diabetes mellitus and hypertension were the most common co-morbidities in COVID patients.

In present study, out of total patients, 89.8% patients were discharged, 9.2% died, 0.6% were DAMA and 0.4% were referred to other COVID care centres. Case fatality in present study was 9.2%. In Tambe MP et al., [2] study, case fatality rate of 29.4% was calculated and 37.6% recovered and were discharged. As the pandemic progressed throughout the world, better management protocols were developed through various researches and it reduced case fatality rate of the infection over the time.

In the present study, it was found that chance of death was significantly associated with the higher age group (p<0.001). Highest death rate was seen among above 80 years age group followed by 61-80 years age group. No deaths were seen in <20 years age group. In Tambe MP et al., [2] study, no deaths were seen in age group of 0-20 years and highest death rate of 45.4% was seen in age group 71-80 years followed by age group 51-60 years 41.6% similar to the present study. Sherwal BL et al., [13] in their study, also mentions that chance of death was significantly associated with the higher age group (p=0.005). In COVID-19 infection as age factor increases, rate of mortality also increases. In the present study, gender was not significantly associated with mortality (p=0.20), though more number of deaths occurred in males. In Tambe MP et

al., [2] study overall male preponderance was seen among deaths. It can be assumed that, as males are more commonly infected with COVID-19 than females, hence mortality figures also show male preponderance but male gender is not significantly associated with the risk of death.

In the present study, maximum were discharged (97.21%) had no co-morbidity and only 2.79% deaths occured in the group without co-morbidities. Among the various co-morbidity groups, highest mortality was observed in the multiple co-morbidities group (OR=23.5, C.I.=12.31-44.86, p<0.001). Most significant single co-morbidity associated with death was hypertension (OR=9.79, C.I.=4.99-19.19, p<0.001) followed by diabetes (OR=4.45, C.I.=2.08-9.49, p<0.001). Tambe MP et al., [2] mentioned that out of 58 patients who died due to COVID-19, co-morbidity was one of the significant risk factor for death (Odds Ratio [OR]=16.8, 95% confidence interval [CI]=7.0-40.1, p<0.0001) similar to the present study.

The WHO [8] also states that older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. Similar findings are seen in various other systematic review and meta-analysis studies done in various parts of the world by Sanyaolu A et al., [15], Zhou Y et al., [16], Yang J et al., [17].

The present study gives detailed insight regarding demographic and clinical parameters of COVID-19 affected individuals and their clinical outcome in a certain geographic area i.e. Pune, Maharashtra, India. This will be a valuable addition to the expanding COVID-19 knowledge base and will help in further research on this topic.

Limitation(s)

The study was record based study so available secondary data was used in the study. The study provides a general overview of the few disease aspects in the study area during study period, but it can not be generalisable as disease presentation, management and case fatality have changed from the start of the pandemic till date in different ways in different parts of the world.

CONCLUSION(S)

This study presented a data of 1146 COVID-19 positive admitted patients in a tertiary care hospital in Pune. Epidemiological profile of patients showed that maximum patients were from the Pune district. It also showed most of the COVID-19 patients were middle aged and males were more affected than females. Most of the patients were asymptomatic at the time of admission. It can be concluded that maximum patients had favourable clinical outcome. Around 90% patients were discharged and case fatality rate was 9.2%. High rate of mortality was significantly associated with higher age and presence of co-morbidities.

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