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Prevalence of Modifiable Risk Factors among Acute Coronary Syndrome Patients in a Tertiary Care Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background and Objectives: Acute Coronary Syndrome (ACS) is one of the major causes for mortality and morbidity among the cardiovascular diseases in India. In this study the modifiable risk factors leading to ACS are considered and its prevalence in a Tertiary care hospital is studied.
Materials and Methods: This is a prospective type of study conducted in a tertiary care hospital. A total of 100 patients diagnosed with ACS were taken in this study. Their data was taken, and results were formulated in excel data sheet.
Results: Among the UA patients, 65% were found to be dyslipidaemic, 60% as obese, 45% as diabetics, 47.5% as hypertensive and 40% as smokers. Among the NSTEMI patients, 66.67% were found to be dyslipidaemic, 52.78% as hypertensive, 44.44% as smokers, 30.56% as diabetics and 27.78% as obese. Among the STEMI patients, 37.50% were found to be dyslipidemic, 25% as both diabetic and obese, 20.83% as hypertensive,12.5% as smokers.
Hypertension, dyslipidemia, smoking and obesity showed significance.
Conclusion: The prevalence of modifiable risk factors is a major concern for developing ACS and when they are modified there will be a great reduction in the incidence of ACS.

Keywords: Acute coronary syndrome; modifiable risk factor; prevalence.

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1. INTRODUCTION

Cardiovascular diseases (CVDs) are the largest cause of mortality, accounting for around half of all deaths resulting from Non-Communicable Diseases (NCDs) [1]. The projected deaths from CVDs, mainly from heart disease and stroke have been estimated to reach 23.3 million by 2030 [2]. Among the NCDs, Acute coronary syndrome (ACS) is important global causes of death and also the major cause of morbidity and mortality in India [3]. ACS is a term which is used for spectrum of conditions manifesting as a result of reduced blood flow to heart due to Coronary Artery Disease (CAD). ACS is a complication of CAD. ACS include Unstable Angina (UA), ST Elevation Myocardial Infarction (STEMI) and Non-ST Elevation Myocardial Infarction (NSTEMI). It is projected that, by the year 2030, about 76% of the deaths in the world would be due to NCDs [4] .

The conventional risk factors for CAD can be divided into modifiable and non-modifiable risk factors [5] .The non-modifiable risk factors are age, gender, and family history. The modifiable risk factors Diabetes mellitus, dyslipidaemia, smoking, obesity, physical inactivity and hypertension. These modifiable risk factors are responsible for the majority of cardiovascular events, as has been found in the INTERHEART study [6]. It was reported that well known and modifiable cardiovascular risk factors were responsible for more than 90% of acute myocardial infarctions, almost irrespective of age, sex, ethnic origin and country of residence [7]. However in view of the increased prevalence of many modifiable risk factors in adults, it has been argued that the decline in cardiovascular mortality might cease or even reverse in the near future [8].

In this study the modifiable risk factors leading to ACS is considered and its prevalence in a Tertiary care hospital were studied so that morbidity and mortality to ACS can be prevented.

2. MATERIALS AND METHODS

This is a prospective type of study conducted in a tertiary care hospital. For this study the approval of Institutional review board was obtained. A total of 100 patients diagnosed ACS between January 2021 to April 2021 was taken in this study.The data included diagnosis, age ,gender, height ,weight, systolic BP, diastolic BP, fasting plasma glucose, post prandial plasma glucose, total cholesterol, HDL, smoking habit, physical inactivity as they were the parameters which would indicate the presence of modifiable risk factors. These parameters were found present and they were considered a risk factor if it met the following criteria. The patients were diagnosed as unstable angina NSTEMI and STEMI as per Hospital's guidelines and these details were taken to find the proportion among them. The guidelines are as follows

At least one of the following criteria was met to diagnosis UA: angina lasting less than 20 minutes, whose onset is within one month, or angina occurring in a crescendo pattern. At least one of the following electrocardiogram (ECG) findings was seen in patients with UA: In any two leads, there should be a 0.5mm ST segment depression or a 0.3mv T inversion. In addition to typical UA symptoms, NSTEMI was detected by the presence of increased troponin I levels as an indication of myocardial necrosis. The presence of clinical symptoms of MI lasting more than 30 minutes, as well as ECG alterations of at least 0.1mv ST elevation in two contiguous precordial leads or two limb leads, or the existence of a new LBBB, were used to diagnosis STEMI.

