Original Research Article

Risk factors of acute myocardial infarction in elderly and nonelderly patients: a comparative retrospective study done in a rural tertiary care centre of India

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ABSTRACT

Background: Cardiovascular diseases are the most common diagnosis in the elderly, and the first cause of death in men and women over 60 years. It is not clear if the risk factors of acute myocardial infarction (AMI) are different in elderly and non-elderly people. The aim of this study was to compare the prevalence of risk factors of acute myocardial infarction between elderly and non-elderly patients who had been admitted to hospital for the first attack of acute myocardial infarction (AMI).
Methods: A retrospective study was done in Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar from January 2017 to December 2017. Study population were all patients who were admitted due to AMI in medicine ward. Patients were selected as per World Health Organization guidelines. The patients were divided into two groups, non-elderly patients of <60 years and elderly patients of ≥60 years.
Results: Among different risk factors, diabetes and hypertension were more common in elderly than their non-elderly counterparts, and male gender, smoking and family history of ischemic heart disease was more common in non-elderly patients than elderly ones.
Conclusions: This study provide vital information on young AMI patients amongst the diverse population of north India and will help to guide the treating physicians and the health care system to adopt appropriate steps directed towards primary and secondary prevention of AMI in young patients of this region, especially smoking cessation, which is the commonest modifiable risk factor, in their most productive years of life.

Keywords: Acute myocardial infarction, Elderly, Risk factors

INTRODUCTION

Cardiovascular diseases are the most common cause of deaths worldwide, accounting for nearly 40% of deaths in developed high income countries while 28% in developing middle and low income countries, mostly because of increase in life expectancy and major shift in epidemiology of illness from communicable to non-communicable diseases (NCD's).[1]

In 2010, WHO had estimated that 60% of world's cardiac patients will live in India, showing an alarming proportion of increase in heart diseases in India.[2] In India, population studies have shown that around 15-53% hospital admission for myocardial Infarction (MI) are elderly population.[3]

There are several factors that contribute to the increased incidence of MI in old age as ageing is associated with

important changes in homeostatic system.[4] The profile of acute MI patients differs in elderly as compared to young individuals. MI related complications including mortality increases manifolds with old age as incidence of heart failure, atrial fibrillations, arrhythmias, myocardial rupture, ventricular septal perforations and papillary rupture tend to occur more in old age and more so in elderly females as compared to males.[5]

This study was aimed to assess the differences in risk factors for AMI in non-elderly (<60 years) and elderly (≥60 years) population.

METHODS

The study was an observational retrospective study and conducted at the Narayan Medical Hospital is a tertiary care hospital located in Jamuhar, Sasaram, Bihar, between January 2017 to December 2017.

The protocol for the study was forwarded for review and approved by the Institutional Ethical Committee (IEC) of the Narayan Medical Hospital, Sasaram.

Participants were all patients who had admitted due to first MI attack in medicine ward of NMCH, Sasaram and their diagnosis was confirmed by a cardiologist. Sampling was done by stratified random sampling method among the admitted patients.

The patients were divided into two groups, group I patients of <60 years and group II patients of ≥60 years, as age more than 60 years is considered elderly as per Indian Council of Medical Research survey on Indian geriatric population 2007.

Measures and measurement

Socio-demographic, clinical and laboratory data were got from the case sheets kept month wise in the Medical Record Department (MRD).

Risk factors

Authors defined systolic hypertension (HTN) as systolic blood pressure ≥140mmHg, diastolic HTN as diastolic blood pres-sure ≥90mmHg, hypercholesterolemia as cholesterol ≥200mg/dl, diabetes as history of known case or fasting blood sugar ≥126/dl, hyper triglyceridemia as triglyceride ≥150, and cigarette smoking as daily use of cigarette and positive family history.

Patients were reviewed irrespective of their treatment outcome (discharged dead or alive). The data was collected by both the authors. All the details of the patients were tabulated and analysed. Case sheets with incomplete data were discarded.

Inclusion criteria

Patients were selected as per World Health Organization (WHO) guidelines for AMI which depends on the presence of at least two of the following- typical chest pain for more than 20 minutes, ECG changes with development of Q waves, bundle branch block or ST segment elevation or depression of at least 0.1mv for 24 hours and increased cardiac enzymes (creatinine phosphokinase, Troponins).[6]

Exclusion criteria

Patients with stable and unstable ungina were excluded from the study. Authors used updated Prasad's socio-economic classification (SES) classification of 2013 to find SES of present study population.[7]

Statistical analysis

Data were entered in MS Excel Data and it was analysed by SPSS version 16. Data were presented in percentages. Chi-square statistics were used to compare categorical variables in both groups. Z test and Odds ratio were calculated along with confidence intervals. The statistical significance was considered as p<0.005.

