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DETERMINATION AND ANALYSIS OF FREQUENCY OF MODIFIABLE RISK FACTORS AMONG PATIENTS SUFFERING FROM MYOCARDIAL INFARCTION PRESENTING TO PESHAWAR INSTITUTE OF CARDIOLOGY

Original Research

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ABSTRACT

Background: Cardiovascular diseases remain a leading cause of morbidity and mortality worldwide, with myocardial infarction (MI) contributing significantly to this burden. Modifiable risk factors such as smoking, hypertension, obesity, and dyslipidemia play a central role in the development and progression of MI. Understanding these risk factors is crucial for developing effective prevention strategies, particularly in high-risk populations. This study aimed to evaluate the prevalence of modifiable risk factors among patients presenting with MI and other cardiac conditions at the Peshawar Institute of Cardiology (PIC).

Objective: To identify and quantify the modifiable risk factors among patients with myocardial infarction at PIC, Peshawar.

Methods: A descriptive cross-sectional study was conducted at PIC, including 323 patients diagnosed with MI or other cardiac conditions. Convenience sampling was employed. Inclusion criteria encompassed adults admitted with cardiac-related diagnoses, while unconscious patients, those with valvular heart disease, children, or individuals unable to communicate were excluded. Data were collected using a semi-structured questionnaire and analyzed using Microsoft Excel and SPSS version 23. Frequencies, percentages, and Chi-square tests were applied to assess associations ($p<0.05$).

Results: Among the participants, 197 (61.0%) were male and 126 (39.0%) were female, with a mean age of 49.9 ± 13.3 years (range: 24–86). Smoking history was reported in 199 (61.6%), diabetes in 184 (57.0%), and hypertension in 199 (61.6%). Obesity was present in 138 (42.7%), and 155 (48.0%) had hyperlipidemia. Regular exercise was reported by only 131 (40.6%). High intake of fatty foods was noted in 181 (56.0%), while 178 (55.1%) consumed vegetables and 130 (40.2%) consumed fruits regularly. No statistically significant associations were found between individual risk factors and MI history ($p>0.05$), although trends were observed for obesity, inactivity, and fatty food intake.

Conclusion: The study highlights a high prevalence of modifiable risk factors among MI patients, notably smoking, diabetes, hypertension, obesity, and sedentary lifestyle. These findings underscore the urgent need for community-level health education and targeted intervention strategies to reduce the cardiovascular disease burden in this population.

Keywords: Cardiovascular Diseases, Diabetes Mellitus, Hypertension, Lifestyle, Myocardial Infarction, Obesity, Risk Factors.

INTRODUCTION

Cardiovascular and vascular diseases remain the leading cause of mortality among non-communicable diseases worldwide, with a significant burden now observed not only in high-income nations but also across low- and middle-income countries. The increasing prevalence of these conditions in developing regions signals a crucial epidemiological transition, wherein their mortality rates are now comparable to those caused by infectious diseases (1). Among the spectrum of cardiovascular disorders, myocardial infarction (MI) stands out due to its acute nature and potential for severe complications. MI refers to the necrosis of myocardial tissue resulting from reduced blood supply and oxygen deprivation to the myocardium, typically due to obstructed coronary arteries. When grouped with acute coronary syndrome (ACS), these conditions carry an even higher risk of morbidity and mortality (2). The pathogenesis of myocardial infarction is multifactorial, driven by a combination of modifiable and non-modifiable risk factors. While non-modifiable factors such as age, male sex, and family history cannot be altered, modifiable elements like hypertension, dyslipidemia, diabetes mellitus, obesity, smoking, poor dietary habits, and physical inactivity are pivotal in disease prevention and management (3). It is well-established that acute MI often affects individuals over the age of 45, but encouragingly, increased awareness and public health interventions targeting modifiable risk factors have led to a decline in MI incidence among younger populations (4).

