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ASSESSMENT OF SECONDARY PREVENTION GOALS ACHIEVEMENT AMONG PATIENTS WITH RECURRENT ACUTE CORONARY SYNDROME AT A TERTIARY CARDIAC CENTRE IN PAKISTAN

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ABSTRACT

Objective: To assess the achievement of secondary prevention targets in patients with recurrent acute coronary syndrome (ACS) in a tertiary cardiac centre in Pakistan.

Study Design and setting: This was a cross-sectional study, which was carried out in the Cardiology Department of Tabba Heart Institute, Karachi, Pakistan, for six months.

Methods: Patients were recruited if they were 18–75 years old and either male or female, and were admitted with a repeat acute coronary syndrome (ACS) (ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI) or unstable angina) with a prior event at least one year before. The composite secondary prevention endpoint was considered to be the achievement of all six targets. SPSS version 22 was used for analyzing data. The p value of <0.05 was considered statistically significant.

Results: The median age was 61.0 years (IQR 53.0–68.0), and 66.9% were male. Overall, 71.0% of patients had blood pressure controlled, 44.4% had LDL-C target and 50.9% (36.2% if diabetics only) had HbA1c target. Antiplatelet therapy was employed in 87.0% of the patients and high intensity statin therapy in 78.1%. Only 9.5% achieved the composite secondary prevention goal. The geriatric age was an independent predictor of BP control (OR 1.04, p = 0.042) and of HbA1c goal (OR 1.05, p = 0.040). Male sex was independently associated with better BP control (OR 3.07, 95% CI 1.43–6.56, p = 0.004).

Conclusion: Achievement of secondary prevention targets among patients with repeat ACS remained suboptimal, with particularly low rates of lipid and glycemic control and very limited attainment of composite goals.

INTRODUCTION

Despite improvements in acute management and revascularization techniques, acute coronary syndrome (ACS) continues to be a leading cause of cardiovascular morbidity and mortality worldwide. Patients who survive their first episode of ACS are at significantly higher risk of another MI, hospitalizations, and cardiovascular mortality [1].

International guidelines have clear evidence-based secondary prevention targets for the prevention of recurrent cardiovascular events and for reducing mortality and morbidity. These targets include high-intensity statin therapy, appropriate antiplatelet therapy, achievement of low-density lipoprotein cholesterol (LDL-C) targets, optimal blood pressure control, smoking cessation, and participation in cardiac rehabilitation. For patients with diabetes mellitus, optimal glycaemic control [2]. In reality, however, these recommendations in actual practice remains suboptimal, in both upper as well as low and middle-income countries [3]. A pooled analysis across 38 low and middle-income countries (LMICs), found that the prevalence of achieving treatment targets in patients with a history of CVD was only 22.7% for antihypertensive drugs, 19.6% for aspirin, and 13.6% for statins, highlighting a striking gap between guideline recommendations and real-world practice[7]. The Prospective Urban Rural Epidemiology (PURE) study, conducted across 17 LMIC, demonstrated that among patients with established CVD, antiplatelet use was only 25.3%, statin use 14.6%, and beta-blocker use 17.4%, while adherence to a healthy lifestyle defined by smoking cessation, appropriate diet, and physical activity was observed in just 4.3% of individuals. This gap is not confined to resource-limited environments. In high-income settings with well-

developed healthcare infrastructure, suboptimal risk factor control remains prevalent. The EUROASPIRE V survey, conducted across 27 European countries, reported that only 30% of patients achieved the recommended low-density lipoprotein cholesterol (LDL-C) target of <1.8 mmol/L (70 mg/dL) one year following an acute coronary syndrome (ACS)[8]. The SEPAT study from Sweden, assessing adherence to secondary prevention guidelines two years after myocardial infarction, found that only 3.5% of patients achieved all six guideline-recommended targets simultaneously. While antiplatelet and statin prescription rates were high (97% and 88.5%, respectively), LDL-C targets were achieved in only 18.5% of patients and systolic blood pressure control in 57.0%. These findings underscore that prescription alone is insufficient, and that inadequate follow-up, poor adherence, and lack of treatment intensification contribute significantly to suboptimal outcomes[9]. In Japan, only 28.1% of patients with recurrent ACS achieved LDL-C targets (≤70 mg/dL), and 12.5% received comprehensive secondary prevention[10].

