Original Article

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Clinicoradiological Profile in Severe Acute Respiratory Illness-Comparative Study in SARS COV-2 Positive and Negative Patients

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Abstract

Background: COVID-19 is a global pandemic which has infected more than 171 million individuals and has taken an immense toll on the world in terms of morbidity and mortality. The disease may progress in some patients from an influenza-like illness to severe acute respiratory illness. Diagnosis of COVID 19 is by RTPCR supported by radiological evidence. **Subjects and Methods:** In this prospective observational study, 80 patients-40 positive for COVID- 19 and 40 negative respectively were enrolled for the study from March 2020 to July 2020 in Bowring and Lady Curzon Hospital, Bangalore after obtaining clearance and approval from institutional ethics committee. We analysed the clinical profile, routine investigations and radiological profile in the study subjects. **Results:** Majority of the patients in positive and negative groups were males – 55% and 57.5% respectively. Most of the patients in the positive group were between 61-80 (42.5%) and in the negative group between 41-60(37.5%). Fever was present in 65% of positive patients and 55% in negative patients, breathlessness was present in 90% of positive patients and 70% of negative patients, cough was present in 82.5% of positive patients and 70% of negative patients, loose stools were present in 2.5% of positive patients and 5% negative patients. X-ray showed bilateral involvement in 82.5% in the positive group and 37.5% in the negative group. Lower zone involvement is most commonly seen in positive patients (92.5%) and 67.5% in negative groups. Non homogenous opacities were the most common finding in chest x-ray. **Conclusion:** COVID -19 has multi-system manifestations with respiratory manifestations being the most common. COVID-19 positive patients showed increased severity radiologically compared to negative patients. Chest imaging via x-rays is a useful way to detect radiological changes in COVID 19 infection in resource limited settings for early prognostication of COVID-19 patients.

Keywords: SARS COV-2, COVID-19, Severe Acute Respiratory Illness

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Introduction

The World Health Organization (WHO) estimates that acute respiratory infections (ARI) cause annual deaths approaching 4 million, at a rate of more than 60 deaths/ 100,000 populations. Viruses are responsible for 30-70 % of ARI where respiratory syncytial virus (RSV), influenza virus, parainfluenza virus (PIV), human Bocavirus, human metapneumovirus (hMPV), adenovirus, rhinovirus, enterovirus and Coronaviruses account for the majority of these cases.[1,2]

Severe Acute Respiratory Illness is defined as an Acute Respiratory Infection with history of fever or measured temperature ≥38 C° and cough; onset within the last ~10 days; and requiring hospitalization. However, the absence of fever does NOT exclude viral infection.[3]

Coronaviruses are non-segmented positive-stranded RNA viruses with a roughly 30 kb genome surrounded by a protein envelope. Most coronaviruses cause diseases in their particular host species.[4] Those that can infect humans through cross-species transmission have become an important threat to public health. Two serious coronavirus disease outbreaks have happened in the past two decades: severe acute respiratory syndrome (SARS) in 2003 and Middle East respiratory syndrome (MERS) in 2012.[5,6] Since December, 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been recognised as the causal factor in a series of severe cases of pneumonia originating in Wuhan in Hubei province, China.[7]

This disease has been named coronavirus disease 2019 (COVID-19) by WHO. SARS-CoV-2 has been shown to cause

disease via a mechanism analogous to the SARS coronavirus, with potential damage to vital organs such as lung, heart, liver, and kidney, and infection poses a considerable risk to patients by the high prevalence of pneumonia.[8]

Subjects and Methods

A study was conducted on 80 patients diagnosed to have severe acute respiratory illness who were admitted in Bowring and Lady Curzon hospital from March 2020 to July 2020. History was taken, general physical examination and a detailed systemic examination was done. COVID-19 infection will be diagnosed by RT-PCR technique. Patients underwent biochemical investigations which included complete blood count, liver function test, renal function test, serum electrolytes, serology, CRP, LDH, D-dimer and serum ferritin, ABG, RDW and chest x-ray. Comorbid conditions like metabolic disorders, endocrine disorders, renal disorders, cardiac disorders, respiratory disorders were confirmed with past medical history.

Objectives of the study

1. To study clinical and radiological profile in SARI patients
2. To compare the clinical profile and radiological profile between SARS-Cov2 positive and negative patients and their outcomes.

