

## ORIGINAL ARTICLE

## PATTERN OF CONVENTIONAL RISK FACTORS IN CORONARY ARTERY DISEASE PATIENTS

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**Background:** Western countries have succeeded in controlling coronary artery disease (CAD) mortality and morbidity associated with modifiable risk factors. Lack of awareness among people and absence of a concrete health strategy for protection against preventable causes of CAD continues to be a significant problem in Pakistan. This study aimed to measure the pattern of conventional risk factors of CAD. **Methods:** This was a descriptive study conducted at Department of Physiology, CMH Lahore Medical College, from February 2012 to June 2012. We recruited 100 physician diagnosed cases of CAD including 65 males and 35 females. We recorded detailed history of each patient regarding presence of conventional risk factors including type 2 diabetes (T2DM), smoking, hypertension (HTN), dyslipidemia, physical inactivity, emotional or physical stress and a family history for CAD. The association of categorical variables like gender and age group with risk factors was analyzed for statistical significance. **Results:** We found clustering of risk factors in higher age category patients. Male gender was significantly associated with smoking ( $p<0.0001$ ), HTN ( $p=0.02$ ) and stress ( $p=0.03$ ). Whereas, T2DM ( $p<0.0001$ ) and physical inactivity ( $p=0.01$ ) were associated with female gender. In our study, smoking was more prevalent in younger patients ( $p=0.02$ ). However, HTN ( $p=0.04$ ), T2DM ( $p<0.0001$ ) and hyperlipidemia ( $p<0.01$ ) was more prevalent in higher age category. **Conclusion:** In the absence of population based prevention strategies, increasing numbers of people will succumb to CAD due to continuing exposure to modifiable risk factors.

**Keywords:** coronary artery disease, risk factors.

Pak J Physiol 2013;9(2):19–22

## INTRODUCTION

Coronary Artery Disease (CAD) is caused by ischemic complications of atherosclerotic plaques in coronary arteries. It is the leading cause of death and disability in most developed countries, and is dramatically increasing in the developing nations. It is estimated that by the year 2025 approximately 80–90% of all the cardiovascular diseases in the world will be occurring in low and middle income countries like Pakistan.<sup>1</sup> In Pakistan, each year CAD accounts for 15% of total mortality. Alarming, Pakistan is ranked 16<sup>th</sup> among the countries on the basis of CAD related death rate.<sup>2</sup>

Cardiovascular disease is usually associated with or more characteristics, known as risk factors that describe any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury.<sup>3</sup> In general, risk factors for CAD include cigarette smoking, physical inactivity, abnormal serum lipids, excess body weight, hypertension (HTN), type-2 diabetes mellitus (T2DM), demographic characteristics and family history of CAD.

Current understanding into the risk factors and determinants of CAD has been provided by pioneering work conducted by the Framingham Heart Study project.<sup>4</sup> Since then, many other studies, including the WHO MONICA Project<sup>5</sup> and the INTERHEART study<sup>6</sup>, have provided further evidence that many risk factors of CAD can be successfully prevented. There is paucity of evidence based data on risk factors for CAD

in Pakistani population because of scarcity of both financial resources and professionals with expertise in prevention of CAD.

The WHO recommends population based preventive strategies targeting modifiable lifestyle or behavioral risk factors for reducing CAD related mortality and morbidity. This is particularly relevant to developing countries with a higher burden of these factors especially smoking, physical inactivity and poor dietary intake.<sup>3</sup>

This study aimed at measuring modifiable risk factors of CAD in a segment of our population suffering from CAD and creating awareness regarding the same among the patients and their family members.

## METHODS

This descriptive study was conducted from February to June 2012 at various tertiary care government, military and private hospitals in Lahore. These included Punjab Institute of Cardiology (PIC), Jinnah Hospital, Combined Military Hospital (CMH), and Doctors Hospital. This study involved a total of one hundred subjects including 65 male and 35 female patients of CAD seeking treatment in above mentioned health institutions. These patients were physician diagnosed cases of CAD including conditions like stable angina, unstable angina, myocardial infarction or acute coronary syndrome. Patients having non-cardiac chest pain, those having undergone angioplasty or coronary artery bypass surgery, and patients with co-morbid conditions like

heart failure, valvular heart disease, renal failure or chronic liver disease were excluded from the study. All patients were informed about the study and consent was taken from them before including them in the study.

