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ORIGINAL ARTICLE / RESEARCH

Differences In Risk Factors And Mortality, In Young And Old Individuals With Acute Myocardial Infarction In Goa

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ABSTRACT

Background: Coronary Heart Disease (CHD) is a major cause of mortality and is a global health problem.

Aims: There could be a difference in the risk factors in the young and the old individuals with Acute Myocardial Infarction (AMI), and the information about these may have an influence on the strategies for preventive cardiology. In this study, we tried to investigate the same.

Settings and design: Retrospective record based study done in a government medical college.

Methods and materials: Records of patients with AMI admitted from January 1 to December 31, 2005 were investigated retrospectively. A total of 355 patients admitted to the Department of Medicine with AMI, were analysed. Characteristics of the patients who were ≤ 45 years of age and were considered young were compared with those above 45 years.

Statistical analysis used: SPSS software.

Results: 22.25% (79) of those admitted with AMI were ≤ 45 years. 11.39% (9) of the AMI in young individuals, occurred in females, compared to 27.69% (77) in the old AMI patients. 21.51% (17) of the young AMIs presented with cardiac failure (CF) compared to 41.30% (114) in the older age group. Risk factors like alcohol and smoking were more commonly found in the young AMIs, whereas diabetes mellitus (DM), hypertension (HT) and past history of Ischaemic Heart Disease (IHD) and AMI were higher in the older patients. 10.12% (8) of the young AMIs died, as compared to 27.53% (76) in the older population.

Conclusions: Preventive measures for AMIs in the younger age group should involve measures to prevent smoking and alcohol consumption. Preventive measures in the elderly patients should emphasise on control of DM and HT.

Key words: Acute Myocardial Infarction (AMI), Coronary Heart Disease, risk factors, young AMIs, old AMIs, smoking, diabetes, hypertension, alcohol, cardiac failure.

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Introduction

CHD is a major cause of mortality, and is a global health problem reaching epidemic proportions in both developed as well as developing countries. [1] Though during the past four decades there has been a slow but steady decline in age-adjusted mortality rates following AMI, [2] the incidence rate of acute coronary syndrome per se, has not declined. [3] CHD is forecast to be the most common cause of death in India by the year 2020. [4] South Asians on the other hand, have the highest rates of Coronary Artery Disease (CAD) around the globe. [5] The main aim of this study was to determine the

differences in the risk factors and mortality in young and old individuals with AMI. Knowledge of the differences between the older and young AMI patients in our local population will help to develop strategies for preventive cardiology.

Materials and Methods

All cases of AMI admitted to the Department of Medicine, Goa Medical College, in the year 2005 (January 1 to December 31), were reviewed retrospectively (discharged dead or alive) from the case papers which are kept month wise in the Medical Record Department (MRD), in a systematic manner. The data was retrieved by the first author, and ethical clearance was taken from institutional review board. Characteristics of the patients of AMI \leq 45 years of age, who were considered young, were compared with those above 45 years i.e. older AMIs. Besides demographic details, information was collected on traditional cardiovascular risk factors like HT, DM, smoking, alcohol and past history IHD and AMI. We also recorded the outcome with respect to death or improvement.

Blood for lipid profile was drawn within 24 hours of hospital admission. A person was considered to be hypertensive if he was taking antihypertensive treatment, or was found to have a systolic BP of \geq 140mm of Hg or a diastolic BP of \geq 90mm of Hg. [6] History of diabetes was considered to be present if the individual was receiving therapy with either insulin or an oral hypoglycemic agent, or had symptoms of diabetes with a Random Blood Sugar Level of \geq 200mg/dl or a Fasting Blood Sugar Level of \geq 126 mg/dl. [7]

The criteria for diagnosis of AMI was by the presence of at least two of the following [8]; (1) h/o typical chest pain $>$ 30 min, (2) characteristic ECG changes of acute AMI, which were [a] evolution of pathological Q waves of $>$ 0.04sec in duration, or [b] $>$ 0.1mV ST segment elevation in contiguous leads or [c] $>$ 0.1mV ST segment depression or definite T wave inversion, or both. And (3) if CPK-MB $>$ twice the normal upper limit. The documentation of cocaine use in this population was negligible, and was not included in the analysis.

Statistics

The data was analysed using SPSS 10.1. Chi2 and student's t test were used to test the significance in were analysed using the Odds ratio, and the 95% confidence interval was calculated using Woulf's method.

Results

We examined a total 355 cases of AMIs admitted in year 2005. 22.25% (79) were young AMIs, and 77.74% (276) were old AMIs. The mean age of the young AMIs was found to be 41 years, and those of old AMIs was 62 years. Males accounted for 88% (70) of the young AMIs, compared to 72% (199) in older AMIs.