Inclusion Criteria

1. Patient/attender willing to give informed consent
2. Patient of either Sex with Age more than 18 years
3. Patients admitted in COVID suspect Hospital and Diagnosed with SARI

Exclusion Criteria

1. Patient not willing to give informed consent
2. Age less than 18 years

Statistical Methods

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data are made, Assumptions: 1.Dependent variables should be normally distributed, 2.Samples drawn from the population should be random, Cases of the samples should be independent. Analysis of variance (ANOVA) has been used to find the significance of study parameters between three or more groups of patients , Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups Inter group analysis) on metric parameters.

Significant figures

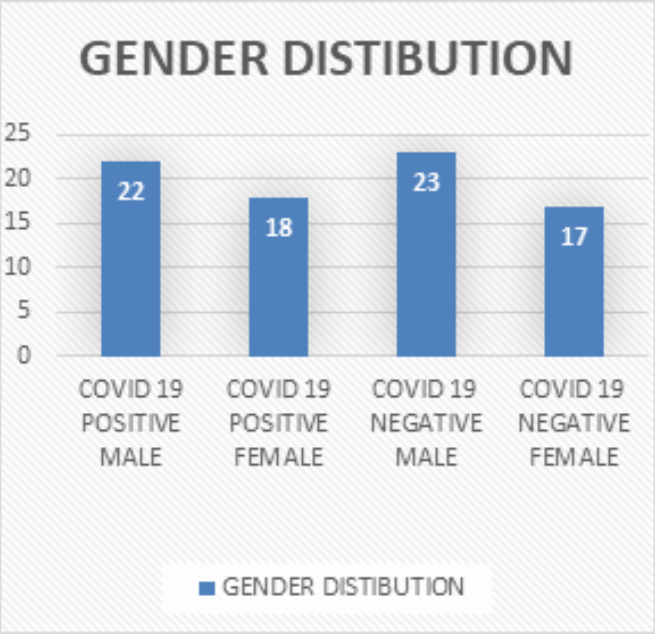
1. Suggestive significance (P value: $0.05<P<0.10$)
2. Moderately significant (P value: $0.01<P \leq 0.05$)
3. Strongly significant (P value: $P \leq 0.01$)

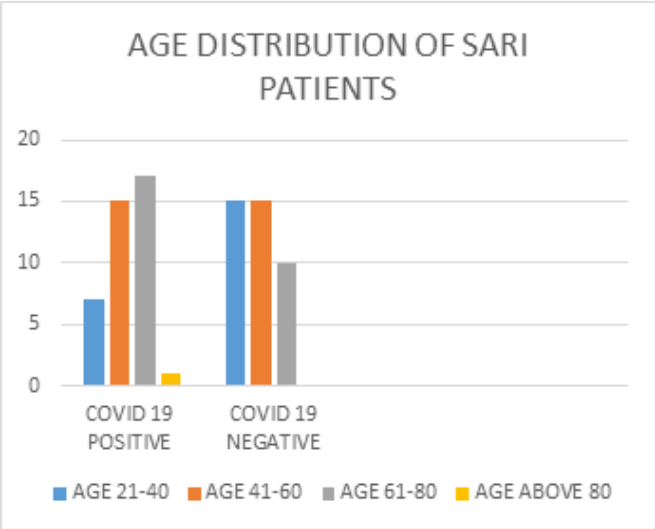
Statistical software

The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1 ,Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc**.**

Results

In our study the majority of the patients were male with COVID negative patients were higher in the age range of 21 to 40 yrs and 41 to 60 yrs- 15(37.5%). COVID Positive patients were higher in the age range of 61 to 80 yrs- 17(42.5%).





Among the patients enrolled in the study, fever was present in 48 patients, out of which 26 were COVID positive. Breathlessness was present in 64 subjects, out of which 36 were COVID positive. Cough was present in 28 COVID negative subjects and 33 COVID positive subjects. Type 2 DM was present in 15 of the COVID positive subjects and 5 of the COVID negative subjects. Hypertension was present in 13 of the COVID positive subjects and 12 of the COVID negative subjects. CKD was present in 2 of the COVID positive subjects and 6 of the COVID negative subjects. IHD was present in 4 of the COVID negative subjects and none of the COVID negative subjects had IHD. Lower zones were seen more in COVID negative – 11(28.2%) subjects whereas lower middle zones were seen more in COVID positive- 19(47.5%) subjects. Consolidation was seen higher in both COVID negative- 37(94.9%) and COVID positive-40(100%) subjects. Peripheral involvement was higher in both COVID negative- 26(66.7%) and COVID positive-29 (72.5%) subjects. Peripheral effusion was moderate in COVID negative- 4(10.3%) and COVID positive-3 (7.5%) subjects. Prominent bronchovascular markings were present in COVID positive subjects-4(10%) whereas prominent bronchovascular markings were absent in all the COVID negative subjects. Hilar Prominence was present in COVID positive subjects-3(7.5%) whereas hilar prominence was absent in all the COVID negative subjects. Severity score was moderate for most of the COVID positive- 16(40%) and COVID negative-21(52.5%) subjects.

