Research Article

Variations in Clinical Parameters of Hospitalized Patients with COVID-19

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Abstract

Background: Severe acute respiratory syndrome coronavirus (SARS-CoV-2) also known as COVID19, is a newly discovered virus that has been recently isolated from humans. A number of researches with special emphasis on its clinical and epidemiological parameters are being carried out in various parts of the world.

Aim: To analyze and evaluate the clinical, laboratory and chest x ray findings of Covid-19 cases, admitted at a recently established Corona Unit of Farooq Hospital West Wood Lahore, Pakistan.

Study Design: Retrospective study

Methods: The current study included a total of 105 COVID-19 positive cases from 9th April to 27th May 2020. 94 cases were confirmed on the basis of laboratory values whereas 11 were diagnosed based on their clinical characteristics.

Results: Of all 105 patients admitted, 94(89.50%) were detected as laboratory-confirmed COVID-19 pneumonia with nasopharyngeal swab samples that were positive for SARS-CoV-2, whereas 11 (10.50%) were confirmed on clinical grounds. The mean age was 48.18 that ranged from 12 to 78 years. Majority were male patients (78.1%). Only 3 (2.9%) patients had recent travel history of abroad. The most common comorbidities were Hypertension (49.39%) and Diabetes Mellitus (43.37%). The most common symptoms (fever, dry cough, and tiredness) were observed in 29.5%, serious symptoms (shortness of breath, chest pain or pressure, and loss of speech or movement) in 40% and only few cases with acute respiratory distress syndrome. The mean systolic blood pressure recorded was 122.8 ± 12.85 mm Hg and mean diastolic blood pressure 79.29 ± 9.96. The mean oxygen saturation levels were 94.30 ± 5.063. The mean value for chest x ray scoring was 7.50 ± 5.6. The laboratory values were taken into account and elevated levels of C-reactive protein (CRP) were reported in 65.75% and procalcitonin levels in 58% of the patients. Higher polymorph leukocytes count was observed in 34 (33%) whereas 40 cases (38.83%) of COVID-19 patients had lymphopenia. D-dimers, AST, ALT levels were raised in 79.68%, 47.2% and 58.3% of patients, respectively. Higher levels of serum ferritin were seen in 61.4% of cases.

Conclusion: The clinical, laboratory and radiological findings may play pivotal role in early detection of positive COVID-19 cases and thus help in timely therapeutics management.

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Introduction

A series of pneumonia cases caused by some mysterious pathogen was first reported in Wuhan, in central part of China in December 2019.[1,2] Earlier cases were reported to be associated with bats, animal market selling seafood.[3] The responsible organism for this was named as SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2).[2] It rapidly spread in China and then worldwide in 209 countries of world. To date 7.94M cases have been reported worldwide with reported 435K deaths.[4] Identification of the causative agent and its transmission pattern have led the Chinese authorities to adapt the effective control and preventive measures. These were later on recommended by World Health Organization (WHO) as well, and declared it as a pandemic by naming it Coronavirus Disease 2019 (COVID-19).[5] The first case of COVID 19 was reported on 26th Feb 2020 in Karachi Pakistan, when a student coming back from Iran, tested positive. The Pakistan Federal Ministry of Health in Islamabad confirmed yet another Covid positive case on the very same day.[6] Pakistan in its capacity, even with limited resources, has taken rigorous measures including specially designed hospitals, laboratories for testing, quarantine facilities, public awareness campaigns and partial lock downs in jeopardized areas to control the spread of virus.[7] According to the Ministry of Health, Government of Pakistan, a total of 155K confirmed cases with 2975 mortalities has been reported till June 17, 2020. The highest number of cases have been reported in Punjab (55,878) followed by Sindh province (55,581), Khyber Pakhtunkhwa (18,472), Federal capital Islamabad (8,857), Baluchistan (8,327), Gilgit Baltistan (1,143), and Azad Jammu & Kashmir (663), respectively.[8]

