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Cardiac Conduction Block as Delay of Cardiac Impulse in Myocardial Infarction

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Abstract

Various types of conduction blocks develop following ST segment elevation myocardial infarction. First-degree AV block occurs in 4 to 14% of patients with ST segment elevation myocardial infarction, Mobitz type I second-degree AV block is observed in around 10% of patients with ST segment elevation myocardial infarction and which is transient in nature. Mobitz type II second-degree AV block observed in <1% of patients with ST segment elevation ST segment elevation myocardial infarction is important cardiac disease in present days. Patients of ST segment elevation myocardial infarction can develop different complications like conduction blocks, ventricular dysfunction,cardiogenic shock, mechanical complications, ventricular arrhythmias.[1] Prognosis of ST segment elevation myocardial infarction patients developing complications is poor.

Introduction

Cardiac conduction block is one of the important complication of ST segment elevation myocardial infarction. Cardiac conduction block is delay or interruption of the cardiac impulse. Cardiac conduction block in ST segment elevation myocardial infarction patients is because of the following physiological changes.

1. Ischemia causing temporary or permanent structural changes of the tissuessurrounding the sinoatrial node and AV junctions.
2. An increase in parasympathetic tone commonly associated with an inferior wall myocardial infarction.
3. An increase in extracellular potassium, which causes slowing of cardiac impulse conduction.
4. Local release and formation of adenosine a metabolite of adenosine triphosphate breakdown, which leads to slowing of velocity of impulseconduction through the AV node.[2] myocardial infarction[2]. Third-degree or complete heart block occurs in about 5-

8% of patients. [3] The development of complete AV block is associated with poor prognosis because of its extensive nature of the infarction. [2,3]

Bundle branch block in ST segment elevation myocardial infarction have poor prognosis. This is related both to the extent of myocardial damage [(4)] and to thefrequency of ventricular asystole.[5] Development of conduction blocks worsensthe outcome of ST segment elevation myocardial infarction. Knowing various types of conduction blocks occurring in ST segment elevation myocardialinfarction help out to recognise conduction blocks at an early stage, so that appropriate treatment including temporary or permanent pacing can be instituted at an early stage.

This study is undertaken to understand various patterns of conduction blocks occurring in various ST segment elevation myocardial infarction patients and itsprognostic implications at tertiary care hospital.

Aim

- To study conduction blocks in patients of ST elevation myocardial infarctionand their prognostic implications at tertiary care hospital.

Objectives

- To study various patterns of conduction blocks occurring in ST elevation myocardial infarction.
- To study the prognostic implications of conduction blocks occurring in ST elevation myocardial infarction.
- To study the relation of conduction blocks with ST elevation Myocardial Infarction and implementing it to detect morbidity or mortality associated with it.

Review of Literature

Historical Review

- A. Keith and M.W. Flack described sinoatrial node in 1906[6].
- In 1883, Gaskell described that some pathway was necessary for the transmission of a stimulus from atria to the ventricles[6].

- In 1893, Kent described a bundle of muscle passing between, the lowerright side of interatrialseptum into the interventricular septum[6].
- In 1893, Kent and His, Jr. described atrioventricular bundle (of kent andHis)[6]
- Atrioventricular node was described by Tawara[6] in 1906.
- Hoffmann and Crane field (1960) have shown that impulses can pass fromthe SA to the AV node more rapidly than they could through ordinary myocardium. James (1963) has described 3 pathways between the nodes and called them as anterior, middle and posterior internodal tracts[7].
- Galabin in 1875 published the first graphic record of heart block, an apex cardiogram[8].
- Einthoven recorded the first electrocardiogram of complete heart block in 1906[8].
- Morgagni, Spens, Burnett, Adams, Mayo, Gibson, Holbertson and finally Stokes all contributed to characterization of the Adams–Stokes syndrome[8].
- Mackenzie described sinoatrial block in 1902 during an epidemic of influenza[8].
- Lown coined the term Sick Sinus Syndrome in 1907[8].
- Moe first demonstrated dual pathways in the AV node of animals in 1956[8].
- Kaufmann and Rothberger, Singer and Winterberg independently developed the concept of exit block[8].

The AV block that is progressively lengthened until an atrial complex is not conducted was first seen in the frog‟s heart by Engelman[8] in 1894. Wenckebach[8], Engelmann‟s pupil described this in man in 1899. John hay[8] in 1906 published venous and arterial pulse tracing, clarified by laddergrams that also showed normal atrioventricular conduction followed by absence of ventricular activation. In 1924, Mobitz found wenckebach periods (which he called type I) and the block described by Hay in the same patient. The latter arrhythmia he named as type II[8]. Ventricular aberration was defined first by Thomas Lewis[8]. Moe, Mendez and Han verified experimentally that the refractory period of the right bundle was longer than that of the left bundle[8]. Firsttotally implanted permanent trans venous pacemaker was placed in 1958[9].

Conducting System of Heart:-

Conducting system of heart is made of specialized myocardial cells and conducting fibers, capable of initiating and conducting electrical impulses. “The functioning of conducting system should be regular and rhythmic for effective Synchronization of cardiac Events, so that heart can effectively receive and pump out blood”. [8,9]

Conducting System is comprised of:-

- Sinoatrial node.
- Interatrial and Internodal Pathways.

Anterior (Bachman), Middle, Posterior

- AV Node
- Bundle of His
- Bundle Branches considered

The "CARDIAC INJURY" is the term used for conditions other than MI leading to elevated cardiac biomarkers as follows.

(i) Heart failure

(ii) Myocarditis, pericarditis

(iii) Chronic kidney disease

(iv) Sepsis

(iv) Subendocardial infarction

(v) Atrial fibrillation.

Mortality rate is increased in patients with elevated TEROPONIN when compared to those with negative troponin, CK MB elevation.

Site of Infarct And ECG Change With Blood Supply:

lead	border	Arterial supply
V3 & V4	anterior Right Ventricle	RCA
V1 & V2	Septum	LAD
a VL, V5 & V6	Lateral Left Ventricle	LCX
II+III+AVF	inferior borderof right ventricle	RCA

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Materials and Methods

Type of study: This was prospective, observational cohort study done in patients admitted in wards and ICU who diagnosed of having ST segment elevation myocardial infarction and developed conduction blocks.

Total Patients enrolled: A total of seventy patients admitted in wards and ICUwere enrolled in the present study.

Duration of study: This study was conducted over period of 18 months. (1st December 2017 to 31st May 2019)

Study setting: This study was carried out in patients admitted in wards and ICU who fulfils the W.H.O. criteria OF ST segment elevation myocardial infarction at Krishna Hospital and Medical Research Centre, Karad.

Inclusion criteria

1. Patients diagnosed with ST segment elevation myocardial infarction (STEMI) as per W.H.O criteria that is at least two of the following three elements be present:

- Typical history of chest pain presenting for > 30 min
- Classical ECG changes indicating ACUTE MI.
- Elevated cardiac enzymes levels CPK MB and troponin I

Exclusion criteria

- Patients with old bundle branch block.
- Patients with cardiomyopathy.
- Patients with congenital or Rheumatic heart disease.
- Patients with history of intake of drugs causing conduction blocks like, clonidine, methyl dopa, verapamil, digoxin etc. All the patients included in the study was explained about the procedure in detail and issued Patient Information Sheet. Informed and written consent was taken in each case.

All the investigations and interventions (if necessary) was done under the direct supervision and guidance of our guide.

This study was approved by Institutional Ethics and protocol committee. Informed and written consent from patients were taken before enrolling in study. A detailed history was taken about the chest pain, the presence of risk factors and duration of risk factors as appropriate. A detailed history was also obtained about the use of different medications. Random venous blood samplewas obtained for analysis of cardiac enzymes, blood glucose,

lipid profile, renal function test, and routine blood investigations.

A diagnosis of STEMI was made on the basis of chest pain lasting>30 min; ST-segment elevation ≥1 mm in at least two of the limb leads and elevation of creatine kinase Enzyme and its myocardial band (MB) fraction to more than twice the upper limit of normal or troponins.

Following admission into ICU, all the patients were followed up, and special attention was paid to detect the occurrence of conduction block. Continuous electrocardiographic monitoring was performed for an average of 48 hr . Standard 12-lead ECG was taken on admission in to ICU, at a paper speed of 25 mm/s and an amplification of 10 mm/mV.

