International Journal of Advances in Medicine
Rangamanikandan M et al. Int J Adv Med. 2019 Aug;6(4):1164-1170
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20193265

Original Research Article

A study focusing emerging risk factors in patients of acute myocardial infarction in South India

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Received: 23 February 2019
Revised: 23 May 2019
Accepted: 31 May 2019

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ABSTRACT

Background: Acute myocardial infarction (MI) is a significantly raising problem particularly in India. The various aspects of myocardial infarction such as risk factor profiles, clinical presentations and prognosis differ significantly in south Indian people when compared to others. This study was undertaken to study the association of socio-demographic and life-style factors with acute myocardial infarction in South India.
Material: This was a prospective study included 100 patients admitted in ICCU for acute MI in Government Rajaji Hospital Madurai over a period of 1 year. History, ECG, CPK-MB, and 2-D Echo was done to diagnose MI.
Results: In this study, 68% patients were males. In this study, 34% patients had diabetes, 42% had hypertension, 58% were smokers. In our study 70% patients had BMI between 25-30kg/m^2. In this study, 86% patients had TGL more than 200mg/dl, 28% patients had LDL more than 100 mg/dl and 78% patients had NON-HDL more than 130 mg/dl. In this study, 9 patients had depression. In our study 61% male patients had waist hip ratio more than >1 and in females 69% patients had waist hip ratio more than >0.85. In our study, 22% patients had hemoglobin >16g/dl.
Conclusion: Prevention of coronary artery syndrome by modifying the risk factors were crucial**.** Serum cholesterol, LDL cholesterol, BMI were not significant to predict ACS in our study Waist Hip ratio, Triglyceride, Non-HDL cholesterol, smoking and Depression were significant to predict acute coronary syndrome in this study.

Key Words: Acute myocardial infarction, Emerging risk factors, Lipid profile

INTRODUCTION

Coronary artery disease (CAD) is one of the most common causes of mortality and morbidity in both developed and developing countries. It is a leading cause of death in India, and its contribution to mortality is rising.[1] According to reports from the National Commission on Macroeconomics and Health, 62 million people in India will have CAD by 2020, with 23 million of these below 40 years of age.[2] The World Health Report also estimated that 78% of the non-communicable disease (NCD) burden and 85% of the cardiovascular burden was borne by the low and middle-income countries including India.[3]A cross-sectional population-based study in a developed country has suggested that participants from most deprived socio-economic areas had unhealthier ultrasound markers of atherosclerosis suggesting that socio-economically deprived groups share a disproportionately higher share of the disease. A similar socio-economic disadvantage could be expected to exist in India and other developing countries.[4]

Atherosclerosis is a multi-factorial disease involving the interplay of genetic and environmental factors.[5] The importance of the classical risk factors for heart disease was examined in the Inter heart study which is a large, international, standardized, case-control study from 262 centers in 52 countries from Asia, Europe, the Middle East, Africa, Australia, North America, and South America.[6]

All these classical and novel risk factors for cardiovascular disease would be expected to have varying relative contributions to the disease outcome in different populations. Although, thrombus formation is the proximate cause of acute myocardial infarction (AMI), atherosclerosis, the chief underlying cause, is a chronic progressive disease. The study results examining the association between various socio-demographic and life-style factors and AMI could help prioritize primary prevention measures for AMI in the community. The prevalence of classic cardiovascular risk factors such as hypertension, dyslipidemia, obesity and diabetes, varies widely between different countries, and shows some important secular trends. The conventional risk factors for CAD can be divided into non-modifiable and modifiable risk factors. The former include age, sex and family history, while the latter include diabetes mellitus (DM), smoking, dyslipidemia, hypertension and obesity. There is increasing incidence indicating that Asian Indians are at increased risk of CAD, which cannot be attributed to the common risk factors. Recently, a number of newer cardiovascular risk factors have been identified, which are of great interest as more than 60% of CAD in native Indians remains unexplained by conventional risk factors. Comparative studies on newer risk factors show that Indians have higher C-reactive protein, plasminogen activator inhibitor (PAI-1) and homocysteine levels. The incidence of CAD is likely to increase further because of rapid urbanisation and its accompanying lifestyle changes, including changes in diet, physical inactivity, drug and alcohol intake, as well as an increase in the prevalence of diabetes mellitus. The prevalence of risk factors in a population determines the future burden on healthcare services and the loss of an individual's productive years. Risk factors constitute a health risk for the individual and impose an overall burden on the economy. Objective of this study to analyze the traditional and newer risk factors.

