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Original Research Article

COMPARISON OF RISK FACTORS & ANGIOGRAPHIC PROFILES BETWEEN YOUNG PATIENTS WITH ST SEGMENT ELEVATION MYOCARDIAL INFARCTION AND NON-ST SEGMENT ELEVATION MYOCARDIAL INFARCTION

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Abstract

Background: Coronary Heart Disease (CAD) is the one of the major causes of death and disability in India. India is passing through an epidemiological transition from communicable disease into burden of non-communicable disease (NCD).

Methods: The study was a prospective observational study conducted in a tertiary care teaching hospital, located in Coimbatore, Tamilnadu.

Conclusion: The study concluded that young male patients have higher chance of developing MI than female. Tobacco consumption, smoking has found to be involved in the development of the pathology followed by the history of hypertension and diabetes. Smoking /Tobacco consumption was found significantly higher in STEMI group when compared to NSTEMI group.

Keywords: MI, AMI, LAD.

Introduction

Coronary Heart Disease (CAD) is the one of the major causes of death and disability in India. India is passing through an epidemiological transition from communicable disease into burden of non-communicable disease (NCD). Among the NCD, in CAD the country faces the double burden of Myocardial Infraction (NSTEMI) and ST-Segment elevation Myocardial Infraction (STEMI).[1] More exactly this condition often presents with sudden death due to acute coronary syndrome which emphasis on the alarming face of this eminent issue. Though due to advances in the medical advances the mortality rate is declining in the western countries, but there is rise in developing country like India.[2]Risk of CAD among Asian Indians is 3–4 times higher than white Americans, 6 times higher than Chinese, and 20 times higher than Japanese.[1] The acute MI commonly occurs in the elder patients, but in last

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decades it is observed the estimated range of occurrence of MI among the young adults is ranging from 2% to 6%.[3]The INTERHEART study, a collaborative international case control study across 52 countries, reported median age of MI in south Asians was 52 years compared with 62 years in the European cohort.[4]When MI occurs at younger age it not only causes significant morbidity and mortality but also contributes towards Disability-adjusted Life Years (DALY).[5] The extensive angiographic involvement of MI at earlier ages are due to genetic and metabolic factors. Factors like sedentary life style, obesity, tolerance to glucose, hypertriglyceridemia, high lipoprotein A, lower levels of lipoprotein cholesterol (HDL-C), dietary habits, smoking, consumption of alcohol drug abuse has paved a way for early incidence of acute MI in adults.[6]

The young adults present with acute MI show diverse in risk factors, clinical presentation and progress in treatment when compared to elder patients.[7] Certain studies have demonstrated the younger patients with onset of CAD commonly exhibited predominance of single vessel diseases and ascendent of coronary factors like hypercholesterolemia, family history of CAD and smoking.[8]However, there have been very limited data to compare demographic and angiographic characteristics in young patients stratified according to the type of acute coronary syndrome.

Therefore, this study aimed to identify the differences between risk factors profile and coronary and angiographic characteristics of young adults presenting with ST-segment elevation myocardial infarction (STEMI) and non-ST-segment elevation myocardial infarction (NSTEMI).

Material and methods

The study was a prospective observational study conducted in a tertiary care teaching hospital, located in Coimbatore, Tamilnadu

Study Population

The study population comprised of young patients presenting with acute coronary syndrome who shall subsequently undergo coronary artery angiography to evaluate chest pain in ICCU department of Cardiology in a tertiary care teaching hospital over a period 6 months.

Inclusion criteria

1. Both male and female patients who were admitted with STEMI & NSTEMI underwent coronary angiography
2. Age ≤45 years

Exclusion criteria

1. Age >45 year
2. Patient with history & evidence of previous ACS (STEMI/NSTEMI/UA).
3. Past History of PTCA or CABG
4. All patients of valvular heart disease and congenital heart disease.

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5. Concomitant co-morbid conditions (severe liver & kidney diseases)
6. Patient who did not give consent.

Sample size

The adequate required sample size was estimated using following formula n = z2pq / d2 which is calculated as 100 where n = sample size ,z = 1.96 (considering 0.05 alpha, 95% confidence limits and 80% beta) p = assumed probability of occurrence or concordance of results .q= 1 – p and d = marginal error (precession). 50 participants will be randomly included in each group of ST segment elevation Myocardial Infraction and Non -ST segment elevation Myocardial infraction group.