ECG criteria for the diagnosis of STEMI: New ST elevation at J-point in two contiguous leads with cut points: ≥0.1 mv in all leads other than leads V2-V3 where the following cut points apply: ≥0.2 mv in men ≥40 years,≥0.25 mv in men < 40 years, ≥0.15 mv in women Diagnosis of various conduction block was made based on characteristic ECG changes as follow:

- First-degree AV block.
- Second-degree AV block: Intermittent failure of AV conduction.
- Mobitz Type I.
- Mobitz Type II.
- Third-degree or complete AV block.
- Left anterior Hemi block (LAHB).
- Left posterior Hemi block (LPHB).
- LBBB.
- RBBB.

Other investigations:

- CPK-MB by CK-MB ELISA kit on EM360 analyser
- Troponin I by Eurolyser troponin I smart kit on EM360 analyser
- Serum Lipid level
- 2 D-ECHO(WIPRO GE-95, Reg.no.: MH/STR/0376)
- ECG (12 lead ECG machine serial number:DUTB5C3153,ID number: KIMSDU/KH/W.NO.3/ECG-1)

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Statistical Analysis

The statistical analyses performed using the Statistical Package for Social Science (SPSS) version21 for Windows. Data were expressed as mean values ± standard deviations (SD) for continuous variables. Frequency and proportions were reported for categorical variables. The p-value of < 0.05 was considered statistically significant.

Observations and Results

Frequency distribution of ST segment elevation myocardial infarction patients according to gender:

In the present study total seventy (n=70) ST segment elevation myocardial infarction patients were enrolled. Out of the seventy ST segment elevation myocardial infarction patients forty nine (70%) patients were male and twenty one (30%) patients were female. Prevalence of ST segment elevation myocardial infarction was significantly (p=0.001) more in males as compared tofemales.

Frequency distribution of ST segment elevation MI patients according togender is depicted in table no.1.

Table 1: Frequency distribution of ST segment elevation myocardial infarction patients according to gender

Gender	**Number (n=70)**	**Percentage**
Male	49	70
Female	21	30
Total	70	100
(„*p*’ value =0.001)		

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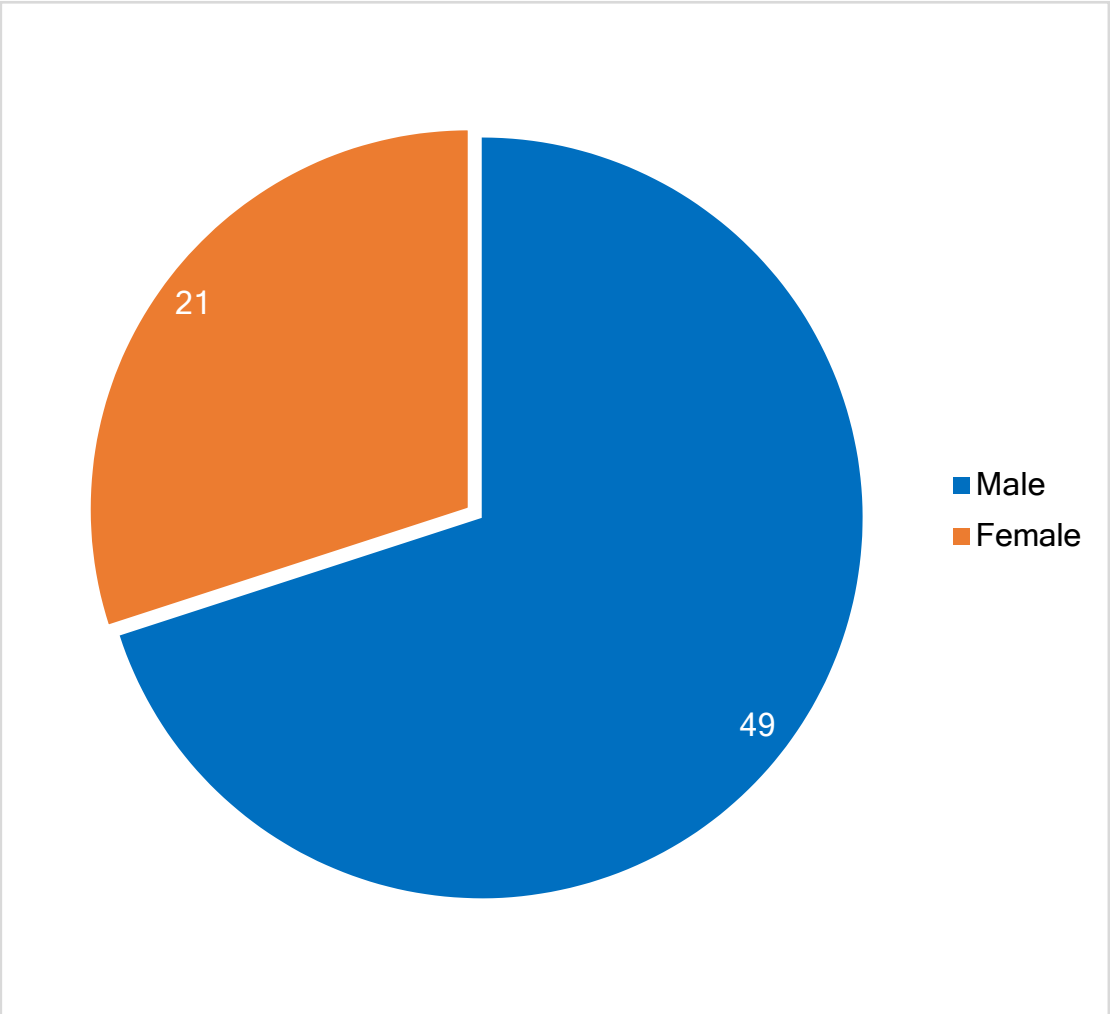
Graph 1: Frequency distribution of ST segment elevation myocardialinfarction patients according to gender.



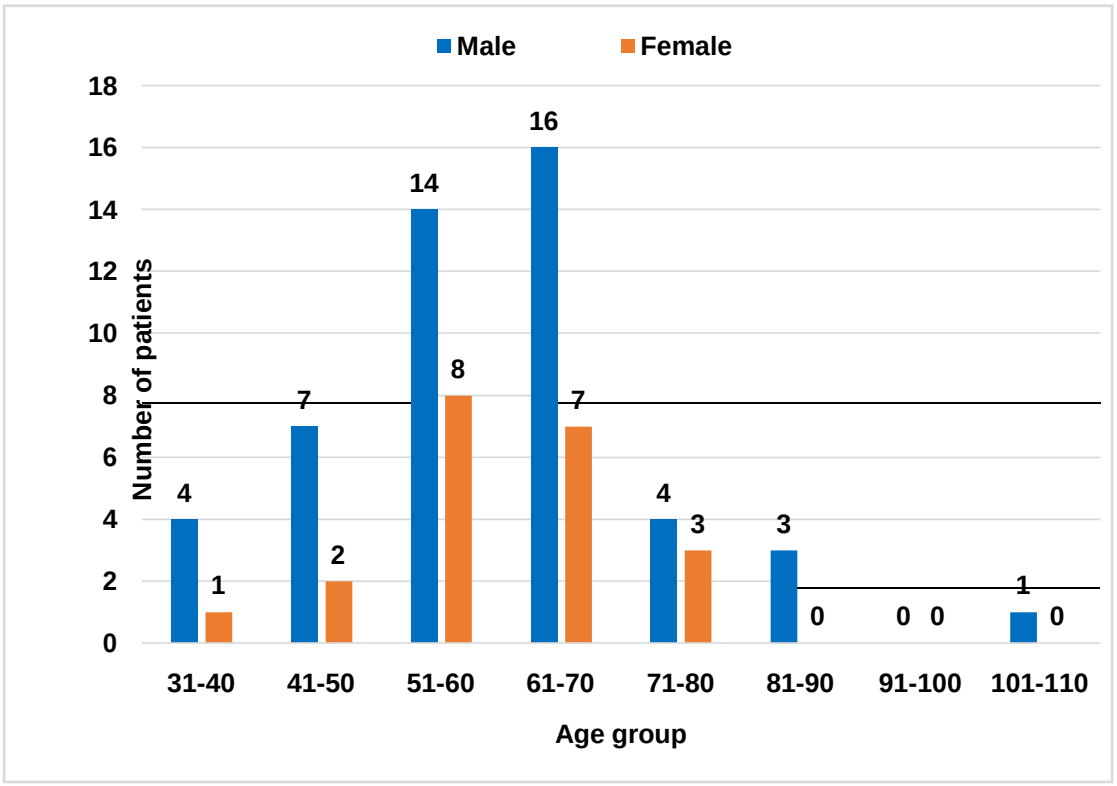
Frequency distribution of ST segment elevation myocardial infarction patients according to age and gender:

In the present study age of patients ranged from 32 to 110 years with mean age of 60.69 (± 13.41) years. Among the seventy (n=70) ST segment elevation myocardial infarction patients studied, maximum number of patients werewithin range of age group 61-70 years, with male predominance.

