

Comparing Clinical and Hematologic Outcomes in Hypertensive and Non-Hypertensive Patients Suffering from COVID-19.

Bhaskar Das¹, Puran Mal Parihar², Mahesh Kumar Choudary³, Mamta⁴, Amit Tak⁵

¹MD, Dept. of Anesthesiology, Classified Specialist, 5 Air Force Hospital, Jorhat, Assam, India

²MD, Dept. of Pathology, Associate Professor, Geetanjali Medical College, Udaipur, Rajasthan, India

³MD, Dept. of Community Medicine, Associate Professor, RVRS Medical College, Bhilwara, Rajasthan, India

⁴PhD, Dept. of Physiology, Associate Professor, Government Medical College, Sirohi, Rajasthan, India

⁵MD, Dept. of Physiology, Assistant Professor, RVRS Medical College, Bhilwara, Rajasthan, India

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Corresponding author: Mamta

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Abstract

Introduction: Hypertension is the most common co-morbidity associated with COVID-19 patients. Many patients take angiotensin-converting enzyme (ACE) inhibitors for the management of hypertension. The study aimed to compare the clinical and hematologic features in hypertensive and non-hypertensive patients suffering from COVID-19.

Material and Methods: This observational study compared clinical and hematologic features in hypertensive and non-hypertensive patients suffering from COVID-19. The study enrolled patients from SMS Medical College, Jaipur (Rajasthan, India) after approval from the institutional Ethics Committee. The comparison of quantitative variables was performed using the Mann-Whitney test, and qualitative attributes were compared using the chi-squared test. The level of confidence is considered at 5%.

Results: There were no significant differences found in clinical and hematologic features between hypertensives and non-hypertensives suffering from COVID-19.

Conclusion: The present study concludes that there is no evidence that either use of ACE inhibitors is useful or harmful in patients with hypertension. Therefore, it is endorsed to use these agents in the management of hypertensives in patients suffering from COVID-19, till further evidence is found.

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Introduction

As of 21 March 2023, World Health Organization reported 761,071,826 cases and 6,879,677 deaths due to severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) infection for all countries [1]. Estimates suggest that 31.1% of adults

(1.39 billion) worldwide had hypertension in 2010. [2] The clinical and epidemiological features of COVID-19 have been repeatedly published in the last few weeks. Interestingly, specific comorbidities associated with an increased

risk of infection and worse outcomes with increased severity of lung injury and mortality have been reported. [3,4] The most common comorbidities in one report were hypertension (30%), diabetes (19%), and coronary heart disease (8%) [5] The frequency with which COVID-19 patients are hypertensive is not entirely surprising, nor does it necessarily imply a causal relationship between hypertension and COVID-19 or its severity, since hypertension is exceedingly frequent in the elderly, and older people appear to be at particular risk of being infected with SARS-CoV-2 virus and of experiencing severe forms and complications of COVID-19. The fact that hypertension and other forms of cardiovascular disease, also frequently found in COVID-19 patients, are often treated with angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs), and that SARS-CoV-2, the virus causing COVID-19, binds to ACE2 in the lung to enter cells, has raised questions regarding the possibility that these agents could either be beneficial or actually nefarious in patients treated with them with respect to susceptibility to acquiring COVID-19 or in relation to its outcome. [6] It has been shown that ACE inhibitors and ARBs increase ACE2, which could theoretically increase the binding of SARS-Cov-2 to the lung and its pathophysiological effects leading to greater lung injury. [7] The present study focused on the comparison of COVID-19 outcomes in hypertensives and non-hypertensives.

Material and Methods – A retrospective cohort study was planned to compare hematologic parameters between hypertensive and non-hypertensives in patients suffering from coronavirus disease-19. The study was approved by the Ethical Committee of the SMS Medical College, Jaipur (No.421 dated 26 Jun 2020). The real-time RT-PCR SARS CoV-2 positive cases between the ages 40 to 85 years of any gender were included in the

study from SMS Medical College, Jaipur, Rajasthan, India. Patients with a history of hypertension and whether or not on medication were considered hypertensives. Patients having comorbidity other than hypertension were excluded from the study. Hypertensives with additional comorbidity were also excluded.

Data collection- The COVID-19 patients who followed the inclusion and exclusion criteria were divided into two groups, based on the presence of hypertension. The demographic, clinical, and hematologic features were collected. The clinical symptoms include fever, cough, breathlessness, and sore throat. The hematologic features include hemoglobin (gm%), erythrocyte sedimentation rate (mm in 1st hour), total leucocyte count (number of cells per cubic mm), platelet count (number of platelets per cubic mm), procalcitonin, prothrombin time (seconds), international normalized ratio (INR) and activated partial thromboplastin time (aPTT) (seconds) and C-reactive protein (positive or negative) were collected.

