



ORIGINAL ARTICLE

Frequency and factors associated with severe COVID-19 patients.

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ABSTRACT... Objective: To determine the frequency and factors leading to the development of severe COVID-19 in patients presenting at civil hospital, Karachi. **Study Design:** Cross-sectional study. **Setting:** Department of Medicine, Dr. Ruth K.M Pfau Civil Hospital, Karachi. **Period:** July 16, 2021 to January 15, 2022. **Methods:** Patients of age 20 to 80 years of either gender and presented with fever ($>38^{\circ}\text{C}$) for more than three days and diagnosed COVID-19 on PCR were included. Severity and factors of the disease were assessed and noted by researcher on pre-designed proforma. **Results:** The mean age was 48.5 ± 11.07 years and most of the patients were males (56.7%) and urban residents (67%). Out of 97 COVID-19 patients, 12 had severe COVID-19 disease (12.4%), while 85 patients had mild to moderate COVID-19 disease (87.6%). In distribution of factors leading for development of severe covid-19, increasing age was noted in 8 (66.7%) patients, chronic kidney disease in 4 (33.3%), diabetes mellitus type II 3(25.0%), hypertension 6(50.0%), smoking 3 (25.0%), heart failure 2 (16.7%) while anemia was noted in 1 (8.3%) patient. Of 12 severe COVID-19 patients, 8 patients had positive family history of COVID-19. There was statistically significant association between COVID-19 severity and family history of COVID-19 ($p=0.001$). **Conclusion:** Severe covid-19 is common in patients presenting with fever while increasing age was noted as most common factor leading to development of severe covid-19 followed by hypertension and diabetes mellitus.

Key words: Coronavirus, COVID-19, Infection, Risk Factors, Severe Disease.

INTRODUCTION

On 30th Jan 2019 WHO declared COVID-19 as a public health emergency and on 11th March 2019 they declared it as a “Pandemic”.¹ Due to overloaded hospital settings, there was a long waiting time for hospital admission which was a risk factor for COVID-19 severity.^{2,3} This shows that early treatment can be effective and impact the course of disease positively.^{1,4}

The typical symptoms of COVID-19 infection are cough, fever, fatigue, headache, hemoptysis, myalgia and diarrhea, while the severe cases have greater risk of respiratory distress syndrome and even organ failure including renal, liver and heart failure.^{5,6,7} Studies have revealed that males COVID-19 patients are at greater risk of severe disease and mortality as compared to females. Moreover, patients with higher age and comorbidities are also at greater risk of severe COVID-19 infection.^{8,9} In the study

by Hu et al., severe COVID-19 disease was present in 60% of males, 25% of older patients (>65 years), 34% of obese patients, and 55% of the patients with comorbidities. They further revealed that hypertension was the most frequent comorbid (34%) followed by diabetes (20%) and cardiovascular disease (12%), respectively.¹⁰ Some studies also highlighted that risk of severe COVID-19 was higher among smokers and immunosuppressant users.^{3,8,9,11}

Limited information is known on the causes of severe COVID-19 in Pakistan. To identify vulnerable groups, the risk factors will help researchers better understand the pathophysiological mechanisms underlying Covid-19, which can then be used to design potential treatment plans. However, information on this is dispersed and based on very small research. Moreover, there is worldwide literature available, but it is not applicable to our community owing to differences

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in the demographics, life style, living conditions and health care delivery, these all effects the disease dynamics. So, the aim of current study is to determine the frequency and factors leading to the development of severe COVID-19 in patients presenting at civil hospital, Karachi, Pakistan.

METHODS

It was a cross-sectional study carried out at the Department of Medicine, Dr. Ruth K.M Pfau Civil Hospital, Karachi from July 16, 2021 to January 15, 2022. The required sample size came out to be 97 patients. By taking frequency of severe COVID-19 as 10%(12), margin of error=6% and confidence level 'C.1'=95%. This sample size was calculated using the WHO software. Patients of age 20 to 80 years of either gender and presented with fever (>38°C) for more than three days and diagnosed COVID-19 on PCR were included. Patients presented with malaria, dengue or typhoid, history of hepatitis B & C, HIV, malignancy, interstitial lung disease, pulmonary embolism, chronic obstructive pulmonary disease, asthma, myocardial infarction and chronic liver disease were excluded. Samples were included in the study using consecutive method.