RESULTS

A retrospective observational study was done in 2017. A total of 200 patients met the prespecified inclusion and exclusion criteria, admitted to the department of general medicine, NMCH, Sasaram. The mean age of the patients was 58.6±10.74years and the range was between 36 and 85.

Table 1 shows the socio-demographic profile of patients. There were 92 (46%) patients designated as non-elderly who were <60 years of age and 108 (54%) patients designated as elderly who were ≥60 years of age.

Majority of patients were male (74.5%; 149/200), belonging mostly to rural areas (69%; 138/200), farming being the main occupation (50.5%; 101/200) and most of them were of upper lower socioeconomic status (48%; 96/200) as per modified BG Prasad classification*.

The status of risk factors in study group was shown in Table 2. A comparative evaluation was tabulated for elderly and non-elderly population.

In elderly group, the prevalence of male gender (p=0.006), rural residence (p=0.009), tobacco consumption (p=0.003), family history of IHD (p=0.015) and hypertension (p=0.016) were significantly lower than non-elderly group (Table 3).

Table 1: Distribution of socio-demographic profile of study population.

Variable	Nonelderly (N=92) n (%)	Elderly (N=108) n (%)	Total (N=200) n (% of 200)	χ^2 value	p
Gender					
Male	77 (51.7)	72 (48.3)	149 (74.5)	7.58	0.006*
Female	15 (29.4)	36 (70.6)	51 (25.5)		
Residence					
Urban	20 (32.3)	42 (67.7)	62 (31.0)	6.83	0.009*
Rural	72 (52.2)	66 (47.8)	138 (69.0)		
Occupation					
Farmer	36 (35.6)	65 (64.4)	101 (50.5)	23.4	0.000*
Business	31 (68.9)	14 (31.1)	45 (22.5)		
Service	13 (33.3)	26 (66.7)	39 (19.5)		
Others	12 (80.0)	3 (20.0)	15 (7.5)		
Socioeconomic status					
Upper	14 (41.2)	20 (58.8)	34 (17.0)	4.98	0.289
Upper middle	9 (47.4)	10 (52.6)	19 (9.5)		
Lower middle	9 (56.3)	7 (43.7)	16 (8.0)		
Upper lower	49 (51.0)	47 (49.0)	96 (48.0)		
Lower	11 (31.4)	24 (68.6)	35 (17.5)		

Table 2: Distribution of risk factors in study population.

Variable	Non-elderly (N=92) n (%)	Elderly (N=108) n (%)	Total (N=200) n (% of 200)	OR	95% CI of OR	Statistics
Tobacco consumption (includes smoking)						
Yes	62 (55.4)	50 (44.6)	112 (56.0)	0.42	0.23-0.74	χ^2=8.97; df=1; p=0.003*
No	30 (34.1)	58 (65.9)	88 (44.0)	1		
Smoking						
Yes	39 (45.9)	46 (54.1)	85 (42.5)	1.01	0.57- 1.77	χ^2=0.82; df=1; p=0.977
No	53 (46.1)	62 (53.9)	115 (57.5)	1		
Family history of ischemic heart disease						
Yes	21 (65.6)	11 (34.4)	32 (16.0)	0.38	0.17- 0.84	χ^2=5.91; df=1; p=0.015*
No	71 (42.3)	97 (57.7)	168 (84.0)	1		
Hypertension						
Yes	54 (54.5)	45 (45.5)	99 (49.5)	0.50	0.29- 0.88	χ^2=5.76; df=1; p=0.016*
No	38 (37.6)	63 (62.4)	101 (50.5)	1		
Diabetes Mellitus						
Yes	7 (36.8)	12 (63.2)	19 (9.5%)	1.51	0.57- 4.03	χ^2=0.71; df=1; p=0.400
No	85 (46.9)	96 (53.1)	181	1		
Dyslipidemia						
Yes	34 (52.3)	31 (47.7)	65 (32.5)	0.68	0.38- 1.24	χ^2=1.54; df=1; p=0.214
No	58 (42.9)	77 (57.1)	135 (67.5)	1		
Overweight (BMI $\geq$ 25.00)						
Yes	30	26	56	0.65	0.35- 1.21	χ^2=1.79; df=1; p=0.180
No	62	82	144	1		

