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Occurrence of Arrhythmias in First Week of Acute Myocardial Infarction and its Correlation with Multiple Risk Factors

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Abstract

Background: CAD a main cause of morbidity and death Serious arrhythmias have been shown to happen often before being admitted to the hospital. The majority of fatalities result from the development of arrhythmias. In patients of Indian beginning, there is scanty information connected with the profile and timing of arrhythmia inside 1-7 days of intense MI. The study focuses on the occurrence of arrhythmias during the first week after an acute myocardial infarction and how various risk variables related to it. **Material and Methods:** Inclusion Criteria are Patient in acute myocardial infarction satisfying the Third Universal Definition of Myocardial Infarction within first week. All the patients above 20 years of age. Exclusion Criteria are Known case of Arrhythmogenic heart disease, Recurrent Myocardial infarction, Valvular Heart disease. **Results:** Mean age, Mean Pulse Mean RR and Mean SPO2 where the mean age was figured out to be 62.78±12.381, 84.45±13.304 and 21.51±7.306 respectively. HTN was the most common in 63 patients, Dyslipidemia in 59.DM and smoking were in 47 and 43 patients. MI was found in the anterior wall for 39 subjects (60%) and found in the inferior wall for 19 subjects (29.29%). 26 were found in ST (40.3%) 3 of them were found in SVT (46%) and only 1 among all the subjects tested was found in VF (1.5%). VPC or ventricular premature complexes present in 7%. **Conclusion:** Males are more prone to having a heart issue pertaining to arrhythmia. Both the anterior and inferior wall seems to be affected and among the multiple risk factors, some of the most common ones were AV blockages, VF, VPC, etc.

Keywords: ST Elevation Myocardial Infarction, Coronary Artery Disease, Acute Coronary Syndrome.

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Introduction

The clinical characteristics of acute coronary syndromes (ACS) can vary, from cardiac arrest to electrical or vasopressor instability with cardiogenic shock (CS) brought on by persistent ischemia or mechanical problems such severe mitral regurgitation. Compared to affluent nations, CAD affects Indians more frequently and at younger ages. It is a main cause of morbidity and death as well as a significant public health issue.[1] Serious arrhythmias have been shown to happen often before being admitted to the hospital. The majority of fatalities result from the development of arrhythmias, and at least 75% of patients with AMI have an arrhythmia in the pre-infarct interval.[2] Within twenty four hrs of the start of AMI, 25% of patients and about 90% of patients with AMI exhibit some form of cardiac rhythm abnormalities. In this case, the first hour following an AMI is when the incidence of significant arrhythmias like ventricular fibrillation (4.5%) is highest and drops quickly after that.[3] Prolonged ischemia in AMI can lead to irreversible myocardial damage and cell death, and it has been demonstrated that if ischemia is quickly reversed, myocardial tissue can be salvaged.

In people, not many examinations have researched the relationship between electrophysiologic irregularities and cardiovascular denervation. Concentrate on bunches were for the most part little and just unambiguous electrophysiologic viewpoints were evaluated. Additionally, clashing outcomes were accounted for, for instance, in regards to an expected relationship between pulse changeability irregularities and the degree of denervated proper myocardium among infarct patients.

By doing so, we aimed to recreate a rapid comparable concentration in patients getting early reperfusion treatment for severe localised myocardial necrosis.

Therapeutic efforts like PCI and thrombolysis are aimed to achieve the restoration of blood flow to ischemic myocardial tissue, termed as 'reperfusion'.[4]

The development of new prediction tools is a necessary step toward more efficient prevention of arrhythmia-related deaths. Decision making regarding reperfusion options-thrombolysis or angioplasty, medical therapy (aspirin, beta blockers, heparin, nitrates etc.) and treating complications (heart failure, shock) are of utmost

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importance. A thought is also there that the outpouring prompting unexpected demise from arrhythmias can be anticipated by specific connections among underlying and utilitarian irregularities. The quest for new apparatuses for expectation, the refinement of the current devices, and the commencement of all around planned mediation preliminaries are the means that should be taken towards the more effective avoidance of unexpected losses from arrhythmias. Sudden cardiac death, which often happens minutes after the beginning of clinical adverse effects, is frequently caused by ventricular fibrillation in the initial stages of AMI. Since VF following AMI develops unexpectedly and quickly, only a limited amount of information is accessible from human tests. Clinical and preclinical antiarrhythmic research should look into novel pharmacological focuses in order to fulfil this unmet clinical demand for such remedial solutions.[5,6]

There is no recorded proof with respect to the profile of such arrhythmias in the current populace. In light of the fact that most heart arrhythmias develop in the first seven days following an AMI, and particularly in the first 24 hours, the goal was to evaluate the rate and profile of heart arrhythmias in AMI during the primary seven-day hospitalisation in a population of 100 patients in a tertiary clinic.[7]

In patients of Indian beginning, there is scanty information connected with the profile and timing of arrhythmia inside 1-7 d of intense MI as well as the elements that expanded the likelihood of such occasions.[8,9]

Methodology

Inclusion criteria

Patient in acute myocardial infarction satisfying the Third Universal Definition of Myocardial Infarction within first week.

