Original Article

Frequency of Ventricular Tachycardia in First 48 Hours of ST-Elevation Myocardial Infarction

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ABSTRACT

ST-elevation myocardial infarction (STEMI) has a poor long-term prognosis associated with early ventricular tachycardia (VT). **Objective**: To find out the frequency of ventricular tachycardia in the first 48 hours of ST-elevation myocardial infarction. **Methods:** After approval from the Hospital ethical committee, the study was conducted in the department of cardiology Hayatabad medical complex Peshawar from 1st October 2020 to 31st March 2021. All the patients having new onset ST-elevation Myocardial infarction as per Operational definition, both genders, aged between 40 and 75 years and who have given consent were included in the study. Non-probability consecutive sampling technique is being used for the sampling. **Results:** Standard deviation was ±1.357 years, while the average age was 51.56. Gender-wise distribution among patients male was 89(53.6%) and female was 77(46.4%). Distribution of duration of disease among patients 12-24 hours 80(48.2%) and more than 24 hours 86(51.8%) was 100(52.4%). Family History of coronary artery disease (CAD) 84(50.6%), diabetes mellitus 93(56.0%), hypertension 110(66.3%) and smoking status was 118(71.1%). Distribution of ventricular tachycardia was present among 103(62.0%) patients and was absent in 63(38.0%) patients. **Conclusions:** Ventricular tachycardia is the most common tachycardia occurring in patients in the first 48 hours who sustained myocardial infarction. It was shown that bradyarrhythmia was more common in patients with inferior wall myocardial infarction while ventricular tachycardia was found to be more in patients with anterior wall myocardial infarction.

INTRODUCTION

Necrosis of myocardial tissue owing to severe prolonged ischemia from coronary artery blockage and blood flow compromise defines acute myocardial infarction (AMI) [1, 2]. While mortality from this cause has decreased somewhat in wealthy countries during the last several years [3, 4]. One-third of all fatalities among those aged 35 and above are still attributable to it. The most recent data from the American Heart Association's (AHA) report on heart disease and stroke statistics shows that 15.5 percent of all Americans aged 20 years and above have coronary heart disease (CHD) [5, 6]. It has been stated that in 2013 ischemic heart disease was the cause of death for 29.0 percent of people in Russia [7]. Illnesses like these are on the rise in Pakistan, say officials at the country's CDC, ischemic heart disorders account for 8% of all fatalities in the country [8]. Even with optimum medical treatment and widespread use of mechanical reperfusion for AMI, the ratio of in-hospital deaths to long-term fatalities is still as high as 7-13%. When compared to non-STEMI (16.3% of deaths in the registry), ST-elevation myocardial infarction (STEMI) causes more fatalities overall (83.7% of deaths in the registry) [9-12]. This mortality further increases when a patient has ventricular tachycardia after acute myocardial infarction. The on-table mortality and 30 days

mortality was higher in the patient who was having early ventricular tachycardia'. Even the 3-year mortality and stent thrombosis are increased in a patient who was having ventricular tachycardia before angioplasty'. Due to major insult to the myocardium, as denoted by ST-segment elevation on ECG, ventricular tachycardia (VT) is common with worse mortality. Its incidence has been presented to be 3.0 to11.6% by different studies". Early VT/VF was detected in 108 (3%) of 3,602 patients with STEMI in the American population ". Patients with STEMI in Denmark had an 11.6% incidence of VF before being transferred to PPCI ". With regard to ST-elevation myocardial infarction, the incidence of VT was 5.7% in the Sweden population [13]. Increased VT incidence is linked to low blood sugar and abnormal serum potassium levels [14]. This study seeks to determine the incidence of ventricular tachycardia (VT) in patients with ST-elevation myocardial infarction (STEMI), since VT is substantially related with higher 3-year rates of mortality. As a result, this would unquestionably help local health experts provide better care for people like these in our community.

