<u>Original Research Article</u>

A comparative study of the clinical characteristic of patients with COVID-19 admitted in Intensive care unit in a tertiary health care facility

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Abstract

Background: Coronavirus disease (COVID-19) pandemic started in 2019 from Wuhan, China, has infected 19.2 million Indians, out of which 15.7 million recovered and caused 212 thousand deaths. Being a novel virus, evidence is lacking on its manifestation and clinical characteristics.

Aim and Objective: To study the clinical characteristics of patients with COVID-19 and compare it with the ICU admission in a tertiary health care facility in Meerut.

Material and Method: Hundred COVID-19 patients diagnosed with Reverse Transcription Polymerase Chain Reaction (RT-PCR) test were studied coming to tertiary care center at Jamnagar for demographic details (age, gender), clinical symptoms, and results of laboratory test (complete blood count, computed tomography (CT) scan) were analyzed.

Results: Male preponderance (70%) was noted, with the mean age being 51 ± 5.3 years. The most common symptom was fever (69%), cough (60%) and shortness of breath (59%) with a mean duration of five days. The oxyhemoglobin saturation (SpO2) at the time of admission was 91%. In CT scans, 73% of patients had bilateral pneumonia. The blood counts of patients on admission showed leucopenia and lymphopenia, increased D-dimer level, and total bilirubin on admission in intensive care unit (ICU) patients than non-ICU patients.

Conclusions: The clinical characteristics of COVID-19 patients are commonly fever and cough, CT scan of chest and blood SpO2 investigation should be conducted to augment the investigation and treatment of the covid patients. Patients admitted in ICU showed leucopenia and lymphopenia, increased D-dimer level, and total bilirubin levels.

Keywords: RTPCR, Coronavirus, ARDS, pneumonia, laboratory parameters, D-dimerIntroduction

Introduction:

In early December 2019, the first clusters of coronavirus disease 2019 (COVID-19) were identified in Wuhan, China. On March 11, 2020, the World Health Organization (WHO) confirmed COVID-19 as a pandemic. Since then, the disease has been spreading quickly, affecting more than 152 million worldwide and 19.2 million in India. To date, it has killed 3.19 million worldwide, which emphasizes the threat it poses to global health. [1, 2]

Clinical manifestations of COVID-19 have shown high variability, including asymptomatic carriers, acute respiratory distress syndrome (ARDS), and pneumonia with variable severity. [3]

Most diagnosed patients experience mild symptoms, including fever, cough, dyspnea, myalgia, and fatigue. In contrast, patients with severe cases develop ARDS and severe cardiac and renal complications, potentially leading to death. [4]

Many times, COVID-19 is asymptomatic and clinical symptoms are elusive and disguising; hence the present study is performed to understand and document the clinical features and symptoms of COVID-19 and compare them between intensive care units (ICU) and non- OCU admission.

Material and Method:

This comparative observational study was performed between April 2020 to April 2021 at a tertiary health center. A study cohort of 100 subjects was selected from the patients diagnosed with COVID-19 using the reverse transcription polymerase chain reaction (RT-PCR).

A written informed consent was obtained from all the patients after informing them a through details of the study in their local language.

Inclusion criteria: During this period, all patients who fulfilled our hospital's COVID-19 suspect criteria were admitted and tested for both SARS-CoV-2 and non-SARS-CoV-2 respiratory viruses. Patients who were positive for either one was included in the study.

Exclusion criteria: Patients who met suspect criteria but were negative for both and those with severe comorbidities or attending hospitals for other diseases or critical medication were excluded from the study.

Our hospital's COVID-19 suspect criteria underwent a constant change as the COVID-19 situation evolved. Our hospital's suspect criteria were based on a combination of clinical symptoms, and epidemiological risks including a history of international travel.

Data collection

At the time of admission, demographic data (age, sex, and occupations) and clinical symptoms, and duration of symptoms were recorded. For further investigation, blood tests and CT scans of the chest were conducted.

All the patients underwent a blood test for differential blood cell count, C-reactive protein (CRP), procalcitonin (PCT), erythrocyte sedimentation rate (ESR), alanine aminotransferase (ALT), aspartate aminotransferase (AST), total bilirubin (TBil), serum creatinine (Cr), and blood urea nitrogen (BUN).

Statistical analysis

All the data were analyzed using IBM SPSS ver. 20 software. Quantitative data were expressed as mean and standard deviation, whereas categorical data were expressed as numbers and percentages. Frequency distribution was performed to prepare the tables. As being an observational study, no further statistical analysis was performed. One-way ANOVA was used to compare the

means, and the Chi-Square test was applied to calculate the p-value for categorical variables. The level of significance was assessed at 5%.