All the patients above 20 years of age.

Exclusion Criteria

- Known case of Arrhythmogenic heart disease
- Recurrent Myocardial infarction
- Valvular Heart disease.

RESULTS

[Table 1] the distribution of frequency for Age interval, where 3 subjects were found in 30-40 Year i.e. 4.6%, 9 subjects were found in 41-50 Year i.e. 13.8%, 14 subjects were found in 51-60 Year i.e. 21.5%, 28 subjects were found in 61-70 Year i.e. 43.1% and 11 subjects were found in >70 Year i.e. 16.9%.

Table 1: Representation of Frequency distribution of cases with respect to Age interval

Age Interval	No of Cases	Percentage
30-40 Year	3	4.6
41-50 Year	9	13.8
51-60 Year	14	21.5
61-70 Year	28	43.1
>70 Year	11	16.9
Total	65	100.0

Table 2: Representation of Frequency distribution of cases with respect to Risk factors

Risk Factors	No of Cases	Percentage
HTN	63	96.9
DM	47	72.3
SMOKING	43	66.2
DYSLIPIDEMIA	59	90.8
OBESE	22	33.8

[Table 2] the distribution of frequency for RISK FACTORS, where 63 subjects were found in HTN i.e. 96.9%, 47 subjects were found in DM i.e. 72.3%, 43 subjects were found in SMOKING i.e. 66.2%, 59 subjects were found in DYSLIPIDEMIA i.e. 90.8% and 22 subjects were found in OBESE i.e. 33.8%.

Table 3: Representation of Frequency distribution of cases with respect to vitals

Vitals		No of Cases	Percentage
JVP	Absent	1	1.5
	Normal	64	98.5
EDEMA	Absent	61	93.8

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	Present	4	6.2
CYNOSIS	Absent	64	98.5
	Normal	1	1.5

[Table 3] the distribution of frequency for VITALS, where in JVP 1 subject was found in Absent i.e. 1.5% and 64 subjects were found in Normal i.e. 98.5%, in EDEMA 61 subject were found in Absent i.e. 93.8% and 4 subjects were found in Normal i.e. 6.2% and in CYNOSIS 64 subject were found in Absent i.e. 98.5% and 1 subject was found in Normal i.e. 1.5%.

Table 4: Representation of Frequency distribution of cases with respect to ECG

ECG		**No of Cases**	**Percentage**
MI	Anterior wall mi	39	60.0
	Inferior wall	19	29.2
	Nstemi	7	10.8
ARRYTHMIA	AF	3	4.6
	AV Block	7	10.8
	NIL	11	16.9
	SB	9	13.8
	ST	26	40.0
	SVT	3	4.6
	VF	1	1.5
	VPC	5	7.7
	Total	65	100.0

[Table 4] the distribution of frequency for ECG, where in MI 39 subjects were found in Anterior wall mi i.e. 60.0%, 19 subjects were found in Inferior wall i.e. 29.2% and 7 subjects were found in Nstemi i.e. 10.8% and in ARRYTHMIA 3 subjects were found in AF i.e. 4.6%, 7 subjects were found in AV Block i.e. 10.8%, 11 subjects were found in NIL i.e. 16.9%, 9 subjects were found in SB i.e. 13.8%, 26 subjects were found in ST i.e. 40.0%, 3 subjects were found in SVT i.e. 4.6%, 1 subject was found in VF i.e. 1.5% and 5 subjects were found in VPC i.e. 7.7%.

