

# Risk Factors of COVID-19 Infection: Certainly Un-Certainty

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## ABSTRACT

**Objective:** To find out risk factor and their relation to severity of disease in COVID-19 patients.

**Study Design:** Cross sectional prospective study

**Place and Duration of Study:** This study was conducted at the Al-Tibri Medical College Hospital, Isra University Karachi campus Karachi from July 2021 to December 2021.

**Materials and Methods:** This cross-sectional prospective study assessed consecutive patients with suspected COVID-19 infection, confirmed by positive RT-PCR. Medical history, clinical and lab evaluations were conducted to determine infection risk factors and disease severity. Patients were categorized into three groups based on symptom severity. Monitoring, management, and follow-up were performed accordingly for all subjects.

**Results:** Total 178 subjects were included in the study. Among those 127 (71.3%) were males and 51 (28.7%) females with over all mean age of 48.062±14.796 years (range 16-85 years). Demographically; majority of subjects were: illiterate or primary education status 60 (33.7%) 59 (33.1%) respectively, sindhi were 75 (42.1%) followed by Baloch 72 (40.4%). On the basis of potential exposure risk: 163 (91.6%) were related non-medical professionally, 37 (20.9%) had exposure history COVID-19 patients, 56 (31.5%) with Mosque attendance, abroad travel history was found in only 19 (10.7%) patients. Disease severity wise; 36 (20.2%) subjects were asymptomatic (Group I), 129 (72.5%) mildly symptomatic (Group II) while 13 (7.3%) patients has severe disease (Group III) Majority of study subjects had one or more Co-morbid/s, among those 26 (14.6%) were diabetics, 22 (12.4%) hypertensive, 29 (16.3%) had both Diabetes and hypertension, 05 (2.8%) bronchial asthma, 03 (1.7%) with ischemic heart disease, 02 (1.1%) had past history pulmonary tuberculosis and 12 subjects had history of disorder other than those common diseases while 79 (44.4%) subjects had no history of any co-morbid.

**Conclusion:** Our study highlighted the advanced age in demographics and hemoglobin, raised TLC, D-Dimer and ferritin are significant laboratory risk factors of severe COVID 19 infection but disparity in literature exist. Hence further studies on larger scale are required to confirm these observations which can be helpful in prediction the severity, prognosis and of course management of disease.

**Key Words:** COVID-19. Uncertainty. Risk factors. Pandemic

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## INTRODUCTION

Despite of scientific advancement the infectious agents regularly and frequently pose a threat to public health in the form of outbreaks. Among those recently emerging of COVID-19 at Wuhan, China in December 2019<sup>[1]</sup>

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and followed by declaration as a pandemic by World Health Organization (WHO) in March 2020 has challenged the global health care systems irrespective of their socioeconomic status. The World is continuously trying to understand its behavior and the extensive research is going on over different aspects of this pandemic. Millions of confirmed cases worldwide strongly emphasizing for a comprehensive understanding of the risk and protective factors for COVID-19 which will be helpful for the prevention of disease infection, progression, and adverse outcomes in infected patients. Among those aspects, the risk factors for acquiring this pandemic infection is still uncertain. Initially; there were few factors identified and claimed that person having those factors would be on higher risk of getting infection as well as infection related mortality. Among those risk factors; the older age, comorbid, health care providers, weather condition (Cold) and socioeconomic status were labelled as having a main role getting infection as well as its worse outcome. These social factors linked to spread of infection converting to pandemic has caused severe

setback to religious practices as well, which has no precedent in the history causing a closure of religious sites like mosques including the most sacred place for Muslims a grand mosque in Makkah (The Kaaba).

But later on; majority of those prematurely established risk factors were turned to be worthless because with the passage of time the pandemic has behaved like super-pandemic and its action, aggravation and fatality were seen irrespective of those factors like young or old, healthy or diseased persons, cold or hot weather and low or high socio economic status. Hence, uncertainty is still to be curtailed that what are those important risk factors which play a role in its infectivity as well as mortality.

