



Full Length Research Article

STUDY OF ACUTE MYOCARDIAL INFARCTION IN YOUNG ADULTS

*Ashish Kakaria, Abhijit Bhavsar, Vivek Nukte

Department of Internal Medicine, SBHGMC, Dhule, Maharashtra, India

ARTICLE INFO

Article History:

Received 05th July, 2014
Received in revised form
13th August, 2014
Accepted 24th November, 2014

Keywords:

Risk factors,
Young Patients,
Acute Myocardial Infarction.

ABSTRACT

Background: CAD has been recognized among younger age group more frequently in recent years throughout the world. Very limited data is available regarding the prevalence of various risk factors in our younger patients. Objectives of the study were to look for the risk factors most prevalent in our young patient of acute myocardial infarction.

Methods: We studied 100 consecutive patients from 16–45 years of age presenting with first acute MI. Twelve risk factors were studied namely, gender, family history of premature CAD, smoking hypertension, diabetes, dyslipidemia, obesity, mental stress (type A personality), alcohol, oral contraceptive pills (OCPs), physical activity, and diet. We divided the patients into two groups. Group A with patients 35 years of age or less and group B with patients 36–45 years of age. All risk factors were compared in both the groups.

Results: Smoking, diabetes mellitus, dyslipidemia and hypertension were statistically different between the two groups. Frequency wise risk factors were lined up as male sex (91%) Diet (66%), Dyslipidemia (62%), smoking (46%), Type A personality (46%), family history (32%), diabetes mellitus (28%), sedentary lifestyle (26%), hypertension (22%), obesity (17%), alcohol (3%), and OCPs (0%) Most of the patients that is 94% had 3 or more risk factors.

Conclusion: Smoking, hypertension, diabetes and dyslipidemia are the major modifiable risk factors in our young adults. If a young male who is smoker or a young female who is diabetic, presents in emergency room with chest pain, always suspect coronary artery disease

Copyright © 2014 Ashish Kakaria et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Coronary artery disease (CAD) is a leading cause of death throughout the world (Murray and Lopez, 1997). The incidence of CAD has been halved in the west in past 3 years, but it has been doubled in the subcontinent (Enas and Senthilkuma, 2002). Moreover people in our part of the world suffer from CAD at relatively younger age, i.e., about half of MI occur under the age of fifty years (Enas and Senthilkuma, 2002). The only way to get away with this problem is to evaluate the risk factors and try to modify them. The presence of major risk factors leads to advanced CAD in 2% of 15–19 years old men and 0% in women. This figure increases to 20% and 8% respectively in the presence of these risk factors in 30–34 years of age. These facts clearly show that early atherosclerosis is influenced by the risk factors for clinical CAD; so long term prevention must begin in early adulthood (McGill et al., 2000). Very limited data is available regarding the prevalence of various risk factors for MI in our younger patients. Keeping in view these facts, a study of risk factors in young patients of acute MI was planned.

*Corresponding author: Ashish Kakaria

Department of Internal Medicine, SBHGMC, Dhule, Maharashtra, India

MATERIALS AND METHODS

This is a descriptive cross sectional study.

A total of 100 consecutive patient with acute MI were studied. The study was conducted in medical ICU in Civil Hospital affiliated to Shri Bhausaheb Hire Government Medical College Dhule (Maharashtra) India. Over a period of January 2008 to January 2009. The diagnosis of MI was based on WHO criteria of chest pain, ECG changes and cardiac enzymes rise. We divided the patients into 2 groups.

Thirty patients were in Group-A (16–35 years of age) and 70 patients were in Group-B (36–45 years of age). According to adjusted Framingham scoring, age less than 35 years is negatively associated with IHD and age above this, itself becomes a risk factor for CAD. So it was taken as a cutoff point between the 2 groups and the significance of each risk factor between the groups was studied.

Inclusion Criteria

- All patients from 16–45 years of age presenting with first acute myocardial infarction

Exclusion criteria

- All patients with stable or unstable angina, or patients having old MI, and those having age less than 16 or above 45.