Data collection procedure

After obtaining written consent, the patients were studied for following parameters using the study tools.

The study tools comprised of five sections

(i)General History: The questionnaire comprises age, sex, history of presenting illness, history of hypertension, history of diabetes mellitus and any other significant past history.

(ii)Physical examination: The section includes examination of vitals and systemic examination

(iii)Investigation: The section includes study of echocardiography of each patient according to echo guidelines for acute myocardial infarction and coronary angiogram.

Statistical Analysis

Data was analyzed with Statistical Package for Social Sciences (SPSS -IBM) software version 21. For quantitative variables proportions was calculated. Chi square test and Mann - Whitney test was applied to find the association of risk factors among STEMI and NSTEMI patients. P value of <0.05 was considered significant

Ethical consideration and confidentiality

Institutional Ethical Committee approval was obtained before starting of the study. Confidentiality of study participants was maintained in all the phases of the study.

Results

Majority of the patients belong to 40 to 45 years (38% and 42% in STEMI and NSTEMI respectively) There was no significant difference in age between the groups. (Table 1). Male predominance was seen in both STEMI (78%) and NSTEMI (76%). The gender distribution between the group was not statistically significant (Table: 1)

Table 1: Profile of the study participants

Variable	STEMI		NSTEMI		P value
	N	%	N	%	
Age (Years)					
25 to 29	7	14	5	10	
30 to 34	10	20	10	20	

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35 to 39	14	28	14	28	
40 to 45	19	38	21	42	0.933
Gender					
Male	39	78	38	76	
Female	11	22	12	24	0.812

Chi square test is applied. P<0.05 is considered as significant

Table 2: Risk factors distribution in the study participants

Variable	**STEMI**		**NSTEMI**		**P value**
	N	**%**	**N**	**%**	
Hypertension	27	54	29	58	0.687
Diabetes	14	28	23	46	0.062
Smoking	31	62	26	52	0.313
Tobacco chewing	34	68	17	34	0.001*
Alcohol	30	60	24	48	0.229

* Chi square test is applied. P<0.05 is considered as significant

There was significant difference in the involvement of LAD, LMCA and LCX between STEMI and NSTEMI patients (Table 3)

Table 3: Vessel involvement in the study participants

Involved vessel	**STEMI**		**NSTEMI**		**P value**
	N	**%**	**N**	**%**	
LAD	39	78	27	54	0.011*
LMCA	0	0	4	8	0.041*
LCX	16	32	28	56	0.016*
RCA	33	66	27	54	0.221

*Chi square test is applied. P<0.05 is considered as significant

Table 4 shows that non critical coronary artery lesion and SVD involvement has statistically significant difference between the STEMI and NSTEMI group.

Table 4: Number of Vessel involvement in the study participants

Number of involved vessels	**STEMI**		**NSTEMI**		**P value**
	N	**%**	**N**	**%**	
Normal	1	2	5	10	0.092
Non critical	0	0	5	10	0.022*
LM	0	0	4	8	0.041*
TVD	6	12	4	8	0.505

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DVD	12	24	11	22	0.812
SVD	31	62	21	42	0.045*

*Chi square test is applied. P<0.05 is considered as significant

Table 5 depicts that normal EF was seen among 6% in STEMI and 60% in NSTEMI patients. The mean EF was 43.28 ± 7.75 and 51.62 ± 7.62 respectively in STEMI and NSTEMI patients. 100% of STEMI patients and 76% of NSTEMI patients had presence of RWMA. It was statistically significant.

Table 5: Echocardiograph findings in the study participants

Ejection fraction	STEMI		NSTEMI		P value
	N	%	N	%	
Normal	3	6	30	60	
Mild	21	42	13	26	
Moderate	26	52	7	14	<0.001*
Mean ± SD	43.28 ± 7.75		51.62 ± 7.62		<0.001*
Presence of RWMA	50	100	38	76	<0.001*

* Mann -Whitney test applied. P<0.05 is significant

57%, 56%, 54%, 51% and 37% of the study participants had history of smoking, hypertension, alcohol consumption, tobacco chewing and diabetes respectively (Fig:1)

