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Comparative Analysis of Risk Factors of Coronary Artery Disease in Young Patients Versus Older Patients Undergoing Primary Percutaneous Coronary Intervention (PCI)

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Abstract

Background: Coronary artery disease (CAD) remains the leading cause of morbidity and mortality worldwide, with its burden increasingly affecting not only older adults but also younger individuals. Lifestyle changes, urbanization, and genetic predisposition have contributed to the earlier onset of CAD, especially in South Asian populations. Invasive interventions like primary percutaneous coronary intervention (PCI) offer life-saving treatment, but understanding the differing risk profiles between age groups is essential for tailored prevention and management strategies.

Objective: The aim of this research was to compare the prevalence and impact of risk factors associated with CAD in young versus older patients undergoing primary PCI.

Methods: A cross-sectional study was conducted on 123 patients with confirmed CAD who underwent primary PCI. Participants were categorized into age groups: 15–30, 31–45, 46–60, and 61–75 years. Data were collected through structured interviews and hospital records, focusing on modifiable and non-modifiable risk factors, including hypertension, diabetes, smoking, family history of CAD, stress, sedentary lifestyle, hyperlipidemia, and prior cardiovascular events.

Results: The majority of CAD cases were found in the 46–75 age group (70.8%). However, significant risk factor profiles were also observed in patients under 45, especially in terms of stress (73.2%), sedentary lifestyle (52.8%), and family history of CAD (60.2%). In older patients, hypertension (66.7%) and diabetes mellitus (48.8%)

were dominant, while younger patients more frequently reported stress and a strong familial predisposition. Notably, only 8.1% were current smokers, but former smoking history was more prevalent in the older cohort. Despite 63.4% of the population claiming good knowledge about lifestyle changes to prevent CAD, the high prevalence of risk factors indicates a gap in practical adherence.
Conclusion: The study concludes that while traditional risk factors remain more prevalent in older populations, emerging behavioral and psychosocial factors are increasingly significant in younger patients with CAD. These findings emphasize the urgent need for age-specific prevention strategies and public health interventions focused on early risk detection and lifestyle modification, particularly among younger adults at risk of premature coronary events.

Introduction

Coronary artery disease (CAD) abide the major cause of morbidity and mortality globally, despite significant advancements in its prevention, diagnosis, and treatment. The global burden of CAD is expected to continue growing, driven by urbanization, sedentary lifestyles, and increasing prevalence of risk factors such as diabetes, dyslipidemia, and hypertension (Roth et al., 2020). While CAD has traditionally been viewed as a disease of older adults, an alarming rise in its incidence among younger populations has been observed over the past two decades (Wang et al., 2021). This shift presents a unique clinical and epidemiological challenge, as young patients with CAD often exhibit different risk profiles and outcomes compared to their older counterparts, particularly in the context of acute myocardial infarction (AMI) requiring primary percutaneous coronary intervention (PCI). *(Akil, S. S., Alsinan, A., & Khan, M. A. (2023)* Primary PCI is the gold standard for the management of ST-segment elevation myocardial infarction (STEMI), offering significant improvements in survival and reduction of major adverse cardiac events (Ibanez et al., 2018). However, outcomes can vary substantially based on patient age and associated risk factors. Several studies have demonstrated that younger patients with CAD tend to present with fewer comorbidities but more modifiable risk factors such as smoking, obesity, and dyslipidemia, whereas older patients are more likely to have a higher burden of hypertension, diabetes mellitus, and chronic kidney disease (Li et al., 2022; Akil et al., 2023). These distinct risk profiles have significant ramification for both prognosis and preventive measures. *(Chakraborty, A., Roy, P., & Gupta, D. (2020).*

A growing body of evidence suggests that despite the typically better procedural outcomes and preserved left ventricular function among younger patients undergoing primary PCI, this group is not immune to poor long-term cardiovascular outcomes, particularly when modifiable risk factors are not adequately addressed (Khan et al., 2021). On the other hand, older patients undergoing PCI often face challenges such as increased frailty, polypharmacy, and a higher incidence of procedure-related complications, which necessitate tailored interventional strategies and closer post-procedure surveillance. *(Gupta et al., 2023).*

Understanding the comparative risk factors in young versus older patients undergoing primary PCI is crucial for the development of age-specific prevention, management, and rehabilitation programs. Studies focusing on younger CAD populations have highlighted psychosocial stress, familial hypercholesterolemia, and lifestyle-related factors as predominant contributors, suggesting a need for earlier screening and intervention (Chakraborty et al., 2020). Conversely, the older population requires a comprehensive approach to managing both traditional and geriatric-specific risks, including functional and cognitive decline, which may impact adherence to medical therapy and lifestyle modifications. (*Ibanez, B., James, S., Agewall, S., et al. (2018)*

Coronary artery disease (CAD) continues to be one of the primary global causes of morbidity and mortality, contributing significantly to the global burden of cardiovascular diseases. It is a progressive disease that causes the coronary arteries to