The following risk factors were studied in these patients:

MI or sudden death before 55 years in father or 1st degree male relatives or in mother before age of 65 years or other 1st degree female relatives; currently smoking, or left smoking less than 3 months of the diagnosis. Patients were considered hypertensive if already on antihypertensive therapy or reported to have blood pressure of more than 140/90 mmHg on two or more occasions. The patients were taken as diabetics if already taking treatment for diabetes or fasting blood sugar >124 mg/dl or random blood sugar >200 mg/dl. Fasting lipid profile was investigated within 48 hours of acute MI, because lipid profile is altered by acute MI, it tends to lower the HDL-C and raises triglycerides. Total cholesterol >200 mg/dl, Triglycerides >250 mg/dl, LDL cholesterol >100 mg/dl was considered high risk. And total cholesterol=200–239 mg/dl, Triglycerides=200–400mg/dl, LDL cholesterol=130–159 mg/dl, HDL cholesterol <35 mg/dl were considered borderline high risk. Patients with BMI \geq 30 Kg/m² were taken as obese and <30 Kg/m² as non obese. The personality traits were evaluated by interviewing the patient as well as the family members.

Patients were asked if they were using diet rich in fat or saturated fats or if they were using diets containing less fat or saturated fat and high fibre diet. Patients were asked about the number of eggs they were taking per week and how much fruit and vegetables they were using in their diet. The patients were inquired about the type and amount of alcohol they were using. The patients were asked about the current use of Oral contraceptive pills OCPs (currently using or left less than 3months of the diagnosis of MI). The patients walking 4 Km/day for 5 times a week were labeled as physically active and patients walking less than that as physically inactive or sedentary. We divided the patients into two groups and the significance of each risk factor between the groups was calculated by employing the chi-square test, and $p < 0.05$ was taken as significant. The percentage, frequency and relative frequency of risk factors were also calculated.

RESULTS

The results thus obtained showed that in this younger age group almost all patients were male 91% versus 9% females (Figure 1). Most of the patients (66%) were taking diet rich in fats and so most the patients (62%) were dyslipidemic. 46% patients were smokers and equal number of patients had type a personality. Family history of premature coronary artery disease was present in 32% of cases. 28% of patients were diabetics. Sedentary lifestyle was present in 26% of patients. 22% of the patients were hypertensive, 17% were obese and 3% were alcoholics. None of the patients were taking oral contraceptive pills. This aggregation of risk factors is further illustrated in (Table 1), which shows that most of the patients, i.e., 77% of patients had 3–5 risk factors. The comparison of risk factors in the two groups showed that smoking, diabetes dyslipidemia and hypertension had significant difference between the two groups. Other risk factors did not show

Table 1. Relative frequency of number of risk factors

Number of risk factors	Frequency	Relative Frequency
0–2	6	0.06
3–5	77	0.77
6–8	16	0.16
9–11	1	0.01

Table 2. Comparison of risk factors in two groups

Risk Factor	Group A (n=30) (\leq 35 years)	Group B (n=70) (36–45 years)	p-value
Smoking	23 (76.66%)	23 (32.8%)	<0.0005
Diabetes	1 (3.33%)	27 (38.6)	<0.001
Dyslipidemia	13 (43.3%)	49 (70%)	<0.025
Hypertension	2 (6.6%)	20 (28.5%)	<0.05
Male Sex	29 (96.66%)	62 (88.5%)	>0.05
Diet	22 (73.33%)	44 (62.8%)	>0.05
Type A personality	12 (40%)	34 (48%)	>0.05
Family History	10 (33.33%)	22 (31.4%)	>0.05
Sedentary Lifestyle	12 (40%)	14 (20%)	>0.05
Obesity	2 (6.66%)	15 (21.4%)	>0.05
Alcohol	1 (3.33%)	2 (2.8%)	>0.05
OCPs intake	0	0	0

significant difference between the two groups (Table-2). Male sex 91%, diet rich in fat 66%, dyslipidemia 62%, smoking 46%, type a personality 46%, family history of premature cad 32%, diabetes 28%, sedentary lifestyle 26%, hypertension 22%, obesity 17%, alcoholics 3%, and OCPs intake 0%. One risk factor was present in just one patient, 2 risk factors were present in 5 patients, 3 risk factors were present in 20 patients, 4 risk factors were present in 33 patients, 5 risk factors were present in 24 patients, 6 risk factors were present in 10 patients, 7 risk factors were present in 4 patients, 8 risk factors were present in 2 patients, 9 risk factors were present in 1 patient.

DISCUSSION

Coronary artery disease remains a leading cause of death and exerts a heavy social and economical toll (Ford *et al.*, 2002). Although mortality rates of CAD are declining overall in affluent world, but these rates have declined less for younger individuals (Ford *et al.*, 2003 and Centers for Disease Control and Prevention, 2003). The IHD has been reported to be more frequent in recent years in younger age group, (Kanitz *et al.*, 1996) but the risk definitely increases with the increasing age. According to the results of this study, there is a linear relation between age and IHD risk, as only 30 patients were in group A (\leq 35 years) as opposed to 70 patients in group B (36–45 years) as shown in Figure 2.

