International Journal of Advances in Medicine
Patil PR et al. Int J Adv Med. 2017 Oct;4(5):1369-1373
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20174285

Original Research Article

A study of the risk factors of various arrhythmias in patients with coronary heart disease

Puneet Rajendra Patil*, Aamera Sait, Dilip Ratan Patil

Department of General Medicine, ACPM Medical College, Dhule, Maharashtra, India

Received: 19 June 2017
Accepted: 18 July 2017

***Correspondence:**
Dr. Puneet Rajendra Patil,
E-mail: prpatilacpm@gmail.com

ABSTRACT

Background: Complications like arrhythmias, cardiac failure, cerebrovascular and mechanical complications. Among these complications, arrhythmias are the most common complication of acute myocardial infarction. The objective of this study was to study the risk factors of various arrhythmias in patients with coronary heart disease.
Methods: Present study was a hospital based cross sectional study conducted at department of General Medicine of a tertiary care hospital for a period of two years among 102 patients. Detailed history, clinical examination, investigation was done. All patients were followed for one year to assess the outcome among them. All data was entered in the Microsoft Excel worksheet and analyzed using proportions.
Results: Arrhythmias were more common with low ejection fraction (72.73%). The overall mortality was 7.84%. Ventricular fibrillation was seen in 50% of the patients who did not receive thrombolytic therapy. First-degree AV block and second-degree AV block were present in 6.25% and 7.50% respectively and did not affect the mortality while complete heart block was present in 8.75% and mortality rate of 28.57% with right ventricular involvement. Risk factors like smoking, alcohol, hypertension, diabetes mellitus and obesity had higher incidence of arrhythmias but was not found to have any statistical significance ($p > 0.05$). However, patients having multiple risk factors strongly associated with the high mortality in statistically significant manner (p value 0.0006).
Conclusions: Patients with risk factors like smoking, alcohol, hypertension, diabetes mellitus and obesity had higher incidence of arrhythmias. Multiple risk factors increase the incidence of both arrhythmias and mortality (67% mortality with 4 risk factors and 75% mortality with 5 risk factors).

Keywords: Alcohol, Arrhythmias, Diabetes, Risk factors

INTRODUCTION

Patients having acute myocardial infarction (AMI) have elevation of ST segment. There are patients having unstable angina and present with no elevation in the ST segment. They all come under the category of acute coronary syndrome. Many patients presenting with myocardial infarction undergo various complications like arrhythmias, cardiac failure, cerebrovascular and mechanical complications. Cardiac arrhythmias are the most common.[1]

Biochemical and ionic changes can lead to myocardial ischemia. These changes produce abnormalities in the electrical substrate. They can produce the arrhythmias. AMI leads to electrical inactivity.[2]

Studies and authors are of the opinion that even before the patients reach hospital, many of them had developed the arrhythmias of serious nature. Two third of patients with AMI have already developed the cardiac arrhythmia even before they report to the hospital. Even small infarcts can lead to the death of the patient.[3]

Large number of patients with AMI present with some abnormality of cardiac rhythm. It has been observed that 25% patients within 24 hours of AMI show disturbances of cardiac conduction.[4]

Proper studies on these topics are less in India. Especially in the study region, such studies are required. Hence present study was conducted to study the risk factors of various arrhythmias in patients with coronary heart disease.

METHODS

Present study was a hospital based cross sectional study. The study was conducted at Department of General Medicine of a tertiary care hospital. The study was conducted for a period of two years.

Institutional Ethics Committee permission was obtained prior to the beginning of the present study. Informed consent form was used as instructed by the Institutional Ethics Committee. Same form was used to take the informed consent from the study subjects.

Eligibility criteria of the study subjects were decided and accordingly inclusion and exclusion criteria were framed. Patients willing to participate in the present after explaining them the nature of the study, patients able to give the history and cooperative for clinical examination were included in the present study. Patients not willing to participate in the present study even after explaining them the nature of the study were excluded. Also, the patients who were very sick as to give proper history and unable to cooperate for examination and/or investigations were excluded from the present study.

It was possible to include a total of 102 patients from the intensive care units of this tertiary care hospital during the study period of two years given the inclusion and exclusion criteria as decided for the present study after thorough research.