Table 2: Frequency distribution of ST segment elevation myocardialinfarction patients according to age and gender

Age group	Sex		Total (n=70)	Percentage
	Male (n=49)	Female(n=21)		
31-40	4	1	5	7.14
41-50	7	2	9	12.86
51-60	14	8	22	31.43
61-70	16	7	23	32.86
71-80	4	3	7	10
81-90	3	0	3	4.29
91-100	0	0	0	0
101-110	1	0	1	1.43
Total	**49**	**21**	**70**	**100.00**

Graph 2: Frequency distribution of ST segment elevation myocardialinfarction patients according to age and gender



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Distribution of ST segment elevation myocardial infarction patients according to symptoms:

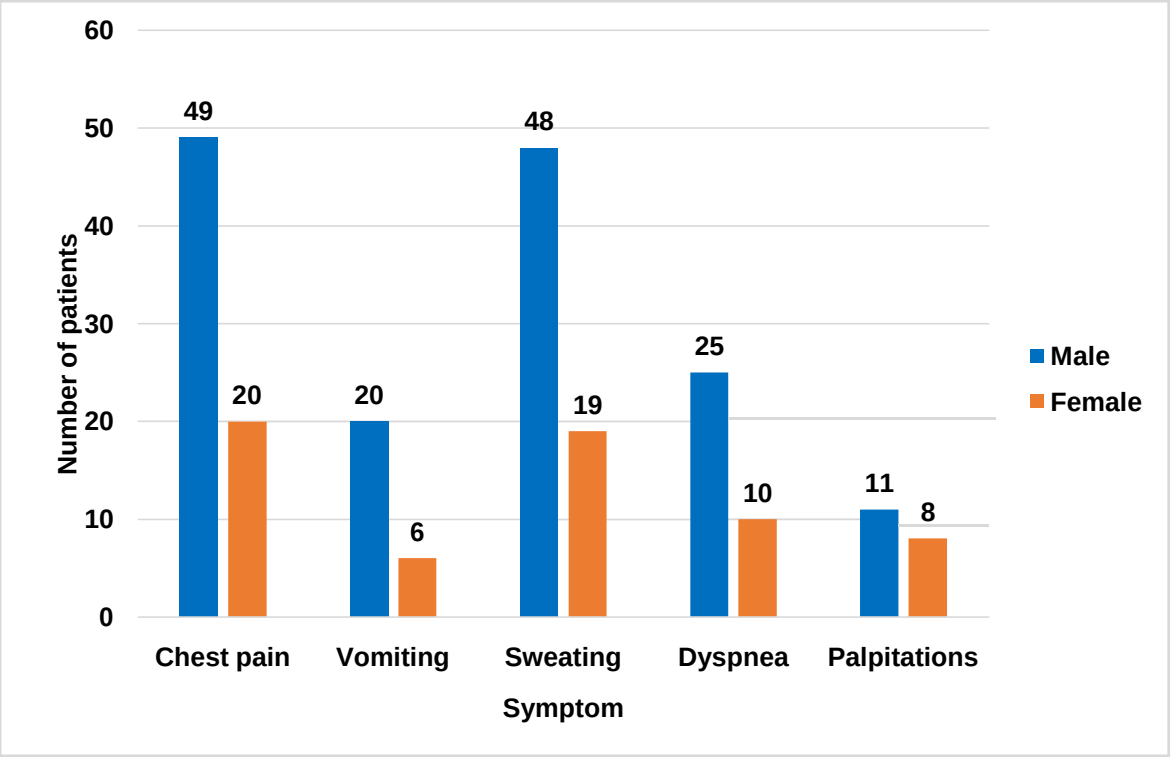
In the present study different symptoms observed in ST segment elevation myocardial infarction patients such as chest pain, sweating, dyspnea, vomitingand palpitation. Out of the all symptoms, chest pain was the most common symptom present in 98.57% of patients and second most common symptom was sweating which was present in 95.71% of patients.

Dyspnea was present in 50% of patients. Vomiting was present in 37.14% of patients. Palpitation was present in 27.14% of patients.

Table 3: Distribution of ST segment elevation myocardial infarction patients according to symptoms

Symptoms	Sex		Total	Percentage
	Male	Female		
Chest pain	49	20	69	98.57
Vomiting	20	6	26	37.14
Sweating	48	19	67	95.71
Dyspnea	25	10	35	50.00
Palpitation	11	8	19	27.14

Graph 3: Distribution of ST segment elevation myocardial infarctionpatients according to symptoms



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Distribution of ST segment elevation myocardial infarction patients according to risk factors:

In the present study hypertension was the most common risk factor being present in twenty seven (38.57%) of ST segment elevation myocardial infarction patients. In the hypertensive patients male (30%) were more than female (8%).

Second most common risk factor was Diabetes mellitus being present in27.14% (n=19) of ST segment elevation myocardial infarction patients. In the diabetes mellitus patients thirteen (n=13) patients were male and six (n=6) patients were female.

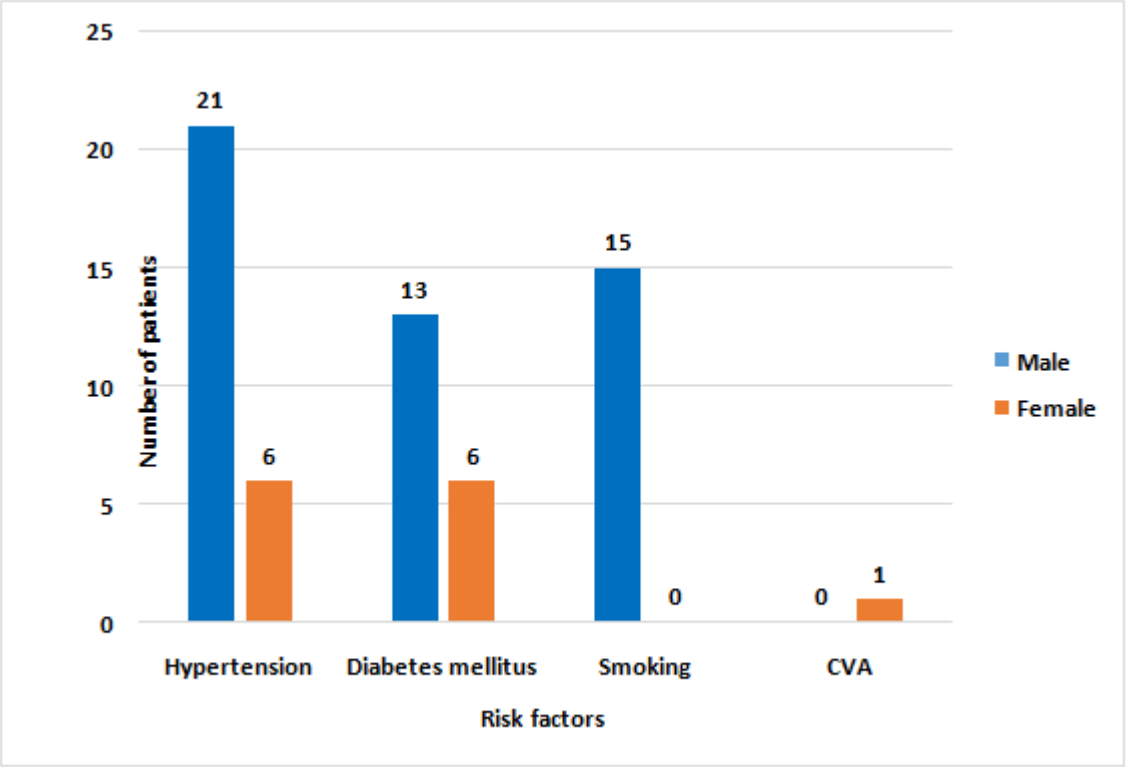
Third most common risk factor was smoking present in 21.43% (n=15) of ST segment elevation myocardial infarction patients. All of the smoking patients were male.

