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IMPACT OF SMOKING ON MEDICATION ADHERENCE AND SECONDARY PREVENTION PRACTICES AMONG PATIENTS WITH CORONARY ARTERY DISEASE IN A TERTIARY CARE HOSPITAL, KARACHI

DR JAVERIA MAQSOOD[1], DR SYED TAHIR HUSSAIN SHAH[2], DR SHAZIA FAHMI[3], DR BILAL SOOMRO[4], DR ZARYAB AHMED[5], DR MUHAMMAD HASHIM[6]

[1]FCPS CARDIOLOGY, SENIOR REGISTRAR AT NATIONAL MEDICAL CENTRE KARACHI, PAKISTAN
[2]MD, FCPS (CARDIOLOGY), INTERVENTIONAL CARDIOLOGIST, CIVIL HOSPITAL KARACHI, PAKISTAN
[3]ASSOCIATE PROFESSOR, DEPARTMENT OF ANATOMY, KARACHI MEDICAL & DENTAL COLLEGE KMDC (KMU), PAKISTAN
[4]FCPS-2 CARDIOLOGY RESIDENT, DOW MEDICAL UNIVERSITY, DR RUTH K.M. PFAU, CIVIL HOSPITAL KARACHI, PAKISTAN
[5]FCPS CARDIOLOGY, FELLOWSHIP INTERVENTIONAL CARDIOLOGY, CONSULTANT CARDIOLOGIST, CIVIL HOSPITAL KARACHI, PAKISTAN
[6]ASSISTANT PROFESSOR, INTERVENTIONAL CARDIOLOGIST, DOW UNIVERSITY OF HEALTH SCIENCES DUHS, KARACHI, PAKISTAN

Abstract

Objective: To assess the impact of smoking on medication adherence and secondary prevention practices among patients diagnosed with coronary artery disease (CAD) at a tertiary care hospital in Karachi.

Methodology: The research was done within Dr. Ruth K.M. Pfau Civil Hospital, Karachi, in six months, between 22nd November 2024 and 30th April 2025. It was a prospective and cross-sectional observational study, which involved patients who had a confirmed diagnosis of coronary artery disease (CAD). The structured interviews and medical records review were used to gather information on the smoking status, medication compliance, and the adherence to secondary prevention measures. The demographic factors, clinical risk factors, and biochemical parameters were measured and compared through descriptive statistics. Meanings of the association between smoking and medication adherence were further tested by using inferential statistical analysis to establish the relationship between the two variables.

Results: There were 100 patients who were included. The average age of the study participants was 60.3 years and 12.4 (mean) with 55 percent males and 45 percent females. Out of this group 33 percent were the active smokers, 20 percent were previous smokers and 47 percent were non-smokers. The adherence rates of medications were considerably lower in current smokers than in non-smokers ($p < 0.05$). More so, poor understanding and low compliance with the secondary prevention recommendations such as diet change, regular exercises, and regular taking of medications demonstrated in 80 percent of smokers.

Conclusion: The results indicate that smoking is closely linked with poor adherence to medication and unfavorable secondary prevention among patients in CAD. Additional treatment use, such as smoking cessation counseling and patient education at a follow-up visit, can lead to better treatment adherence and a reduced cardiovascular outcome.

Keywords: coronary artery disease, smoking, medication adherence, secondary prevention, patient education, lifestyle modification.

INTRODUCTION

In spite of the development of medical and interventional treatment, coronary artery disease (CAD) is one of the most common causes of morbidity and mortality in the world today, being a major cause of cardiovascular diseases (CVDs) on a global scale (Hosseini et al., 2021; Kodeboina et al., 2023; Shehu et al., 2023; Lugo-Gavidia et al., 2024). Even though the introduction of modern treatment strategies and early diagnostics has significantly improved the acute death rate, long-term prognosis greatly relies on compliance with the measures of secondary prevention and prescribed

medications (Aggarwal et al., 2021; Giubilato et al., 2023; Pedretti et al., 2023; Odeberg et al., 2025). Pharmacological therapy, smoking cessation, physical activity, and dietary changes as a part of secondary prevention are crucial in preventing re-occurrence of cardiovascular events (Kaldal et al., 2021; Vasankari et al., 2021; Sigamani and Gupta, 2022; Rodriguez et al., 2025).