Statistical analysis – The quantitative variables were expressed as median and IQR as their distribution is non-normal. The quantitative variables were compared using the Mann-Whitney test. [8] The qualitative attributes were expressed as proportions and compared using the chi-squared test. The statistical significance level was considered at 5%. JASP (version 0.16.3) was used for statistical analysis. [9]

Results

The hypertensive and non-hypertensive groups were not significantly varied in age [W=409.5; p=0.389]and gender [chi square =0.381; p=0.537]. The two groups were not significantly differ in clinical symptoms, including fever [chi square =1.904; p=0.168], cough [chi square=0.383; p=0.536], breathlessness [chi square=0.289; p=0.591]and sore throat [chi square=0.597; p=0.44] (Table 1)

Table 1. Comparison of qualitative attributes between hypertensives and non-hypertensives suffering from COVID-19 using Chi-square test.

Attributes	Non-Hypertensives	Hypertensives	chi-square value	P value
Gender (F)	69.565 %	30.435 %	0.381	0.537
Fever (%)	53.571 %	46.429 %	1.904	0.168
Cough (%)	57.692 %	42.308 %	0.383	0.536
Breathlessness (%)	57.143 %	42.857 %	0.289	0.591
Sore Throat (%)	50.000 %	50.000 %	0.597	0.44
CRP present (%)	60.000 %	40.000 %	0.006	0.936

The hematologic features including hemoglobin [W=466; p=0.834], TLC [W=507; p=0.423], PLT [W=446.5; p=0.954], ESR [W=392; p=0.695], PCT [W=288.5; p=0.07], PT [W=336; p=0.399], INR [W=344.5; p=0.464], aPPT [W=373; p=0.933] and CRP [chi-square =0.006; p=0.936] between the two groups showed no significant difference. (Table 2)

Table 2. Comparison of hematologic parameters in hypertensives and non-hypertensives suffering from COVID-19 using Mann Whitney test.

Variables	Hypertensives		Non-hypertensives		W	p
	Median	IQR	Median	IQR		
Age	63	12	57	15	409.5	0.389
Hb	13.35	1.3	13	1.5	466	0.834
TLC	6.2	1.975	6.8	4.36	507	0.423
PLT	2.26	201.01	2.24	156.2	446.5	0.954
ESR	42	33.75	40	28.5	392	0.695
PCT	0.068	0.061	0.02	0.035	288.5	0.07
PT	13.2	2.5	12.6	2.6	336	0.399
INR	1	0.2	1	0.3	344.5	0.464
APTT	30.4	3.2	31.6	2.15	373	0.933

Discussion

Among COVID-19 patients, hypertension is the most commonly associated comorbidity. [5] Many studies were conducted to find out whether hypertension is a risk factor for COVID-19. The coronavirus infects host cells using ACE2 receptors, and the management of hypertension includes angiotensin-converting enzyme inhibitors. [10] ACE2 forms angiotensin 1–7 from angiotensin II, and thus reduces the inflammatory action of angiotensin II, and increases the potential for the anti-inflammatory effects of angiotensin 1–7. Accordingly, by reducing either formation of angiotensin II in the case of ACE inhibitors, or by antagonizing the action of angiotensin II by blocking angiotensin

AT₁ receptors in the case of ARBs, these agents could actually contribute to reducing inflammation systemically and particularly in the lung, heart, and kidney. [11] Thus, ACE inhibitors and ARBs could diminish the potential for the development of either acute respiratory distress syndrome, myocarditis, or acute kidney injury, which can occur in COVID-19 patients. In fact, ARBs have been suggested as a treatment for COVID-19 and its complications. [10] Increased soluble ACE2 in the circulation could bind SARS-CoV-2, reducing its ability to injure the lungs and other ACE2-bearing organs. [12]. None of these possibilities have, however, been demonstrated in patients yet. [13]

The present study investigated the effect of hypertension on the outcomes of COVID-19 patients. However, the study found no significant differences in the clinical symptoms and hematologic parameters in the hypertensive and non-hypertensive groups suffering from COVID-19.

Conclusion:

The present study concludes that there is not evidence that either use of ACE inhibitors is useful or harmful in patients with hypertension. Therefore, it is endorsed to use these agents in the management of hypertensives in patients suffering from COVID-19, till further evidence is found.

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