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Original Research

Assessment of risk of hypertension in COVID-19 patients

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ABSTRACT:
Background: Cardiovascular diseases (CVDs) are known to be triggered by acute respiratory infections caused by viruses or bacteria. The presence of underlying CVD is often linked with other comorbidities that predispose patients to more frequent and severe forms of infection. The present study was conducted to assess the risk of hypertension in COVID-19 patients. **Materials & Methods:** 46 cases of COVID- 19 positive patients were included. Severe COVID-19 was defined as the presence of respiratory distress (respiratory distress (30 breaths or more per min), oxygen saturation of ≤93% at rest, PaO2 /FiO2 ratio of 300mm Hg) or the need for ICU care. The occurrence of hypertension and cardiovascular disease was recorded. **Results:** Out of 46 patients, males were 30 and females were 16. The mean age of patients was 43.6 years, mean weight was 60.2 Kgs. Hypertension was present in 20, CVDs in 25 and diabetes in 22. Out of 46 patients, 41 survived and 5 died. The difference was significant (P< 0.05). **Conclusion:** CVD and the associated risk factors (hypertension) were closely related to fatal outcomes in patients with COVID-19.
Key words: COVID-19, Cardiovascular disease, Hypertension.

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INTRODUCTION

A novel coronavirus (SARS-CoV-2) was identified in COVID-19 patients in Wuhan, Hubei Province, China and since then rapidly spreading across the world.[1] On 11 March, the World Health Organization (WHO) declared COVID-19 a pandemic. The causative agent for this pneumonia has been officially named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the WHO. SARS-Cov2 virus is the pathogen responsible for COVID-19.[2] Active COVID-19 patients are those who have been diagnosed with the disease and are currently undergoing treatment in hospitals or are lodged in quarantine facilities. As the India gears up for the third lockdown from May 4, the total number of

coronavirus patients in India has gone up to 33,050 while the death toll has reached 1074, showed latest figures from the Health Ministry.[3]

Although some studies have demonstrated that hypertension is a risk factor for developing severe COVID-19, the observation could be attributed to the higher prevalence of comorbidities in elderly patients. Cardiovascular diseases (CVDs) are known to be triggered by acute respiratory infections caused by viruses or bacteria. The presence of underlying CVD is often linked with other comorbidities that predispose patients to more frequent and severe forms of infection.[4] During outbreaks of influenza, several infected patients have reportedly died due to complications of comorbid CVDs than due to secondary bacterial pneumonia. Furthermore, the presence of underlying CVD increases both the severity of the primary respiratory disease and the risk of developing further complications.[5] The present study was conducted to assess the effect of hypertension and COVID-19.

MATERIALS & METHODS

The present study was conducted among 46 cases of COVID- 19 positive patients. All were informed regarding the study and their consent was obtained.

Demographic profile such as name, age, gender etc. was recorded. Clinical outcomes in patients with laboratory confirmed COVID-19, indicated by a positive SARS-CoV-2- RT-PCR test. The primary outcome measure was a composite fatal outcome of severe COVID-19 or death. Severe COVID-19 was defined as the presence of respiratory distress (respiratory distress (30 breaths or more per min), oxygen saturation of ≤93% at rest, PaO2 /FiO2 ratio of 300mm Hg) or the need for ICU care. The occurrence of hypertension and cardiovascular disease was recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 46		
Gender	**Males**	**Females**
Number	30	16

Table I shows that out of 46 patients, males were 30 and females were 16.

Table II Assessment of parameters

Parameters	Value
Mean age (years)	43.6
Mean weight (Kgs)	60.2
Hypertension	20
CVDs	25
Diabetes	22

Table II, graph I shows that mean age of patients was 43.6 years, mean weight was 60.2 Kgs. Hypertension was present in 20, CVDs in 25 and diabetes in 22.

