Demographic & clinical profile of patients with COVID-19 at a tertiary care hospital in north India

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Background & objectives: The COVID-19 pandemic emerged as a major public health emergency affecting the healthcare services all over the world. It is essential to analyze the epidemiological and clinical characteristics of patients with COVID-19 in different parts of our country. This study highlights clinical experience in managing patients with COVID-19 at a tertiary care centre in northern India.

Methods: Clinical characteristics and outcomes of consecutive adults patients admitted to a tertiary care hospital at Chandigarh, India, from April 1 to May 25, 2020 were studied. The diagnosis of SARS-CoV-2 infection was confirmed by real-time reverse transcriptase polymerase chain reaction (RT-PCR) on throat and/or nasopharyngeal swabs. All patients were managed according to the institute’s consensus protocol and in accordance with Indian Council of Medical Research guidelines.

Results: During the study period, 114 patients with SARS-CoV-2 infection were admitted. The history of contact with COVID-19-affected individuals was available in 75 (65.8%) patients. The median age of the patients was 33.5 yr (13-79 yr), and there were 66 (58%) males. Of the total enrolled patients, 48 (42%) were symptomatic. The common presenting complaints were fever (37, 77%), cough (26, 54%) and shortness of breath (10, 20.8%). Nineteen (17%) patients had hypoxia (SpO₂<94%) at presentation and 36 (31%) had tachypnoea (RR >24). Thirty four (29.8%) patients had an accompanying comorbid illness. Age more than 60 yr and presence of diabetes and hypertension were significantly associated with severe COVID-19 disease. Admission to the intensive care unit (ICU) was needed in 18 patients (52%), with three (2.6%) patients requiring assisted ventilation. Mortality of 2.6 per cent (3 patients) was observed.

Interpretation & conclusions: Majority of the patients with COVID-19 infection presenting to our hospital were young and asymptomatic. Fever was noted only in three-fourth of the patients and respiratory symptoms in half of them. Patients with comorbidities were more vulnerable to complications. Triaged classification of patients and protocol-based treatment resulted in good outcomes and low case fatality.

Key words: Acute respiratory distress syndrome - comorbidities - COVID-19 - hypoxia - India - pandemic - pneumonia
The World Health Organization (WHO) reported more than 43 million confirmed cases of SARS-CoV-2 infection and more than one million deaths globally, with India contributing to >600,000 confirmed patients and >100,000 deaths until October 29, 2020. The first patient in India was reported from Kerala, and gradually COVID-19 has engulfed the entire country. Patients with SARS-CoV-2 infection may have mild-to-asymptomatic illness, but some rapidly progress to acute respiratory distress syndrome (ARDS), multi-organ dysfunction syndrome (MODS) and death.

It is pertinent to identify the clinical and demographic characteristics of patients considering the novelty and substantial heterogeneity of the illness across the world, particularly in countries like China and India. This study describes the demographic characteristics, comorbid conditions, baseline laboratory findings, clinical course and outcomes among COVID-19 patients admitted at a dedicated COVID hospital in north India.

**Material & Methods**

**Study population and settings:** The study was conducted at the Nehru Hospital Extension Block, a dedicated COVID hospital at the Postgraduate Institute of Medical Education & Research (PGIMER), Chandigarh, India, from April 1 to May 25, 2020. Individuals with influenza-like illness who fulfilled the ICMR screening criteria (dated May 18, 2020) and asymptomatic close contacts of COVID-19-positive patients were screened. Consecutive adult patients (>12 yr) who tested positive on real-time reverse transcriptase polymerase chain reaction (RT-PCR) assay for SARS-CoV-2 on a throat and/or a nasopharyngeal swab were admitted and included in the study. Pregnant women and children were excluded. The study was approved by the Institutional Ethics Committee.

**Data collection:** A written informed consent was taken in person from patients by the treating team while a telephonic consent was obtained from the quarantined immediate family members in case the patient was unable to consent himself/herself. Demographic details, medical history including comorbidities, history of exposure to COVID-19 and vital parameters were recorded at admission to the hospital. Baseline laboratory parameters, treatment details and clinical outcomes were also collected.

**Case definitions and classification:** A standard protocol which included case definitions for categorization of SARS-CoV-2 infection, detailed management plan, baseline and follow up investigations and treatment according to clinical severity was devised by a group of experts from various specialities of the PGIMER. This consensus treatment algorithm was developed after reviewing the guidelines of various international societies and revised national clinical management guidelines for COVID-19 by the MoHFW, Government of India, dated March 31, 2020. Symptomatic patients were categorized to have mild, moderate or severe disease. Patients with uncomplicated upper respiratory tract infection or non-specific symptoms such as fever, cough, sore throat, nasal congestion, malaise and headache were classified to have mild disease. Patients with radiologically proven pneumonia but without the signs of severe pneumonia were categorized as moderate disease. Severe pneumonia included a patient with fever, plus one of the following: respiratory rate >30 breaths/min, severe respiratory distress and SpO2 <90% on room air. Standard criteria for defining ARDS and MODS were used. Critically ill patients included those who had severe pneumonia, shock and organ dysfunction syndrome at admission or during hospital stay.

All stable patients irrespective of symptoms were treated in isolation rooms, while those with critical illness were admitted in the intensive care unit (ICU). Standard organ-specific supportive care was provided when clinically indicated.

