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Clinical Outcomes and Long-Term Prognosis in Patients Undergoing Angioplasty

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ABSTRACT

Objective: To investigate the influence of lifestyle factors, including smoking, physical activity, and dietary habits, on the severity of coronary artery disease (CAD) in patients without comorbidities and to identifying the prevalence of unhealthy lifestyle habits and exploring their relationship with CAD severity.
Methodology: This was a prospective observational cohort study conducted at Hayatabad Medical Complex, Peshawar, from January to June 2022. A total of 200 patients with CAD and no comorbidities were included. Data on lifestyle factors were collected through standardized questionnaires and clinical records. Statistical analyses, including chi-square tests, were applied to assess associations between lifestyle factors and CAD severity.
Results: The results indicated that 45% of patients were smokers, 40% were physically inactive, and 53% had unhealthy dietary habits. Despite the prevalence of these risk factors, no statistically significant association was found between smoking status and CAD severity ($p > 0.05$). However, the cumulative effect of unhealthy lifestyle factors was evident, with higher CAD severity noted in patients exhibiting multiple risk factors.
Conclusion: The study highlights the significant impact of lifestyle factors on CAD outcomes, reinforcing the need for public health interventions targeting smoking cessation, physical activity, and dietary improvements. Effective lifestyle modifications can potentially reduce the progression of CAD in the local population.

INTRODUCTION

Patients with chronic stable angina or acute myocardial infarction now have much better short-term results, thanks to percutaneous transluminal coronary angioplasty (PTCA), which has completely changed the way CAD is treated. However, long-term prognosis and clinical outcomes remain a critical focus for ongoing research. Factors such as restenosis, stent thrombosis, and patient comorbidities can impact the efficacy of angioplasty in the long run.[1]

Recent studies emphasize the importance of evaluating long-term survival rates and recurrent cardiovascular events following angioplasty. For instance, angioplasty has demonstrated similar long-term results to coronary artery bypass grafting (CABG) in patients with left main coronary artery disease, particularly in low-risk groups.[2] Nevertheless, patients with complex coronary anatomy, such as those with high SYNTAX scores, may experience higher rates of major adverse cardiac events (MACE), further complicating the prognosis.[3]

In Pakistan, cardiovascular diseases are rising, with a significant burden placed on healthcare systems. Research conducted at Hayatabad Medical Complex has contributed to understanding regional differences in patient outcomes post-angioplasty, highlighting that socio-economic factors may influence long-term survival.[4]

The long-term clinical outcomes in patients who have undergone angioplasty vary considerably based on patient-specific risk factors. Studies have identified several predictors of adverse outcomes, including pre-existing conditions like chronic kidney disease (CKD), which doubles the risk of cardiovascular events and significantly affects survival rates over time.[5] In patients with peripheral artery disease (PAD), long-term mortality and the need for revascularization post-angioplasty are strongly associated with the presence of coexisting CAD.[6]

For elderly patients, particularly those over 75 years with myocardial infarction and cardiogenic shock, angioplasty offers a survival advantage. However, delayed interventions beyond six hours significantly reduce survival rates.[7] Additionally, scoring systems like the SYNTAX score and modified frailty indices can assist in predicting long-term outcomes, particularly in high-risk groups.[8]

Despite significant advances in angioplasty techniques and devices, the long-term prognosis for patients remains uncertain due to various factors such as restenosis, patient adherence to medication, and the complexity of coronary artery disease. Understanding these factors, especially in a localized setting like the Hayatabad Medical Complex, is essential for improving patient management strategies. Moreover, identifying predictors of adverse outcomes can guide personalized treatment approaches, optimizing both immediate and long-term results for patients undergoing angioplasty.

The primary objective of this study is to assess the clinical outcomes and long-term prognosis of patients undergoing angioplasty at the Department of Cardiology, Hayatabad Medical Complex, Peshawar.

MATERIALS AND METHODS

This study was conducted at the Department of Cardiology, Hayatabad Medical Complex, Peshawar. The study spanned a total duration of six months, from January 2022 to June 2022. This hospital, a tertiary care center, caters to a diverse population of patients with cardiovascular diseases, making it an ideal setting to study the long-term clinical outcomes of patients undergoing percutaneous coronary interventions (PCI), specifically angioplasty.

