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ASSESSMENT OF RISK FACTORS FOR CORONARY ARTERY DISEASE IN PATIENTS ATTENDING A TERTIARY CARE HOSPITAL: A CROSS-SECTIONAL STUDY

Original Research

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ABSTRACT

Background: Coronary artery disease (CAD) is a leading cause of global morbidity and mortality, resulting in impaired blood flow to the myocardium, myocardial infarction, and heart failure. Major risk factors include hypertension, diabetes mellitus, hyperlipidemia, smoking, physical inactivity, and advancing age. Despite the burden of CAD, limited data exists on its predictors in low-resource settings, particularly in South Asia. This study aimed to assess the frequency of conventional risk factors for CAD among patients admitted to a tertiary care hospital.

Objective: To determine the prevalence of conventional CAD risk factors, explore their association with CAD, and provide insights for targeted preventive interventions.

Methods: This cross-sectional study was conducted over six months (June to November 2024) in a tertiary care hospital. A total of 154 patients diagnosed with CAD were enrolled using non-probability purposive sampling. Data were collected through face-to-face interviews and medical record reviews using a self-structured, non-validated questionnaire. Demographic, clinical, and lifestyle variables, including physical activity, dietary habits, and smoking status, were analyzed using SPSS, with statistical significance determined by p-values.

Results: The mean age of participants was 58.01 years (SD=9.509). Hypertension was the most prevalent risk factor, affecting 79.9% (p=0.069). Diabetes was present in 61% of patients (p=0.760), while 52.6% had hyperlipidemia (p=0.960). A positive family history was reported by 37% (p=0.459). Physical inactivity was observed in 59.1%, and 55.8% consumed an unhealthy diet. Among men, 20.1% were current smokers, while no women reported smoking (p=0.000).

Conclusion: The study confirms a high burden of traditional CAD risk factors, emphasizing the need for public health interventions targeting modifiable risks such as physical inactivity, unhealthy diets, and smoking. Larger, longitudinal studies are recommended to establish causal relationships.

Keywords: Coronary artery disease, diabetes mellitus, dyslipidemia, hypertension, myocardial infarction, physical activity, smoking cessation.

INTRODUCTION

Coronary artery disease (CAD) stands as one of the most significant causes of morbidity and mortality worldwide, with cardiovascular conditions accounting for a substantial proportion of deaths in almost every country (1). Despite extensive research, the prevalence and impact of risk factors associated with CAD continue to show variability across populations due to its multifactorial nature. Established contributors, such as smoking, elevated blood cholesterol levels, hypertension, diabetes mellitus, advancing age, gender, family history, and genetic predisposition, interact in complex ways to influence outcomes (2). The economic burden of cardiovascular diseases is enormous; in the United States alone, cardiovascular illnesses cost approximately USD 180 billion annually, encompassing both direct healthcare expenses and indirect costs associated with lost productivity (3). Globally, the percentage of deaths attributed to cardiovascular disease surged from 10% to 30% over the past century, with CAD consistently identified as the leading cause of such fatalities. Alarmingly, two out of every ten deaths worldwide are directly linked to CAD (1, 2).

Latin American nations, including Brazil, Chile, and Venezuela, exhibit alarmingly high rates of obesity and dyslipidemia, making CAD a predominant health issue (4). Similarly, in Mexico, cardiovascular disease ranks as the foremost cause of mortality, fueled by a complex interplay of risk factors, including abnormal lipid metabolism that often begins in childhood and progresses into adulthood (5). In socioeconomically disadvantaged nations like Pakistan, these risk factors exert an even greater toll, given limited access to advanced healthcare facilities and preventive interventions. While individual risk factors vary in their contribution to cardiovascular outcomes, their cumulative effects create a synergistic burden, particularly in low- and middle-income countries, where contemporary risk assessment models remain underdeveloped (6). The burden of cardiovascular disease disproportionately affects Asians, particularly those residing in South Asia, where the prevalence of CAD is markedly higher compared to Western populations. This disparity is further exacerbated by socioeconomic inequalities and inadequate healthcare infrastructure, leading to a growing epidemic of non-communicable diseases (NCDs) in these regions (7). If proactive measures are not taken, the economic and social consequences of these conditions will become unsustainable, especially as NCDs are largely preventive rather than curative. This highlights the urgent need for tailored strategies to address these health challenges in a region where the prevalence of CAD at younger ages compounds the economic burden (8).