Table 5: Representation of significant status of mean with variability in MI with respect to lab finding parameters

Lab Findings	**MI**			**P-Value**
	Anterior Wall MI	**Inferior Wall MI**	**NSTEMI**	
HB	13±1.6	13.3±1.2	12.6±1.5	0.541
TLC	11094.4±3610.3	11447.1±3333.2	10020±2858.9	0.650
PLAT	2.2±0.8	1.9±0.8	2.3±0.7	0.346
CREAT	1.2±0.6	1.1±0.4	1.1±0.2	0.441
BIL	1.1±0.2	1.2±0.2	1±0.2	0.316
ALT	38.2±3.5	41.5±4.3	40.3±4.6	0.012
AST	29.2±7.4	28.7±2.3	28.3±1.8	0.899
TSH	9±9.7	15.4±14.7	9±10.5	0.133
HDL	29.1±5.6	29.4±7.5	29.3±8	0.981
LDL	145±44.1	146.3±27.6	136.3±26.4	0.834
TG	249.3±102.1	290.6±91.7	272.4±80.9	0.314
Mg(mEq/L)	1.4±0.6	1.5±0.5	1.5±0.6	0.988
K(mEq/L)	4.2±1	3.7±1.2	4.1±1.4	0.188
AGE	61.8±13	65.2±12.5	61.7±8	0.604

(To compare the Mean of Variables between LAB FINDINGS and MI, we used ANOVA Test)

[Table 5] shows the comparison of Mean of Variables between LAB FINDINGS and MI, The difference in Mean HB were found not significant or important since the P value has been > 0.05 , The difference in Mean TLC were found not significant or important since the P value has been > 0.05, The difference in Mean PLAT were found not significant or important since the P value has been > 0.05, The difference in Mean CREAT were found not significant or important since the P value has been > 0.05, The difference in Mean BIL were found not significant or important since the P value has been > 0.05, The difference in Mean ALT were found significant as the P-value is <0.05, The difference in Mean AST were found not significant or important since the P value has been > 0.05, The difference in MeanTSH were found not significant or important since the P value has been > 0.05, The difference in Mean HDL were found not significant or important since the P value

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has been > 0.05, The difference in Mean LDL were found not significant or important since the P value has been > 0.05, The difference in Mean TG were found not significant or important since the P value has been > 0.05, The difference in Mean Mg(mEq/L) were found not significant or important since the P value has been > 0.05, The difference in Mean K(mEq/L) were found not significant or important since the P value has been > 0.05 and The difference in Mean Age were found not significant or important since the P value has been > 0.05.

Table 6: Representation of association between MI and RISK FACTORS

Risk Factors		MI			p-value
		Anterior Wall MI	Inferior Wall	NSTEMI	
HTN	Yes	38(97.4)	19(100)	6(85.7)	0.16
	No	1(2.6)	0(0)	1(14.3)	
DM	Yes	27(69.2)	15(78.9)	5(71.4)	0.734
	No	12(30.8)	4(21.1)	2(28.6)	
SMOKING	Yes	27(69.2)	11(57.9)	5(71.4)	0.660
	No	12(30.8)	8(42.1)	2(28.6)	
DYSLIPIDEMIA	Yes	35(89.7)	17(89.5)	7(100)	0.670
	No	4(10.3)	2(10.5)	0(0)	
OBESE	Yes	15(38.5)	5(26.3)	2(28.6)	0.620
	No	24(61.5)	14(73.7)	5(71.4)	

The Association was found statistically not significant in HTN, DM, SMOKING, and DYSLIPIDEMIA and OBESE as the P-value is > 0.05 in each of the following. [Table 6]

Table 7: Representation of association between ARRYTHMIA and Age Interval

Age Interval	ARRYTHMIA								p-value
	AF	AV Block	SB	ST	SVT	VF	VPC	NIL	
30-40 Year	0(0)	0(0)	1(11.1)	1(3.8)	0(0)	0(0)	0(0)	1(9.1)	0.95
41-50 Year	1(33.3)	1(14.3)	1(11.1)	5(19.2)	0(0)	0(0)	0(0)	1(9.1)	
51-60 Year	1(33.3)	2(28.6)	2(22.2)	7(26.9)	0(0)	0(0)	1(20)	1(9.1)	
61-70 Year	1(33.3)	2(28.6)	4(44.4)	9(34.6)	2(66.7)	0(0)	3(60)	7(63.6)	
>70 Year	0(0)	2(28.6)	1(11.1)	4(15.4)	1(33.3)	1(100)	1(20)	1(9.1)	
Total	3(100)	7(100)	9(100)	26(100)	3(100)	1(100)	5(100)	11(100)	

(To find the Association between Age Interval and ARRYTHMIA, we used Fixer Exact Test)
[Table 7] shows the Association between Age Interval and ARRYTHMIA, The Association were found statistically not significant as the P-value is > 0.05

