Covid impact on pattern of ischemic heart diseases in comparable period

Bhanupriya[1*] and Deepa Chugh[2]

[1] M.Sc. Nursing Student, National Heart Institute, Delhi, India

[2] Research Scholar, Department of Nursing, National Heart Institute, Delhi, India

Correspondence Author: Bhanupriya

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Abstract

Aim: To compare the impact of COVID-19 on pattern of Ischemic Heart Disease in comparable period by assessing the incidence, severity of symptoms and in-hospital mortality of Ischemic Heart Disease patients before and during COVID-19.

Background: COVID-19 directly or indirectly, affects the cardiovascular system it not only causes myocardial injury but also reduces the incidence and increasing the severity and mortality of Ischemic Heart Disease patients and it was seen that pneumonia and influenza infections increases the risk of acute MI by six folds.

Methods: Data collected from health records of patients admitted in National Heart Institute from Ischemic Heart Disease in comparable four months period of before (Oct 2019-Jan 2020) and during (Oct 2020-Jan 2021) COVID-19 by using a self-structured biophysiological tool. The total samples taken were 421 out of which 237 were before COVID-19 and 184 were during COVID-19. STARD checklist used to report the study.

Results: The major findings of the study reveal that incidence of ischemic heart disease indicates that before COVID-19 incidence was 13.32% whereas the incidence of ischemic heart disease during COVID-19 was 12.69%. This means incidence decreases during COVID-19 as compared to before COVID-19. Severity scores measured before COVID-19 showed the majority of the patient (61.2%) having no severity as compared to during COVID-19 whereas the majority of patients having mild (41.8%) and moderate (1.1%) severity as compared to before COVID-19. Mortality of ischemic heart disease indicates that before COVID-19 in-hospital mortality was 1.28% whereas in-hospital mortality of ischemic heart disease during COVID-19 was 0.54%.

Conclusion: From findings the study interprets that incidence and in-hospital mortality of Ischemic Heart Disease patients decreases during COVID-19 as compared to before COVID-19, whereas the severity of Ischemic Heart Disease symptoms increases during COVID-19 as compared to before COVID-19.

Implication: Patients are staying away from the hospital due to fear of contracting the infection which in return act as a major issue of increasing Ischemic Heart Disease severity so, the nurses should involve in a proactive campaign to alleviate patient concern and encourage them to seek timely medical attention despite the COVID-19 pandemic.

Keywords: covid 19, pattern of IHD, comparable period, incidence, in-hospital mortality, severity

1. Introduction

The COVID-19 pandemic is the greatest crisis of our time, claiming more than 2 million lives and causing the biggest shock to the global economy since World War II (WHO, 2021) [18]. COVID-19 is a highly contagious new virus caused by SARS-CoV-2. The disease was first identified in December 2019 in Wuhan, Hubei, China (WHO, 2020) [17]. Lau, H *et al*. (2021) [8] note that the outbreak was declared a Public Health Emergency of International Concern by the World Health Organization (WHO) in January 2020 and was recognized as a pandemic in March 2020.

Zheng, Y. Y *et al*. (2020) [21] wrote that COVID-19 primarily affecting the respiratory system but it can also cause acute myocardial injury and chronic damage to the heart. Some clinical studies reported an association between cardiovascular diseases and COVID-19. The Patients with pre-existing cardiovascular comorbidities increasing the risk of death in patients with COVID-19, whereas COVID-19 can also induce myocardial injury, arrhythmia, acute coronary syndrome, and venous thromboembolism (Nishiga, M *et al*. 2020) [10].

As COVID-19 pandemic has had a huge impact on the global health care system. Across the world, the Government has appealed to people to stay at home and observe social distancing to slow down the pandemic, but this leads to "pseudo-reduction" i.e., the incidence of ACS/STEMI is actually the same, but these patients are staying away from hospitals due to fear of contracting the infection in the hospital setting (Kapoor, A 2020) [7]. Braiteh, N (a) *et al*. (2020) [2] note that Some reports also showed that due to COVID-19 pandemic there is significant decline in total acute coronary syndrome, this decrease in hospital admissions and late presentations can be a worrisome sign for an increase in future complications of myocardial infarctions.

Similarly, according to the American college of emergency physicians, nationwide hospitals are seeing up to 60% reduction in admission for heart attack due to fear in the medical community of the dangerous and potentially fatal effect of COVID-19. These fears are also backed up by a recent study showing a 38% drop in the patient being treated with a life-threatening STelevated myocardial infarction (STEMI) heart attack (Fornell, D 2020) [6]. And according to Wadhera,

R. K *et al*. (2021) [15] there is increase in deaths caused by IHD during the initial phase of COVID-19 which raising concern due to the indirect toll on the patient.