DISCUSSION

A substantial proportion of patients with CHD do not have traditional risk factors of the disease. In only 40% patients, risk factors modification inhibits the progression of atherosclerosis. This necessitates a context-specific and holistic model to explain the occurrence of AMI, including searching for new risk factors of atherosclerosis.[8]

Tobacco consumption including smoking may be the important modifiable risk factor among ''young'' MI patients. In comparison to older patients, ''young'' MI

patients smoked a greater number of cigarettes per day but had a lower pack year history as expected due to their younger age.[9]

Table 3: Odds ratio and risk ratio for risk factors in elderly and nonelderly patients.

Risk factors	Non-elderly n (%)	Elderly n (%)	OR	RR	p
Male gender	77 (83.7)	72 (66.7)	2.56	1.25	0.006*
Rural residence	72 (78.3)	66 (61.1)	2.29	1.25	0.009*
Tobacco consumption	62 (67.4)	50 (46.3)	2.39	1.45	0.003*
Family H/O IHD	21 (22.8)	11 (10.1)	2.60	2.24	0.015*
Hypertension	54 (58.7)	45 (41.7)	1.98	1.40	0.016*

Yusuf et al, identified smoking as one of the most important risk factors associated with ''young'' MI, suggesting the association of smoking and MI in the ''young'' having an odds ratio (OR) of 3.33 (99% confidence interval (CI), 2.86-3.87) compared to controls.[10] The high prevalence of smoking among patients presenting to hospital with premature MI was also highlighted by Aggarwal et al. Smoking was found to be five times more prevalent among ''young'' MI patients than age- and gender-matched patients presenting to hospital with non-cardiac complaints.[11]

Oliveira et al, studied the association between smoking and MI among ''young'' men that smoked more than 15 cigarettes a day and demonstrated an OR for MI of 4.56 (95% CI, 2.32-9.00), in comparison with ex-smokers.[12] There is a large gender bias with the vast majority of ''young'' MI occurring in men. Chan et al. reported that 90% of patients presenting with MI who were of young age were male compared to 68.4% (OR 3.59: 95% CI, 2.37-5.44) of older patients.[13] But this should not be the potential reason that "young'' women in particular, may experience delays in prompt care and may appear to be neglected when they truly present with MI. Although contributing factors in women receiving prompt management of potential MI include cultural factors that may not be universal.[14]

A family history of CHD which is usually defined in the literature as documented CHD in a first-degree relative before the age of 55-60years. Compared to older individuals, ''young'' MI patients appear to have double the prevalence of family history of CHD.[15]

Although some data suggests the increase in prevalence may be as high as four-fold.[13] This was illustrated by Chan et al. who reported an OR of 2.98 (95% CI, 2.26-3.94) for family history of premature MI among MI patients of young age compared to older MI patients.[13] Zimmerman et al, reported that the prevalence of family history of CHD in ''young'' MI patients is only greater in men compared to their older counterparts.[16]

Oliveira et al, demonstrated the adjusted OR of MI among ''young'' men had a family history of MI in a first-degree relative of 1.84 (95% CI, 1.07-3.17), compared with those who did not.[12] Yusuf et al, confirmed a similar result and highlighted the importance of family history as a risk factor in younger individuals.[10]

Hypertension was reported to be present in 38.1% of ''young'' MI patients.[17,13] This is significantly lower than the rates reported in patients suffering MI at an older age.[16,13] There appears to be higher rates of untreated hypertension in the ''young'' (OR 2.99: 95% CI, 2.00-4.46) suggesting the prevalence of hypertension among ''young'' MI patients is under-appreciated.[13]

Many researchers have reported a higher prevalence of smoking, family history of premature CHD and male gender among ''young'' MI patients compared with their older counterparts, similar to present study result.[13,16,18]

Limitation of the study was a group-matched case control study design where we collected data from records. Authors recorded known risk factors of the disease. Authors' hospital is a private hospital so financial constrains could have precluded some patients from seeking care in this institution. So, applying results of this study to general setting needs some precautions.

CONCLUSION

In elderly people hypertension and diabetes have been more prevalent, and male gender, smoking and family history of IHD are less prevalent than non-elderly group.