Detailed history was obtained from each patient of CAD regarding presence of risk factors like T2DM, smoking, HTN, dyslipidemia, physical inactivity, emotional or physical stress and a family history for premature CAD. Hypertensive patients were those having sustained increase in systolic blood pressure more than 140 mmHg and/or diastolic blood pressure more than 90 mmHg on more than one occasion. Diabetics were those having elevated fasting plasma glucose level more than 126 mg/dl on more than one occasion. Patients with dyslipidemia were having a raised total serum cholesterol level more than 200 mg/dl. Use of tobacco in any form and mode was documented. Current smokers were those individuals who smoked any tobacco in the previous 12 months or those who had had been using tobacco but quit within the past year. Former smokers were defined as those who had quit more than a year earlier. Psychosocial stress during the previous 12 months was assessed with the help of relevant questions that were asked about stressful events in life. A family history for premature CAD was taken as positive if any of the first degree relatives suffered from CAD before 55 years of age in males and before 65 years of age in females. Subjects who regularly involved themselves in activities like brisk walk, jogging or cycling for at least 30 minutes daily for 5 days a week were regarded as physically active.

The available clinical investigations like Electrocardiogram (ECG), level of cardiac enzymes and Echocardiography were also documented. Variables were recorded on a pre-designed research proforma. Data were analysed using SPSS-15. Frequency and percentages were calculated for categorical variables like age groups (<45 years and ≥45 years), gender and presence of a certain risk factor. The association of categorical variables with risk factors was analyzed for statistical significance using Pearson chi-square tests.

## RESULTS

The current study involved 65% male and 35% female subjects suffering from CAD. The mean ± SD age of male subjects was 41.29 ± 7.86 while mean age ± SD of female subjects was 44.34 ± 6.07. Clustering of risk factors present in male patients did not differ significantly from those of female patients (For both groups Median = 3.0). However clustering of risk factors in patients having ≥45 years (Median = 4.0) was higher than those with age <45 years (Median = 3.0).

We found significant association of gender with CAD risk factors as shown in Table 1. Male gender was significantly associated with smoking ( $\chi^2=55.25$ ,

$p<0.0001$ ), HTN ( $\chi^2=4.80$ ,  $p=0.02$ ) and stress ( $\chi^2=4.57$ ,  $p=0.03$ ). Whereas, T2DM ( $\chi^2=29.10$ ,  $p<0.0001$ ) and physical inactivity ( $\chi^2=5.70$ ,  $p=0.01$ ) were associated with female gender. This seems to represent the fact that, based on the odds ratio, the odds of patients being a smoker was 81 times higher if they were male and odds of patient being physically inactive was 3.3 times higher if they were female. Similarly, the odds of patients being a hypertensive was 2.5 times higher if they were male and odds of having stress was 2.4 times higher for male patients.

Current study also found significant association between age category (<45 vs ≥45 years) and CAD risk factors. As seen in Table-2, smoking was more prevalent in younger patients ( $\chi^2=5.02$ ,  $p=0.02$ ). However, HTN ( $\chi^2=4.07$ ,  $p=0.04$ ), T2DM ( $\chi^2=14.57$ ,  $p<0.0001$ ) and hyperlipidemia ( $\chi^2=7.44$ ,  $p<0.01$ ) was more prevalent in higher age category. This seems to further represent the fact that, based on the odds ratio, the odds of being smoker was 2.5 times higher for patients of <45 years.

**Table-1: Association of gender with risk factors in patients with coronary artery disease**

Risk Factor	Males (%)	Females (%)	$\chi^2$	<i>p</i>	OR
Smoking	83.07	5.71	55.25	<0.0001	81.00
Hypertension	70.76	48.57	4.80	0.02	2.56
Diabetes	38.46	94.28	29.10	<0.0001	0.03
Hyperlipidemia	33.84	45.71	1.36	0.24	0.06
Family History of CAD	47.70	40.00	0.54	0.46	1.36
Stress	67.70	45.71	4.57	0.03	2.48
Physical Inactivity	59.37	82.85	5.70	0.01	3.30

**Table-2: Association of age with risk factors in patients with coronary artery disease**

Risk Factor	Age Category		$\chi^2$	<i>p</i>	OR
	<45 Yr (%)	≥45 Yr (%)			
Smoking	67.34	45.10	5.02	0.02	2.51
Hypertension	53.06	72.54	4.07	0.04	0.42
Diabetes	38.77	76.47	14.57	<0.0001	0.19
Hyperlipidemia	24.48	50.98	7.44	<0.01	0.31
Family History of CAD	44.89	45.09	0.00	0.98	0.99
Stress	63.26	56.86	0.42	0.51	1.30
Physical Inactivity	77.08	58.82	3.76	0.05	0.42

