MODIFIABLE RISK FACTORS FOR MYOCARDIAL INFARCTION AMONG HYPERTENSIVE PATIENTS VISITING OUTPATIENT CLINICS OF TERTIARY CARE HOSPITALS IN COASTAL SOUTH INDIA

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ABSTRACT

Objectives: To assess the proportion of modifiable risk factors for myocardial infarction (MI) among hypertensive patients and to categorize them into different risk categories so as to determine the probability of developing MI in near future.

Methods: A hospital-based cross-sectional study done in two tertiary care hospitals attached to a medical college in south India. 600 hypertensive patients were interviewed by the treating physician using convenient sampling technique after taking the written informed consent from them. The interview was conducted using the non-laboratory INTERHEART Modifiable Risk Score (non-laboratory IHMRS scores).

Results: The majority of the study participants (n=404, 67.3%) never smoked in their life time, 21.6% were former smokers (n=130), and 11.1% of the study participants were currently smoking (n=66). More than half of the study participants (n=328, 54.7%) were currently diabetic. Most of them had abdominal obesity (n=469, 78.2%). Around 35.3% (n=212) of the subjects had felt sad or depressed for 2 weeks or more in a row in the last year. Fruits and vegetables were not consumed one or more times daily by 35.5% (n=213) and 11.1% (n=67) of the subjects respectively. A 19 patients (3.2%) were in the lowest risk category, 132 (22%) were at moderate risk, and 449 (74.8%) fell into the highest risk category for development of MI.

Conclusion: The present study categorized the hypertensive patients into different risk categories; wherein majority of them fell into the high-risk category. Thus, this non-laboratory IHMRS can be used as a risk predictor for the development of MI.

Keywords: Risk factors, Hypertensive, Non-laboratory INTERHEART Modifiable Risk Score, Myocardial infarction.

INTRODUCTION

According to the World Health Organization, coronary heart disease is now the leading cause of death worldwide, accounting for 30.8% of all deaths annually and with about 80% of all cardiovascular deaths occurring in developing countries [1]. Approximately, 75% of the cardiovascular diseases (CVDs) are due to conventional risk factors which have a high prevalence in many populations and whose treatment and control reduces the burden of CVDs [1]. In India alone, there were approximately 46.9 million patients with CVDs during the year 2010. Deaths from CVD in people aged 35-64 years cause the highest loss in potentially productive years of life in India when compared to other countries of the world [2].

Hypertension leads to two-fold increase in the risk for CVDs especially coronary heart disease [3]. For every 20/10 mmHg increase in blood pressure, the risk for CVD doubles in some age groups [2]. Ischemic heart disease (IHD) proves to be fatal in 40% of the patients with a history of hypertension [4]. Hypertension accounts for 9.4 million deaths globally and 7% of the disability adjusted life years in 2010 [5].

Hypertension is defined as "having persistent, elevated systolic blood pressure of 140 mmHg or above and/or diastolic blood pressure of 90 mmHg or above" [5]. Hypertension induces endothelial dysfunction, an increase of mechanical stress on blood vessels, and an increase of permeability of intima which leads to atherosclerosis and thus myocardial infarction (MI) [6]. Therefore, assessment of hypertensive patients for the modifiable risk factors for MI stands important.

The prevalence of other risk factors in south Asians like smoking, hypercholesterolemia, high triglyceride concentrations, low concentrations of high-density lipoprotein cholesterol, increased

visceral fat, and insulin resistance also have been stated as causes for the high risk of IHD [7]. These modifiable risk factors if prevented, treated or controlled can provide major health benefits for both men and women at all ages [1]. Thus, formulation of a global strategy for the effective prevention of MI requires knowledge of the importance of these risk factors for coronary heart disease [8].

There has been recent development and application of methods that estimate the risk of future CVD events. Such algorithms identify the population at risk, the individuals that are most likely to benefit from the intervention strategies and also help to evaluate the most cost-effective preventive therapy [9]. In 2004, investigators conducting one of the largest, international, standardized case-control studies, known as the INTERHEART study, have identified a globally consistent association of nine modifiable risk factors [10]. These include hypertension, obesity, diabetes, apolipoprotein levels, psychosocial factors, abdominal obesity, physical activity, alcohol consumption and dietary factors [11]. In accordance with the first INTERHEART study, these nine traditional risk factors predict more than 90% of the global risk for acute MI in young and older age groups, men and women, across all ethnic groups [10]. In this background, this study has been undertaken with an objective of assessing the proportion of modifiable risk factors for MI among hypertensive patients and to categorize them into different risk categories so as to determine the probability of developing MI in near future.