Height and weight was used to calculate BMI. BMI of more than 30 was considered as a risk factor [9]. Blood pressure was measured in left arm in sitting posture thrice a day and the next day too and when it was found to be of Systolic BP>140mm Hg and diastolic BP>90 mmHg or a known case of hypertension were considered a risk factor. To assess diabetic as a risk factor a known case of diabetes and those with fasting plasma glucose which was taken after 8 hrs of food intake if found >125 mg/dl and postprandial plasma glucose which was taken 2 hrs after food if found >200 mg/dl were considered. Smoking habit was mentioned in the patient's data and thus was taken into account. To assess the risk of dysplidaemia , total cholesterol of more than 240 mg/dl and HDL below 40 mg/dl were considered as a risk factor.

All these data were put up in excel data sheets and then the results were formulated and significance for these risk factors was also assessed.

3. RESULTS

During the study period, 100 ACS patients presented. All these results were formulated and displayed in Table 1 and Table 2. This included 76(76%) males and 24(24%) females. Among them, 40(40%) were cases of UA, 36(36%) were

cases of NSTEMI, 24(24%) were cases of STEMI (Fig. 1). The mean of all parameters included in this study are displayed in Table 2.

Patients with unstable angina had mean age of 58.5±7.57. Among the 40% of UA, 30 were male patients and 10 were female patients (Fig. 2). In UA patients, 19(47.5%) were found to be hypertensive and it consisted of 56.6% male and 20% female patients. 18(45%) were found to be diabetic and it consisted of 53.3% male and 20% female patients. 26(65%) were found to be dyslipidemic and it consisted of 60% male and 40% female patients. 16(40%) were smokers and it consisted of 50% male and 10% female patients. 24(60%) were obese and it consisted of 73.3% male and 20% female patients.

Among the 36% of NSTEMI,29 were male and 7 were female patients (Fig. 1). They were of mean age of 57.97±6.416. In NSTEMI, 19(52.78%) were found to be hypertensive and it consisted of 58.6% male and 28.5% female patients. 11(30.56%) patients were diabetic, and it consisted of 31.03% male and 28.5% female patients. 24(66.67%) were found to be dyslipidemic and it consisted of 65.5% male and 71.4% female patients. 16(44.44%) were smokers and that consisted of 51.7% male and 14.2% female patients. 10(27.78%) were obese and it consisted of 27.5% male and 28.5% female patients.

Among the 24% of STEMI 17 were male and 7 were female patients (Fig. 1) with mean age of 59.58±6.99.In STEMI, 5(20.83%) were found to be hypertensive and it consisted of 23.5% male and 14.2% female patient. 6(25.00%) were found to be diabetic and it consisted of 23.5% male and 28.5% female patients. 9(37.50%) were dyslipidemic and it consisted of 17.6% male and 85.7% female patients. 3(12.50%) were smokers and it consisted of 11.7% male and 14.2% female patients. 6(25.00%) were obese and it consisted of 29.4% male and 14.2% female patients.

Among all these, the most prevalent risk factor was found to be dyslipidemia which is 59 patients (59%) followed by hypertension (43%), obesity to be 40%, 35 patients (35%) to be diabetic, and 35% to be smokers.

Significance was found in hypertension, dyslipidemia, smoking and obesity. Diabetes mellitus was not significant. Significance shows that there is a strong association between ACS and significant parameter. Insignificance shows that there is no association between ACS and that parameter. P value less than 0.05 is found to be significant whereas more than 0.05 is insignificant. P=0.037 in hypertension=0027 in dyslipidemia=0.048 in smoking, p=0.0037 in obesity whereas p= 0.209(not significant) in diabetes mellitus (Table 1).