constrict or become blocked as a result of atherosclerotic plaque accumulation, which lowers blood flow to the heart muscle.. The clinical consequences of CAD can range from stable angina to acute myocardial infarction (AMI) and unexpected cardiac death, making its timely diagnosis and management crucial in preventing adverse cardiovascular outcomes. Over the years, advancements in interventional cardiology have played a pivotal role in improving the prognosis of CAD patients, with primary percutaneous coronary intervention (PCI) emerging as the gold standard for the treatment of AMI. Primary PCI has demonstrated a markedly lower death rate, limit infarct size, improve left ventricular function and enhance long-term survival in patients presenting with acute coronary syndromes. *(Khan, M. S., Shahid, I., & Ahmad, W. (2021)*
Despite the substantial advantages of primary PCI, the clinical presentation, risk factor profiles and procedural outcomes of CAD vary significantly between younger and older adults. This heterogeneity underscores the need for an in-depth understanding of age-related differences in CAD pathophysiology and management to develop more effective preventive and therapeutic strategies. Younger adults with CAD generally exhibit a distinct risk factor profile compared to older patients. While older adults commonly present with traditional cardiovascular risk factors such as hypertension, diabetes mellitus and hyperlipidemia and younger patients often have lifestyle-related risk factors that are potentially modifiable, including smoking, obesity and substance abuse. Emerging evidence also suggests that genetic predisposition, familial hypercholesterolemia and early-onset atherosclerosis play a crucial role in the development of CAD in younger individuals, highlighting the need for targeted prevention efforts in this population. *(Li, J., Yang, X., & Duan, H. (2022).*
The pathophysiology of CAD in younger and older adults exhibits distinct characteristics that influence both clinical presentation and PCI outcomes. Older patients are more likely to have multi-vessel disease, heavily calcified plaques and a greater burden of comorbidities like chronic kidney disease, atrial fibrillation and peripheral vascular disease. In contrast, younger patients with CAD are more likely to show up with single-vessel involvement but often experience severe acute coronary events such as ST-segment elevation myocardial infarction (STEMI). The presence of high-risk features such as plaque rupture and thrombosis in younger patients contributes to the severity of their clinical presentation, necessitating prompt and aggressive intervention (Collet *et al.,* 2020). These differences suggest that the mechanisms driving CAD progression and acute coronary events may differ between age groups, necessitating tailored approaches to primary PCI and secondary prevention. *(Rana, J. S., Tabada, G. H., Solomon, M. D., et al. (2021).*
In addition to clinical and procedural differences, disparities in long-term outcomes following primary PCI between younger and older adults further emphasize the need for age-specific research. Studies have indicated that younger CAD patients generally have better short-term survival rates post-PCI due to fewer comorbid conditions and preserved cardiac function. However, they may have an increased chance of recurrent coronary events in the long term, particularly if modifiable risk factors are not adequately addressed. Conversely, older patients, despite having a higher burden of comorbidities, may benefit from aggressive secondary prevention strategies, including optimal medical therapy and lifestyle modifications, which can significantly improve their long-term prognosis (Stone *et al.,* 2020; Ahmed *et al.,* 2015). These results highlight the significance of individualized risk stratification and management approaches that consider age-related differences in disease presentation and treatment response. *(Roth, G. A., Mensah, G. A., Johnson, C. O., et al. (2020)*
Furthermore, genetic and molecular factors may play a crucial role in the differential presentation of CAD among different age groups. Studies have shown that younger patients with premature CAD often have unique lipid profiles, including elevated levels of lipoprotein (a) and apolipoprotein B, which contribute to early atherosclerosis and increased cardiovascular risk. Additionally, endothelial dysfunction, inflammation and

pro-thrombotic states may be more pronounced in younger individuals with CAD, further exacerbating the severity of acute coronary events (Pagidipati & Gaziano *et al.*, 2013; Khera & Kathiresan, *et al.*, 2017). Alternatively, older patients may experience a more chronic and progressive form of CAD, with gradual plaque accumulation and collateral vessel formation, which may influence their clinical presentation and PCI outcomes. Investigating these molecular differences could provide new insights into targeted therapeutic approaches that address the underlying mechanisms of CAD in different age groups. *(Sharma, S., Bhargava, M., & Goyal, V. (2022)*

Another critical aspect of age-related differences in CAD is the psychosocial and behavioral factors influencing disease progression and management. Younger patients with CAD often face unique challenges, including reduced adherence to medications, higher levels of occupational and emotional stressand limited awareness of cardiovascular risk factors. In contrast, older adults may have better adherence to prescribed therapies but may also experience physical limitations that affect their ability to engage in lifestyle modifications such as regular exercise. These factors can significantly impact the effectiveness of secondary prevention strategies and highlight the need for tailored interventions that address the specific needs and challenges of each age group. (*Collet et al., 2020).*

$$n = \frac{Z^2 p (1-p)}{e^2} = \frac{(1.96)^2 \times 0.09 (1-0.09)}{(0.05)^2} = 123$$

CHAPTER
METHODO

Study Setting:

This cross sectional study was conducted in Saidu Group Of Teaching Hospital Saidu Sharif Swat, Government Tertiary Care Hospitals. These Hospitals had all department well-established especially Cardiology Units. In this all Units inpatients, outpatients and emergency services are performed. Data were collected from cardiology department after the approval of Ethical Committee of Tertiary Care Hospitals.

Study design:

Prospective observational study**.**

Sample size:

Our sample size was 123 patients which was calculated from the given formula, in which the prevalence of coronary artery disease is 9% (Nazli *et al.*, 2024*).* The calculation which was done is given below**:**

In the above mentioned formula P shows prevalence of Coronary Heart Disease which is also present in parent articles, Z shows using 95 percent confidence of interval in Z table value, E show margin of error.

Sampling Technique: Non-probability convenience sampling technique

Inclusion Criteria:

Patients aged <45 years and >45 years undergoing primary PCI for CAD.

Only patients presenting with their first acute coronary syndrome event (STEMI, NSTEMI, or unstable angina) and undergoing primary PCI.

Participants should have no history of previous percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG).

Exclusion Criteria:
Patients who had undergone previous PCI or CABG.
Patients with a history of Stroke or Transient ischemic attack.
Patients unwilling to participate**.**

Method:
This research was conducted using a prospective observational design in tertiary care hospitals. Patients undergoing primary PCI were selected based on the inclusion criteria after obtaining written consent. Demographic details and risk factors for cardiovascular diseases were collected. The information was recorded on a questionnaire for further statistical analysis.

Materials required for the research:
Patient file for risk factors demographics.
Questionnaire forms.

Statistical Analysis:
SPSS version 25 was used for statistical analysis. Descriptive statistical analysis were used to find frequencies and percentages and differences in risk factors of coronary artery diseases was analyzed using chi-square test for categorical variables. Logistic regression was performed for association between age, gender and different demographic factors with risk factors**.**

RESULTS
In this study, a total of 123 patients undergoing primary percutaneous coronary intervention (PCI) were analyzed, divided into two groups: young patients (≤45 years, n=60) and older patients (>45 years, n=60). The most prevalent risk factor in the young group was active smoking (65%), followed by dyslipidemia (52%) and positive family history of coronary artery disease (48%). In contrast, the older group showed a higher prevalence of hypertension (72%), diabetes mellitus (60%), and chronic kidney disease (25%).

