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Demographic and Clinical Characteristics in COVID-19 Ischemic Heart Disease Patients

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Abstract **Original Research Article**

Background: Coronavirus disease 2019 (COVID-19), the highly contagious infectious disease caused by severe acute respiratory syndrome coronavirus 2(SARS-CoV-2), has had a catastrophic effect on the world's demographics resulting in about 3 million deaths worldwide within a few years. The outbreak of coronavirus disease-2019 (COVID-19) has been declared a Public Health Emergency of International Concern (PHEIC) and the virus has now spread to many countries and territories including Bangladesh. On the other hand, in this country, number of ischemic heart disease (IHD) patients is increasing day by day. ***Aim of the study:*** This study aimed to assess the demographic and clinical characteristics of ischemic heart disease patients with COVID-19. ***Methods:*** This was a cross-sectional analytical study and was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka, Bangladesh from January 2021 to December 2021. In total 70 diagnosed COVID-19 patients with or without IHD, were enrolled in this study as the study subjects. A convenient purposive sampling technic was used in sample selection. Among the total study subjects, 35 were post-COVID-19 with IHD (Cases in group-A) and 35 were post-COVID-19 without IHD (Control in Group-B). Data were analyzed by using the SPSS version 23.0 program. ***Results:*** In this study, the mean ± SD age of group A (COVID-19 with IHD) participants was 57.62 ±11.32 years and there was no significant age difference between group-A and group -B. The majority of the group- A participants were male (54.3%) and the most frequent comorbidity in this group was hypertension (45.7%). Among group A participant, the mean ±SD systolic blood pressure, diastolic blood pressure and BMI of the study subjects were 129.57 ± 14.62, 81.71 ± 5.28 and 25.17 ± 3.44 respectively. There was not any significant difference in SBP, DBP, or BMI between group-A and group B. ***Conclusion:*** The frequency of COVID-19 among male IHD patients is higher than among female IHD patients. There may not have any significant correlation in demographic and clinical statuses between COVID-19 with IHD cases and COVID-19 without IHD cases.

Keywords: COVID-19, Ischemic Heart Disease, IHD, Demographic, Clinical, Co-Morbidities.

1. INTRODUCTION

Coronavirus disease 2019 (COVID-19), the highly contagious infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has had a catastrophic effect on the world's demographics resulting in more than 2.9 million deaths worldwide, emerging as the most consequential global health crisis since the era of the influenza pandemic of 1918. After the first cases of this predominantly respiratory viral illness were first reported in Wuhan, Hubei Province, China, in late December 2019, SARS-CoV-2 rapidly disseminated across the world in a short period, compelling the World Health Organization (WHO) to declare it as a global pandemic on March 11, 2020 [1]. On 18 March 2022, a total of 1,950,357 confirmed cases and death of 29,112 have been reported in Bangladesh [2]. Coronaviruses belong to the family Corona viridae. They can be classified into four genera: Alpha corona virus, Beta corona virus, Gamma corona virus, and Delta corona virus; among them, alpha-and beta coronaviruses infect mammals [3]. Like other coronaviruses, the primary mechanism of transmission of SARS-CoV-2 is via infected respiratory droplets, with viral infection occurring by direct or indirect contact with