Significance was also found in male and female patients with hypertension(p=0.011) dyslipidemia(p=0.021), smoking(p=0.08%) and obesity(p=0.027). Diabetes mellitus(p=0.23) was not significant in them. These values are displayed in Table 3.

4. DISCUSSION

The prevalence of ACS risk factors was studied in this study. Epidemiological studies in South Asian countries have led to important conclusions regarding the prevalence, the type of presentation and the treatment of ACS in the regression [10-12].However ,there are fewer studies on the risk factors of different kinds of ACS in the Indian community. Studies have shown that the onset of cardiovascular disease in women occur 7 to 10 years after that for males [13]. Our study showed that the mean age for females to be 65.54 years which was higher than expected compared to males(56.59 years). The reason for this age difference in male and female is due to hormones which is explained in a study by Sutton-Tyrell et al. l[14] and Vanhoutee PM et al. [15] .

Table 1. Distribution of characteristics according to the type of ACS

Parameters	UA	NSTEMI	STEMI	P Value
No. of patients	40(40%)	36(36%)	24(24%)	
Age	58.5±7.57	57.97±6.416	59.58±6.99	
Hypertensive	19(47.5%)	19(52.78%)	5(20.83%)	0.037
Diabetes Mellitus	18(45%)	11(30.56%)	6(25.00%)	0.209
Dyslipidaemia	26(65%)	24(66.67%)	9(37.50%)	0.0027
Smoking	16(40%)	16(44.44%)	3(12.50%)	0.048
Obesity	24(60%)	10(27.78%)	6(25.00%)	0.0037

Table 2. Mean of all parameters in the study

Parameters	Men	Women
Age	56.59±6.01	65.54±6.73
Height	173.05±7.84	165.6±8.43
Weight	81.31±14.27	81.04±17.77
BMI	27.61±4.63	29.91±5.38
Systolic BP	138.17±17.95	144.87±14.32
Diastolic BP	90.21±13.10	95.45±8.04
FPG	135.03±23.22	127.87±22.44
PPPG	238.14±32.34	229.54±39.16
TC	183.9±21.98	192.2±26.29
HDL	36.97±5.99	34.33±5.49

Table 3. Number of male and female patients risk factors

Parameters	Men	Women	P value
Hypertension	38(50%)	5(20.8%)	0.011
Obesity	35(46%)	5(20.8%)	0.0279
Dyslipidaemia	40(52.6%)	19(79.1%)	0.021
Smoking	32(42.1%)	3(12.5%)	0.008
Diabetes Mellitus	29(38.1%)	6(25%)	0.23

