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Risk factors associated with mortality in COVID-19 patients in Nishtar Hospital Multan.

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ABSTRACT… Objective: To identify risk factors associated with mortality in COVID-19. **Study Design:** Retrospective Cross Sectional Study. **Setting:** Nishtar Hospital Multan. **Period:** April 2020 to September 2020. **Material & Methods:** Charts of all PCR confirmed COVID-19 cases expired during the study period. **Results:** Out of 96 cases, 62(64.6%) were male and 34(35.4%) were female. Sixty five (67.7%) were from urban areas. Niney two (95.8%) patients had a co-morbid condition. Fifty two (54.2%) had diabetes, 42(43.8%) had hypertension, 29(30.20%) had heart disease, 21(21.9%) had chronic kidney disease, 14(14.5%) had chronic lung disease and 5(5.2%) had chronic liver disease. Mean respiratory rate was 25.01±7.80, mean SaO2 was73.99±17.53 and 57(59.37%) had bilateral infiltrates on chest X-ray. Mean CRP was 59.95±46.28, mean S/LDH was 765.92 ±266.61, mean S/Ferritin was 1446.00±1261.69 and mean D-dimer was 1.26±0.45μg/ml. Thirty five (36.45%) had sepsis, 26(27.08%) had cytokine storm, 17(17.7%) had respiratory failure and 13(13.5%) had hypotension. **Conclusion:** Male gender, old age, diabetes, hypertension, ischemic heart disease and chronic kidney disease were associated with increased mortality in COVID 19. Tachypnea, hypoxia, bilateral infiltrates on chest X-ray and raised inflammatory markers also had poor prognosis. Sepsis, cytokine release syndrome, shock, and respiratory failure were common complications. These high risk patients with COVID 19 should be timely admitted and managed aggressively to improve outcome.

Key words: COVID 19, Mortality, Risk Factors.

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INTRODUCTION

In December 2019, a novel coronavirus, named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) of unknown origin spread in Hubei province of China. This epidemic was given the name of coronavirus disease-19 (COVID-19).[1] WHO declared it as a pandemic and international public health emergency on 30th January 2020.[2]

It has a broad clinical spectrum encompassing asymptomatic infection, mild upper respiratory tract illness, and severe viral pneumonia with respiratory failure and even death.[3] The case fatality rate reported in various countries and age groups is highly variable, ranging from about 0.5% to 10%.[4]

The first case of coronavirus was reported in Pakistan on February 26, 2020. Number of cases continued to rise as a result of large number of exchanged students, scientists, tourists and business community, therefore COVID-19 started infecting Pakistani population.[5]

Unfortunately, no definite treatment is available. Many studies done all over the world showed that certain population like males, elderly, immunosuppressed patients, and those with underlying medical conditions are more vulnerable to the disease than the general healthy population.[6]

The objective of our study is to find the risk factors associated with mortality in COVID- 19 in patients in our population. The rationale of our study is that these risk factors can be identified and managed aggressively to reduce mortality of this serious condition.

MATERIAL & METHODS

Charts of all PCR confirmed cases expired from April 2020 to September 2020 in Nishtar Hospital Multan were retrospectively reviewed. Demographic data (age, sex, residence and comorbidities), clinical data (vital signs), oxygen saturation and radiological findings at the time of admission were recorded. Inflammatory markers like serum Ferritin, serum LDH, CRP and D-dimer were also noted on a specially designed proforma.

Data was analysed using Statistical Package for Social Sciences (SPSS) version 20. Descriptive analysis were applied to calculate frequency and percentage for qualitative variables. Mean and standard deviation were calculated for quantitative variables.

RESULTS

Ninety six patients expired during the study period; 62 male and 34 female. Mean age of our patients was 55.95±14.92 years. Details of demographic characteristics of patients are given in Table-I.

	N=96	Percentage/ Mean±SD
Age (Years)	(22-80)	55.95±14.92
Gender Male Female	 62 34	 64.6 35.4
Residence Urban Rural	 65 31	 67.7 32.3
Co-morbids	92	95.8
Duration of symptoms (days)	1-30	4.98±4.57

Table-I. Demography of patients expired due to COVID-19.

Diabetes, hypertension and heart disease were the three leading risk factors seen in 52, 42 and 29 patients respectively. Details of co-morbids are given in Table-II.

	N=96 (%)
Diabetes	52 (54.2 %)
Hypertension	42 (43.8 %)
Heart disease IHD VHD CCF	29 (30.20%) 25 (26%) 1 (1.1%) 3 (3.1 %)
Chronic kidney disease	21 (21.9%)
Lung disease Asthma Bronchiectasis Pulmonary TB COPD	14 (14.58%) 8 (8.3%) 1 (1.1%) 2 (2.2%) 3 (3.1%)
Liver disease Acute hepatitis CLD	6 (6.25%) 1 (1.1%) 5 (5.2%)
Miscellaneous Malignancy CVA Brain neoplasm Myasthenia Post-surgical Renal transplant Smoking Obesity Pregnancy	18 (18.75%) 3 (3.1%) 4 (4.2%) 2 (2.1%) 1 (1.1%) 2 (2.1%) 1 (1.1%) 2 (2.1%) 1 (1.0%) 2 (2.2%)

Table-II. Co-Morbids in patients expired due to COVID-19.

Details of clinical features, laboratory parameters, complications and/or immediate cause of death is given in Table-III and IV.

