The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/18.4694

ORIGINAL PROF-4694

ACUTE CORONARY SYNDROME;

FREQUENCY OF DIFFERENT ARRHYTHMIAS IN PATIENTS WITH ACUTE CORONARY SYNDROME DURING FIRST 24 HOURS OF ADMISSION

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Article received on:
01/12/2017
Accepted for publication:
30/03/2018
Received after proof reading:
04/05/2018

ABSTRACT... Introduction: Chest pain is one of the most common presentations to the emergency and cardiology clinics and most serious of these is acute coronary syndrome (ACS) is a life threatening acute emergency.[1] There are a number of complications, which can cause death immediately in patients of ACS which include arrhythmias, cardiogenic shock, progressive heart failure, mechanical cardiac complications and repeat MI.[2-3] **Objectives:** To determine the frequency of different arrhythmias in patients with acute coronary artery syndrome in the first 24 hours of hospitalization. **Study Design:** Cross sectional study. **Period:** 1st July 2016 to 31st January 2017. **Setting:** Department of Cardiology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. **Methodology:** 379 consecutive cases of ACS of either gender, with age range of 30 to 60 years were included. Socio-demographic data and other clinical data was taken. These patients were then attached with ECG monitors in department of cardiology, and ECG was recorded for 24 hours and then the type of arrhythmias if detected (PVCs / AF / VF / non sustained VT / sustained VT / first degree heart block/ second degree heart block/ third degree) and duration of develop arrhythmias was noted according to operational definitions**. Results:** In this study there were total 379 cases out of which 193 (50.92%) were males and 186 (49.08%) females with mean age of 48.80±4.51 years. Arrhythmias were detected in 175 (46.17%) cases. The most common arrhythmia was PVCs seen in 44 (11.61%) out of 379 cases. Arrhythmias affected more to age groups 30-45 years affecting 66 (58.9%) cases with p= 0.002 and those with BMI more than 30 (p= 0.01). The cases with DM and NSTEMI had it more with p= 0.02 and 0.01 respectively. On stratification of different types of arrhythmia, the male gender was significantly associated with sustained VT and female with second degree HEART BLOCK. The age group of 46-60 years was significantly associated with AF and sustained VT. Regarding different type of ACS, NSTEMI as compared to STEMI was found significantly associated with VF, non-sustained VT, sustained VT and third degree heart block with p= 0.0001, 0.02, 0.01 and 0.001. **Conclusion:** Acute coronary syndrome with arrhythmia is a well-encountered complication presenting to the chest pain and coronary care units. Age group 30-45, higher BMI, and DM have significant association with different types of arrhythmias seen in patients admitted with ACS and PVC is the most common arrhythmia seen in ACS.

Key words: ACS, Arrhythmias, CAD, BMI.

Article Citation: Majid A, Babar MZM, Shahzad K. Acute coronary syndrome; frequency of different arrhythmias in patients with acute coronary syndrome during first 24 hours of admission. Professional Med J 2018; 25(5):770-776. **DOI:**10.29309/TPMJ/18.4694

INTRODUCTION

Chest pain is one of the most common presentations to the emergency and cardiology clinics and acute coronary syndrome (ACS) is a life threatening acute emergency.[1] ACS comprises of unstable angina and myocardial infarction (MI) which has two subtype ST segment elevation MI (STEMI) and non-ST segment elevation MI (NSTEMI).

Complications of acute coronary syndrome include, pulmonary edema, rupture of the papillary muscle, left ventricular free wall, and ventricular septum, cardiogenic shock, cardiac arrhythmias and sudden udden death.[2-3] These arrhythmias are associated with multiple underlying cardiovascular risk factors, which include DM, HTN, Hyperlipidemia and increasing age. Both atrial and ventricular arrhythmias may occur in the setting of ACS and can present in

wide variety of patterns. They can manifest as premature ventricular contractions (PVCs), atrial fibrillation (AF),ventricular fibrillation (VF), non-sustained VT, sustained ventricular tachycardia (VT), heart blocks (HB) i.e., first degree heart block, second degree heart block, third degree heart block.[4]

Ventricular tachyarrhythmias and ventricular fibrillation are thought to be the most lethal for the risk of mortality while the atrial fibrillation the most common by a study conducted by Ali et al. A recent study done by Shah et al revealed different arrhythmias in their study in cases of ACS like myocardial infarction within 24 hour of their admission in hospital. Out of these, 36.23% of patients had premature ventricular contractions (PVCs), 15.94% had sustained and non-sustained ventricular tachycardia 2.9% VF, 5.79% AF and amongst HEART BLOCK first degree was in 7.24%, second degree 1.44% and third degree heart block in 1.44% of cases respectively. According to another study the AF was the most common arrhythmia and was found in 12.3% of patients.