A Self Structured Conceptual framework is used in this study (see fig 1).

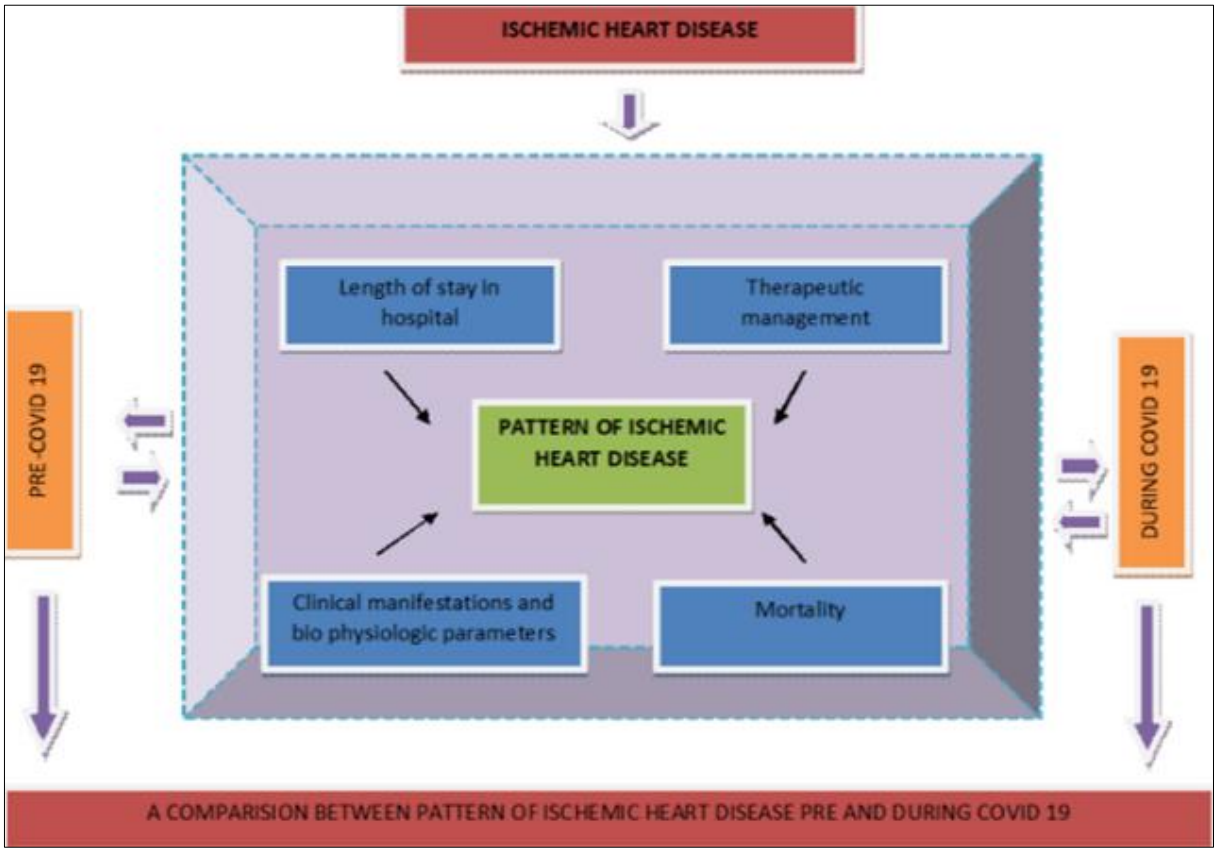

Fig 1: A Self Structured Conceptual framework of research comparing incidence, severity, duration of hospitalization, and in-hospital mortality before and during COVID-19 pandemic

2. Background

Among patients with Coronavirus disease 2019 (COVID-19), coronary artery disease (CAD) has been identified as a high-risk condition. Coronary artery disease (CAD) is the leading cause of death and the most common cardiovascular disease worldwide (Timmis, A *et al* 2020) [14]. Similarly; according to Xie, J *et al*. (2020) [20] CAD is a prevalent condition among patients with COVID-19, varying between 2.5% and 10% of cases. According to the china report CAD has been identified as a risk factor for severe COVID-19 and the case-fatality rate increased from 2.3% to 10.5% in patients with pre-existing cardiovascular disease (Wu, Z & McGoogan, J. M. 2020) [19].