**Specimen collection, laboratory test and discharge policy:** Throat and/or nasopharyngeal specimens were obtained using standard techniques. The nasopharyngeal samples were tested using the National Institute of Virology (NIV), Pune-developed kits as per the ICMR recommendations. The kit was a two-step kit wherein the E gene was used for the screening test. All those specimens came out to be positive by screening test were confirmed by a second reaction targeting the ORF and RdRP genes as per the NIV protocol. The ICMR guidelines were followed to discharge the patients from the hospital. Initially, till May 8, 2020, all the admitted patients were discharged only after two consecutive nasopharyngeal swabs (done after 14th day of stay) tested negative on RT-PCR. After May 8, 2020, with a change in the national guidelines, asymptomatic and mild patients were discharged after 10 days of symptom onset.
and being afebrile for three consecutive days. The discharge guidelines for severe pneumonia were also revised and mandated oxygen-free period of three days and a negative RT-PCR result as against the two samples previously\textsuperscript{16,17}.

Statistical analysis: Statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA, version 23.0 for Windows) and Microsoft Excel 2016. All quantitative data such as age, weight, haemodynamic parameters and laboratory values were estimated using measures of central location (mean). Qualitative or categorical variables were described as proportions. Normality of quantitative data was checked by Kolmogorov-Smirnov tests of normality. For normally distributed data, means were compared using independent \textit{t} test. Mann-Whitney U-test was applied for statistical analysis of skewed continuous variables and ordered categorical variables. Univariate and multivariate logistic regression analyses were performed to analyse the effect of comorbidities (age \textgreater{}60 yr, diabetes mellitus and hypertension) on the severity of COVID-19. Mortality as an outcome measure could not be used as its number was low.

Results

Demographics and baseline clinical characteristics: During the study period, 114 patients were diagnosed to have COVID-19 and were included in the study. The baseline demographic and clinical characteristics of these patients are summarized in Table I. The median age of the patients was found to be 33.5 yr (IQR: 24.2-46.7, range: 13-79 yr) and 66 (57.8\%) were male. Of the total patients, 66 (57.8\%) were asymptomatic and 48 (42.1\%) were symptomatic at admission. Two patients developed symptoms during hospitalization. Among the symptomatic patients (n=50), mild, moderate and severe illness was seen in 22, 10 and 18 patients, respectively. The common presenting complaints were fever in 37 (77.1\%) followed by cough in 26 (54.2\%) patients. Twenty eight patients (58.3\%) were noted to have multiple (\textgreater{}2) symptoms. At triage, 19 (16.6\%) patients were hypoxic with oxygen saturation (Sp\textsubscript{O}\textsubscript{2}) <94 per cent on room air, 36 (31.6\%) patients had tachypnoea while two patients (1.7\%) had hypotension (systolic arterial pressure <60 mmHg). Two patients (1.7\%) required non-invasive ventilation, while three (2.6\%) were mechanically ventilated. Renal replacement therapy was instituted in four (3.5\%) patients. Three of these had an underlying chronic kidney disease and were

| Parameters                  | Values          |
|-----------------------------|-----------------|
| Age (yr)                    | 35.9±14.7       |
| Range                       | 13-79           |
| Median                      | 33.5            |
| IQR (%)                     | 24.2-46.7       |
| 12-45                       | 85 (74.5)       |
| 45-59                       | 20 (17.5)       |
| >60                         | 9 (7.8)         |
| Gender (%)                  | Male 66 (57.8)  |
|                            | Female 48 (42.1)|
| Comorbidities** (%)         | None 80 (70.1)  |
|                            | Cardiovascular (IHD) 2 (1.7) |
|                            | HTN 19 (16.6)    |
|                            | COPD 2 (1.7)     |
|                            | Diabetes mellitus 17 (14.9) |
|                            | Thyroid 6 (5.2)  |
|                            | CKD 3 (2.6)      |
|                            | CLD 1 (0.8)      |
|                            | Obesity 1 (0.8)  |
|                            | CVA 1 (0.8)      |
|                            | Multiple comorbidity\# 10 (8.7) |
|                            | Temperature \textgreater{}38°C, n (%) 37 (77.1) |
| Per cent oxygen saturation room air, n (%) | <94 19 (16.6) |
|                            | >94 95 (83.3)    |
| Respiratory rate (breaths/min), n (%) | <24 78 (68.42) |
|                            | >24 36 (31.6)    |
| HR, n (%)                   | <100/min 96 (84.2) |
|                            | >100/min 18 (15.8) |
| Blood pressure, n (%)       | SBP <90 and DBP <60 mmHg 2 (1.8) |
|                            | Admission to the ICU 18 (15.7) |
| Treatment (%)               | Oxygen supplementation |
|                            | Non-rebreathing mask 19 (16.6) |
|                            | Mechanical ventilation |
|                            | Non-invasive 2 (1.7) |
|                            | Invasive 3 (2.7)  |

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on maintenance dialysis regimen before the current illness, whereas one patient developed new-onset acute kidney injury (Kidney Disease Improving Global Outcomes stage 3).