Given this context, understanding the predictors and contributory factors associated with CAD is imperative. This study seeks to identify the prevalence of established risk factors and their relationship with demographic, genetic, and lifestyle variables among patients admitted to a tertiary care hospital in Pakistan. The findings aim to inform evidence-based strategies for intervention and prevention, ultimately assisting policymakers in mitigating the burden of CAD, reducing mortality rates, and improving public health outcomes in Pakistan.

METHODS

This study employed a cross-sectional design conducted over a period of six months, from June to November 2024. A total of 154 participants were recruited using a non-probability convenience sampling method, specifically purposive sampling. Data collection was performed through face-to-face interviews and review of past medical records by the investigators, utilizing a self-structured, non-validated questionnaire. The questionnaire was designed to capture essential demographic data, including gender, age, marital status, education level, and occupation, as well as disease-related information such as diabetes, hypertension, and history of other chronic illnesses. Additionally, lifestyle factors, including physical activity levels, daily work hours, and family history of coronary artery disease (CAD), were meticulously documented. Written informed consent was obtained from all participants prior to data collection to ensure ethical compliance.

Participants were included in the study if they had a clinical diagnosis of CAD, had visited the cardiology department for CAD-related concerns during the study period, and were willing and able to provide informed consent. Exclusion criteria involved patients without a confirmed diagnosis of CAD and those unable to provide consent due to cognitive impairments or other constraints. Data were analyzed using the latest available version of SPSS (anticipated as SPSS_27). Appropriate statistical tests were applied based on the type of data

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collected, with a focus on deriving meaningful insights related to the research objectives. The study adhered to strict ethical guidelines, receiving prior approval from the institutional ethical review board of Ayub Medical College, Abbottabad.

RESULTS

The study population comprised 154 patients diagnosed with coronary artery disease (CAD). The mean age of the patients was 58.01 years, with a standard deviation of 9.509. The youngest patient was 40 years old, while the oldest was 90 years. Among the participants, 56.5% (87) were male, and 43.5% (67) were female. Most patients (87%) were married, while 12.3% were widowed, and only 0.6% were single. Educationally, 33.1% of the patients were illiterate, while 17.5% had completed primary education, and 20.8% had secondary education. Only 15% had obtained a bachelor's degree, and 13.5% had achieved a master's degree. Occupationally, 54 patients were housewives, while the rest included drivers, laborers, clerks, professors, police officers, retired professionals, and others.

Table 1 Age of the Patients

	N	Minimum	Maximum	Mean	Std. Deviation
Age	154	40	90	58.01	9.509

Table 2 Gender and Marital Status of Patients

Category	**Frequency (%age)**
Gender	
Female	67 (43.5%)
Male	87 (56.5%)
Marital Status	
Married	134 (87.0%)
Single	1 (0.6%)
Widowed	19 (12.3%)
Total	154 (100.0%)