METHODS

A retrospective study conducted in the Cardiology department, Government Rajaji Hospital, Madurai Sample size was 100 patients.

Inclusion criteria

- Patients with acute ST elevation Myocardial Infarction (STEMI)
- Typical rise of cardiac biomarkers either in the form of Creatine Kinase-MB (CKMB) or Troponin.

Exclusion criteria

- NonStemi
- History of previous revascularization
- Patients who were already on statin and antiplatlets.

Baseline characteristics like age, sex, clinical history, conventional risk factors, duration of symptoms, type of thrombolytic agent used and coronary angiogram results were analyzed in detail.

Study protocol

The design was prospective analytical study conducted on October 2017 to August 2018. Collaborating Department of Cardiology, Government Rajaji Hospital, Madurai. Ethical clearance of the study obtained consent individual written and informed consent.

Statistical analysis

The information collected regarding all the selected cases were recorded in a master chart. Data analysis was done with the help of computer by using SPSS 16 software and Sigma Stat 3.5 version (2012). Using this software mean, standard deviation and ‘p’ value were calculated through Student ‘t’ test, one way ANOVA, Chi square test and correlation coefficient from Pearson correlation and P value of <0.05 was taken as significant.

Participants

Patients of acute STEMI who were admitted in our ICCU and thrombolysed were included in this study.

RESULTS

In this study, 68% patients were males and 32% patients were females (Table 1) indicating high prevalence of Acute Coronary Syndrome in men.

Table 1: In our study there were 62 male patients and 38 female patients.

Sex	No. of patients	%
Male	62	62%
Female	38	38%
Total	100	100%

In this study there were 62 male patients and 38 female patients.

In this study, there were 56% patients between 40-60 years (Table 2) indicating high prevalence of ACS in 40-60-year population. Mean age for male patients was 48.12 in female patients was 54.42 young patients (10%) were included in our study . very old patients (>4%) were also included in our study. The mean age of women was 42.47±10.34 years, in this study 58 (%) patients had AWMI (Table 3) indicating high prevalence of AWMI in STEMI. 40% patients had inferior wall MI.

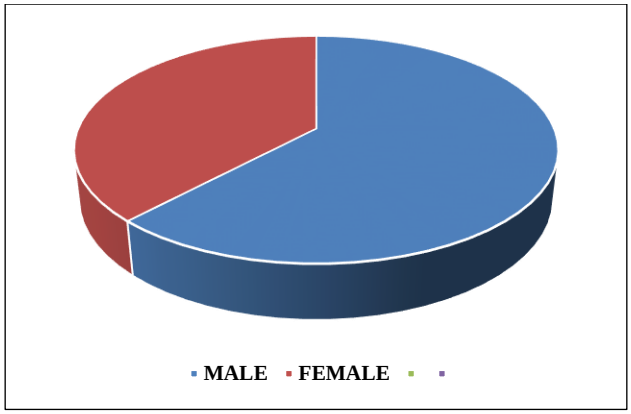

Figure 1: Gender Distribution.

Table 2: Age Distribution.