**Baseline laboratory characteristics of patients:** At admission, leucocyte counts had increased in 17 patients (15%) and were below the normal range in five (4.5%) patients. Twenty one (19%) patients had lymphocyte count below the normal range. High neutrophil-to-lymphocyte ratio (NLR) (≥3.5) was observed in 41 (37%) patients. Fourteen (13%) patients had thrombocytopenia (<0.15 million), and 38 (34%) had anaemia (haemoglobin <12 g/dl) at baseline A variable degree of liver dysfunction with an increase in aspartate aminotransferase (25%)/alanine aminotransferase (32%)/alkaline phosphatase (29%) was observed. Nine (12%) patients had high serum procalcitonin. Thirty seven (41%) patients had high C-reactive protein (CRP), while 14 (16%) had a serum ferritin level above the normal range. Determination of cardiac injury was assessed with troponin T (Trop T) levels in 51 patients, but only five (9.8%) patients had the values above the normal range. Similarly, of the 54 patients tested, eight (14.8%) had values of pro-BNP higher than the normal range at admission (Table II).

**Clinical characteristics of patients with comorbid illness:** Thirty four (29.8%) patients had associated comorbid condition of varying severity. These included hypertension in 19 (16.6%), diabetes in 17 (14.9%) and chronic renal disease in three (2.6%) patients. Ten patients (8.7%) had multiple comorbidities (Table I). Significantly higher levels of inflammatory biomarkers at admission [CRP, ferritin and lactate dehydrogenase (LDH)] among patients with an underlying comorbidity as compared to those without a comorbidity ($P<0.05$) were observed. In addition, these patients also demonstrated significantly higher levels of high D-Dimers as well as cardiac biomarkers (Trop T, pro-BNP) ($P=0.05$) (Table III). On univariate analysis, age >60 yr and presence of hypertension and diabetes mellitus were significantly associated with severe COVID-19 but failed to achieve significance on multivariate analysis (Table IV). This could be attributed to the small sample size, which was evident from the wide confidence intervals (CIs).

**Comparison of clinical and laboratory characteristics of asymptomatic and symptomatic patients:** Asymptomatic patients were younger with a mean age of 29.90±12.91 yr while the mean age of patients with severe COVID-19 was 55.9±12.91 yr (Table V). Comorbidities including hypertension and diabetes were observed more frequently in patients who were symptomatic as compared to those who were asymptomatic (14/50 vs. 5/59). Inflammatory parameters (LDH, CRP and serum ferritin) were significantly increased in the symptomatic group compared to asymptomatic group. Maximal increase in the above inflammatory parameters was observed in patients with severe SARS-CoV-2 infection.

**Clinical characteristics of critically ill patients:** Eighteen (15.7%) patients were critically ill at admission and required intensive care services. Elderly patients (age >60 yr), presence of comorbidities such as hypertension and diabetes, increased serum levels of inflammatory biomarkers (CRP, ferritin and LDH) and renal dysfunction/high creatinine at admission

| Parameters                          | Values |
|-------------------------------------|--------|
| Dialysis (renal replacement therapy)| 4 (3.5) |
| Specific drugs                      |        |
| Antibiotic treatment                | 9 (7.9) |
| Antifungal treatment                | 2 (1.8) |
| Anti-tubercular                     | 2 (1.8) |
| Immuvac (Sepsivac)                 | 20 (17.5) |
| Tocilizumab (IL-6 inhibitor)        | 2 (1.8) |
| HCQ                                 | 37 (32.5) |
| Anticoagulation                     |        |
| Prophylactic (enoxaparin)           | 17 (14.9) |
| Therapeutic (enoxaparin)            | 11 (9.6) |
| Clinical outcome (%)                |        |
| Undergoing treatment                | 3 (2.6) |
| Discharge*                          | 108 (94.7) |
| Mortality                           | 3 (2.6) |