nasal, conjunctival, or oral mucosa, when respiratory particles are inhaled or deposited on these mucous membranes [4]. There is an association between COVID-19 and cardiovascular disease. COVID-19 patients with or without pre-existing heart disease may suffer a heart attack, heart failure, myocarditis, and even death [5]. Patients with CVD are at higher risk of cytokine storms [6]. The prevalence of COVID-19 in IHD patients is 17% [7]. CVD is a common comorbidity observed in patients infected with SARS (with a prevalence of 10%). The high prevalence of these comorbidities was confirmed in subsequent studies. Importantly, the prevalence of these pre-existing conditions was higher in critically ill patients (such as those admitted to the intensive care unit (ICU)) and in those who died [8]. Novel SARS-CoV-2 has been demonstrated to interact with ACE2 and enter the host's cells, particularly cardiac myocytes and alveolar epithelial cells [1]. ACE2 has a broad expression pattern in the human body with a powerful expression observed in the heart, lungs, gastrointestinal system, and kidneys. Additionally, ACE2 plays an essential role in the neurohumoral regulation of the cardiovascular system. The binding of SARS-CoV-2 to ACE2 causes acute myocardial and lung injury through the alternation in ACE2 signaling pathways [9]. COVID-19 cases are escalating morbidity in patients with cardiovascular problems. The infection affects cardiac-relevant biochemical pathways such as the ACE2 signaling pathway, cardiac muscle integrity, fibrinogen pathways, redox homeostasis, and induces a break in plaque associated with the stent, and finally, aggravates a myocardial injury and dysfunction [10]. The objective of this current study was to assess the demographic and clinical characteristics of ischemic heart disease patients with COVID-19

2. METHODOLOGY

This was a cross-sectional analytical study that was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka, Bangladesh from January 2021 to December 2021. In total 70 diagnosed COVID-19 patients with or without IHD, were enrolled in this study as the study subjects. A convenient purposive sampling technic was used in sample selection. Among the total study subjects, 35 were post-COVID-19 with IHD (Cases in group-A) and 35 were post-COVID-19 without IHD (Control in group -B). The study was approved by the ethical committee of the mentioned hospital. Properly written consent was taken from all the participants before data collection. As per the inclusion criteria of this study, only RT-PCR-confirmed adult patients with or without IHD who performed an anti-SARS-CoV-2 IgG test within 3 to 12 weeks of COVID-19 detection, were included. On the other hand, according to the exclusion criteria of this study, patients who received vaccination against SARS-COV-2, cases with acute infection or recent fever, malignancy cases and pregnant women were excluded. All the demographic and clinical information of the participants was recorded. All data were processed, analyzed and disseminated by using MS Excel and SPSS version 23.0 program as the necessity. In statistical analysis, a P value <0.05 was considered as the indicator of significance.

Ethical Clearance

Ethical permission was taken from Ethical Review Committee of Dhaka Medical College.

Inclusion criteria for cases:

- Adult patients (18 years and above) of both gender.
- Diagnosed case of IHD patients.
- Diagnosed case of post COVID-19 patients by RT-PCR test.
- Serum Anti-SARS-CoV-2 IgG test was done within 3 to 12 weeks of COVID-19 detection by RT-PCR test.

Inclusion criteria for comparison group:

- Age, gender and duration (Between RT-PCR positive and IgG test) matched post COVID-19 patients without history of IHD.

Exclusion criteria:

- Subjects who received vaccination against SARS-COV-2.
- Acute infection or recent fever.
- Malignancy
- Pregnancy

3. RESULTS

Table 1: Distribution of the study subjects according to age. (N=70)

Age in years	Group-A		Group-B		p-value
	n	%	n	%	
18 - 30 yrs.	2	5.7	1	2.8	0.684[b]
31 - 40 yrs.	1	2.8	3	8.6	
41 - 50 yrs.	5	14.4	7	20.0	
51 - 60 yrs.	11	31.4	12	34.3	
>60 yrs.	16	45.7	12	34.3	
Mean ± SD	57.62 ± 11.32		54.14 ± 11.29		0.202[a]

Unpaired student's t-test & b Chi-square test was done to measure the level of significance

Table 1 showed, >60 years was highest of group A 16(45.7%), mean age 57.62±11.32 years and in group B, 51-60 years & >60 years both were highest 12(34.3%), mean age 54.14±11.29 years.

