ORIGINAL ARTICLE
FREQUENCY OF SUSTAINED VENTRICULAR ARRHYTHMIAS IN PATIENTS WITH NON-ST SEGMENT ELEVATION MYOCARDIAL INFARCTION AT A TERTIARY CARE HOSPITAL

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Objectives: To determine the frequency of sustained ventricular arrhythmias in Non-ST segment elevation myocardial infarction (NSTEMI) patients.

Methodology: This is a Cross sectional study was done at Chaudhry Pervaiz Elahi Institute of Cardiology, Multan Pakistan from 10th August 2018 to 9th February 2019. We included 170 patients fulfilling the inclusion criteria with diagnosis of NSTEMI presented in department of cardiac emergency were selected. Informed consent was taken. The data was collected on prepared proforma.

Results: In our study   mean age of patients was 50.90+7.25 years. There were 139 (81.76%) male patients and 31 (18.24%) female patients. There were 58 (34.12%) patients who were having diabetes mellitus, 68 (40.0%) patient's having hypertension, 71 (41.76%) patients were smokers, 15 (8.82%) patients were having hypercholesterolemia, and 18 (10.59%) patients who were having positive family history of coronary artery disease (CAD). Sustained ventricular arrhythmias (VA) occurred in 9 (5.29%) patients of non-STEMI.

Conclusion: The incidence of Sustained ventricular arrhythmias in patients of non-ST elevation myocardial infarction (NSTEMI) is 5.29%. The occurrence of such events remains difficult to predict. Cardiac monitoring should be done in all patients to monitor occurrence of such Sustained ventricular arrhythmias in these patients.

Keywords: Non-ST elevation myocardial infarction, ventricular arrhythmia, Cardiac monitoring

INTRODUCTION

Ischemic heart disease (IHD) shares the major portion of morbidity and mortality around the globe. The prevalence of ischemic heart disease is more in males than females. The prevalence of ischemic heart disease is increasing in developing countries now days. Myocardial ischemia due to atherosclerotic coronary artery disease may present itself either as acute myocardial infarction (AMI), unstable angina or stable angina. The mortality rate for myocardial infarction is decreased over the last decade but it still significant.[1]

NSTEMI comprises the majority of acute coronary syndrome (ACS) around the globe despite of improved treatment, mortality is still high. Intervention of NSTEMI is different compared with the door to balloon time approach to STEMI. Patients with NSTEMI are at increased risk of heart rhythm disorders as well as ventricular arrhythmias. Although literature advocates more and frequent ventricular arrhythmias in STEMI patients, their incidence and importance in NSTEMI have not been documented. One study from documented ventricular arrhythmias was 7.6% in NSTEMI.[2] As there is paucity of local data in NSTEMI patients with ventricular arrhythmias we have conducted this study to help for making local protocols with available resources. Therefore, objective of this study was to determine the frequency of sustained ventricular arrhythmias in Non-ST segment elevation myocardial infarction (NSTEMI) patients.

METHODOLOGY

This is a Cross sectional study was conducted at Chaudhry Pervaiz Elahi Institute of Cardiology, Multan. Pakistan from 10th August 2018 to 9th

February 2019 after the approval of institution and CPSP research evaluation unit ref no: CPSP/REU/CRD-2016-101-1375. After verbal consent, we included 170 patients fulfilling the inclusion criteria using non-probability, consecutive sampling with diagnosis of NSTEMI as defined by ECG ST-segment depression or prominent T wave inversion and/or positive biomarkers of necrosis (Troponin I > 0.03ng/ml, troponin T >0.02ng/ml, CK-MB > 25U/L) in the absence of ST-segment elevation. Age between 30-65 years both male and female were included. Patients with STEMI and previous history of infarction, previous history of arterial or venous thrombosis. History of coronary artery bypass surgery and Patients who don't give consent of participation were excluded. After explaining the pros and cons of the study informed consent was taken. The demographics were obtained which included registration number, admission number, gender, age, height and weight and risk factors (diabetes, cigarette smoking, hypertension, family history of heart disease. Relevant baseline investigations were done including cardiac enzymes. Electrocardiography and echo-cardiography was done. Each Patient with NSTEMI enrolled in this study was monitored centrally on cardiac monitor for 3 days and documented sustained ventricular arrhythmias (rhythm disturbance as or more consecutive wide QRS complexes occurring at a rate of more than 120 beats, assessed on ECG or ECG monitor, lasting more than 30 seconds or accompanied by hemodynamic instability requiring cardioversion and originating from the ventricle) on ECG was further interpreted by senior consultant cardiologist to overcome inter-observer bias.