Age	No of patients
< 30	2
31-40	8
41-50	20
51-60	36
61-70	20
71-80	10
>80	4

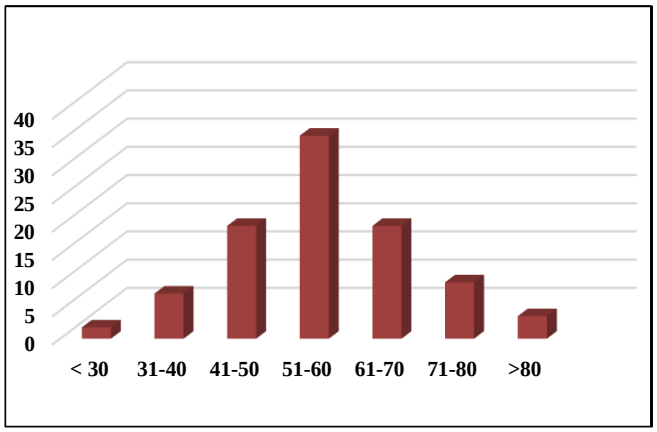

Figure 2: Age Distribution.

Table 3: Type of MI.

Type of MI	Patients	%
AWMI	58	58%
IWMI	40	40%
LWMI	2	2%
Type of MI	Patients	%

In our study 34% patients had diabetes indicating Diabetes is one of the most common risk factors. The prevalence of diabetes in our study was 34% (Table 4).

Diabetes is one of the common risk factor still need to be controlled in India. In our study patients 42% had hypertension (Table 5) indicating it's the one of the common cause for acute coronary syndrome.

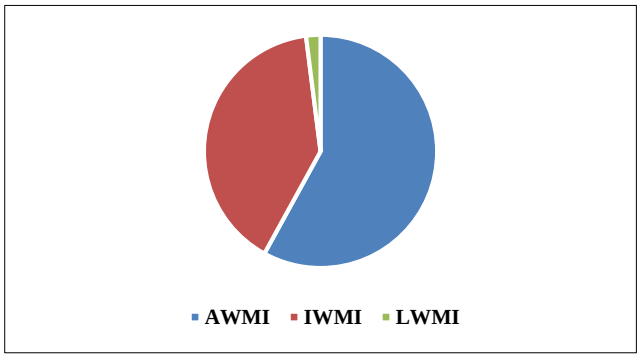

Figure 3: Type of MI.

Table 4: Diabetes Mellitus

Risk factor	YES	NO
Diabetes present	34	66

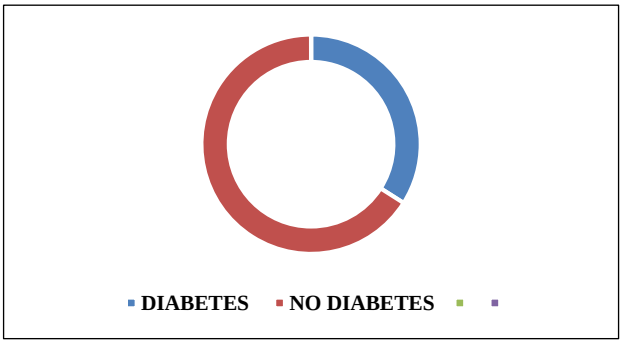

Figure 4: Diabetes Mellitus.

Table 5: Hypertension in acute coronary syndrome.

Risk factor	Present	Not present
Hypertension	42%	58%

The overall prevalence of hypertension was 21% in sekrhi8 study. In our study 58% of the patients were smokers (Table 6) most (90%) of them were men indicating high prevalence of ACS in smokers. Smoking accelerates the atherosclerotic process and provoke myocardial infarction in young patients.

Table 6: Smoking in Acute Coronary Syndrome.

Risk factor	Present	Absent
Smoking	58%	42%

In this study, patients had BMI 6% patients had BMI <25 kg/m^2, 70% patients had BMI between 25-30 kg/m^2 (Table 7), 24% of the patients had BMI between 30-40 kg/m^2 indicating CAD is more common in overweight patients than obese patients.

