

Original Article

Frequency and Types of Bradyarrhythmias in Patients Presenting with Acute Inferior Wall Myocardial Infarction (AIWMI)

Chaudhry Muhammad Kalimullah, Sami Ullah Mumtaz, Somia Iqtadar, Zafar Niaz, Tayyeba Komal, Sajid Abaidullah

Department of Medicine, King Edward Medical University Lahore.

Abstract

Objective: To determine the frequency and types of bradyarrhythmias in patients presenting with acute inferior wall myocardial infarction.

Material & Methods: This Descriptive case series was conducted at accident & emergency and medicine departments, King Edward Medical University, Mayo Hospital Lahore for 6 months from 1st July to 31st December 2017. After ethical approval, total 350 clinically diagnosed IWMI patients of age 30-65 years of either genders presenting in emergency department, with ST segment elevation of >1mm in ECG leads II, III, aVF were included in the study through non-probability, purposive sampling. Patients were assessed on ECG to determine the bradyarrhythmias like sinus bradyarrhythmia, 1st, 2nd& 3rd degree AV blocks developed in patients during 1st 7 days after IWMI. The collected data was analysed statistically by using SPSS version 20.

Results: In the study, the mean age of the patients was noted as 50.12 ± 7.84 years. There were 253 (72%) male and 97 (28%) female patients. Out of 350 patients of IWMI, Bradyarrhythmia were present in 209 (60%) while absent in 141 (40%) patients. Sinus bradycardia was found in 80 (38.3%) patients, 1st degree AV Block was observed in 49 (23.4%) patients, 2nd degree AV Block was observed in 45 (21.5%) patients and 3rd degree AV Block was observed in 35 (16.7%) patients.

Conclusion: It was concluded that frequency of bradyarrythmias is very high among patients of IWMI with the presence of all the major types. Thus, in future we will recommend practitioners & cardiologists to be more careful about better management & clinical outcome.

Keywords: Inferior Wall Myocardial Infarction, Bradyarrhythmias, Sinus Bradycardia, Antero- ventricular Block.

How to cite this:

Kalimullah CM, Mumtaz SU, Iqtadar S, Niaz Z, Komal T, Abaidullah S. Frequency and Types of Bradyarrhythmias in Patients Presenting with Acute Inferior Wall Myocardial Infarction. J Pak Soc Intern Med. 2020;1(1):41-44.

Corresponding Author: Dr. Sami Ullah Mumtaz **Email:** drsummumtaz@gmail.com.

Introduction

Myocardial infarction (MI), commonly known as a heart attack, is an irreversible necrosis of heart muscles secondary to prolonged ischemia.¹ It is the leading cause of death worldwide. Cardiovascular diseases(CVD) cause 12 million deaths throughout the world each year.² In Pakistan, males have three times more risk of developing CVD and MI as compared to females.³ An active and ongoing transmural myocardial injury is shown on ECG by ST-segment elevation in corresponding leads.⁴ Arrhythmias, mechanical complications, left ventricular aneurysm, ventricular septal rupture,

pseudoaneurysm, heart failure are the complications of MI. It may lead to impairment of systolic or diastolic function and to increased predisposition to arrhythmias and other long-term complications.⁵ Of all patients who have an acute Inferior wall MI, about 90% develop some form of cardiac arrhythmia. In 25% of patients, such rhythm abnormalities manifest within the first 24 hours. In this group of patients, the risk of serious arrhythmias, such as ventricular fibrillation, is greatest in the first hour and declines thereafter. The incidence increases with ST elevation STEMI) and decreases with non ST elevation infarction

(NSTEMI).⁶ Sinus bradycardia (SB) is the most common arrhythmia associated with inferior wall MI. It is present in up to 40% of patients in the first two hours, decreasing to 20% by the end of the first day. Occlusion of the left circumflex artery may affect the AV node directly in the 10% of individuals. High (second or third) degree AV block occurs in approximately 9.8% of patients with an inferior wall MI.⁷ One previous study reported that sinus bradycardia (SB) was present in 29.6% cases, first degree atrioventricular block (AV1) was seen in 3.7% cases and second degree atrioventricular block (AV2) in 7.4% cases.⁸ While one latest study reported controversial results and showed that in acute inferior wall MI cases, SB was 0%, AV1 was absent, AV2 was present in 10% cases while AV3 or complete block in 20% cases.⁹ Therefore, in this study, we wanted to confirm the frequency of overall bradyarrhythmias & their proper frequency in local population. This would help to improve our practice as well as guidelines in patients of IWMI who later develop bradyarrhythmias.