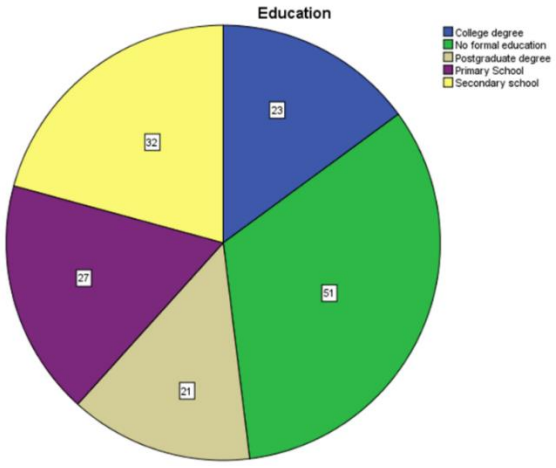

Figure 1 Educational Status of The Patients

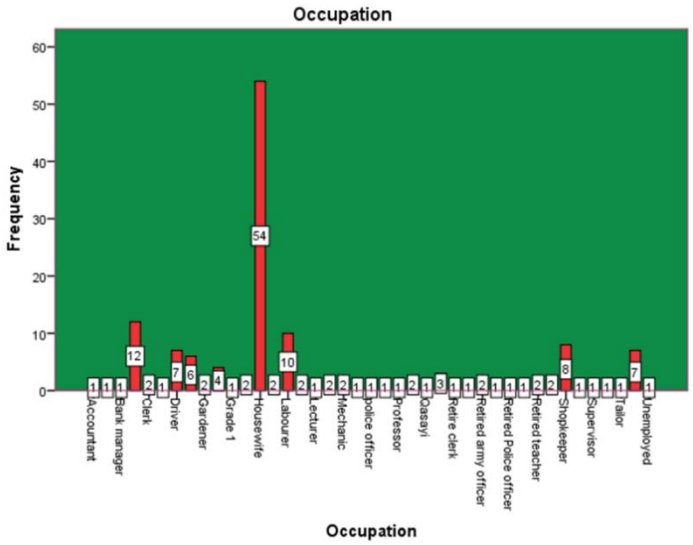

Figure 2 Occupation of the patients

Hypertension was the most prevalent clinical risk factor, present in 79.9% of the patients, while 61% had a history of diabetes mellitus. High cholesterol was noted in 52.6% of the patients. Only 37% reported a family history of CAD, and none of the participants consumed alcohol. Regarding physical activity, 59.1% of patients were sedentary, 35.7% engaged in moderate physical activity, and only 5.2% reported vigorous exercise. In terms of dietary habits, 55.8% consumed an unhealthy diet rich in saturated fats, processed foods, and sugary drinks, whereas 44.2% reported a healthy diet comprising vegetables, fruits, and whole grains.

Table 3 Physical Activity and Dietary Status of Patients

Category	**Frequency (%age)**	
Physical Activity Status		
Moderately active (30 minutes of moderate exercise most days)	55 (35.7%)	0.485
Sedentary (little to no exercise)	91 (59.1%)	
Very active (vigorous exercise most days)	8 (5.2%)	
Dietary Status		
Healthy diet (rich in vegetables, fruits and whole grains)	68 (44.2%)	0. 264
Unhealthy diet (high in saturated fats, processed foods, sugary drinks)	86 (55.8%)	
Total	154 (100.0%)	

Smoking was predominantly observed among male patients, with 20.1% being current smokers and 21.4% being former smokers, while 14% had never smoked. None of the female patients were smokers. The overall distribution of smoking habits was significant, with a p-value of 0.000.

Table 4 Risk factors for CAD

Risk Factors	**YES**		**No**		
	Frequencies (N)	**Percentage (%)**	**Frequencies (N)**	**Percentage (%)**	**p-value**
History of high blood pressure (hypertension)	123	79.9	31	20.1	0.069

Risk Factors	**YES**		**No**		
	Frequencies (N)	**Percentage (%)**	**Frequencies (N)**	**Percentage (%)**	**p-value**
History of Diabetes Mellitus	94	61.0	60	39.0	0.760
History of high cholesterol	81	52.6	73	47.4	0.960
Family history	57	37.0	97	63.0	0.459
Alcohol consumption	0	0	154	100	

Table 5 Smoking status of patients

		Smoking			**Total**	**p-value**
		Current Smoker (N)-(%)	Former smoker (N)-(%)	Never smoker (N)-(%)		
Gender	Female	0	0	67-(43.5%)	67-(43.5%)	
	Male	31-(20.1%)	33-(21.4%)	23-(14%)	87-(56.5%)	0.000
Total		31-(20.1%)	33-(21.4%)	90-(58.4%)	154-(100%)	