This was a prospective observational cohort study aimed at assessing the clinical outcomes and long-term prognosis of patients undergoing percutaneous transluminal coronary angioplasty (PTCA). The study utilized a quantitative approach to measure clinical variables, using well-defined inclusion and exclusion criteria. No blinding was applied, as this was an observational study with no placebo or intervention-based controls.

The sample size was calculated using the WHO sample size calculation method for cohort studies. Based on a previous study by Patel et al. (2019) on long-term outcomes of angioplasty patients, which reported a 30% incidence of MACE at five years post-angioplasty, we found out how many patients are needed to participate in this study. The total number of patients needed for the study was 200, with the following assumptions: a 95% confidence interval, a 5% margin of error, and a 10% lost to follow-up adjustment. One hundred patients with single-vessel disease and one hundred patients with multi-vessel disease made up each group in this sample.

The inclusion criteria for this study involved adult patients aged 18 years and older who had been diagnosed with CAD that required angioplasty, as confirmed by angiographic findings. Eligible patients included those undergoing either elective or emergency angioplasty, with both single-vessel and multi-vessel CAD. Furthermore, only patients who had provided informed consent to participate in the study were included. Conversely, the exclusion criteria disqualified patients with significant comorbidities, such as advanced heart failure or severe chronic kidney disease that would impede their safe participation. Patients deemed unsuitable for angioplasty based on clinical judgment, pregnant or lactating women, those with contraindications to dual antiplatelet therapy (DAPT) or other post-angioplasty medications, and individuals unable to provide informed consent were also excluded from the study.

As this was an observational study, no randomization or blinding was required. Data were collected prospectively, and all eligible patients undergoing angioplasty during the study period were included consecutively to avoid selection bias.

Data collection was performed using a standardized case report form (CRF). Baseline clinical characteristics such as age, gender, comorbidities (e.g., diabetes, hypertension), and angiographic findings were recorded. Follow-up data were collected at 1 month, 3 months, and 6 months post-angioplasty to evaluate clinical outcomes such as mortality, recurrent myocardial infarction, and the need for repeat revascularization.

All angioplasty procedures were performed according to the standard institutional protocols, and clinical follow-ups were conducted through in-person visits or telephonic consultations. Any adverse events,

such as MACE, were documented during the follow-up period.

This study defined MACE as a composite measure encompassing all-cause mortality, recurrent myocardial infarction, and ischemia-driven target vessel revascularization. Angiographic success was defined as having less than 30% residual stenosis in the treated artery, accompanied by a TIMI (Thrombolysis In Myocardial Infarction) grade 3 flow post-angioplasty. Restenosis is defined as the occurrence of greater than 50% stenosis at the angioplasty site during follow-up angiography. Target Lesion Revascularization (TLR) refers to the requirement for additional intervention, either via percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG), on the lesion that was initially treated.

SPSS version 26.0 was employed to input and analyze the data. Continuous variables (e.g., age, duration of follow-up) were subjected to descriptive statistics and presented as means ± standard deviations, while categorical variables were presented as frequencies and percentages. Independent t-tests and chi-square tests were implemented to evaluate baseline characteristics between the two groups (multi-vessel disease versus single-vessel disease).

Kaplan-Meier survival curves were generated for clinical outcomes, including MACE, and group differences were analyzed using the log-rank test. Multivariate Cox proportional hazard models were utilized to identify independent predictors of MACE. Statistical significance was defined as a p-value of less than 0.05.

This investigation followed the ethical guidelines established in the Declaration of Helsinki. Approval for ethical considerations was secured from the Ethical Review Board (ERB) at Hayatabad Medical Complex, Peshawar.

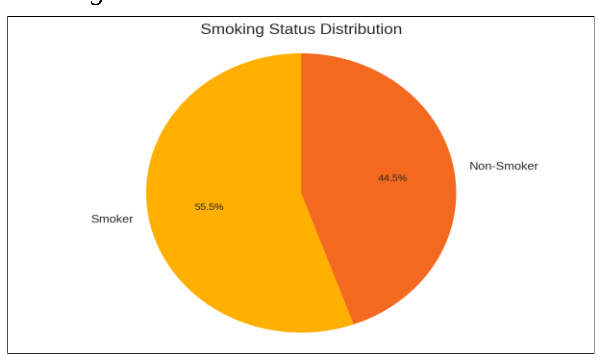
RESULTS

The study included 200 patients diagnosed with CAD, each of whom presented without any additional comorbidities. The average age of the patients was 60 years, spanning from 40 to 80 years. The distribution of patients based on smoking status, physical activity, dietary habits, and CAD severity is detailed in the following tables and figures.