Data expressed in number (n), and percentage (%); "Multiple comorbidity: >1 comorbidity; "Discharge as per the ICMR guidelines$^{15,16}$; "Comorbidities listed here are defined as medical diagnoses, included in medical history by ICD-10 coding, SD, standard deviation; IQR, interquartile range; IHD, ischaemic heart disease; HTN, hypertension; COPD, chronic obstructive pulmonary disease; CKD, chronic kidney disease; CLD, chronic liver disease; CVA, cerebrovascular accident; HCQ, hydroxychloroquine; ICMR, Indian Council of Medical Research; ICD, International Classification of Diseases; IL, interleukin; ICU, intensive care unit; SBP, systolic blood pressure; DBP, diastolic blood pressure; HR, heart rate
| Parameter                          | Median (IQR) | n    | Normal range |
|-----------------------------------|--------------|------|--------------|
| Haemoglobin (g/dl), median (IQR) | 12.7 (11.6-13.9) | 110  | 11-16        |
| Decreased (<12 g/dl)              | 38 (34)      |      |              |
| WBC count (×10^9/l)               | 7.6 (6.2-9.6) | 110  | 4000-11000   |
| Increased, n (%)                  | 17 (15)      |      |              |
| Decreased, n (%)                  | 5 (4.5)      |      |              |
| DLC                               |              | 110  |              |
| Neutrophils (%)                   | 58 (48-70)   |      |              |
| Lymphocytes (%)                   | 30 (21-35.5) |      |              |
| Lymphocyte count                  | 1500 (1000-2500) | 110  | 1100-3200    |
| Increased, n (%)                  | 4 (4)        |      |              |
| Decreased, n (%)                  | 21 (19)      |      |              |
| NLR                               | 2.35 (1.48-5.7) | 110  | <3.5         |
| Increased, n (%)                  | 41 (37)      |      |              |
| Platelets (×10^9/l)               | 305 (224-486) | 110  | 150-450      |
| Increased, n (%)                  | 33 (30)      |      |              |
| Decreased, n (%)                  | 14 (13)      |      |              |
| APTT (s)                          | 30.9 (27-34) | 95   | <35          |
| Increased, n (%)                  | 18 (18)      |      |              |
| PT (s)                            | 14.3 (13.5-15.2) | 95   | <15          |
| Increased, n (%)                  | 25 (26)      |      |              |
| D-Dimer\(^\d\) (normal standardized value) | 0.94 (0.5-1.9) | 88   | <1          |
| Increased, n (%)                  | 36 (40.9)    |      |              |
| Fibrinogen (g/l)                  | 3.53 (2.9-4.5) | 79   | <4          |
| Increased, n (%)                  | 28 (35)      |      |              |
| Serum sodium (mEq/l)              | 141 (139-142) | 95   | 135-145      |
| Increased, n (%)                  | 2 (2)        |      |              |
| Decreased, n (%)                  | 8 (8)        |      |              |
| Serum potassium (mEq/l)           | 4.3 (4.1-4.6) | 91   | 3.5-5.5      |
| Increased, n (%)                  | 5 (5)        |      |              |
| Decreased, n (%)                  | 3 (3)        |      |              |
| Chloride (mEq/l)                  | 100 (98-103) | 50   | 95-105       |
| Decreased, n (%)                  | 4 (8)        |      |              |
| Total protein (g/dl)              | 7.6 (7.1-7.8) | 95   | >6.5         |
| Decreased, n (%)                  | 5 (5)        |      |              |
| Albumin (g/dl)                    | 4.4 (4-4.6)  | 93   | >3.5         |
| Decreased, n (%)                  | 8 (8.6)      |      |              |
| AST (U/l)                         | 27.7 (20-40.2) | 92   | <40         |
| Increased, n (%)                  | 23 (25)      |      |              |
| ALT (U/l)                         | 29 (18-49.2) | 92   | <40         |
| Increased, n (%)                  | 30 (32)      |      |              |
| ALP (U/l)                         | 102 (82-125) | 92   | <120        |
| Increased, n (%)                  | 27 (29)      |      |              |

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Parameter | Median (IQR) | n | Normal range
--- | --- | --- | ---
Total bilirubin (mg/dl) | 0.5 (0.4-0.7) | 94 | <1.1
Increased, n (%) | 4 (4.2) | | |
LDH (U/l) | 223.5 (192.5-266.5) | 58 | <333
Increased, n (%) | 4 (6.8) | | |
Urea (mg/dl) | 24.4 (20-28.7) | 95 | <50
Increased, n (%) | 5 (5.2) | | |
Serum creatinine (mg/dl) | 0.7 (0.6-0.9) | 95 | <1.2
Increased, n (%) | 4 (4.2) | | |
LDH (U/l) | 223.5 (192.5-266.5) | 58 | <333
Increased, n (%) | 4 (6.8) | | |
Urea (mg/dl) | 24.4 (20-28.7) | 95 | <50
Increased, n (%) | 5 (5.2) | | |
Serum creatinine (mg/dl) | 0.7 (0.6-0.9) | 95 | <1.2
Increased, n (%) | 4 (4.2) | | |
Lipid profile - TG (mg/dl) | 112.5 (82.2-155.7) | 58 | <150
Increased, n (%) | 16 (27) | | |
Procalcitonin (ng/ml) | 0.03 (0.0-0.1) | 70 | <0.15
Increased, n (%) | 9 (12) | | |
CRP (mg/dl) | 2.1 (0.8-5.4) | 90 | <3
Increased, n (%) | 37 (41) | | |
Serum ferritin (ng/ml) | 90 (40.5-200.5) | 83 | 30-300
Increased, n (%) | 14 (16) | | |
Decreased, n (%) | 16 (19) | | |
Pro-BNP (pg/ml) | 11.4 (5-38.7) | 54 | <125
Increased, n (%) | 8 (14.8) | | |
Trop T (pg/ml) | 6.1 (5.4-8.2) | 51 | <100
Increased, n (%) | 5 (9.8) | | |
CK-MB (U/l) | 44.9 (38.0-100.3) | 6 | <25
Increased, n (%) | 6 (5.26) | | |
HbA1c (%) | 6.4 (5.5-8.4) | 15 | | |
Increased, n (%) | 7 (46.6) | | |

*Normalized D-Dimer value (1 indicate 240 ng/ml); Data expressed as median and IQR. DLC, differentiate leucocyte count; NLR, neutrophil-lymphocyte ratio; PT, prothrombin time; APTT, activated partial thromboplastin time; CRP, C-reactive protein; AST, aspartate aminotransferase; ALT, alanine aminotransferase; ALP, alkaline phosphatase; LDH, lactate dehydrogenase; TG, triglyceride; Pro-BNP, pro-brain natriuretic peptide; Trop T, troponin T; CK-MB, creatinine kinase-MB; HbA1c, haemoglobin A1c; IQR, interquartile range; WBC, white blood count

were significantly higher among critically ill patients. (P<0.05) (Table VI). High D-dimers and fibrinogen levels were also observed among these patients.