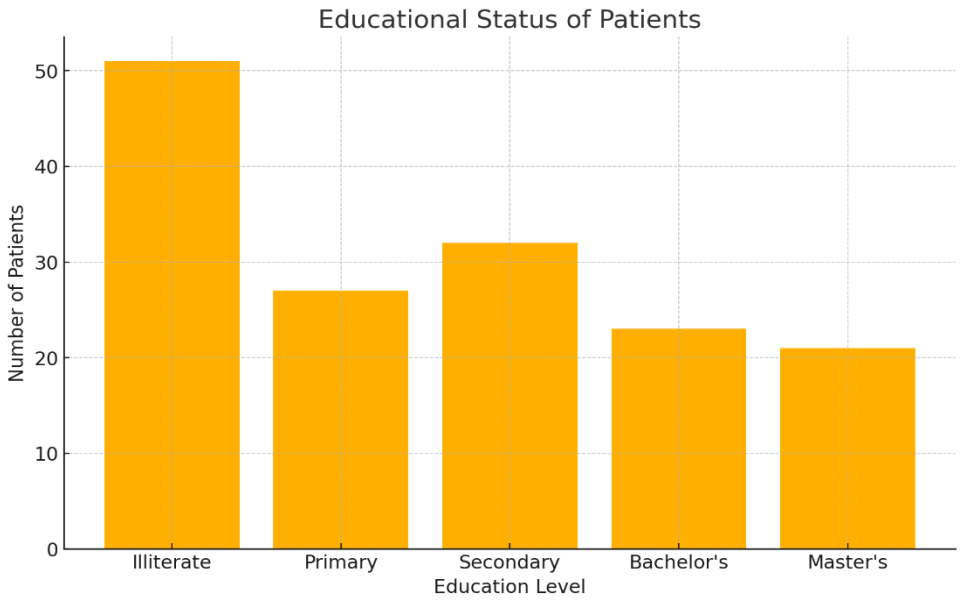

Figure 3 Educational Status of Patients

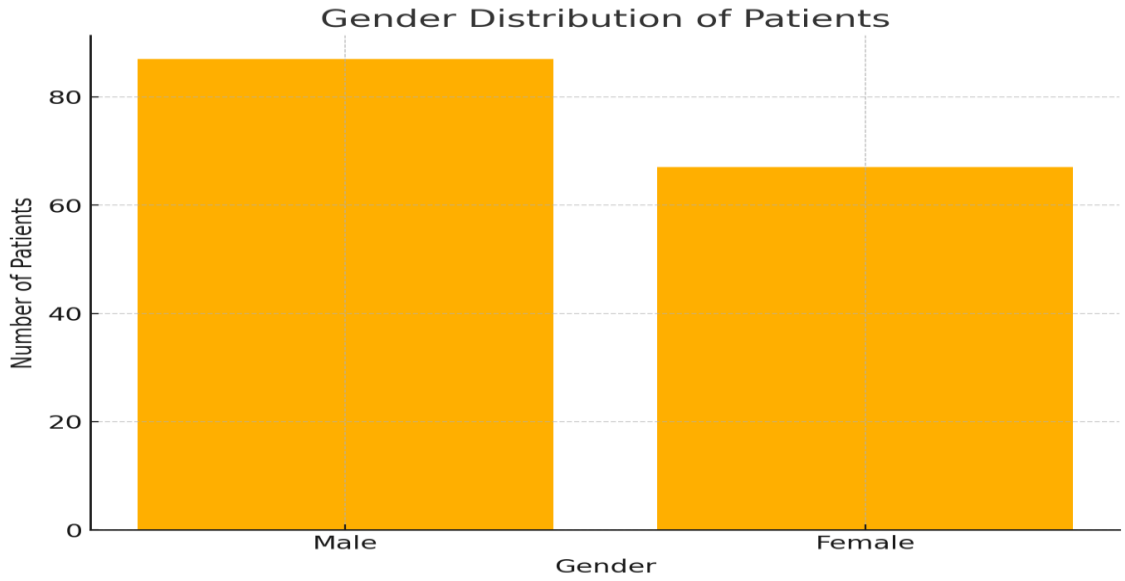

Figure 4 Gender Distribution of Patients

DISCUSSION

This cross-sectional study investigated the risk factors associated with coronary artery disease (CAD) in a tertiary care hospital and highlighted the substantial burden of modifiable and non-modifiable factors within the study population. The findings emphasize the urgent need for targeted interventions to address these factors and reduce the prevalence of CAD. The sociodemographic profile revealed that the majority of patients were married (87%), and 50.6% had either no formal education or only primary education. Lower educational attainment is widely recognized as a significant risk factor for poor health outcomes, including CAD, with individuals possessing minimal education exhibiting a higher risk of mortality compared to those with advanced degrees (9). This reflects the critical role of education in promoting awareness and adoption of preventive measures for CAD.

