

Clinical Characteristics of Hospitalized Patients with COVID-19 at Tertiary Care Hospital of Pakistan

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TM MS MA conceived idea, TM ASK UNS drafted the study, TM MS collected data, TM UNS MA did statistical analysis and interpretation of data, TM MS MA critical review manuscript, All approved final version to be published.

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The authors declare that there is no conflict of interest.

Abstract

Background: Infectious diseases have always been a challenge for human civilization. Most of the infectious diseases are caused by bacteria or viruses. The 1st pandemic of 21st century was started in December 2019 from China. World health organization (WHO) named the disease as COVID-19 which is being caused by SARS-CoV-2 virus. Risk factors associated with COVID-19 include age, gender and comorbidities. Most common symptoms at the time of presentation include fever, cough, fatigue, shortness of breath and diarrhea. In pathogenesis of COVID-19 infection the Inflammation has central role and disease progression also depends upon the level of inflammation. As diseases pattern varies in different parts of the world that's why the present study was designed to study clinical characteristics of hospitalized patients with COVID-19 in local population.

Methodology: This was a cross-sectional study and was carried out at department of pulmonology Shaikh Zayed hospital, Lahore. The duration of study was 6 months from June 01, 2020 to December 31, 2020. One hundred six (106) COVID-19 patients admitted at Shaikh Zayed hospital, Lahore and consented to participate in the study were included in the study. The data were recorded in SPSS 20.0.

Results: The total number of patients registered in the study was 106, having ages between 24 and 85 years. The most common symptom at the time of presentation was fever (80.2%) followed by shortness of the breath (75.5%) and cough (62.3%). Most common co-morbid condition was diabetes (44.3%) followed by hypertension (43.4%). Chest x-ray taken in emergency department showed bilateral involvement in 67% patients, unilateral in 17%, while 16% patients had normal chest radiograph. The inflammatory markers like S ferritin, D Dimers and CRP levels increased with disease severity while lymphocytes decreased with disease severity. Among co-morbid conditions the ESRD had significantly high death rate (39.1%) as co-mpared to non-ESRD patients (10.8%) with a p-value 0.001.

Conclusion: Patients presenting acutely with fever, cough, shortness of breath and/or infiltrates on chest x-rays mandates COVID testing. Presence of comorbidities like diabetes, hypertension, ischemic heart disease and ESRD are common with COVID infection. ESRD patients have shown high mortality with COVID. Inflammatory markers like S ferritin, D Dimers and CRP levels correlates with severity of disease in COVID-19 patients.

Keywords: COVID-19; Clinical characteristics; Chest X-rays; Inflammatory markers

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Introduction

Infectious diseases have always been a challenge for human civilization. Most of the infectious diseases are caused by bacteria or viruses.¹ The 1st pandemic of 21st century was started in December 2019 when several cases of pneumonia due to some unknown etiology were diagnosed in China. Some of these patients underwent bronchoscopy and in Broncho alveolar lavage (BAL) samples a virus was detected, later world health organization (WHO) named the disease as COVID-19 which is being caused by SARS-CoV-2 virus.^{2,3} WHO declared it as a worldwide pandemic on March 11, 2020.⁴ In Pakistan the 1st case of disease was detected in February 2020,⁴ and in June 2021, more than 928,000 cases have been confirmed as reported in dashboard of COVID-19 pk app.

Risk factors associated with COVID-19 include age, gender and co-morbidities, the common co-morbidities are hypertension, diabetes and heart diseases.⁵ In different studies it has been reported that COVID-19 patients have diverse presentation, from asymptomatic disease to very severe illness. Most common symptoms at the time of presentation include fever, cough, fatigue, shortness of breath and diarrhea.⁶ The early diagnosis is important for initiating the treatment and containing the disease spread. Currently available tools for diagnosis of COVID-19 include RT-PCR and chest radiology.⁷

In pathogenesis of COVID-19 infection the Inflammation has central role and disease progression also depends upon the level of inflammation. The inflammatory markers like C-reactive protein (CRP), ferritin and LDH can be used to predict the mortality.⁸ Elevated D Dimer and lymphopenia can also be used as prognostic factor in COVID-19.^{9,10}

As diseases pattern varies in different parts of the world that's why the present study was designed to study clinical characteristics of hospitalized patients with COVID-19 in local population.