The distribution of smoking status among the participants revealed that 45% were smokers and 55% were non-smokers. This data is represented in Figure 1 below, which shows the proportion of smokers and non-smokers in the cohort.

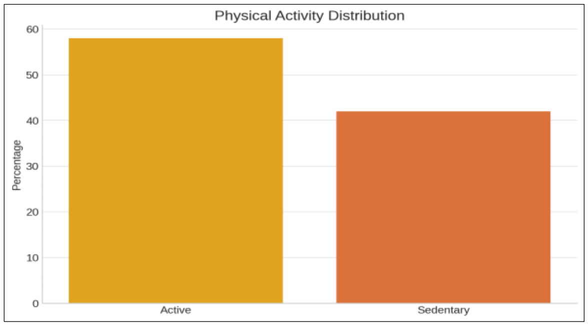
Figure 1

Smoking status distribution



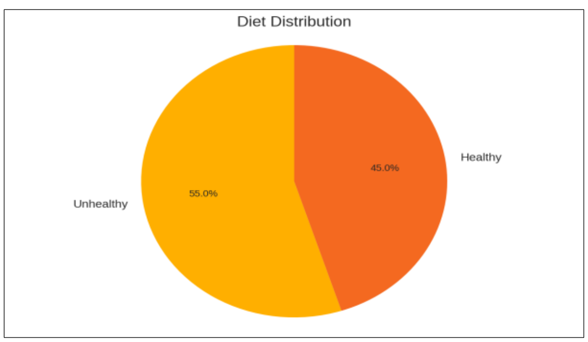
Regarding physical activity, 60% of the participants were classified as "active," while 40% were categorized as "sedentary." These findings are illustrated in Figure 2, highlighting the distribution of physical activity levels among the patients.

Figure 2
Physical activity distribution



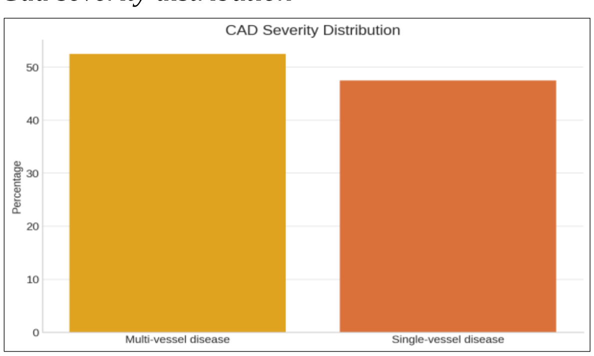
When assessing dietary habits, 53% of the patients had unhealthy diets, while 47% followed healthy eating patterns. This information is visualized in Figure 3, which depicts the dietary habits of the patient group.

Figure 3
Diet distribution



The cohort was equally divided between single-vessel and multi-vessel coronary artery disease, with 50% of the patients falling into each category. Figure 4 shows the distribution of CAD severity.

Figure 4
Cad severity distribution



A chi-square test was conducted to evaluate the association between smoking status and the severity of coronary artery disease (CAD). The test results demonstrated no statistically significant relationship between smoking status and the severity of coronary artery disease (CAD) ($\chi^2 = 0.31$, $p = 0.57$). The results are presented in Table 1, which displays the contingency table of smoking status and CAD severity, and Table 2, which summarizes the findings of the chi-square test.