Only one (n=1) of the ST segment elevation myocardial infarction patient was having cerebrovascular accident as a risk factor which was present in female patient.

Table 4: Distribution of STEMI patients according to risk factors

Risk factors	Sex		Total	Percentage
	Male	Female		
Hypertension	21	6	27	38.57
Diabetes mellitus	13	6	19	27.14
Smoking	15	0	15	21.43
CVA	0	1	1	1.43

Graph 4: Distribution of ST segment elevation myocardial infarctionpatients according to risk factors



Different sites of infarction in ST segment elevation myocardial infarctionpatients:

In the present study among the seventy (n=70) ST segment elevation myocardial infarction patients studied we found different sites of myocardial infarction. Anterior wall myocardial infarction present in 38.57% (n=27) patients, Inferior wall myocardial infarction present in 34.29% (n=24) patients, Lateralwall myocardial infarction present in 11.43% (n=8) patients, Anterolateral wall myocardial infarction present in 7.14% (n=5) patients, Anteroseptal wall myocardial infarction present in 4.28% (n=3) patients, Inferior Posterior wall myocardial infarction present in 2.86%(n=2) patients, Anteroinferior wall myocardial infarction in 1.43%(n=1) patients. The most prevalent site was anterior wall myocardial infarction followed by Inferior wall myocardial infarction.

Table 5: Different sites of infarction in ST segment elevation myocardial infarction patients

Site	**No. of cases (n=70)**	**Percentage**
ANTERIOR WALL MI	27	38.57
INFERIOR WALL MI	24	34.29
LATERAL WALL MI	8	11.43
ANTEROLATERAL WALL MI	5	7.14

ANTEROSEPTAL WLL MI	3	4.28
INFEROPOSTERIOR WALL MI	2	2.86
ANTEROINFERIOR WALL MI	1	1.43
Total	**70**	**100**

Types of conduction blocks in ST segment elevation myocardial infarction patients:

In the seventy (n=70) ST segment elevation myocardial infarction patients studied there were eight different types of conduction blocks observed. First Degree heart block present in 28.57% (n=20) patients, Mobitz type 2AV block present in20% (n=14) patients, complete heart block present in 17.14% (n=12) patients, Mobitz type 1 AV block present in 11.43%(n=8) patients, Right bundle branch block present in 10% (n=7) patients, Left bundle branch block present in10% (n=7) patients, Left anterior hemi block present in 1.43% (n=1) patients, and Trifascicular block present in 1.43%(n=1) patients.

The most prevalent conduction block was first degree heart block followed by Mobitz type 2 AV heart block and complete heart block.

Table 6: Types of conduction blocks in ST segment elevation myocardial infarction patients

Type of conduction block	No. of cases (n=70)	Percentage
First degree heart block	20	28.57
Mobitz type 2 heart block	14	20
Complete heart block	12	17.14
Mobitz type 1 heart block	8	11.43
Right bundle branch block	7	10
Left bundle branch block	7	10
Left anterior hemi block	1	1.43
Trifascicular block	1	1.43

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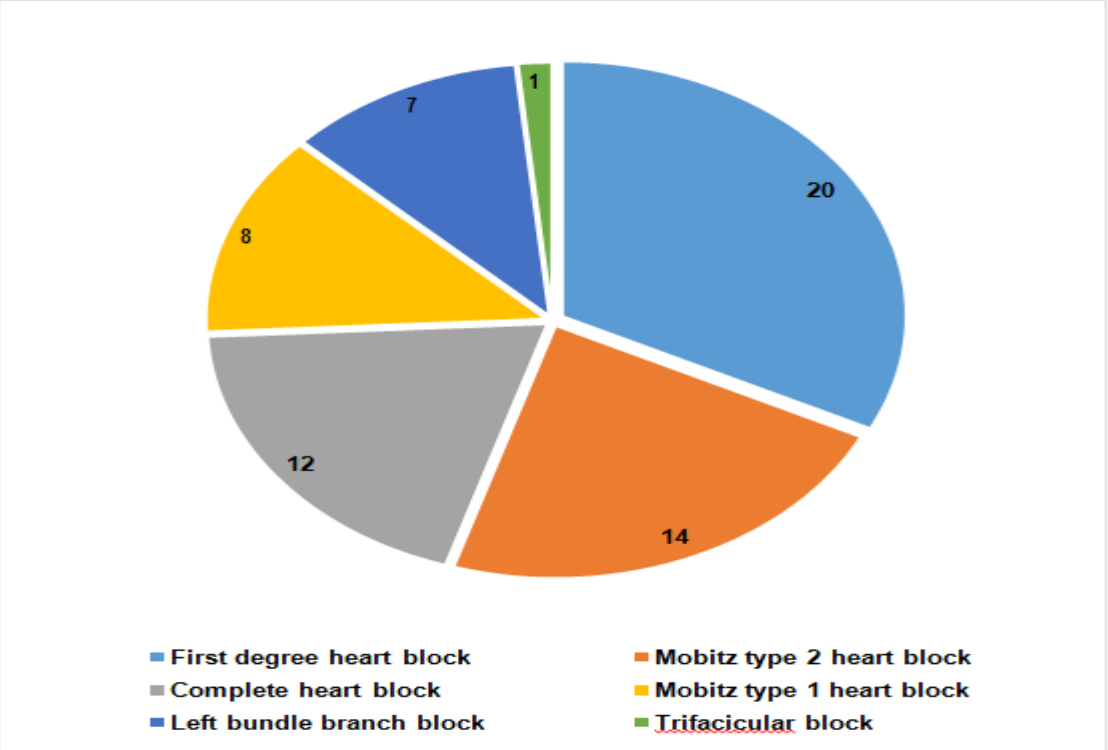
Graph 6: Types of conduction blocks in ST segment elevation myocardial infarction patients



Gender-wise distribution of conduction blocks among ST segment elevation myocardial infarction patients:

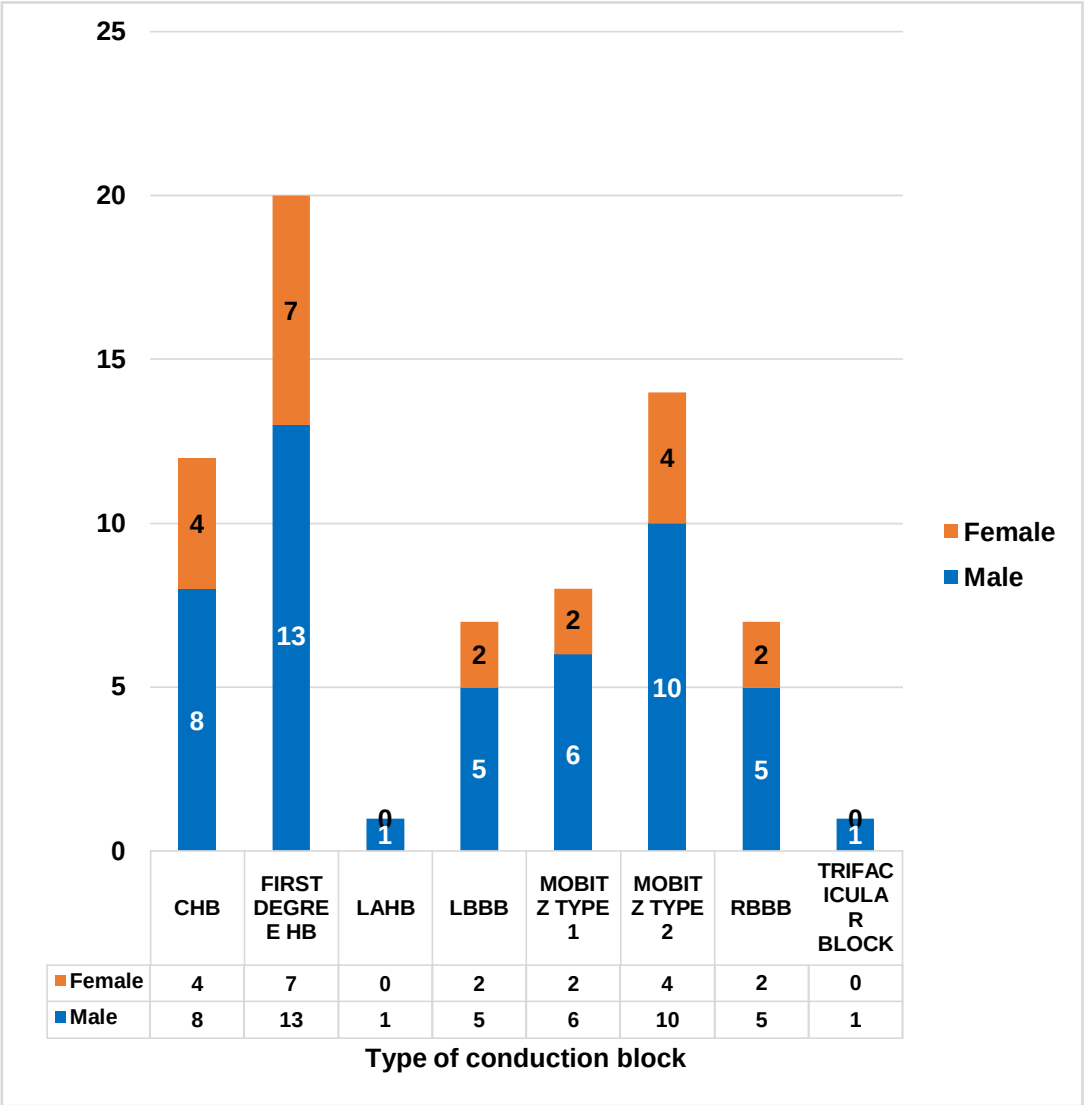
In the present study distribution of conduction block was studied according to gender. We found no significant difference in the numbers of each conduction block compared to gender. Though there was no significant difference, the higher number of patients among all conduction blocks were of male gender.

Table 7: Gender-wise distribution of conduction blocks among ST segment elevation myocardial infarction patients

Sex	CHB	FIRST DEGREE HB	LAHB	LBBB	MOBITZ TYPE 1	MOBITZ TYPE 2	RBBB	TRIFASCICULARBLOCK
Male	08 (66.67%)	13 (61.90%)	01 (100%)	05 (71.43%)	06 (75%)	10 (71.43%)	05 (71.43%)	01 (100%)
Female	04	07	00	02	02	04	02	00

	(33.33%)	(38.10%)	(0%)	28.57%)	(25%)	(28.57%)	(28.57%)	(0%)
P value	0.2205	0.2344	-	0.2850	0.1336	0.2850	0.2850	-

Graph 7: Gender-wise distribution of conduction blocks among STsegment elevation myocardial infarction patients



	CHB	FIRST DEGREE HB	LAHB	LBBB	MOBITZ TYPE 1	MOBITZ TYPE 2	RBBB	TRIFACICULAR BLOCK
Female	4	7	0	2	2	4	2	0
Male	8	13	1	5	6	10	5	1

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Distribution of conduction blocks among various sites of ST segment elevation myocardial infarction:

In the present study distribution of conduction blocks among various sites of ST segment elevation myocardial infarction was studied. Most common site of ST segment elevation myocardial infarction was anterior wall myocardial infarction (n=27). Out of these twenty seven patients, nine (n=9) patients were having first degree heart block, seven (n=7) patients were having Mobitz type 2 AV heart block, six (n=6) patients were having right bundle branch block, three (n=3) patients were having complete heart block, one patient having left bundle branch block another one patient having Mobitz type 1 AV heart block.

Number of ST segment elevation myocardial infarction patients having inferior wall myocardial infarction was twenty four (n=24). Out of these twenty four patients nine (n=9) patients were having first degree heart block, five (n=5) patients were having Mobitz type 1 AV heart block, four (n=4) patients were having complete heart block, two (n=2) patients were having left bundle branch block another two (n=2) patients were having Mobitz type 2 heart block.

Number of ST segment elevation myocardial infarction patients having lateral wall myocardial infarction was eight (n=8). Out of these eight patients three (n=3) patients were having left bundle branch block, two (n=2) patients were having first degree heart block and one patient of each complete heart block, right bundle branch block , left anterior hemi block.

Number of ST segment elevation myocardial infarction patients having anterolateral wall myocardial infarction were five (n=5). Out of those five patients three (n=3) were having Mobitz type 2 heart block and one patient of each having left bundle branch block & right bundle branch block.

Number of ST segment elevation myocardial infarction patients having anteroseptal wall myocardial infarction were three (n=3). Out of those three there was one patient of each complete heart block, Mobitz type1 AV and Mobitz type 2 AV heart block.

Number of ST segment elevation myocardial infarction patients having inferoposterior wall myocardial infarction was two (n=2). Out of those two

patients there was one patient of complete heart block and one patient of Mobitz type 1 AV heart block.

Number of ST segment elevation myocardial infarction patient having anteroinferior wall myocardial infarction was one (n=1) who had complete heartblock.

Table 8: Distribution of conduction blocks among various sites of ST segment elevation myocardial infarction

Site	of conductionblocks	Types of conduction block							
		CHB	FIRST DEGREE HB	LAHB	LBBB	MOBITZ TYPE 1	MOBITZ TYPE 2	RBBB	FASCICULARBLOCK
Anterior Wall MI	27	3	9	-	1	1	7	6	-
Anteroinferior wall MI	1	1	-	-	-	-	-	-	-
Anterolateral wall MI	5	-	-	-	1	-	3	1	-
Anteroseptal wall MI	3	1	-	-	-	1	1	-	-
Inferoposterior wall MI	2	1	-	-	-	1	-	-	-
Inferior wall MI	24	4	9	-	2	5	2	0	1
Lateral wall MI	8	1	2	1	3	-	1	1	-

