

Association of various arrhythmias following acute myocardial infarction within one week with risk factors

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Abstract

Background: In most of the patients during acute myocardial infarction cardiac rhythm disturbances occurs, approximately twenty-five percent have cardiac conduction disturbance within 24 hours following infarct onset. **Aim:** To study the association of various arrhythmias following acute myocardial infarction within one week with risk factors. **Material and Methods:** A total of 100 cases of acute myocardial infarction on clinical, electro cardio graphical and biochemical analysis presented to tertiary care hospital were studied over a period of 2 years. ECG was done and types of arrhythmias were noted. **Results:** Sinus tachycardia (21.05%) was the most common arrhythmia. In patients with DM and hypertension, 93.33% had an arrhythmia. Majority of mortality (33.33%) found in same group DM with hypertension. In patients having hypertension and no DM, 78.04% develops an arrhythmia. 88.46% of smoker patients had arrhythmia; it was found statistically significant. 87.18% alcoholic patients had arrhythmia; it was found statistically significant. 80% of patients with tobacco chewer had arrhythmia; it wasn't found statistically significant. **Conclusion:** Age, sex, addiction and other co-morbid conditions like hypertension, diabetes mellitus and addictions like smoking and alcohol are an important predictor of arrhythmia.

Key Word: Myocardial infarction, arrhythmia, risk factors, mortality

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INTRODUCTION

Coronary artery disease remains the leading cause of death in the industrialized world. Now a days Indians has also show increases in incidence of mortality and morbidity due to myocardial infarction and arrhythmia during period of myocardial infarction contributed to many deaths.¹ In most of the patients during acute myocardial infarction cardiac rhythm disturbances occurs, approximately twenty-five percent have cardiac conduction disturbance within 24

hours following infarct onset. Bradyarrhythmias, supraventricular tachyarrhythmia, ventricular arrhythmias, and atrio ventricular block, almost any rhythm disturbance can be associated with acute myocardial infarction. It was found that some rhythm disturbances in patients with acute myocardial infarction may be related to coronary artery reperfusion during thrombolysis.² To evaluate the incidence and profile of cardiac arrhythmias in relation to age, sex, site of infarction, risk factors in acute myocardial infarction especially during first 48hr as arrhythmias are most likely to be seen around this time is the purpose of this study.³ The prevalence of coronary artery disease in Asian Indians has to be viewed with concern.⁴ Indians are prone to coronary artery disease as at a much younger age than other ethnic groups.⁵ The present study was carried out to study the association of various arrhythmias following acute myocardial infarction within one week with risk factors.

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MATERIAL AND METHODS

In this prospective observational study, 100 cases of acute myocardial infarction on clinical, electrocardiographical and biochemical analysis presented to tertiary care hospital were studied over a period of 2 years. The diagnosis of acute myocardial infarction was based on the Revised Definition of Myocardial Infarction. Study was approved by the ethics committee prior to commencement of data collection. An informed consent was obtained from patients and their close relatives.

Inclusion criteria

- Patients 18 years of age or above admitted in the ICU with acute myocardial infarction.
- Myocardial infarction less than 1 week old.

Exclusion criteria

- Patients less than 18 years of age.
- Cases of Myocardial infarction admitted after 1 week or more.
- Patients with valvular heart disease.
- Known case of arrhythmias.
- Patients with electrolyte imbalance.

A detailed clinical examination plus physical examination was done with special emphasis on the

cardiovascular system. All patients have been evaluated for risk factors like diabetes, hypertension, smoking, tobacco chewing and alcohol.

Investigations

1. 12-lead ECG was taken at admission.
2. ECG - during pre-thrombolysis, thrombolysis and post thrombolysis.
3. ECG- 12 hour, 18 hour, 24 hour, 48 hour and at the time of arrhythmia. [SEP]
4. Multipara monitors were used to monitor the patients for 48 hours and types of arrhythmias were noted if any.
5. Blood CPK MB, Trop I, blood sugar level, lipid profile, KFT.
6. 2D echocardiography and coronary angiography was done wherever possible.