This study was designed to determine the possible risk factors of getting COVID-19 infection with additional factors like profession/occupation, religion, prayers (Namaz) regularity at home or mosque, frequency of hand wash, at two tertiary care hospitals of Karachi.

## MATERIALS AND METHODS

This prospective cross-sectional study was conducted at two tertiary care hospitals in Karachi, Pakistan, from July to December 2021. Using convenient sampling, consecutive patients with suspected COVID-19 infection were confirmed through positive RT-PCR tests. Detailed medical history and evaluations of risk factors were taken, including age, gender, tribe/race, education, profession, travel history, exposure, mosque attendance, comorbidities, and laboratory tests. Subjects were categorized into three groups based on disease severity. The study was ethically approved and involved monitoring, management, and follow-up of all subjects.

Data was analyzed using SPSS v23.0, Chi-Square and ANOVA statistics was applied statistical analysis.

## RESULTS

In this study, 178 subjects were assessed, comprising 71.3% males and 28.7% females, with a mean age of  $48.062 \pm 14.796$  years (age range: 16-85). The research revealed that disease severity was notably higher in patients aged over 60 years compared to younger subjects, and this difference was statistically significant (p-value 0.0001). (Table I)

### On the Basis of Potential Exposure Risk:

**Profession Or Occupation:** One hundred and sixty three (91.6%) subjects were related non-medical profession while only 15 (8.4%) study subjects were linked with health care profession.

**Exposure to Confirmed Case of Covid-19:** Thirty seven (20.9%) subjects gave positive response to question of exposure while 141 (79.2%) of subjects either denied or didn't know exactly regarding the exposure to any COVID-19 patient.

**Mosque Exposure/Prayer:** On enquiring about mosque exposure during pandemic, 56 (31.5%) subjects gave history of prayer at mosque on regular basis while rest of 122 (68.5%) subjects had no mosque exposure either of different religious attachment or following SOPs as advised by authorities.

**Abroad Travel History:** Travel history abroad before or during pandemic was positive in only 19 (10.7%) patients.

Based on severity, 72.5% of subjects were mildly symptomatic and managed in general wards, 20.2% were asymptomatic and advised home isolation with monitoring, and 7.3% with severe disease were shifted to ICU care. Most study subjects had comorbidities. 14.6% had diabetes, 12.4% hypertension, 16.3% both, 2.8% bronchial asthma, 1.7% ischemic heart disease, 1.1% past pulmonary tuberculosis, and 44.4% had no comorbid history.

Laboratory findings: Mean hemoglobin levels were found slight lower in Group III patients as compare to Group I and II and that difference was significant statistically with p-value of 0.040, similarly TLC was found significantly higher in Group III comparing to Group I and II. On other hand, comparatively specific inflammatory markers used to assess severity of COVID-19 disease like ferritin was also found significantly higher in Group III (mean  $796.18 \pm 713.064$ ) vs Group I and II ( $299.92 \pm 231.889$  and  $420.42 \pm 391.879$  respectively) (p 0.016). Similarly, D-dimer was found in rising pattern as the disease severity increases as Group III shown mean D-dimer levels of  $2.862 \pm 1.830$  followed by Group II ( $0.853 \pm 0.8436$ ) and Group I ( $0.475 \pm 0.354$ ) which turned statistically significant (0.0001). D of laboratory findings are shown in Table 2.