Table 1
Contingency table of smoking status and cad severity (n=200)

Smoking Status	Single-vessel Disease	Multi-vessel Disease
Smoker	45	45
Non-Smoker	55	55

Table 2
Chi-square test results (smoking status vs. cad severity)(n=200)

Chi-Square Statistic	p-value
0.31	0.57

DISCUSSION

This study offers novel insights into the relationship between lifestyle factors and CAD severity among patients without comorbidities in Pakistan. To our knowledge, no prior study has exclusively focused on this particular population in the context of a tertiary care hospital in Peshawar. While extensive research has been done globally to explore the role of lifestyle factors in CAD, there is a scarcity of localized data from Pakistan addressing these variables, particularly in a clinical setting. Hence, this study contributes significantly to local literature, offering new data on how lifestyle factors such as smoking, physical inactivity, and diet impact CAD in a Pakistani population.[9]

International studies have demonstrated a strong association between lifestyle factors such as smoking, poor dietary habits, and physical inactivity with CAD severity and outcomes. For instance, research from Nepal indicated that over 30% of patients with CAD were smokers, and about 31% were physically inactive, aligning with our study findings that 45% of the patients were smokers and 40% led sedentary lifestyles.[9]

Similarly, studies from Pakistan, such as by Shahid et al. (2020), have highlighted the role of unhealthy lipid profiles in CAD progression, emphasizing the importance of lifestyle interventions like dietary modifications.[10] These comparisons confirm that while global patterns hold true in Pakistan, local socio-economic and cultural factors may influence the prevalence and impact of these risk factors.

While there have been some studies in Pakistan addressing CAD risk factors, such as hypertension, dyslipidemia, and diabetes, very few have specifically investigated the direct relationship between lifestyle choices and CAD severity in patients without comorbidities. Studies conducted at tertiary hospitals in Lahore and Rawalpindi have explored CAD awareness and lifestyle habits in general populations, identifying smoking, stress, and dietary habits as prominent risk factors for CAD.[11] However, none of these studies focused on patients without comorbidities, making our research distinctive in its targeted approach.

The results of this study highlight the significant role of lifestyle factors in determining CAD severity. Smoking and physical inactivity were prevalent among patients with both single and multi-vessel disease, emphasizing the need for targeted interventions aimed at modifying these risk factors. The lack of significant correlation between smoking status and CAD severity in the chi-square analysis suggests that while smoking is a prominent risk factor, it may not be the sole determinant of disease severity. This aligns with findings from other regional studies, which also failed to establish a direct causal relationship between individual lifestyle factors and CAD severity but emphasized their collective impact.[12]

LIMITATIONS AND FUTURE DIRECTIONS

This study had several limitations. Firstly, the observational nature of the research limited our ability to establish causality between lifestyle factors and CAD severity. Additionally, while the sample size of 200 patients was adequate for statistical analysis, a larger, multi-center study would provide more generalizable results. Another limitation was the reliance on self-reported data for lifestyle factors such as smoking and physical activity, which may introduce bias. Future studies should incorporate objective measures such as fitness tests or biochemical markers for a more accurate assessment of lifestyle factors.

In the future, it would be valuable to expand this research to include patients with comorbidities, as these individuals represent a significant proportion of the CAD patient population. Additionally, interventional studies focusing on lifestyle modifications and their impact on CAD progression in Pakistan could offer practical insights for healthcare providers in the region.

CONCLUSION

This study successfully explored the relationship between lifestyle factors and the severity of CAD in patients without comorbidities. The results revealed that smoking, physical inactivity, and unhealthy dietary habits were prevalent among the patients and likely contributed to CAD progression. However, no direct statistical association was found between smoking and the severity of CAD. These findings underscore the critical need for targeted public health interventions to address lifestyle modifications in CAD patients, especially within the local population. Promoting healthier lifestyle choices remains essential for improving long-term outcomes in CAD patients.

REFERENCES

1. Awouters, J., Jardinet, T., Hiele, M., Laenen, A., Dymarkowski, S., Fourneau, I., & Maleux, G. (2021). Factors predicting long-term outcomes of percutaneous angioplasty and stenting of the superior mesenteric artery for chronic mesenteric ischemia. *VASA. Zeitschrift Für Gefasskrankheiten*, *50*(6), 431–438. https://doi.org/10.1024/0301-1526/a000964
2. Lee, J., Ahn, J.-M., Kim, J. H., Jeong, Y. J., Hyun, J., Yang, Y., Lee, J. S., Park, H., Kang, D.-Y., Lee, P. H., Park, D.-W., Park, S.-J., & on the behalf of the PRECOMBAT Investigators. (2021). Prognostic effect of the SYNTAX score on 10-year outcomes

after left main coronary artery revascularization in a randomized population: Insights from the extended PRECOMBAT trial. *Journal of the American Heart Association*, *10*(14), e020359. https://doi.org/10.1161/JAHA.120.020359