Smoking is one of the most harmful risk factors that can contribute to the occurrence and progression of CAD among modifiable risk factors (Florek et al., 2024; Kotlyarov, 2023). Tobacco smoke induces atherosclerosis, oxidative stress, and endothelial dysfunction, platelet aggregation that enhance the potential of recurrent myocardial infarction and mortality (Nowak & Pawliczak, 2022). Moreover, post-cardiac smoking has close links with low adherence to medications and lower efficacy of secondary prevention measures.

The compliance with cardiovascular medications like antiplatelet agents, statins, beta-blockers, and ACE inhibitors can easily reduce the mortality rate and avert executive recurrence (Chinwong et al., 2021; Strauss et al., 2023; Bana et al., 2025). Nevertheless, regardless of the high rates of evidence of these therapies, a major share of CAD patients, particularly in low- and middle-income nations, do not adhere to them due to inadequate health literacy, social pressures, as well as behavioral determinants such as incessant smoking (Ogungbe et al., 2021). Smokers, specifically, were found to exhibit weak health-seeking behavior and the willingness to change the lifestyle, which is a significant obstacle to secondary prevention (Iyngkaran et al., 2024).

CAD is disproportionately burdened by the population of South Asia, especially in Pakistan, India and Bangladesh, where tobacco use, poor diets, and sedentary lifestyles are widespread (Jan et al., 2024; Agrawal et al., 2023). The smoking habit of adults in Pakistan continues to raise significant concerns, but the exact effect on the adoption of secondary prevention practices by CAD patients is not yet properly analyzed (Barolia et al., 2024). There has been an indication that proper secondary prevention, with smoking cessation and optimum pharmacotherapy, may help in the prevention of up to 75-80 percent of recurrence vascular events.

It is on this understanding of these gaps that the American Heart Association (AHA) and American College of Cardiology (ACC) have put a significant focus on lifestyle modification and smoking cessation as part of the secondary prevention (Brown et al., 2024). Nevertheless, the rate of smoking continuation and low compliance with treatment despite the diagnosis of CAD still dictates the necessity of more specific education and counseling interventions, especially within the context of resource-constrained areas such as Pakistan.

Thus, the study rationale is to establish the effects of smoking on medication use and the secondary prevention behaviors of patients with coronary artery disease in Karachi. The objective of the study is to determine behavior and lifestyle determinants of adherence, guide patient-centered interventions, as well as assist in developing successful smoking cessation and secondary prevention models to decrease morbidity and mortality caused by CAD.

MATERIAL AND METHODS

In the Department of Cardiology, the Dr. Ruth K.M. Pfau Civil Hospital, Karachi, six months, i.e. 22nd November 2024 and 30th April 2025. This is a cross-sectional surveys study. One hundred patients with defined coronary artery disease (CAD) were selected to include. Patients who already had a history of myocardial infarction with high troponin levels over 0.4 IU, had a previous history of performing percutaneous coronary intervention (angioplasty), or had a history of coronary artery bypass graft (CABG) were declared CAD. The WHO software was used to estimate sample size and used the prevalence rate of inadequate practices of secondary prevention among CAD patients at 70 with a 9% margin of error and a 95% confidence interval. The sampling method used was non-probability consecutive sampling.

Inclusion and Exclusion Criteria

Informal consent was obtained through the eligibility of both male and female patients between the ages of 30 and 80 years. Patients who had known malignancy, known heart disease by congenital, pregnant (verified by dating scan), or refused to take part were not used in the study.

