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SARS- COVID 19: A SINGLE INSTITUTIONAL DESCRIPTIVE STUDY

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ABSTRACT

Objective: The corona virus disease 2019 (COVID-19) shows unusually high transmission rate and unique clinical characteristics. This study was undertaken to attempt to describe the disease course and to study laboratory markers in these patients. **Methods:** Clinical characteristics, laboratory parameters and imaging of 200 patients were collected retrospectively and analysed using SPSS 17.0 software. **Results:** Among the 200 patients with positive COVID-19 PCR test, 100 patients (50%) had symptoms. All the patients were of Indian ethnicity and 60% had a history of travel or contact with a COVID 19 positive case. Male patients constituted 85 % of the population. The median age of patients in symptomatic and asymptomatic groups was 38 years and 32 years, respectively. Most common presenting symptom was fever followed by shortness of breath and sore throat. Of all the symptomatic patients, 28 had lymphopenia. Out of the 200 patients studied, 197 (98.5%) patients recovered whereas 3(1.5%) succumbed to the disease process. **Conclusion:** The study population was younger (mean 35yrs) with less severity of symptoms and our study shows no such significant corelation between absolute leucocyte count and disease severity.

KEYWORDS: leucocyte count and disease severity.

INTRODUCTION

There is a new public health crisis threatening the world with the emergence and spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus originated in bats and was transmitted to humans through yet unknown intermediary animals in Wuhan, Hubei province, China in December 2019. The virus could not be contained despite global efforts and tough decisions like lockdown's and curfew.

Since the first descriptive study in China regarding the COVID-19 infection, lymphocyte count has been a marker of interest.[1] Lymphopenia has been associated with severe COVID-19 infection. Although the pathogenesis of SARS-CoV-2 is not yet fully understood, extensive lung damage in COVID-19 patients appears to be associated with high initial viral load, neutrophil infiltration in the lungs concomitant with explosive elevated levels of serum proinflammatory cytokines and chemokines with a rapid and precipitous decrease of peripheral T lymphocyte.[2] However, the clinical significance and underlying mechanisms are still not clear.

We sought to retrospectively analyse the clinical characteristics of the spectrum of COVID-19 infection as well as delineate any correlation of laboratory parameters (particularly lymphopenia) with severity of illness.

MATERIALS AND METHOD

Study design and participants

For this single centre, retrospective study, all patients admitted between 01 September 2020 to 16 September 2020 to our urban 899-bedded hospital who tested positive for COVID-19 by polymerase chain reaction (PCR), were included.

Patients with COVID-19 were confirmed by a positive result on real-time reverse transcriptase-polymerase chain reaction (PCR) assay for nasal and pharyngeal swab specimens. Only laboratory-confirmed cases, based on diagnostic criteria recommended by National Institute of Virology, Pune were included in the analysis.[1,5,6]

A thorough social history for family exposure, known positive contacts and travel was taken from each patient. All COVID-19 positive patients were categorised into asymptomatic and symptomatic groups as defined below.

Symptomatic group was further subdivided into mild, moderate and severe categories.

Asymptomatic patients included
(1) Absence of fever or other respiratory symptoms
(2) Absence of typical radiological abnormality for COVID-19

Symptomatic patients satisfied at least one of the following criterion
(1) Fever > 100 F or any respiratory complaint - cough, sore throat, shortness of breath
(2) Respiratory rate ≥16 times/min
(3) Oxygen saturation (Resting state) ≤93%.
(4) Characteristic radiological findings on chest imaging.

1. Mild Symptomatic satisfied at least one of the criteria
- Fever with cough
- No pneumonia
- Respiratory rate < 20 times/min
- Oxygen saturation (Resting state) > 92 %.

2. Moderate symptomatic had the following criteria
- Fever, cough , pneumonia
- Respiratory rate 20-24 times/min
- Oxygen saturation (Resting state) > 92 %.
- Not requiring supplemental oxygen

3. Severe symptomatic group
- Fever, cough , pneumonia
- Respiratory rate > 25 times/min
- Oxygen saturation (Resting state) < 92 %.
- Requiring supplemental oxygen
- Organ Failure

All patients underwent laboratory assessments including complete blood count with differential, basic metabolic profile, liver function tests, coagulation testing (prothrombin time, activated partial thromboplastin time, international normalised ratio), D-dimer on admission and repeated if any abnormality was noted. Electrocardiogram (ECG) and chest radiograph were performed on all patients.