After an incubation period of about 5-6 days, the symptoms of COVID-19 infection begin to appear.[9] The time from the onset of symptoms to the final outcome (recovery/death) ranges from 6 - 41 days with a median of 14 days.[10] The most common symptoms are fever, dry cough, and tiredness, while less common symptoms include aches & pains, sore throat, headache, diarrhea, conjunctivitis, loss of tastes or smell and rashes on skin or discoloration of toes. The serious symptoms include shortness of breath, chest pain or pressure and loss of speech or movement.[11,12] X-ray chest or CT scan findings demonstrates ground-glass opacities, patchy or multifocal consolidation, interstitial and alveolar infiltrates with predominance of anyone of them. However, complications such as acute respiratory distress syndrome, acute cardiac injury and renal failure have even led to death in severe cases.[11]

The diagnosis is based on Real-time reverse transcriptase polymerase-chain-reaction (RT-PCR) assay on nasopharyngeal swabs. Majority of COVID-19 cases presents with lymphopenia, high leukocyte counts, raised plasma pro-inflammatory cytokines like C-reactive protein (CRP), procalcitonin, serum ferritin, abnormal renal and liver function tests.[13]

Lahore with highest number of reported cases, has consistently remained as one of the top three cities in Pakistan.[8] Therefore this provides a good basis to record variations in clinical presentation, laboratory parameters and radiological findings in patients of COVID-19. This study reports the clinical characteristics and laboratory findings of patients suffering from COVID-19, presented at Corona Unit of Farooq Hospital West Wood Lahore, Pakistan.

Methods

This was a retrospective study based on the epidemiologic history, clinical records, laboratory results, and chest radiological features of 105 patients admitted in Covid Unit of Farooq Hospital West Wood, Lahore, from 9th April 2020 to 28th May 2020. The primary diagnostic method is real-time reverse transcriptase polymerase-chain-reaction (RT-PCR) assay of nasopharyngeal swabs. Eleven cases were reported as clinically diagnosed COVID-19 pneumonia because of their epidemiological history, signs, symptoms and chest x-ray evidence according to WHO guidelines, although they tested negative for the SARS-CoV-2. The medical records of patients were retrieved after taking written permission from Medical Superintendent Farooq Hospital West Wood, Lahore. The retrieved data was shared with research working group for further analysis and evaluation. The study has been reviewed and approved by the Research Ethical Committee (IRB) Akhtar Saeed Medical and Dental college, Lahore. The requirement for written informed consent from patients was waived because of the urgent need for collection of clinical data and no harm could potentially be done to patients. Doctors recor-

ded the epidemiological characteristics by interviewing each patient about their recent travel and contact history in the past two weeks before onset of the symptoms. The clinical symptoms, x-ray chest and laboratory findings on admission were extracted from electronic medical records. Laboratory results included CBC, complete blood counts, (Hb, TLC, DLC, lymphocytes, polymorphs, and Platelet count), liver function tests (ALT, AST, ALP, bilirubin, albumin and total proteins), renal function tests (serum urea and creatinine), D-dimers, C-reactive protein, serum ferritin and procalcitonin.

Patients were analyzed based on their chest X-ray findings.

The scoring system is done as follows:

Score 0: no lung abnormalities

Score 1: interstitial infiltrates

Score 2: interstitial and alveolar infiltrates (interstitial predominance)

Score 3: interstitial and alveolar infiltrates (alveolar predominance)

The scores of the six lung zones were then added to obtain an overall "CXR SCORE" ranging from 0 to 18.[14]

All the data was counter checked by two qualified and experienced physicians working in Corona unit of Farooq Hospital, Lahore.

Statistical Analysis

The summary statistics of continuous variables using the means and standard deviations (SD) or median were taken into account for current study. Categorical variables for above mentioned categories were expressed as frequencies and percentages. IBM SPSS statistics version 26.0 was used for analysis of the recorded data.