The incidence of cardiovascular diseases is on the rise in Pakistan. According to the 2019 Global Burden of Disease study, the estimated age-standardized incidence of CVD in Pakistan was 918.18 per 100,000, significantly exceeding the global average of 684.33 per 100,000, and the age-standardized death rate was 357.88 per 100,000 compared with the global figure of 239.85 per 100,000[12] Patients presenting with repeat ACS represent a particularly high risk subgroup within this at-risk population.

Evaluating secondary prevention goal attainment in tertiary cardiac care settings is an important tool to gain insight into the effectiveness of post-ACS management pathways. Parameters like lipid profile, blood pressure, glycemic status, adherence to treatment and lifestyle modification can detect a specific target for interventions and can have a positive long-term prognosis [6]. There is recent evidence that structured secondary prevention programmes and ongoing follow-up can make a significant contribution to better control of risk factors and fewer reoccurring cardiovascular complications [7]. However, there is still a significant gap in health care resources, patient awareness and compliance, which is an important barrier in low and middle-income countries like Pakistan [8].

Pakistan has a significant burden of coronary artery disease, and information on achievement of secondary prevention targets among those who have recurrent ACS is limited. An understanding of how well evidence-based prevention targets are met in local tertiary cardiac centres is important to craft effective strategies to lower the likelihood of recurring cardiovascular events [9]. The importance of better implementation of preventive therapies and better monitoring of the cardiovascular risk factors in everyday clinical practice has been shown in previous investigations [10].

Hence, this study was conducted to evaluate the achievement of secondary prevention goals among patients with repeat acute coronary syndrome at a cardiac care centre in Pakistan. The results were designed to highlight any existing deficiencies in preventive care, the achievement of targets recommended by these guidelines and evidence to support the further enhancement of secondary prevention in individuals at high risk for a new cardiovascular event.

MATERIAL AND METHODS

This was a cross-sectional study which involved patients admitted to Tabba Heart Institute, Cardiology Department at Karachi for six months. All the data collection, storage and analysis processes were conducted in ways that respected patient privacy and confidentiality.

Patients aged from 18 to 75 years, both sexes, admitted with recurrent acute coronary syndrome (ACS) – ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI) or unstable angina – were eligible for inclusion. A recurrent ACS event was defined as a new index admission at least one year after the previous ACS event with or without previous revascularization. Patients older than 75 years were excluded, as patients of older age are often frail, have multiple comorbidities, cognitive impairment, and a different therapeutic approach, which may have an impact on adherence to treatment and meeting secondary prevention targets independently. A one-year time period following the last ACS event was chosen to minimize the impact of early post-ACS factors, such as culprit plaque healing, signposts of residual inflammatory activity, early periprocedural events (index or staged events), stent-related complications, cardiac rehabilitation participation, medication optimization, and routine dual antiplatelet therapy. Recurrent cardiovascular events are more closely related to advanced atherosclerotic disease and continued exposure to modifiable cardiovascular risk factors than to problems associated with the initial ACS event or coronary procedure after the first year.

Patients with incomplete clinical and/or laboratory data needed to assess the secondary prevention goals, such as LDL cholesterol (LDL-C, glycated haemoglobin (HbA1c) and medication data, were excluded, as were those who refused to participate, and those with an advanced malignancy, end-stage renal disease or significant cognitive impairment that could impair assessment of secondary prevention goals.

The single population proportion formula was used to determine the sample size using OpenEpi. The calculations were done at a 95% confidence level, with 80% statistical power, a 5% margin of error and an expected proportion of 12.5% (based on the literature) of achieving comprehensive secondary prevention goals. The minimum sample size calculated was 169 participants.

Secondary prevention targets were chosen based on current international guidelines for people with known atherosclerotic cardiovascular disease and ACS. The assessed targets were LDL-C ≤70 mg/dL, HbA1c ≤7%, no smoking in the last 6 months, ≥1 antiplatelet agent (aspirin, clopidogrel or ticagrelor), BP goals of 140/80(a conservative threshold adopted to account for potential white-coat effects and variable adherence to standardized measurement protocols)and prescription of high-intensity statin therapy (rosuvastatin 20-40 mg or atorvastatin 40-80 mg). The composite secondary prevention endpoint comprised a simultaneous achievement of all six individual prevention endpoints.