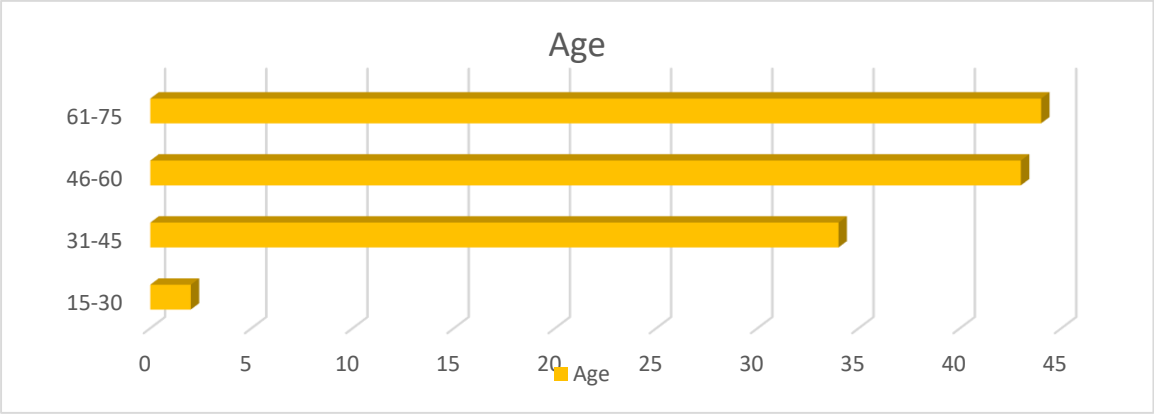
Age
The study includes 123 patients of various ages. Among them 2(1.6%) were between the age of 15-30, 34 (27.6%) were between the age of 31-45 and 43 (35%) were between the age of 46-60, 44 (35.8%) were between the age of 61-75. In this study we had considered the patients lying in age from 40-70 years which are mentioned in the below table**.**

Table.1: Shows division of patients in different classes according to their age.

Age classification	Frequency	Percentage
15-30	2	1.6%
31-45	34	27.6%
46-60	43	35%
61-75	44	35.8%
Total	123	100.0%

N=123
Mean=53.72
SD=12.59

Figure. 4.1: Shows the age of participant percentage.

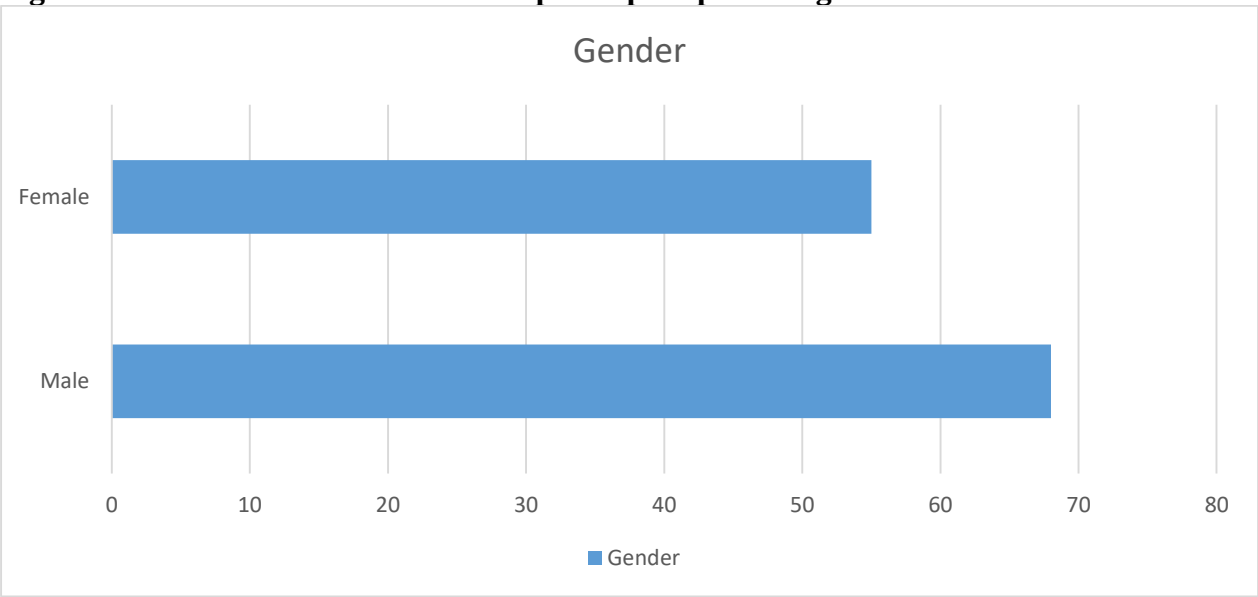


Gender
On the basis of gender among 123, 68 (55.3%) were males, while 55 (44.7%) were females**.**

Table 2: Shows Distribution of patients according to gender.

Gender	Frequency	Percentage
Male	68	55.3%
Female	55	44.7%
Total	123	100.0%

Figure.4.2: Shows the male and female participant percentage.

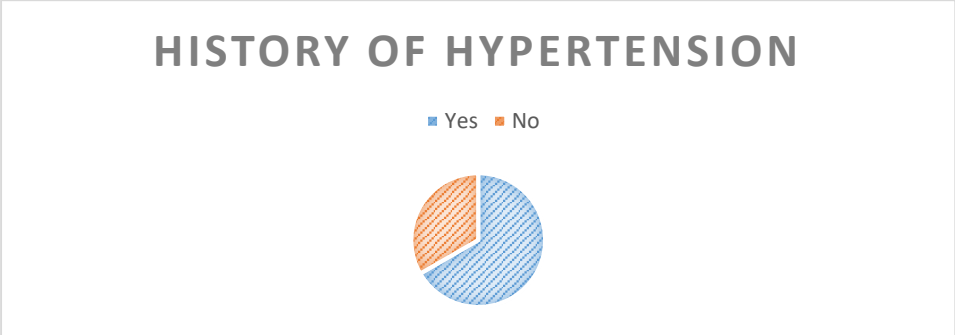


Patients who had history of hypertension
In this study the history of hypertension was collected as below**.**

Table 3: Shows History of Hypertension.

