Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/57y0g377

RISK FACTORS DISTRIBUTION AMONG PATIENTS WITH SEVERE AND NON-SEVERE CORONARY ARTERY DISEASE

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Abstract

Background and Objectives: Atherosclerotic coronary disease is the most important cause of mortality and morbidity. There are many well known risk factors of coronary artery disease. Risk factors for ischemic heart disease that can affect abnormal lipids, obesity, smoking, high blood pressure and diabetes. Association of these cardiovascular risk factors with ischemic heart disease is well established. But the association between ischemic heart disease risk factors and CAD severity on coronary angiography is less related and many studies have produced different results. To determine the association of cardiovascular risk factors in patients with severe versus non-severe coronary artery disease (CAD).

Material & Methods: A total number of 200 patients having age 30-70 years, diagnosed with severe (cases N=100) CAD and those who have insignificant CAD (control, N=100) were included in our research. The diagnosis of factors for CAD e.g. smoking, high sugar, high blood pressure and lipids, family history of CAD and obesity were made in all patients. Chi-square test was applied and odds ratio value >1 was taken significant association.

Results: Mean age in our study was 51.01+7.76 years. There were 159 (79.50%) male patients, 99 (49.50%) obese, 90 (45.0%) diabetic, 94 (47.0%) hypertensive, 77 (38.5%) smokers, 53 (26.5%) with positive family history and 17 (8.5%) dyslipidemic. Regarding association of cardiovascular risk factors with severity of CAD, smoking (odds ratio 1.73, p-value 0.04), hypertension (odds ratio 1.6, p-value 0.05), diabetes (odds ratio 1.6, p-value 0.05), and obesity (odds ratio 1.98, p-value 0.016) were independently associated with severity of CAD.

Conclusion: Smoking, hypertension, diabetes, and obesity emerged as independent predictors of severe coronary artery disease in this study, whereas dyslipidemia and family history did not show significant associations. These findings emphasize the importance of controlling modifiable risk factors to reduce the severity of ischemic heart disease in the local population.

Keywords: coronary artery disease, smoking, diabetes, hypertension, obesity

Introduction

Ischemic heart disease (IHD) is number one reason of death worldwide and it progresses over time [1]. We know many risk factors of coronary artery disease. Some risk factors are non-modifiable such

as age and gender and genetic effects. Contrary to this, the risk factors for IHD that the patient can modify or at least can change them are hypercholesterolemia, obesity, smoking, hypertension and diabetes [2,3]. Effects of these risk factors is higher when multiple of these are present. The major risk factors for IHD in terms of morbidity and mortality are also the same [4-6]. The association of these risk factors with presence of CAD and its bad effects is well established. Less consistency has found among risk enhancers and CAD severity on correlation and many studies have produced conflicting results [7-10]. Larifla et al conducted a study to find the association of these factors and disease severity in coronaries and found that diabetes and male gender are independent risk factors of severity of CAD [9] In their study the prevalence of diabetes was 52.5% in patients with severe CAD versus 35.6% in patients with insignificant CAD. The prevalence of male gender was 71.6% in severe CAD patients and 63.1% in insignificant CAD group. In another study, Josef Yanan found only hypertension as an independent predictor of severity of CAD, with prevalence rate of 84.0% and 37.5% in severe CAD group and insignificant CAD group respectively 10]. In these and other studies the prevalence of diabetes has been described from 30.2% to 52.5% in patients with severe CAD versus 12.5% to 42.6% in insignificant CAD patients [4] prevalence of dyslipidemia from 24.5% to 37.8% in severe CAD versus 25.0% to 37.6% in insignificant CAD patients, smoking 14.2% to 35.8% in severe CAD versus 0.0% to 32.4% in insignificant CAD patients.9-10 Veeranna et al. found prevalence of diabetes 31.6% in patients with severe CAD versus 27.7% in insignificant CAD patients, prevalence of dyslipidemia was 37.7% in severe CAD versus 31.4% in insignificant CAD patients, prevalence of smoking was 32.5% severe CAD versus 35.8% in insignificant CAD patients [11].