Male sex is an important risk factor for IHD especially at a younger age. The lifetime risk of CAD is one in three for women, and lifetime risk of developing CAD at 40 years of age is 50% for men and 33% for women. (Llyod-Jones *et al.*, 1999) CAD is significantly low in premenopausal women because of estrogen, but the diabetes takes away this advantage (Llyod-Jones *et al.*, 1999). So a young female having diabetes, if presents with chest pain, always suspect CAD. In our study 91% of patients were male. This finding is consistent with the study of Siwach SB *et al* (Siwach *et al.*, 1998), who showed

85% of male patients in their study. The male gender showed a non significant difference between the two groups in our study.

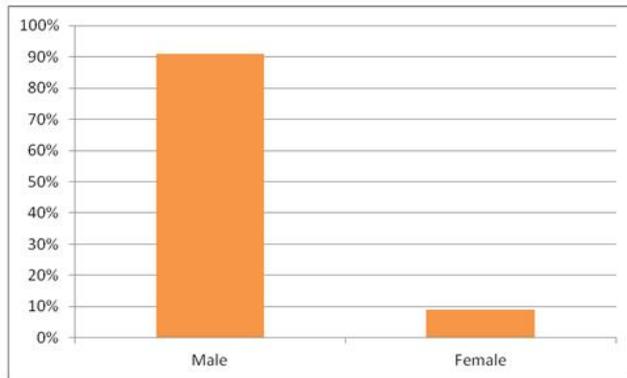


Figure 1. Gender wise presentation of patients with myocardial infarction

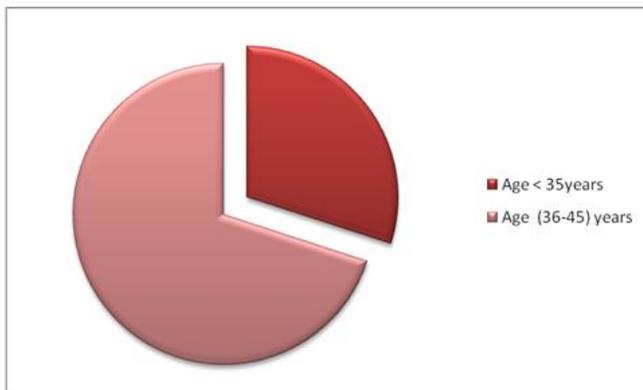


Figure 2. Age wise patients with myocardial infarction

This is because most of the patients were male in both the groups, as male sex remains an important risk for IHD in this younger age population. Family history of CAD has an increased risk of premature coronary events.¹² Recent results indicated that this risk might be higher in women compared to men (Llyod-Jones *et al.*, 1999). Our study showed that 32% of patients had family history of premature CAD, whereas Siwach SB showed 57% of their patients to have positive family history of CAD. The difference between the results may be due to the difference between the age group selected. It is less than 40 years in study of Siwach SB and it is up to 45 years in our study.

Smoking is the most important preventable cause of CAD (Hennekens, 1997). Over half of young Indian males with IHD are smokers (Siwach *et al.*, 1998). In our study 46% of patients were smokers, and more importantly 23 out of 30 (76.6%) patients younger than 36 years were smokers. Smoking causes premature CAD due to a number of factors. It has unfavorable effects on lipoprotein, it decreases HDL (Cullen *et al.*, 1998). Smoking also enhances platelet aggeragability, promotes endothelial dysfunction, and causes coronary artery vasospasm (Sugiishi and Takatsu, 1993). Its harmful effects are also seen in females causing early menopause (Kato *et al.*, 1998 and Hu *et al.*, 1999). The studies Pais *et al* (PaisP *et al.*, 1996) conducted has shown very high percentage of their patients to be smokers 42.8% and 55% respectively. So we support the

conclusion that tobacco control programs in India and other countries of this region could have an important impact on decreasing this deadly disease in our young adults. Hypertension is firmly established as a risk factor for IHD. In our study 22% of patients were hypertensive. However the study conducted by Siwach SB in 1993 on young patients of IHD 47.6% of their patients to be hypertensive (Siwach *et al.*, 1998). This difference is because of two reasons. Firstly, they selected all the patients with IHD and we selected only those who had MI, not the stable or unstable angina. Secondly, due to the socioeconomic status they come from, obesity is implicated in hypertension, as almost half of their patients were obese. Our patients belonged to poor socioeconomic status (most of them) and only 17% were obese.