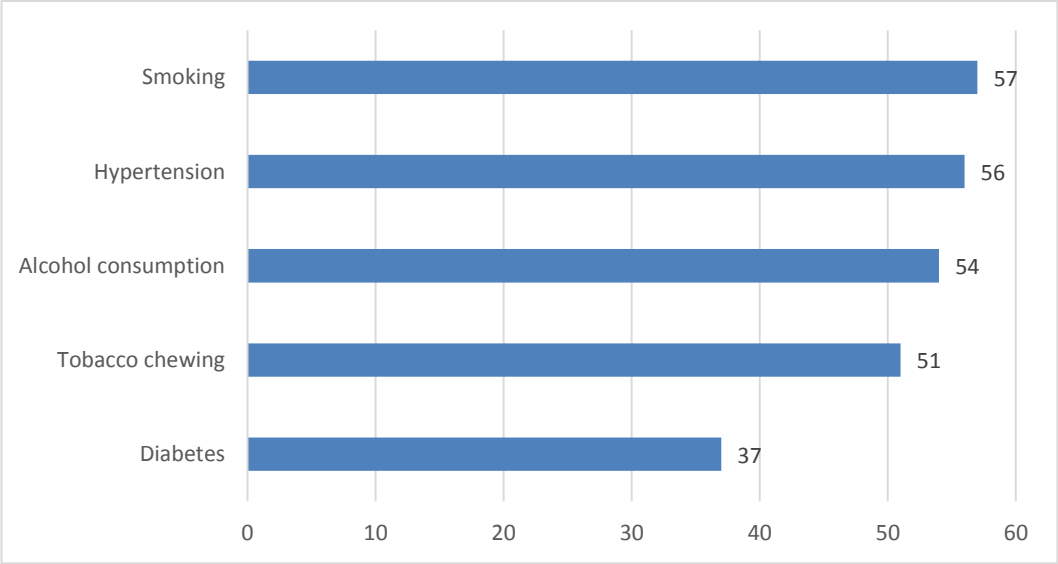

Fig 1: Diagram showing risk factors distribution among the study participants

Majority of the study participants had involvement of LAD (66%), followed by RCA (60%), LCX (44%) and LMCA (4%). (Fig:2)

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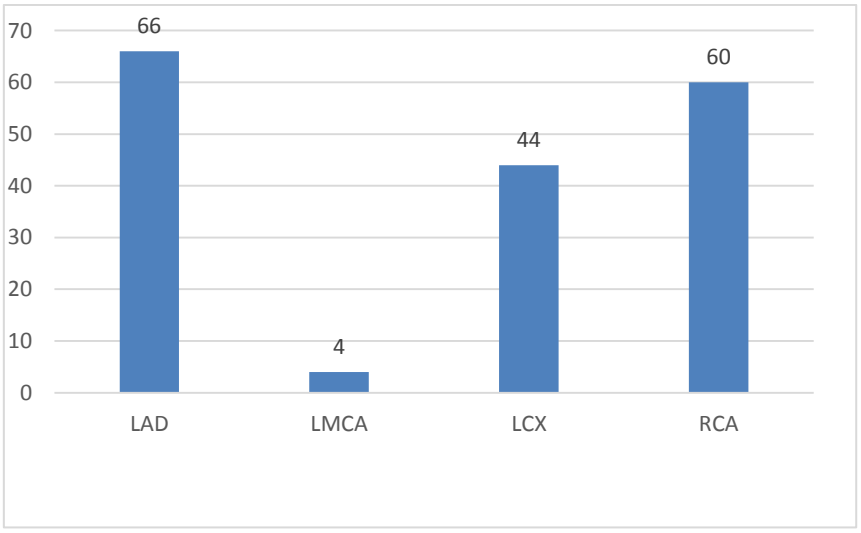

Fig 2: Diagram showing vessels involved in the patients

SVD, DVD, TVD, LM was found in 52%, 23%, 10% and 4% respectively. 6% had normal coronary artery and 5% had non critical coronary artery lesions. (Fig:3)