Statistical analysis: Study design- Prospective observational study. The test of significance used between the associations of different characteristics was the Chi square test. The statistical analyses performed using the Statistical Package for Social Science (SPSS) version 21 for Windows. The p-value of < 0.05 was considered statistically significant.

RESULTS

A total number of 100 patients were studied. In our study 68% were males and 32% were females. Majority of patients were in the age group between 51-60 years followed by age group between 61-70 years.

Table 1: Type of MI

Type of MI	Sex		Total
	Male	Female	
Ant wall MI	36	19	55
Inf wall MI	18	6	24
Lat wall MI	6	2	8
Ant lat wall MI	5	4	9
Inf post wall MI	3	1	4
	68	32	

Majority of the patients had (55%) anterior wall infarction, followed by inferior wall infarction (24%). Out of 100 patients with AMI 76 having arrhythmias. Out of 76 patients 55 were males and 21 were females. 80.88% of males having arrhythmia while 65.62% of females having arrhythmia.

Table 2: Specific arrhythmia

Type of arrhythmia	Frequency	Percent
Sinus tachycardia	16	21.05
Sinus bradycardia	13	17.10
VPC	7	9.21
VT	3	3.95
VF	2	2.63
AF	2	2.63
Atrial tachycardia	1	1.32
2nd degree heart block	2	2.63
CHB	2	2.63
CHB+1ST Degree heart block	1	1.32
VPC+1ST Degree heart block	3	3.95
VPC+RBBB	2	2.63

VPC+Sinus tachycardia	10	13.16
VPC+Sinus bradycardia	5	6.58
LBBB	6	7.89
Sinus bradycardia + 1ST Degree heart block	1	1.32
Total	76	100

Sinus tachycardia was the most common arrhythmia. Sinus bradycardia was the second most common arrhythmia. However, VPCs occurred in isolation in 9% of patients but it also occurred along with other arrhythmia like first degree heart block, right bundle branch block, sinus tachycardia, and sinus bradycardia.

Table 3: Arrhythmia Vs Type of Myocardial Infarction

Type of arrhythmia	AWMI	IWMI	LWMI	ALWMI	IPWMI	Frequency
Sinus tachycardia	12	1	1	2	0	16
Sinus bradycardia	1	12	0	0	0	13
VPC	6	0	1	0	0	7
VT	1	1	0	1	0	3
VF	1	0	1	0	0	2
AF	2	0	0	0	0	2
Atrial tachycardia	1	0	0	0	0	1
Second degree heart block	1	1	0	0	0	2
CHB	1	1	0	0	0	2
CHB+first Degree heart block	0	1	0	0	0	1
VPC+first Degree heart block	1	1	0	1	0	3
VPC+RBBB	1	0	1	0	0	2
VPC+Sinus tachycardia	8	1	0	1	0	10
VPC+Sinus bradycardia	2	1	0	1	1	5
LBBB	3	0	2	0	1	6
Sinus bradycardia + first Degree heart block	0	1	0	0	0	1
Total	41	21	6	6	2	76

Sinus tachycardia (75%) found in majority of patients with anterior wall MI. Sinus bradycardia (92.3%) found in majority of patients with inferior wall MI. VPCs found in isolation (85.7%) in combination with sinus tachycardia (80%) of patients with anterior wall MI. Almost 100% mortality seen in patients develops ventricular tachycardia, ventricular fibrillation and complete heart block during the course of AMI. Less mortality seen in patients with VPCs.