For all participants, COVID-19 PCR was rechecked 10 days after the initial positive test. If a positive result was obtained, the test was repeated in 7 days till a negative result.

Once a negative result was obtained and the patient remained symptom free, they were discharged.

Written informed consent was obtained prior to enrolment in study and all steps were taken to ensure confidentiality of participants. The diagnosis was based on clinical criteria and laboratory features according to the WHO interim guidance.[1,5] The final date of follow-up was 24 Sept 2020.

Data Collection
Epidemiological, clinical, radiological and laboratory data were obtained and COVID-19 positive cases were diagnosed on the basis of interim guidelines of the World Health Organization (WHO).

Epidemiological data were collected from the patient's medical record. Details of current illness, comorbid conditions, and concomitant medications were also noted. Clinical course and outcomes was observed during their hospital stay and patients were followed up till their discharge from the hospital.

Statistical Analyses
All these statistical calculations were performed using the SPSS 17.0 software.

Laboratory data
All laboratory data were collected within 24 hours of admission. Laboratory data were analysed by our hospital's dedicated haematology laboratory. All laboratory samples are typically processed within hour of receipt. Complete blood counts (CBCs) were measured on automated CBC and differential analyser (Beckman coulter LH 750). If the analyser could not classify a WBC, the blood smear was manually assessed by a technician. If technician had difficulty in interpreting results; the pathologist reviewed the slide. Quality control materials were run every 12 hours. Lymphocytopenia was defined as an absolute lymphocyte count (ALC) < 1.0×10^6 cells/L. Anemia was defined as haemoglobin < 14 gm/dL for men or < 12 gm/dL for women. Thrombocytopenia was defined as platelet count < 150.0×10^9 cells/L. Lymphopenia was defined as leukocyte count < 4.4×10^9 cells/L. Leucocytosis was defined as a leukocyte count > 11.0×10^9 cells/L.

RESULTS
A total of 200 patients admitted to the hospital who were COVID-19 positive by PCR were included in the study. Out of the study population, 100 patients were asymptomatic while an equal number of patients had symptoms of COVID-19.

All patients were of Indian ethnicity. 40% (n=80) of the patients had a history of travel and 20% (n=40) patients had a history of contact with the COVID-19 positive patient. Notably, symptomatic patients were older than the asymptomatic patients with a median age of 38 years. Median age of asymptomatic patients was 32 years. No significant difference in gender-specific incidence was noted.

In the total study population, 24.5% patients had associated comorbidities. Among these, diabetes (43%) and hypertension (37%) were the most common. 40

patients (20%) of the patients had both these chronic illnesses. 34 of 49 patients (69%) with co-morbidities were in the symptomatic group.

Median duration of symptoms before admission was 3 days. Clinical symptoms at presentation included fever (77.7%), shortness of breath (70.3%), and cough (62.9%) (Figure 1). Less common symptoms were myalgias (23%), diarrhoea (13%), nausea and vomiting (9%).

Of the total symptomatic patients, 80 (80%) did not require supplemental oxygen.

Three patients (3%) required invasive mechanical ventilation.

On admission, lymphopenia was observed in 28% of symptomatic patients compared to 15% of asymptomatic patients, which was not statistically significant. The laboratory reference range for leucocyte count was 4.5-11 X 10^9 per litre and for lymphocyte was 1-4.8 X 10^9 per litre. Thrombocytopenia was observed in 12 (12%) patients in the symptomatic group, however this finding was statistically insignificant. Other laboratory data is summarised in Table 1.

Chest radiographs showed bilateral hazy lung infiltrates in 3 of 100 symptomatic and 1 of 100 asymptomatic patients.

Two patients (2%) developed shock and multi -organ dysfunction syndrome (MODS) during their hospital stay. Mortality rate among patients admitted to the hospital was 1.5%.

A comparison was done between patients who recovered (n = 197) and who succumbed to COVID-19 (n = 3) and it was observed that the median age of patients who died was 64 years and that of patients who recovered was 32 years. Lymphopenia was noted in 2 (66%) patients who died of COVID-19.