Methodology

This was a cross-sectional study and was carried out at department of pulmonology Shaikh Zayed hospital, Lahore. The duration of study was 6 months from 01-06-2020 to 31-12-2020. One hundred six (106) COVID-

19 patients admitted at Shaikh Zayed hospital, Lahore and consented to participate in the study were included in the study. The data were recorded in SPSS 20.0. Data for inflammatory markers was expressed by using median (IQR), gender, symptoms, co-morbid conditions and admission were described by using frequencies and percentages and presented in tables, Box-plot and component percent bar charts were used to present distribution of inflammatory markers by severity and outcome. Mann Whitney U test and Kruskal Wallis test were used for two groups and four groups comparisons respectively and chi-square test was used to see association of co-morbid conditions with outcome. Binary logistic regression model was used to see the significant predictors of death and survival and results were expressed by using adjusted odds ratios with 95% confidence interval. P-value ≤ 0.05 was considered significant.

Results

The total number of patients registered in the study was 106, having ages between 24 and 85 years; there were 63 (59.4%) males. Eighty eight (83.0%) patients were admitted to the ward while 18 (17.0%) patients were admitted to the intensive care unit designated for COVID patients.

The most common symptom at the time of presentation was fever (80.2%) followed by shortness of the breath (75.5%) and cough (62.3%), other symptoms were severe body aches (59.0%), loss of smell &/or taste (43.6%) and diarrhea (31.8%). Forty seven (44.3%) study participants were diabetic, 46 (43.4%) were hypertensive while other co-morbidities included ischemic heart disease (29.2%) ESRD (21.7%) chronic respiratory illnesses (10.4%) malignancy (9.4%) CLD (8.5%) and connective tissue diseases (2.8%).

At admission 35 (33.0%) patients had mild disease, 38 (35.8%) patients had moderate illness, 26 (24.5%) had severe COVID-19 and 7 (6.6%) patients admitted with critical condition. Chest x-ray taken in emergency department showed bilateral involvement in 71 (67%) patients, unilateral in 18 (17%), while 17 (16%) patients had normal chest radiograph.

The serum Ferritin increased with severity of disease, with median level around 400 ng/ml in mild cases and

Table 1. Comparison of inflammatory markers between deceased and discharged cases

	Discharged	Death	P-value
S. Ferritin	558 ng / ml (259 – 921)	1080 (768 – 1280)	0.002
CRP	24 mg / l (12 – 36)	48 (24 – 72)	0.007
D.Dimers	528 ng/ml (250 – 1138)	1444(1124 – 2249)	<0.001
Lymphocytes	8% (4 –14)	7% (4 – 13)	0.689

Table 2. Comparison of death rate in each comorbid conditions with covid-19

Comorbid conditions	Present	Discharged		Death		P-value
		n	%	n	%	
Diabetes Mellitus	Yes	39	83.0	8	17.0	0.992
	No	49	83.1	10	16.9	
HTN	Yes	37	80.4	9	19.6	0.385
	No	51	85.0	9	15.0	
IHD	Yes	26	83.9	5	16.1	0.881
	No	62	82.7	13	17.3	
ESRD	Yes	14	60.9	9	39.1	0.001
	No	74	89.2	9	10.8	
Respiratory diseases	Yes	8	72.7	3	27.3	0.337
	No	80	84.2	15	15.8	
CLD	Yes	9	100.0	0	0.0	0.156
	No	79	81.4	18	18.6	
Malignancy	Yes	8	80.0	2	20.0	0.789
	No	80	83.3	16	16.7	
Connective Tissue Disease	Yes	3	100.0	0	0.0	0.427
	No	85	82.5	18	17.5	
Other	Yes	14	82.4	3	17.6	0.936
	No	74	83.1	15	16.9	

above 1000 ng/ml in critical cases. The difference among 4 groups by severity was significant with p-value <0.001. The CRP levels also increased from mild to severe but were indifferent in critical group. The D. Dimers also increased with severity and were highly concentrated for critical cases around 1500 ng/ml. The lymphocytes though reduced with severity of disease but the difference among four groups was found insignificant with p-value 0.352 (Fig.1).