To aid in risk stratification, tools such as the Framingham Cardiovascular Risk Score are widely used, incorporating variables including age, gender, blood pressure, cholesterol levels, and smoking status to estimate a person's 10-year risk of coronary artery disease (5). Global data support the urgency of such preventive measures. According to a WHO report, ischemic heart disease accounted for 8.1 million deaths globally in 2013, representing a 42% increase compared to previous years. Alarmingly, South Asia exhibits disproportionately high rates of premature cardiac deaths, affecting both younger and older age groups (6). Moreover, while some countries have robust data, others like Sri Lanka only began officially documenting ischemic heart disease-related mortality in hospital settings as recently as 1995. A wealth of evidence underscores the dominant role of modifiable risk factors in the etiology of cardiovascular disease. One study suggests that 90–94% of myocardial infarction cases are attributable to such factors in both men and women (7). In 2017 alone, cardiovascular diseases were responsible for 17.7 million of the total 55 million global deaths, reinforcing their public health significance (8). In the context of Pakistan, and more specifically Peshawar, the need to evaluate and address modifiable cardiovascular risk factors is paramount, particularly in specialized centers managing high patient volumes. Therefore, this study aims to investigate the distribution and frequency of modifiable risk factors among patients presenting to the Peshawar Institute of Cardiology (PIC), thereby offering insights that may inform targeted prevention strategies and resource allocation.

METHODS

A descriptive cross-sectional study was conducted to assess the frequency and pattern of modifiable cardiovascular risk factors among patients presenting to the Peshawar Institute of Cardiology (PIC), Peshawar. The study was carried out across multiple clinical departments including the emergency department, cardiac catheterization lab (pre-procedure room), coronary care unit (CCU), and inpatient cardiac wards. Data collection extended beyond the initially planned academic semester due to logistical delays and coordination challenges, but was successfully completed within a feasible timeframe. A total of 323 patients were enrolled in the study. The sample size was originally calculated based on a 30% expected prevalence of myocardial infarction, with a 10% anticipated non-response rate, 5% beta error, and a 95% confidence interval, resulting in a projected requirement of 355 participants. However, due to time constraints and patient availability during the data collection window, 323 patients were successfully recruited. This sample size still represented over 90% of the original estimate and was considered sufficient for achieving the study objectives and generating meaningful descriptive insights. The minimal deviation was not expected to significantly affect the reliability or validity of the findings, particularly given the descriptive nature of the research.

Participants were selected through a non-probability convenience sampling method, chosen for its practicality in a hospital-based setting. Adults aged 18 years and above who presented with cardiovascular-related complaints were included, while those who were critically ill, cognitively impaired, or declined participation were excluded from the study. Data were collected using a semi-structured questionnaire consisting of three sections: demographic information, evaluation of modifiable and non-modifiable risk factors, and

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patient awareness regarding modifiable risk factors. Information was gathered directly from patients or their attendants, following the acquisition of verbal informed consent. Strict confidentiality was maintained, and participation was voluntary. Ethical approval for the study was obtained from the Institutional Review Board (IRB), ethical principles were adhered to, and verbal consent was deemed appropriate and consistent with institutional norms for minimal-risk, survey-based research. The data were coded and entered into Microsoft Excel and subsequently analyzed using SPSS version 23. Descriptive statistics, including frequencies and percentages, were used to summarize the data. Visual representations such as graphs and charts were employed to illustrate categorical variables. Associations between selected variables were examined using the Chi-square test, with a p-value of less than 0.05 considered statistically significant.