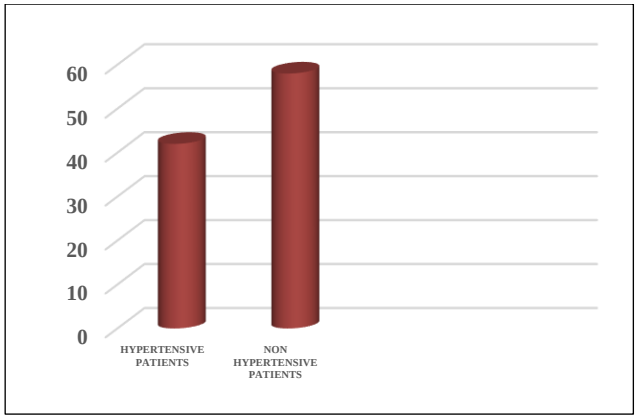

Figure 5: Hypertension in acute coronary syndrome.

Figure 6: Smoking in acute coronary syndrome.

Table 7: BMI in acute coronary syndrome.

BMI kg/m^2	No of patients	%
<25	6	6
25-30	70	72%
31-35	20	24%
>35	4	4%

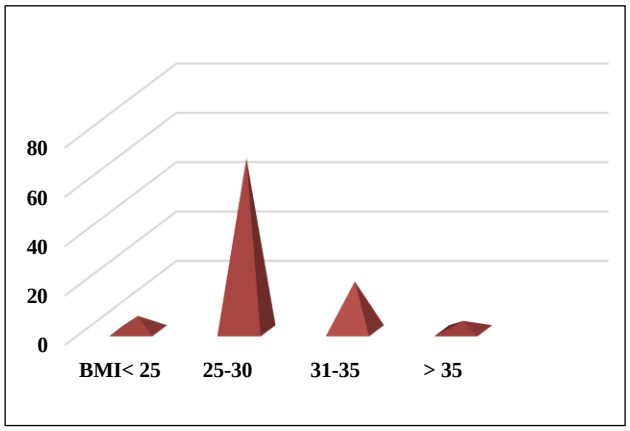

Figure 7: BMI in acute coronary syndrome.

In our study patients only 40% patients (Table 8) had Serum cholesterol more than 200mg/dl indicating serum cholesterol is not a significant to predict ACS.

Table 8: Serum cholesterol in acute coronary syndrome.

Serum cholesterol	No. of patients	%
<200 mg/dl	60	60%
200-400	36	36%
>400 mg/dl	4	4%

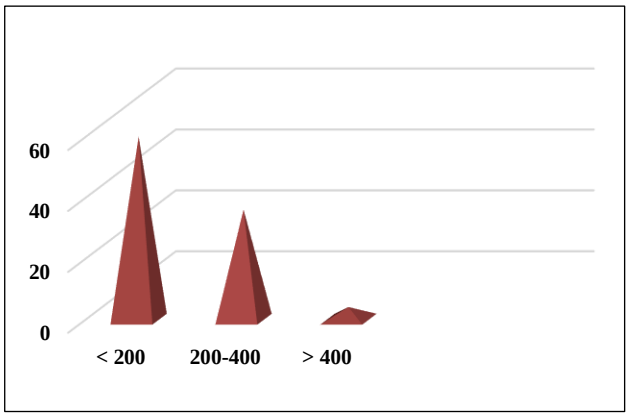

Figure 8: Serum cholesterol in acute coronary syndrome.

In this study, 86% patients had TGL more than 200 mg/dl (Table 9) indicating TGL is more correlating with.

Table 9: Triglyceride level in acute coronary syndrome.

Serum triglyceride (mg/dl)	No. of patients	%
<200 mg/dl	14	14%
200-400	74	74%
>400 mg/dl	12	12%

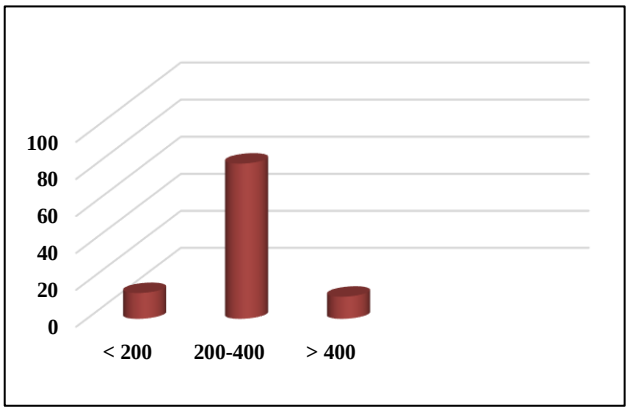

Figure 9: Triglyceride level in acute coronary syndrome.