Results

Of all 105 patients recruited, 94(89.50%) were detected as laboratory-confirmed COVID-19 pneumonia with nasopharyngeal swab samples that were positive for SARS-CoV-2 and 11(10.50%) clinically confirmed COVID-19 pneumonia since they had definite demographic history, typical symptoms and chest X-ray findings. (Fig-1)

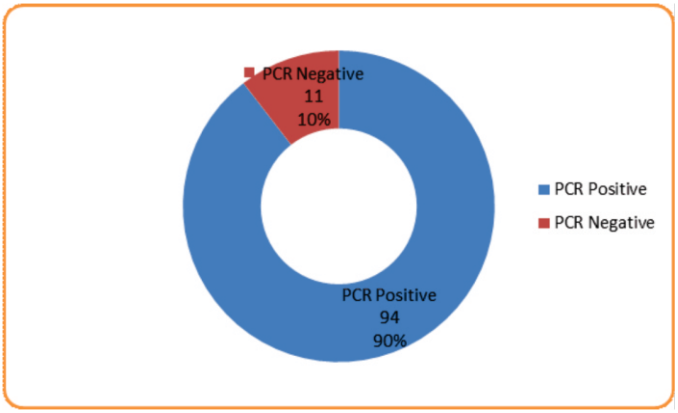

Fig-1. *Distribution of PCR Positive & Negative Cases*

The mean age was 48.18 ± 16.01 (years), ranged from 12 to 78 years. There were 82 males (78.1%) and 23 female patients (21.9%), with one of them was pregnant in second trimester. (Fig.2)

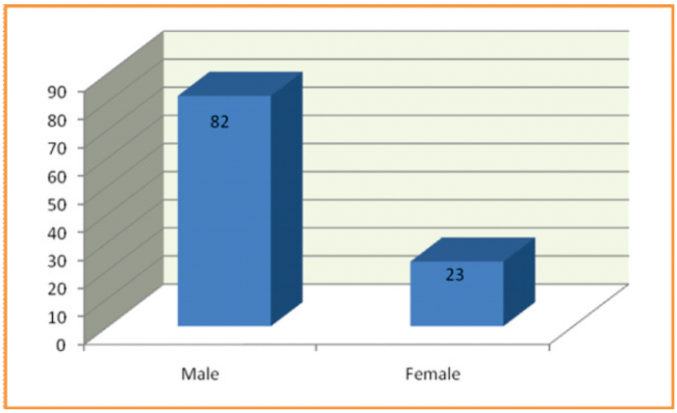

Fig-2. *Gender Distribution*

As for epidemiologic characteristics, 3(2.9%) patients had recent travel history abroad. Local cases were 102 (97.1%) with no travel history. 14 patients (13.3%) had positive covid19 contact history. Maximum number of cases 47(44.8%) were reported from Allama Iqbal Town, Lahore. (Fig-3)

Only one case of female health care worker was reported in our study, who had a positive contact history. 83 patients (79.04%) had underlying comorbidities. while 22 (20.95%) patients had none. Among them 41 cases (49.39%) had Hypertension & cardiovascular disease, 36 (43.37%) patients had Diabetes Mellitus, 4 (4.81%) asthma, and only 2 cases of liver pathology (2.4%). {Fig-4}