The data was input and analysed with the help of Statistical Package for Social Sciences (SPSS) version 22. The Shapiro–Wilk test was used to determine normality of the continuous variables. Data for normally distributed variables were expressed as mean ± SD, while those for non-normally distributed variables were reported as median and interquartile range (IQR). Categorical data were reported as frequencies and percentages. Association between categorical variables and individual secondary prevention targets were examined by Pearson's chi-square test or the Fisher test as appropriate. The Mann–Whitney U test was used to assess differences in age by groups defined as per the secondary prevention goal achievement. Multivariable binary logistic regression analysis was conducted for each secondary prevention outcome, with clinically relevant parameters such as age, sex, diabetes mellitus, hypertension, previous revascularization, and type of ACS included as co-variates. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for the results. The composite endpoint was not evaluated statistically because of the limited number of patients who reached the outcome. A p-value of ≤ 0.05 was defined as statistically significant for a two-sided test.

RESULTS

Baseline Characteristics

In total, 169 patients with recurrent acute coronary syndrome (ACS) with previous coronary event at least 1 year prior were included in the analysis. The median age of the participants was 61.0 years (IQR: 53.0–68.0). Female patients were significantly older than male patients, with median ages of 65.5 years (IQR: 57.0–70.3) and 60.0 years (IQR: 53.0–66.5), respectively (p = 0.007). Most participants were male (n = 113, 66.9%).

Patients presented with non-ST-elevation myocardial infarction (NSTEMI) in 111 (65.7%) cases, ST-elevation myocardial infarction (STEMI) in 44 (26.0%) cases and unstable angina in 14 (8.3%) cases.

Diabetes mellitus was found in 116 patients (68.6%), hypertension in 141 patients (83.4%) and a family history of premature coronary artery disease was noted in 15 patients (8.9%). As far as tobacco exposure was concerned, 116 of the patients (68.6%) had never smoked, 35 (20.7%) were current smokers at the time of the recurrent event, and 18 (10.7%) were former smokers who had not smoked for at least six months.

Of the patients who had had previous coronary revascularisation, 54 (32.0%) had not received any revascularisation procedure. Percutaneous coronary intervention (PCI) alone was done in 88 patients (52.1%), and 27 patients (16.0%) had coronary artery bypass grafting (CABG) done.

Table 1 shows the baseline clinical measurements. The blood pressure was normally distributed (Shapiro-Wilk test p = 0.663) and therefore presented as mean ± SD: 128.7 ± 23.6 mmHg. All other continuous variables were not normally distributed (Shapiro–Wilk p ≤ 0.05) and are presented as median and interquartile range. Median diastolic blood pressure was 70.0 mmHg (IQR: 65.0–74.0), median LDL-cholesterol was 75.0 mg/dL (IQR: 50.0–105.0), and median glycated haemoglobin was 7.0% (IQR: 5.9–8.3).

Table 1. Baseline Characteristics of the Study Population (n = 169)

Variable	n (%) or Summary Measure
Demographic characteristics	
Age, years, median (IQR)	61.0 (53.0–68.0)
Female age, years, median (IQR)	65.5 (57.0–70.3)
Male age, years, median (IQR)	60.0 (53.0–66.5)
Male sex	113 (66.9)
Female sex	56 (33.1)
Comorbidities	
Diabetes mellitus	116 (68.6)
Hypertension	141 (83.4)
Family history of premature CAD	15 (8.9)
Smoking status	
Never smoked	116 (68.6)
Former smoker, abstinent for ≥6 months	18 (10.7)
Current smoker	35 (20.7)
ACS presentation	
NSTEMI	111 (65.7)

STEMI	44 (26.0)
Unstable angina	14 (8.3)
Previous revascularisation	
PCI only	88 (52.1)
CABG	27 (16.0)
No previous revascularisation	54 (32.0)
Baseline clinical parameters	
Systolic blood pressure, mmHg, mean ± SD	128.7 ± 23.6
Diastolic blood pressure, mmHg, median (IQR)	70.0 (65.0–74.0)
LDL-C, mg/dL, median (IQR)	75.0 (50.0–105.0)
HbA1c, %, median (IQR)	7.0 (5.9–8.3)
Antiplatelet therapy	
Aspirin	121 (71.6)
Clopidogrel	94 (55.6)
Ticagrelor	21 (12.4)