It is presumable that COVID-19, directly and indirectly, affects the cardiovascular system and the heart in particular. Potential mechanisms of cardiovascular injury have been identified and include direct myocardial injury from hemodynamic derangement or hypoxemia, inflammatory myocarditis, stress cardiomyopathy, microvascular dysfunction or thrombosis due to hypercoagulability, or systemic inflammation (cytokine storm), which may also destabilize coronary artery plaques. Pneumonia and influenza infections have been associated with a six-fold increased risk of acute MI. Patients with severe COVID-19, such as those with high fever or hypoxia due to lung disease, may need a significant increase in cardiac output. Type II myocardial ischemia, therefore, may result in patients with obstructive CAD (Duane, S.P 2021) [5].

According to a study conducted to analyze the death rates from ischemic heart disease before and after the onset of the pandemic in the United States and its comparison with those to the same periods the year before and they found a substantial increase in deaths from ischemic heart diseases and hypertensive diseases over that period. Specifically, there was an 11 percent spike in deaths due to ischemic heart diseases, or those related to the narrowing of the arteries, over that time compared with the previous year (Welch, A 2021) [16].

Another study was conducted in Italy by De Rosa, S *et al* (2020) [4] to evaluate the impact of the COVID-19 pandemic on patient admissions to Italian cardiac care units (CCUs). In which they compared admissions for acute MI to coronary care units from March 12th to 19th in 2020 with those during the equivalent week in 2019 and they found that there was a 49.4 percent reduction for both STEMI and NSTEMI. The STEMI case fatality rate was higher, comparing 2020 with 2019.

A large database study was also conducted in England comparing hospital admissions for acute coronary syndromes (ACS) between mid-February and the end of March 2020 and with the weekly average in 2019 (3017 per week). It shows a substantial reduction in the weekly numbers of patients with ACS admitted to hospitals in England by the end of March 2020 (1813 per week; 40 percent reduction) compared with the 2019 weekly average. The trend was partially reversed by the end of May 2020 (2522 per week; 16 percent reduction). Although the decline in hospital admissions was seen in all

types of ACS (eg., STEMI, NSTEMI, unstable angina, and MI of unknown type), but it was most pronounced for those with NSTEMI (Mafham, M. M *et al* 2020) [9].

Roffi, M *et al* (2020) [11] note that there are some reports which show an increased coronary artery thrombus burden in patients with STEMI along with an increased frequency of thrombotic strokes, especially in young people during the COVID-19 pandemic.

Similarly; according to National Center for Health Statistics data the death rates from ischemic heart disease and hypertensive disease in the U.S increased after the onset of the pandemic in 2020, compared with changes over the same period in 2019. And there was an increase in deaths due to ischemic heart disease (139%) and hypertensive diseases (164%) during the pandemic (ACC News Story 2021) [1].

3. Aim of study

The present study was conducted as an attempt to assess the pattern of Ischemic Heart Diseases in a comparable period of pre and during COVID-19 pandemic in a patient admitted to National Heart Institute, Delhi. With following objectives:

a) To compare the incidence of ischemic heart disease before and during COVID-19.
b) To compare the severity of symptoms before and during the COVID-19 pandemic
c) To compare the in-hospital mortality due to IHD before and during COVID-19.

4. Methods

4.1 Research Design: Descriptive-Comparative Research design.

4.2 Sample and setting: All the patients of IHD admitted to the National Heart Institute within 4 months period before (Oct 2019-Jan 2020) and during COVID-19 (Oct 2020-Jan 2021) were taken as a sample. There was total 421 samples out of which 237 samples were before COVID-19 and 184 samples were during COVID-19**.**

4.3 Inclusion criteria: All the patients who were admitted diagnosed and treated as IHD in the hospital within 4 months of period before and during COVID-19.

4.4 Exclusion criteria: Less than 15 years and more than 90 years of age; Patients admitted with non-cardiac conditions; Patients with valvular heart diseases, a congenital heart defect and peripheral arterial diseases.

4.5 Data collection: Data was collected from the health records of the patients admitted in National Heart Institute from Ischemic Heart Disease in comparable four months period of before (Oct 2019-Jan 2020) and during (Oct 2020-Jan 2021) COVID-19 by using a self structured biophysiological tool.

4.6 Data analysis: The data was analyzed by applying descriptive and inferential statistics, data was analyzed in terms of frequencies and percentages. Mean, mean percentage, standard deviation, mean difference and Mann Whitney U test were computed to find the comparison of pre-COVID-19 and during COVID-19 impact on the pattern of Ischemic Heart Disease. Statistical software used in this study is SPSS.