In this study, 28% patients had LDL more than 100 mg/dl (Table 10) indicating LDL is not a good predictor of ACS.

Table 10: Serum LDL cholesterol in acute coronary syndrome.

LDL Cholesterol (mg/dl)	No. of patients	%
<100	72	72%
100-200	26	26%
>200	2	2%

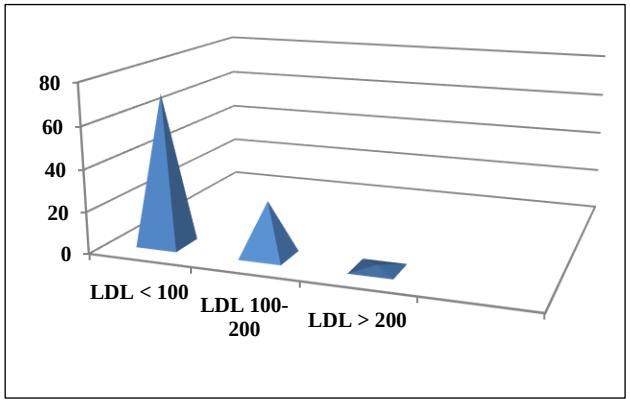

Figure 10: Serum LDL cholesterol in acute coronary syndrome.

In this study, 56% patients had NON-HDL (Table 11) more than 130 mg/dl indicating NON-HDL is more correlating with ACS.

Table 11: Non-HDL cholesterol in acute coronary syndrome.

Non-HDL cholesterol	No of patients	%	P value
<100	22	22%	
100-130	22	22%	
>130	56	56%	<0.001

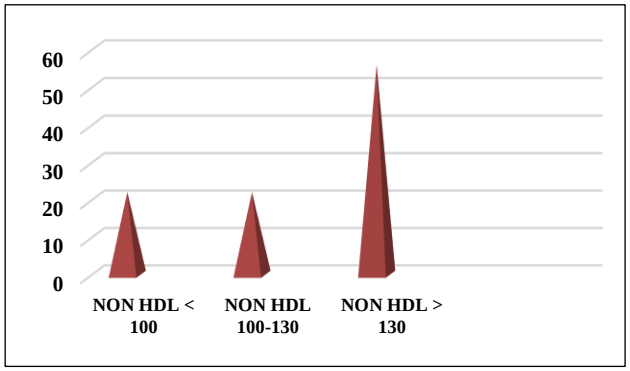

Figure 11: Non-HDL cholesterol in acute coronary syndrome.

In this study, 9 patients had depression (Table 12) even though it's not a significant factor treating depression lowers the ACS risk . Authors should routinely include depression as a risk factor.

Table 12: Depression in acute coronary syndrome.

Risk Factor	Present	Absent
Depression	9	91

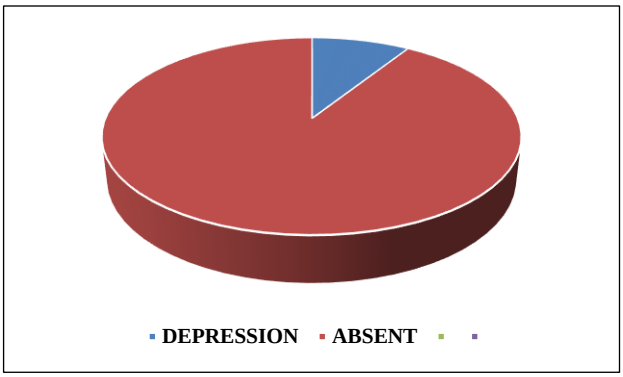

Figure 12: Depression in Acute Coronary Syndrome.

In this study, 61% male patients (Table 13) had waist hip ratio more than >1 and in females 69% patients (Table 14) had waist hip ratio more than >0.85 and it found to be more correlating than BMI.