Table 8: Representation of association between ARRYTHMIA and EF

EF	ARRYTHMIA								p-value
	AF	AV Block	SB	ST	SVT	VF	VPC	NIL	
20-25	0(0)	0(0)	0(0)	4(15.4)	0(0)	0(0)	1(20)	1(9.1)	0.11
25-30	0(0)	2(28.6)	1(11.1)	5(19.2)	1(33.3)	0(0)	3(60)	2(18.2)	
30-35	2(66.7)	0(0)	0(0)	1(3.8)	0(0)	0(0)	0(0)	0(0)	
35-40	1(33.3)	5(71.4)	4(44.4)	9(34.6)	2(66.7)	1(100)	1(20)	5(45.5)	
40-45	0(0)	0(0)	1(11.1)	1(3.8)	0(0)	0(0)	0(0)	0(0)	
45-50	0(0)	0(0)	3(33.3)	2(7.7)	0(0)	0(0)	0(0)	2(18.2)	
55-60	0(0)	0(0)	0(0)	4(15.4)	0(0)	0(0)	0(0)	1(9.1)	
Total	3(100)	7(100)	9(100)	26(100)	3(100)	1(100)	5(100)	11(100)	

(To find the Association between EF and ARRYTHMIA, we used Fixer Exact Test)
[Table 8] shows the Association between EF and ARRYTHMIA, The Association were found statistically not significant as the P-value is > 0.05.

DISCUSSION

This was a Prospective study conducted in TMU TERTIARY care hospital of UP India in accordance with the department of internal medicine and cardiology.
The study focuses on the occurrence of arrhythmias during the first week after an acute myocardial infarction and how various risk variables relate to it. The mean and standard deviation were taken into account when

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calculating the quantitative data, while the percentage and frequency were determined when examining the qualitative data.

The group of respondents between the ages of 61 and 70 comprised 43.1%. The second highest was the age group of 51-60 years comprised 21.5%, followed by 11 patients in the age group of greater than 70 years (16.9%) and 9 patients (13.8%) in the age group of 41-50 years. Finally, 3 subjects falling in the category of 30-40 years were the least prone to the medical condition, which comprised 4.6%.

Among the total number of patients, 59 were male subjects and only 6 were female subjects.

Mean age, Mean Pulse Mean RR and Mean SPO2 where the mean age was figured out to be 62.78±12.381, where the maximum and minimum were 88 and 32, respectively. The mean pulse was 84.45±13.304, where the maximum number was 110 and the minimum was 40, and the mean RR was 21.51±7.306. In the case of the mean RR, the maximum number was 78 and the minimum number was 19 and finally, the SPO2 was 97.63±1.386, where the maximum was 99 and the minimum was 94.

Among the different issues leading to heart problems, HTN was the most common and was seen in 63 patients, followed by Dyslipidemia, which was seen in 59 patients. The next common reasons were DM and smoking, where 47 and 43 patients showed signs of heart issues due to the respective causes.[10] A total of 64 complaints were related to Chest Pain, which comprised 98.5%. Furthermore, Dyspnea was seen among only 70.8% of subjects, where only 1 subject had issues pertaining to diarrhoea (1.5%), headache (1.5%), 3 subjects had health issues related to heaviness (4.6%), 19 subjects had issues pertaining to palpitation (29.2%), 11 subjects had swearing problems (16.9%) and only 8 subjects were found to have problems regarding vomiting (12.3%).[10]

There was one subject where JVP was absent and was present or normal in the case of 64 subjects. In the case of 61 subjects, EDEMA was found to be absent; however, in the case of only 4 subjects comprising 6.2% of the total 100%, it was present. For the cases of Cyanosis, in 64 patients the symptoms were found to be absent and in the case of 1 subject, it was present, which was 1.5%.[10]

MI was found in the anterior wall for 39 subjects (60%) and found in the inferior wall for 19 subjects (29.29%). Furthermore, there were 7 subjects in which Nstemi was positive and arrhythmia was only positive for 3 subjects who were in the AF state (4.6%). A total of 7 subjects were found in the AV block stage (10.8%) and 11 of them were found to be non-reactive to any of the elements as they were in SB (13.8%). Among all the subjects analyzed, 26 were found in ST (40.3%) and 3 of them were found in SVT (46%) and only 1 among all the subjects tested was found in VF (1.5%). Finally, when it came to analyzing VPC or ventricular premature complexes, only 7% of the patients were found to be positive, that is 5 subjects.[11]

The RWMA comprised 23 subjects, where it was found negative or 35.4% and 42 subjects were found in a positive state that comprised 64.6%, where 6 subjects were in EF state was found in 20-25 patients that comprised 9.2%. 14 subjects were found in 25-30 subjects, which consist of 21.5% and 3 subjects, were found in 30-35 subjects who comprise 4.6%. 28 subjects were found in the 35-40 category 43.1% and 2 subjects were found in 40-45 patients which is 3.1% and 7 subjects were found in 45-50 that makes up 10.8% and 5 subjects were found in 55-60 category that consists of the 7.7% among the 100%.[12]

CONCLUSION

As per the different analysis steps, it was found that males are more prone to having a heart issue pertaining to arrhythmia, which is usually at the onset of heart attacks, where the blood flow to the heart is restricted. DM seems to be the most common set outcome for such heart conditions. Both the anterior and inferior wall seems to be affected and among the multiple risk factors, some of the most common ones were AV blockages, VF, VPC, etc.