DISCUSSION

Studying arrhythmias in hospitalized cases of acute myocardial infarction is an indirect estimate of mortality and assumes significance because true mortality due to acute myocardial infarction is difficult to ascertain in the community due to inadequate reporting and low autopsy rates. Indians show a higher incidence of mortality than other ethnic groups.¹ The risk factors namely age; sex, hypertension, diabetes mellitus, smoking, tobacco chewing, and alcohol were also evaluated in these patients. This study showed myocardial infarction was more common among elderly in accordance to the American Heart Association observation.⁶ This study showed a male preponderance as was observed in the Framingham Heart Study,⁷ is also the same with Boucher *et al.*⁸ The maximum incidence of AMI as seen in this study was in the age group of 51-60 years (38%), followed by 61-70 years (25%), only 11% of cases were below the age group of 40 year age and 16% above the age of 70 years incidence of this study almost compares well with incidence being 85% between 35 and 75 years of age as reported by Martin TC *et al.*⁹ In present study incidence of AMI in males was 68% and in

females was 32% which compares well again with the study done by Martin TC *et al.*⁹ where the incidence was 72% in males and 28% in females. Siddique MB *et al.*,¹⁰ also observed males (67%) predominance over the females (33%); Rajkumar C *et al.*¹¹ also observed males (68%) predominance over the females (32%); Marangmei L *et al.*¹² also observed males (69%) predominance over the females (31%); Mhatre MA *et al.*¹³ also observed males (74%) predominance over the females (26%). The age distribution in this present study ranged from 27 years to 90 years with a maximum number of patients in the age group of 51 to 60 years. There were 38% of patients in this age group. This is comparable with the findings of author Muthuraju N *et al.*,¹⁴ Kumar V *et al.*,¹⁵ which is 31% and 44% respectively. In the present study, 52% of patients were smokers. It correlated with the study conducted by Abidov *et al.*,¹⁶ where 43-47% patients were smokers; Smoking correlated well with the study by Marangmei L *et al.*¹² and Patil PR *et al.*¹⁷ where (47% and 52.9%) were smoker respectively. The Framingham study demonstrated that smokers have a 2-3fold increase in sudden cardiac death in each decade of life at entry

between 30 and 50 years and significantly increases the risk of CAD in this high-risk patients.⁷ In our study, highly statistically significant association was found between smoking and the occurrence of arrhythmia. In our study, 33% were diabetic and in the study conducted by Abidov *et al*¹⁶ 20-24% were diabetic whereas Agrawal S *et al*¹⁸ and Patil PR *et al*¹⁷ where (35% and 36%) were diabetic respectively which correlate with our study. In the present study, 39% of patients consumed alcohol of which 87.18% had an arrhythmia. In a study by Djousse L *et al*¹⁹ it was concluded that there was little association between long-term occasional alcohol consumption and the risk of AF, but a significantly increased in risk of AF among subjects consuming >36 g/day. It is also correlated with the study conducted by Patil PR *et al*¹⁷ where 39.2% were alcoholic and developed arrhythmia in patients of AMI. In the present study, smoking and alcohol were the major risk factors in accordance with Deshpande JD *et al* study.²⁰ It was observed that, 56% of patients were hypertensive of which 82.14% had an arrhythmia. However, in our study no statistically significant association was found between hypertension and the occurrence of arrhythmia. Yildirim A *et al*²¹ concluded that the increased incidence of ventricular premature beats, complex ventricular arrhythmias and the presence of LVH are the major predictors of mortality in hypertensive patients.

Table 4: Comparison of studies for percent of arrhythmia during MI

Studies	Arrhythmias during MI (%)
Aufderheide TP <i>et al</i> ²	90%
Marangmei L <i>et al</i> ¹²	76%
Kumar V <i>et al</i> ¹⁵	78%
Muthuraju N <i>et al</i> ¹⁴	81%
Patil PR <i>et al</i> ¹⁷	90%
Present study	76%