By using SPSS-20 all the data was analyzed. Frequencies and percentage were tabulated for the categorical variables like age groups, gender, diabetes, hypertension, hypercholesterolemia, family history, smoking, pharmacological/electrical cardioversion and sustained ventricular arrhythmias. Effect modifiers like age, gender, family history, smoking, diabetes, hypertension, and hypercholesterolemia were controlled by making stratified tables. Post stratification chi-square test was applied and equal or less than 0.05 p value was taken as significant.

RESULTS

A total number of 170 patients of Non-STEMI were included in this study. The mean age of patients included in this study was 50.90 ± 7.25 years. Minimum age was 30 years and maximum age was 65 years. While mean height was of 162.5 ± 14.6 cm, mean weight was 65.4 ± 10.4 in kg and mean body mass index was 27.8 ± 6.3 kg/m² as shown in Table 1.

Table 1: Distribution of age and body mass index

	Range	Mean
Age (years)	30-65	50.4 ± 7.2
Weight(kg)	48-99	65.4 ± 10.4
Height (cm)	160-170	162.5 ± 14.6
Body mass index (kg/m²)	27-35	27.8 ± 6.3

Number of male patients was higher as compared to female patients in this study. There were 139 (81.76%) male patients and 31 (18.24%) female patients in this study. There were 58 (34.12%) patients who were having diabetes mellitus and remaining 112 (65.88%) patients were not having diabetes mellitus. There were 68 (40.0%) patients who were having hypertension while 102 (60.0%) patients were not having hypertension. There were 71 (41.76%) patients who were having history of smoking. There were 15 (8.82%) patients were having hypercholesterolemia. There were 18 (10.59%) patients who were having positive family history of coronary artery disease (CAD) Cardioversion was done in 09 (5.29%) patients of non-STE myocardial infarction. While in remaining 161 (94.71%) no such event occurred that require electrical or pharmacological cardioversion as shown in Table 2.

Table 2: Distribution of demographic and clinical characteristics of the study sample

	Frequency	Percentage
Gender		
Male	139	81.8%
Female	31	18.2%
Diabetes	58	34.1%
Hypertension	68	40.0%
Smoker	71	41.8%
Positive family history	18	10.6%
Hypercholesterolemia	15	8.8%
Cardioversion	9	5.3%

Sustained ventricular arrhythmias (VA) occurred in 9 (5.29%) patients of non-STEMI, while no Sustained ventricular arrhythmia occurred in remaining 161 (94.71%) patients as shown in Figure 1.
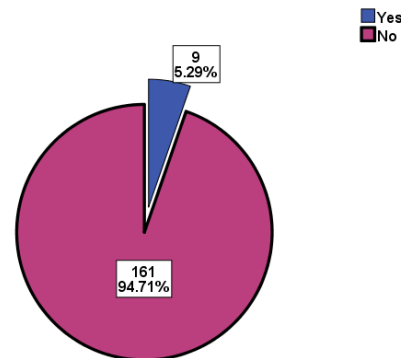

Figure 1: Frequency of Sustained Ventricular Arrhythmias

Stratification of age was performed, in patients having age 30-50 years, VA occurred in 5 patients and in patients having age 51-65 years VA occurred in 4 patients. This difference was not statistically significant with p-value of 0.57. More male patients VA occurred in 7 patients and in only 2 patients in female gender with insignificant p-value of 0.75 .Stratification of patients on the basis of diabetes mellitus was also performed. In patients having diabetes, VA occurred in 1 patient and in patients not having diabetes mellitus, VA occurred in 8 patients (p-value 0.13) Stratification of hypertension was performed, in hypertensive patients, VA occurred in 4 patients and in patients without hypertension VA occurred in only 5 patients (p-value 0.78).Stratification of smoking history was performed. In patients having history of smoking VA occurred in 3 patients and in 6 patients without smoking (p-value 0.59).Stratification of hypercholesterolemia was performed. In patients having hypercholesterolemia, VA occurred in 1 patient and in 8 patients without hyper-cholesterolemia. This difference was not statistically significant with p-value of 0.80.Stratification of positive family history of CAD was performed. In patients having positive family history VA occurred in 2 patients and in 7 patients without positive family history of CAD. Stratification of patients on the basis of cardioversion was also performed. All patients of cardioversion were having ventricular arrhythmia as shown in Table 3.