Material and Methods

This Descriptive case series study was carried out at Accident & Emergency and Deptt. of Medicine, KEMU/Mayo Hospital Lahore for 6 months, from 1st July to 31st December 2017. After the ethical approval from the hospital committee, 350 consecutive cases of IWMI (with ST segment elevation in II, III avF leads of ECG) of age 30-65 years of both genders were included in the study through non-probability, purposive sampling. Patients with previous history of arrhythmias before MI, history of old (more than a week) or more than one MI & those already on Beta-blockers or Calcium Channel Blockers were excluded from the study. The sample size was calculated with 95% confidence level, 2 % margin of error and taking expected percentage of AV1 block i.e., 3.7% among patients presented with acute inferior wall MI. Informed written consent was obtained from all patients. All information was kept confidential. All basic demographic information of each patient (name, age, sex, address, and contact) was also noted. Patients were assessed on ECG to determine the arrhythmias developed in patients during 1st 7 days after IWMI. Presence of any type of Bradyarrhythmias was labelled as Sinus bradycardia (heart rate <60 beats/min.), 1st degree AV block (If

prolonged PR interval >0.20sec), 2nd degree AV block Mobitz 1 (PR interval is progressively increased unless one P wave is blocked and produced no QRS), 2nd degree AV block Mobitz 2 (AV conduction ratio varies between 2:1 and 3:1) & 3rd degree AV block (variable PR interval with no relation between P-wave and QRS). The collected data was analysed statistically by using SPSS version 20. Quantitative variables like age were presented in form of mean \pm S.D. Qualitative variables like gender, brady arrhythmias and type of brady arrhythmias were presented in form of frequency and percentage.

Results

The mean age of the patients was 50.12 ± 7.84 years with minimum and maximum age values of 35 & 65 years, respectively. There were 253 (72%) males and 97 (28%) females (Fig-1). The male to female ratio was 2.6:1. The mean age of male patients was 50.81 ± 7.88 years with minimum and maximum age values of 35 & 65 years, respectively. The mean age of female patients was 48.32 ± 7.48 years with minimum and maximum age values of 35 & 63 years respectively (Table-1). ECG finding of the patients showed that out of 350 patients of AIWMI, bradyarrhythmia were present in 209 (60%) while absent in 141 (40%) patients. Among male patients, bradyarrhythmias were present in 152 (60.1%) and absent in 101 (39.9%). Among female patients, bradyarrhythmias were present in 57 (58.8%) patients and absent in 40 (41.2%) patients. There was highly insignificant difference between male and female patients (p -value=0.822) (Table-2). Out of 350 patients, bradyarrhythmias were noted in 209 (60%) while 141 (40%) had no bradyarrhythmias (Fig-2). As far as types of arrhythmias were concerned, Sinus bradycardia was

Table-1: Descriptive statistics of age (Years) of both genders.

Age (Years)	Gender	
	Male	Female
n	253	97
Mean age (year)	50.81	48.32
SD	7.88	7.48
Minimum	35	35
Maximum	35	35

found in 80(38.3%) patients, 1st degree AV Block was observed in 49 (23.4%) patients, 2nd degree AV Block was observed in 45 (21.5%) patients and 3rd degree AV Block was observed in 35 (16.7%) patients (**Table 2**).

Table-2: Age distribution and types of bradyarrhythmias.