ACS: acute coronary syndrome; CABG: coronary artery bypass grafting; CAD: coronary artery disease; HbA1c: glycated haemoglobin; IQR: interquartile range; LDL-C: low-density lipoprotein cholesterol; NSTEMI: non-ST-elevation myocardial infarction; PCI: percutaneous coronary intervention; SD: standard deviation; STEMI: ST-elevation myocardial infarction. Antiplatelet categories were not mutually exclusive because some patients received more than one antiplatelet agent. Systolic blood pressure is reported as mean ± SD because it was normally distributed (Shapiro–Wilk p = 0.663); all other continuous variables are reported as median (IQR).

Secondary Prevention Goal Achievement

Achievement of the secondary prevention goals is shown in **Table 2**. 120 patients (71.0%) achieved blood pressure control (≤140/90 mmHg). The overall cohort had a rate of 50.9% of patients with glycaemic control (HbA1C < 7%). Of patients who had diabetes mellitus, 36.2% (42/116) reached the HbA1c target. For LDL-C there was a higher proportion who met the target level of ≤70 mg/dL, at 75 patients (44.4%). 134 patients (79.3%) were smoking cessation (no tobacco use for the past six months). This proportion comprised 116 never-smokers and 18 ex-smokers who had managed to stop smoking. Of the 53 patients with any prior smoking history, 18 (34.0%) had quit smoking while 35 (66.0%) remained current smokers despite having had a prior ACS event.

Table 2. Secondary Prevention Goal Achievement (n = 169)

Secondary Prevention Goal	Target	Achieved, n (%)	Not Achieved, n (%)
LDL-C goal	≤70 mg/dL	75 (44.4)	94 (55.6)
HbA1c goal, overall cohort	≤7%	86 (50.9)	83 (49.1)
HbA1c goal, diabetic patients	≤7%	42/116 (36.2)	74/116 (63.8)
Blood pressure control	≤140/90 mmHg	120 (71.0)	49 (29.0)
Smoking cessation, overall cohort	No smoking during the previous 6 months	134 (79.3)*	35 (20.7)
Smoking cessation, ever-smokers	No smoking during the previous 6 months	18/53 (34.0)	35/53 (66.0)
Any antiplatelet agent	Aspirin, clopidogrel, or ticagrelor	147 (87.0)	22 (13.0)
High-intensity statin therapy	Rosuvastatin 20–40 mg or atorvastatin 40–80 mg	132 (78.1)	37 (21.9)
Statin plus antiplatelet therapy	Concurrent use of both treatments	130 (76.9)	39 (23.1)
Composite secondary prevention goal	Achievement of all six targets	16 (9.5)	153 (90.5)

**The overall smoking-cessation category included never-smokers (n = 116) and former smokers who had abstained for at least six months (n = 18). The cessation rate among ever-smokers was 18/53 (34.0%). The composite goal was defined as simultaneous achievement of LDL-C ≤70 mg/dL, HbA1c ≤7%, blood pressure ≤140/90 mmHg, smoking cessation, use of any antiplatelet agent, and use of a high-intensity statin.*

Unadjusted Associations with Secondary Prevention Goal Achievement

The associations between categorical clinical predictors and secondary prevention goal achievement are shown in

Table 3, which has not been adjusted for other variables. Achievement of LDL-C goal was significantly higher among women compared to men (55.4% vs. 38.9%, respectively; p = 0.049). This association was however, dampened following adjustment for age and other covariates and was not significant.

Male patients achieved significantly better blood pressure control as compared to female patients. Blood pressure was controlled in 88 of 113 male patients (77.9%) compared with 32 of 56 female patients (57.1%; p = 0.007).

All the female patients in the cohort were non-smokers. As such, there was a significantly higher smoking cessation achievement rate among female patients (100% v. 69.0% of male patients, p < 0.001). This finding is largely due to the sex distribution of the study population and should be taken with caution.