Before the actual start of the data collection for the present study, a well-designed questionnaire was prepared. It was tested on a sample of 10 patients during the pilot study. Based on the experience and again on completion of review of literature, some modifications were incorporated in this questionnaire. The data from these first 10 patients was again collected on the missing parameters. And then the study was continued further.

Thus, the detailed history and clinical examination was recorded in the pre-designed pre-tested study questionnaire for the present study. History pertaining to smoking habits, alcohol consumption habits, history of hypertension, past history of diabetes, history of obesity, and other relevant history was recorded. A detailed and thorough clinical examination was carried out for each and every patient. Special emphasis was given for examination of cardiovascular system. All this clinical examination data was recorded in the pre-designed pre-tested study questionnaire for the present study.

All patients were subjected to routine and special investigations like complete blood picture, fasting blood glucose, blood pressure measurements, complete urine examination, electrocardiogram etc. All this investigation data was recorded in the pre-designed pre-tested study questionnaire for the present study.

All patients were followed for one year to assess the outcome among them. During the follow up period, they were asked to come once in every three months. During the follow up visits, the history pertaining to occurrence of any new complications etc., detailed clinical examination, and investigation if required were carried out. Any patient missing the follow up visit was called over phone and asked to visit the next day.

All data was entered in the Microsoft Excel worksheet and analyzed using proportions. Chi square test as a statistical test was used to study the statistical significance between the variables studied. P value of less than 0.05 was taken as significant statistically.

RESULTS

Table 1 show that the patients with low ejection fraction (< 40%) frequently had arrhythmias (72.73%). Among the patients with ejection fraction of more than 40% the incidence of arrhythmias was found to be 71.43%, which is slightly lesser than those with ejection fraction of less than 40%.

Table 1: Left ventricular ejection fraction and arrhythmia.

Arrhythmia	2D-Echo (EF %)				Total
	< 40%		> 40%		
	Frequency	Percentage	Frequency	Percentage	
No	6	27.27%	8	28.57%	14
Yes	16	72.73%	20	71.43%	36
Total	22	100.00%	28	100.00%	50

Table 2 shows that there was a total of 54 (52.9%) smokers in the study group. Among them the incidence of arrhythmia was 81.5% compared to 75% among non-smokers. But this difference was not found to be statistically significant (p > 0.05).

Table 2: Association of smoking with arrhythmia.

Smoking	Arrhythmia		Total
	Yes	No	
Yes	44 (81.5%)	10 (18.5%)	54 (52.9%)
No	36 (75%)	12 (25%)	48 (47.1%)
Total	80 (78.4%)	22 (21.6%)	102 (100%)

X2 = 0.3061, p = 0.2901 (Not significant).

Table 3 shows that there was a total of 40 (39.2%) smokers in the study group. Among them the incidence of arrhythmia was 75% compared to 80.6% among non-alcoholics. But this difference was not found to be statistically significant (p > 0.05).

Table 3: Association of alcohol consumption with arrhythmia.

Alcohol consumer	Arrhythmia		Total
	Yes	No	
Yes	30 (75%)	10 (25%)	40 (39.2%)
No	50 (80.6%)	12 (19.4%)	62 (60.8%)
Total	80 (78.4%)	22 (21.6%)	102 (100%)

X2 = 0.1851, p = 0.3335 (Not significant).

Table 4 shows that there was a total of 39 (38.2%) hypertensive in the study group. Among them the incidence of arrhythmia was 79.5% compared to 77.7% among non-hypertensive. But this difference was not found to be statistically significant (p > 0.05).

Table 4: Association of hypertension with arrhythmia.

Hypertension	Arrhythmia		Total
	Yes	No	
Yes	31 (79.5%)	08 (20.5%)	39 (38.2%)
No	49 (77.7%)	14 (22.3%)	63 (61.8%)
Total	80 (78.4%)	22 (21.6%)	102 (100%)

X^2 = 0.001911, p = 0.4825 (Not significant).

Table 5: Association of diabetes with arrhythmia.

Diabetes	Arrhythmia		Total
	Yes	No	
Yes	31 (83.8%)	06 (16.2%)	37 (36.3%)
No	49 (75.4%)	16 (24.6%)	65 (63.7%)
Total	80 (78.4%)	22 (21.6%)	102 (100%)

X2 = 0.5494, p = 0.2293 (Not significant).

Table 5 shows that there was a total of 37 (36.3%) diabetics in the study group. Among them the incidence of arrhythmia was 83.8% compared to 75.4% among non-diabetics. But this difference was not found to be statistically significant. (p > 0.05).