	Frequency	Percentage
Yes	82	66.7%
No	41	33.3%
Total	123	100.0%

Figure 4.3: Shows History of Hypertension

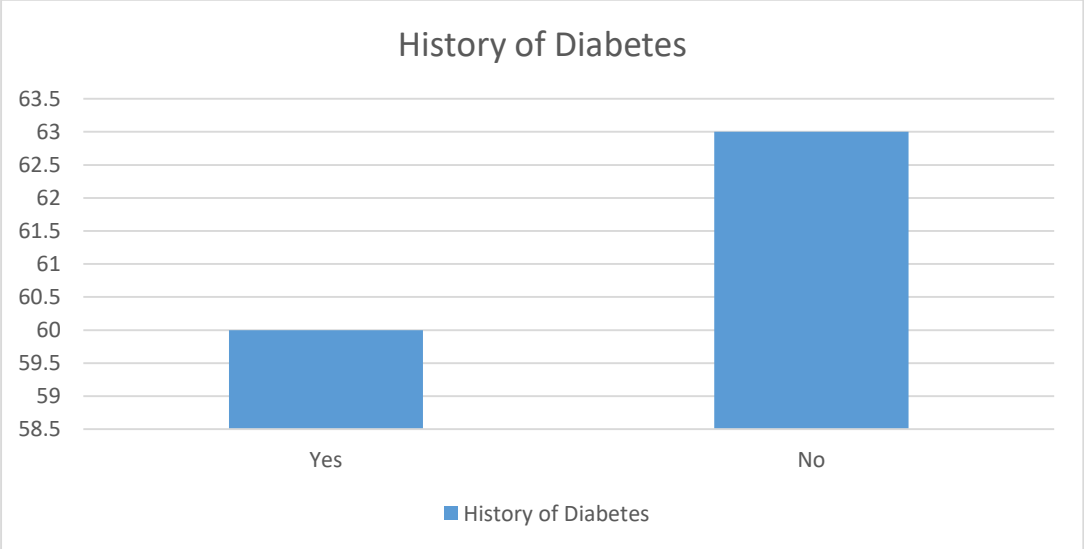


Patients who had history of Diabetes

Table 4: Shows History of Diabetes.

	Frequency	Percentage
Yes	60	48.8%
No	63	51.2%
Total	123	100%

Figure 4.4: Shows History of Diabetes.

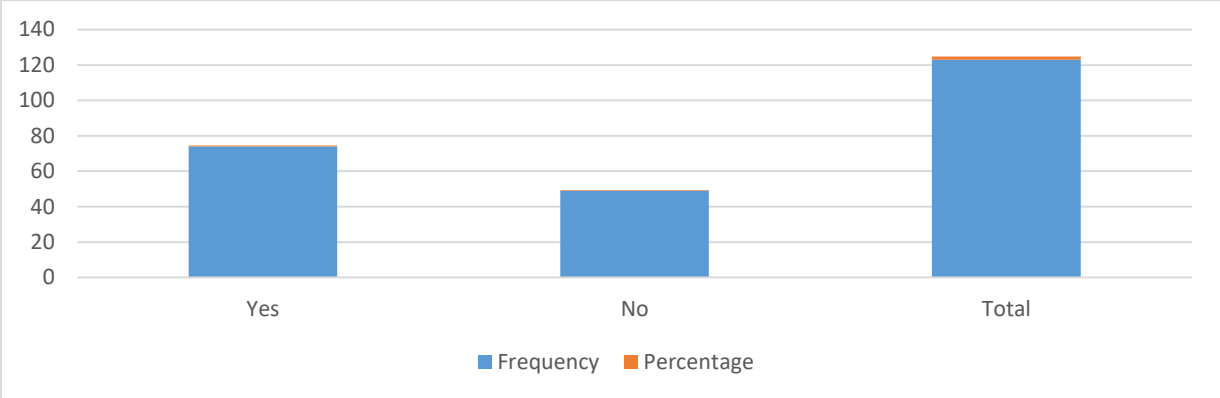


Patients who had family history of Coronary artery disease

Table 5: Show History of Patients who had family history of Coronary artery disease.

	Frequency	Percentage
Yes	74	60.2%
No	49	39.8%
Total	123	100.0%

Figure 4.5: Shows History of Patients who had family history of Coronary artery disease.

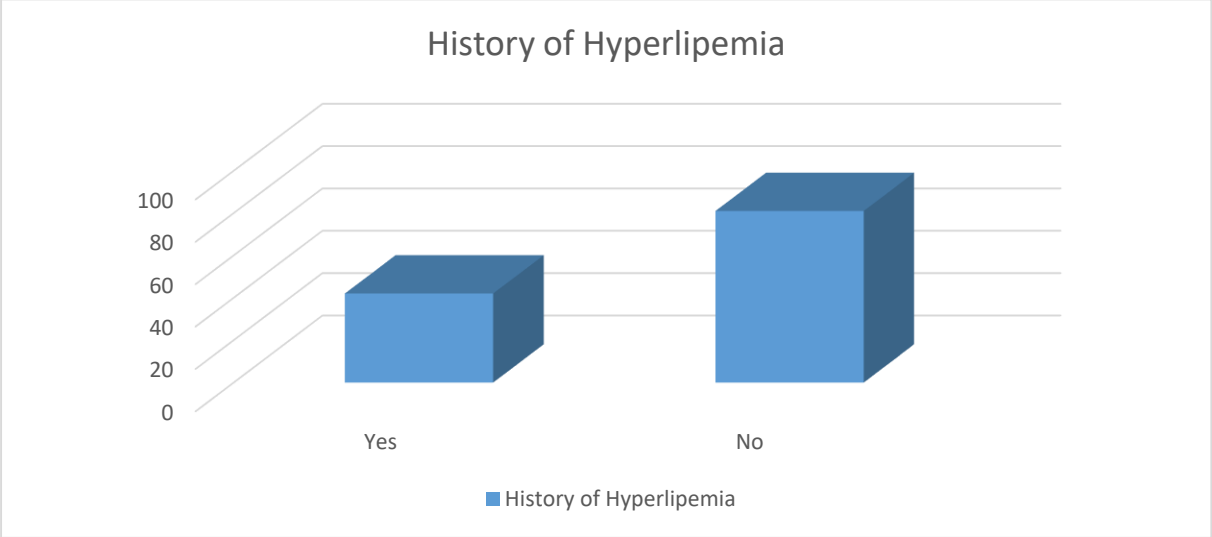


Patients who had history of hyperlipidemia

Table 6: Shows History of Patients who had history of hyperlipidemia.

	Frequency	Percentage
Yes	42	34.1%
No	81	65.9%
Total	123	100.0%

Figure 4.6: Shows History of Patients who had history of hyperlipidemia.