Results:

Demographic data of patients shows that 70% male and 30% female patients were admitted to the hospital, mean age of male patients was 52±13.1 years and 50±9.5 years for females.

Table 1: Showing age and gender distribution among COVDI-19 patients

Variable	Male	Female
Percentage	70%	30%
Mean age (years)	52.42 ± 13.1	50.26 ± 9.5

Symptom data shows that 60% of patients had three common symptoms at the time of admission, i.e., fever, cough, and shortness of breath, with a mean duration of five days. The distribution of symptoms shows that fever (69%) was the most common symptom following cough in 60% and shortness of breath in 59% of patients. Other recorded symptoms were gastrointestinal symptoms in 13% and myocardial infarction in 4% of patients.

Figure 1: Symptoms distribution in COVID-19 patients
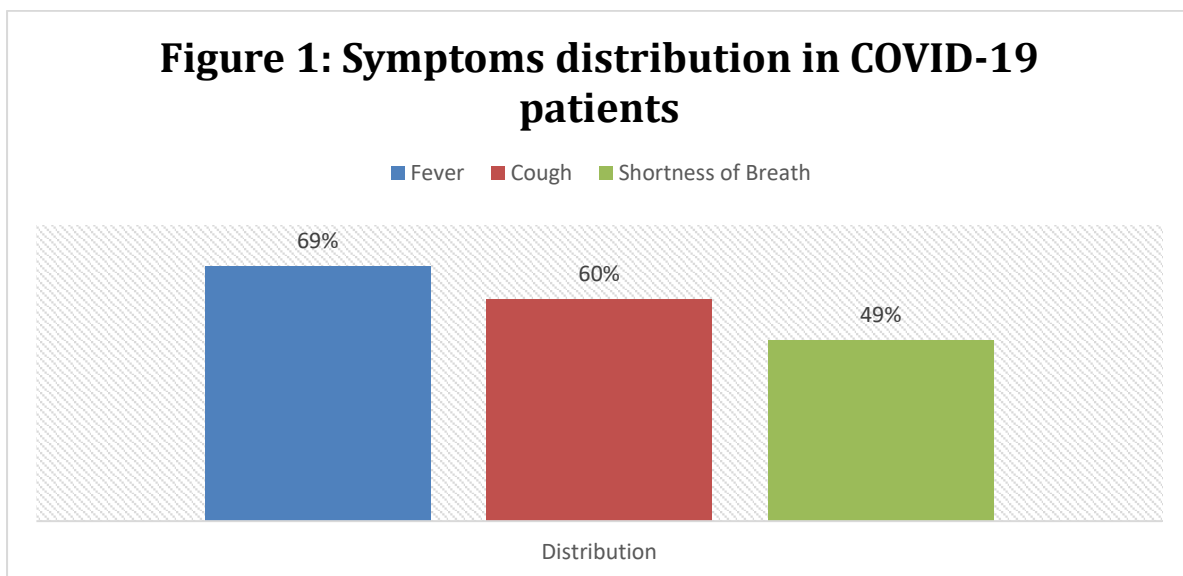
The median SpO2 recorded at the time of admission was 91%. Laboratory investigation of blood reveals the average hemoglobin of 11.7 g/dl and platelet count of 169 /ml. CT scan of chest reveals 73% of patients had multiple patchy glassy shadows in both lungs (mainly peripheral).

Table 2: Laboratory findings of patients infected with 2019-nCoV on admission to hospital