This study is well comparable with Marangmei L *et al*¹² and Kumar V *et al*.¹⁵ In the present study, arrhythmia was detected in 76% of the patients. In a study by Aufderheide TP *et al*,² 90% of patients with acute myocardial infarction have some cardiac rhythm abnormality during the first 24 hours following infarct onset. The present study showed majority of arrhythmias occurred during the first hour of hospitalization. In the study by Aufderheide TP *et al*,² approximately 25% have cardiac conduction disturbance within 24 hours following infarct onset. In the present study, sinus tachycardia occurred in 21.05% of the patients, in a study by Irwin JM (1988)¹²⁰, sinus tachycardia was observed in up to 30% of the patients. Sinus tachycardia was more frequent in anterior wall MI (75%) when compared to inferior wall MI (6%). It is also correlated well with the study by Marangmei L *et al*¹² and Muthuraju N *et al*¹⁴ where (21% and 30%) sinus tachycardia was found respectively. In the present study,

sinus bradycardia was observed in 17.10% of the patients. It is correlated well with the study by Agarwal S *et al*¹⁸ Marangmei L *et al*¹² and Muthuraju N *et al*¹⁴ where (17%; 15% and 15%) sinus bradycardia was found respectively. In the present study, VPCs were observed in 9.21% of the patients when they occurred alone. However, they also occurred in some patients along with other (28.9%) arrhythmias like heart blocks, tachyarrhythmia, and bradyarrhythmia. In a study by Volpi A *et al*,²² approximately 36% of patients with acute myocardial infarction presented with less than one premature ventricular beat per hour in Holter, whereas almost 20% of patients showed frequent (more than 10 premature ventricular beats per hour). In the present study, VPCs were observed in 28.9% of the patients when they occurred alone and long with other arrhythmia. It is correlated well with the study by Marangmei L *et al*¹² and Muthuraju N *et al*¹⁴ where (23% and 20%) VPCs were found respectively. The study done by AV Ghuran and AJ Cann²³ it shows VPC are usually asymptomatic and their presence in the preinfarction period, regardless of frequency and complexity (bigeminy, multiformity etc.) bears no relation to the mortality. AIVR is usually benign and has no adverse effect on mortality. The present study also highlights this aspect. In the present study, 3.9% of patients developed ventricular tachycardia, 2.6% developed ventricular fibrillation 100% mortality seen during the first 48 hours of hospitalization. It is correlated well with the study by Marangmei L *et al*¹² and Muthuraju N *et al*¹⁴ where (7% and 5%) VT was found respectively. In the present study, ventricular fibrillation occurred in 2.6% of the patients. It is correlated well with the study by Kumar V *et al*,¹⁵ Muthuraju N *et al*¹⁴ and Agarwal S *et al*¹⁸ where (2.5%, 3%, and 5%) VF was found respectively. In the present study, patients with ventricular fibrillation found to have 100% mortality. In the present study, total of 4% of patients had supraventricular tachyarrhythmias with AF being 2.6%, and atrial tachycardia in 1.3% case. The incidence of atrial fibrillation very well correlates with the study done by Novaro GM *et al* (2008)¹²⁸ It is correlated well with the study by Muthuraju N *et al*,¹⁴ Mhatre MA *et al*¹³ and Agarwal S *et al*¹⁸ where (2%, 2%, and 1%) AF was found respectively. In the present study 50% mortality was seen in cases with AF. In the present study, first degree heart block along with sinus bradycardia was observed in 1.3%, second degree heart block in 2.6% of the patients, complete heart block present alone in 2.6% of the patients, CHB along with first degree heart block was seen in 1.3% of the patients and associated with first degree heart block and VPC in 3.9%. Sinus bradycardia with first-degree heart block in 1.3%, RBBB, and VPC in 2.6% and LBBB in 7.8% of patients. Archbold RA *et al*²⁴ observed that LBBB and RBBB occurred in 2.4% and 3.6% of the

