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"COMPARISON OF ACUTE MYOCARDIAL INFARCTION RISK FACTORS IN YOUNG AND ELDERLY PATIENTS- A CLINICO-EPIDEMIOLOGY STUDY"

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ABSTRACT

Acute myocardial infarction (AMI) in young adults is typical as regards risk factors, clinical, angiographic and prognostic characteristics. In young people the risk factor pattern is different from older people. In the present study, we compare and study the clinical presentation, treatment and outcome in young and elderly AMI patients. Total number of 511 AMI patients enrolled and divided into two groups (Group I- ≤45 years old and Group II- >45 years old). The standardized questionnaire was filled seeking information of clinical presentation at hospital admission, in-hospital management, and in-hospital prognosis. A total number of 123 patients were younger than 45 years. The symptom of Killip Class IV (p=0.02), history of hypertension (p=0.02), previous history of coronary artery disease (CAD) (p=0.003) and overweight (p=0.0001) was significantly higher in young patients. The habit of smoking was about four times significantly higher among the subjects of Group I than Group II (RR=3.91, 95%CI=2.31- 6.62, p=0.0001). This study concludes that young patients with AMI differ from older patients in their clinical presentation, past medical history, and outcome.

KEYWORDS: **Acute myocardial infarction; Smoking; Hypertension; Diabetes; Killip class**

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INTRODUCTION

Although coronary heart disease (CHD) primarily occurs in patients over the age of 40, younger men and women can also be affected. Most studies have used an age cut- off of 40 to 45 years to define "young" patients with CHD or acute myocardial infarction (AMI). The same age-definition will be used in this study. AMI has a peculiar presentation in the young population with specific etiopathogenic, anatomic, and prognostic characteristics that differentiate these patients from the elderly[1-4.] The concept that AMI is not common in young individuals is based on the fact that it occurs in only 4 to 8% of this population[1,2]. Despite the relatively low frequency of myocardial infarction in the young population[5], the potential for death and long-term disability make this entity an important clinical problem. There is scarcity of study concerning the risk factors and prognosis in young AMI patients. Though patients aged 45 years or less account for only a minor proportion of all patients with AMI, the young patient is of particular interest considering the years of potential life lost. We therefore evaluate the clinical presentation, treatment and outcome of patients aged 45 years and younger who were admitted with an AMI and their comparison with older patients.

SUBJECTS AND METHODS

(i) Patients selection

This is a prospective cohort study of patients admitted with AMI to the intensive care unit of Cardiology Department, King George's Medical University, India. According to the presence of the pathological Q wave in at least 2 contiguous leads, AMI was classified as "Q- wave" and "non-Q-wave" myocardial infarction[6]. In regard to its electrocardiographic location, acute myocardial infarction was classified as[6] (i) anterior (septal, anterolateral, high lateral, extensive location) - alteration in 1 or more of the following lead groups: V1-V3; V4-V6; D1 and AVL; (ii) inferior (inferior, inferolateral, inferodorsal, laterodorsal, inferolaterodorsal location) - alteration in one or more of the following lead groups: D2, D3, AVF; D1, AVL; V5 and V6; V7 and V8; (iii) undetermined – normal electrocardiogram or with left bundle-branch block. Inclusion criteria of the patients were - patients of age 45 or <45 with the diagnosis of AMI established in the presence of at least 2 of the following criteria: a) clinical: report of pain in the anterior thoracic location, b) electrocardiographic c) enzymatic criteria: high level troponine T. Electrocardiograms were performed on hospital admission, after the initial treatment, at the emergency department. Blood samples were collected at the beginning of hospital admission and every 6 hours until normalization of the plasma enzymatic levels. Patients with at least one of the following conditions were excluded: AMI during or following any surgical procedure; AMI in patients undergoing heart transplantation; patients with congenital cardiac or vascular malformations admitted to the hospital 48 hours after AMI symptom onset.

(ii) Data Collection

After taking the ethical clearance from the institute's ethical committee, the standardized questionnaire was filled in the presence of physician. It seeks information regarding previous medical history, clinical presentation at hospital admission, in-hospital management, and in-hospital prognosis. Cardiovascular risk factors were defined as follows: dyslipidemia, hypertension and/or diabetes was considered, if the patient was treated for dyslipidemia, hypertension and/or diabetes or if it was previously diagnosed by a primary care physician according to guidelines[7,8]. A family history of CAD was considered present, if a first-degree relative younger than 60 years had CAD; overweight was defined as body mass index (BMI) ≥25 kg/m^2. Error rate was 0% for therapeutic interventions and 0%–0.9% for baseline characteristics. Patients who were taking tobacco in any form (bidi, cigarette, khaini, gul, gutkha, hukka, pan etc.) was considered under tobacco consumption category. A written informed consent was taken from all participants recruited in the study.