**Treatment and clinical outcome:** Fifty nine (51.75%) patients were given specific therapies for COVID-19. Thirty seven patients (32.4%) received hydroxychloroquine (HCQ), 20 (17.54%) received a study drug Immuvac (Sepsivac-Mw vaccine) and two patients (1.75%) received tocilizumab (interleukin-6 inhibitor). By the end of May 25, 108 (94.7%) patients were discharged, three were still undergoing treatment and three (2.6%) patients had died. All the three patients who succumbed to the illness had diabetes mellitus, while two patients also had chronic kidney disease.

**Discussion**

SARS-CoV-2 is one of the most virulent pathogens causing severe acute respiratory illness along with MERS and swine flu in humans. Initial case studies from China demonstrated COVID-19 to be a respiratory illness with a spectrum ranging from mild illness (81%), severe respiratory distress (14%) and critical illness in five per cent with a case fatality rate of around 2.4 per cent. Considerable disparities in demographic and clinical patterns have been observed between countries across different continents. This prospective study demonstrated the clinical profile and outcomes of initial COVID-19 patients from northern India. These patients were well categorized according
to severity and managed using standard protocols for investigations and treatment.

Patients in our study were younger (median age – 33 yr) compared to those in China (median age – 56 yr)19, New York (median age – 63 yr)20 or Italy (median age – 63 yr)21. Although similar age pattern (mean age of 40.3 yr) was observed in a study done by Gupta et al22 at another tertiary care hospital from northern India, but their sample size was limited.

Fifty eight per cent of the patients in our study were asymptomatic at admission; all of them were followed closely, and only two out of 66 patients became subsequently symptomatic during the hospital stay. We found abnormalities in laboratory parameters in 25 per cent of our asymptomatic patients. In a study by Hu et al23 from China, five of the 24 asymptomatic COVID-19 patients developed symptoms during the hospital stay. Varied laboratory abnormalities were observed, with four each (16.7%) developing lymphopaenia (<0.8×10⁹ cells/l) and leucopenia at admission. These observations reiterate the fact that asymptomatic patients need to be followed closely as some of them may progress to severe disease. Another observation was an increased incidence of severe COVID-19 disease manifestations in patients with underlying chronic diseases (hypertension 16.6% and diabetes 14.9%). Similar findings have been reported from various studies across the world4,5,7.

Various biomarkers have been shown to predict severe COVID-19 disease. This observation is confirmed in a meta-analysis of 21 studies (3,377 patients) by Henry et al24. An increased white blood count, decreased lymphocyte/platelet count, high interleukin-6 and high serum ferritin levels were strong discriminators for severe

| Parameter | Without comorbidities (n=80) | With comorbidities (n=34) | P |
|-----------|-------------------------------|--------------------------|---|
| Age (yr) (%) | Median   | Range          | Median   | Range          |           |
| 12-44'     | 30      | 13-59          | 50       | 22-29          |           |
| 45-59'     | 9       | 11.25          | 11       | 32.3           |           |
| >60'       | 0       |                | 9        | 26.4           |           |
| Gender (%) | Male                  | 50 (62.5)           | 16 (47)  |                |           |
|            | Female                | 30 (37.5)           | 18 (52.9) |                |           |
| RR (/min)  | 20       | 16-24          | 20       | 16-26          |           |
| SpO₂ (%)   | 98       | 93-100         | 97       | 90-100         |           |
| Temperature (°C) | 37   | 36.7-38.4   | 37       | 37-39          |           |
| SBP (mmHg) | 120      | 100-160       | 129      | 88-206         |           |
| DBP (mmHg) | 80       | 64-104        | 78       | 60-100         |           |
| NLR        | 1.9      | 0.6-22.5      | 2.3      | 0.7-47.5       |           |
| Fibrinogen (g/l) | 3.3 | 1.5-8.0 | 4.5       | 1.2-7.9        |           |
| Ferritin (ng/ml) | 86 | 8.1-1522 | 138.5     | 11.3-2000      | 0.047     |
| CRP (mg/dl) | 1.3      | 0.1-162       | 5.0      | 0.1-252        | <0.001    |
| Normalized D-Dimer | 0.7 | 0.0-83 | 1.0       | 0.1-25         | 0.021     |
| LDH (U/l)  | 227      | 159-359       | 208      | 150-603        | 0.626     |
| Pro-BNP (pg/ml) | 5.1 | 3.0-138.5 | 40       | 4.1-105330     | 0.002     |
| Trop T (pg/ml) | 5.8 | 3.8-317 | 8.24      | 3.5-49.7       | 0.014     |
| Procalcitonin (ng/ml) | 0.0 | 0.0-0.4 | 0.0      | 0.0-7.0        | 0.211     |
| Urea (mg/dl) | 24       | 14-39         | 24.950   | 14-263         | 0.176     |
| Creatinine (mg/dl) | 0.7 | 0.4-1.2 | 0.7       | 0.2-12         | 0.334     |

aNormalized D-Dimer value (1 indicate 240 ng/ml); 'Expressed in number and percentage. RR, respiratory rate; SpO₂, oxygen saturation; HB, haemoglobin; TLC, total leucocyte count