The structured questionnaire was used in the face-to-face interviews where participants were interviewed using a structured questionnaire. Demographic information including age and gender plus clinical features including hypertension, diabetes mellitus, and dyslipidemia was observed.

The level of medication adherence was evaluated with the help of a structured adherence questionnaire where scores above 80 percent were evaluated as good and those below as poor adherences. Secondary prevention practices were measured according to nine modifiable factors, such as the use of medications (antiplatelets, ACE, beta-blockers, statins), smoking quit, physical activity, dieting, and hypertension, diabetes or dyslipidemia control. Those who replied with six or more affirmative responses were said to have sufficient compliance with secondary prevention practices.

Statistical Analysis

Analysis of data was done through the use of SPSS version 20. Continuous variables (age and CAD duration) were measured by descriptive statistics to measure their means and standard deviation, whereas categorical variables (gender, smoking status, comorbidities, and adherence rates) were displayed in the frequencies and percentages. Age, gender, and comorbidity stratification were performed to control the effect modification. The Chi-square test was used

to test the association between smoking status and medication adherence or practices of secondary prevention, and a p-value of 0.05 and below was taken to indicate statistically significant.

Ethical Considerations

Before the start of the study, ethical approval was received in the College of Physicians and Surgeons Pakistan (CPSP). Informed consent was provided to all participants on paper with an explanation of the objectives and purpose of the research.

RESULTS

The study included 100 patients who met the inclusion criteria. The study population mean age was 60.36 ± 12.40 years, and the corporate age ranged between 36 and 80 years. The number of participants was 55 (55%) males and 45 (45%) females. Table I demonstrates the demographic and clinical features of the study population.

Table I. Demographic Characteristics of Study Population

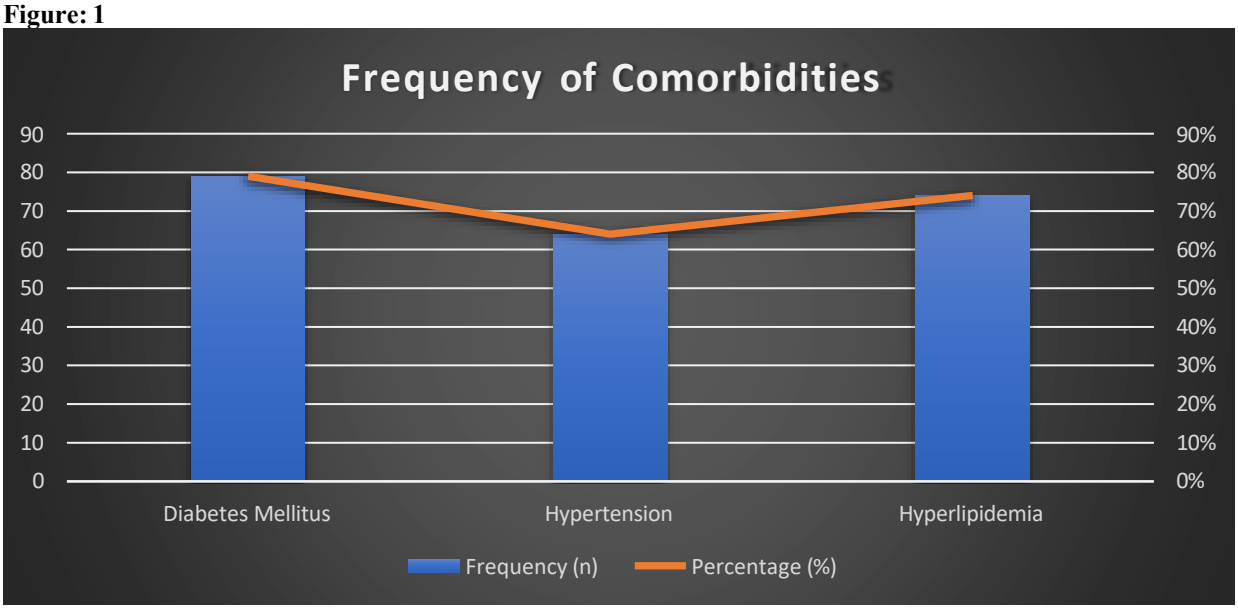
Variable	Minimum	Maximum	Mean ± SD	Frequency (%)
Age (years)	36	80	60.36 ± 12.40	—
Gender (Male/Female)	—	—	—	55 / 45

Most of the patients had multiple comorbidities, including **diabetes mellitus (79%)**, **hypertension (64%)**, and **hyperlipidemia (74%)** (Table II).