REFERENCES

1. Wang C, Pei YY, Ma YH, Ma XL, Liu ZW, Zhu JH, et al. Risk factors for acute kidney injury in patients with acute myocardial infarction. Chin Med J (Engl). 2019;132(14):1660-1665. doi: 10.1097/CM9.0000000000000293.
2. Stanojevic D, Apostolovic S, Stokanovic D, Momčilović S, Jevtovic-Stoimenov T, Salinger-Martinovic S, et al. Galectin-3 in Acute Myocardial Infarction Patients with Atrial Fibrillation. Med Princ Pract. 2019;28(3):284-290. doi: 10.1159/000497611.
3. Oikawa J, Fukaya H, Ako J, Nakao K, Ozaki Y, Kimura K, et al. Risk Factors of In-Hospital Lethal Arrhythmia Following Acute Myocardial Infarction in Patients Undergoing Primary Percutaneous Coronary Intervention - Insight From the J-MINUET Study. Circ Rep. 2019;2(1):17-23. doi: 10.1253/circrep.CR-19-0081.
4. Sattler, S.M., Skibsbye, L., Linz, D., Lubberding, A.F., Tfelt-Hansen, J. and Jespersen, T., 2019. Ventricular arrhythmias in first acute myocardial infarction: epidemiology, mechanisms, and interventions in large animal models. Frontiers in Cardiovascular Medicine, 6, p.158.

ISSN:0975-3583,0976-2833 VOL14,ISSUE05,2023

5. Ursaru, A.M., Costache, I.I., Petris, A.O., Haba, M.S.C., Mitu, O., Crisan, A. and Tesloianu, N.D., 2022. Optimal Timing of Cardioverter-Defibrillator Implantation in Patients with Left Ventricular Dysfunction after Acute Myocardial Infarction. Reviews in Cardiovascular Medicine, 23(4), p.124.
6. SINGH, M., GHAI, M. and RAMAKRISHNAN, S., 2020. A Study of Arrhythmias in First 48 Hours of Acute Myocardial Infarction in a Tertiary Care Hospital. Journal of Clinical & Diagnostic Research, 14(5).
7. Chan, P.Y., Ryan, N.P., Chen, D., McNeil, J. and Hopper, I., 2022. Novel wearable and contactless heart rate, respiratory rate, and oxygen saturation monitoring devices: a systematic review and meta-analysis. Anaesthesia, 77(11), pp.1268-1280.
8. Standring S. Heart and great vessels. In: Gray's Anatomy. 39th ed. London: Elsevier Churchill Livingstone; 2005: 996-1020
9. Chen, X., Zhao, X., Wu, H., Li, L., Yang, D., Si, Y., Wang, F., He, Y., Shou, J., Jiang, Y. and Chu, W., 2022. Association of Nonalcoholic Fatty Liver Disease with Ventricular Tachycardia and Sinus Arrest in Patients with Non-ST-Segment Elevation Myocardial Infarction. International Heart Journal, 63(5), pp.814-820.
10. Oikawa, J., Fukaya, H., Ako, J., Nakao, K., Ozaki, Y., Kimura, K., Noguchi, T., Suwa, S., Fujimoto, K., Nakama, Y. and Morita, T., 2020. Risk Factors of In-Hospital Lethal Arrhythmia Following Acute Myocardial Infarction in Patients Undergoing Primary Percutaneous Coronary Intervention—Insight From the J-MINUET Study—. Circulation Reports, 2(1), pp.17-23.
11. Ursaru, A.M., Costache, I.I., Petris, A.O., Haba, M.S.C., Mitu, O., Crisan, A. and Tesloianu, N.D., 2022. Optimal Timing of Cardioverter-Defibrillator Implantation in Patients with Left Ventricular Dysfunction after Acute Myocardial Infarction. Reviews in Cardiovascular Medicine, 23(4), p.124.
12. SINGH, M., GHAI, M. and RAMAKRISHNAN, S., 2020. A Study of Arrhythmias in First 48 Hours of Acute Myocardial Infarction in a Tertiary Care Hospital. Journal of Clinical & Diagnostic Research, 14(5).