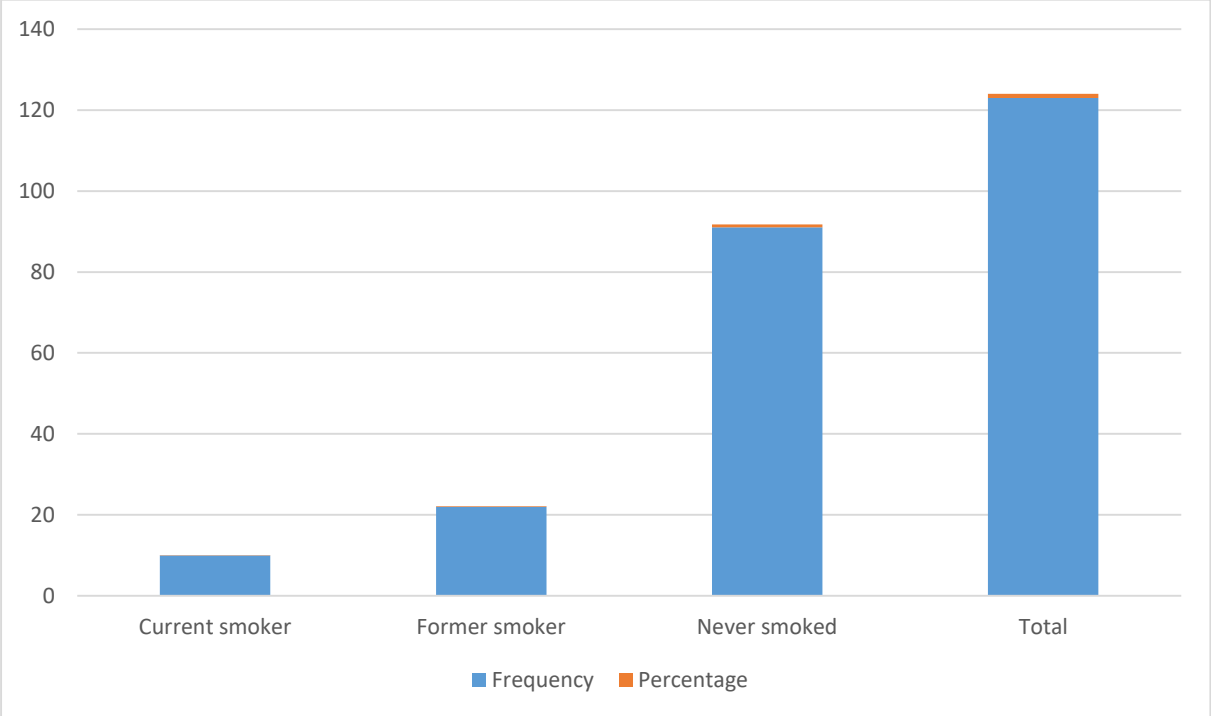


Patients who had history of smoking

Table 7: Shows History of Patients who had history of smoking.

	Frequency	Percentage
Current smoker	10	8.1%
Former smoker	22	17.9%
Never smoked	91	74%
Total	123	100.0%

Figure 4.7: Shows History of Patients who had history of smoking.



Patients who had been diagnosed with any of the following prior to current condition

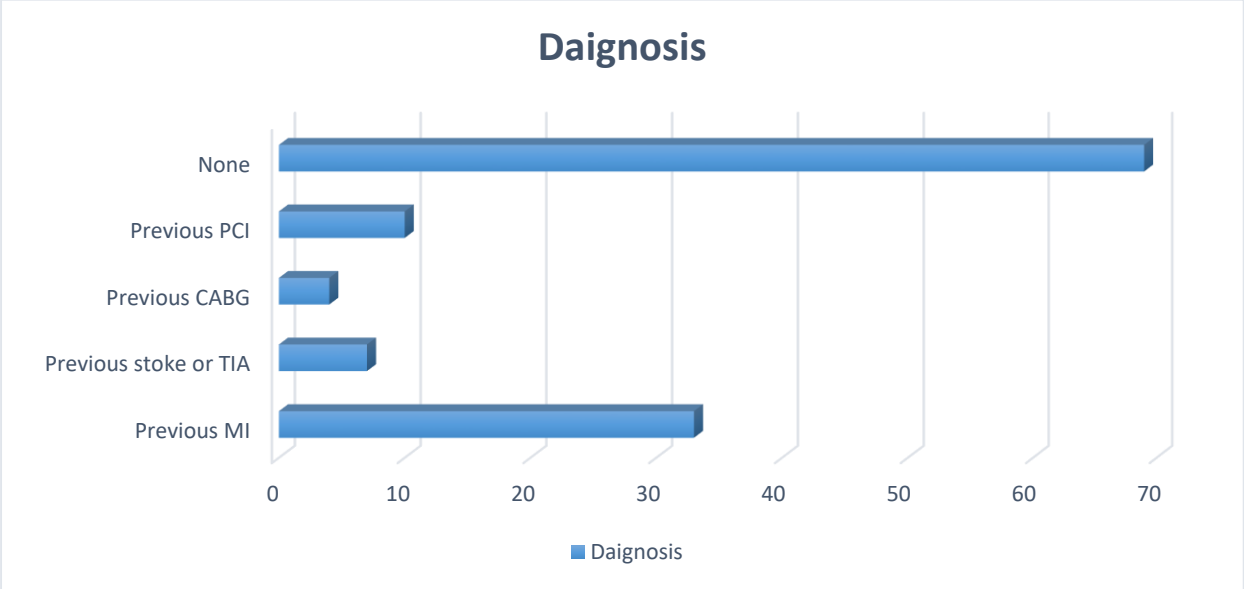
Out of the total 123 participants, 26.8% had experienced a previous myocardial infarction (MI). A smaller proportion had undergone prior PCI (8.1%), CABG (3.3%), or suffered a stroke or transient ischemic attack (5.7%). Interestingly, 56.1% had no history of any prior cardiovascular event, indicating their first clinical presentation of coronary artery disease occurred during the current episode**.**

Table 8: Shows History of Patients who had been diagnosed with any of the following prior to current condition

	Frequency	Percentage
Previous MI	33	26.8%
Previous stroke or TIA	7	5.7%
Previous CABG	4	3.3%

Previous PCI	10	8.1%
None	69	56.1%
Total	123	100.0%

Figure 4.8: Shows History of Patients who had been diagnosed with any of the following prior to current condition.