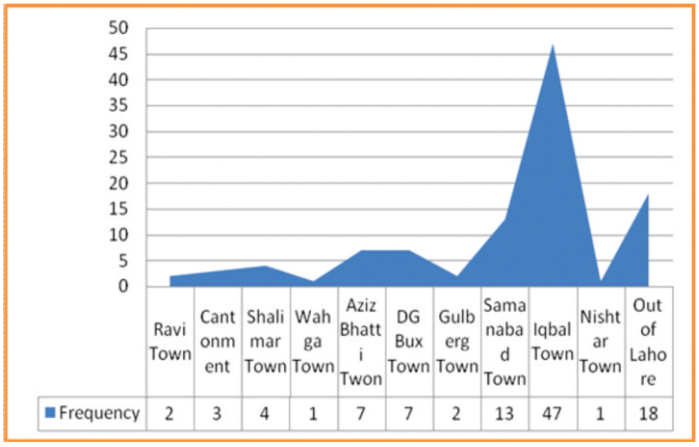

Fig-3: *Frequencies of Area Distribution*

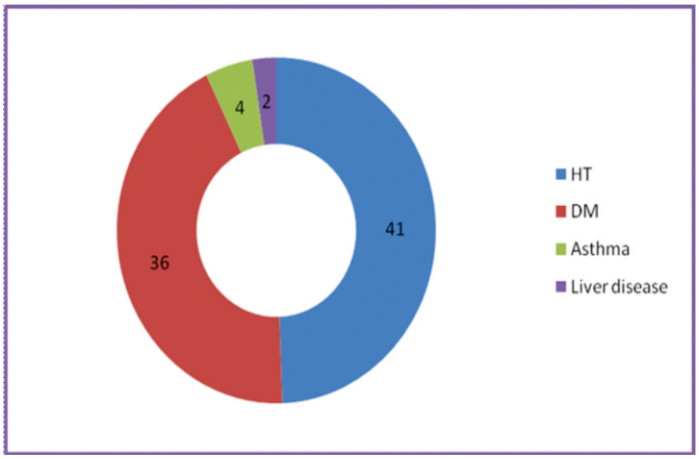

Fig-4. *Distribution of Comorbidities in Covid19 Patients*

Clinical Characteristics

On admission, 20 cases (19%) were asymptomatic and the remaining 85 (81%) were symptomatic. 31 cases (29.5%) were presented with most common symptoms (fever, dry cough, and tiredness), less common symptoms (aches and pains, sore throat, headache, diarrhea, conjunctivitis, loss of tastes or smell, rashes on skin or discoloration of toes) were 12 (11.4%) and serious symptoms were seen in 42 (40%) cases. The serious symptoms reported were shortness of breath, chest pain or pressure and loss of speech or movement. Acute respiratory distress syndrome was reported in 3 cases, out of which 2 were in mild, whereas only one in moderate category. (Fig-5)

As far as signs of patients are concerned, mean temperature 98.37± 0.8 with a range from 96 degree to 103 degree centigrade was seen. The mean Systolic blood pressure was recorded 122.8 ± 12.85 with a range of 100 mm Hg to 160 mm Hg. The mean diastolic blood pressure was recorded 79.29 ± 9.96 with a range of 52 mm Hg to 120 mm Hg. The mean Systolic blood pressure was recorded 122.8 ± 12.85 with a range of 100 mm Hg to 160 mm Hg. The mean oxygen saturation level was 94.30 ± 5.063, falling within the range of minimum 76 percent and maximum 99.

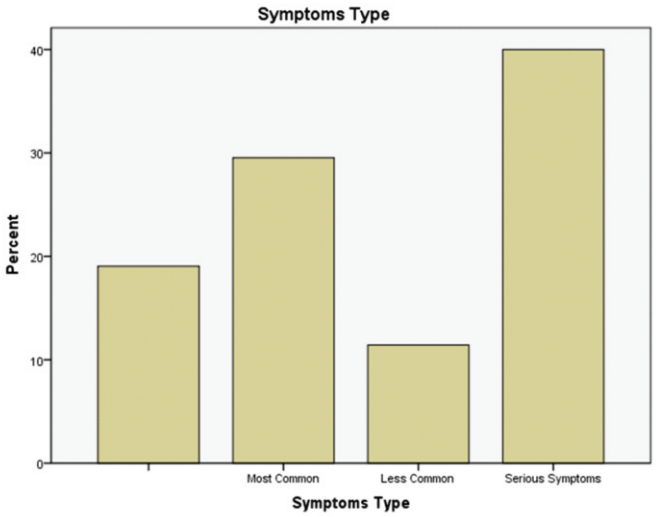

Fig-5: *Frequency Distribution of Symptoms*

Systolic blood pressure was recorded 122.8 ± 12.85 with a range of 100 mm Hg to 160 mm Hg. Hospitalized and discharged as of 28th May 2020, 19 (18.1%) patients were still isolated in our hospitals, 83 (79.05%) patients had been discharged and 03 (2.85%) patients had died so far. (Fig-6)