	N=96	Percentage/ Mean±SD
Respiratory rate	10-53	25.01±7.80
Blood pressure (mmHg) Systolic Diastolic	 00-180 00-100	 113.61±25.86 71.33±16.85
Oxygen saturation (SaO2) %	32-99	73.99±17.53
Hypoxia (SaO2≤94%)	78	81.3
Bilateral Infiltrates on Chest X-ray	57	59.37
CRP mg/L	10.5-192	59.95±46.28
S/LDH U/L	358-1316	765.92±266.61
S/Ferritin μg/L	302-3422	1446.00±1261.69
D-dimer μg/ml	1.2-4.3	1.26±0.45

Table-III. Clinical and laboratory parameters.
CRP= C-reactive protein, S/LDH= serum lactate dehydrogenase

	N=96 (%)
Sepsis	35 (36.45%)
Cytokine Release Syndrome	26 (27.08)
Respiratory failure requiring assisted ventilation	17 (17.7%)
Hypotension	13 (13.5%)

Table-IV. Complications/Cause of death.

DISCUSSION

Corona virus disease is a pandemic which has led to an emergency situation all over the globe. According to an estimate, overall mortality rate of COVID-19 is 3.77 to 5.4% increasing to 41.1 to 61.5% in severe and critical cases.[7]

Many studies are being carried out in different parts of the world to identify various risk factors of mortality due to COVID-19.

We reviewed ninety six deaths due to COVID-19 to analyze whether the demographics and underlying health conditions can explain for increased mortality.

The mean age of our patients was 55.95 years with 62 (64.6%) male patients. This is in concordance with other studies conducted in Pakistan by Ayed[8] et al and Ayaz et al[9] who found average age to be 53 years and 50.6 years respectively, with majority male patients. However, several studies carried abroad found a shift in mortality to much older age. Zhang et al in Hubei observed the average age of non-surviving patients to be 66 years.[7] Likewise Yanez et al noted 86.2% deaths were in persons aged 65 years or older.[10] This difference could be attributed to higher life expectancy in those countries. The substantial risk of fatality with advancing age could be due to weaker immunity. Moreover, the number of other comorbid conditions increase with age. In several studies, including our own research, male deaths due to COVID are much more than female deaths but it is not clear whether this gender difference is due to decreased exposure to the virus or better immune response in the latter.

Out of these ninety six, ninety two (95.83%) patients had pre-existing comorbid conditions. Diabetes was the most common comorbidity, observed in 52 (54.2%) patients. Forty two (43.8%) patients were hypertensive. Another study conducted in Karachi, Pakistan by Ahmad[11] et al revealed a similar trend with diabetes mellitus being the leading risk factor (69% patients) followed by hypertension (59% patients). This emphasizes on the significance of diabetes and hypertension in COVID related fatality in Pakistan, both diseases being quite prevalent in our country. Diabetes is associated with impaired innate immunity which is the first line of defense against COVID.

30.20% of our patients had a cardiovascular disease. Bae also evaluated that cardiovascular disease is a potential risk of fatal outcome in Covid 19.[12] But this was inconsistent with results of Albitar et al.[13]

We documented pre-existent chronic kidney disease in 21 (21.9%) patients. A study by Gansevoort et al[14] demonstrated that patients with severe forms of CKD have a very high risk of COVID-19 mortality. Uremia is a state of immune dysfunction due to alterations in innate and adaptive immunity. This leads to high prevelance of infections and increased mortality.[15]

Fourteen (14.58%) of our patients had an underlying lung disease. Study by Kya Oh et al showed that patients with COPD had a 1.56-fold higher risk of hospital mortality after diagnosis of COVID-19.[16]

Six (6.25%) patients were suffering from prior liver disease. Chronic liver disease (CLD) and cirrhosis are associated with immune dysregulation, leading to concerns that affected patients may be at risk of adverse outcomes following SARS-CoV-2 infection.[17] Ahmad observed cirrhosis of liver in 4.5% cases.[11]

In this study, we also recorded clinical and laboratory parameters of all patients who had expired. Mean respiratory rate was 25.01/min and mean oxygen saturation was 73.99%. Zhang and Mikami also reported tachypnea and hypoxia as risk factors of in hospital mortality.[7,18]

Fifty seven patients had bilateral lung infiltrates on chest X-ray. This shows that significant lung involvement is a poor prognostic feature of Covid as also observed by Ayaz et al.[9]

Inflammatory markers like C-Reactive Proteins, serum Ferritin and serum LDH were raised in all the patients while D-dimer was raised in 78% cases as supported by many other studies like Arshad, Ahmadi and Li et al.[19,20,21]

A frequent complication observed in our patients was cytokine release syndrome and common immediate causes of death were respiratory failure and sepsis/septic shock in agreement with many other studies by Elezkurtaj, Suleman and Yang.[22,23,24]

Our study had several limitations including small sample size and limited duration of time. However this will encourage others to conduct a larger study to find underlying mechanism of this increased risk of mortality.

CONCLUSION

We concluded that male gender, old age and chronic diseases like diabetes, hypertension, ischemic heart disease and chronic kidney disease were associated with increased mortality of COVID 19. Patients with tachypnea, hypoxia, bilateral infiltrates on chest X-ray and raised inflammatory markers at the time of presentation also had poor prognosis. Cytokine release syndrome, sepsis, shock, and respiratory failure were common complications and immediate causes of death.

These high risk patients with COVID 19 should be timely admitted and managed aggressively in intensive care units to improve outcome.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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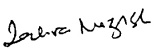
1	Zahra Nazish	Conception of topic and study design acquisition, analysis and interpretation of data, Manuscript writing.	
2	Fatima Tu Zahra	Contribution writing of paper interpretation Revising critically.	
3	Haroon Aziz Khan Babar	Selection of topic, drafting, Final approval of paper for publication.