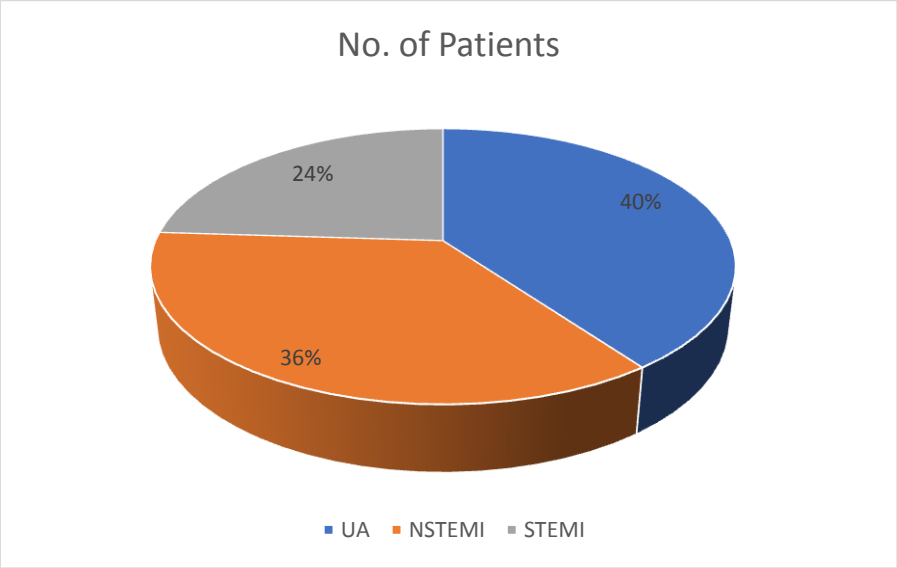

Fig. 1.Distribution of number of patients among the type of ACS

In our study many(74%) were male patients and was highly related with all three types of ACS. This was in correlation with a study done in Nepal which also showed a strong association of ACS in males (75.7%) [16] and male preponderance is also seen in the INTERHEART study [6] and a study by Ralapanawa et al. [17] also showed that nearly two-third in their study were male patients. Majority of the patients had two or more modifiable risk factors. Lack of awareness of the preventable risk factors and ignorance of the disease are also important factors responsible for the increasing rate of CAD among Indians [18,19] .

The ACCESS group of investigators [20] reported 46% ACS in developing countries to be STEMI and 54% to be NSTEMI/UA, while another study by Medagama *et al.* [21] reported 32.8% ACS to be STEMI while our study showed 40% to be UA,36% To be NSTEMI and 24% To be STEMI.

The prevalence of dyslipidaemia was found to be higher in this study similar to a study by Sekhri *et*

al. [5] and a significant association between NSTEMI and dyslipidaemia was found in this study similar to study by Ralapanawa et al. [17].

Hypertension was the 2nd most common risk factor with (43%) 43 patients being hypertensive .This correlated with the study by Mohanan et al. [11] which reported 48.8% to be hypertensive and a study by Sharma et al. [22]which showed 40.2% to be hypertensive. In this study hypertension was found to be more in NSTEMI and UA patients than STEMI patients thereby correlating with a study by *Sharma* et al. [22] which showed hypertension to be significantly associated with NSTEMI and another study by Medagama et al. [21] also showed hypertension to be more common in NSTEMI/UA. The reason for this is explained by a study done by Picariello et al. [23]. In our study,40% were found to be obese and in a study by Sekhri et al. [5] its prevalence was found to be 47.6%.