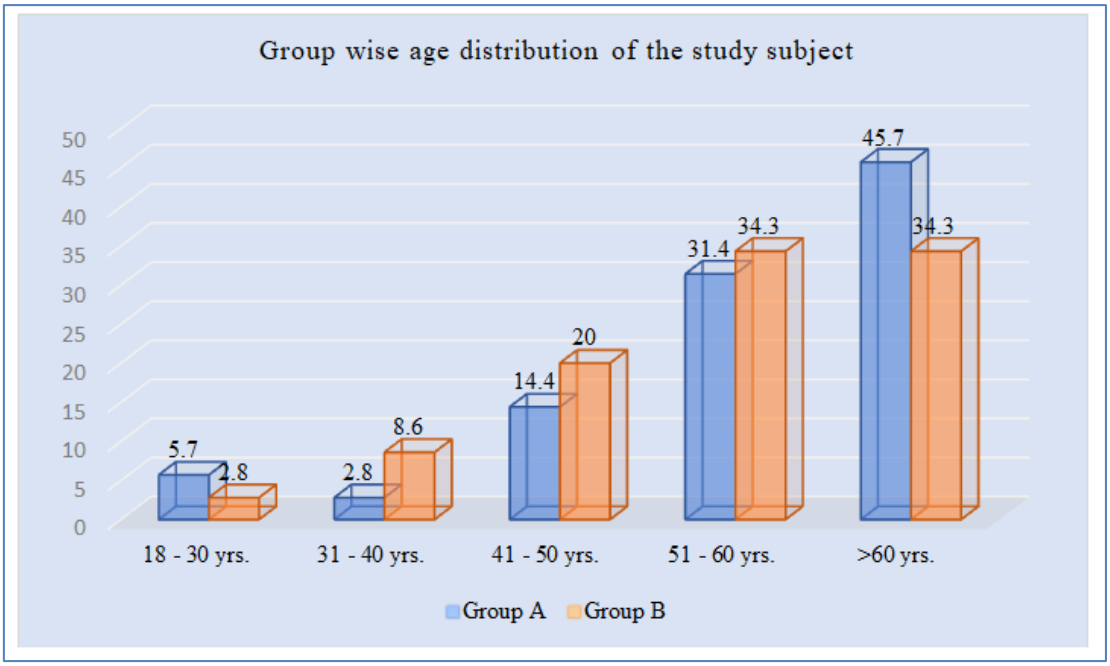

Figure I: Group wise age distribution of the study subject. (N=70)

Table 2: Distribution of the study subjects according to gender. (N=70)

Gender	Group-A		Group-B		p-value
	n	%	n	%	
Male	19	54.3	15	42.9	0.339
Female	16	45.7	20	57.1	

A chi-Square test was done to measure the level of significance

Table 2 showed in gender, male was highest in group A 19(54.3%) and in group B female were highest 20(57.1%). P value was 0.339.