Diabetes mellitus is also a major IHD risk factor. We found 28% of the patients to be diabetic in our study. Gandapur *et al* (Gandapur *et al.*, 1998) reported 14% of their patients to be diabetic in their study. Siwach SB *et al* (Siwach *et al.*, 1998) reported a higher percentage of diabetes in young IHD patients (35.7%). The results of our study were very close to the study of Siwach SB *et al* (Siwach *et al.*, 1998), because they selected young patients less than 40 years of age, contrary to the patients selected by Gandapur *et al* (Gandapur *et al.*, 1998). McKeigue *et al* (McKeigue *et al.*, 1993) also reported early onset of CAD in south Asian men with glucose intolerance.

Dyslipidemia is one of the major modifiable IHD risk factor. Siwach SB *et al* (Siwach *et al.*, 1998) reported dyslipidemia in their 63.2% of patients. In our study 62% patients had dyslipidemia. The similar results were reported by Gandapur *et al* (Gandapur *et al.*, 1998). The reason for increased prevalence of dyslipidemia is not known, however genetic factors and dietary habits seem to be important. Obesity is an independent risk factor for CAD in both men and women (Willett *et al.*, 1995). Weight reduction is associated with favorable changes in lipid profile and blood pressure and hence reduces the risk of IHD (Van Gaal *et al.*, 1997). But in our study only 17% of patients were obese with a no significant difference between the groups. This smaller number is because of the fact that generally patients belonged to poor socioeconomic status.

Type a personality is also considered to be a risk factor for CAD. The socioeconomic status and increasing level of education are making more and more patients with type a personality but its strong correlation with MI is yet to be proved. Regular physical activity has been shown to reduce the risk of IHD in a number of observational and epidemiological studies. A Meta analysis of studies showed the relative risk of IHD death was 1.9% in sedentary as compared to active subjects (Berlin *et al.*, 1990). We found out 26% of our patients sedentary, which is quite a significant number, keeping in view the younger population we selected for the study.

Diet is also an important risk factor for IHD. Diet predisposes to atherosclerosis not only directly but also indirectly through obesity, hypertension, glucose intolerance and dyslipidemia. There is no concept of balanced diet in our population. We found out that 66% of our patients were not taking risk free diet, and most of them (51%) were taking ghee (classified butter) regularly in excessive amounts. Thomas *et al* (Thomas *et al.*, 1986) has reported high risk of IHD in Indians attributed to the consumption of ghee. It is well known that IHD risk factors

synergize the effect of each other, and clustering of risk factors is important in causing premature CAD. In study of Siwach SB *et al* (Siwach *et al.*, 1998), 55% of patients had 3 or more risk factors, whereas 94% of patients in our study had 3 or more risk factors. The observed difference exists because we studied twelve risk factors against six risk factors studied by Siwach SB *et al* (Siwach *et al.*, 1998). Therefore we conclude that as the number of risk factors increase in an individual, the risk of IHD also increases, and the patient develops IHD at an early age.

Conclusion

- Smoking, hypertension, diabetes and dyslipidemia are the major modifiable risk factors in our young adults.
- The clustering of risk factors particularly three or more risk factors in an individual predispose to CAD at relatively younger age.
- If a young male who is smoker or a young female who is diabetic, presents in emergency room with chest pain, always suspect coronary artery disease.

Acknowledgements

The author is indebted to technical assistance received from Shri Bhausaheb Hire Government Medical College Dhule (Maharashtra) India from department of Biochemistry.

Declarations

Funding: No funding sources

Conflict of interest any declared : None.

Ethical approval: The study was approved by the institutional ethics committee.

REFERENCES

- Berlin, J.A., Golditz, G.A., A Meta analysis of physical activity in the prevention of coronary heart disease. *Am. J. Epidemiol*, 1990. 132:612–28.
- Carroll, M.D., Lacher, D.A., Sorlie, P.D., Cleeman, J.I., Gordon, D.J. and Wolz, M., *et al.* Trends in serum lipids and lipoproteins of adults, 1960–2002. *JAMA.*, 2005. 294:1773–81.
- Centers for Disease Control and Prevention. Prevalence of Diabetes and impaired fasting glucose in adults- United States, 1999–2000. *MMWR Morb Mortal Wkly Rep* 2003. 52:833–7.
- Cullen, P., Schulte, H. and Assmann, G., Smoking, lipoproteins and coronary heart disease risk. Data from the Munster Heart Study (PROCAM). *Eur. Heart J.*, 1998. 19:1632–41.
- Enas, E.A., Senthilkumar, A. Coronary Artery Disease in Asian Indians: an Update and Review. *Int J. Cardiol.*, 2002. 1(2):1–34.
- Ford, E.S., Capewell, S., Coronary Heart Disease Mortality Among Young Adults in the US. From 1980 through 2002. *J. Am. Coll. Cardiol.*, 2007. 50:2128–32.
- Ford, E.S., Giles, W.H., Mokdad A.H. Increasing prevalence of the metabolic syndrome among US adults. *Diabetes Care*, 2004. 27:2444–9.
- Ford, E.S., Mokdad, A.H. and Giles, W.H., Trends in waist circumference among US adults. *Obes Res.*, 2003. 11:1223–31.