This study was done to see the frequency of different arrhythmias in our society with different socio-economic status. The objective of this study was to determine the frequency of different arrhythmias in patients with acute coronary artery syndrome in the first 24 hours of hospitalization.

METHODOLOGY

Study Design
Cross sectional study.

Setting
Department of Cardiology, Sheikh Zayed Hospital, Rahim Yar Khan.

Duration
First July 2016 to 3First January 2017

Sample Size
The sample size was calculated as 379 by keeping the confidence level equal to 95% and the margin of error equal to 1.2% while anticipated prevalence of heart block in 1.44% of cases. [7]

Sampling Technique
Non-probability consecutive sampling.

Inclusion Criteria
Age 30 to 60 years, both gender, **c**ases of ACS according to operational definition

Exclusion Criteria
Electrolyte imbalance (potassium more than 05 mEq/L), case having any pre-existing arrhythmias (i.e. PVCs, VT, VF, AF, HEART BLOCK) documented by history and medical record, any surgical intervention during first 24 hours of admission for ACS, history of any previous heart disease.

Data Collection Procédure
Study was conducted after the ethical approval from Institutional Review Board. Informed verbal consent was taken from each patient for inclusion in this study. Sociodemographic data like age, gender, BMI and other data like DM, HTN, smoking, family history of CAD, dyslipidemias and type of ACS like STEMI (AWMI or IWMI), NSTEMI, angina pectoris were taken and patients were attached with ECG monitors in department of cardiology and arrhythmia was recorded for 24 hours. ECG was done during arrhythmia to document the arrhythmia and then the type of arrhythmias if detected (PVCs / AF / VF / non sustained VT / sustained VT / first degree heart block/ second degree heart block/ third degree heart block) and duration to develop arrhythmias was noted on a predesigned proforma. Data was analyzed with the help of SPSS version 16. Quantitative variables like age, BMI and duration to develop arrhythmias were presented in terms of mean ± SD (Standard Deviation). Frequency & percentages were calculated for gender, DM, HTN, Smoking, family history of CAD, Dyslipidemias, type of ACS, outcome variable that is arrhythmias (Yes / No) and type of arrhythmias detected (PVCs/AF/ VF/non-sustained VT/sustained VT/first degree HEART BLOCK/ second degree HEART BLOCK/ third degree HEART BLOCK). Effect modifier were controlled through stratification of age, gender, BMI, DM, HTN, smoking, family history of CAD, dyslipidemias, type of ACS and time to develop arrhythmias to see the effect on outcome variable (arrhythmia and type of arrhythmia detected).

Post stratification Chi-Square test was applied, taking P-value < 0.05 as significant.

RESULTS

In this study there were total 379 cases out of which 193 (50.92%) were males and 186 (49.08%) females. The mean age and BMI were 48.80±4.51 and 30.19±4.51. Maximum cases were in age group of 46 to 60 year affecting 267 (70.45%) cases (Table-I). There were 163 (43.01%) cases with STEMI and 157 (41.22%) with NSTEMI. Table-I reveals the frequency of various risk factors. Arrhythmias were detected in 175 (46.17%) of cases and out of these 97 (55.43%) cases developed it within first 12 hour of admission. The most common arrhythmia was PVCs seen in 44 (11.61%) out of 379 cases as in Figure-1.