**Table No.1: Demographic characteristics and disease severity of study subjects**

Variable	Group I n= 36	Group II n= 129	Group III n=13	p-value
<b>Age (years)</b>				
< 20	01 (14.3%)	05 (71.4%)	01 (14.3%)	0.0001
21-40	12 (27.9%)	30 (69.8%)	01 (2.3%)	
41-60	15 (16.5%)	74 (81.3%)	02 (2.2%)	
>60	08 (21.6%)	20 (54.1%)	09 (24.3%)	
<b>Gender n (%)</b>				

Male 127 (71.3%)	24 (18.9%)	91 (71.7%)	12 (9.4%)	0.756
Female 51 (28.7%)	12 (23.5%)	38 (74.5%)	01 (2.0%)	
<b>Educational status</b>				
Illiterate 60 (33.7%)	13 (21.7%)	43 (71.7%)	04 (6.7%)	0.366
Primary 59 (31.%)	14 (23.7%)	41 (69.5%)	04 (6.7%)	
Matriculation 47 (26.4%)	07 (14.9%)	37 (78.7%)	03 (6.4%)	
Intermediate 04 (2.2%)	01 (25.0%)	02 (50.0%)	01 (25.0%)	
Graduation 03 (1.7%)	01 (33.3%)	01 (33.3%)	01 (33.3%)	
Master/post-graduation 05 (2.8%)	00	05 (100%)	00	
<b>Profession/occupation</b>				
Medical 15 (8.4%)	02 (13.3%)	11 (73.3%)	02 (13.3%)	0.548
Non-medical 163 (91.6%)	34 (20.9%)	118 (72.4%)	11 (6.7%)	
<b>Tribe/race/language</b>				
Sindhi 75 (42.1%)	16 (21.3%)	50 (66.7%)	09 (12.0%)	0.739
Baloch 72 (40.4%)	14 (19.4%)	56 (77.8%)	02 (2.8%)	
Urdu 16 (9.0%)	02 (12.5%)	13 (81.3%)	01 (6.3%)	
Pashto 03 (1.7%)	01 (33.3%)	02 (66.7%)	00	
Punjabi 03 (1.7%)	01 (33.3%)	02 (66.7%)	00	
Others 09 (5.1%)	02 (22.2%)	06 (66.7%)	01 (7.7%)	
<b>History of travel</b>				
Yes 19 (10.7%)	04 (21.1%)	13 (68.4%)	02 (10.5%)	0.314
No 158 (89.3%)	32 (20.3%)	115 (72.8%)	11 (7.0%)	
<b>Exposure to COVID-19 patient</b>				
Yes 37 (20.8%)	09 (24.3%)	27 (73.0%)	01 (2.7%)	0.723
No 141 (79.2%)	27 (19.1%)	102 (72.3%)	12 (8.5%)	
<b>Mosque exposure</b>				
Yes 56 (31.5%)	11 (19.6%)	37 (66.1%)	08 (14.3%)	0.775
No 122 (68.5%)	25 (20.5%)	92 (75.4%)	05 (4.1%)	
<b>Co-morbid/s</b>				
Yes 99 (55.6%)				0.713
Diabetes 26 (26.27%)	08 (30.8%)	18 (69.2%)	00	
Hypertension 22 (22.2%)	06 (27.3%)	15 (68.2%)	01 (4.5%)	
Diabetes+Hypertension 29 (29.29)	04 (13.8%)	23 (79.3%)	02 (6.9%)	
Heart disease 03 (3.03%)	00	03 (100%)	00	
Asthma/COPD 05 (5.05%)	01 (20.0%)	4 (80.0%)	00	
Pulmonary tuberculosis 02 (2.02%)	01 (50.0%)	01 (50.0%)	00	
Others 12 (12.12%)	03 (25.0%)	08 (66.7%)	01 (8.3%)	
No 79 (44.4%)				

Table No.2. Laboratory characteristics and disease severity of study subjects

Variable	Group I	Group II	Group III	p-value
<b>Hemoglobin (gm/dl)</b>				
n	36	129	13	0.040
(Mean±SD)	12.186±20922	13.002±1.967	12.046±1.933	
<b>Total leukocyte count (TLC)</b>				
n	36	129	13	0.013
(Mean±SD)	8369±4147.965	7674±3163.071	11430±8636.394	
<b>Platelet count</b>				
n	36	129	13	0.453
(Mean±SD)	241.25±147.796	228.33±114.327	226.23±131.739	
<b>C-reactive protein (CRP)</b>				
n	28	95	13	0.241
(Mean±SD)	74.707±71.404	70.70±80.622	111.925±112.360	
<b>Total bilirubin</b>				
n 130	26	94	10	0.068
(Mean±SD)	1.748±4.495	0.6336±0.446	1.124±1.6149	