Table 13: Hip/Waist ratio in men in acute coronary syndrome.

Hip/waist ratio	No of patients	%	P value
<0.95	6	9%	
0.96-1.0	28	45%	
>1.0	38	61%	<0.001

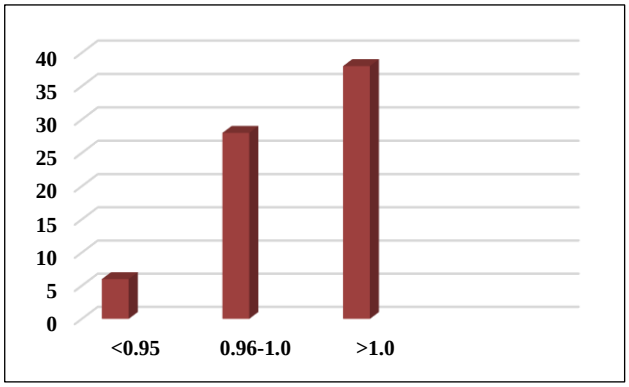

Figure 13: Hip/Waist ratio in men in acute coronary syndrome.

Table 14: Hip/Waist Ratio in Women in Acute Coronary Syndrome.

Hip/waist ratio	No. of patients	%	P value
<0.8	1	4%	
0.8-0.85	4	13%	
>0.85	33	86%	<0.001

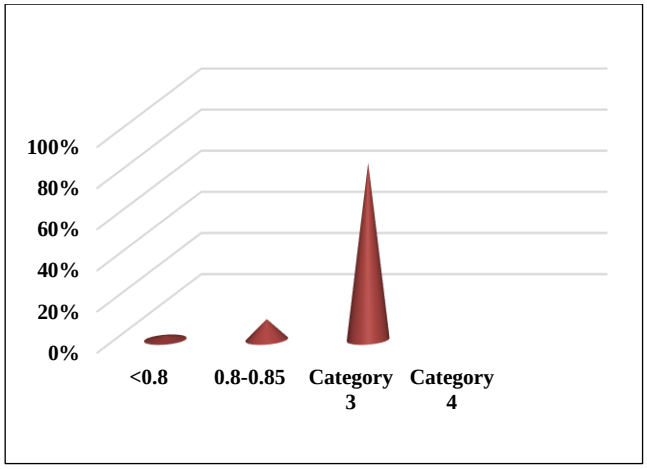

Figure 14: Hip/Waist ratio in women in acute coronary syndrome.

Table 15: Hemogloblin in acute coronary syndrome.

Hemoglobin	No. of the patients	%
<12 g/dl	2	2%
12-16 /dl	76	76%
>16g/dl	22	22%

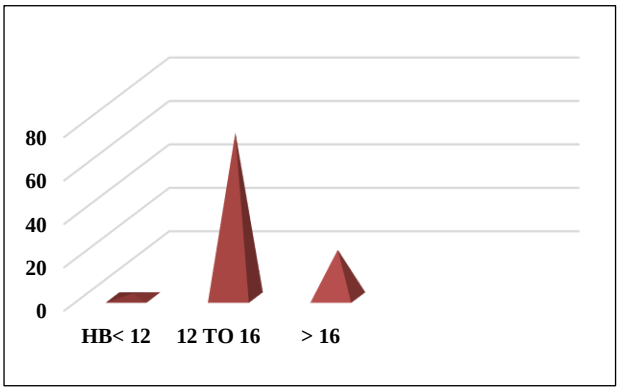

Figure 15: Hemoglobinin acute coronary syndrome.

In this study, 22% patients had hemoglobin >16 g/dl (Table 15) and these patients also were smokers.