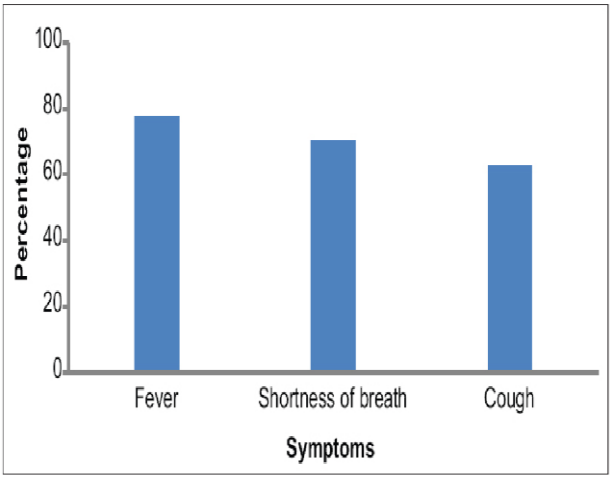

Figure: 1. Common presenting features in symptomatic patients.

Table 1. Laboratory data.

Parameter	Median (Range)
Haemoglobin (g/dl)	10.8 (6.6-15)
White blood cell count(per mm^3)	8.8×10^9 cells/L(3.6-16.3)
Platelet Count	1.8×10^9 (.7-5.3)
Total Bilirubin (mg/dl)	0.8 (0.4-2.7)
International normalized ratio	1.08 (0.8-1.5)
D Dimer (ng/mL)	324 (110-3200)
S Creatinine (mg/dl)	0.8 (0.3-5)

DISCUSSION

To the best of our knowledge, this is the first case series reporting clinical characteristics, and outcomes of confirmed cases of COVID-19 admitted to an urban hospital in the North East Indian region. Published data thus far, reports history of travel in 62% patients by Gupta *et al* ; 40% of our patients revealed such history. The median duration of symptoms was 3 days in our series while it was 6 days in findings by Guan *et al*. from China.[14] Fever was the most common presenting symptom followed by shortness of breath and cough in our patient population, whereas cough was observed as the most common presenting symptom by Young *et al*.[15]

Lymphopenia, a cardinal feature of severe acute respiratory illness due to COVID-19 was observed in 43 of our patients, whereas the reports by Zhou *et al*. and Bhatraju *et al*. reported higher incidence of lymphopenia in their series.[2],[10] This difference may be attributed to less severe disease noted in our patient cohort. Bilateral lung infiltrates were observed as the most common radiological finding as mentioned in other reports.[10],[15]

We observed the lower incidence of comorbidities (20%) requiring ICU admission compared to the reports by Wang *et al*. (72.2%) from China and Grasselli *et al*. (68%) from Italy in critically ill patients.[8],[9] This could be attributed to the genetic and racial differences in patient population. Diabetes and hypertension were the most common comorbid illnesses in critically ill patients as seen in most published series.[4],[9],[10]

3 patients required non-invasive ventilation and subsequently recovered, however all patients who required invasive mechanical ventilation succumbed to the disease.

The mortality rate of the patients requiring mechanical ventilation was lower in our case series as reported from China, Washington, and New York Area.[2],[4],[16]

Among the patients who died, 100% had associated comorbid diseases with 66% had 2 or >2 comorbid conditions. Bhatraju *et al*. in their case series from the Seattle region have also observed poor outcome among the elderly and in patients with comorbidities.[10]

We observed a 1.5% mortality rate in our study which is lower than the reported by previous reports (62%–78%). The possible reason for this observation could be a younger cohort with less severity of the disease.[2],[16],[17]

Limitations of our study include the data from a single centre and observations over a limited period of time. As it is an initial experience, there is a need for larger data over a long period of time to know the course and outcome of disease in North East India.

CONCLUSION

Although many studies have suggested Lymphopenia to be an effective and reliable indicator of onset of symptoms and severity of disease in COVID-19 patients , our study shows no such significant corelation between disease severity and absolute lymphocyte count.

This case series shows middle-aged patients with comorbid diseases present with severe COVID-19 disease have poor outcome. Considering the novel infection and with evolving change in treatment strategy, our study can be a stepping stone for further research and data analysis.

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CONFLICTS OF INTEREST: There are no conflicts of interest.

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