Table 3. Unadjusted Associations Between Clinical Predictors and Secondary Prevention Goal Achievement

Predictor	Smoking Cessation, p-value	HbA1c Goal, p-value	LDL-C Goal, p-value	BP Control, p-value	Composite Goal, p-value	Statin + Antiplatelet, p-value
Sex: female versus male	<0.001**	0.516	0.049*	0.007*	1.000	0.870
ACS type: NSTEMI/STEMI/UA	0.090	0.222	0.020*	0.383	0.711	0.615
Diabetes mellitus: yes, versus no	0.686	—†	0.622	0.144	0.580	0.198
Hypertension: yes, versus no	0.059	1.000	0.095	1.000	0.077	0.985
Family history of premature CAD: yes, versus no	0.087	0.003*	0.791	0.558	0.638	0.980
Previous revascularisation: yes, versus no	0.227	0.621	0.067	0.717	0.779	0.043*

*Fisher's exact test, two-sided, was used for 2 × 2 comparisons. Pearson's chi-square test was used for ACS type because it included three categories. *p ≤ 0.05; **p < 0.001. ACS: acute coronary syndrome; BP: blood pressure; CAD: coronary artery disease; HbA1c: glycated haemoglobin; LDL-C: low-density lipoprotein cholesterol; NSTEMI: non-ST-elevation myocardial infarction; STEMI: ST-elevation myocardial infarction; UA: unstable angina.*

*†The association between diabetes status and HbA1c goal achievement was not tested because patients with and without diabetes have inherently different HbA1c distributions. HbA1c target achievement among diabetic patients is reported descriptively in **Table 3**.*

Age Comparisons According to Goal Achievement Status

The age distributions by secondary prevention goal achievement are displayed in **Table 4**. The median ages of the patients achieving the composite secondary prevention goal and the patients not achieving the composite secondary prevention goal were 68.0 years (IQR: 65.5 to 73.5) and 60.0 years (IQR: 52.0 to 68.0), respectively (p < 0.001).

Patients who reached LDL-C goal were also significantly older than those who failed to reach the goal (median ages 64.0 years, IQR 55.5–70.0, and 60.0 years, IQR 52.0–66.8, respectively; p = 0.039).

Likewise, patients who quit smoking were older compared with those who smoked. The median age was 63.0 years (IQR: 56.0–69.0) among smoking-cessation achievers and 55.0 years (IQR: 49.0–62.5) among non-achievers (p = 0.001).

There was no statistical difference between the ages in terms of blood pressure control, overall HbA1C goal achievement or the use of both statins and antiplatelets.

Table 4. Age Comparisons According to Secondary Prevention Goal Achievement Status

Outcome	Not Achieved, Median Age (IQR)	Achieved, Median Age (IQR)	p-value
Blood pressure control	60.0 (53.0–66.0), n = 49	62.5 (52.0–68.2), n = 120	0.391
HbA1c goal	61.0 (54.8–68.0), n = 83	63.0 (51.0–68.0), n = 86	0.868
LDL-C goal	60.0 (52.0–66.8), n = 94	64.0 (55.5–70.0), n = 75	0.039*
Smoking cessation	55.0 (49.0–62.5), n = 35	63.0 (56.0–69.0), n = 134	0.001**
Composite goal	60.0 (52.0–68.0), n = 153	68.0 (65.5–73.5), n = 16	<0.001***
Statin plus antiplatelet therapy	60.0 (52.0–68.0), n = 39	62.0 (53.2–68.0), n = 130	0.396

*Mann–Whitney U test was used for all comparisons. *p ≤ 0.05; **p ≤ 0.001; ***p < 0.001. HbA1c: glycated haemoglobin; IQR: interquartile range; LDL-C: low-density lipoprotein cholesterol.*

Multivariable Analysis

The results of the multivariable logistic regression analyses are shown in **Table 5**. There was an independently significant association between increased age and higher odds for blood pressure control. The blood pressure control odds increased by 4% with each year of age (aOR: 1.04; 95% CI: 1.00–1.09; p = 0.042).

The independently associated parameters were older age for achievement of HbA1c targets. Each additional year of age was associated with a 5% increase in the odds of achieving an HbA1c level of ≤7% (aOR: 1.05; 95% CI: 1.00–1.09; p = 0.040).