## DISCUSSION

Fifty years after William Kannel first introduced the term 'risk factor', industrialised countries have made enormous progress in controlling the epidemic of cardiovascular disease by preventive measures and treatments focused on the cardinal risk factors of dyslipidemia, HTN and smoking.<sup>7</sup> However, The growing epidemics of obesity and T2DM are laying the groundwork for a new rising tide of cardiovascular disease especially in ill-prepared developing countries. Historically, a small number of factors were recognised to mark a predisposition to CAD. These so-called classical, or conventional, risk factors included the 'non-

modifiable' risk factors (e.g., age, sex, family history, and the social and ethnic differences) as well as 'modifiable' risk factors (e.g., smoking, raised blood cholesterol, HTN, physical inactivity, obesity and stress). However, over the past two decades a number of new factors have been recognised and are considered novel, or emerging, risk factors.<sup>8</sup> Inevitably, however, the definition of what is conventional and what is novel, or emerging, is somewhat subjective.

We have demonstrated that smoking is an overwhelmingly major risk factor for male patients. Lower smoking rates among women in this region have been reported earlier.<sup>9</sup> The rates of smoking in developed countries have been declining due to aggressive enforcement of antismoking policies like increased taxation on cigarettes, restricting smoking in public places and restricting sale of cigarettes to minors. A popular and common social practice in many regions in the world including rural inhabitants of Punjab and Sind is the use of tobacco through water-pipe (also known as hubbly-bubbly, *hookah*, *huqqa*, shisha, sheesha). Its popularity is largely based on a common misconception that smoking water-pipe is not as harmful as smoking cigarettes. In fact, it is estimated that 1 episode of smoking water-pipe produces as much tar as smoking 20 cigarettes.<sup>10</sup> The situation becomes more alarming since we demonstrated that prevalence of smoking was significantly higher in younger age category. This finding further supports earlier findings of higher distribution of significant risk factors in men at younger ages.<sup>11</sup>

This study found that physical inactivity and T2DM was more prevalent among women. The traditional role of women in our society has been limited to household activities. This finding is in accordance with INTERHEART study reporting that the Middle East, Africa, and China were the least active regions.<sup>6</sup> Physical inactivity is a major determinant of obesity and subsequent development of pre-diabetes and T2DM. This situation has been made worse by lack of sports and recreational facilities in Pakistan in general and particularly due to a sheer lack of awareness that women also need equal opportunities of outdoor sports and physical fitness.

A study of gender based differences in risk factors and distribution of CAD in patients undergoing coronary angiography by Jan & colleagues found higher prevalence of HTN among women which is contrary to our finding of significantly higher prevalence in males patients.<sup>12</sup> Since our participants were from a younger segment of population and age difference of male and female subjects of our study was not significant, prevalence of risk factors in males has been reported to outweigh those in females for the same age especially in younger age groups.<sup>11</sup> Each year globally there are 12 million fatal and approximately 20

million non-fatal myocardial infarctions, mostly in developing countries. Research showed that treated hypertension reduces risk of myocardial infarctions by 15%.<sup>13</sup>

Our study was in agreement with the existing evidence that advancing age is a powerful cardiovascular risk factor. The CAD risk factors were clustered among patients in higher age category. The rapidly growing burden of CAD in developing countries is accelerated by population ageing. The United Nations (UN) has projected that in 2025 there will be 1.2 billion elderly people globally, with three quarters of them likely to be in developing countries.<sup>14</sup>

Currently, public health services in Pakistan are overwhelmed by increasing numbers of heart disease, stroke, cancer, diabetes and chronic respiratory disease. At the same time, health care system is let down by a model based on hospital care focused on the treatment of diseases, often centred around a few hospitals providing treatment for only a small minority of population. As a result, a large number of people with high cardiovascular risk remain undiagnosed. Globally available data supports the benefits of preventive strategies for CAD. Population wide preventive strategies can result in a major reduction in the health and socioeconomic burden caused by CAD and its risk factors in Pakistan.

## CONCLUSION

We have found a clustering of conventional risk factors in patients of CAD which are further complicated by gender based inequities. In the absence of prevention strategies, increasing numbers of people will succumb to CAD due to continuing exposure to risk factors. There is an urgent need of concrete and sustained actions towards the population based national strategy of surveillance and monitoring as well as prevention and reduction of CAD risk factors.

## ACKNOWLEDGEMENTS

We wish to thank the staff and the administration of the Department of Cardiology, Combined Military Hospital Lahore, Punjab Institute of Cardiology Lahore, Jinnah Hospital, Lahore, and Doctors Hospital Lahore for their immense support and cooperation in collection of data for this project.

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