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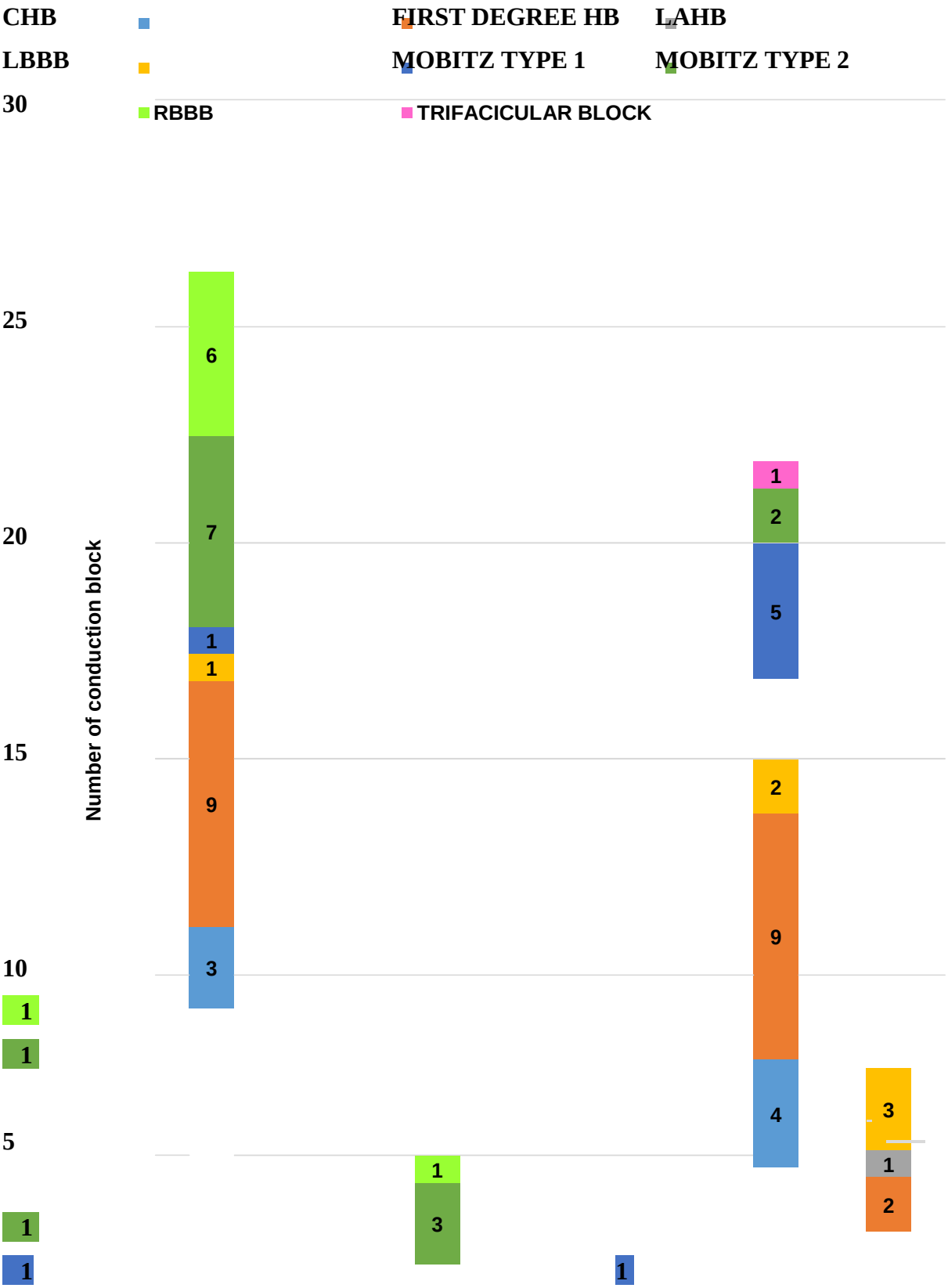
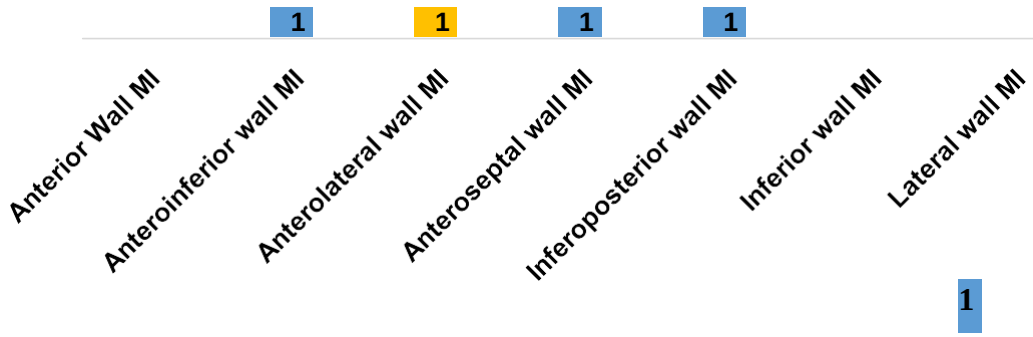
Graph 8: Distribution of conduction blocks among various sites of ST segment elevation myocardial infarction





Sites of STEMI

The mortality rate observed among the ST segment elevation myocardial infarction patients as per the conduction block

In the present study mortality among the ST segment elevation myocardial infarction patients was studied according to type of conduction block. The mortality was only observed in patients with complete heart block (n=8) and firstdegree heart block (n=2). While in all other patients with other conduction blocks improvement was noted. The rate of mortality of patients with complete heart block when compared with the mortality rate of patients with first degree heart blocks, there was significantly (p=0.0031) higher mortality rate observed in patients with complete heart block than first degree heart block.

Table 9: The mortality rate observed among the ST segment elevation myocardial infarction patients as per the conduction block

Group	No. ofCases	No. of deaths	Percentage	p value
CHB	12	8	66.66	
FIRST DEGREE HB	20	2	10	0.0031
LAHB	1	-	-	-
LBBB	7	-	-	-
MOBITZ TYPE 1	8	-	-	-
MOBITZ TYPE 2	14	-	-	-
RBBB	7	-	-	-
ASCICULARBLOCK	1	-	-	-

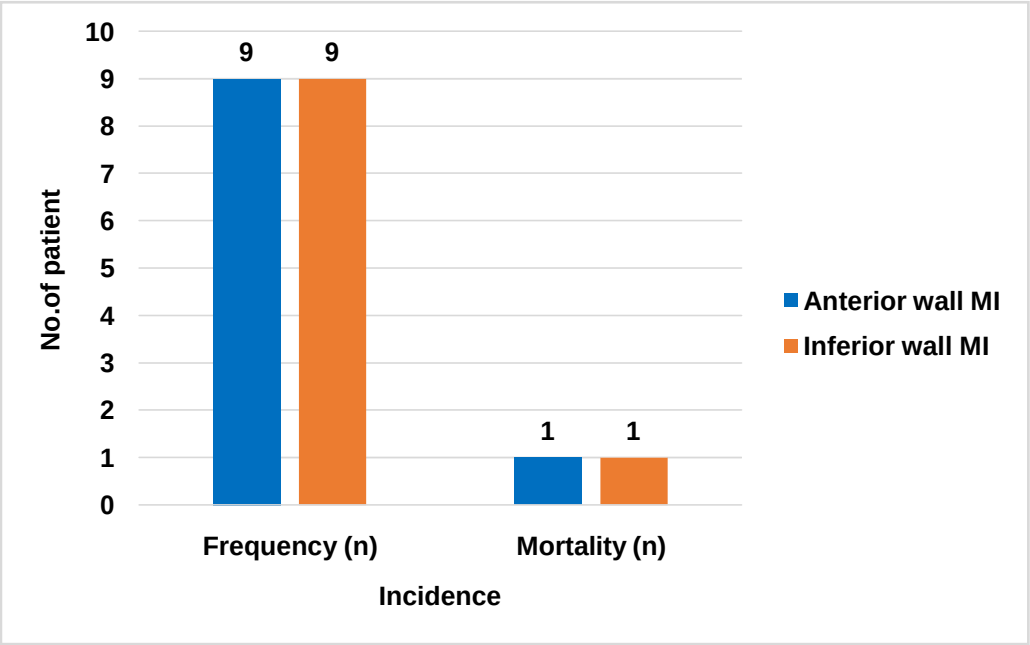
Incidence of mortality of first degree heart block in anterior wall myocardial infarction and inferior wall myocardial infarction:

The incidence of First degree heart block in patients of ST segment elevation myocardial infarction with anterior wall myocardial infarction was noted in 09 patients with death of 1 patient. While the number of patients in inferior wall myocardial infarction was 09 with costing 1 patients death. No statistical significance was seen when patients of anterior wall myocardial infarction and inferior wall myocardial infarction were compared with outcome.

Table 10: Incidence of mortality of first degree heart block in anterior wallmyocardial infarction and inferior wall myocardial infarction

Type of MI	Frequency (n)	Mortality (n)
Anterior wall MI	9	1
Inferior wall MI	9	1
p value = 0.50		

Graph No 10: Incidence of mortality of first degree heart block in anterior wall myocardial infarction and inferior wall myocardial Infarction



Mortality pattern according to Killip classification in ST segment elevation myocardial infarction patients

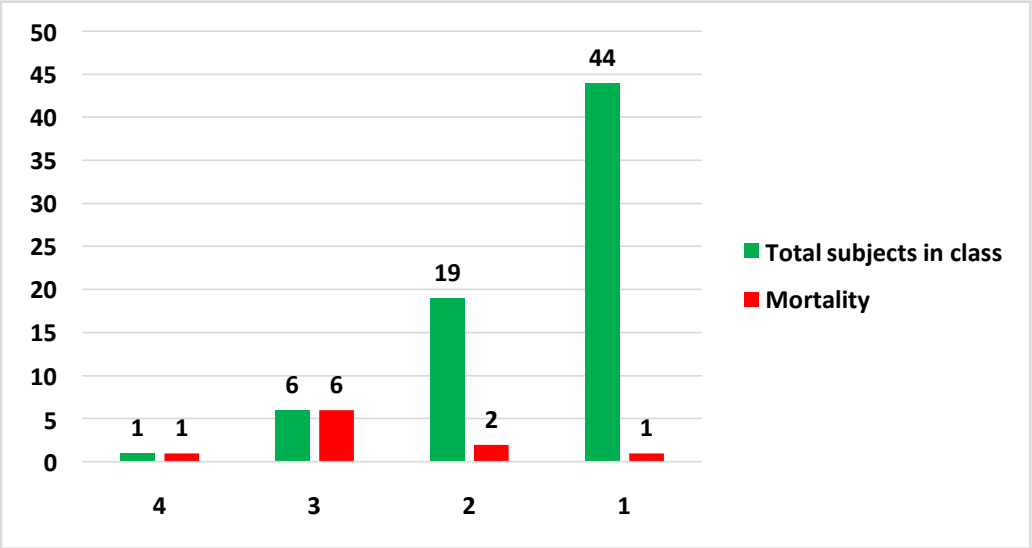
In the present study, we compared the mortality on admission according to Kilipclassification. On admission most number of patients were in killip class 1 (62.8%). We observed that there was 100% mortality among Kilip class 3 and 4,while in killip class 2 there was 10% mortality and in killip class 1 there was 2%mortality.