The comparison was also made between groups by outcome status. There were 18 deaths, and these cases with death had significantly higher inflammatory markers as compared to those who survived. Lymphocytes were still insignificant between these two groups with p-value 0.689 (Table 1).

Among co-morbid conditions the ESRD had significantly high death rate (39.1%) as compared to non-ESRD patients (10.8%) with a p-value 0.001. The presence or absence of other co-morbid conditions had no significant difference in death rates (Table 2).

The number of co-morbid conditions also seems to have some impact on death rate as there was only one death among cases without any co-morbid condition. The death rate was 50.0% among cases with 4 co-morbid conditions (Fig 2).

Then the binary logistic regression analysis was performed to see which of the symptoms, inflamma-

tory markers, age, gender and admission unit predicts the death and discharge of patients. The ESRD and Malignancy were the two identified co-morbid conditions with adjusted odds ratios of 7.0 and 11.4 to predict death, cough was the only significant symptom among tested with odds ratio of 25.6 (1.4 – 483.4), while the ferritin ≥ 590 ng/ml had an odds ratio of 46.7 and those admitted to HDU had a very high adjusted odds ratio of 246.6 (14.1 - 4324.3). The accuracy of this model in prediction of death was 61.1 while for discharge it was 97.7% and overall accuracy was 91.5% (Table 3).

Discussion

World has faced many epidemics in the past but the magnitude with which COVID-19 has affected the world is unmatched as it led to isolation of billions of people,⁴ it has had a catastrophic effect on the world's demographics resulting in more than 3.7 million deaths worldwide. Clinical features of COVID-19 varies from asymptomatic disease at one extreme to mild moderate and critical to other end. In current study 33% patients had mild disease, 35.8% had moderate disease, 24.5% had severe COVID infection while 6.6% were critically ill.

In our study fever was the most common symptom seen in 80% of patients; other common symptoms included shortness of breath and cough which were

Table 3. Prediction of death and discharge through binary logistic regression

	Adjusted Odds ratio (95% C.I.)	P-value	Predictability of binary logistic regression model			
			Predicted			Percentage Correct
ESRD	7.0 (1.3 –38.0)	0.024	Observed	Outcome		
Malignancy	11.4 (0.7 – 185.8)	0.088		Death	Discharged	
Cough	25.6 (1.4 – 483.4)	0.031	Death	11	7	61.1
Ferritin = 590ng/ml	46.7 (2.6 – 850.1)	0.009	Discharged	2	86	97.7
Admission in HDU	246.6 (14.1 – 4324.3)	<0.001	Overall percentage			91.5
Constant	0.000	0.002				

Variable(s) entered on step 1: Gender, DM, HTN, IHD, ESRD, COPD, CLD, Malignancy, CTD, Other, Fever, Cough, SOB, Others, Xray, Age≥57, Ferritin≥590, CRP≥25, D.Dimers≥687, Lympho≤8, Admission

seen in 75.5% and 62.3% patients respectively. Common non respiratory symptoms in our patients were body aches (59%), loss of smell/taste (43.6%) and diarrhea (31.8%). In a study conducted by Hassan et al.⁶ the common symptoms in patients with COVID-19 at the time of presentation were fever, cough, fatigue, shortness of breath and diarrhea. Stokes et al.¹¹ Also share the similar findings in their study.