<b>ALT</b> n 178 (Mean±SD)	36 77.50±110.701	129 64.91±45.332	13 70.85±42.284	0.464
<b>D-dimer</b> n (Mean±SD)	4 0.475±0.354	23 0.853±0.8436	12 2.862±1.830	0.0001
<b>LDH</b> n 100 (Mean±SD)	20 440.0±176.422	75 498.21±226.302	05 682.60±279.216	0.092
<b>Serum Ferritin</b> n 78 (Mean±SD)	16 299.92±231.889	64 420.42±391.879	09 796.18±713.064	0.016

## DISCUSSION

Covid-19 management is a global health issue that affects both developed and developing countries. Despite the rapid exchange of information, many problems remain unanswered and many treatments lack conclusive evidence. [2] There is still a dearth of information on the prevalence of Covid-19, its risk factors for acquiring infection as well as associated mortality rates in developing nations, particularly Pakistan.

According to studies from China, men accounted for 60% of COVID 19 patients, and our study's findings suggested a male dominance rate of 71.3%. [3,4] The results of a meta-analysis by Pijls BG and colleagues, which included 36,470 patients from 59 studies, showed that men had greater rates of infection, disease severity, ICU admission, and death than women. Overall, men were 8% more likely than women to receive a COVID-19 diagnosis (RR: 1.08, 95% CI: 1.03 to 1.12). [5] Another study by Liu et al. found that men (40.43%) had a considerably greater positive proportion than women (36.71%). [6]

Older age (above 60 years) was associated with higher pandemic severity. Wang D.'s study linked severity to weakened immune systems and underlying medical conditions in older adults, making them more vulnerable to respiratory infections. Age-related immune system changes may increase mortality from COVID-19 in older adults. However, one study found inconsistent results, suggesting other factors may contribute to severity and cardiac injury in some patients without underlying cardiovascular diseases. [7]

This study had not found any association of COVID 19 with literacy rate due to the reason that the awareness of the diseases was generally high and a positive association between knowledge and preventive practices adopted. These findings were in consistent with previous findings. [8] This was in oppose to the study conducted in India that showed that a higher literacy rate, people are willing to get themselves tested because of higher consciousness.

As with Arshad M.'s earlier study, comorbidities were not related to illness severity in this study. [9] Contrary to a

prior study, which found that patients had comorbidities in 36.8% of cases. The three comorbid diseases with the highest prevalence were diabetes (11.9%), cardiovascular disease (14.4%), and hypertension (18.6%). [10] COVID-19 pandemic waves, varying impact globally. Crucial to understand severity risk factors for prompt treatment.

Laboratory tests indicate COVID-19 severity. Hemoglobin levels showed significant differences, confirming previous research. [11,12] Leukocyte count correlated with disease severity; mean TLC was 11430 in severe cases. Previous research linked leukocytosis to inflammation and illness severity. [13]

COVID-19 may elevate pro-inflammatory cytokines, releasing serum ferritin as an illness severity marker. Earlier studies showed ferritin as a good predictor. In contrast, this study found higher ferritin levels (796.1) compared to a recent study (264.5) for disease severity prediction. [14,15]

The identification of risk factors associated with severe and critical COVID-19 cases can help healthcare professionals to identify patients who are at higher risk of developing severe disease and provide them with appropriate care.

## CONCLUSION

Our study highlighted the advanced age in demographics and hemoglobin, raised TLC, D-Dimer and ferritin are significant laboratory risk factors of severe COVID 19 infection but disparity in literature exist. Hence further studies in larger scale are required to confirm these observations which can be helpful in prediction the severity, prognosis and of course management of disease.

### Author's Contribution:

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**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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