Table 11: Mortality pattern according to Kilip classification in ST segment elevation myocardial infarction patients

Kilip class	r of subjects(n=70)	Mortality	Percent
4	1	1	100
3	6	6	100
2	19	2	10

1	44	1	2
Total	70	10	14.2

Graph 11: Mortality pattern according to Kilip classification in STsegment elevation myocardial infarction patients



DISCUSSION

DEMOGRAPHIC CHARACTERISTICS

In the present study total seventy (n=70) ST segment elevation myocardial infarction patients were enrolled. Out of the seventy ST segment elevation myocardial infarction patients forty nine (70%) patients were male and twenty one (30%) patients were female. Prevalence of ST segment elevation myocardial infarction was significantly (P=0.001) more in males as compared tofemales.

In the present study age of patients ranged from 32 to 110 years with mean age of 60.69 (± 13.41) years. Among the seventy (n=70) ST segment elevation myocardial infarction patients studied, maximum number of patients werewithin range of age group 61-70 years, with male predominance.

Ratan Ram et al[56], in their study observed Among the 100 patients enrolled inthis study. In both males and females, the most common age group for MI is 51–60 years age group. In the study by **Ratan Ram et al**[56]**,** MI was common in the age group of 51–60 years, and the mean age was 57.3 years with a standard deviation of 9.5 years. Similar findings were observed in **Chavdaet al**[57]. where MI is common in sixth decades of life. However, in some studies, maximum incidence was found over 60 years of age. Males were significantly younger than females when they had MI in this study. This finding is similar withBangalore et al.

Vijay Kumar et al[58] in their study reported that the mean age of patient with conduction blocks was 62.90 whereas in patients without blocks was 57.37. On comparison with other studies, our figures are in concordance with the study done by **Newby KH et al**[59] and **Abidov et al**[60]. In the present study group 70%were males and 30% were females.

Clinical Presentation

Different symptoms observed among the ST segment elevation myocardial infarction patients in the current study was chest pain (98.57%), sweating (95.71%), dyspnea (50%), vomiting (37.14%) and palpitation (27.14%). The most common symptoms was chest pain followed by sweating.

In the study done by **Chandrashekar and Path et al**[61], in their study observed that, chest pain was the most common symptom overall and was noted in 193 (98.4%) patients without blocks and 29 (80.5%) patients with blocks. Vomiting and giddiness was the next two common symptoms. Breathlessness, palpitations, vomiting, and giddiness were more common in patients with CB compared to those without CB which was statistically significant.

Risk Factors

In the present study hypertension was the most common risk factor being present in twenty seven (38.57%) of ST segment elevation myocardial infarction patients. In the hypertensive patients male (30%) were more than female (8%). Second risk factor was Diabetes mellitus being present in 27.14%(n=19) of ST segment elevation myocardial infarction patients. Third risk factor was smoking present in 21.43% (n=15) of ST segment elevation myocardial infarction patients. All of the smoking patients were male. Only one (n=1) of the ST segment elevation myocardial infarction patient was having cerebrovascular accident as a risk factor which was present in female patient.

In the study by **Ratan Ram et al**[56]**,** Various risk factors such as hypertension were present in 27% of cases, diabetes in 25% of cases, IHD in 13% of cases, and smoking in 30% of cases. A similar finding was observed in the study by **Chavda et al**[57].where smoking (72.0%) was the most common risk factor followed by IHD in 14% of cases and 10% had DM. The prevalence of hypertension and diabetes mellitus in the study by **Hreybe and Sab**[62] was 22.3% and 20.2%, respectively. On comparing between males and females, hypertension, IHD, and smoking were more among males, but diabetes was more among females.

According to **Mukhargee et al**,[63] in their study, out of 33 patients who were known Diabetics, 9 had an AV Block while 24 did not have AV block. The occurrence of AV Block following an Inferior Wall AMI in known diabetics was found to be significant.

Sites of Infarction in St Segment Elevation Myocardial Infarction

In the present study among the seventy (n=70) ST segment elevation myocardial infarction patients studied we found different sites of myocardial infarction. Anterior wall myocardial infarction present in 38.57% (n=27) patients, Inferior wall myocardial infarction present in 34.29% (n=24) patients, Lateral wall myocardial infarction present in 11.43% (n=8) patients, Anterolateral wall myocardial infarction present in 7.14% (n=5) patients, Anteroseptal wall myocardial infarction present in 4.28% (n=3) patients, Inferior Posterior wall myocardial infarction present in 2.86%(n=2) patients, Anteroinferior wall myocardial infarction in 1.43%(n=1) patients. The most prevalent sites was anterior wall myocardial infarction followed by Inferior wall myocardial infarction

Ratan Ram et al[56]in their study reported that inferior wall MI is the most common site of MI in this study followed by AWMI. This finding is consistent with the study by **Hreybe and Saba**[62] and **Shah et al.**[64]

Types Of Conduction Blocks Observed

In the seventy (n=70) ST segment elevation myocardial infarction patients studied there were eight different types of conduction blocks observed. First Degree heart block present in 28.57% (n=20) patients, Mobitz type 2 AV block present in 20% (n=14) patients, complete heart block present in 17.14% (n=12)patients , Mobitz type 1 AV block present in 11.43% (n=8) patients, Right bundle branch block present in 10% (n=7) patients, Left bundle branch block present in 10% (n=7) patients, Left anterior hemi block present in 1.43% (n=1) patients and trifascicular block present in 1.43% (n=1) patients. The most prevalent conduction block was first degree heart block followed by Mobitz type2 AV heart block and complete heart block.

In a study conducted by **Ratan Ram et al**[56], out of 100 MI patients, 17 (17%) had conduction block. Moreover, out of this 17, 7 (7%) cases were firstdegree AV block, 4 (4%) cases were seconddegree AV block, 3 (3%) cases were complete heart block, and one case each of LAHB, right bundle branch block, and LBBB. Similar findings were observed in the study by **Bhalliet al.**[65]**,Archbold et al**[66]**and Shirafkan et al**[67]**.**where conduction block was present

in17.6%, 16.0%, and 15.8% of patients, respectively.

In the present study distribution of conduction block was studied according to gender. We found no significant difference in the numbers of each conduction block compared to gender. Though there was no significant difference, the higher number of patients among all conduction blocks were of male gender.

Ratan Ram et al[56] in their research observed that males had more conduction block than females (18.0% vs. 14.7%) as observed in this study and in **Escosteguy et al**[68] study. However, there is no statistical significant difference.

In the study by **Vijay Kumar et al**[58]**,** the incidence of RBBB was more than LBBB. It was comparable with the results of **Stephen scheidt& Thomas Killip**[69]**, Col & Weinberg**[70] and **Rizzon, Biase& Baissu**s.[71] Stephen scheidt&Thomas Killip have reported an equal incidence of RBBB and LBBB. However some studies have noted a higher incidence of RBBB than LBBB. Two patients with RBBB expired with mortality of 50%. Two patients (2%) in the present study developed left anterior hemiblock (LAHB), which is comparable with 4.7% reported by **James atkins et al.**[72]

Comparison Of St Segment Elevation Myocardial Infarction And Different Types Of Conduction Blocks With Outcome

In the present study distribution of conduction blocks among various sites of ST segment elevation myocardial infarction was studied. Most common site of ST segment elevation myocardial infarction was anterior wall myocardial infarction (n=27). Out of these twenty seven patients, nine (n=9) patients were having first degree heart block, seven (n=7) patients were having Mobitz type 2 AV heart block, six (n=6) patients were having right bundle branch block, three (n=3) patients were having complete heart block, one patient having left bundle branch block another one patient having Mobitz type 1 AV heart block.