5. Results

Findings related to demographic and clinical variables of ischemic heart disease patients before and during COVID-19

Majority of Ischemic heart disease patients were in the age group 54-63 years age group before (37.1%) and during COVID-19 (35.8%), Before COVID-19 81.9% of IHD patients were male and 18.1% were female and during COVID-19 75% were male and 25% were female. The majority of IHD patients were diagnosed with CAD before (40.5%) and during COVID-19 (45.1%) and duration of hospitalization for less than 7 days was seen high with 92.4% during COVID-19 and 91.6% before COVID-19. During COVID-19 86.9% patients were having heart rate between 51-100 beats/min whereas it before COVID-19 it was 86.5%. Majority of IHD patients before (61.2%) (73.4%) and during COVID-19 (59.2%) (73.4%) were having DBP between 61-80mmhg and SBP between 101-150mmhg respectively. 15.2% of IHD patients before and 5.9% during COVID-19 were having Spo2 with O2 above 90% and 86.5% before COVID-19 and 86.9% during COVID-19 were having Spo2 on room air above 90%. Chest pain was seen high with 90.8% during COVID-19 and 86.5% before COVID-19 (see Table 1).

Findings related to comparison of the incidence of IHD patients before and during COVID-19

Majority of IHD patients were admitted in Jan before COVID-19 (14.88%) and during COVID-19 (15.90%). The overall incidence of IHD was decreasing during COVID-19 (12.69%) as compared to before COVID-19 (13.32%). To test the incidence of IHD patients before and during COVID-19, a Mann Whitney U test was used. There was a significant difference at p=0.015 in the mean incidence of ischemic heart disease before and during COVID-19 (see Table 2).

Findings related to the description of clinical parameters showing the severity of IHD before and during COVID-19

Troponin was positive in 29.1% of patients before COVID-19 and 27.2% patients during COVID-19. CK-MB >24IU/L was seen in the majority of patients before COVID-19 (28.3%) as compared to during COVID-19 (24.5%). Majority of patients were having Pro-BNP >300pg/ml during COVID-19 (14.7%) as compared with before COVID-19 (11.8%) and D-dimer >0.5 µg/ml was seen only during COVID-19 (4.9%). CRP 5.7 during COVID-19 (34.2%) as compared to before COVID-19 (30.4%). Patients were having PT/INR 9.8-14.9sec/0.8-1.8 before (81.4%) and during COVID-19 (85.3%) but it was more deranged during COVID-19 (10.3%) as compared to before COVID-19 (9.7%). 17.9% of patients were having SGOT >59U/L and SGPT1.3mg/dl during COVID-19 (75.5%) as compared to before COVID-19 (8.4%). And sr. urea was deranged (43 mg/dl) during COVID-19 (15.8%) (15.2%) as compared to before COVID-19 (10.1%) (9.3%) respectively. Majority of patients were having sr. sodium 135-145 mmol/l during COVID-19 (77.7%) as compared to before COVID-19 (64.6%) whereas it was more deranged before (34.2%) COVID-19 as compared to during COVID-19 (20.7%) and sr. potassium was deranged during COVID-19 (12.5%) as compared to before COVID-19 (6.3%). And sr. calcium was also deranged during COVID-19 (10.3%) as compared to before COVID-19 (2.1%). Majority number of patients was having random blood sugar 140 mg/dl during COVID-19

(49.5%) as compared to before COVID-19 (47.7%). Mortality was more before COVID-19 (1.3%) as compared to during COVID-19 (0.5%). Intubation was done in 28.8% of patients during COVID-19 whereas it was done in 23.6% of patients before COVID-19 and 8.9% of patients were readmitted before COVID-19 and 8.2% were readmitted during COVID-19. Majority of patients were treated with CABG (27.2%) (21.9%), PTCA (36.4%) (27.4%), and thrombolysis (5.4%) (2.5%) during COVID-19 as compared to before COVID-19 respectively (see Table 1).

Findings related to comparison of severity of symptoms before and during COVID-19

Majority of patients had mild (41.8%) and moderate (1.1%) severity during COVID-19 as compared to before COVID-19 (38.4%) (0.4%) respectively. The severity of symptoms of IHD during COVID-19 (24.40%) was more than before COVID-19 (21.93%). To test the severity of symptoms of IHD patients before and during COVID-19, Mann Whitney U test was used. There was a significant difference at p=0.015 in mean severity of ischemic heart disease before and during COVID-19 (see Table 2).

Findings related to comparison of in-hospital mortality of IHD patients before and during COVID-19

The in-hospital mortality was seen in Oct before (5%) and during COVID-19 (3.03%). In-hospital mortality of IHD was decreased during COVID-19 (0.54%) as compared to before COVID-19 (1.28%). To test the in-hospital mortality of IHD patients before and during COVID-19, the MannWhitney U test was used. There was a non-significant difference at p=0.14 in mean inhospital mortality of ischemic heart disease before and during COVID-19 (see Table 2).