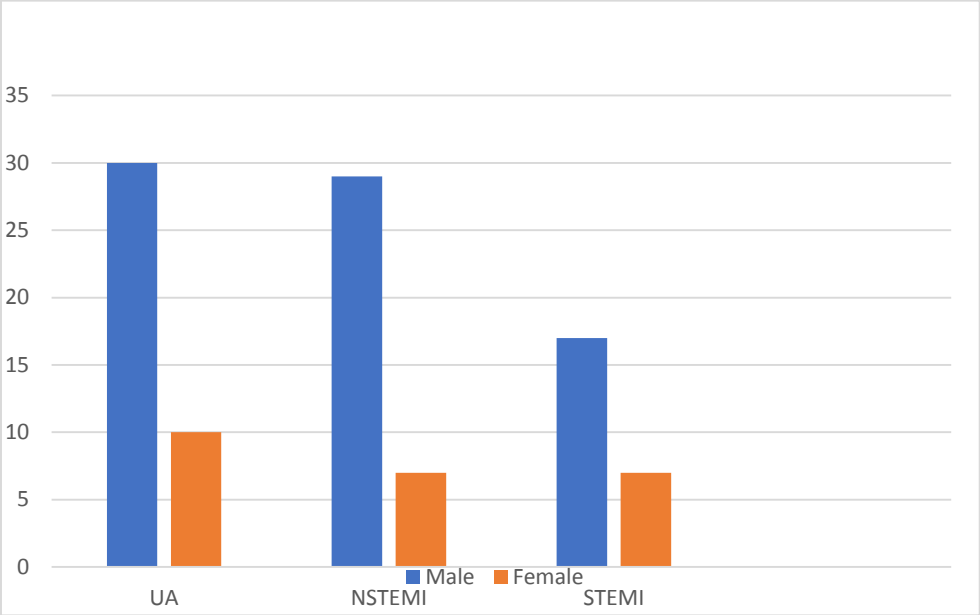

Fig. 2. Gender distribution as per the type of ACS

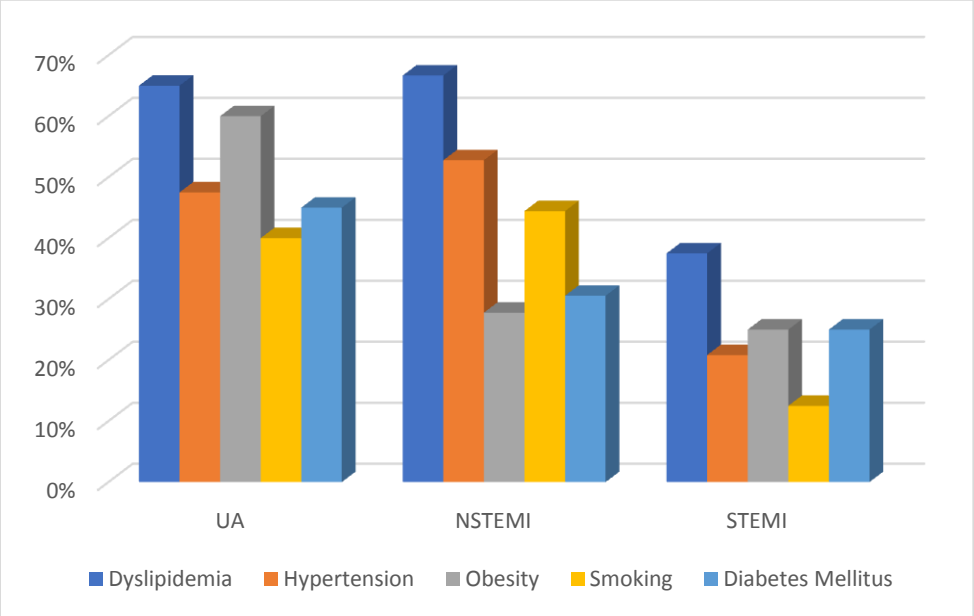

Fig. 3. Distribution of parameters among the type of ACS

In our study out of 100 patients 35[35%] were smokers and this was the least prevalent modifiable risk factor in this study which is correlated with a study by Sekhri et al. [5] whose least modifiable risk factor was also smoking. But our study was in contrast to study by Ralapanawa etal. [17] which showed smoking to be the second most common risk factor for developing ACS.

No significant association between diabetes mellitus and ACS (p=0.209)was found in the study similar to study by Sekhri et al. [5] and also another study by Ralapanawa et al. [17] showed p=0.225 thereby indicating insignificance but this was found to be in contrast to *Sharma et al* which showed significant association between DM and NSTEMI.

ACS is a multi-factorial condition, with lifestyle influencing many of the risk variables. Obesity, hypertension, dyslipidaemia, diabetes, and smoking were all modifiable ACS risk factors, which are all prevalent among the study group, according to our findings. Previous research has provided further evidence that the modification of these risk factors through lifestyle changes, medical therapy or interventional procedures can result in substantial improvements in morbidity and mortality [24-26].

Cardiovascular diseases (CVDs) were once thought to be the disease impacting the rich and affluent community, but it is now well established that they afflict the poor as well [27]. Rapid changes in eating patterns, combined with decreased physical activity, may explain some of the rise in ACS in India as a result of urbanisation. India is experiencing an epidemiological transition with high rates of urbanisation [28,29]. Even there is increasing availability and focus on curative care in urban areas, this alone cannot clear up the problem of CVDs [30]. This necessitates changes on both an individual and a community level.

5. CONCLUSION

The results of this study show a significant prevalence of modifiable risk factors in ACS patients. Its incidence and prevalence is more likely to increase in the near future due to changes in lifestyle.As a result, there is an immediate need to improve public awareness about these risk factors, and to encourage them to have a healthy diet and to do more physical activity.This study also paves way for developing guidelines for screening and preventive treatment programmes to identify and manage people who are at high risk for developing ACS in future.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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