(iii) Lipid Profile estimation

Estimation of blood Plasma glucose was done by GOD-POD method (Randox Laboratories Ltd., Antrim, UK) and Serum Lipid profile were done by enzymatic method (Randox Laboratories Ltd., Antrim, UK). Low density lipoprotein (LDL) was calculated by Friedewald equation[9]

LDL= TC-(HDL+VLDL)

(iv) Measurements

Patients were analyzed after stratification into 2 age groups (≤45 and >45). We measured differences in the clinical presentation, such as pain or signs of heart failure, and in the cardiovascular risk factors. We analyzed differences in the use of reperfusion therapies, including primary PCI (PCI, Percutaneous coronary intervention, was termed primary, when it constituted the initial reperfusion strategy and was performed within 24 h of symptom onset) or thrombolysis for the subgroup of patients with STEMI (ST- elevation myocardial infarction), and early PCI (defined as PCI within the first 24 h after hospital admission) in patients with Non-STEMI.

(v) Statistical analysis

The results are presented in mean±SD and percentages. The dichotomous/categorical variables were compared by Chi-square/Fisher exact test. The continous variables were compared by using unpaired t-test. The relative risk with its 95% confidence interval (CI) was calculated to find the association between the groups and dichotomous variables. The p-value<0.05 was considered significant. All the analysis was carried out by using SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

Five hundred and eleven patients with AMI were enrolled for this study. Only 123 patients (24.07%) were younger than 45 years. Baseline characteristics of young patients as compared to patients aged 45 years and older are shown in Table 1.

Table 1

Distribution of the acute myocardial infarction patients according to gender and dietary habit

	Group I (≤45 years) (n=123)		Group II (>45 years) (n=388)		Chi-square	p- value
	No	%	No	%		
Gender						
Male	109	88.6	345	88.9	0.01	0.97
Female	14	11.4	43	11.1		
Dietary habit						
Vegetarian	68	55.3	129	33.2	19.14	**0.001***
Non-vegetarian	55	44.7	259	66.8		

Significant

The male and female ratio was similar in both the groups. The vegetarian (55.3%) subjects were higher in Group I than Group II (33.2%) and this difference was statistically significant (p=0.001) (Table-1). The symptom of Killip Class IV was significantly higher among the subjects of Group I (13.8%) compared with Group II (7.2%) (RR=1.66, 95%CI=1.10-2.50, p=0.02). None of the other symptoms were different (p>0.05) between the groups (Table-2).

Table 2
Clinical presentation of acute myocardial infarction Patients at the time of admission

	Group I (≤45 years) (n=123)		Group II (>45 years) (n=388)		Chi-square	p- value
	No	%	No	%		
Chest pain	94	76.4	294	75.8	1.03 (0.71-1.47)	0.88
Killip Class I	92	74.8	285	73.5	1.05 (0.73-1.50)	0.76
Killip Class II	10	8.1	45	11.6	0.73 (0.41-1.31)	0.28
Killip Class III	4	3.3	30	7.7	0.47 (0.18-1.20)	0.08
Killip Class IV	17	13.8	28	7.2	1.66 (1.10-2.50)	**0.02***
Dyspnea	18	14.6	90	23.2	0.64 (0.40-1.01)	0.06
STEMI	84	68.3	230	59.3	1.35 (0.96-1.89)	0.07
NSTEMI	40	32.5	158	40.7	0.76 (0.54-1.06)	0.10

Significant, RR- relative risk, STEMI- ST elevation myocardial infarction, NSTEMI- Non ST elevation myocardial infarction

The habit of smoking was about four times significantly higher among the subjects of Group I than Group II (RR=3.91, 95%CI=2.31-6.62, p=0.0001). The history of hypertension (RR=1.44, 95%CI=1.05-1.98, p=0.02) and previous history of CAD (RR=1.79, 95%CI= 1.25-2.57, p=0.003) were also significantly higher among the subjects of Group I compared with Group II. The percentage of overweight was significantly (p=0.0001) higher in Group I (56.1%) compared with Group II (33%) (Table-3).

Table 3
Personal and post medical history of acute myocardial infarction patients

	Group I (≤45 years) (n=123)		Group II (>45 years) (n=388)		Chi-square	p- value
	No	**%**	**No**	**%**		
Smoking	109	88.6	231	59.5	3.91 (2.31-6.62)	**0.0001***
Diabetes	27	22.0	90	23.2	0.94 (0.65-1.37)	0.77
Hypertension	42	34.1	93	24.0	1.44 (1.05-1.98)	**0.02***
Previous history of CAD	23	18.7	35	9.0	1.79 (1.25-2.57)	**0.003***
Family history of CAD	15	12.2	61	15.7	0.79 (0.49-1.28)	0.33
Overweight	69	56.1	128	33.0	2.03 (1.49-2.77)	**0.0001***

Significant, RR- relative risk, CAD- coronary artery disease

Table-4 presents the comparison of biochemical parameters between the groups. LDL and HDL were significantly (p<0.05) higher among the subjects of Group I than Group II. However, TG was significantly (p<0.05) lower among the subjects of Group I than Group II (Table-4).