Mean age was slightly higher in COVID positive subjects-58.35 ± 16.37 as compared to COVID negative subjects-46 ± 15.98. Similarly, pulse- 103.65 ± 8.43, SBP-134.75 ± 9.1, DBP-85.48 ± 6.14, RR -25.88 ± 2.83 were higher in COVID positive subjects whereas SpO2 was higher in COVID negative subjects- 86.83 ± 13.71.

Discussion

In this prospective observational study, 80 patients-40 positive for COVID- 19 and 40 negative respectively were enrolled for the study from March 2020 to July 2020 in Bowring and lady Curzon Hospital, Bangalore. In our study COVID negative patients were higher in the age range of 21 to 40 yrs and 41 to 60 yrs- 15(37.5%). COVID Positive patients were higher in the age range of 61 to 80 yrs- 17(42.5%). Out of 40(100%) subjects in each group (COVID positive and COVID negative), males were higher in both the groups.Review by Hu et al concluded that elderly male were more susceptible to severe disease.[9]

Fever was present in 48 patients, out of which 22(55%) were COVID negative and 26(65%) were COVID positive. Breathlessness was present in 64 subjects, out of which 28(70%) were COVID negative and 36(90%) were COVID positive.).Cough was present in 28 COVID negative subjects and 33 COVID positive subjects. A study by Wang et al showed the common symptoms to be fever cough and fatigue.[10]

Type 2 DM was present in 15 of the COVID positive subjects and 5 of the COVID negative subjects. Review by Apicella et al revealed that diabetic patients were increasingly susceptible to COVID 19 infection and severe disease.[11]

Hypertension was present in 13 of the COVID positive subjects and 12 of the COVID negative subjects. CKD was present in 2 of the COVID positive subjects and 6 of the COVID negative subjects. IHD was present in 4 of the COVID negative subjects and none of the COVID negative subjects had IHD.

Bilateral X-rays were higher in both COVID positive-15(37.5%) and COVID negative subjects-33(82.5%). Lower zones were seen more in COVID negative – 11(28.2%) subjects whereas lower middle zones were seen more in COVID positive- 19(47.5%) subjects. Prominent bronchovascular markings were present in COVID positive subjects-4(10%) whereas prominent bronchovascular markings were absent in all the COVID negative subjects. Study conducted by Lomoro et al concluded that common manifestations on chest x ray was bilateral consolidation and lower zone involvement predominantly in COVID 19 pneumonia.[12]

Severity score was moderate for most of the COVID positive-16(40%) and COVID negative- 21(52.5%) subjects.

Mean age was slightly higher in COVID positive subjects-58.35 ± 16.37 as compared to COVID negative subjects-46 ± 15.98. Similarly, pulse- 103.65 ± 8.43, SBP-134.75 ± 9.1, DBP-85.48 ± 6.14, RR -25.88 ± 2.83 were higher in COVID positive subjects whereas SpO2 was higher in COVID negative subjects- 86.83 ± 13.71.

Table 1: Patient Characteristics on Presentation

	COVID 19 Positive	COVID 19 Negative
Sex -Male	22	23
Sex-Female	18	17
Fever	26	22
Dyspnea	36	28
Cough	33	28
Loose stools	1	2
Sore throat	1	0
Asthma	0	1
Type II diabetes mellitus	15	5
Hypertension	13	12
Chronic kidney disease	2	6
Ischemic heart disease	0	4

Conclusion

In our study the majority of subjects were males, with breathlessness being common symptom in the positive group and cough being common symptom in the negative group. Most common finding in chest x-ray was bilateral non homogenous opacities predominantly in the lower zone in COVID 19 positive individuals. COVID-19 positive patients showed increased severity radiologically compared to negative patients. Chest imaging via x-rays is a useful way to detect radiological changes in COVID 19 infection in resource limited settings for early prognostication of COVID-19 patients.

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