RESULTS

The findings of this study are based on data collected from 323 patients, of whom 197 (61.0%) were male and 126 (39.0%) were female, with a mean age of 49.9 ± 13.3 years, ranging from 24 to 86 years. A substantial proportion of the participants, 185 (57.3%), presented with a history of myocardial infarction (MI), while the remaining 138 (42.7%) were admitted with other cardiac conditions without MI. In terms of comorbidities, 199 participants (61.6%) reported a positive history of smoking. The average duration of smoking was 13.87 ± 8.39 years, with a mean daily cigarette consumption of 3.29 ± 4.72, ranging from 1 to 20 cigarettes per day. A total of 184 patients (57.0%) were diabetic, with an average disease duration of 10.69 ± 7.26 years. Hypertension was reported in 199 patients (61.6%) with an average history of 8.24 ± 5.45 years. Lifestyle-related risk factors were also prominent. Although 131 patients (40.6%) reported engaging in regular physical activity, 138 (42.7%) were classified as obese and 155 (48.0%) were found to have hyperlipidemia. Regarding dietary habits, 181 patients (56.0%) consumed fatty foods, 178 (55.1%) consumed vegetables regularly, while only 130 (40.2%) reported regular fruit intake. Further analysis of the associations between lifestyle factors and myocardial infarction revealed that 102 of the patients with MI (53.1%) reported performing regular exercise, while 83 MI patients (63.4%) did not engage in regular physical activity (p=0.068). Similarly, 112 (60.5%) obese patients had a history of MI compared to 73 (52.9%) among non-obese patients (p=0.17). Among those with hyperlipidemia, 92 patients (59.4%) had experienced an MI compared to 93 (55.4%) among those without hyperlipidemia (p=0.46). Although these associations suggested trends, none of them reached statistical significance, likely due to the homogeneity of the clinical population studied.

Table 1: Comorbidities such as Risk Factors of MI and other cardiac diseases

		Frequency	Percent
Smoking			
	Yes	199	61.6%
	No	124	38.4%
History of diabetes mellitus			
	No	139	43.0%
	Yes	184	57.0%
Hypertension			
	No	124	38.4%
	Yes	199	61.6%

Table 2: Modifiable risk Predictors of cardio-vascular diseases

		Frequency	Percent
Exercise			
	No	192	59.4%
	Yes	131	40.6%
Obesity			
	No	185	57.3%
	Yes	138	42.7%
Hyperlipidemia			

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		Frequency	Percent
	No	168	52.0%
	Yes	155	48.0%

Table 3: Dietary Habit of participants

		Frequency	Percent
Fatty foods consumption			
	Yes	181	56.0%
	No	142	44.0%
Vegetables			
	Yes	178	55.1%
	No	145	44.9%
Fruits			
	Yes	130	40.2%
	No	193	59.8%

Table 4: Physical activities and obesity their link to Hyperlipidemia and MI

			Presenting with MI		p-value
			Yes	No	
Obesity	Yes	n/f	112	73	0.17
		%	60.5%	39.5%	
	No	n/f	73	65	
		%	52.9%	47.1%	
Exercise	Yes	n/f	102	90	0.068
		%	53.1%	46.9%	
	No	n/f	83	48	
		%	63.4%	36.6%	
Hyperlipidemia	Yes	n/f	92	63	0.46
		%	59.4%	40.6%	
	No	n/f	93	75	
		%	55.4%	44.6%	