Table 6: Association of obesity with arrhythmia.

Obesity	Arrhythmia		Total
	Yes	No	
Yes	26 (81.3%)	06 (18.7%)	32 (31.4%)
No	54 (77.1%)	16 (22.9%)	70 (68.6%)
Total	80 (78.4%)	22 (21.6%)	102 (100%)

X2 = 0.04349, p = 0.4174 (Not significant)

Table 6 shows that there was a total of 32 (31.4%) obese in the study group. Among them the incidence of arrhythmia was 81.3% compared to 77.1% among non-obese. But this difference was not found to be statistically significant (p > 0.05).

Table 7: Distribution of cases with outcome.

Outcome	Frequency	Percentage
Death	08	7.84
Survived	94	92.16
Total	102	100

Table 7 shows that majority of patient's general condition was good within 48 hours of hospitalization while 8 (7.84%) patients expired due to arrhythmic complication.

Table 8: Correlation of type of arrhythmia with death.

Type of arrhythmia	Cases	Number of deaths	Percentage
Ventricular tachycardia	08	06	75
Ventricular fibrillation	04	04	100
Sinus tachycardia	10	02	20
Complete heart block	07	02	28.75
Ventricular premature complex	30	02	6.67

Table 8 shows that in the patients of anterior wall MI, ventricular fibrillation and ventricular tachycardia are the fatal arrhythmias causing highest mortality in these patients. Ventricular tachyarrhythmia like ventricular fibrillation (100%) and ventricular tachycardia (75%) had the highest mortality rate.

DISCUSSION

This present study shows that in anterior wall myocardial infarction (AWMI), majority of patients in whom 2D-Echo was done, had low Left Ventricular ejection fraction (LVEF <40%) (72.73%) while in inferior wall myocardial infarction (IWMI), majority did not have low left ventricular ejection fraction (9%). The patients with low ejection fraction (<40%) frequently had arrhythmias (72.73%) in this study.

In a study by Yap YG et al, 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.[5] In a study by Alejandro Macchia et al 6 in 2005, compared to patients with EF >50%, systolic dysfunction patients had higher mortality and sudden death rates.[6]

In the present study, 52.90% of patients were smokers and 81.48% of those who smokes had arrhythmia. Ngarmukos T et al, identified factors that may affect arrhythmia complications in ACS patients and found that current tobacco use was associated with significantly higher arrhythmic complications.[7]

In the present study, 39.20% of patients consumed alcohol and 66.67% of those who consumed alcohol had arrhythmia. In a study by Djousse L et al, it was concluded that there was little association between long-term moderate alcohol consumption and the risk of AF, but a significantly increased risk of AF among subjects consuming >36 g/day.[8]

In the present study, 38.20% of patients were hypertensive and 79.49% of those had arrhythmia. Yildirir A et al 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.[9]

In the present study, 36.30% of patients were diabetics and 83.78% of those with diabetes had arrhythmia. In the study by Rana JS et al, patients with diabetes are less likely to develop ventricular arrhythmia than patients without diabetes.[10] This difference is because of they compare the incidence of arrhythmias in patients with diabetes on treatment and those of without diabetes.[10]

In the present study, majority of patient's general condition was good within 48 hours of hospitalization while 8 (7.84%) patients expired due to arrhythmic complication. The incidence of mortality is 9.9% in anterior wall MI and 7.3% in inferior wall MI. Ventricular fibrillation (100%), ventricular tachycardia (75%) and complete heart block (28.57%) were the fatal arrhythmias causing highest mortality in patients.

Hreybe H et al, found that overall mortality rate was 9.3%, 11.3% in anterior wall MI and 7.7% in inferior wall MI in their study. They concluded that anterior or lateral MI is a significant predictor of in-hospital death.[11]

Henkel DM et al, studied ventricular arrhythmias after acute myocardial infarction in 2317 patients.[12] They concluded that ventricular arrhythmias after MI are relatively common, particularly among persons with more severe MI and no prior history of coronary disease. Over time, the incidence of VF declined, whereas VT did not change. Ventricular arrhythmia after MI was associated with a 6-fold increase in mortality.[12]

In this study, complete heart block is present in 3% of cases of inferior wall MI with right ventricular involvement. The mortality rate in patients of inferior wall MI with right ventricular involvement associated with complete heart block is 28.57%.