Table II. Frequency of Comorbidities

Variable	Frequency (n)	Percentage (%)
Diabetes Mellitus	79	79%
Hypertension	64	64%
Hyperlipidemia	74	74%

Figure: 1

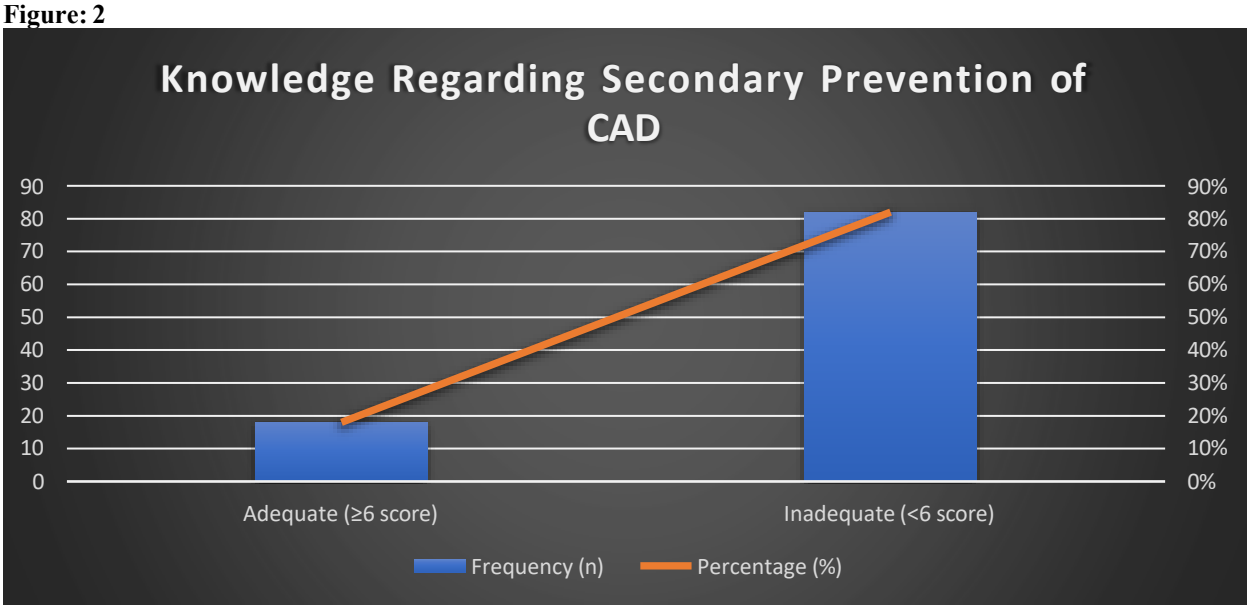


Assessment of knowledge regarding secondary prevention of coronary artery disease (CAD) revealed that **82% of participants scored less than 6**, indicating inadequate knowledge, while only **18% demonstrated adequate knowledge** (Table III).

Table III. Knowledge Regarding Secondary Prevention of CAD

Knowledge Level	Frequency (n)	Percentage (%)
Adequate (≥6 score)	18	18%
Inadequate (<6 score)	82	82%

Figure: 2



Further analysis showed that adequate knowledge was significantly associated with several behavioral and clinical factors. Patients who had been counseled by their physicians about the harmful effects of smoking ($p = 0.0001$), those who exercised regularly ($p = 0.00005$), followed up with their physicians ($p = 0.0156$), and adhered to their medications ($p = 0.0128$) were more likely to have adequate knowledge (Table IV).