Variables	All patients (n=100)	ICU care (n=22)	No ICU care (n=78)	p-value

White blood cell count, × 10⁹ per L		6·1 (4·1–10·5)	11·2 (5·8–12·1)	5·6 (3·1–7·6)	0·012
	<4	28 (28)	2 (9)	26 (33.3)	0·038
	4-10	45 (45)	8 (36.4)	37 (47.4)	
	>10	27 (27)	12 (54.5)	15 (19.2)	
Neutrophil count, × 10⁹ per L		5·2 (3·1–8·8)	10·4 (5·2–11·6)	4·6 (2·2–6·2)	<0.001
Lymphocyte count, × 10⁹ per L		0·8 (0·6–1·1)	0·4 (0·2–0·8)	1·0 (0·7–1·1)	0.034
	<1.0	63 (63)	19 (86.4)	42 (53.8)	0.041
	≥1·0	37 (37)	3 (13.6)	36 (46.2)	
Haemoglobin, g/L		126·0 (118·0–140·0)	122·0 (111·0–128·0)	130·5 (120·0–140·0)	0.231
Platelet count, × 10⁹ per L		164·5 (131·5–263·0)	196·0 (165·0–263·0)	149·0 (131·0–263·0)	0.352
	<100	5 (5)	2 (9)	4 (5.1)	0.362
	≥100	95 (95)	20 (91)	74 (94.9)	
D-dimer, mg/L		0·5 (0·3–1·3)	2·4 (0·6–14·4)	0·5 (0·3–0·8)	<0.001
Total bilirubin, mmol/L		11·7 (9·5–13·9)	14·0 (11·9–32·9)	10·8 (9·4–12·3)	0.001
Potassium, mmol/L		4·2 (3·8–4·8)	4·6 (4·0–5·0)	4·1 (3·8–4·6)	0.422
Sodium, mmol/L		139·0 (137·0–140·0)	138·0 (137·0–139·0)	139·0 (137·5–140·5)	0.254

Discussion:

COVID-19, a pandemic by WHO, has varied clinical features; this observational study was conducted to understand the distribution of these symptoms for better diagnosis and management. Understanding symptoms is necessary for timely containment and management.

The demographic observation of this study is comparable with the Indian research by Kayina CA et al. (2020), where the majority of patients were in the working-age group, and 68% were males, and 32% were females; in our study, 70% of patients were male, and 30% were female. [5] Similarly, Sharma E et al. (2020) reported 80% of patients were male. This male predominance may be due to higher travel by for occupational as compared to females. [6]

In the present study, fever (69%), cough (60%), and shortness of breath in 59% of patients were the most common symptoms. Similar observations were made by Kayina CA et al. (2020), were fever (68.1%), cough (59.6%), and shortness of breath (71.9%) were the most common presenting symptoms. [5] Another study by Jethani B et al. (2020) identified fever (43.4%), cough (47.4%), sore throat (29.6%), shortness of breath (11.2%), and loss of taste (10.2%). [7]

We observed the median oxyhemoglobin saturation (SpO2) at the time of admission was 91%; Wang supports this finding, J et al. (2021), who reported the mean oxygen saturation in the resting state was below 93% in 85% of patients. [8] Similar Indian study by Kayina CA et al. (2020) noted the median (IQR) SpO2 and RR at the time of ICU admission were 90. [5]

The blood counts of patients on admission showed leucopenia (white blood cell count less than 4×10^9/L) and lymphopenia (lymphocyte count $<1.0 \times 10^9$/L). D-dimer level on admission was higher in ICU patients than non-ICU patients. Total bilirubin was significantly higher in ICU patients compared to non-ICU patients. In line with the present study, Wang et al. also showed that depressed total lymphocytes, extended prothrombin time, and increased lactate dehydrogenase were the most prevalent laboratory abnormalities were more prevalent in ICU patients. Patients who received ICU care had numerous test abnormalities when compared to non-ICU patients. 2019-nCoV infection may be linked to cellular immune insufficiency, coagulation activation, myocardia injury, hepatic injury, and kidney impairment based on these findings. These abnormalities in the laboratory are identical to those seen in patients infected with MERS-CoV and SARS-CoV. [8]

In the current study, a CT scan of the chest revealed patchy glassy shadows in both the lungs; this observation is supported by the finding of the study of Wang, J et al. (2021), who reported 83% of patients had bilateral pneumonia, and 16.5% had unilateral pneumonia. [9]

Another Chinese study also recorded similar results where multiple patchy glassy shadows were present in both lungs, particularly in the peripheral areas, in 86.22 % of COVID-19 patients. [10]

Being a cross-sectional study with a small sample size, the results cannot be applied to the whole population. There is a need for a large randomized clinical trial to further strengthen the present study's findings.

Conclusion:

COVID-19 affects a wide range of patients, mainly the working-age group. Symptoms such as fever, cough, and shortness of breath are strongly associated with COVID-19 that should not be ignored. CT scan and blood test should be conducted in case of asymptomatic patients. We emphasize that epidemiological risk factors and clinical symptoms are more useful than laboratory and radiological abnormalities in differentiating COVID-19 from other respiratory viral infections. Patients admitted in ICU showed leucopenia and lymphopenia, increased D-dimer level, and total bilirubin levels. A multi-specialty COVID care team can improve patient outcomes.

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