| Table III. Clinical characteristics based on the burden of comorbid illness | Without comorbidities (n=80) | With comorbidities (n=34) | P |
|----------------------|-------------------------------|--------------------------|---|
| Age (yr) (%)         | Median   | Range          | Median   | Range          |           |
| 12-44'               | 30       | 13-59          | 50       | 22-29          |           |
| 45-59'               | 9        | 11.25          | 11       | 32.3           |           |
| >60'                 | 0        |                | 9        | 26.4           |           |
| Gender (%)           | Male      | 50 (62.5)      | 16 (47)  |                |           |
|                      | Female    | 30 (37.5)      | 18 (52.9)|                |           |
| RR (/min)            | 20        | 16-24          | 20       | 16-26          |           |
| SpO₂ (%)             | 98        | 93-100         | 97       | 90-100         |           |
| Temperature (°C)     | 37        | 36.7-38.4     | 37       | 37-39          |           |
| SBP (mmHg)           | 120       | 100-160       | 129      | 88-206         |           |
| DBP (mmHg)           | 80        | 64-104        | 78       | 60-100         |           |
| NLR                  | 1.9       | 0.6-22.5      | 2.3      | 0.7-47.5       |           |
| Fibrinogen (g/l)     | 3.3       | 1.5-8.0       | 4.5      | 1.2-7.9        |           |
| Ferritin (ng/ml)     | 86        | 8.1-1522      | 138.5    | 11.3-2000      | 0.047     |
| CRP (mg/dl)          | 1.3       | 0.1-162       | 5.0      | 0.1-252        | <0.001    |
| Normalized D-Dimer   | 0.7       | 0.0-83        | 1.0      | 0.1-25         | 0.021     |
| LDH (U/l)            | 227       | 159-359       | 208      | 150-603        | 0.626     |
| Pro-BNP (pg/ml)      | 5.1       | 3.0-138.5     | 40       | 4.1-105330     | 0.002     |
| Trop T (pg/ml)       | 5.8       | 3.8-317       | 8.24     | 3.5-49.7       | 0.014     |
| Procalcitonin (ng/ml)| 0.0       | 0.0-0.4       | 0.0      | 0.0-7.0        | 0.211     |
| Urea (mg/dl)         | 24        | 14-39         | 24.950   | 14-263         | 0.176     |
| Creatinine (mg/dl)   | 0.7       | 0.4-1.2       | 0.7      | 0.2-12         | 0.334     |

aNormalized D-Dimer value (1 indicate 240 ng/ml); 'Expressed in number and percentage. RR, respiratory rate; SpO₂, oxygen saturation; HB, haemoglobin; TLC, total leucocyte count
disease. We also observed nearly same results with high baseline levels of CRP, ferritin and LDH and an NLR ratio of ≥3.5 along with hypoalbuminaemia and deranged baseline creatinine, indicating severe COVID-19-related illness.

The frequency of COVID-19-related myocardial injury among hospitalized patients varied from 7 to 28 per cent. At admission, 9.8 per cent of our patients had an elevated Trop T level, while pro-BNP was higher than the normal range in 14.8 per cent of the patients. Two of our patients had acute myocardial insults during the hospital stay. COVID-19 is considered a hypercoagulable state, leading to venous thromboembolism in patients with severe disease. Routine radiological screening for venous thrombosis was not performed. A compression ultrasound was done only if peripheral venous thrombosis was clinically suspected (n=3), however, none of these patients had any evidence of venous thrombosis at imaging. This was despite 35 per cent of patients having increased D dimer levels at admission. As per our institutional protocol, early institution of heparin therapy based on D-dimers levels was strictly followed. This intervention might have made a difference in preventing any thrombotic episodes in any of our patients. Tang et al. also observed beneficial effects of early initiation of low molecular weight heparin among the 449 severe COVID-19 patients with markedly elevated D-dimers with a significantly improved 28-day overall survival (P=0.017 and P=0.029, respectively) among the users versus non-users.