Table/fig 1: Risk factors in young and old people with AMI

Risk factor	Young AMI (n = 79)	Old AMI (n = 276)	OR	95% CI	Significance
H/o hypertension	38(48.10)	159(57.60)	0.68	0.41-1.13	$\chi^2=2.25$, df=1, p=0.134
H/o diabetes mellitus	24(30.37)	115(41.66)	0.61	0.36-1.04	$\chi^2=3.28$, df=1, p=0.070
H/o alcohol	25(31.64)	57(20.65)	1.78	1.02-3.10	$\chi^2=4.11$, df=1, p=0.043
H/o smoking	44(55.69)	110(42.96)	1.90	1.14-3.14	$\chi^2=6.27$, df=1, p=0.012
Past H/o Ischaemic Heart Disease	17(21.51)	80(28.98)	0.67	0.37-1.22	$\chi^2=1.72$, df=1, p=0.189
Past H/o acute Myocardial Infarction	03(3.79)	35(12.68)	0.27	0.08-0.90	$\chi^2=5.07$, df=1, p=0.024

OR = Odds ratio, CI = confidence interval
Figures in parenthesis indicate percentages

[Table/fig 1] depicts the risk factors in both the age groups. HT was the most common risk factor in older age group, followed by smoking and DM. The younger age group in contrast, gave the H/o smoking as the most common risk factor. When we analysed the two age groups separately, we found that alcohol and smoking were significant risk factors in the younger age group. Nearly 32% (25) of young AMIs were alcoholic, and 56% (44) were smokers. We also found that past history of AMI was a significant risk factor in the older age group ($\chi^2=5.07$, df=1, p=0.024). Though the history of HT, DM and IHD were higher in the older age group, the difference was not statistically significant. Analysis of the lipid profile showed triglycerides to be a significant risk factor (t=2.674, df=296, p=0.008) in young AMIs [Table/fig 2].

Table/fig 2: Mean values of lipid profile in young and old people with AMI

Serum lipid	Young AMI (mean \pm SD)	Old AMI (mean \pm SD)	Significance
Serum cholesterol	200.7 \pm 49.15	196.88 \pm 46.02	t=0.605, df=297, p=0.54
Serum triglyceride	139.07 \pm 79.03	116.11 \pm 57.33	t=2.674, df=296, p=0.008
Low Density lipoprotein	136.17 \pm 44.10	130.99 \pm 39.98	t=0.668, df=167, p=0.50
High Density lipoprotein	36.22 \pm 12.75	35.73 \pm 11.40	t=0.221, df=167, p=0.82

SD = standard deviation

There was also difference in the clinical presentation at casualty between the two groups. Mean systolic and diastolic BP was more in young AMIs as compared to old AMIs, and was statistically significant as well (t=2.082, df=353,

p=0.038 and t=2.654, df=353, p=0.008 respectively). Among the young patients with AMI, 21.5% (17) presented with cardiac failure compared to 41% (114) in the older individuals with AMI. This was found to be statistically significant ($\chi^2=10.33$, df =1, p=0.001). In the younger group with AMI, 63.3% (50) occurred in the anterior or anteroinferior wall, 32.9% (26) in the inferior, and 3.8% (03) in the posterior or posteroinferior wall. In the older group with AMI, 63.8% (176) occurred in the anterior or anteroinferior wall, 33% (91) in inferior wall, and 3.3% (9) in the posterior or posteroinferior wall. There was no statistically significant difference between the two groups ($\chi^2=0.055$, df =2, p=0.973).

Table/Fig 3: Fatal outcome with respect to age, gender and site of infarct.

Characteristic (Total number)	Dead (Total number)	Significance
Age Y=79 O=276	Y=08(10.12) O=76(27.53)	$\chi^2=10.30$, df=1, p=0.001
Gender M=269 F=86	M=58(21.56) F=26(30.23)	$\chi^2=2.71$, df=1, p=0.1
Site of infarct AW or AIW=226 IW=117 PW or PIW=12	AW or AIW = 64(28.32) IW = 14(11.97) PW or PIW = 06(50)	$\chi^2=16.18$, df=2, p<0.001

Figures in parenthesis indicate percentages

Y = young patients, O = Old patients, M = Males, F = Females, AW = Anterior wall, AIW = Anteroinferior wall, IW = Inferior wall, PW = Posterior wall, PIW = Posteroinferior wall

On analyzing the variables resulting in the fatal outcome [Table/Fig 3], we found that the older patients with AMI were significantly more likely to die, compared to the young. ($\chi^2=10.30$, df =1, p=0.001). There was no significant difference between males and females ($\chi^2=2.71$, df=1, p=0.1). It was found that the patients who presented with anterior wall AMI are more likely to die as compared to those with inferior wall. We also found that patients with history of DM, smoking, IHD or those who presented with CF, are more likely to have fatal outcome. Forty percent of the patients who presented with CF died [Table/Fig 4].