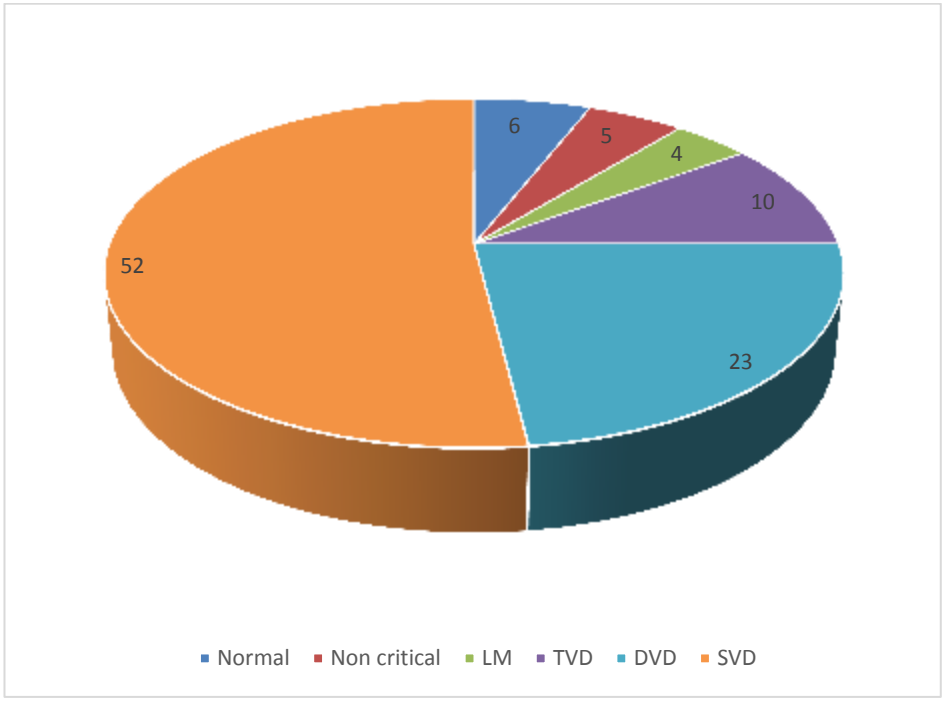

Fig 3: Pie chart depicting number of vessels involved

Discussion

This study was conducted to assess the risk and angiographic factors among STEMI and NSTEMI young patients. 100 study participants were included in this study The study population was divided into two groups and studied. There were 50 participants in STEMI and 50 participants in NSTEMI group. In the current study, the highest prevalence of STEMI (38%) and NSTEMI (42%) was found in 40 to 45 years of age and there was no statistical significance was found in age difference. Similar result was observed by Yunyun et al where

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mean age of incidence of STEMI was 40 years of age.[9] Madder et al reported in last two decades there is a 47-fold increase in incidence of MI among the age group between 40 to 45 years of age.[10] Murut et al observed in his study that, Castelli risk index (CRI) 1 and 2 were found to higher in the younger age group when compared to the elder patients.[11] The study also demonstrated that there are no significant difference outcomes in the one year follow up between the younger and elder patients. In the study, the distribution of male has higher incidence of STEMI (78%) and NSTEMI (76%) when compared to females and there was no statistical difference was found. This shows young male have higher odds of developing MI when compared to the females. The finding was consistent with the INTERHEART which revealed the incidence of MI 9.7% higher in Asian male and 4.4% of Asian female when compared to European population.[4] Similar observation was noted in Jaipur Heart Watch (JHW) where the prevalence of MI was 80.4% among the male when compared to the females.[12] Wang et al found male sex as an important risk factor for in developing MI.[13] Androgens has shown negative correlation with the incidence, androgen levels which peaks at age 20-24 years and then decline gradually which is significantly reduced in atherosclerotic patients which can cause heart disease and predict AMI. [14] The lifestyle of younger adults like sedentary work, stress, smoking, alcohol, overeating and obesity can cause change in internal environment like coronary spasms, broken plaque resulting in acute blockage.[15] In the current study, among the distribution risk factors smoking /tobacco chewing was found to be major risk factors in contributing MI followed hypertension, diabetes and alcohol. Smoking /tobacco consumption was 62% and 68%in STEMI group and 52% and 34% in NSTEMI group. Diabetes Mellitus was found in 28% in STEMI group and 46% in NSTEMI group. Hypertension was found in 54% in STEMI group and 58% in NSTEMI group. This result was concurrent the study of Haque et al where smoking was found to be common risk factors in young adults.[16] Malik et al showed similar results as smoking as most common risk factor for the aetiology.[17] There was statistical association tobacco usage and incidence of STEMI and NSTMI. INTERHEART study revealed 92% of young individuals with CAD were smokers.[4] Murut et al reported smoking cessation can greatly reduce the risk of AMI and quitting can reduce the risk of death by 90% and also demonstrated rate of smoking is higher in younger adults than elder which explains the importance of smoking cessation for the prevention of early MI.[11] These results validate the findings of previous works which shows association with smoking and MI. The study also demonstrated hypertension and diabetes mellitus as next common risk factors in STEMI and NSTEMI patients and found statistical association. CURES 38 (Chennai Urban and Rural Epidemiological Study) showed glucose intolerance as predicable indicator of metabolic syndrome and cardiovascular risk.[18] Murut et al explained in his study that glucose intolerance and metabolic syndrome as an important risk index in cardiovascular risk outcome.[11] The study conducted by Deora et al showed hypertensive, diabetes and obese patients were significantly higher in STEMI group when compared to NSTEMI group.[19] Song et al showed diabetes mellitus (31.65 vs 25.1%), hypertension (54.4%vs 46.1%) and dyslipidaemia(28.2%vs18.2%) in STEMI and NSTEMI group which is similar with the current study.[20] In the study, Left Anterior Descending Artery (LAD) was the commonest artery in involved in STEMI (78%) and NSTEMI (54%) which was statistically significant. Similarly, Merut el al reported the commonest artery involved is