Recommendation

According to this study, it can be said that for prevention of AMI in non-elderly, smoking along with hypertension should be mostly attended. These finding can be used for national programmes to include screening for hypertension and awareness programmes for smoking. However, primordial prevention should be used as a tool to prevent these NCD's as a first approach.

REFERENCES

1. Lopea AD, Mathers CD, Ezzati M. Global burden of disease and risk factors. In:Zipes DP, Libby P, Bonow RO, Mann DL, Braunwald E, editors. Braunwald's Heart Disease: a textbook of cardiovascular medicine. 8th ed. Philadelphia: Saunders; 2008:1.
2. Singh RB, Niaz MA, Thakur AS, Janus ED, Moshiri M. Social class and coronary artery disease in a urban population of North India in the Indian Lifestyle and Heart Study. Int J Cardiol. 1998 Apr 1;64(2):195-203.
3. Gregoratos G. Clinical manifestations of acute myocardial infarction in older patients. The American J Geriatric Cardiol. 2001 Nov 1;10(6):345-7.
4. Lakatta EG. Arterial and cardiac aging: major shareholders in cardiovascular disease enterprises: Part III: cellular and molecular clues to heart and arterial aging. Circulation. 2003 Jan 28;107(3):490-7.
5. Rich MW. Epidemiology, clinical features, and prognosis of acute myocardial infarction in the elderly. Am J Geriatr Cardiol. 2006 Jan-Feb;15(1):7-11; quiz 12.
6. Bonita R, Courten M, Dwyer T, Jamrozik K. Surveillance of risk factors for non communicable disease; WHO STEP wise Approach. Geneva: WHO, 2001.
7. Sharma R. Revision of Prasad's social classification and provision of an online tool for real-time updating. South Asian J Cancer. 2013 Jul;2(3):157.
8. Fong IW. Emerging relations between infectious diseases and coronary artery disease and atherosclerosis. Cmaj. 2000 Jul 11;163(1):49-56.
9. Barbash GI, White HD, Modan M, Diaz R, Hampton JR, Heikkila J, et al. Acute myocardial infarction in the young-the role of smoking. the investigators of the international tissue plasminogen activator/streptokinase mortality trial. European Heart J. 1995 Mar;16(3):313-6.
10. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the Interheart study): case-control study. Lancet. 2004;364:937-52.
11. Aggarwal A, Aggarwal S, Goel A, Sharma V, Dwivedi S. A retrospective case-control study of modifiable risk factors and cutaneous markers in Indian patients with young coronary artery disease. JRSM Cardiovascular Dis. 2012 Jun;1(3):1-8.
12. Oliveira A, Barros H, Azevedo A, Bastos J, Lopes C. Impact of risk factors for non-fatal acute myocardial infarction. Eur J Epidemiol. 2009 Aug 1;24(8):425-32.
13. Chan MY, Woo KS, Wong HB, Chia BL, Sutandar A, Tan HC. Antecedent risk factors and their control in young patients with a first myocardial infarction. Singapore Med J. 2006 Jan;47(1):27-30.
14. Alshahrani H, McConkey R, Wilson J, Youssef M, Fitzsimons D. Female gender doubles pre-hospital delay times for patients experiencing ST segment elevation myocardial infarction in Saudi Arabia. Eur J Cardiovasc Nursing. 2014 Oct;13(5):399-407.
15. Hosseini SK, Soleimani A, Karimi AA, Sadeghian S, Darabian S, Abbasi SH, et al. Clinical features, management and in-hospital outcome of ST elevation myocardial infarction (STEMI) in young adults under 40 years of age. Monaldi Arch Chest Dis. 2009;72:71-6.
16. Zimmerman FH, Cameron A, Fisher LD, Grace NG. Myocardial infarction in young adults: angiographic characterization, risk factors and prognosis (Coronary Artery Surgery Study Registry). J Am Coll Cardiol. 1995 Sep 1;26(3):654-61.
17. McManus DD, Piacentine SM, Lessard D, Gore JM, Yarzebski J, Spencer FA, Goldberg RJ. Thirty-year (1975 to 2005) trends in the incidence rates, clinical features, treatment practices, and short-term outcomes of patients <55 years of age hospitalized with an initial acute myocardial infarction. Am J Cardiol. 2011 Aug 15;108(4):477-82.
18. Incalcaterra E, Caruso M, Lo Presti R, Caimi G. Myocardial infarction in young adults: risk factors, clinical characteristics and prognosis according to our experience. Therapeutic Clinic. 2013;164:e77-82.