Arrhythmias affected more to age groups 30-45 years affecting 66 out of 112 cases with p= 0.002 and those with BMI more than 30 (p= 0.01). The cases with DM and NSTEMI had it more with p= 0.02 and 0.01 respectively and none of the other confounder found this association as significant. On stratification of different types of arrhythmia, the male gender was significantly associated with sustained VT and female with second degree heart block. The age group of 46-60 years was significantly associated with AF and sustained VT. BMI more than 30 was also significantly associated with third degree heart block. It also reveals the association of risk factors like DM, HTN, smoking, dyslipidemia and family history of CAD. Third degree heart block significantly developed with 12 hours as compared to other variables with p= 0.001 as in table 1. Regarding different type of ACS, NSTEMI was found significantly associated with VF, non sustained VT, sustained VT and third degree heart block with p= 0.0001, 0.02, 0.01 and 0.001.

Variables		Arrhythmias		Total	Significance
		Yes	No		
Gender	Male	92(%)	101	193	p= 0.55
	Female	83	103	186	
Age group	30-45	66	46	112	p= 0.002
	46-60	109	158	267	
BMI	< 30	85	124	209	p= 0.01
	> 30	90	80	170	
HTN	Yes	59	63	122	p= 0.55
	No	116	141	257	
Family history of CAD	Yes	60	70	130	p= 1.0
	No	115	134	249	
Dyslipidemia	Yes	56	62	118	p= 0.74
	No	119	142	261	
DM	Yes	39	67	106	p= 0.02
	No	136	137	273	
Smoking	Yes	56	74	130	p= 0.38
	No	119	130	249	
Duration to develop arrhythmia	< 12 hr	97	104	201	p= 0.38
	> 12 hr	**70**	108	178	
Type of ACS	STEMI	68	95	163	p= 0.01
	NSTEMI	86	71	157	
	UA	21	38	59	

Table-I. Arrhthmias with respect to confounders (n= 379)

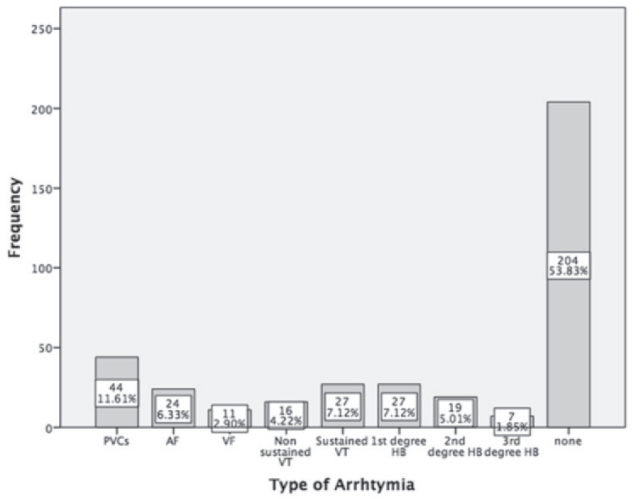

Figure-1. Frequency of different arrhythmias in study population

DISCUSSION

In this study arrhythmias were detected in 175 (46.17%) out of 379 cases with acute coronary syndrome. This was similar to studies done by Aufderheide TP et al that also revealed that in their study, the incidence of arrhythmia was about 50%.[5] However, the study done by Marangmei L et reported as high as 76% of the cases with this.[6] The higher number in their study was due to difference in inclusion criteria and the monitoring of the cases with holter monitoring. They also observed their cases for 48 hour after hospital admission due to acute coronary syndrome as compared to 24 hours in our study.

Arrhythmias affected more males, affecting 92 out of 193 males as compared to 83 out of 186 females (p=0.55) This difference was not found statistically significant in this study. This was similar to study conducted by Marangmei L that showed that there was much higher number of males with these complications as compared to females affecting 69% of males and only 31% of females.[6] However in their study PVCs were the most common type of arrhythmias which was common in males. In the present study second degree heart block was found significantly high in number in males where it was seen in 16 out of 95 cases while sustained VT was significantly high in females with p= 0.002. Similar trend was also observed by other studies; however they did not find any significant association with this.[6-9] The higher number of males can be a part of the main course of the disease with acute coronary syndromes as male gender, smoking, alcohol, stressful life of males are one of the long list of factors that can increase the chances of such complication in male gender as compared to females. On the other hand, the risk of sustained VT in females can be due to late presentation at the hospital as the females in our society are dependent and later presentation can end up in larger area of infarct and hence led to increased chances of sustained arrhythmias.