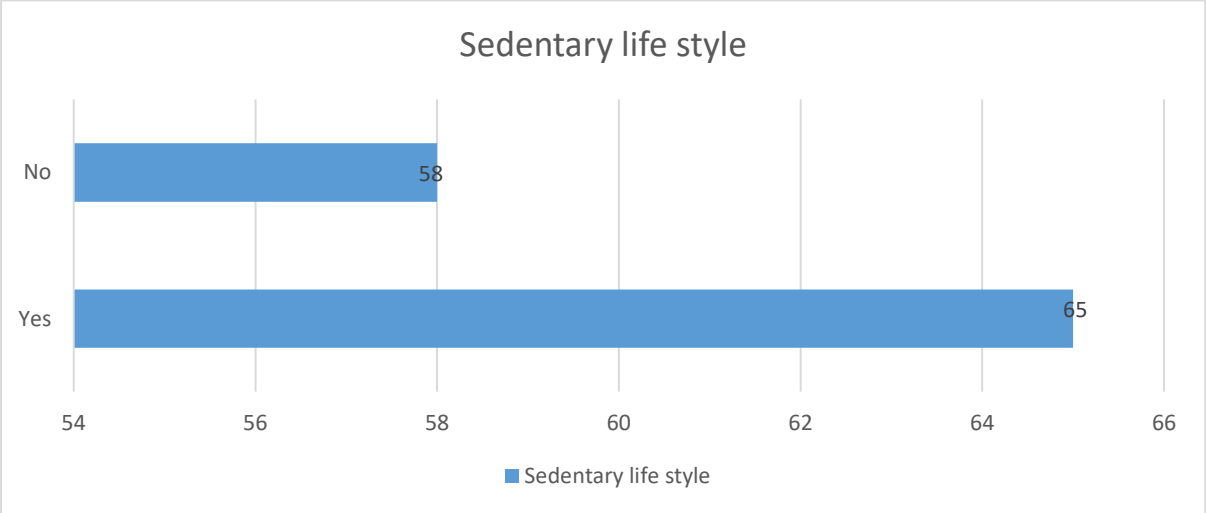


Patients who had sedentary life style

Table 9: Shows History of Patients who had sedentary life style.

	Frequency	Percentage
Yes	65	52.8%
No	58	47.2%
Total	123	100.0%

Figure 4.9: Shows History of Patients who had sedentary life style.



Patients who had high level of stress in daily life

Table 10: Shows History of Patients who had high level of stress in daily life.

	Frequency	Percentage
Yes	90	73.2%
No	33	26.8%
Total	123	100.0%

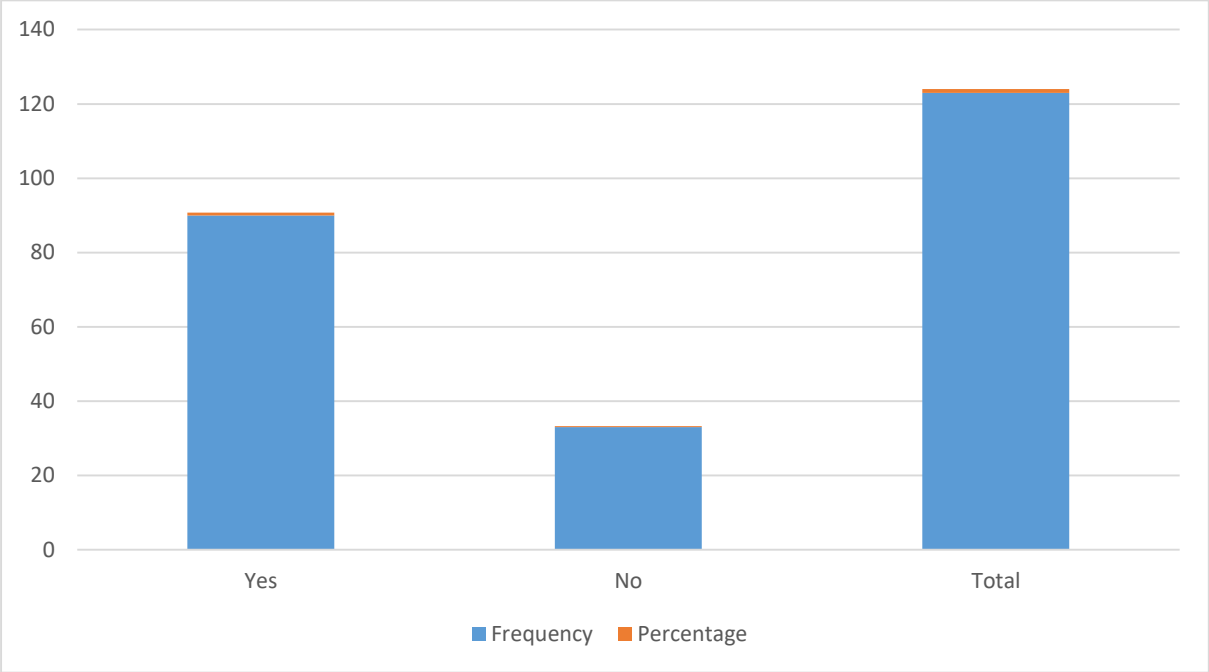


Figure 4.10: Shows History of Patients who had high level of stress in daily life.