Table 1: Frequency and percentage distribution of patients according to variables (N=421)

S. No	Variables	Before Covid N=237		During Covid N=184	
		F	%	F	%
	Demographic variables				
Age (in years)					
1	24-33	2	0.8	2	1.1
	34-43	11	4.6	12	6.5
	44-53	48	20.3	24	13.1
	54-63	88	37.1	66	35.8
	64-73	61	25.7	55	29.9
	74-83	17	7.2	20	10.9
	84-93	09	3.8	05	2.7
	Above 93	01	0.4	00	00
Gender					
2	Male	194	81.9	138	75
	Female	43	18.1	46	25
Diagnosis					
3	ACS	21	8.9	39	21.2
	Angina	01	0.4	2	1.1
	CAD	96	40.5	83	45.1
	Nstemi	29	12.2	17	9.2
	Stable A	21	8.9	8	4.3
	Stemi	31	13.1	22	12.0
	Unstable	38	16.0	13	7.1
Length of stay					
4	Less than 7 days	217	91.6	170	92.4
	8-16 days	19	8.0	13	7.1
	More than 16 days	01	0.4	01	0.5
Clinical manifestations					
HR					
1	≤50	03	1.3	00	00
	51-100	205	86.5	160	86.9
	101-150	29	12.2	24	13.1
SBP					
2	≤100	27	11.4	12	6.5
	101-150	174	73.4	135	73.4
	151-200	35	14.8	35	19.1
	More than 200	00	00	01	0.5
	Non recordable	01	0.4	01	0.5
DBP					
3	≤60	28	11.8	13	7.1
	61-80	145	61.2	109	59.2
	81-100	57	24.1	57	30.9
	101-120	06	2.5	03	1.7
	More than 120	00	00	01	0.5
	Non recordable	01	0.4	01	0.5
SPO_2 With O_2					
4	Less than 90	04	1.7	00	00
	Above 90	36	15.2	11	5.9
	Not applicable	197	83.1	173	94.1
SPO_2 with Room air					
5	Less than 80	05	2.1	01	0.5
	81-90	13	5.5	05	2.7
	Above 90	198	83.5	172	93.5
	Not applicable	21	8.9	06	3.3
Chest pain					
6	Yes	205	86.5	167	90.8
	No	32	13.5	17	9.2
Clinical Variables					
Cardiac and inflammatory biomarkers					
Troponin					
1	Positive	69	29.1	50	27.2
	Negative	48	20.3	49	26.6
	Not done	120	50.6	85	46.2
CK-MB					
2	0-24 IU/L	48	20.2	37	20.1
	>24 IU/L	67	28.3	45	24.5
	Not done	122	51.5	102	55.4
Pro-BNP					
3	<300 Pg/ml	05	2.1	05	2.7
	>300 pg/ml	28	11.8	27	14.7
	Not done	204	86.1	152	82.6
CRP					
4	<6 mg/l	01	0.4	03	1.6
	>6 mg/l	00	00	02	1.1
	Not done	236	99.6	179	97.3
D-Dimer					
5	<0.5 µg/ml	00	00	04	2.2
	>0.5 µg/ml	00	00	09	4.9
	Not done	237	100.0	171	92.9
ST Wave					
6	No change	121	51.1	80	43.5
	Elevation/depression	115	48.5	104	56.5
	Not done	01	0.4	00	00
T Wave					
7	No change	82	34.6	83	45.1
	Elevation/ Depression	154	65.0	101	54.9
	Not done	01	0.4	00	
Arrhythmias					
8	Yes	50	21.1	42	22.8
	No	186	78.5	142	77.2