Samadikhah J et al, conducted a study including one hundred seventy patients with the diagnosis of inferior MI with (group 1) and without (group 2) right ventricular involvement to assess the prognostic impact of right ventricular (RV) myocardial involvement in patients with inferior MI.[13] They found that mortality was higher in the patients with inferior infarction extended to the RV (15.3%) as compared to another group (3.5%) without right ventricular involvement, which was statistically significant.[13]

In the present study, patients with multiple risk factors had worse prognosis with high mortality, which was statistically significant with p value 0.0006.

Shabbir M et al, conducted a study on predictors of fatal outcome in acute myocardial infarction.[14] Two hundred and fifty cases were assessed. They assessed various risk factors in their study and concluded that patients with risk factors are more prone to develop complications and have a higher mortality rate. Identification of these risk factors and timely management of complications may reduce mortality.[14]

CONCLUSION

Atrioventricular blocks did not affect the mortality in patients of inferior wall myocardial infarction without right ventricular involvement. In present study, the mortality rate of atrioventricular block is higher (28.57%) in patients of inferior wall myocardial infarction with right ventricular involvement. Patients with risk factors like smoking, alcohol, hypertension, diabetes mellitus and obesity had higher incidence of arrhythmias. Multiple risk factors increase the incidence of both arrhythmias and mortality (67% mortality with 4 risk factors and 75% mortality with 5 risk factors).

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Yadav P, Joseph D, Joshi P, Sakhi P, Jha RK., Gupta J. Clinical profile and risk factors in acute coronary syndrome. Natl J Community Med. 2010;1(2):150-2.
2. Ghuran AV, Camm AJ. Ischemic heart disease presenting as arrhythmias. BMB. 2001;59:193-210.
3. Yesil M. Management of arrhythmias during transportation in patients with acute myocardial infarction. Anatol J Cardiol. 2007;7(1):85-7.

4. Aufderheide TP. Arrhythmias associated with acute myocardial infarction and thrombolysis. Emerg Med Clin North Am. 1998;16(3):583-600.
5. Yap YG, Duong T, Bland M, Malik M, Torp-Pederson C, Kober L, et al. Temporal trends on the risk of arrhythmic versus non-arrhythmic deaths in high-risk patients after myocardial infarction: a combined analysis from multicentre trials. Eur Heart J. 2005;26(14):1385-93.
6. Macchia AJ, Leventesi G, Franzosi MG, Geraci E, Maggioni AP, Marfisi R, et al. Left ventricular systolic dysfunction, total mortality and sudden death in patients with myocardial infarction treated with n-3 PUFA. Eur J Heart Fail. 2005;7(5):904-9.
7. Ngarmukos T, Sriratanasthavorn C, Sansaneevithayakul B, Kasemsuwan P, Kitiporn A S, Yamwong S. Cardiac arrhythmias in thai: acute coronary syndrome registry. J Med Assoc Thai. 2007;90(Suppl 1):58-64.
8. 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.
9. Yildirir A, Batur MK, Oto A. Hypertension and arrhythmia: blood pressure control and beyond. Europace. 2002;4:175-82.
10. Rana JS, Mukam KJ, Nesto RW, Morgan JS, Muller JE, Mittleman MA. Effect of diabetes mellitus and it's treatment on ventricular arrhythmias complicating acute myocardial infarction. Diabet Med. 2005;22(5):576-82.
11. Hreybe H, Saba S. Location of acute myocardial infarction and associated arrhythmias and outcome. Clin Cardiol. 2009;32(5):274-7.
12. Henkel DM, Witt BJ, Gersh BJ, Jacobsen SJ, Weston SA, Meverden RA, et al. Ventricular arrhythmias after acute myocardial infarction: a 20-year community study. Am Heart J. 2006;151(4):806-12.
13. Samadikhah J, Hakim SH, Asl AA, Azarfarin R, Ghaffari S, Khalili A. Arrhythmia and conduction disorders in acute inferior myocardial infarction with right ventricular involvement. Rawal Med J. 2007;32:135-8.
14. Shabbir M, Kayani AM, Qureshi O, Mughal MM. Predictors of fatal outcome in acute myocardial infarction. J Ayub Med Coll Abbottabad. 2008;20(3):14-6.

Cite this article as: 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.