Two severely hypoxaemic patients with exuberant inflammatory response received tocilizumab. This was followed by a significant improvement in their P/F ratio, radiological features and reduction in the inflammatory biomarkers in each of these two patients. This drug has shown promise if given early in the course of the disease. Sciascia et al. used tocilizumab
| Parameter                        | Critically ill patients (n=18) | Clinically stable patients (n=96) | P     |
|---------------------------------|-------------------------------|----------------------------------|-------|
|                                | Median                       | Range                           | Median| Range                           |       |
| Age (%)                         | 55.9                         | 29-79                           | 31    | 13-65                           |       |
| 12-44†                          | 5 (27.7)                     |                                  | 80    | (83.3)                         |       |
| 45-59†                          | 7 (38.8)                     |                                  | 13    | (13.5)                         |       |
| >60†                            | 6 (33.3)                     |                                  | 3     | (3.1)                          |       |
| Gender (%)                      |                               |                                  |       |                                 |       |
| Male†                           | 11 (61.1)                    |                                  | 55    | (57.2)                         |       |
| Female†                         | 7 (38.8)                     |                                  | 41    | (42.7)                         |       |
| Hypertension (%)                | 8/18 (44.4)                  |                                  | 11/96 | (11.45)                        | <0.001|
| Diabetes (%)                    | 7/18 (38.8)                  |                                  | 10/96 | (10.4)                         | <0.001|
| RR (/min)                       | 22                           | 16-26                           | 20    | 16-24                          |       |
| SpO₂ (%) room air               | 96                           | 79-97                           | 98    | 94-100                         |       |
| Temperature (°C)                | 37                           | 37-39                           | 37    | 36.7-39                        |       |
| SBP (mmHg)                      | 129                          | 88-160                          | 120   | 100-206                        |       |
| DBP (mmHg)                      | 79                           | 60-100                          | 80    | 64-104                         |       |
| Hb (g/dl)                       | 12.4                         | 5.8-16                          | 13    | 8-17.8                         |       |
| TLC (×10⁶/l)                    | 7300                         | 4000-19,800                     | 6650  | 3100-15,400                    |       |
| Neutrophil (%)                  | 78                           | 53-96                           | 56    | 31-80                          |       |
| Lymphocyte (%)                  | 14                           | 2-29                            | 30    | 9-60                           |       |
| Absolute lymphocyte count (×10⁶/l) | 936                        | 256-2128                       | 1883  | 816-7200                       |       |
| Increased (%)                   | 0                            |                                  | 7     | (7.3)                          |       |
| Decreased (%)                   | 9 (50)                       |                                  | 6 (6) |                                 |       |
| Platelets (×10⁹/l)              | 180                          | 54-518                          | 163   | 68-690                         |       |
| Increased (%)                   | 1 (5.5)                      |                                  | 3 (3.1)|                                 |       |
| Decreased (%)                   | 3 (16.6)                     |                                  | 35 (36)|                                 |       |
| NLR                              | 5.5                          | 1.8-47.5                        | 1.8   | 0.6-8.8                        |       |
| Fibrinogen (g/l)                | 4.6                          | 1.2-8.0                         | 3.5   | 1.5-116                        |       |
| Increased (%)                   | 8 (44.4)                     |                                  | 20 (21)|                                 |       |
| Ferritin (ng/ml)                | 425                          | 81-2000                         | 75.25 | 8.1-1522                       |       |
| Increased (%)                   | 8 (44.4)                     |                                  | 6 (7) |                                 |       |
| CRP (mg/dl)                     | 34.6                         | 3.7-252                         | 1.6   | 0.1-162                        | <0.001|
| Normalized D-Dimer               | 2.8                          | 0.1-25                          | 0.8   | 0.02-83                        |       |
| LDH (U/l)                       | 374                          | 265-603                         | 216   | 150-359                        | 0.004 |
| Total protein (g/dl)            | 7.10                         | 5.3-7.9                         | 7.600 | 5.4-6.9                        | 0.16  |
| Albumin (g/dl)                  | 3.500                        | 2.7-4.3                         | 4.500 | 2.8-5.3                        | <0.001|
| Pro-BNP (pg/ml)                 | 2881                         | 11.2-105330                     | 8.5   | 3-734                          | 0.02  |
| Trop T (pg/ml)                  | 579                          | 145-4975                        | 6.00  | 3.5-317                        | <0.001|
| Procalcitonin (ng/ml)           | 0.09                         | 0.02-7.0                        | 0.02  | 0.2-0.8                        | <0.001|
| Urea (mg/dl)                    | 36                           | 16-263                          | 24    | 14-39                          |       |
| Serum creatinine (mg/dl)        | 1.2                          | 0.5-12                          | 0.7   | 0.2-1.2                        | 0.001 |

*Normalized D-Dimer value (1 indicates 240 ng/ml); †Expressed in number and percentage
in 63 patients with severe COVID-19. They observed significant improvement in the levels of ferritin, CRP, D-dimer, and serial PaO₂/FiO₂ after tocilizumab use. They also observed that tocilizumab, when given within six days of admission, was associated with an increased likelihood of survival [hazard ratio (HR): 2.2 95% CI: 1.3-6.7, P<0.05]²⁸. Steroids, especially dexamethasone, are now a mainstay in the treatment of COVID-19 management after the results of the RECOVERY trial have been published²⁹. Better outcomes as compared to usual care were observed when dexamethasone was initiated in those patients requiring invasive mechanical ventilation (29.3 vs. 41.4%) and among those receiving oxygen without invasive mechanical ventilation (23.3 vs. 26.2%). No benefit was observed in the use of steroids in patients with COVID-19 infection who were not hypoxic at admission²⁹. We did not routinely use corticosteroids in critically ill patients as part of our treatment protocol.

The case fatality rate in our study was 2.6 per cent. All the three patients had diabetes mellitus, whereas two patients also had chronic kidney disease and were on maintenance haemodialysis. They had missed multiple dialysis sessions before being admitted at the hospital with COVID-19.

To conclude, though symptomatic SARS-CoV-2 infection was encountered in 43 per cent patients, severe illness was seen in 15.7 per cent patients only. Fever was noted only in three-fourth of the patients and respiratory symptoms in nearly half of them. High inflammatory parameters, NLR ratio of ≥3.5, hypalbuminaemia and deranged creatinine predicted severe COVID-19 illness. Older patients with diabetes and hypertension were significantly associated with severe disease on univariate analysis. The management team consisting of physicians from different specialities and triaged classification of patients and protocol-based management algorithms resulted in good outcomes and low case fatality.

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References

1. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. Available from: https://covid19.who.int/, accessed on October 29, 2020.

2. Ministry of Health and Family Welfare, Government of India. Available from: https://www.mohfw.gov.in, accessed on October 29, 2020.

3. Andrews MA, Areekal B, Rajesh KR, Krishnan J, Suryakala R, Krishnan B, et al. First confirmed case of COVID-19 infection in India: A case report. Indian J Med Res 2020; 151 : 490-2.

4. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020; 395 : 497-506.

5. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. JAMA 2020; 323 : 1239-42.

6. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He XJ, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020; 382 : 1708-20.