	Not done	01	0.4	00	00
RWMA					
9	Present	132	55.7	95	51.6
	Absent	65	27.4	59	32.1
	Not done	40	16.9	30	16.3
EF					
10	55-70%	78	32.9	68	37.0
	40-54%	94	39.7	58	31.5
	35-39%	12	5.1	19	10.3
	<35%	13	5.5	9	4.9
	Not done	40	16.9	30	16.3
MR					
11	Trace	144	60.8	120	65.2
	Mild	42	42	28	15.2
	Moderate	11	11	4	2.2
	Severe	00	00	2	1.1
	Not done	40	16.9	30	16.3
PAH					
12	Present	28	11.8	142	77.2
	Absent	169	71.3	12	6.5
	Not done	40	16.9	30	16.3
CAG					
13	Yes	198	83.5	167	90.8
	No	39	16.5	17	9.2
Blood investigations					
HB					
1	<13 gm/dl	99	41.8	75	40.8
	13-17 gm/dl	130	54.9	104	56.5
	>17 gm/dl	07	2.9	03	1.6
	Not done	01	0.4	02	1.1
ESR					
2	0-22 mm/1hr	127	53.6	76	41.3
	>22 mm/1hr	26	10.9	25	13.6
	Not done	84	35.4	83	45.1
HbA1C					
3	4.5-5.7	10	4.2	07	3.8
	>5.7	72	30.4	63	34.2
	Not done	155	65.4	114	61.9
PT/INR					
4	9.8-14.9sec/0.8-1.8	193	81.4	157	85.3
	>14.9/>1.8	23	9.7	19	10.3
	Not done	21	8.9	08	4.3
SGOT					
5	<17	04	1.7	01	0.5
	17-59 U/L	120	50.6	96	52.3
	>59 U/L	39	16.5	33	17.9
	Not done	74	31.2	54	29.3
SGPT					
6	<21	28	11.8	33	17.9
	21-72 U/L	116	48.9	87	47.3
	>72 U/L	19	8.1	10	5.5
	Not done	74	31.2	54	29.3
Sr. Creatinine					
7	Less than 0.7 mg/dl	52	21.9	21	11.4
	0.7-1.3 mg/dl	160	67.5	139	75.5
	>1.3 mg/dl	20	8.5	22	11.9
	Not done	05	2.1	02	1.1
Sr. Urea					
8	<19	24	10.1	29	15.8
	19-43 mg/dl	186	78.5	125	67.9
	>43 mg/dl	22	9.3	28	15.2
	Not done	05	2.1	02	1.1
Sr. Sodium					
9	Less than 135 mmol/l	81	34.2	36	19.6
	135-145 mmol/l	153	64.6	143	77.7
	>145mmol/l	00	00	02	1.1
	Not done	03	1.3	03	1.6
Sr. Pottasium					
10	<3.5 mmol/l	05	2.1	02	1.1
	3.5-5.1 mmol/l	219	92.4	158	85.9
	>5.1mmol/l	10	4.2	21	11.4
	Not done	03	1.3	03	1.6
Sr. Calcium					
11	<8.6 mg/dl	04	1.7	03	1.6
	8.6-10.3 mg/dl	17	7.2	19	10.3
	>10.3 mg/dl	01	0.4	00	00
	Not done	215	90.7	162	88.1
Random Blood sugar (RBS)					
12	<80 mg/dl	02	0.8	02	1.1
	80-140 mg/dl	119	50.2	88	47.8
	>140 mg/dl	111	46.8	89	48.4
	Not done	05	2.1	5	2.7
Death					
	Yes	03	1.3	1	0.5
	No	234	98.7	183	99.5
Intubation					
	Yes	56	23.6	53	28.8
	No	181	76.4	131	71.2
Non-invasive ventilation					
	Yes	06	2.5	04	2.2
	No	231	97.5	180	97.8
Readmission					
	Yes	21	8.9	15	8.2
	No	216	91.1	169	91.8
COVID Status					
	Not applicable	237	100.0	00	00
	Positive	0	00	01	0.5
	Negative	0	00	183	99.5
Therapeutic Management					
CABG					
1	Yes	52	21.9	50	27.2
	No	185	78.1	134	72.8
PTCA					
2	Yes	65	27.4	67	36.4
	No	172	72.6	117	63.6
Thrombolysis					
3	Yes	06	2.5	10	5.4
	No	231	97.5	174	94.6
Medical optimization					
4	Yes	92	38.8	45	24.5
	No	145	61.2	139	75.5

Table 2: Comparison of parameters of IHD before and during COVID-19 using Mann Whitney U test

Parameter	Group	N	Mean Rank	Sum of Rank	Mann-Whitney U	P value
Incidence	Before COVID-19	237	6.375	25.5	0.5	0.015*
	During COVID-19	184	2.625	10.5		
Severity	Before COVID-19	237	198.27	46991.00	1.879	0.015*
	During COVID-19	184	227.39	41840.00		
In-hospital mortality	Before COVID-19	237	4.625	18.5	7.5	0.14**

	During COVID-19	184	4.375	17.5		

Level of significance 0.05, *significant, **non-significant

6. Discussion

Currently, COVID-19 is a threat to global health. Various researches show that COVID-19 can cause cardiovascular disorders, including myocardial injury, arrhythmias, acute coronary syndrome and venous thromboembolism. Hence it is important to know the impact of COVID-19 on the pattern of ischemic heart disease like the incidence of IHD, severity, and duration of hospitalization of IHD patients during COVID-19, and mortality of IHD patients during COVID19 so that measures can be taken to reduce the impact of COVID-19 on the pattern of ischemic heart diseases.

6.1. Study limitations

The limitations of the study were:

- The study was limited to only one hospital of Delhi.
- The study was only done in 4 months comparable period of before and during COVID-19 pandemic
- Assessment of the IHD pattern was done from the data obtained through a self-structured tool.