Table/Fig 4: Fatal outcome with respect to risk factors

Risk factor (total number)	Dead (n)	OR	95% CI	Significance
H/o hypertension n=197	41 (20.81)	0.70	0.43-1.15	$\chi^2=1.990$, df=1, p=0.16
H/o diabetes mellitus n=139	42 (31.21)	1.79	1.09-2.94	$\chi^2=5.432$, df=1, p=0.02
H/o alcohol n=82	14 (17.07)	0.60	0.32-1.13	$\chi^2=3.415$, df=1, p=0.12
H/o smoking n=154	28 (18.18)	0.58	0.34-0.96	$\chi^2=4.522$, df=1, p=0.03
Past H/o Ischaemic Heart Disease n=97	30 (30.92)	1.69	1.00-2.86	$\chi^2=3.901$, df=1, p=0.05
Past H/o acute Myocardial Infarction n=38	10 (26.31)	1.17	0.54-2.53	$\chi^2=0.166$, df=1, p=0.68
Past H/o cardiac failure n=131	53 (40.45)	4.23	2.53-7.08	$\chi^2=32.425$, df=1, p<0.001

Figures in parenthesis indicate percentages

Discussion

Out of 355 people admitted with AMI in year 2005, 22.25% (79) were ≤ 45 years {m=88% (70), f=12% (9)} and 77.74% (276) were > 45 years {m=72% (199), f=28% (77)}

According to the National Commission on Macroeconomics and Health (NCMH), there would be around 62 million patients with CAD by 2015 in India, and of these, 23 million would be patients who were younger than 40 years of age.[9] In this study, we found that in both the age groups, males were more likely to have AMI than females, the ratio being higher in the younger group (7.8:1) than the older group (2.6:1). A similar trend in young individuals with AMI was seen in the research done by Siwach SB et al in Haryana, India, where the male to female ratio was 20:1.[10]

Some research papers have reported that elderly AMI patients were most likely to be females compared to young AMI patients.[11]

We found that smoking was the most common risk factor in young patients with AMI, followed by alcohol intake. This also echoed the results of other studies.[10,11,12] Smoking is associated with endothelial dysfunction, and can precipitate coronary spasm.[13] But this risk falls rapidly after people stop smoking.[14,15] Our findings, like other studies, emphasize the need of smoking cessation interventions.[16]

It was also noted that HT and DM are less frequent in younger AMI patients than in older AMIs, which was also the finding in the study by V.C.Woon et al[11] However, our findings were not statistically significant unlike the findings of Tesak et al and Tresch et al.[17,18]

Other risk factors such as past history of IHD and AMI were higher in the elderly. The difference in the proportion of people with past history of MI in the two groups was statistically

significant. ($\chi^2=5.07$, $df=1$, $p=0.024$).

Dyslipidaemia has been found to be one of the most important contributing factors, and it has long been known that lipid abnormalities are major risk factors for premature CAD. [19] Analysis of the lipid profile showed only triglycerides to be a significant risk factor in young AMIs ($t=2.674$, $df=296$, $p=0.008$). Sawant et al have reported the increased prevalence of hypercholesterolaemia and hypertriglyceridaemia being more prominent in the 31-40 age group than in the ≤ 30 age group in the adult Indian population. [20] Also, high TG levels have been associated with increased levels of small dense LDL, which are considered to be highly atherogenic. [21] Hypertriglyceridaemia also predisposes an individual to thrombosis by increasing the factor VII coagulant activity.

We found that AMI is associated with significantly higher mortality in the elderly (27.53%, 76), as compared to the young population (10.12%, 8). Numerous studies have reported a similar finding. [10,11,22,23,24]

In this study, we also noticed that patients with anterior wall infarction were more likely to die (28.32%, 64), as compared to those with an inferior wall AMI (11.97%, 14) This was in accordance with a finding by Tesak et al [17]

We also found that elderly patients were more likely to develop CF and die ($\chi^2=10.33$, $df=1$, $p=0.001$), indicating that heart failure at the time of admission is a very unfavourable factor for the prognosis of the patient. This was also seen in several other studies [25,26] and as suggested by V C Woon et al, future research should be aimed at developing more effective strategies for prevention of CF in elderly patients. [11]

In accordance with other studies [27], it was found that DM was an important risk factor influencing the outcome in AMI, as 31% (42) of patients of AMI with diabetes died ($\chi^2=5.432$, $df=1$, $p=0.02$) We did not find any statistically significant association between mortality and previous history of AMI ($\chi^2=0.166$, $df=1$, $p=0.68$).

Knowledge on the various risk factors among the two age groups can help in planning appropriate preventive programmes to target the different age groups independently.

Recommendations:

Smoking and alcohol cessation programmes have to be enforced. They should specifically target the youth, as there were found to be significant risk factors for AMI in them. Preventive measures in the elderly patients should emphasise on control of DM and HT. Diet should be low in triglycerides. The

patient should follow up regularly for early detection and management of risk factors, and interventions should be aimed at prevention of CF in AMI patients.

Strengths and Limitations:

With the improving health indicators in the State of Goa [28], the focus of public health is changing from infectious to non infectious diseases. However, there are very few studies to this effect. This study is a stepping stone to further hypothesis driven research. The case papers of all the patients during this period could be traced, and the history and investigations were systematically recorded. The study had a fairly good sample size as well. However, our study does have few limitations. Since it is a retrospective record based study, we could not evaluate non traditional emerging risk factors like serum homocysteine levels, fractionated lipid profile, lipoprotein (a), small dense LDL (low-density lipoprotein), C-reactive protein, and psychological factors like stress, anger, personality type, physical activity, job profile etc.

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