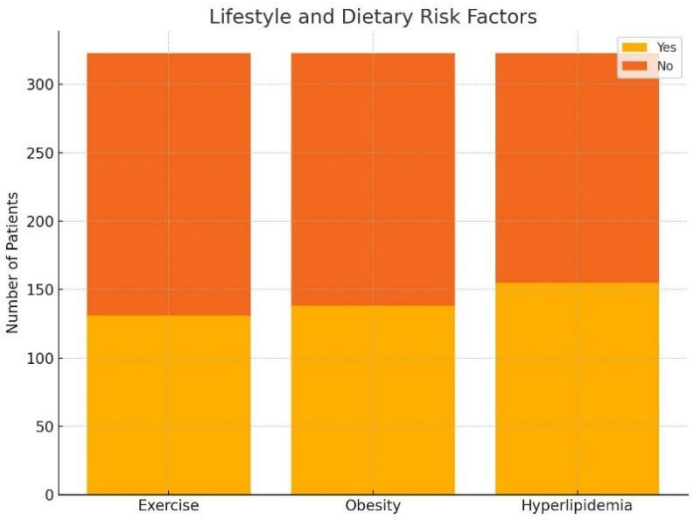


Figure 2 Lifestyle and Dietary Risk Factors

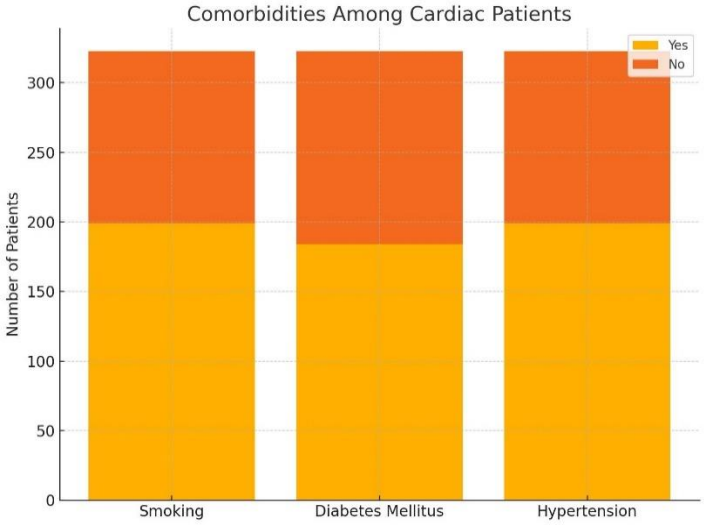
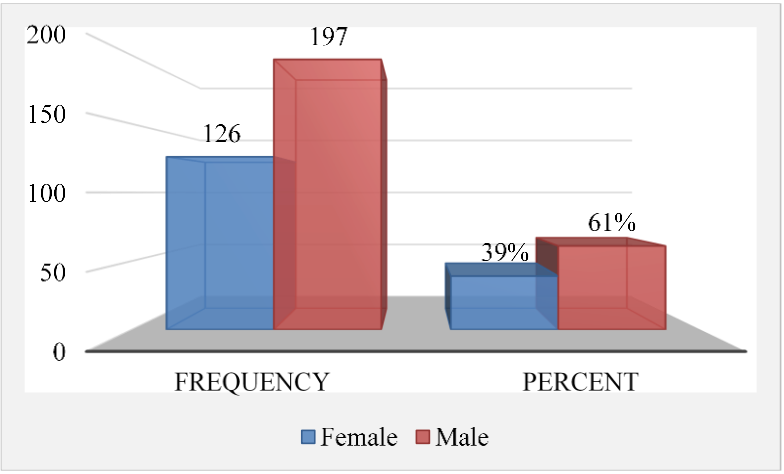


Figure 1 Comorbidities Among Cardiac Patients



Gender wise presentation of cardiac patients

DISCUSSION

The present study provided critical insights into the modifiable risk factors associated with myocardial infarction (MI) and other cardiovascular diseases (CVD) in a hospital-based population at the Peshawar Institute of Cardiology. Among the enrolled participants, the mean age was approximately 50 years, reflecting the growing burden of cardiovascular conditions in middle-aged and older individuals. This trend is well-documented in the literature, which has shown that the prevalence of CVD, including atherosclerosis and myocardial infarction, rises substantially with age due to physiological declines in cardiovascular function and increased oxidative stress, inflammation, and cellular degeneration (9,10). As age advances, vascular stiffening and endothelial dysfunction compound the risk of ischemic events, highlighting the importance of age as a key non-modifiable risk factor. The study revealed that 57.3% of patients had a history of MI, indicating a significant burden of ischemic heart disease within the hospital population. Anatomical findings from previous dissections support the conclusion that anterior and inferior walls of the myocardium are frequently involved in infarction, which aligns with the current study's clinical profiles. Although inferior wall infarctions are generally associated with better outcomes, complications such as hypotension and right ventricular involvement can still increase the risk of adverse outcomes (11,12).