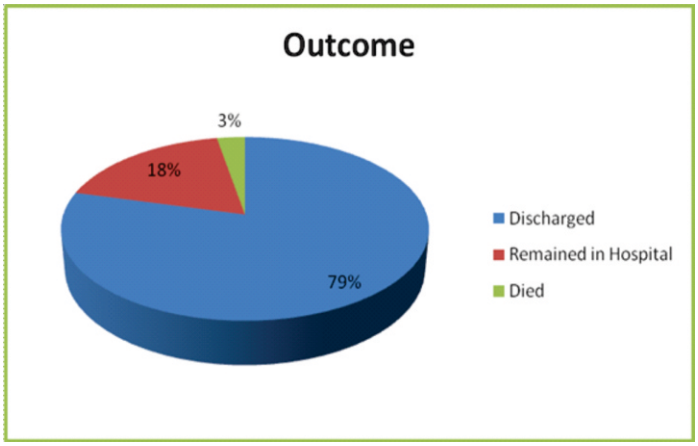

Fig-6. *Frequency Distribution of Outcomes of Covid19 Cases*

Chest Xray scoring. The mean scoring 7.50 ± 5.6 with range from 0-18, with a median value of 8. (Fig-7)

According to data of laboratory tests, the elevated levels of C-reactive protein (CRP) were detected in 48 0ut of 73 patients (65.75%). Similarly, procalcitonin levels were also observed to be higher in

concentration in 58% of the patients. Patient's blood profile showed higher polymorph leukocytes count in 34 (33%), normal neutrophil count in 68(66.01%) cases, whereas only one patient presented with low polymorph leukocyte count. 40 cases (38.83%) of Covid-19 had lymphopenia. Platelet count was observed to be suppressed in only 2 (1.94%) cases. D-dimers were raised in 51 cases (79.68%). The serum albumin levels were found to be suppressed in 17(23.6%) cases. ALT & AST were raised in 34 (47.2%) and 42 (58.3%) patients, respectively. Elevated levels of serum ferritin were observed in 35 (61.4%) cases. (Table-1)

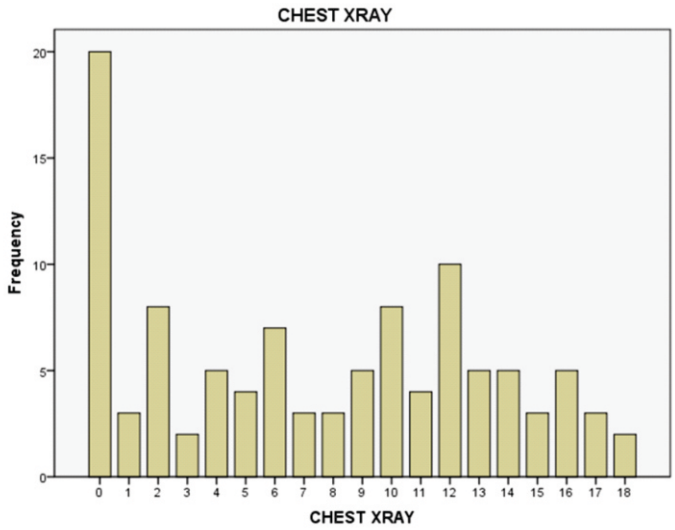

Fig-7:*Frequency Distribution of Chest X-ray Findings*

Discussion

This study, to our knowledge, is the first one from Pakistan in which epidemiological, clinical features, laboratory parameters and chest x-ray findings of the hospitalized patients with COVID-19 in Farooq Hospital Westwood, Lahore has been presented. As of 28 May, 2020, out of 105 cases in the present study, 79% were discharged, 18% remain hospitalized and 3% patient died. The mortality rate was in contrast to the studies from New York, Italy and China where comparatively high mortality rates had been reported.[15,16,17]