Hypertension was the most common modifiable risk factor, affecting 79.9% of the study population, consistent with its well-established relationship with CAD (10). Diabetes mellitus was present in 61% of patients, a finding in alignment with existing literature highlighting diabetes as a major contributor to CAD-related morbidity and mortality (11). High cholesterol levels were observed in 52.6% of participants; however, the statistical insignificance in the association may be attributed to the limited sample size, as reflected by the p-value of 0.960. Similarly, while 37% of participants had a positive family history of CAD, the lack of statistical significance (p=0.459) underscores the need for larger, multicenter studies to confirm these associations. Lifestyle factors further demonstrated significant gaps in preventive health behaviors. Physical inactivity was widespread, with 59.1% of patients being sedentary, while only 35.7% engaged in moderate activity and a mere 5.2% performed vigorous exercise. This highlights the necessity of interventions promoting physical activity, as inactivity is a well-documented risk factor for CAD (13). Diet also emerged as a critical concern, with 55.8% of participants consuming unhealthy diets rich in saturated fats, processed foods, and sugary beverages. These findings underline the need for dietary modifications as a cornerstone of CAD prevention. Notably, none of the participants reported alcohol consumption, which could reflect cultural or religious practices prevalent in the region.

Gender differences in smoking behavior were evident, with no women in the study reporting smoking, a finding consistent with cultural norms in conservative regions where female smoking prevalence remains low (14). Conversely, 20.1% of men were current smokers, and 20.3% were former smokers, reinforcing the importance of smoking cessation programs targeting male populations. Smoking remains a critical modifiable risk factor, and efforts to curb its prevalence can have a substantial impact on reducing CAD incidence. This study's strengths include its focus on a vulnerable population and its detailed assessment of sociodemographic, clinical, and lifestyle factors. However, certain limitations must be acknowledged. The cross-sectional design precludes causal inferences, and the relatively

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small sample size may have limited the statistical power to detect significant associations for some risk factors. Furthermore, data collection from a single tertiary care hospital limits the generalizability of the findings to the broader population. The use of a non-validated questionnaire may also have introduced bias in data collection.

The findings underscore the urgent need for public health interventions targeting modifiable risk factors such as physical inactivity, unhealthy diets, and smoking. Routine screening and early detection of conditions like hypertension, diabetes, and dyslipidemia should be integrated into primary healthcare services to facilitate timely management. Community-based education and awareness campaigns are essential to promote healthier lifestyles and reduce the burden of CAD. Future research should focus on multicenter studies with larger sample sizes to confirm the associations identified in this study and explore additional risk factors, including genetic susceptibility and psychosocial determinants. These efforts will be instrumental in guiding evidence-based strategies to combat the growing epidemic of CAD.

CONCLUSION

The findings of this study highlight the significant burden of traditional risk factors for coronary artery disease in the studied population, particularly hypertension, diabetes, physical inactivity, and unhealthy dietary habits. While the associations observed were not statistically significant, the trends underscore the importance of addressing modifiable risk factors to reduce the prevalence of CAD. The study emphasizes the need for comprehensive public health interventions focused on promoting healthier lifestyles, including increased physical activity, balanced diets, and smoking cessation. Future research with larger and more diverse populations, employing longitudinal designs, is essential to establish causal relationships and further guide preventive strategies.

AUTHOR CONTRIBUTIONS

Author	Contribution
Ali Mujtaba*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Muhammad Attique Ur Rehman	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Jamal Ali	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Bushra Zafar	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Maisam Tammar	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Azhar Mehmood	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Kinza Syed	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Adil Muhammad	Writing - Review & Editing, Assistance with Data Curation

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