patients respectively and bifascicular block occurred in 2.9%. A study by Goldberg RJ *et al*,²⁵ showed that in-hospital mortality is significantly higher with anterior wall infarction with complete heart block than with inferior wall myocardial infarction and that complete heart block is twice as common with inferior or posterior wall infarction as with anterior wall involvement. In the present study there is 100% mortality noted in patients with complete heart block and complete heart block plus first degree AV block. In the present study, the majority of patients did not have any arrhythmia during thrombolysis. The commonest arrhythmia during thrombolysis was VPC, followed by sinus bradycardia. In a study by Solimene *et al*,²⁶ reperfusion arrhythmias were observed in 75% patients and consisted of ventricular arrhythmias and/or sinus bradycardia. In the present study, 81.5% of patients with LV dysfunction had arrhythmias. In a study by Ale jandro Macchia *et al*,²⁷ compared to patients with EF >50%, systolic dysfunction patients had higher mortality and sudden death rates. In a study by Yee Guan Yap *et al*,²⁸ in high-risk post-MI patients with LVEF < 40% or frequent VPCs, the risk of arrhythmic deaths was higher than that of non-arrhythmic deaths for up to 2 years.

CONCLUSION

Arrhythmia following AMI is an important cause of mortality and also important prognostic factor in deciding the outcome of the patient and hospital stay. Arrhythmia is very common during the first week of MI, particularly during the first few hours, tachyarrhythmias being more common than bradyarrhythmias. Age, sex, addiction and other co-morbid conditions is an important predictor of arrhythmia. It is more prevalent in the age group for more than 50 years, being more common in males than females with co-morbid conditions like hypertension, diabetes mellitus and addictions like smoking and alcohol.

REFERENCES

- Enas EA, Dhawan J, Petkar S. Coronary artery diseases in Asian Indians: Lessons learnt and the role of lipoprotein – a. Indian Heart J. 1996; 49:25-34.
- Aufderheide TP. Arrhythmias associated with acute myocardial infarction and thrombolysis. Emerg Med Clin North Am. 1998 Aug;16(3):583-600.
- Ghuran AV, Camm AJ. Ischaemic heart disease presenting as arrhythmias. BMB 2001; 59: 193-210.
- Enas EA, Yusuf S, Mehta JL. Prevalence of coronary artery disease in Asian Indians. Am J Cardiol 2001; 88(2): 201-2.
- Janus ED, Postiglione A, Singh RB, Barry Lewis. The modernization of Asia: Implications for coronary heart disease. Circulation 1996; 94:2671-3.
- American Heart Association: Heart and Stroke facts: 1995 Statistical Supplement. Dallas, American Heart Association, 1994.
- Lerner DJ and Kannel WB. Pattern of coronary heart disease morbidity and mortality in sexes : A 26-year follow of the Framingham population. Am Heart J 1986; 111:383.
- Boucher JM, Racine N, Thanh TH, Rahme E, Brophy J, LeLorier J, *et al*; Quebec Acute Coronary Care Working Group. Age-related differences in in-hospital mortality and the use of thrombolytic therapy for acute myocardial infarction. CMAJ 2001;164:1285-90.
- Martin TC, Longhuyzen VH, Bennett B, Peterson S, Beazer C, Thomas CV. The age-specific incidence of admission to the intensive care unit for acute myocardial infarction in Antigua and Barbuda. West Indian Med J. 2007;56(4):326-9.
- Muhammad BS, Fazal I, Ejaz A, Awan ZI. Frequencies and patterns of arrhythmias in anterior and inferior myocardial infarction. Pakistan Armed Forces Med J. 2009;59(4).
- Rajkumar C, Kiran Kumar E, Subhash A, Singh NK, Nagabushana MV, Reddy YJV. A study of arrhythmias in the first week of acute myocardial infarction-an experience of a rural medical college hospital. J Clin Sci Res 2016;5:195-7.
- Marangmei L, Singh SK, Devi KB, Raut SS, Chongtham DS, Singh KB. Profile of cardiac arrhythmia in acute myocardial infarction patients within 48 hours of admission: A hospital based study at RIMS Imphal. J Med Soc 2014;28:175-9.
- Mhatre MA, Sirur FM, Rajpal DR, Shah MR. A clinical study of arrhythmias associated with acute myocardial infarction and thrombolysis. Int J Res Med Sci 2017;5:335-43.
- NDM. The pattern of arrhythmias during first 48 hours of acute myocardial infarction. 2016;1(4):38–40.
- Kumar V, Singh MP, Agrawal PK, Kumar A, Chauhan S. Study of cardiac arrhythmias in acute myocardial infarction within 48 hours. Int J Adv Med 2017;4:103-7.
- Abidov A, Kaluski E, Hod H, Leor J, Vered Z, Gottlieb S, *et al*; Israel Working Group on Intensive Cardiac Care. Influence of conduction disturbance on clinical outcome in patients with acute myocardial infarction receiving thrombolysis (results from ARGAMI-2 study). Am J Cardiol 2004;93:76-80.
- Patil PR, Sait A, Patil DR. A study of the risk factors of various arrhythmias in patients with coronary heart disease. Int J Adv Med 2017;4:1369-73.
- Agarwal S, Singh P, Sikri T, Neki NS. The Study of Arrhythmias in the First Week of Myocardial Infarction. Ann. Int. Med. Den. Res. 2017; 3(1):ME35-ME41.
- Djousse L, Levy D, Benjamin EJ, Blease SJ, Russ A, Larsen MG, *et al*. Long-term alcohol consumption and the risk of atrial fibrillation in the Framingham Study. Am J Cardiol. 2004;93(6):710- 3.
- Deshpande JD, Dixit JV. Risk factors for acute myocardial infarction: a hospital based case control study. health and population: Perspectives and Issues. 2008;31(3):164-9.
- Yildirim A, Batur MK, Oto A. Hypertension and arrhythmia: blood pressure control and beyond. Europace. 2002;4:175-82.
- A Volpi, A Maggioni, MG Franzosi, S Pampallona, F Mauri, G Tognoni. In-hospital prognosis of patients with