Arrhythmias also affected more to age groups 30-45 years as compared to 46-60 years and this was surprising to observe with younger age groups over all with p= 0.002. However, AF and sustained VT were significantly higher in older age group while heart block was common in younger age groups. In the past majority of the studies revealed that the cases with higher age had more of the chances to develop arrhythmias; although they did not focus on any specific type with respect to age srtratification.[10-11] The reason of such higher number in older age groups can be due to structural defects in the myocardium and also the prevalence of multiple risk factors that are also part of the older age group. The AF and sustained VT was surprisingly high and it can only be explained by the factor that the cases that had age more, could have multiple or any single infarction before that led to an infracted area that is non healing and served as a focus to generate electrical signals and led to this fibrillation and sustained VT as compared to younger age groups that have good healing capacity and also the lesser degree of risk factors.

Arrhythmias were significantly higher in cases that had BMI > 30 and those who had DM as compared to those who were smokers, had family history of CAD and dyslipidemia. These are the well developed risk factors of ACS and lead to interrupted supply of oxygen to the myocardium.[12-14] As we already know that the every cell of myocardium has the potential to become a pacemaker. So, the cases with these risk factors especially those with having

combination of these had more severe form of disease and hence led to increased number of this complication to develop. In contrast to this the cases with history of HTN, CAD and smoking did not reveal any significant association with any type arrhythmia. This was surprising to see because these are well-established risk factors with ACS and their number is majority of the times higher in cases with these co morbid conditions in previous studies. The reason of non-significant results in this study is un explainable.

Regarding different type of ACS, the arrhythmias were maximum seen in NSTEMI group with p= 0.01. This was also observed by many studies that the arrhythmia has highest chances with myocardial infarction as compared to angina only, which was also seen in this study in the form of STEMI and NSTEMI.[15-17] However the studies have not elaborated the NSETMI and STEMI separately. Both the STEMI and NSTEMI reveal the injury to the myocardium. The STEMI shows an extensive transmural damage and leaving the larger affected area as compared to NSTEMI. But the reason for all cases of NSTEMI suffering from VF, non-sustained and sustained VT and third degree heart block can only be explained by the factors, that the cases with STEMI had typical signs and symptoms and presented earlier and so were managed. In contrast to this the cases with NSTEMI presented relatively late and waiting for investigation to documentation led to more time with ischemia and hence more cases with these arrhythmias.

There was no significant association seen in terms of duration to develop arrhythmias, however it was common in those that presented before 12 hours of the event and amongst them only the third heart block was significantly associated with this. Heart blocks and VT were the most common arrhythmias that were developed within first 12 hours of presentation. This was also consistent and reveals the pathophysiology, that during initial phase of ischemia there are the maximum chances of cells to create active action potential and so was seen that the maximum cases had it, in the first 12 hour of admission. Later on after the management with anti-ischemic drugs, the chances to develop it are relatively uncommon. But the presence of inflammatory tissue and the scar area to serve as a focus for it can explain the presence of other arrhythmias in later duration group.[18-19]

PVCs was the most common arrhythmia affecting 11.61% of cases followed by sustained VT and first degree heart block affecting 7.12% of cases each. This was also observed by studies in the past.[20-22] According to a study by Winkler C et al, the PVCs were seen in 22% of cases.[20] While in other study regarding the sustained and un sustained VT the data was also variable ranging from 1% to 22% as was see in 6-7% with ACS and 22% in CAST in previous studies.[21-22] The variability in this data can be due to variation in inclusion criteria as well the difference in the operational definitions of the VT.

There were many strengths of this study. As, it addressed the wide variety of confounding variables and co morbid diseases to establish the number of arrhythmias in each particular group.

However, there were few limitations too. We did not check the type of myocardial infarction with type of arrhythmia. As the heart blocks are more associated with inferior wall MI as compared to tachyarrhythmias in AWMI.

CONCLUSION

Arrhythmia is a well-encountered complication presenting to the chest pain and coronary care units. Age group 30-45, higher BMI, and DM have significant association with different types of arrhythmias seen in patients admitted with ACS especially NSTEMI as compared to STEMI.

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After a storm always comes the calm.

– Unknown –

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