Most of the infected cases were males 82% and 23% females. These findings were consistent with the studies by Huang et al and Chen et al which reported female patients 27% and 28% respectively.[11,18] As far as co-morbidities are concerned, 49.39% had Hypertension & cardiovascular disease, 43.37% patients had diabetes mellitus, 4.81% asthma, and 2.4% presented with liver diseases. These findings are consistent with Richardson et al, Wang et al, Zhang et al whereas Huang et al reported higher percentage of patients with diabetes.[15,11,19,20]

Most patients had presented with serious symptoms 40%, which included shortness of breath, chest pain or pressure and 19% cases showed no symptoms

Table 1: *Laboratory Parameters*

Variable	Description	Frequency (%)
Hb	Low	22(21.3%)
	Normal	81(78.6%)
TLC	Normal	78(75.7%)
	Raised	25(24.2%)
Platelet Count	Normal	101(98%)
	Low	2(1.94%)
NEUTROPHILS	Normal	68(66.02%)
	Raised	34(33.01%)
	low	01(0.97%)
LYMPHOCYTES	Normal	54(52.4%)
	Low	40(38.83%)
	Raised	9(8.73%)
Bilirubin	Normal	69(95.8%)
	raised	3(4.16%)
SGPT(ALT)	Normal	38 (52.77%)
	Raised	34(47.22%)
SGOT(AST)	Normal	30(41.66%)
	Raised	42(58.33%)
Alkaline Phosphatase	Normal	59(81.9%)
	raised	13(18.05%)
Total Protein	Normal	69(95.83%)
	low	3(4.166%)
Albumin (serum)	Normal	55(76.38%)
	low	72(23.6%)
Serum Urea	Normal	72(78.2%)
	high	20(21.7%)
Serum Creatinine	Normal	64(69.5%)
	high	28(30.4%)
CRP	Normal	25 (34.2%)
	high	48(65.75%)
Ferritin	Normal	22 (38.6%)
	High	35(61.4%)
PROCALCITONIN	Normal	21(42%)
	High	29(58%)
D. DIMER	Normal	13(20.3%)
	High	51 (79.6%)

which is consistent with Huang et al and Zhang et al.[11,20] Asymptomatic patients are potential sources of transmission as it is difficult to detect them. Therefore, large screening tests will be helpful to detect asymptomatic COVID-19 patients.

In contrast to Zhang et al 75% and Huang et al 63%, the present study showed 40 (38.83%) cases with lymphopenia but similar results were given by Chen et al 38%.11,18,20 AST and ALT were raised in almost half of the patients being in 58.33% and 47.22% respectively and are in accordance to Qingxian et al.21 Inflammatory markers like CRP(65.75 %), serum ferritin (61.4%), procalcitonin (58%) and d-dimers (79.6%) were raised in more than half of the patients especially in critical patients showing their importance as clinical indicators of progressive stage in patients. These results are in accordance with the previous studies.[22,23]

All patients were scanned by chest x-rays at the time of presentation. Although HRCT scan is the most sensitive way to detect lung abnormalities, in current emergency settings, CXR is a useful diagnostic tool to observe and monitor the progression of lung pathologies in covid-19 infected patients. In the present study CXR were scored for COVID-19 pneumonia in two steps, following the scoring system adapted by Borghesi et al in Italy.[14] The scores of the six zones of lungs were added to obtain the total score from 0-18. In the present study most cases obtained score 0 followed by 12 score at the time of presentation and this finding is in accordance with a study conducted in Italy.[14]

89.50% cases were detected by RT-PCR for COVID-19 whereas 10.50% were confirmed clinically for COVID-19 in this study, since they had definite demographic history, typical symptoms and chest X-ray images despite being negative by RT-PCR. This demonstrates the importance of identification of clinical features, laboratory parameters and radiological findings in infected patients for early diagnosis and treatment.[23]

Conclusion

This study provides first time clinical characteristics, laboratory parameters and early outcomes of hospitalized patients with COVID-19 from Lahore, Pakistan. This study will set a foundation for future studies to see associations and correlations among different parameters which will help the clinicians, decision makers and researchers to plan accordingly.

Conflict of Interest

The authors declared that they have no conflicts of interest to this work.

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