METHODS

After approval from the Hospital ethical committee, the study was conducted in the department of Cardiology Hayatabad Medical Complex Peshawar from 1st October 2020 to 31st March 2021. All the patients having new onset ST-elevation Myocardial infarction as per Operational definition., both genders, aged between 40 and 75 years and who have given consent were included in the study. Patients with known cardiac arrhythmias such as chronic atrial fibrillation or Bundle Branch block, as well as those with a history heart failure, congenital heart disease, and ischemic heart disease, or any kind of cardiomyopathies indicated by his/her previous record, were not included in the study. Non-probability consecutive sampling technique was used for sample size calculation. Sample size was calculated using 166 ST-elevation myocardial infarction patients, ventricular tachycardia in ST-elevation myocardial infarction at 5.6%, absolute precision at 3.5%, and a confidence level of 95%. Patients visiting Cardiology OPD or referred through A&E Department to Cardiology Department were enrolled in the study. Written informed consent was also obtained from the patients. Throughout the study, confidentiality was maintained. Demographic data like sex, age, address and contact numbers were taken. The patient was managed as per hospital protocol for his acute myocardial infarction. The modality of treatment like Primary Percutaneous Coronary Intervention, streptokinase injection given or late for kstreptokinase was noted. Patient blood glucose and serum potassium level were also measured in the hospital laboratory at the time of presentation and at the time of ventricular tachycardia if any. Patients were followed up for up to 48 hours of admission. Any ventricular tachycardia observed on ECG as per operational definition was noted in the pro-forma. Any patients lost were excluded from the study. All the information such as age, weight, height, BMI, gender, family history, diabetes mellitus, hypertension, duration of symptoms, smoking status and frequency of VT were noted.

RESULTS

Distribution of ventricular tachycardia was present among 103 (62.0%) patients and was absent among 63 (38.0%) patients. Modality of treatment is shown in Table 1.

Ventricular tachycardias	N (%)
Yes	103 (62%)
No	63 (38%)
modality of treatment	
PCI	57 (34.3%)
Streptokinase	40 (24.1%)
Late for streptokinase	69 (41.6%)
Total	166 (100%)

Table 1: Ventricular tachycardias and modality of treatment (no 166)

Age wise distribution among 166 patients was analyzed as n=40-50 years 26 (15.7%), 51-60 years 37 (22.3%), 61-70 years 39 (23.5%), 70-75 years 64 (38.6%). Table 2 shows the stratification of ventricular tachycardia based on modality of treatment.

Ventricular Tachycardia	Modality of treatment			Total	P-value
	PCI	Streptokinase	Late for streptokinase		
Yes	37(35.9%)	28(27.2%)	38(36.9%)	103	
No	20(31.7%)	12(19.0%)	31(49.2%)	63	0.259
Total	57(34.3%)	40(24.1%)	69(41.6%)	166	

Table 2: Stratification of ventricular tachycardia: * modality of treatment

Mean age was 51.56 years with standard deviation ±1.357. Gender wise distribution among patients male was 89 (53.6%) female was 77 (46.4%). Distribution of BMI classification underweight 66 (34.6%), Normal weight 60 (31.4%), overweight 65 (34.0%). Distribution of duration of disease among patients 12-24 hours 80 (48.2%) and more than 24 hours 86 (51.8%) was 100 (52.4%). Family History of Coronary artery disease (CAD) was 84 (50.6%), diabetes mellitus 93 (56.0%), hypertension 110 (66.3%) and smoking status was 118 (71.1%). Table 4 represents the stratification of ventricular tachycardia based on disease duration.

Ventricular Tachycardia	Duration of Disaese		Total	P-value
	12-24 hours	More than 24 hours		
Yes	54(52.4%)	49(46.6%)	103	
No	26(41.3%)	37(58.7%)	63	0.201
Total	80(48.3%)	86(51.8%)	166	