Patients with co-morbidities have an increased risk of developing severe COVID infection.¹² Diabetes was most common co-morbid condition in our study and

was seen in 44.3% patients other co-morbidities include hypertension, ischemic heart disease, end stage renal disease and chronic respiratory illness. In a study conducted in China by Wei-jie Guan et al. in which 1590 COVID-19 patients were enrolled and 25% of patients had at least one co-morbid condition and the most prevalent co-morbidity was hypertension followed by diabetes.¹³

Chest radiograph is essential tool for diagnosis of respiratory tract infections.¹⁴ Chest x-ray was taken in all of our patients in emergency department. Majority

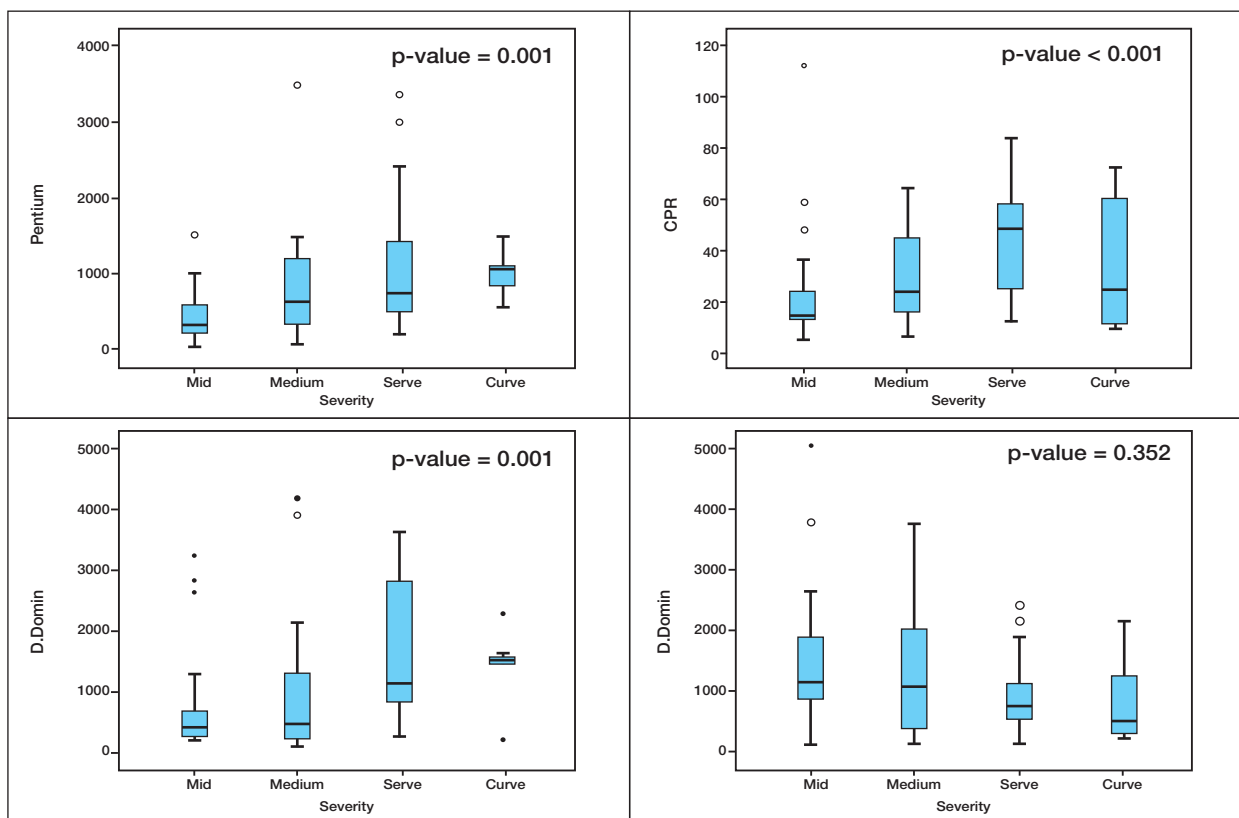


Fig.1: Distribution of inflammatory markers by severity of disease

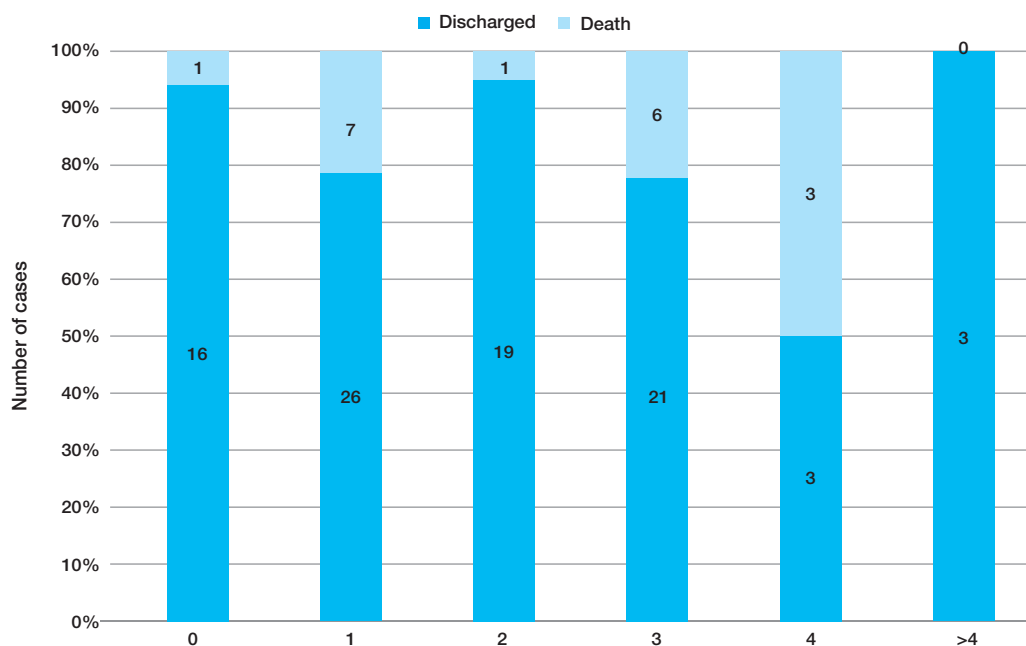


Fig. 2: Number of comorbidities

of the patients had bilateral opacities (67%) on chest x-ray, some patients (17%) had unilateral disease and about 16% patients had normal chest x-rays. These results are comparable with another study conducted at university teaching hospital of Pakistan where 63% of study participants had bilateral disease on chest radiograph.¹⁵

It has been reported that inflammatory markers like serum ferritin, erythrocyte sedimentation rate (ESR) and CRP significantly associated with severity of COVID-19.