Modifiable comorbidities including smoking (61.6%), diabetes mellitus (57.0%), and hypertension (61.6%) were highly prevalent among participants. These findings are consistent with other large-scale analyses that identified diabetes and hypertension as major contributors to CVD morbidity and mortality globally. One meta-analysis involving over four million individuals demonstrated that

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diabetes alone was associated with coronary artery disease and stroke, accounting for a significant proportion of cardiovascular deaths (13,14). The current study also found that the average duration of smoking was over 13 years, with even low daily cigarette use contributing significantly to cardiovascular strain through mechanisms such as tachycardia, elevated blood pressure, and oxidative stress (15). The prolonged history of diabetes and hypertension in participants further illustrated the cumulative risk posed by poorly managed chronic conditions. In terms of lifestyle habits, only 40.6% of patients reported engaging in regular physical activity, while 42.7% were obese and 48.0% had hyperlipidemia (16). The low level of physical activity and the presence of unhealthy body weight are in line with previous studies that documented a positive association between physical inactivity, obesity, and CVD outcomes. While the current study did not find statistically significant associations between these risk factors and MI ($p > 0.05$), the trends suggest a clinical relevance that warrants further exploration in larger or longitudinal studies. The dietary behavior of participants also reflected common risk patterns, with 56.0% consuming fatty foods and only 40.2% reporting regular fruit intake. These patterns are corroborated by studies showing that low fruit and vegetable consumption is linked to elevated blood pressure and cardiovascular risk, especially among older women with irregular dietary routines (17,18).

Interestingly, while no significant gender difference was observed in MI prevalence in the current study ($p=0.465$), global literature suggests that men typically have a higher risk of MI, while women often present with atypical symptoms such as fatigue, nausea, and delayed hospital presentation. Such gender-based differences in symptom recognition and healthcare-seeking behavior may contribute to disparities in outcomes and diagnosis (19,20). Moreover, hormonal differences, antioxidant depletion, and autonomic dysfunction in older women may exacerbate disease severity, while men often present with silent or unrecognized MI events, potentially due to differences in pain thresholds and fat distribution patterns (21,22). The findings also pointed to a limited level of awareness among patients regarding cardiovascular risk factors. A significant proportion of participants had minimal understanding of lifestyle-related contributors to heart disease, a challenge echoed in several previous studies. Limited health literacy, inadequate public health campaigns, and a lack of structured counseling in healthcare settings have all been cited as barriers to patient education. In resource-limited settings, particularly those without structured cardiac rehabilitation programs, this knowledge gap can hinder both primary and secondary prevention efforts (23,24).

This study has several strengths, notably being the first of its kind at a tertiary cardiac care facility in Peshawar. Its findings offer vital baseline data that can inform future health strategies at both institutional and regional levels. The hospital-based nature of the study ensured access to detailed clinical information and direct interaction with patients and caregivers. However, the study is not without limitations. The use of convenience sampling and reliance on self-reported data may introduce selection and reporting biases. The absence of biochemical verification of certain risk factors, such as lipid profiles or glycemic indices, may have limited the accuracy of some findings. Additionally, the cross-sectional design precludes causal inferences, highlighting the need for future case-control or longitudinal studies to establish stronger associations. Given these findings, further research is warranted to investigate the causal relationships between modifiable risk factors and MI using more robust study designs. There is also a pressing need to enhance preventive strategies, particularly in the domains of physical activity, dietary behavior, and patient education. Structured counseling sessions, community outreach programs, and targeted interventions aimed at improving health literacy can significantly mitigate the burden of CVD in such high-risk populations. Developing gender-sensitive strategies and addressing age-related vulnerabilities can also enhance early detection and improve outcomes. Investing in such initiatives is essential to curbing the rising tide of cardiovascular disease in developing regions.

CONCLUSION

This study underscored the significant burden of myocardial infarction and other cardiovascular diseases among patients presenting at the Peshawar Institute of Cardiology, revealing a strong association with modifiable risk factors such as hypertension, smoking, diabetes, obesity, poor dietary patterns, and elevated cholesterol levels. These findings highlight the urgent need for early identification and proactive management of lifestyle-related risk factors to reduce the incidence and severity of cardiovascular events. Although the study did not directly assess awareness levels, the evident lack of adherence to healthy behaviors points toward a potential gap in patient education. The insights generated from this research can guide targeted interventions and health promotion strategies aimed at improving cardiovascular outcomes in high-risk populations.

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AUTHOR CONTRIBUTION

Author	Contribution
Muhammad Irfan	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Bilawal Habib	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
Ummad Israr	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Zaib-un-Nisa Wagma	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Hazrat Abbas	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Nasir Farooq Khan*	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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