METHODS

Approval from the Institutional Ethics Committee was obtained before starting the study. It was a hospital-based cross sectional study done in two tertiary care hospitals attached to a medical college of a coastal city in the south India. Necessary permission was obtained from the medical

superintendents of the concerned hospitals before commencement of the study. The study population is the hypertensive patients visiting physician's clinic of the above-mentioned hospitals. A total of 600 hypertensive patients were interviewed during January to June 2014 (6 months) by the treating physician using the convenient sampling technique. The hypertensive patients, who visited the outpatient clinic of a physician, were approached individually and were provided with a participant information sheet which explained the purpose of the study in language known to them. Thereafter, a written informed consent was taken from all those who were willing to participate in the study. Study participants were interviewed by the treating physician in a consultation room ensuring confidentiality and anonymity of the study subjects. The interview was conducted using the non-laboratory INTERHEART Modifiable Risk Score (non-laboratory IHMRS scores). Overall risk score for an individual study participant was calculated by adding the score obtained in the each section of non-laboratory IHMRS study tool. Based on the overall risk score; the study participants were categorized into low-risk category, moderate risk category, and high-risk category. Collected data were entered and analyzed using Statistical Package for Social Sciences Version 11.5. The results were expressed using descriptive statistics such as proportions, mean, and standard deviation.

RESULTS

Distribution of modifiable risk factors in hypertensive patients for MI as a non-laboratory IHMRS was shown in Table 1. A total of 600 hypertensive patients were interviewed as a non-laboratory IHMRS. The mean age of the hypertensive patients, who visited physician's clinic in our study, was 52.7 (±11.42) years. The majority of them were males (n=365, 60.8%), and rest were females (n=235, 39.2%). The majority of the study participants (n=404, 67.3%) never smoked in their lifetime, 21.6% were former smokers (n=130), and 11.1% of the study participants were currently smoking (n=66). Around 18.2% (n=09) of the hypertensive subjects were exposed to more than 1 hr of second-hand smoking. It was evident from the Table 1 that more than half of the study participants (n=328, 54.7%) were currently diabetic. Around one-third of the study subjects (n=199, 33.3%) had a family history of heart attack. It was observed that mild exercise was practiced by 42.8% (n=257) of the study population followed by 17.5% (n=105) of them were practicing moderate exercise. Most of the study participants in our study had abdominal obesity (n=469, 78.2%). Around 35.3% (n=212) of the subjects had felt sad or depressed for two weeks or more in a row in the last year. When the study assessed, the frequency of stress periods in the last 1 year among hypertensive patients; it was seen approximately one-third (n=196, 32.7%) of them had several periods of stress. It can be concluded from the Table 1 that 57.6% (n=346) of the patients had a habit of eating salty food one or more times a day; deep fried food was consumed by 47.8% (n=287) for three or more times a week. 40.1% (n=241) ate meat and or poultry two or more times daily. Fruits and vegetables were not consumed one or more times daily by 35.5% (n=213) and 11.1% (n=67) of the subjects, respectively.

When the overall risk score was categorized, it was observed that 19 patients (3.2%) were in the lowest risk category, 132 (22%) were at moderate risk and 449 (74.8%) fell into the highest risk category for development of MI as per non-laboratory IHMRS. The probability of suffering from MI in the next 3.25 years was 0.58% for the hypertensive patients who fell in the highest risk category and 0.27% and 0.23% for the subjects in the moderate risk and low-risk category respectively. Details regarding the distribution of the study subjects into different risk category as per non-laboratory IHMRS is shown in Table 2.

DISCUSSION

A cross-sectional study was done among 600 patients visiting routine clinical care setting in two tertiary care teaching hospitals of Mangalore. The total number of male patients was 365 (60.8%), and the total number of female patients was 235 (39.2%). The age group of the study participants was 18-90 years, and the mean age was 52.73 (±11.42) years which was similar to the studies done in Latin America [11] and also a multicentric study done in 52 countries worldwide [12].