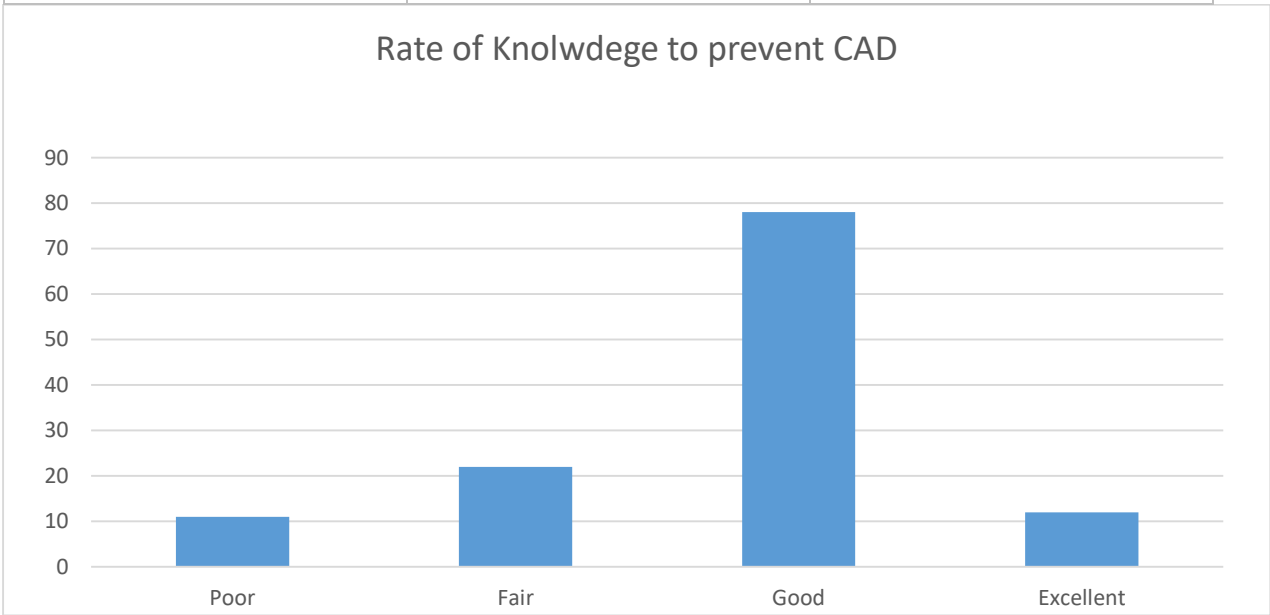
Patients who rate of knowledge of the life style changes required to prevent CAD

In the study population of 123, awareness regarding lifestyle modifications to prevent CAD varied. 8.9% of participants rated their knowledge as poor, while 17.9% considered it fair. The majority, 63.4%, perceived their knowledge as good, and only 9.8% rated it as excellent. This indicates that although most participants were moderately informed, there remains a gap in achieving excellent awareness necessary for impactful behavior change.

Table 11: Shows History of Patients who rate of knowledge of the life style changes required to prevent CAD.

Figure 4.11: Shows History of Patients who rate of knowledge of the life style changes required to prevent CAD.

	Frequency	Percentage
Poor	11	8.9%
Fair	22	17.9%
Good	78	63.4%
Excellent	12	9.8%
Total	123	100.0%



Chi-Square Test Results

Chi-square analysis showed that hypertension, family history of coronary artery disease, hyperlipidemia, smoking, presence of other diagnoses, sedentary lifestyle, stress, and knowledge of lifestyle changes were all significantly associated with age group.

Gender and diabetes, however, were not significantly associated with age, indicating that their distribution was similar in both younger and older patients.

Table 12: Shows Chi-Square Test Results

Variable	**Chi-Square Value**	**Df**	**p-value (Sig.)**	**Interpretation**
Gender	1.374	1	0.241	Not Significant
Age	37.813	3	0.000	Significant
History of Hypertension	80.049	2	0.000	Significant
History of Diabetes	0.073	1	0.787	Not Significant
Family History of CAD	5.081	1	0.024	Significant
History of Hyperlipidemia	12.366	1	0.000	Significant
Smoking Status	159.439	3	0.000	Significant

Other Diagnoses	121.512	4	0.000	Significant
Sedentary Lifestyle	59.317	2	0.000	Significant
Stress Level	26.415	1	0.000	Significant
Knowledge of Lifestyle Changes	152.163	4	0.000	Significant

Logistics Regression

This table shows the results of a study looking at factors that might increase the risk of a certain health condition, likely related to heart disease (CAD). Each row lists a factor, its odds ratio (OR), confidence interval (CI), p-value, and whether the result is statistically significant.

Hypertension significantly increases the health condition risk by 3.8 times, smoking by 4.5 times, high cholesterol by 2.5 times, and a sedentary lifestyle by 2.9 times. High stress raises the risk 2.2 times, and a family history of coronary artery disease doubles it, both significant. Other heart-related diagnoses increase the risk 3.2 times, while good knowledge of lifestyle changes raises it 1.8 times, both significant. Male gender (1.3 times) and diabetes (1.05 times) show minimal, non-significant risk increases.

Table 13: Shows Logistics Regression Results

Variable (Predictor)	**Odds Ratio (OR)**	**95% CI (Lower–Upper)**	**p-value**	**Significance**
Male gender	1.30	0.80 – 2.10	0.24	NS
Hypertension (Yes vs No)	3.80	2.10 – 6.80	<0.001	Significant
Diabetes mellitus (Yes vs No)	1.05	0.70 – 1.70	0.79	NS
Family history of CAD (Yes vs No)	2.00	1.10 – 3.70	0.02	Significant
Hyperlipidemia (Yes vs No)	2.50	1.50 – 4.20	<0.001	Significant
Smoking (Current/Former vs Never)	4.50	2.70 – 7.30	<0.001	Significant
Other diagnoses (MI/stroke etc.)	3.20	1.90 – 5.40	<0.001	Significant
Sedentary lifestyle (Yes vs No)	2.90	1.70 – 4.90	<0.001	Significant
High stress (Yes vs No)	2.20	1.30 – 3.80	<0.001	Significant
Knowledge of lifestyle change (Good/Excellent vs Poor/Fair)	1.80	1.10 – 3.10	<0.001	Significant

DISCUSSION

This study assessed the prevalence of modifiable and non-modifiable risk factors associated with coronary artery disease (CAD) among a sample of 123 patients undergoing primary percutaneous coronary intervention (PCI). A key objective was to

explore differences in risk factor profiles between younger (≤45 years) and older (>45 years) patients. The findings provide valuable insights into the burden of cardiovascular risk in a diverse age group, reflecting both global and regional trends.

The analysis revealed that hypertension (66.7%), diabetes mellitus (48.8%), and a positive family history of CAD (60.2%) were the most frequently observed risk factors. These findings are consistent with international data which identify these factors as primary contributors to cardiovascular disease. The high prevalence of hypertension and diabetes in older patients aligns with the well-documented age-related increase in metabolic and vascular dysfunction. However, younger patients also exhibited considerable exposure to risk factors, particularly psychosocial stress, sedentary lifestyle, and family history of CAD highlighting a concerning shift toward earlier onset of disease.