- Ford, E.S., Mokdad, A.H., Giles, W.H. and Mensah, G.A., Serum total cholesterol concentrations and awareness, treatment, and control of hypercholesterolemia among US adults: findings from the National Health and Nutrition Examination Survey, 1999–2000. *Circulation* 2003. 107:2185–9.
- Gandapur, A.S.K., Yar, S., Majid, T., Study of risk factors in coronary heart disease. *Pak Heart J.*, 1998; 21:89–91.
- Hajjar, I., Kotchen, T.A., Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. *JAMA.*, 2003. 290:199–206.
- Hennekens, C.H., Coronary disease: risk intervention. In: Julian DG, Wenger NK, (editors), *Women and heart disease*, 1st ed., London: Martin Dunitz; 1997. p. 39–48.
- Hu, F.B., Grodstein, F., Hennekens, C.H., Colditz, G.A., Johnson, M., Manson, J.E., *et al.* Age at natural menopause and risk of cardiovascular disease. *Arch Intern Med* 1999; 159:1061–6.
- Kanitz, M.G., Giovannucci, S.J., Jones, J.S. and Mott, M., Myocardial infarction in young adults; risk factors and clinical features. *J Emerg Med* 1996 Mar- Apr; 14(2): 139–45
- Kato, I., Toniolo, P., Akhmed khanov, A., Koenig, K.L. and Shore, R., Zeleniuch-Jacquotte A. Prospective study of factors influencing the onset of natural menopause. *J. Clin Epidemiol*, 1998. 51:1271–6.
- Llyod-Jones, D.M., Larson, M.G., Beiser, A. and Levy, D., Lifetime risk of developing coronary artery disease. *Lancet* 1999; 353:89–92.
- McGill, H.C., Jr, McMahan, C.A., Zieske, A.W., Tracy, R.E., Malcom, G.T. and Herderick, E.E., *et al.* Association of Coronary Heart Disease Risk Factors With Microscopic Qualities of Coronary Atherosclerosis in Youth. *Circulation* 2000. 102:374–9.
- Mckeigue, P.M., Ferrie, J.E., Pierpoint, T. and Marmot, M.G., Association of early onset heart disease in South Asian men with glucose intolerance and hyperinsulinemia. *Circulation* 1993. 87:152–61.
- Murray, C.J., Lopez A.D. Mortality by cause for eight regions of the world: Global Burden of Disease Study. *Lancet* 1997. 349: 1269–76.
- Pais, P., Pogu, J., Gerstein, H., Zachariah, E., Savitha, D. and Jayprakash, S., *et al.* Risk factors for acute myocardial infarction in Indians: A case control study. *Lancet* 1996. 348: 358–63.
- Siwach, S.B., Singh, H. and Sharma, D., Profile of acute myocardial infarction in the young in Haryana. *J. Assoc Physicians of India* 1998. May; 46 (5): 424–26.
- Sugiishi, M., Takatsu, F., Cigarette smoking is a major risk factor for coronary artery spasm. *Circulation* 1993; 87:76–9.
- Thomas, I., Gupta, S., Sempson, S. and Cooper, R., Serum lipids in Indian Physicians in the US compared to US born physicians. *Atherosclerosis* 1986. 61:99–106.
- Van Gaal, L.F., Wauters, M.A., DeLeeuw, I.H., The beneficial effects of modest weight loss on cardiovascular risk factors. *Int J Obes Relat Metab Disord* 1997; 21(Suppl1):S5–S9.
- Willett, W.C., Manson, J.E., Stampfer, M.J., Colditz, G.A., Rosner, B. and Speizer, F.E., *et al.* Weight, change, and coronary heart disease in women. Risk within the 'normal' weight range. *J. Am. Med. Assoc.*, 1995. 273:461–5.