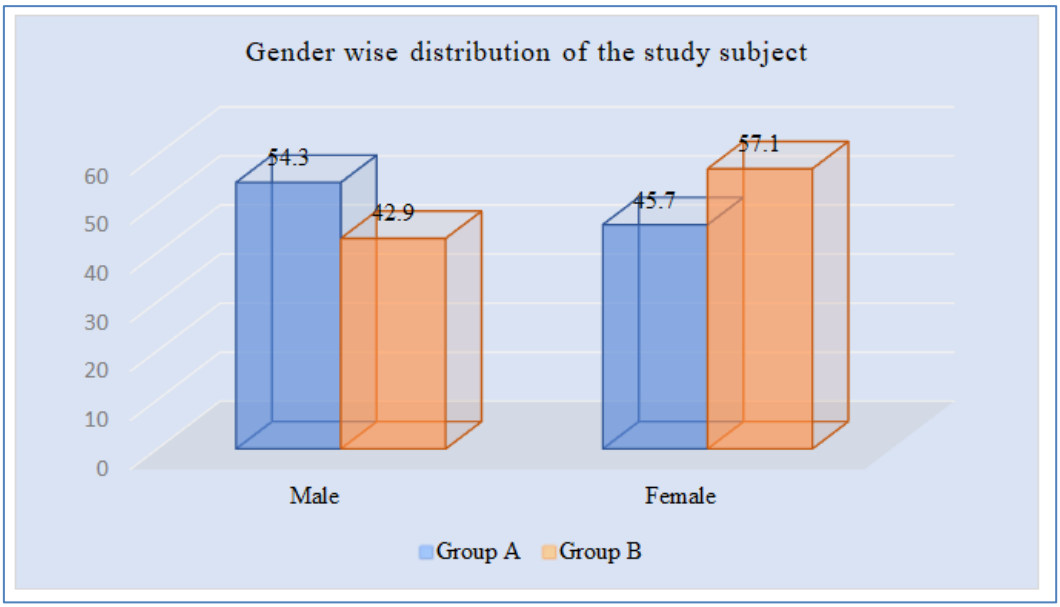

Figure II: Gender wise distribution of the study subject. (N=70)

Table 3: Co-morbidities of the study subjects. (N=70)

Co-morbidities	Group-A		Group-B		p-value
	n	%	n	%	
Hypertension	16	45.7	9	25.7	0.081 [a]
Diabetes mellitus	0	0.0	3	8.6	0.239[b]
Chronic kidney disease	0	0.0	1	2.9	1.000[b]
Hypertension with DM	6	17.1	7	20.0	0.759[a]
Hypertension with CKD	2	5.7	1	2.9	1.000[b]
Total	24	68.6	21	60.0	0.454[a]

The chi-Square test and Fischer's exact test were done to measure the level of significance

Table 3 showed the co-morbidity, in group A hypertension were 16(45.7%) followed by hypertension with DM were 6(17.1%). And in group B hypertension were 9(25.7%) & hypertension with DM 7(20%) respectively.

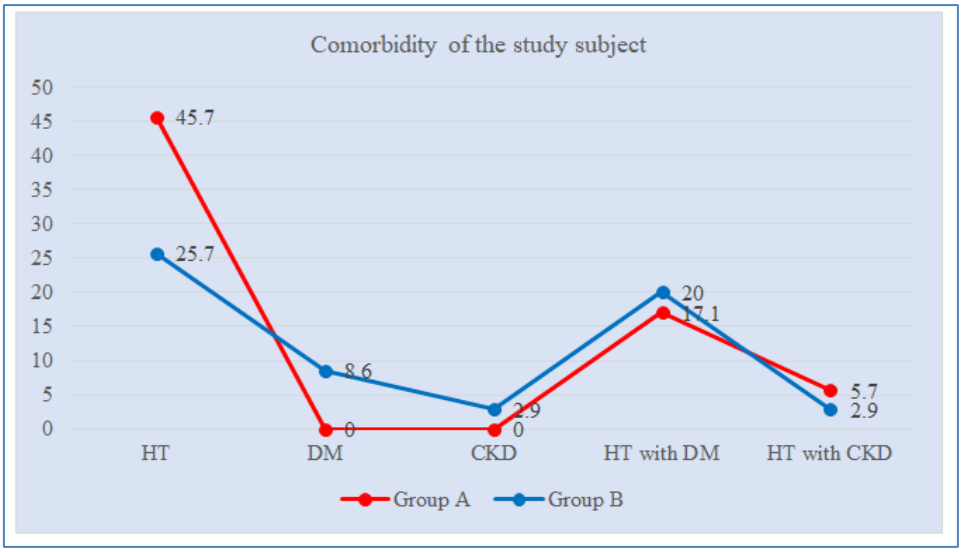

Figure III: Comorbidity of the study subject. (N=70)

Table 4: Blood pressure and BMI of the study subjects. (N=70)

Characteristics	Group-A	Group-B	p-value
	n	n	
	Mean ± SD	Mean ± SD	
	(Min-Max)	(Min-Max)	
Systolic BP (mmHg)	129.57 ± 14.62	129.97 ± 14.38	0.908
	(100 - 160)	(100 - 160)	
Diastolic BP (mmHg)	81.71 ± 5.28	82.57 ± 5.47	0.507
	(70 - 90)	(70 - 95)	
BMI (kg/m^2)	25.17 ± 3.44	25.07 ± 1.99	0.876
	(17.32 - 38.16)	(21.13 - 29.72)	

Unpaired student's t-test was done to measure the level of significance

Table 4 showed in group A, the mean ±SD systolic blood pressure, diastolic blood pressure and BMI were 129.57±14.62, 81.71±5.28 and 25.17±3.44 respectively. There was no significant difference between SBP, DBP, or BMI between group-A and group B.