	Gender		
	Male	Female	Total
Bradyarrhythmias	Present	152 (60.1%)	57 (58.9%) 209 (59.7%)
	Absent	101 (39.9%)	40 (41.2%) 141 (40.3%)
	Total	253 (100%)	97 (100%) 350 (100%)
Types of Bradyarrhythmias			
Sinus bradycardia	41 (16.2%)	9 (9.3%)	50 (14.3%)
1 st degree AV Block	52 (20.6%)	16 (16.9%)	68 (19.4%)
2 nd degree AV block	34 (13.4%)	19 (19.6%)	53 (15.2%)
3 rd degree AV block	25 (9.9%)	13 (13.4%)	38 (10.9%)

Chi-square = 0.050 P-value = 0.822 (Highly insignificant)

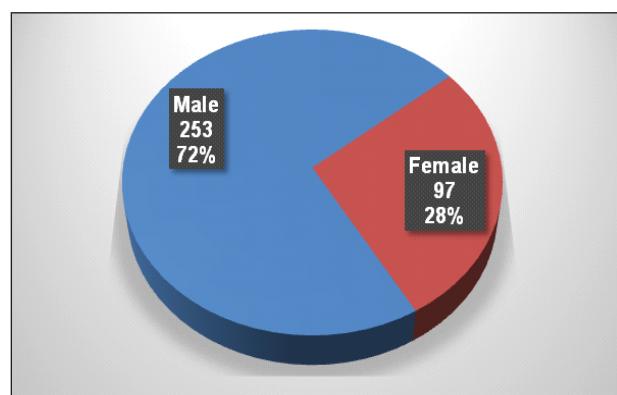


Fig-1: Distribution of gender of the patients.

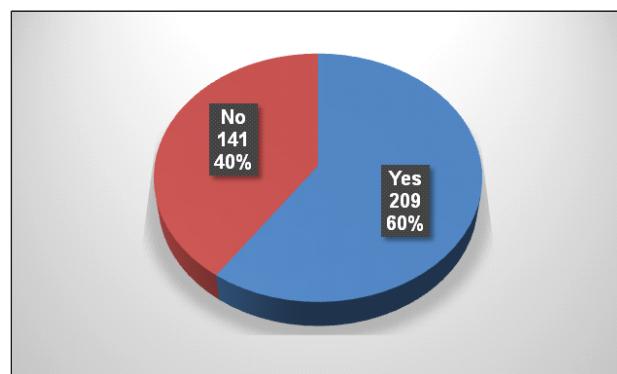


Fig-2: Distribution of Bradyarrhythmias in patients of IWMI.

Discussion

In our study male to female ratio was 2.6:1. Literature also reported that male predominance in the incidence of CVD exists. Females appear to be somewhat protected from atherosclerosis, possibly owing to the effects of estrogen.¹⁰ This male predominance is consistent with a Pakistani study in which 93.1% of the young patients were men.¹¹ Siddique et al, showed that Complete heart block was seen in 9% of patients most and had inferior MI (88.1%), only one patient with anterior MI had complete heart block (11.1%). Second degree block was seen in 4 patients (4%), it was seen only with inferior MI (100 %). First degree AV block was observed in both anterior and inferior wall MI with equal frequency i.e., 50 % each. The overall incidence of high degree AV block was 6.9%; 9.8% with inferior MI and 3.2% with anterior MI.¹²

Zeymeret *et al.*, studied the prognostic impact of Right Ventricular Infarctions (RVI) in streptokinase-treated patients with acute inferior wall MI. They found that patients with inferior wall MI and “small ST” (sum of ST-segment elevations of ≤ 0.8 mm on standard 12-lead ECG) had a very low cardiac mortality regardless of whether RVI (identified by the presence of ST-segment elevation in right precordial lead RV4) was present or not.¹³ Brady WJ *et al.*, showed that Bradyarrhythmias arising in the setting of acute myocardial infarction are common and Sinus bradycardia is one of the most common rhythm disorders related to myocardial infarction, especially in right coronary involvement (about 30%-40%).¹⁴ Meine concluded that AV block occurs in 6-7% of cases of acute myocardial infarction and is 2 to 3 times more commonly associated with inferior than anterior infarction.¹⁵ Clemmensen showed that the incidence of Complete AV Blocks among our patients with inferior myocardial infarction (6.0%) is lower than that in the TAMI (13%) and TIMI (12%) studies.¹⁶

Conclusion

It was concluded that frequency of bradyarrhythmias is very high among patients of IWMI with the presence of all the major types. Thus, in future we will recommend medical practitioners and cardiologists to assess such patients for bradyarrhythmias to prevent them from hazards and for better management & clinical outcomes.