So different studies have found different risk factors of severity of CAD. The causes of different results are diverse like different disease prevalence and different interaction among risk factors and geographic differences [12,13]

Coronary artery disease is highly prevalent in Pakistan and is an important cause of death in our population.[14] Hypertension, diabetes, smoking and obesity are common documented cardiovascular risk factors of CAD in our population [14] Previous research are very limited on this issue of distribution of cardiovascular risk factors among patients with ischemic heart disease in Pakistani population. The effect on severity of CAD has not been thoroughly evaluated. So, we believe that the outcome may be different in Pakistani population as compared to the other populations because of geographic variations. Therefore, objective of our research is to study association of these with IHD and with anatomical severity. This study will help in risk stratification and diagnosis of severe CAD in patients with CAD based on the presence of these cardiovascular risk factors [5].

Materials & Methods

After approval from ethical committee of Quaid-e-Azam Medical College Bahawalpur, Pakistan, a total number of 200 patients who underwent coronary angiography in Cardiology Department of Department of Cardiology, PIC/ Quaid-e-Azam Medical College Bahawalpur, Pakistan, meeting criteria of selection were selected by non-probability consecutive sampling technique between 16-January-2023 to 15-June-2023. It is a case control study. Patients with coronary artery stenosis > 70% of total artery diameter was categorized as cases and the patients with coronary artery stenosis < 70% of total artery diameter was labelled as controls. Patients of either gender and between 30 to 70 years were included in this study. Consent was taken in a standard written form after giving full information about study.

The diagnosis of cardiovascular risk factors e.g. smoking, diabetes, hypertension, dyslipidemia, family history of CAD and obesity was made according to the operational definitions. Data regarding age, gender and duration of CAD was also noted for all patients. Coronary angiography was performed and analysed for severity of CAD. All the information gathered was entered in a predesigned proforma.

SPSS 20.0 was used to analyze quantitative and qualitative data, Mean and standard deviation were calculated for quantitative variables i.e. age and duration of CAD. Frequency and percentages were calculated for qualitative variables i.e. gender, smoking, diabetes, hypertension, dyslipidemia, family

history of CAD and obesity. Chi-square test was applied, and odds ratio were calculated to determine the association of cardiovascular risk factors with severity of CAD. Stratification of confounder variables like age, gender and duration of CAD was done. Post-stratification Chi-square test was applied, and odds ratio were calculated. Odds ratio value >1 was taken was significant association.

Results

Mean was calculated for age of patients included and it was 51.01+7.76 years. Minimum age was 31 years, and maximum age was 70 years Mean duration of coronary artery disease (CAD) in studied patients was 5.15+4.16 years. Minimum duration of CAD was 1 month, and maximum duration was 24 years.

There were 159 (79.50%) male patients and 41 (20.50%) female patients. There were 99 (49.50%) obese patients and 101 (50.50%) non-obese patients included in this study.

There were 90 (45.0%) diabetic patients and 110 (55.5%) non-diabetic patients. There were 94 (47.0%) hypertensive patients and 106 (53.0%) non-hypertensive patients in this study.

There were 77 (38.5%) smokers and 123 (61.5%) non-smoker patients.

Positive family history of CAD was presented in 53 (26.5%) patients. while remaining 147 (73.50%) did not have any family history of CAD. Dyslipidemia was diagnosed in only 17 (8.5%) patients. while remaining 183 (91.5%) patients were having normal lipid profile.

Regarding association of cardiovascular risk factors with severity of CAD. Smoking was significantly associated with severity of CAD. There were 45% smokers in cases and only 32% smokers in control group, the odds ratio was 1.73 and p-value was 0.04. Regarding association of hypertension with severity of CAD. There were 53% of hypertensive patients in cases group and 41% hypertensive patients in control group with odds ratio of 1.6 and p-value 0.05. Regarding association of diabetes mellitus with severity of CAD, there were 51 diabetic patients in cases group and 39 diabetic patients in control group. There was significant association of diabetes with severity of CAD with odds ratio of 1.62 and p-value of 0.05. In this study, I also found significant association of obesity with severity of CAD. There were 58% obese patients in cases group and only 41% obese patients in control group with odds ratio of 1.98 and p-value of 0.016. However, I did not find any association of dyslipidemia and family history of CAD with severity of CAD (Table 1).

Stratification of age, gender and duration of CAD was done to determine the effect of these confounder variables on the association of CAD risk factors with severity of CAD. There was no significant effect of any confounder variable on this association.