6.2. Comparison with similar studies

Comparison of incidence of IHD patients before and during COVID-19

The findings of the present study reveal that the in-hospital incidence of IHD patients during COVID-19 (in 2020) decreases as compared with before COVID-19 (the same period in 2019). It also reveals that there was a significant difference (p=0.015) in the mean incidence of IHD before and during COVID-19.

The finding is consistent with the previous study conduct by Solomon, M. D *et al* (2020) [13] which shows that weekly rates of hospitalization decreased by 48% during COVID-19. Yet another study shows a drop by 17.8% (p= 0.152) of total STEMI cases during the COVID-19 pandemic (Braiteh, N (b) *et al* 2020) [3].

Comparison of severity of symptoms of IHD patients during and before COVID-19

The finding of the present study reveals that severity of IHD increases during COVID-19 with a mean score of 9.5163±3.9 as compared to before COVID-19 with a mean score of 8.5527±3.7. It also shows a significant difference (p=0.015) in the mean of severity before and during COVID-19.

This finding was supported by another study conduct by Braiteh, N (b) *et al* (2020) [3] that suggests many patients with mild or anginal equivalent symptoms are likely staying at home and waiting longer before presenting to the hospital. Hence severity increases during COVID-19.

Comparison of in-hospital mortality of IHD patients before and during COVID-19

The findings of the present study reveal that the in-hospital mortality of IHD patients during COVID-19 decreases as compared to before COVID-19 in the comparable period. It also shows a non-significant difference (p=0.14) in the mean in-hospital mortality of IHD patients before and during COVID-19

These findings are in congruence with the previously conducted study that reveals that there was a concurrent reduction of in-hospital mortality of cardiovascular diseases during lockdown (during COVID-19) and there was a significant increase in out-of-hospital mortality, during the lockdown (Santi, L *et al* 2021) [12].

7. Conclusion

The present study assessed the pattern of ischemic heart disease i.e. incidence, the severity of symptoms, duration of hospitalization, and in-hospital mortality during and before the COVID-19 pandemic. The findings show that:

- IHD mainly affected the age group of 54-63 years irrespective of COVID-19
- Male are more commonly affected by IHD as compared to females irrespective of COVID19
- CAD is a more common type of IHD that affected most of the patients before and during COVID-19
- The incidence of IHD decreases during COVID-19 as compared to before COVID-19
- The severity of IHD increases during COVID-19 as compared to before COVID-19.
- The in-hospital mortality of IHD patients decreases during COVID-19 as compared to before COVID-19.

The results revealed that COVID-19 has an indirect impact on the pattern of ischemic heart disease as due to lockdown less or very few numbers of patients were going to hospital as they have fear of contracting with COVID-19 patients which will lead to a reduction in the incidence of IHD on the same side the patients ignoring their symptoms and stay at home for longer period which leads to increase in severity and they present clinical picture showing severe symptoms of IHD similarly, in-hospital mortality of IHD is also decreased during COVID-19 as all concern is shifted to the surge of COVID-19 but some researches indicated that out hospital mortality increases during COVID-19 as patients are not going to the hospital for proper treatment which makes their life in danger.

8. Recommendations

- A study can be replicated with a larger sample for better generalization.
- The study can be conducted in different hospitals with similar facilities.
- A comparative study can be conducted to compare the first wave and second wave of COVID19 on the pattern of IHD patients.
- A similar study can be conducted to find out the association between clinical parameters and mortality of IHD patients during COVID-19.
- The study can be done in the community setting to know the factors leading to a decrease in in-hospital emergencies of IHD patients during COVID-19.
- A similar study can be carried out to find other factors causing IHD during lockdown other than COVID-19.
- A study could also involve the findings of CAG for comparison during and before COVID-19 in the comparable period.

- A study can be conducted to compare the severity of post-COVID-19 IHD patients with nonCOVID-19 IHD patients.

9. Implications

- Nurses can identify the health problem of IHD during the COVID-19 pandemic and help to alleviate the sufferings; special emphasis should be given by the community health nurse on reducing the severity of IHD during COVID-19 by mass awareness program home visits and teleconsultations.
- Patients are staying away from the hospital due to fear of contracting the infection which in return act as a major issue of increasing IHD severity so, the nurses should involve in a proactive campaign to alleviate patient concern and encourage them to seek timely medical attention despite the COVID-19 pandemic.