References

1. Pocock S, Bunnemans L, et al. Predictors of one-year mortality at hospital discharge after acute coronary syndromes: A new risk score from the EPICOR (long-term follow up of antithrombotic management patterns In acute Coronary syndrome patients) study. *Eur Heart J: Acute Cardiovasc Care.* 2015;4(6):509-17.
2. Jollis JG, Al-Khalidi HR, Roettig ML, Berger PB, Corbett CC, Dauerman HL, et al. Regional systems of care demonstration project: american heart association mission: Lifeline STEMI systems accelerator. *Circulation.* 2016;134(5):365-74.
3. Dahn CM, Wijesekera O, Garcia GE, Karasek K, Jacquet GA. Acute care for the three leading causes of mortality in lower-middle-income countries: a systematic review. *Int J Crit Illn Inj Sci.* 2018;8(3):117.
4. Thygesen K, Alpert JS, Jaffe AS, Chaitman BR, Bax JJ, Morrow DA, et al. Fourth universal definition of myocardial infarction (2018). *Eno H, Licour M, Medina J, Zhang L, AJ Am Col Cardiol.* 2018;72(18):2231-64.
5. Nicolau JC, Franci A, Barbosa C, Baracioli LM, Franken M, Furtado R, et al. Influence of proven oral therapies in the very old with acute coronary syndromes: A 15 year experience. *Int J Cardiol.* 2015;198(11):213-5.
6. Patel RS, Ghasemzadeh N, Eapen DJ, Sher S, Arshad S, Ko Y-a, et al. Novel biomarker of oxidative stress is associated with risk of death in patients with coronary artery disease. *Circulation.* 2016;133(4):361-9.
7. Reddy K, Khaliq A, Henning RJ. Recent advances in the diagnosis and treatment of acute myocardial infarction. *World J Cardiol.* 2015;7(5):243.
8. Pirzada AM, Zaman KS, Mahmood K, Sagheer T, Mahar SA, Jafri MH. High degree Atrioventricular block in patients with acute inferior Myocardial Infarction with and without Right Ventricular involvement. *J Coll Physicians Surg Pak.* 2009;19(5):269-74.
9. Tippannavar SH, Shekhanawar MS, Gunasheela N. The study of arrhythmias following myocardial infarction occurring within one week. *J Evol Med Dent Sci.* 2012;1(6):1178-86.
10. Zafari AM. Myocardial Infarction. 2019 [cited 2020]; Available from: <https://emedicine.medscape.com/article/155919-overview>.
11. Saleheen D, Frossard P. CAD risk factors and acute myocardial infarction in Pakistan. *Acta Cardiol.* 2004;59(4):417.
12. Siddique MB, Fazal I, Ejaz A, Awan ZI. Frequencies and patterns of arrhythmias in anterior and inferior myocardial infarction. *Pak Armed Forces Med J.* 2009;59(4):450-4.
13. Zeymer U, Neuhaus K-L, Wegscheider K, Tebbe U, Molhoek P, Schröder R, et al. Effects of thrombolytic therapy in acute inferior myocardial infarction with or without right ventricular involvement. *J Am Col Cardiol.* 1998;32(4):876-81.
14. Hayes E. Adenosine receptors and cardiovascular disease. *Cardiovasc Toxicol.* 2003;3(1):71-88.
15. Meine TJ, Al-Khatib SM, Alexander JH, Granger CB, White HD, Kilaru R, et al. Incidence, predictors, and outcomes of high-degree atrioventricular block complicating acute myocardial infarction treated with thrombolytic therapy. *Am Heart J.* 2005;149(4):670-4.
16. Ameur YB, Mghaieth F, Ouchallal K, Hmem M, Terras M, Longo S, et al. Valeur pronostique du bloc auriculoventriculaire du deuxième et du troisième degré au cours de la phase aiguë de l'infarctus du myocarde inférieur. *Ann Cardiol Angéiol.* 2003;52(1):30-3.