Table 3: Stratification of ventricular tachycardia: * duration of disease

DISCUSSION

Participants ranged in the age from 29 to 70, with the largest sample size in the age bracket of 51-60. Beamish et al., [15] reported that the largest population in this age group are corroborated by these findings. Patients' mean ages 53.38± 10.22 years, which is consistent with results from the study by Gooding et al. were used in their investigation according to which mean ages was 53 ±10 years [16]. Only 8 of the responses were female, making up only 16% of the total. Arrhythmia after acute myocardial infarction has been studied extensively, and nearly all studies have found a comparable male incidence. Jinnouchi et al found a male preponderance of 70 percent to a female preponderance of 30 percent [17]. Since women in low-income nations like ours face more obstacles to education and health care, this tendency may be skewed toward men. A whopping 76% of patients who completed risk factor analysis were found to have a smoking history. Numerous studies observed that 70% of cases involved smokers, which is consistent with our own data. Eighty percent of the risk factors involved smoking, followed by hypertension (64%). Additional risk factors include a family history of coronary artery disease (18%), obesity (34%), dyslipidemia (38%), and diabetic retinopathy (40%) [16-18]. The prevalence rates of diabetes and hypertension in our study (66%) and in (54%) respectively, are quite close to those reported by the Kim found a similar percentage (36% of patients) to be dyslipidaemic. A majority of our study participants (54% overall) had an anterior wall infarction [19]. Consistent with the findings of Weizman et, al., the incidence of the anterior wall was 56% and that of the inferior wall was 44% [20]. Also, Demidova et al. showed that the incidence of the anterior wall myocardial infarction was 8 times greater than expected (58%) [21]. Sinus tachycardia accounted for 36.8 percent of all arrhythmias in this study. In the present investigation, sinus tachycardia was likewise shown to be the most frequent arrhythmia. Sinus tachycardia, which affects 30% and 31% of patients, respectively, is the most prevalent arrhythmia. Sinus bradycardia was the second most prevalent arrhythmia in this study, with a prevalence of 22.8 percent. 22 percent and 19 percent, respectively, of prevalence rates are consistent with those reported in past investigations. According to recent study ventricular tachycardia was shown to be prevalent in 19.3 percent of cases. In this study,

12.3 percent of births included an ectopic ventricular septum. Similar results were found by Li at el., who found that 17% of individuals had ventricular ectopic [22]. However, other studies, like the one conducted by Gupta et al, have found a much higher AV blockage prevalence, at 15%. Potentially at fault for the disparity is the small sample size of the present investigation [23]. The study found that 5.3% of participants had total AV block. Bhonsale et al both identified about the same percentage of patients with first-degree AV block [24]. There was a significant increase in arrhythmias within the first 12 hours of hospitalization (71.9%). The results of Mayosi et. al., who also noted that the majority of arrhythmias occurred within 12 hours after admission, are consistent with this conclusion [25]. In this study, 87.7% of the patients had arrhythmias on the first day of being admitted. In addition, the bulk of arrhythmias (90%) occurred during the first 24 hours of hospitalization, which is consistent with other study results. The findings of almost all the studies on arrhythmia in AMI were the same: 72% of patients had a full recovery. These figures are quite similar to the seventeen percent and eleven percent that Mayosi et al. found in their study, respectively [26]. Ten percent of patients in the present study encountered acute left ventricular failure, and eight percent went into cardiogenic shock. This slight variation in incidence may be due to the small size of the sample employed in this study. More patients with CHB and VT experienced shock. One patient with anterior MI and VT died during the first 12 hours of admission (2%). According to a study by Saguner et al., 15% of all hospital deaths occur during the first 24 hours of admission; this is especially true in VT and CHB [27]. The study outcomes may have been positive due to the small sample size and excellent CCU treatment for patients with STEMI at BSMMU's University Cardiac Center. Patients with anterior wall myocardial infarctions had more tachyarrhythmias than those with inferior wall infarctions. It is statistically significant (p <0.0001) that there is an association between the location of a myocardial infarction and several types of cardiac arrhythmia. The researchers Mushtaque et al. discovered a connection between the site of the infarction and the subsequent arrhythmias that developed [28]. Results from this study are consistent, with some slight differences, with those from prior studies of arrhythmias in acute STEMI. Potential causes include the following limitations: Single-location studies. The under-sampling of the population might bias the results of the study. The adoption of a purposive sample strategy opened the door to the potential of selection bias.

CONCLUSIONS

Ventricular tachycardia is the most common tachycardia occurring in patients in the first 48 hours who sustained myocardial infarction. It was shown that bradyarrhythmia

was more common in patients with inferior wall myocardial infarction while ventricular tachycardia was found to be more in patients with anterior wall myocardial infarction.

Conflicts of Interest

The authors declare no conflict of interest

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