- acute myocardial infarction complicated by primary ventricular fibrillation. *N Engl J Med* 1987;317:257-261.
23. Ghuran AV, Cann AJ. Ischaemic heart disease presenting as arrhythmias. *Br Med Bulletin*. 2001;59:193-210.
24. Archbold RA, Sayer JW, Ray S, Wilkinson P, Ranjadayalan K, Timmis AD. Frequency and prognostic implications of conduction defects in acute myocardial infarction since the introduction of thrombolytic therapy. *Eur Heart J* 1998;19(6):893-898.
25. Goldberg RJ, Zevallos JC, Yarzebski J, Alport JS, Gori JM, Chen Z, *et al*. Prognosis of acute myocardial infarction complicated by complete heart block [the Worcester Heart Attack Study]. *Am J Cardiol* 1992;69(14):1135-41.
26. Solimene MC, Ramires JA, Bellotti G, Tranchesi B Jr, Pileggi F. Reperfusion arrhythmias in acute myocardial infarction – fact or coincidence? *International Journal of Cardiology* 1988;20(3):341–351.
27. Ale jandro Macchia, Leventesi G, Franzosi MG, Geraci E, Maggioni AP, Marfis R, *et al*. Left ventricular systolic dysfunction, total mortality and sudden death in patients with myocardial infarction treated with n-3 PUFA. *European Journal of Heart Failure* 2005 ; 7(5): 904-909.
28. Yee Guan Yap, Trinh Duong, Martin Bland, Marek Malik, Christian Torp- Pederson, Lara Kober *et al*. Temporal trends on the risk of arrhythmic Vs non- arrhythmic deaths in high-risk patients after myocardial infarction: A combined analysis from multicentre trials. *European Heart Journal* 2005;26(14): 1385 -1393.

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