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LAD (58.1%) in young than compared to elderly.[11] The study also observed the thrombus load was significantly higher in younger individuals than in elderly and hence this result attributed to the fact that younger patients are more prone for thrombus formation. Similar results of thrombus formation load were observed by the study of Shalby et al.[21] Doera et al has observed similar results as LAD involvement were common among STEMI group while LMCA and LCX involvement were common among NSTEMI group of patients and the difference was not found statistically significant.[19]

Khan et al also demonstrated the commonest vessel involved in the pathology is LAD (66.7%) followed by RCA (48%) and LCX (41.5%). LMCA was not found in STEMI group but 4.6% had LMCA in STEMI group which was concurrent with the current study.[8] In the current study, 32% showed involvement of LCX ($p<0.018$) in STEMI group and 56% involvement in NSTEMI similar result was observed in the study of Khan et al[8] where 28.6% and 55.4% involvement of LCX in STEMI and NSTEMI group respectively which was found statistically significant ($p<0.05$).

In the current study SVD was significantly higher in STEMI group (62%) when compared to NSTEMI(42%) which was found statistically significant. ($p<0.045$). Deora et al study found that SVD (56.6%) was significantly higher in STEMI group.[19] Khan et al showed higher prevalence of SVD involvement in younger patients followed by DVD (31.3%), TVD (14.8%) and LMCA (2.2%).[8] This result was concurrent with other studies conducted by Malik et al, Haque et al.[17,16] In the current study, while observing echocardiography results normal EF was found in 6% patients in STEMI group and 60% in patients in NSTEMI. The mean EF of STEMI patients was 43.28 ± 7.75 and 51.62 ± 7.62 in NSTEMI patients. 100% patients had RWWA in STEMI group and 76% in NSTEMI group. The association was found statistically significant. The study conducted by Deora et al also showed similar results.[19] Similarly, Khan et al showed 100% RWWA in STEMI and 61.5% RWWA in NSTEMI group which was also found statistically significant.[8]

Conclusion

The study concluded that young male patients have higher chance of developing MI than female. Tobacco consumption, smoking has found to be involved in the development of the pathology followed by the history of hypertension and diabetes. Smoking /Tobacco consumption was found significantly higher in STEMI group when compared to NSTEMI group. The involvement of LAD is significantly higher in STEMI group when compared to NSTEMI patients. The frequency of SVD and involvement of LAD has statistical significance in young STEMI patients when compared to NSTEMI. Hence from the inference from the study it is important to identify the modifiable risk factors among the young age and prevent the incidence of AMI. Complex coronary artery lesion was found in NSTEMI patients than STEMI, hence earlier intervention has to be advocated to prevent the coronary risk factors and special intervention at primary and secondary prevention.

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