Graph I Assessment of parameters

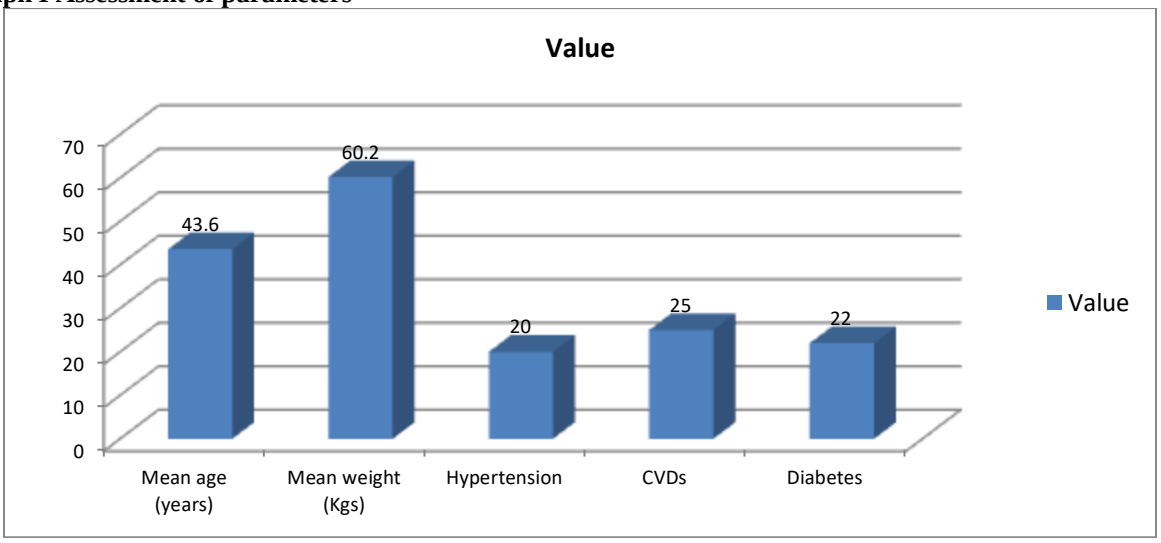

Table III Outcome of treatment

Outcome	Number	P value
Survival	41	0.01
Death	5	

Table III shows that out of 46 patients, 41 survived and 5 died. The difference was significant (P< 0.05).

DISCUSSION

Novel virus strain, SARS-CoV-2, an enveloped, positive-sense, single-stranded RNA betacoronavirus of the family Coronaviridae. Coronaviruses infecting humans included several mild common cold viruses e.g. hCoV-OC43, HKU, 229E5.[6] However, over the past two decades, highly pathogenic human coronaviruses have emerged, including SARS-CoV in 2002 and 2003 with 8000 cases worldwide and a death rate of approximately 10%, and MERS-CoV in 2012, which caused 2500 confirmed cases and a fatality rate of 36%. The betacoronavirus genome encodes several structural proteins, including the glycosylated spike (S) protein that functions as a major inducer of host immune responses. This Spike protein mediates host cell invasion by both SARS-CoV and SARS-CoV-2 via binding to a receptor protein called angiotensin-converting enzyme 2 (ACE2) located on the surface membrane of host cells.[7] This invasion process requires S protein priming which is facilitated by the host cell produced serine protease TMPRSS2. The interaction between viral Spike protein and ACE2 on the host cell surface is of significant interest since it initiates the infection process. It is reported that binding affinity of SARS-CoV-2 S protein to ACE2 is about 10–20 times higher than that of SARS-CoV S protein. Hence, it is speculated that this may contribute to the reported higher transmissibility and contagiousness of SARS-CoV-2 as compared to SARS-CoV.[8] The present study was conducted to assess the effect of hypertension and COVID-19.

In present study, out of 46 patients, males were 30 and females were 16. Bae et al[9] included 51 studies with a total of 48 317 patients with confirmed COVID-19 infection. Overall, the relative risk of developing severe COVID-19 or death was significantly higher in patients with risk factors for CVD (hypertension: OR 2.50, 95% CI 2.15 to 2.90; diabetes: 2.25, 95% CI 1.89 to 2.69) and CVD (3.11, 95% 2.55 to 3.79). Younger patients had a lower prevalence of hypertension, diabetes and CVD compared with older patients; however, the relative risk of fatal outcomes was higher among the former. The results of the meta-analysis suggest that CVD and its risk factors (hypertension and diabetes) were closely related to fatal outcomes in COVID-19 for patients across all ages. Although young patients had lower prevalence rates of cardiovascular comorbidities than elderly patients, relative risk of fatal outcome in young patients with hypertension, diabetes and CVD was higher than in elderly patients.

We observed that mean age of patients was 43.6 years, mean weight was 60.2 Kgs. Hypertension was present in 20, CVDs in 25 and diabetes in 22. Previous studies have demonstrated that patients with CVD or related risk factors were at significantly higher risk of developing poor clinical outcomes following COVID-19.[10] The findings of the reviewed studies indicated that patients with underlying diseases were more vulnerable to COVID-19 as their comorbidities predispose them to infection and make them more likely to develop severe disease.16–18 Upon infection with SARS-CoV-2, an initial immune response is activated to protect the body from further viral invasion and growth, which occurs in the parenchyma of the lung and other epithelial sites.[11] This immune response is associated with the appearance of mild symptoms and coincides with the activation of monocytes and macrophages. The ensuing inflammatory response causes blood vessel dilation, increased endothelial permeability and leucocytoplania. These events eventually lead to pulmonary distress with the development of parenchymal damage, fluid extravasation and hypoxaemia, ultimately causing increased stress on the cardiovascular system.[12] Amplification of the host inflammatory response eventually leads to systemic inflammatory response syndrome.

CONCLUSION

Authors found that CVD and the associated risk factors (hypertension) were closely related to fatal outcomes in patients with COVID-19.

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