7. Liang WH, Guan WJ, Li CC, Li YM, Liang HR, Zhao Y, et al. Clinical characteristics and outcomes of hospitalized patients with COVID-19 treated in Hubei (epicentre) and outside Hubei (non-epicentre): A nationwide analysis of China. Eur Respir J 2020; 55 : 2000562.

8. Goyal P, Choi JJ, Pinheiro LC, Schenck EJ, Chen R, Jabri A, et al. Clinical characteristics of COVID-19 in New York city. N Engl J Med 2020; 382 : 2372-4.

9. Bhandari S, Bhargava A, Sharma S, Keshwani P, Sharma R, Banerjee S. Clinical profile of COVID-19 infected patients admitted in a tertiary care hospital in north India. J Assoc Physicians India 2020; 68 : 13-7.

10. Indian Council of Medical Research. Strategy for COVID-19 testing in India (Version 5, dated 18/05/2020). Available from: https://www.mohfw.gov.in/pdf/Revised testing guidelines.pdf, accessed on May 18, 2020.

11. Directorate General of Health Services (EMR Division), Ministry of Health & Family Welfare, Government of India. Revised guidelines on clinical management of COVID-19. Available from: https://www.mohfw.gov.in/pdf/RevisedNational Clinical Management Guideline for COVID1931032020.pdf, accessed on March 31, 2020.

12. ARDS Definition Task Force, Ranieri VM, Rubenfeld GD, Thompson BT, Ferguson ND, Caldwell E, et al. Acute respiratory distress syndrome: The Berlin definition. JAMA 2012; 307 : 2526-33.

13. Marshall JC, Cook DJ, Christou NV, Bernard GR, Sprung CL, Sibbald WJ. Multiple organ dysfunction score: A reliable descriptor of a complex clinical outcome. Crit Care Med 1995; 23 : 1638-52.

14. Choudhary ML, Vipat V, Jadhav S, Basu A, Cherian S, Abraham P, et al. Development of in vitro transcribed RNA
as positive control for laboratory diagnosis of SARS-CoV-2 in India. Indian J Med Res 2020; 151 : 251-4.

15. ICMR-National Institute of Virology (ICMR-NIV), Pune. Standard Operating Procedure For Detection of 2019 novel coronavirus (2019-nCoV) in suspected human cases by rRT-PCR: First Line Screening assay. Document No.: SP.01.

16. Discharge Policy of nCoV Case. Available from: https://www.mohfw.gov.in/pdf/Corona%20Discharge-Policy.pdf, accessed on March 17, 2020.

17. Directorate General of Health Services (EMR Division), Ministry of Health & Family Welfare, Government of India. Guidance document on appropriate management of suspect/confirmed cases of COVID-19. Available from: https://www.mohfw.gov.in/pdf/FinalGuidanceon MANAGEMENT of Covid casesversion2.pdf, accessed on May 8, 2020.

18. Sehgal IS, Bhalla A, Puri GD, Yaddanapudi LN, Singh M, Malhotra P, et al. Safety of an immunomodulator Mycobacterium w in COVID-19. Lung India 2020; 37 : 279-81.

19. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet 2020; 395 : 1054-62.

20. Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York city area. JAMA 2020; 323 : 1024-32.

21. Grasselli G, Zangrillo A, Zanella A, Antonelli M, Cabrini L, Castelli A, et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the Lombardy Region, Italy. JAMA 2020; 323 : 1574-81.

22. Gupta N, Agrawal S, Ish P, Mishra S, Gaind R, Usha G, et al. Clinical and epidemiologic profile of the initial COVID-19 patients at a tertiary care centre in India. Monaldi Arch Chest Dis 2020; 90 : 193-6

23. Hu Z, Song C, Xu C, Jin G, Chen Y, Xu X, et al. Clinical characteristics of 24 asymptomatic infections with COVID-19 screened among close contacts in Nanjing, China. Sci China Life Sci 2020; 63 : 706-11.

24. Henry BM, de Oliveira MHS, Benoit S, Plebani M, Lippi G. Hematologic, biochemical and immune biomarker abnormalities associated with severe illness and mortality in coronavirus disease 2019 (COVID-19): A meta-analysis. Clin Chem Lab Med 2020; 58 : 1021-8.

25. Shi S, Qin M, Shen B, Cai Y, Liu T, Yang F, et al. Association of cardiac injury with mortality in hospitalized patients with COVID-19 in Wuhan, China. JAMA Cardiol 2020; 5 : 802-10.

26. Klok FA, Kruij M, van der Meer NJ, Arbous MS, Gommers D, Kant KM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. Thromb Res 2020; 191 : 145-7.

27. Tang N, Bai H, Chen X, Gong J, Li D, Sun Z. Anticoagulant treatment is associated with decreased mortality in severe coronavirus disease 2019 patients with coagulopathy. J Thromb Haemost 2020; 18 : 1094-9.

28. Sciaccia S, Aprà F, Baffa A, Baldovino S, Boaro D, Boero R, et al. Pilot prospective open, single-arm multicentre study on off-label use of tocilizumab in patients with severe COVID-19. Clin Exp Rheumatol 2020; 38 : 529-32.

29. RECOVERY Collaborative Group, Horby P, Lim WS, Emberson JR, Mafham M, Bell JL, et al. Dexamethasone in hospitalized patients with COVID-19 - Preliminary report. N Engl J Med 2020. doi.10.1056/NEJMo2021436

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