Permission from the institutional ethical review committee was taken prior to conduction of study (150/07/21). Prior to enrollment informed consent was taken from patient/guardian. Brief history about demographic information was taken at the time of admission from the patient. COVID-19 patients having positive qRT-PCR were considered as severe if any one or more of the following was present: Respiratory frequency > 30 breaths per minute on clinical examination, SaO₂ < 93% on room air measured on pulse oximeter, ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO₂/FiO₂) < 300 measured on ABG and lung infiltrates on CT scan>50%. The researcher then looked for factors leading to the development of severe COVID 19 including increasing age (age > 65 years), chronic kidney disease (with serum creatinine level of >1.3mg/dl in males and >1.2mg/dl in females at the time of admission), diabetes mellitus type II (history of DM and on anti-diabetic medication for at least 6 months either controlled and uncontrolled),

hypertension (documented history of HTN and on anti-hypertensive medication for at least 6 months either controlled or uncontrolled) , smoker (a person who smoke 10 cigarettes per day for the last two years), heart failure (patient having a New York Heart Association Functional Class >1 (13)) and anemia (serum hemoglobin < 12 mg/dl in male and <11 mg/dl in female). Other information such as duration of fever, gender, residence status, family monthly income, occupational status, ICU admission and family history of COVID-19 was also noted by researcher on pre-designed proforma.

SPSS version 22 was used to analyze data. Mean and SD was reported for age and duration of fever. Frequency and percentage were reported for gender, residence status, family monthly income, employment status, ICU admission, family history of COVID-19, severity of COVID-19 and risk factors. Effect modifiers were controlled through stratification of age, gender, residence status, family monthly income, employment status, ICU admission, family history of COVID 19 and duration of fever to see the effect of these on the outcome variables. Post stratification, Chi square/ Fischer exact test was applied taking p-value of < 0.05 as statistically significant.

RESULTS

The mean age was 48.5±11.07 years and most of the patients were males (56.7%) and urban residents (67%). Almost 73.2% of the patients were employed, 51.5% were admitted in ICU, 18.6% had positive family history of COVID-19 and 50.5% had income between 25,000 to 45,000 PKR, respectively. (Table-I)

Out of 97 COVID-19 patients, 12 had severe COVID-19 disease (12.4%), while 85 patients had mild to moderate COVID-19 disease (87.6%). In distribution of factors leading for development of severe covid-19, increasing age was noted in 8 (66.7%) patients, chronic kidney disease in 4 (33.3%), diabetes mellitus type II 3(25.0%), hypertension 6(50.0%), smoking 3 (25.0%), heart failure 2 (16.7%) while anemia was noted in 1 (8.3%) patient.

Stratification of age group, gender, residential status, occupational status, ICU admission, family history of COVID-19, duration of fever and family monthly income were done with respect to severe COVID-19 to find statistical difference. Of 12 severe COVID-19 patients, 8 patients had positive family history of COVID-19. There was statistically significant association between COVID-19 severity and family history of COVID-19 ($p=0.001$). (Table-II)

Variables	Statistics
Age (years)	48.5±11.0
Duration of fever (days)	7.3±2.6
Gender	
Male	55 (56.7%)
Female	42 (43.3%)
Residence	
Urban	65 (67%)
Rural	32 (33%)
Employment status	
Employed	71 (73.2%)
Unemployed	26 (26.8%)
ICU admission	
Yes	50 (51.5%)
No	47 (48.5%)
Family history of COVID-19	
Yes	18 (18.6%)
No	79 (81.4%)
Family monthly income	
<25,000 PKR	21 (21.6%)
25,000-45,000 PKR	49 (50.5%)
>45,000 PKR	27 (27.8%)

Table-I. Baseline characteristics of study variables (n=97)

DISCUSSION

Many studies have been conducted related to COVID-19 pandemic, but a huge number of studies are limited symptomatology, mental health and impact on health system. Thus, in the current study, we have evaluated the potential factors associated with severe COVID-19 disease.