Table 1. Association of Cardiovascular Risk Factors with Severity of Coronary Artery Disease (CAD).

Name of Variable	Study Group		Odds Ratio		P-value
	Cases (>70%)		Controls (<70%)		
Smoking	**Yes**	45	32	1.73	0.04
	No	55	68		
HTN	**Yes**	53	41	1.6	0.05
	No	47	59		
Diabetes Mellitus	**Yes**	51	39	1.62	0.05
	No	49	61		
Dyslipidemia	**Yes**	10	7	1.47	0.44
	No	90	93		
Obesity	**Yes**	58	41	1.98	0.016
	No	42	59		
Family History	**Yes**	31	22	1.59	0.15
	No	69	78		

Discussion

In this study, we evaluated the association between cardiovascular risk factors and the severity of CAD among patients booked for angiograms for coronaries who have documented ischemic heart disease. In present study, researchers have come to find that smoking, hypertension, diabetes mellitus and obesity as significant risk factors associated with severity of CAD. Other traditional risk factors such as family history and dyslipidemia were not strongly related to the anatomical severity of disease. Our results also match with research conducted by by Veeranna et al. He concluded that diabetes is an important determinant of IHD and its severity [11]. Diabetes is also recognized as a factor responsible for progression of disease [16,17]. Glucose intolerance and insulin resistance or even impaired fasting levels still are responsible IHD development and progression [18,19]

Findings of our research support the fact that conventional risk factors responsible for CAD prevalence and its related morbidity and fatality may not have the similar effect in showing relation between severe anatomical disease burden or progressive increase in disease. Reality is that many researchers have shown discrepant results, and many other researchers have concluded that many of the conventional risk enhancers are also strongly correlated with anatomical severity [8], while some have shown that only few of these factors are good predictors of anatomical severity [7,21] Different study designs and geographic and ethnic factors are responsible for this. A study conducted by Yanan et al. concluded that hypertension is an independent risk factor of severity of CAD in elderly patients. However, these authors did not find smoking, diabetes, obesity, family history and dyslipidemia as independent risk factors of severity of CAD [10].

Other studies have found that traditional cardiovascular risk factors such as progressing age, diabetes mellitus, hypertension, dyslipidemia, smoking, and obesity are well co related with CAD [22]

In our study, we found that obesity is a risk factor for severity of CAD. Larifla et al. found that obesity is associated with lower risk of severity of CAD [9]. This opposite association has also been seen in other studies. In all these research, a referral bias can be the reason that obesity is responsible for early occurrence of coronary heart disease, and these patients are relatively younger. Referring to doctors sending obese patients early because they consider obesity as a strong risk enhancer of CAD and disease severity is less in these patients because they are at earlier spectrum of CAD [21].

Ko et al. concluded that the association between diabetes, hypertension, and smoking with obstructive coronary disease was stronger in women as compared to men [18]. These differences are even more pronounced when the impact of individual risk factors is combined, such that we observed twice the magnitude of association in predicting obstructive coronary artery disease in women than men.

So, our research shows that anatomical severity is related strongly associated with the well-established risk factors, some differences observed may be due to ethnicity and geographical factors and spectrum of disease state when patients were studied

Conclusion

The present study demonstrates that smoking, hypertension, diabetes mellitus, and obesity are independent risk factors contributing to the severity of coronary artery disease (CAD). The findings provide important evidence that these modifiable risk factors significantly influence the anatomical progression of disease in patients undergoing coronary angiography. On the other hand, family history and dyslipidemia were not found to have a statistically significant relationship with CAD severity in this sample. These results align with previous international research, while also highlighting certain differences that may be related to geographic, ethnic, or referral biases. For example, the strong association of obesity with CAD severity in this study contrasts with some reports that suggested a paradoxical or weaker relationship. This variation underscores the need to consider local population characteristics when assessing cardiovascular risk.

The outcomes of this study carry important clinical and preventive implications. Identifying smoking, diabetes, hypertension, and obesity as major contributors to severe CAD emphasizes the urgent need for targeted public health strategies focusing on lifestyle modification, early screening, and strict management of these risk factors. Effective control of blood pressure, blood glucose, and body weight,

alongside smoking cessation, can potentially reduce the burden of severe CAD and its complications in the Pakistani population.

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