Table 5: Distribution of the study subjects by Anti-SARS-CoV-2 IgG status. (N=70)

IgG status	Group-A		Group-B		p-value
	n	%	n	%	
Positive (≥50 AU/ml)	35	100%	34	97.10%	1.000
Negative (<50 AU/ml)	0	0%	1	2.90%	

Fisher's exact test was done to measure the level of significance

Table 5 showed Anti-SARS-CoV-2 IgG status, in group A positive (≥50 AU/ml) were 35(100%) & negative (<50 AU/ml) 0(0%) and in group B positive (≥50 AU/ml) were 34(97.1%)% & negative (<50 AU/ml) 1(2.9%) respectively.

4. DISCUSSION

This study aimed to assess the demographic and clinical characteristics of ischemic heart disease patients with COVID-19. In this current study, we found that the mean ±SD of age was 57.62 ± 11.32 and 54.14 ± 11.29 years in group-A and group -B respectively. In both groups, the majority of patients were from the>60 year's age group followed by the 51-60 year's age group. There was no significant age difference between group-A and group B. Xiang *et al.,* (2021) [11] found in their study a median age of 60 (46.5-67.0) years which was almost similar to our study. On the other hand, Guo *et al.,* (2021) [12] found a mean age of 48.6 ± 15.5 years in his study which was a little bit different from this study. This may be due to differences in sample size. As per the gender distribution of the study subjects, male (54.3%) was predominant in group-A and female (57.1%) was predominant in group B without any significant difference between the two groups. Xiao *et al.,* (2021) [13] found in their study that there were 28 (50%) males and 28(50%) females. Guo *et al.,* (2021) [12] found 57.4% male in his study. Both findings were almost similar to this study. In this study, hypertension was the commonest comorbidity in both groups. There was no significant difference between the two groups in terms of comorbidities. Callender *et al.,* (2020) [14] found hypertension (16%), cardiovascular disease (12.11%), and diabetes (7.87%) were the most prevalent pre-existing co-morbidities among hospitalized COVID patients. Akter *et al.,* (2020) [15] found about 84% of asymptomatic cases had no co-morbid diseases, while 52% of the severe cases had more than one co-morbid disease. The majority of the severe cases reported diabetes (60%) followed by hypertension (36%), and asthma (32%). In our study, there was not any significant difference in systolic BP, diastolic BP and BMI between group-A and group B; no significant difference in anti-SARS-CoV-2 IgG status was present between the two groups. Kutsuna *et al.,* (2021) [16] found that male sex, diabetes mellitus and high C-reactive protein levels during the disease course were associated with elevated IgG antibodies. In their study, DM was a risk factor for COVID-19 severity and the severity of the disease is associated with a high rise in antibody titer. IHD was a risk factor for COVID-19 severity in this study. Callender *et al.,* (2020) [14] in their study regarding the impact of comorbidity on COVID-19, found that the individuals who were asymptomatic or mild symptomatic were without any comorbidity or healthy individuals. And symptomatic or the individuals of critical cases with one or more comorbidity. All the findings of this current study may be helpful in further similar studies.

Limitation of the Study:

This was a single-centered study with small-sized samples. Moreover, the study was conducted over a very short period. So, the findings of this study may not reflect the exact scenario of the whole country.

5. CONCLUSION & RECOMMENDATION

As per the findings of this current study, we can conclude that the frequency of COVID-19 among male IHD patients is higher than among female IHD patients. There may not have any significant correlation in demographic and clinical statuses between COVID-19 with IHD cases and COVID-19 without IHD cases. Special care should be ensured in managing COVID-19 patients with IHD. For getting more specific results, we would like to recommend conducting similar studies in several places with larger-sized samples.

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CONFLICT OF INTEREST: None declared.

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