10. Ethical considerations

- **Ethical Committee:** All India Heart Foundation
- **Approval No:** F.No.3/9/110/EC/2020

11. References

1. ACC News Story. Studies highlight increase in CVD deaths, reduction in diagnosis during COVID-19 pandemic. American College of Cardiology, 2021. https://www.acc.org/latest-in-cardiology/articles/2021/01/11/20/03/studies-highlight-increase-in-cvd-deaths
2. Braiteh N (a) *et al*. Decrease in acute coronary syndrome presentations during the COVID-19 pandemic in upstate New York. American Heart Journal, 2020; 226:147-151. https://doi.org/10.1016/j.ahj.2020.05.009
3. Braiteh N (b) *et al*. Decrease in acute coronary syndrome presentations during the COVID-19 pandemic in upstate New York. American Heart Journal, 2020; 226:147-151. https://doi.org/10.1016/j.ahj.2020.05.009
4. De Rosa S, *et al*. Reduction of hospitalizations for myocardial infarction in Italy in the COVID-19 era. European Heart Journal, 2020; 41(22):2083-2088. https://doi.org/10.1093/eurheartj/ehaa409
5. Duane SP. COVID-19: Myocardial infarction and other coronary artery disease issues. UpToDate, 2021. https://www.uptodate.com/contents/covid-19-myocardial-infarction-and-other-coronary-artery-disease issues/
6. Fornell D. The cardiovascular impact of COVID 19. DAIL (Diagnostic and interventional cardiology), 2020. https://www.dicardiology.com/article/cardiovascular-impact-covid-19
7. Kapoor A. Will the hidden specter of acute coronary syndrome (ACS) and ST-segment elevation myocardial infarction (STEMI) emerge from the avalanche of COVID-19? Indian Heart Journal, 2020; 72(3):192-193. https://doi.org/10.1016/j.ihj.2020.05.017
8. Lau H, *et al*. Evaluating the massive underreporting and undertesting of COVID-19 cases in multiple global epicenters. Pulmonology, 2021; 27(2):110-115. https://doi.org/10.1016/j.pulmoe.2020.05.015
9. Mafham MM, *et al*. COVID-19 pandemic and admission rates for and management of acute coronary syndromes in England. Lancet (London, England), 2020; 396(10248):381-389. https://doi.org/10.1016/S0140-6736(20)31356-8
10. Nishiga M, *et al*. COVID-19 and cardiovascular disease: from basic mechanisms to clinical perspectives. Nature reviews. Cardiology, 2020; 17(9):543–558. https://doi.org/10.1038/s41569-020-0413-9
11. Roffi M, *et al*. The Obstacle Course of Reperfusion for ST-Segment-Elevation Myocardial Infarction in the COVID-19 Pandemic. Circulation, 2020; 141(24):1951-1953. https://doi.org/10.1161/CIRCULATIONAHA.120.047523
12. Santi L *et al*. Non-COVID-19 patients in times of pandemic: Emergency department visits, hospitalizations and cause-specific mortality in Northern Italy. PloS one, 2021; 16(3):e0248995. https://doi.org/10.1371/journal.pone.0248995
13. Solomon MD *et al*. The Covid-19 Pandemic and the Incidence of Acute Myocardial Infarction. The New England Journal of Medicine, 2020; 383(7):691-693. https://doi.org/10.1056/NEJMc2015630
14. Timmis A *et al*. European Society of Cardiology: Cardiovascular Disease Statistics 2019. European Heart Journal, 2020; 41(1):12-85. https://doi.org/10.1093/eurheartj/ehz859
15. Wadhera RK *et al*. Cardiovascular Deaths During the COVID-19 Pandemic in the United States. Journal of the American College of Cardiology, 2021; 77(2):159-169. https://doi.org/10.1016/j.jacc.2020.10.055
16. Welch A. Uptick in Cardiovascular Deaths Amid COVID-19 Pandemic, Study Finds. Everyday health review, 2021. https://www.everydayhealth.com/heart-health/uptick-in-cardiovascular-deaths-amid-covid-19-pandemic-study-finds/
17. World Health Organization. Novel coronavirus (2019-nCoV) situation report. World Health Organization, 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf
18. World Health Organization. Looking back at a year that changed the world: WHO's response to COVID-19, 2021. World Health Organization. https://apps.who.int/iris/handle/10665/340321
19. Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. JAMA, 2020; 323(13):1239-1242. https://doi.org/10.1001/jama.2020.2648
20. Xie J, *et al*. Clinical Characteristics of Patients Who Died of Coronavirus Disease 2019 in China. JAMA network open, 2020; 3(4):e205619. https://doi.org/10.1001/jamanetworkopen.2020.5619
21. Zheng YY, *et al*. COVID-19 and the cardiovascular system. Nature reviews. Cardiology, 2020; 17(5):259-260. https://doi.org/10.1038/s41569-020-0360-5.