Male patients were nearly three times more likely to have blood pressure controlled than female patients (aOR: 3.07; 95% CI: 1.43–6.56; p = 0.004) after controlling for other covariates and age.

In the unadjusted analysis, female patients had a higher proportion of LDL-C goal, but there was a dampening effect after multivariable adjustment. The adjusted OR for LDL-C goal achievement was 0.55 (p = 0.092) when male sex was compared with female sex, suggesting that the sex was not an independent predictor of LDL-C target achievement.

Previous coronary revascularisation was independently associated with higher odds of achieving LDL-C goal (aOR: 2.18; 95% CI: 1.06–4.50; p = 0.035). In addition, patients with previous revascularisation were more likely to receive combination of statin and antiplatelet therapy (aOR: 2.37; 95% CI: 1.08–5.21; p = 0.031).

Table 5. Multivariable Logistic Regression Analysis of Factors Associated with Secondary Prevention Goal Achievement

Outcome	Independent Predictor	Adjusted OR	95% CI	p-value
Blood pressure control	Age, per one-year increase	1.04	1.00–1.09	0.042*
Blood pressure control	Male sex versus female sex	3.07	1.43–6.56	0.004**
HbA1c goal achievement	Age, per one-year increase	1.05	1.00–1.09	0.040*
LDL-C goal achievement	Male sex versus female sex	0.55	Not reported	0.092
LDL-C goal achievement	Previous revascularisation	2.18	1.06–4.50	0.035*
Statin plus antiplatelet use	Previous revascularisation	2.37	1.08–5.21	0.031*

**p ≤ 0.05; **p < 0.01. CI: confidence interval; HbA1c: glycated haemoglobin; LDL-C: low-density lipoprotein cholesterol; OR: odds ratio. Adjusted odds ratios were obtained through multivariable binary logistic regression. The 95% confidence interval for the association between sex and LDL-C achievement was not available in the reported regression output.*

DISCUSSION

This cross-sectional study suggests that there is a large discrepancy between guideline-recommended secondary prevention targets and clinical results in patients presenting for a second acute coronary syndrome (ACS) event > 1 year after the index event. Long-term metabolic and lifestyle management was very poor, although 87.0% and 71.0% of individual patients achieved antiplatelet therapy and blood pressure control, respectively. To be specific, less than half of the patients attained their target LDL-C (44.4%), only 36.2% of patients with diabetes achieved their targeted HbA1c, and an astounding 66.0% of ever-smokers remained smokers after the ACS. In total, only 9.5% met all the composite secondary prevention goals. Older age was independently correlated with better control over BP and glycemic control, while in unadjusted analysis, this older age group was also found to have better rates of lipid target achievement and smoking cessation than their younger counterparts. These findings may reflect greater perceived cardiovascular risk, more frequent healthcare encounters, better adherence to pharmacological therapy, and longer exposure to secondary prevention interventions among older patients. Male sex was independently associated with better blood pressure control. Although the reasons for this finding cannot be determined from our data, it may reflect sex-related differences in healthcare access, follow-up, treatment adherence, or the intensity of antihypertensive therapy. In the Pakistani context, women may encounter socioeconomic and cultural barriers that limit access to regular healthcare and continuity of treatment, potentially contributing to poorer blood pressure control.

Our findings are similar to other international studies conducted previously. This result is similar to that of Tara et al who reported a composite target achievement of 12.5% in patients with recurrent ACS in Japan [13].