Table IV. Factors Significantly Associated with Adequate Knowledge

Variable	p-value	Significance
Counseled by physician about smoking	0.0001	Significant
Exercise	0.00005	Significant
Physician follow-up	0.0156	Significant
Medication adherence	0.0128	Significant

These findings suggest that lifestyle behaviors, physician counseling, and medication adherence play a critical role in improving awareness and secondary prevention practices among patients with coronary artery disease.

DISCUSSION

The current study was meant to determine the effect of smoking on medication adherence and secondary prevention knowledge in patients with coronary artery disease (CAD) in a tertiary care hospital in Karachi. It showed that far majority of the patients (82 percent) knew little about secondary prevention measures, and only 18 percent displayed proper knowledge about the lifestyle change and medication compliance. The findings indicate that there is a significant disparity in patient awareness even with the prevalence of CAD and comorbidities like diabetes mellitus, hypertension and hyperlipidemia amongst our population.

Our findings align with prior research that implies that smoking and inadequate medication adherence are considered to be some of the major causes of recurring cardiovascular events and adverse outcomes in CAD patients. Smoking, specifically, enhances the acceleration of endothelial dysfunction, platelet aggregation, and the development of oxidative stress, negatively affecting the effect of the pharmacological treatment. The smoking patients who either did not discuss the seriousness of smoking issues properly or did not get sufficient counseling scored lower on knowledge and adhered less to the prescribed medicine. On the other hand, the group of patients who were counseled by physicians on quitting smoking and the importance of medication reported rightly higher levels of knowledge ($p = 0.0001$), which illustrates the role of healthcare physicians in shaping patient behavior.

This relationship is also supported by international data. A research by the National Commission on Prevention Priorities (NCCP) found cessation and compliance to aspirin use as the most effective secondary prevention strategy of cardiovascular diseases. Nevertheless, the methodology of the NCCP rested within the framework of a cost-efficiency model, and the present study offers real world and hospital-based data that indicates the actual patient practices and awareness. The standards of both studies are similar in the emphasis on the need to eliminate the modifiable factors of risk-specifically smoking with the help of systematic patient education and ongoing physician involvement.

The previously mentioned connection between lifestyle and proper knowledge in this study also contributes to the idea of education and counseling as important aspects of secondary prevention. Patients with routinely performed exercises, met their physicians, and taking their medications showed much more awareness and control of their going. These results go hand in hand with other regional and global reports which suggest the introduction of lifestyle modification programs and smoking cessation clinics into mainstream cardiac care.

On the whole, this paper demonstrates the critical necessity of enhancing patient education, smoking cessation and drug adherence counseling as indispensable components of the cardiac rehabilitation services. Physician and nursing staff Continuous Medical Education (CME) activities should also be given priority so that they become more competent in providing effective secondary prevention interventions. It is essential not to only issue written guidelines but the active involvement, frequent follow-ups and multidisciplinary co-ordination are essential to enhance the long-term care of CAD patients.

CONCLUSION

A big percentage of coronary artery disease (CAD) patients exhibited poor knowledge levels as pertains to secondary prevention strategies. Specifically, the knowledge regarding dietary guidance, smoking cessation, and medication compliance was identified as lacking. These results indicate a dire necessity of developing better patient education and greater participation of healthcare providers in counseling patients on lifestyle changes. Limitations of the time spent by physicians and patients in interaction, inadequate patient knowledge of the disease management, low compliance rates to lifestyle and pharmacological treatments, and the high prices of medications can be recognized as the major barriers of this research. The solution to these issues with the help of structured counseling programs, multidisciplinary cardiac rehabilitation programs, and the opportunity to receive low-cost treatment can have significant positive effects on the results of secondary prevention and decrease the rates of cardiovascular events among CAD patients.

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