According to CDC, severe COVID-19 disease is more common in higher age as compared to younger age.¹⁴ F Ho et al. also revealed that mortality was higher in patients ≥75 years as compared patients with age<65 years.¹⁴ In our study, mean age was 48.5±11.07 years. While in the study by Xia L et al. the mean age was

48.23±15.55 years.¹² Boehmer et al. conducted a study in UK and concluded that advanced age is an independent risk factor for severe COVID-19 disease and mortality.¹⁵ Adults are the family’s breadwinners, therefore they often need to travel outdoors more and interact with individuals from other backgrounds. Additionally, the age of 35 or older is the cutoff for the onset of non-communicable illnesses; as a result, those over 35 are at a higher risk of developing severe COVID-19.^{16,17}

	Severe COVID-19		P-Value
	Yes	No	
Age groups			
20 to 50 years	5 (5.2%)	30 (30.9%)	0.448
>50 years	7 (7.2%)	55 (56.7%)	
Gender			
Male	6 (6.2%)	49 (50.5%)	0.617
Female	6 (6.2%)	36 (37.1%)	
Residence			
Urban	9 (9.3%)	56 (57.7%)	0.393
Rural	3 (3.1%)	29 (29.9%)	
Employment status			
Employed	8 (8.2%)	63 (64.9%)	0.407
Unemployed	4 (4.1%)	22 (22.7%)	
ICU admission			
Yes	7 (10.6%)	43 (10.6%)	0.424
No	5 (34.8%)	42 (44.1%)	
Family history of COVID-19			
Positive	8 (8.2%)	10 (10.3%)	0.001
Negative	4 (4.1%)	75 (77.3%)	
Duration of fever			
4 to 12 days	5 (5.2%)	33 (34%)	0.543
>12 days	7 (7.2%)	52 (53.6%)	
Family monthly income			
<25,000 PKR	3 (3.1%)	18 (18.6%)	0.806
25,000-45,000 PKR	5 (5.2%)	44 (45.4%)	
>45,000 PKR	4 (4.1%)	23 (23.7%)	

Table-II. Association of severe COVID-19 disease with socio-demographic factors (n=97)

In the present study, 56.7% of the patients were and 43.3% were females. Hu L et al. found similar results, most of the patients were males (51%) and 49% of the patients were females.¹⁸ In another study by Chen R et al. noted to have 30 (60%) male and 20 (40%) female cases.¹⁹ While Xia L et. Similar proportion of males (50%) and females (50%) in their research.¹² In the present study, most of the patients were urban area and

less patients were from rural areas (67% vs 33%). In the study by Mohsin et al. similar findings have been observed, 90.9% of the patients were from urban area and 9.9% of the patients were from rural area.²⁰ Furthermore, we found 73.2% of the patients were employed and 26.8% of the patients were unemployed. Hu L et al. found employment in 30.3% cases, retired were 44.6%, self-employed 3.7% while 21.4% patients were unemployed.¹⁸

In current study severe covid-19 was found in 12 (12.4%) patients. The study of Xia L, et al found severe covid-19 in 10% patients.¹² This study showed factors leading for development of severe covid-19 as increasing age was noted in 8 (66.7%) patients, chronic kidney disease in 4 (33.3%), diabetes mellitus type II 3(25.0%), hypertension 6(50.0%), smoker 3 (25.0%), heart failure 2 (16.7%) while anemia was noted in 1 (8.3%) patient. The study of Mohsin FM, et al found diabetes mellitus in 74.0% cases, hypertension 76.2%, chronic kidney disease 61.6%, smoking 50.0% while increasing age was noted in 18.0% patients.²⁰

In present study, stratification of confounders / effect modifiers with respect to diabetes mellitus, insignificant difference was noted in age group ($P=0.448$), gender ($P=0.6.17$), residential status ($P=0.393$), occupational status ($P=0.407$), ICU admission ($P=0.424$), duration of fever ($P=0.543$) and family monthly income ($P=0.806$), while, significant difference was noted in family history of covid-19 ($P=0.0001$). However, all patients had similar severity of the disease, so examination of real-life situations provided useful information. Further large-scale work is recommended for validation of current findings. Our study comes up with several strengths and limitations. We have successfully revealed some important risk factors of life-threatening COVID-19, which might be helpful for the general population as well as policymakers.

CONCLUSION

Severe COVID-19 is common in patients presenting with fever while increasing age was noted as most common factor leading to

development of severe covid-19 followed by hypertension and diabetes mellitus.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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




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2	Syed Tesheen Akhtar	Concept and design of study, data validation, literature review, final review of the manuscript.	
3	M. Hussain Haroon	Concept and design of study, data validation, literature review, final review of the manuscript.	
4	Arjan Kumar	Initial write up, data analysis, results and final review of the manuscript.	
5	Sapna Bai	Data analysis, results and final review of the manuscript.	
6	Amber Hanif	Final manuscript writing, literature review and final approval of manuscript.	