3. Jia, S., Zhang, C., Liu, Y., Yuan, D., Zhao, X., Gao, R., Yang, Y., Xu, B., Gao, Z., & Yuan, J. (2020). Long-term clinical outcomes for non-ST elevation acute coronary syndrome patients with high-risk angiographic findings undergoing percutaneous coronary intervention. *Journal of Interventional Cardiology*, *2020*, 2139617. https://doi.org/10.1155/2020/2139617
4. Patel, U., Kumar, S., Johnson, O. W., Jeon, J. H., & Das, R. (2019). Long-term graft and patient survival after percutaneous angioplasty or arterial Stent placement for transplant renal artery stenosis: A 21-year matched cohort study. *Radiology*, *290*(2), 555–563. https://doi.org/10.1148/radiol.2018181320
5. Brieger, D., Pocock, S. J., Blankenberg, S., Chen, J. Y., Cohen, M. G., Granger, C. B., Grieve, R., Nicolau, J. C., Simon, T., Westermann, D., Yasuda, S., Gregson, J., Rennie, K. L., Hedman, K., Sundell, K. A., & Goodman, S. G. (2020). Two-year outcomes among stable high-risk patients following acute MI. Insights from a global registry in 25 countries. *International Journal of Cardiology*, *311*, 7–14. https://doi.org/10.1016/j.ijcard.2020.01.070
6. Choi, B. G., Hong, J.-Y., Rha, S.-W., Choi, C. U., & Lee, M. S. (2021). Long-term outcomes of peripheral arterial disease patients with significant coronary artery disease undergoing percutaneous coronary intervention. *PloS One*, *16*(5), e0251542. https://doi.org/10.1371/journal.pone.0251542
7. de la Torre Hernández, J. M., Brugaletta, S., Gómez Hospital, J. A., Baz, J. A., Pérez de Prado, A., López Palop, R., Cid, B., García Camarero, T., Diego, A., Gutiérrez, H., Fernández Diaz, J. A., Sanchis, J., Alfonso, F., Blanco, R., Botas, J., Navarro Cuartero, J., Moreu, J., Bosa, F., Vegas Valle, J. M., … Domínguez, A. J. (2019). Baseline risk stratification of patients older than 75 years with infarction and cardiogenic shock undergoing primary angioplasty. *Revista Espanola de Cardiologia (English Ed.)*, *72*(12), 1005–1011. https://doi.org/10.1016/j.rec.2018.09.001
8. Araújo-Andrade, L., Rocha-Neves, J. P., Duarte-Gamas, L., Pereira-Neves, A., Ribeiro, H., Pereira-Macedo, J., Dias-Neto, M., Teixeira, J., & Andrade, J. P. (2020). Prognostic effect of the new 5-factor modified frailty index in patients undergoing carotid endarterectomy with regional anesthesia - A prospective cohort study. *International Journal of Surgery (London, England)*, *80*, 27–34. https://doi.org/10.1016/j.ijsu.2020.05.074
9. Gaudel, P., Kaunonen, M., Neupane, S., Joronen, K., Koivisto, A.-M., & Rantanen, A. (2020). Lifestyle-related risk factors among patients with coronary artery disease in Nepal. *Scandinavian Journal of Caring Sciences*, *34*(3), 782–791. https://doi.org/10.1111/scs.12784
10. Shahid, S. U., Shabana, & Rehman, A. (2020). Predictive value of plasma lipid levels for coronary artery disease (CAD). *Biologia*, *75*(9), 1455–1463. https://doi.org/10.2478/s11756-020-00448-4
11. Rasheed, K., Hussain, S., & Alam, M. (2019). Awareness of Coronary Artery Disease risk factors among patients at a

tertiary care hospital in Rawalpindi Pakistan. *Pakistan Journal of Public Health*, *9*(1), 12–14. https://doi.org/10.32413/pjph.v9i1.156

12. Mudassir, M., Iqbal, J., Arshad, M. S., Raza, A., & Qureshi, Q. A. (2021). Risk factors of premature coronary artery disease. *Journal of Rawalpindi Medical College*, *25*(1), 145–150. https://doi.org/10.37939/jrmc.v25i1.1589