^{14,16} In this study we also found that serum Ferritin, CRP and D.Dimers levels increased with the severity of COVID-19. In our patients lymphocytes reduced with the severity of disease. The inflammatory markers and elevated D Dimer and lymphopenia can be used as prognostic factor in COVID-19,^{8-10,16} and in current study it has been seen that patient who died had significantly higher inflammatory markers as compared to those who survived.

Factors associated with mortality in patients with COVID-19 include gender, old age patients and co-morbid conditions.^{14,17} In present study it was observed that patients with ESRD had high death rates due to COVID infection as compared to non-ESRD patients (p-value 0.001), and when binary logistic regression analysis was performed it was also seen that ESRD and Malignancy were the two identified co-morbid conditions with adjusted odds ratios of 7.0 and 11.4 which was significant to predict death. Other co-morbid conditions had no significant impact on death rate. However it was also observed that patients with multiple co-morbidities had higher

death rates in our patients.

Conclusion

Patients presenting acutely with fever, cough, shortness of breath and/or infiltrates on chest x-rays mandates COVID testing. Presence of co-morbidities like diabetes, hypertension, ischemic heart disease and ESRD are common with COVID infection. ESRD patients have shown high mortality with COVID. Inflammatory markers like S ferritin, D Dimers and CRP levels correlates with severity of disease in COVID-19 patients.

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