Nevertheless, it was higher than the 3.5% reported in the Swedish SEPAT cohort [14] indicating that insufficient comprehensive risk factor control is a general problem in healthcare systems.
Antiplatelet therapy was widely used in our cohort (87.0%) and high-intensity statins were widely prescribed (78.1% of patients). The rates of these prescriptions were similar to those found in the EUROASPIRE V registry (93% and 80%, respectively). However, our patients had only 44.4% of those that were able to reach the recommended LDL-C level of <70 mg/dl. [15]. Historically, this mismatch between high rates of evidence-based prescribing and suboptimal lipid goal attainment has been reported. Likewise, patients with coronary artery disease in EUROASPIRE V had a low success rate of 29% for reaching LDL-C targets <1.8 mmol/L (<70 mg/dL) despite widespread use of lipid-lowering therapy. [16] Similarly, among those who received statins, only 28.1% of recurrent ACS patients achieved LDL-C target in the Tara et al. [10] study, and between 14.4% and 34.6% of ACS patients reached LDL-C goal in the EXPLORE-J registry after long-term follow-up [17]. These findings taken together indicate that statin therapy alone is not enough, and insufficient treatment intensification, poor adherence, infrequent lipid monitoring, and limited use of combination lipid-lowering therapy are all key challenges for optimal lipid control. New drugs like ezetimibe, bempedoic acid, and PCSK9 inhibitors could help fill this treatment gap in eligible patients. [18].
There was still suboptimal glycemic control in our population. Although 68.6% of the subjects had diabetes mellitus, only 36.2% of the diabetics reached the recommended HbA1C level of ≤7%. This was significantly lower than the EUROASPIRE V survey of patients with coronary artery disease and diabetes which reported around 54% [19]. This research indicates difficulties in long-term diabetes management following ACS, likely due to poor follow-up, poor medication adherence and a lack of multidisciplinary diabetes care.
The most well-controlled individual target was blood pressure control, which was reached in 71.0% of the patients, with the target of ≤140/90 mmHg being achieved. Male patients were more successful at reaching blood pressure targets than female patients (77.9% vs. 57.1%), which is similar to prior reported findings indicating that women with cardiovascular disease receive less intensive antihypertensive treatment and less titration of medications. About 52% of smokers had successfully quit, and EUROASPIRE IV [20] where 48.6% of baseline smokers continued to smoke after a coronary event. The results suggest that there should be a regular implementation of structured smoking cessation programs, behavioural counselling, nicotine replacement therapy, and evidence-based medication (varenicline and bupropion) into the long-term secondary prevention.
Overall, our findings highlight substantial deficiencies in comprehensive secondary prevention among patients with recurrent ACS despite relatively high rates of evidence-based pharmacotherapy. The findings highlight the importance of a structured multidisciplinary follow up, frequent monitoring of cardiovascular risk factors and prompt treatment escalation. For long-term secondary prevention, efforts to enhance the ability to meet guideline-recommended targets and to decrease the burden of recurrent cardiovascular events may be enhanced.
Limitation: It was a single centre private tertiary care centre study which may not be generalizable in the broader Pakistani population. Only those who are hospitalized are included, not all out-patients with chronic CAD who are followed as out-patients. This subset may have over representation of patients with poor goal achievement as those patients who achieved better targets may not have had repeat ACS. The patients who seek treatment at these centres may be from the top-end of the socioeconomic spectrum and may thus present a selection bias and lack representation from the lower end of the spectrum. Contemporary lipid management guidelines suggested lower LDL-C targets of <55 mg/dL for very high-risk ASCVD [13] did not evaluate other lipid parameters, and patients were not divided by very high-risk categories of ASCVD, which could have resulted in underestimation of residual cardiovascular risk. Medication adherence was evaluated by the self-reported use of medication, not by objective measures like counts of pills or pharmacy records. The cross-sectional study does not allow for causal inferences about the factors found in this study. In addition, assessment of secondary prevention was restricted to pharmacological management and blood pressure, lipid and glycemic control, and structured clinical follow-up were not included; lifestyle modification (physical activity, dietary optimization), psychosocial factors were not part of this study.

CONCLUSIONS

Overall, there was sub-optimal achievement of secondary prevention targets in this group of patients with a history of acute coronary syndrome (ACS). Key modifiable risk factors, the LDL-C and HbA1C targets, remained suboptimal, and only 9.5% of patients reached comprehensive secondary prevention targets, although individual targets (such as blood pressure control and antiplatelet use) were achieved by most of the patients. There were large differences between subgroups such as sex differences in lipid control, blood pressure control, and pharmacotherapy adherence in the patients with previous revascularization. These results suggest that there is a significant gap between evidence-based recommendations and actual implementation in a high-risk population, and that there is still a residual cardiovascular risk, even after treatment. Optimizing treatment and risk factors, increasing treatment intensity, ensuring patient adherence, and providing structured follow-up are immediately needed to ensure better secondary prevention results and decrease the likelihood of recurrence of cardiovascular events.

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