Number of ST segment elevation myocardial infarction patients having inferior wall myocardial infarction was twenty four (n=24). Out of these twenty four patients nine (n=9) patients were having first degree heart block, five (n=5) patients were having Mobitz type 1 AV heart block, four (n=4) patients were having complete heart block, two (n=2) patients were having left bundle branch block another two (n=2) patients were having Mobitz type 2 AV heart block.

Number of ST segment elevation myocardial infarction patients having lateral wall myocardial infarction was eight (n=8). Out of these eight patients three (n=3) patients were having left bundle branch block, two (n=2) patients were having first degree heart block and one patient of each complete heart block, right bundle branch block ,left anterior hemi block.

Number of ST segment elevation myocardial infarction patients having anterolateral wall myocardial infarction were five (n=5). Out of those five patients three (n=3) were having Mobitz type 2 AV heart block and one patientof each having left bundle branch block & right bundle branch block.

Number of ST segment elevation myocardial infarction patients having anteroseptal wall myocardial infarction was three (n=3). Out of those three there was one patient of each complete heart block, Mobitz type1 AV and Mobitz type 2 AV heart block.

Number of ST segment elevation myocardial infarction patients having inferoposterior wall myocardial infarction was two (n=2). Out of those two patients there was one patient of complete heart block and one patient of Mobitz type 1 AV heart block.

Number of ST segment elevation myocardial infarction patient having anteroinferior wall myocardial infarction was one (n=1) who had complete heartblock.

In the present study mortality among the ST segment elevation myocardial infarction patients was studied according to type of conduction block. The mortality was only observed in patients with complete heart block (n=8) and firstdegree heart block (n=2). While in all other patients with other conduction blocks improvement was noted. The rate of mortality of patients with complete heart block when compared with the mortality rate of patients with first degree heart blocks, there was significantly (p=0.0031) higher mortality rate observed in patients with complete heart block than first degree heart block.

In a study conducted by **Ratan Ram et al,** The mortality rate among MI patientsin this study is 21%. There were 7 deaths among 17 conduction block patients accounting for 41.2%, and there were 14 deaths among 83 patients with no conduction block accounting for 16.8%. Hence, MI patients with conduction block had higher chance of mortality as compared to non-conduction block MI patients. This finding is found to be statistically significant ($P < 0.05$). This finding is consistent with various studies.

Vijay Kumar et al, in their study observed that Mortality was higher in patientswith blocks (19.1%) as compared to patients without blocks (2.5%). It was significant statistically with p value 0.008.

Vijay Kumar et al, in their study reported that the conduction blocks were significantly more common among patients with inferior wall MI (66.7%) than the anterior wall MI (33.3%) with a p value of 0.016 which was statistically significant. The results are complete with study of**Majumdar AA et al**, which also showed higher incidence of conduction blocks in inferior wall MI patients than anterior myocardial infarction (56.8% and 31.8% respectively).

As per **Vijay Kumar et al,** Conduction blocks were mostly atrioventricular (78.6%) in inferior wall MI where as they were mostly intraventricular (71.4%) with anterior wall MI. These results are complete with the study done by **Majumdar AA et al**, which are 92% and 72% respectively. In our study the mortality rate in patients with complete AV block was 50%, which was higher than that of patients without blocks which was 2.5% and this is comparable to study done by **Goldberg et al,** but is higher than study by **Beher et al**. Among the 4 patients who developed RBBB in the present study, 2 patients expired with a mortality of 50%, which is in concordance with 52% as in **Godman, Lassers& Julian**, but is higher than the results of **Moreno AM et al.**

Mortality pattern according to killip classification

In the present study, we compared the mortality on admission according to Kilipclassification. On admission most number of patients were in killip class 1(62.8%). We observed that there was 100% mortality among Kilip class 3 and4, while in killip class 2 there was 10% mortality and in killip class 1 there was 2% mortality.

Summary

1. In the present study prevalence of ST segment elevation myocardial infarction was significantly (P=0.001) more in males as compared to females. Age of patients ranged from 32 to 110 years with mean age of 60.69 (± 13.41) years.
2. Different symptoms observed among the ST segment elevation myocardial infarction patients in the current study was chest pain (98.57%), sweating (95.71%), dyspnea (50%), vomiting (37.14%) and palpitation (27.14%). The most common symptoms was chest painfollowed by sweating.
3. In the present study hypertension was the most common risk factor being present in twenty seven (38.57%) of ST segment elevation myocardial infarction patients. In the hypertensive patients male (30%) were more than female (8%). Second risk factor was Diabetes mellitus being present in 27.14% (n=19) of ST segment elevation myocardial infarction patients. Third risk factor was smoking present in 21.43% (n=15) of ST segment elevation myocardial infarction patients. All of the smoking patients were male. Only one (n=1) of the ST segment elevation myocardial infarction patient was having cerebrovascular accident as a risk factor which was present in female patient.

4. In the present study among the seventy (n=70) ST segment elevation myocardial infarction patients studied we found different sites of myocardial infarction. Anterior wall myocardial infarction present in 38.57% (n=27) patients, Inferior wall myocardial infarction present in 34.29% (n=24) patients, Lateral wall myocardial infarction present in 11.43% (n=8) patients, Anterolateral wall myocardial infarction present in 7.14% (n=5) patients, Anteroseptal wall myocardial infarction present in 4.28% (n=3) patients, Inferior Posterior wall myocardial infarction present in 2.86%(n=2) patients, anteroinferior wall myocardial infarctionin 1.43%(n=1) patients. The most prevalent sites was anterior wallmyocardial infarction followed by Inferior wall myocardial infarction.
5. In the seventy (n=70) ST segment elevation myocardial infarction patients studied there were eight different types of conduction blocks observed. First Degree heart block present in 28.57% (n=20) patients, Mobitz type 2 AV block present in 20% (n=14) patients, complete heart block present in 17.14% (n=12) patients , Mobitz type 1 AV block present in 11.43% (n=8) patients, Right bundle branch block present in 10% (n=7) patients, Left bundle branch block present in 10% (n=7) patients, Left anterior hemi block present in 1.43% (n=1) patients, andTrifascicular block present in 1.43% (n=1) patients. The most prevalent conduction block was first degree heart block followed by Mobitz type 2AV heart block and complete heart block.
6. In the present study distribution of conduction block was studied according to gender. We found no significant difference in the numbers of each conduction block compared to gender. Though there was no significant difference, the higher number of patients among allconduction blocks were of male gender.
7. In the present study mortality among the ST segment elevation myocardial infarction patients was studied according to type of conduction block. The mortality was only observed in patients with complete heart block (n=8) and first degree heart block (n=2). While in all other patients with other conduction blocks improvement was noted. The rate of mortality of patients with complete heart block when compared with the mortality rate of patients with first degree heart blocks, there was significantly (p=0.0031) higher mortality rate observedin patients with complete heart block than first degree heart block.
8. In the present study, we compared the mortality according to Kilipclassification. We observed that there was 100% mortality among Kilip class 3 and 4, while in class 2 there was 10% mortality.

Our study concludes that the prevalence of ST segment elevation myocardial infarction was significantly more in male. The most common symptom in ST segment elevation myocardial infarction patients was chest pain followed by sweating.

In ST segment elevation myocardial infarction patient‟s the most common site of myocardial infarction was anterior wall myocardial infarction followed by inferior wall myocardial infarction. In the present study most prevalent conduction block was first degree heart block followed by Mobitz type 2 AV block.

High prevalence of mortality was seen in the patients with complete heart block.Thus severity of conduction block is predictor of poor outcome in the ST segment elevation myocardial infarction patients. All patients with ST segment elevation myocardial infarction should be monitored for early recognition of conduction block and appropriate treatment should be started to improve the outcome of patient.

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