Table 1: Proportion of modifiable risk factors for MI as per non-laboratory IHMRS among study population (n=600)

Risk factor	n (%)
Smoking	
Never	404 (67.3)
Former	130 (21.6)
Current	066 (11.1)
Second-hand smoking	
≥1 hr exposure	009 (18.2)
Diabetes	328 (54.7)
Family history of heart attack	199 (33.3)
Physical activity	
Sedentary	232 (38.7)
Mild exercise	257 (42.8)
Moderate exercise	105 (17.5)
Strenuous exercise	006 (01.0)
Abdominal obesity	469 (78.2)
Sad or depressed ≥2 weeks (1 year)	212 (35.3)
Stress (1 year)	
Never	106 (17.7)
Some periods	023 (03.9)
Several periods	196 (32.7)
Permanent	023 (03.9)
Dietary factors	
Salty food (yes)	346 (57.6)
Deep fried foods (yes)	287 (47.8)
Meat and/or poultry (yes)	241 (40.1)
Fruits (no)	213 (35.5)
Vegetables (no)	067 (11.1)

MI: Myocardial infarction, IHMRS: INTERHEART Modifiable Risk Score

Table 2: Distribution of the study population into risk categories by non-laboratory IHMRS (n=600)

Risk category	Risk for the outcome of MI in 3.25 years (%)	Number in this category (%)	Number of MI in this category in 3.25 years (n)
Low risk (≤9)	0.23	019 (03.2)	0.04
Moderate risk (10-15)	0.27	132 (22.0)	0.35
High risk (16-48)	0.58	449 (74.8)	2.60
Total		600 (100)	2.99

MI: Myocardial infarction, IHMRS: INTERHEART Modifiable Risk Score

According to a global study done in 52 countries [8], nine potentially modifiable risk factors contribute for more than 90% of the acute MI cases. Smoking is described as one of the most important risk factors for the development of MI [8]. A current smoker is a person who smoked regularly in the last 12 months of his life estimated by the average number of cigarettes smoked daily while a former smoker is the one who ceased smoking 12 or more months ago [12]. Here, the term smoker is used for a person who is either a current or former smoker. In our study, around one-third of the study participants were smokers, which are less when compared to the INTERHEART study done in 52 countries [8] wherein two-thirds of the study participants (cases) were smokers. The population attributable risk (PAR) calculated by this study [8] was the highest for smoking (36%) after apolipoproteins (55%).

Diabetes is one of the important risk factors for acute MI. It is associated with a prothrombotic and procoagulant state which contributes to the higher incidence and worse prognosis of MI [13]. In our study, more than half (55%) of the study participants were diabetic, whereas only about 20% of the cases were reported as diabetic in a study done in 52 countries [8]. This finding can be attributed to the increased susceptibility of the Indian population to diabetes mellitus [2].

In our study, abdominal obesity was seen as the most common risk factor with around 80% patients presenting with a high body mass

index. The results were in line with the INTERHEART study done in Latin America [11] where a convincing 51% of individuals were abdominally obese. It also presented as the second most common risk factor (46.3%) after smoking (65%) in the study done in 52 countries [8].

Lifestyle factors like consumption of deep fried and salty food and lack of proper exercise also increase the risk for early development of MI. In our study, nearly half of the study population consumed such unhealthy foods. Daily consumption of fruits and vegetables and regular exercise reduces the degree of risk [11]. Two-thirds of our study participants consumed fruits while nearly 90% of them consumed vegetables every day. In a study done in Latin America [11], around 45% of the participants reported a daily consumption of fruits and vegetables which was supported by a study done in 52 countries. In our study, around 60% of the participants were involved in some form of mild to moderate exercise. Regular physical activity was performed by around 22% of the people in the study done in Latin America [11] and by only around 14% of the people in a study done in 52 countries [8].

Psychosocial risk factors, such as stress and depression, are associated with increased mortality from coronary heart disease [14]. In our study, permanent stress was observed in nearly 3% of the participants which was supported by a study done in China [15].

The risk of premature death increases in the individuals giving a family history of coronary heart disease [2]. In our study, one-third of the case population gave a family history of heart attack. In a study done in Spain [16], nearly 17% of the study participants gave a family history of Ischemic coronary disease. The PAR for genetic factors calculated by the INTERHEART studydone in 52 countries [11] was 12%.

In our study, according to the non-laboratory IHMRS, the risk for the outcome of MI in 3.25 years for the patients under low-risk category (≤9) was 0.23%, for patients under moderate risk category (10-15) was 0.27% and for patients at high-risk category (16-48) was 0.58%. In a similar study done in multiple regions of the world [12], the risk for the outcome of MI in 3.25 years for the patients under low category (0-4) was 0.12%, for patients under moderate risk category (5-9) was 0.27% and for patients under high-risk category (≥10) was 0.68%.

CONCLUSION

The present study categorized the hypertensive patients into different risk categories; wherein majority of them fell into the high-risk category. Thus, this non-laboratory IHMRS can be used as a risk predictor for the development of MI. It also acts as an education tool for making the patients aware of their potentially modifiable risk factors.

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