DISCUSSION

The Inter Heart study identified abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, consumption of fruits, vegetables, and alcohol, and regular physical activity account for most of the risk of myocardial infarction world-wide. Various other studies have also shown similar trends in the Indian population. Sanjay P. Zodpey, study also states high prevalence of ACS in male patients. Prevalence of Diabetes was 16% in sekrhi study.[7,8] The prevalence of hyper cholesterolemia in sakrhi study[8] was 31.3%. An increasing prevalence of impaired glucose tolerance and diabetes in urban residents of Chennai was reported by Ramchandran et al, in 2002, Gupta et al, showed that smoking and low physical activity levels were widespread in 20–39-year-old urban adults.[9,10] Another important independent risk factor for CAD is a family history of CAD, as reported by Goel et al, in 2003.[11] In Jaipur Heart Watch-5 study by Gupta et al, That study found that 46.2% of men and 50.7% of women were overweight or obese.[10] The prevalence of hypertension was 39.5% in men and 24.6% in women, diabetes was present in 15.5% of men and in 10.85% of women, and 33% of men and 32.7% of women had high cholesterol levels.

Similar results were found by a study by Prabhakaran et al among men working in an industry in northern India. A high serum total cholesterol/HDL ratio was found in 62% of the population, overweight in 47%, hypertension in 30% and diabetes in 15%.[12] Prabhakaran et al, also showed that 47% of their subjects had at least two CAD risk factors, compared with 78.6% with two or more CAD risk factors in the present study.

Another study in 2008 by Mohan and Deepa showed the following prevalences of major risk factors for cardiovascular disease: diabetes 11.9%, hypertension 25.4%, dyslipidemia 40.2%, hyper triglyceridemia 28.3%, overweight (BMI ≥23 kg/m^2) 60.2% and metabolic syndrome 34.1%.[13]

The most prevalent risk factor in men was dyslipidemia (present in 48.27% of men), followed by a BMI >25 (present in 46.1% of men). In women, a BMI >25 was the most prevalent factor (present in 55.5% of women), followed by dyslipidemia in 31.45%.

India is experiencing an epidemiological transition with high rates of urbanisation.[14] This has led to economic improvement, the consequences of which are increased fast food consumption and tobacco usage and decreased physical activity. With the introduction of an era of refined foods, sugar and hydrogenated oils, the traditional high complex carbohydrate, high fibre and low fat diet has been replaced by a diet rich in fats and simple sugars low in dietary fibre.[15] More importantly, CAD is affecting young Indians who comprise the productive workforce. The incidence of CAD in young Indians is 12-16%, which is higher than in other ethnic groups worldwide.

Prevention and control of the risk factors for CAD can reduce the rate of CAD. This requires changes in the individual as well as at the community level. Modifying risk factors such as smoking, increased levels of body fat, consuming too much fat and salt, and a sedentary lifestyle together with the use of accessible and affordable preventive medicines, can lower the risk of CAD.

A substantial proportion of patients with coronary artery disease do not have traditional risk factors of the disease. The common risk factors of atherosclerosis explain disease occurrence in only half of the diagnosed cases. 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. The present study identified[11] significant risk factors of AMI in the final model. These include conventional risk factors for coronary artery disease like obesity (estimated through waist-hip ratio and BMI), depression, hypertension, smoking, raised non HDL cholesterol.

CONCLUSION

Prevention and control of the risk factors for CAD can reduce the rate of CAD. This requires changes in the individual as well as at the community level. Modifying risk factors such as smoking, increased levels of body fat, consuming too much fat and salt, and a sedentary lifestyle together with the use of accessible and affordable preventive medicines, can lower the risk of CAD. Therefore, there is an immediate need to raise awareness among the general population about these risk factors, promote the correct diet and physical activity, and at the same time develop guidelines for screening and preventive therapeutic programmes to identify and manage individuals at high risk for future CAD.

- Prevention of coronary artery syndrome by modifying the risk factors were crucial
- Serum cholesterol, LDL cholesterol, BMI were not significant to predicit ACS in our study
- Waist Hip ratio, Triglyceride, Non HDL cholesterol smoking , Depression were significant to predict acute coronary syndrome in our study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Rangamanikandan M, Balasubramanian S, Veeramani SR, Sivakumar GS, Saravanan RR, Ramesh R et al. A study focusing emerging risk factors in patients of acute myocardial infarction in South India. Int J Adv Med 2019;6:1164-70.