Table 4
Comparison of lipid profile parameters in acute myocardial infarction patients

	Group I (≤45 years) (n=123)	Group II (>45 years) (n=388)	Chi-square	p- value
Sugar (mg/dl)	133.49±61.74	133.80±60.29	0.04	0.96
TC (mg/dl)	210.12±61.35	212.79±59.57	0.43	0.66
LDL (mg/dl)	155.07±40.33	132.35±36.78	5.82	**0.0001***
HDL (mg/dl)	54.63±24.51	47.53±18.07	3.46	**0.001***
TG (mg/dl)	179.84±76.60	193.20±60.46	1.99	**0.04***

Significant, TC- total cholesterol, LDL- low density lipoprotein, HDL- high density lipoprotein, TG- triglycerides

DISCUSSION

There is a relative paucity of information concerning the clinical features, natural history, and prognosis in young patients with AMI. Despite the relatively low frequency of myocardial infarction in the younger population[10], the potential for death and long-term disability makes this entity an important clinical problem. A number of studies have examined the epidemiologic features and the coronary arterial anatomy in young adults with evidence of coronary heart disease, and angiographic studies have demonstrated less extensive coronary artery disease than in older patients[11-15]. We hyphothesized, therefore, that young patients with myocardial infarction should have not only different presenting features, but also a more favorable early and late prognosis than their older counterparts. Accordingly, in the present study, we divided a large group of patients with AMI into subsets defined by age to examine in detail differences in risk factors, clinical features, morbidity, and mortality. From our study it has been shown that there are significant differences between the younger patients and the patients above 45 years. These differences are on their clinical presentation at the time of admission, post medical history and dietary habit. Young patients with AMI received guideline recommended treatment and had on excellent outcome. We believe that our result add to the literature in showing these data on young patients across the whole spectrum of AMI. In our study current smoking is the prominent risk factor for AMI. Very few studies have been done focusing on the relationship of smoking with AMI. Evidence linking smoking to an increased risk of myocardial infarction and death is incontrovertible, but the precise mechanisms responsible remain elusive. Morbidity and mortality in CAD is a consequence of a complex interplay between coronary atherosclerosis (fixed component) and superimposed factors such as vasomotor tone, platelet aggregation and intraluminal thrombosis (dynamic component). It is the dynamic components of this equation that contribute to abrupt or semiabrupt, transient or permanent coronary occlusion leading to AMI and possible ischemic sudden cardiac death[16,17]. Lipid abnormalities, including high levels of low-density lipoprotein cholesterol (LDL-C), elevated triglycerides and low levels of high-density lipoprotein cholesterol (HDL-C), are associated with an increased risk of cardiovascular (CV) events, thereby serving as contributors to this process[18]. In our study dyslipidemia has also been reported as the most important cardiovascular risk factor in younger patients with myocardial infarction. Our study highlights the importance of male sex, family history, and cigarette smoking in young patients with AMI. A previous study has also reported a greater familial influence on the development of myocardial infarction in young patients compared with the older patients and the authors suggested that this influence is mediated by hypertension and familial

hyperlipidemia[19]. Although not the family history of CAD, but the history of hypertension was found to be the prominent risk factor for AMI in younger patients, a finding different from the work of others[20-22]. Our study is the extension of the knowledge of cardiovascular risk factors (smoking, hypertension, diabetes, previous history of CAD, family history of CAD, obesity and dyslipidemia) to the young patients across the whole spectrum of AMI and strongly confirms the previous study. Considering the health risk associated with the smoking, all current users should be counselled to quit using tobacco in any form. In the literature, comparatively little data were available regarding the prevalence of chest pain in AMI. Most previous studies reporting data on chest pain focused on patients with myocardial infarction and were published in the 1990s or earlier[23]. In accordance with the previous studies on myocardial infarction, signs of heart failure increased in the older age group most probably due to a greater prevalence of previous or advanced CAD resulting in a lower ejection fraction. In our study chest pain was the most common symptom of AMI in young patients. There is only one study assessed the proportion of patients with STEMI[24]. Where by the prevalence is nearly 80%. But in our study the result was somewhat different. In which the prevalence of STEMI was more in older patients as compared to young. The reason for this is may be contributed to different life style and dietary habits of the younger population as compared to the elderly population. A dietary pattern with lower consumption dairy product and vegetable, and a pattern characterised by high consumption of red meat and alcohol is associated with and increased risk of AMI and adverse cardiovascular risk profile[25]. Our findings highlighted the importance of sustained recommendations for fruit and vegetable intake and cautious guidance on consumption of meat and alcoholic beverages, which clusters with less healthy dietary patterns of men and women. Our study also confirms that several aspects of diet can influence the risk of myocardial infarction. When several dietary factors were simultaneously included in a logistic model no major interaction was observed between various foods and the pattern of risk was largely unchanged. Interpreting the significance of the estimates from models that included various foods simultaneously was, however, difficult because of problems of colinearity and consequent over adjustment. Nevertheless, we believe that there are important and significant associations between the consumption of a few foods and subsequent risk of myocardial infarction, and the role of these foods may well be independent of that of known risk factors.

CONCLUSION

In conclusion, young patients with AMI differ from older patients in their clinical presentation, past medical history, and outcome. Primary prevention of smoking, dyslipidemia and being overweight should be more aggressively promoted in an early period of life so it is advisable that the young patients should have refrained from smoking and fat rich diet to have have less risk of heart attack.

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