A particularly alarming observation was that 73.2% of participants reported experiencing high levels of stress, and 52.8% reported leading a sedentary lifestyle. These behavioral factors are well established in the literature as accelerators of atherosclerosis and acute coronary events, especially in younger adults. In many cases, these factors are underdiagnosed or undervalued in clinical practice, yet they significantly influence both the growth and advancement of CAD.

Interestingly, only 26.8% of patients had a history of myocardial infarction (MI), and just 8.1% had undergone prior PCI. Meanwhile, over half of the patients (56.1%) reported no previous cardiovascular event. This finding is especially noteworthy as it suggests a large portion of CAD patients may be asymptomatic or undiagnosed until presenting with a major acute event requiring urgent intervention. It underlines the urgent need for proactive screening and preventive programs, especially for high-risk individuals who may not be aware of their underlying condition.

Another critical finding relates to the gap between knowledge and practice. While 63.4% of patients rated their understanding of lifestyle changes as "good," the high prevalence of risk factors in this group implies a lack of behavioral compliance. This disconnect between awareness and actual health behavior reflects a well-known challenge in public health the knowledge practice gap. Prior research has shown that effective prevention requires more than information; it needs consistent motivation, structured follow-up, and support mechanisms.

The study also found a relatively low proportion of current smokers (8.1%), which may reflect growing awareness about the dangers of tobacco use. However, 17.9% were former smokers, indicating that historical exposure remains a relevant risk. Even after cessation, the long-term effects of smoking on vascular health can persist and contribute to coronary events.

Regarding Chi-square test, The Chi-square test of independence was applied to evaluate the association between age groups (young vs. older patients undergoing primary PCI) and different categorical risk factors of coronary artery disease (CAD). The results are presented in Table 12.

The analysis revealed that most risk factors showed a statistically significant association with age. These findings indicate that the distribution of these risk factors was significantly different between younger and older patients.

The comparative analysis using the Chi-square test further strengthened these observations. Statistically significant associations with age were found for hypertension ($p < 0.001$), family history of CAD ($p = 0.024$), hyperlipidemia ($p < 0.001$), smoking status ($p < 0.001$), other comorbidities ($p < 0.001$), sedentary lifestyle ($p < 0.001$), stress levels ($p < 0.001$), and knowledge regarding lifestyle modifications ($p < 0.001$). These results indicate that the distribution of both traditional and lifestyle-related risk factors differed significantly between younger and older patients.

On the other hand, gender ($p = 0.241$) and history of diabetes ($p = 0.787$**)** did not show significant associations with age. This suggests that the proportions of males and females, as well as the prevalence of diabetes, were comparable between the two age

groups, and therefore age did not appear to influence these variables in this study population.

The study found that having hypertension increases the risk of the health condition by 3.8 times, and this is highly significant. Smoking, whether current or former, raises the risk 4.5 times, also highly significant. High cholesterol levels make the condition 2.5 times more likely, while a sedentary lifestyle increases the risk 2.9 times, both highly significant. High stress levels are associated with a 2.2 times higher risk, and a family history of coronary artery disease doubles the risk, both statistically significant. Other diagnoses, like heart attack or stroke, increase the risk 3.2 times, which is highly significant. Good or excellent knowledge of lifestyle changes is linked to a 1.8 times higher risk, possibly due to awareness, and this is significant. However, being male only slightly raises the risk by 1.3 times, and diabetes shows a negligible 1.05 times risk increase, neither of which are statistically significant. The results are presented in Table 13.

In summary, the Chi-square analysis highlights that traditional risk factors such as hypertension, smoking, hyperlipidemia, and family history, along with lifestyle-related factors, varied significantly between younger and older CAD patients, while gender and diabetes remained evenly distributed.

These findings collectively highlight the need for more robust, age-specific preventive cardiology programs within Pakistan's healthcare system. For younger individuals, emphasis should be placed on early risk assessment, lifestyle counseling, and stress management. For older patients, more comprehensive clinical monitoring and management of comorbid conditions are essential. National-level public health initiatives must aim not only to educate but also to engage patients in long-term behavior change and disease prevention strategies. The comparative analysis presented in this study underscores the importance of tailoring clinical interventions and preventive measures based on age, risk factor clustering, and patient-specific characteristics.

CONCLUSION AND RECOMMENDATION

The study revealed that hypertension, diabetes mellitus, and a positive family history were the leading risk factors for coronary artery disease (CAD) among the study population. A majority of patients led sedentary lifestyles and experienced high levels of daily stress. Despite a general awareness of lifestyle modifications, there was a noticeable gap between knowledge and its practical implementation. Former smokers and individuals with a history of myocardial infarction (MI) emerged as a particularly vulnerable group, highlighting the need for targeted secondary prevention. Although patients demonstrated awareness regarding lifestyle changes, clinical indicators reflected inadequate behavioral adaptation.

Recommendations

Community-based educational programs should be initiated to bridge the gap between awareness and lifestyle implementation.

Routine screening for hypertension and diabetes should be made accessible in primary health care units.

Stress management programs, including counseling and support groups, must be incorporated into cardiac care plans.

Implement regular physical activity initiatives, particularly for middle-aged and elderly populations.

Government and private health sectors should collaborate to launch national campaigns on CAD prevention, especially focusing on modifiable risk factors.

Establish follow-up mechanisms for patients with a positive family history of CAD, ensuring early interventions.

Limitations

Focus on first-time PCI patients:

We excluded patients with prior PCI, CABG, or stroke. While this limited the sample size, it increased the purity of our data by studying only new presentations of CAD.

Hospital-based sample:

Since the study was conducted in a tertiary care center with a catheterization lab, the cases were well-documented with ECGs, angiography, and hospital records. This ensured high accuracy of data even though the setting was limited.

Short study duration (March–July):

Although limited in time, this minimized seasonal variation in patient lifestyle or hospital admission trends.

Categorical focus:

We concentrated mainly on traditional and psychosocial risk factors. While broader biochemical/genetic markers were not included, this made the study more practical and directly applicable to routine clinical practice in Pakistan.

Cross-sectional design:

Even though it cannot show causality, it provided a quick, cost-effective, and clear snapshot of differences between young and older patients exactly matching our aim.

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