Table 3: Frequency of Ventricular Arrhythmias by various patients' characteristics

	Ventricular Arrhythmias		P-value
	Yes	No	-
Age in groups			
30-50	5 (6.3%)	74 (93.7%)	0.570
51-65	4 (4.4%)	87 (95.6%)	
Gender			
Male	7 (5%)	132 (95%)	0.750
Female	2 (6.5%)	29 (93.5%)	
Diabetes			
Yes	1 (1.7%)	57 (98.3%)	0.130
No	8 (7.1%)	104 (92.9%)	
Hypertension			
Yes	4 (5.9%)	64 (94.1%)	0.780
No	5 (4.9%)	97 (95.1%)	
Smoker			
Yes	3 (4.2%)	68 (95.8%)	0.800
No	6 (6.1%)	93 (93.9%)	
Positive family history			
Yes	2 (11.1%)	16 (88.9%)	0.240
No	7 (4.6%)	145 (95.4%)	
Hypercholesterolemia			
Yes	1 (6.7%)	14 (93.3%)	0.240
No	8 (5.2%)	147 (94.8%)	
Cardioversion			
Yes	9 (100%)	0 (0%)	0.001
No	0 (0%)	161 (100%)	

DISCUSSION

Sustained ventricular tachycardia may lead to life threatening arrhythmia such as ventricular fibrillation (VF). The important factors in development of VA include LV dysfunction especially ejection function is less than 30%, size and territory involved are also significant. In current era of primary PCI and early frequent availability of thrombolytic incidence is reduced but still significant and major cause of sudden cardiac death.[3] The incidence of VA in patients with NSTEMI patients is lower than STEMI patients. The occurrence of VA after 48 hours is about 60% in with non-ST-elevation myocardial infarction in contrast to ST-elevation myocardial infarction whereas it is 90% within 48 hours.

Number of studies done in context of STEMI to investigate risk factors, incidence and prognosis but few are available for Non-STEMI.[4] In present study the frequency of sustained ventricular arrhythmia was 5.29% in patients of acute Non-STEMI the larger number incidences 7.5%. was seen in GUSTO-III trial this may be because of large pool and they also include STEMI patients in contrast to this figure 2.1% incidence of VA reported in an analytic study of four randomized clinical trials on platelet IIb/IIIa inhibitors in NSTEMI.[5] Majority events occurred predominantly after 48 hours of presentation similar results were seen in study by Jonathan P et all where incidence of was 1.5% (141), 0.6% (55) within 48 hours of presentation vs. 0.9% (86) had VA after 48 hours406 of admission. Similar findings regarding time duration was also seen in sub-analysis of the 'Early Glycoprotein IIb/IIIa Inhibition in NSTEMI' trial in which more than 50% events of VA occurred after 48 hours.[6,7] However 30 day mortality was higher in those who observed VA within 48 hours of admission same findings were in Gupta et al, where VA after 48 hours were one of major factor for prediction of 30-day mortality.[3,8]

Less number of female 22% observed VA in similar to study by Jonathan P et all where it was 29% may be because of less female patients enrolled.[9]

The incidence of VA was significantly associated with higher WBC count, tachycardia, increased BMI, Killip class>1 and increased baseline troponin level. Patients with severe LVEF less than 30% observed more episodes of VT and increase mortality risk at 30-days.[5,10]

NSTEMI patients undergoing early invasive coronary interventions was observed with decrease incidence and better 30 day outcome similar finding in study by Rahimi et al.VA occurred in 2.6% of patients and was

associated with significant decrease mortality because of early invasive coronary intervention.[11]

Timely hospitalization remained important for risk assessment of VA and prevention of sudden cardiac death in patients presenting with NSTEMI. Continuously ECG monitoring of patients with NSTEMI for at least 48 hours after admission is recommended. Patients developing sustained VT in 48 hours are prone to develop VF after and therefore may be evaluated and considered for complete coronary revascularization before discharge as sustained VA are potential risk for in hospital mortality.[12,13] Patients with NSTEMI monitoring for longer period and aggressive treatment is still debatable and usually addressed case by case. Limited availability of beds in CCU and coronary intervention facilities remained big problem in growing number of NSTEMI patients so triage algorithms should determine the most appropriate management for each case.[14]

Some limitations of our study that we excluded prior IHD patients and STEMI patients sample size and single center.

CONCLUSION

The incidence of Sustained ventricular arrhythmias in patients of non-ST elevation myocardial infarction (NSTEMI) is 5.29%. The occurrence of such events remains difficult to predict. Cardiac monitoring should be done in all patients to monitor such sustained ventricular arrhythmias in these patients.

AUTHORS' CONTRIBUTION

AF and NAZ: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. SMB, AA, AWB, and MAS: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

Conflict of interest: Authors declared no conflict of interest.

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