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Original Research Article

EVALUATION OF MEDICATION ADHERENCE AND BLOOD PRESSURE CONTROL IN PATIENTS WITH HYPERTENSION AND CORONARY ARTERY DISEASE: A PROSPECTIVE STUDY CONDUCTED AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Hypertension is a major modifiable risk factor for coronary artery disease and is strongly associated with adverse cardiovascular outcomes when not adequately controlled. In patients with both hypertension and coronary artery disease, long-term pharmacotherapy is essential; however, poor medication adherence, polypharmacy, inadequate treatment knowledge, and lifestyle-related factors may negatively affect blood pressure control.

Materials and Methods: This prospective observational study was conducted among 95 patients diagnosed with hypertension and coronary artery disease. Adult patients receiving antihypertensive and cardiovascular medications and willing to participate were included. Data were collected using a structured data collection form through patient interviews, prescription review, case records, and hospital documentation. Demographic details, clinical profile, comorbidities, lifestyle factors, medication pattern, adherence-related factors, and blood pressure readings were recorded. Medication adherence was assessed using a structured adherence questionnaire and patients were categorized into good, moderate, and poor adherence groups.

Results: Among 95 patients, the majority were aged 61–75 years (40.00%) and males constituted 64.21%. Dyslipidemia was the most common comorbidity (67.37%), followed by diabetes mellitus (45.26%). Polypharmacy was observed in 61.05% of patients, while missed medication doses were reported by 37.89%. Overall, 46 patients (48.42%) had controlled blood pressure, whereas 49 patients (51.58%) had uncontrolled blood pressure. Good adherence was observed in 32 patients, among whom 75.00% achieved blood pressure control. In contrast, only 20.00% of patients with poor adherence had controlled blood pressure. Medication adherence showed a statistically significant association with blood pressure control ($p<0.001$). Older age, diabetes mellitus, polypharmacy, dosing frequency more than two times daily, inadequate treatment knowledge, and smoking were significantly associated with uncontrolled blood pressure.

Conclusion: Medication adherence was significantly associated with blood pressure control among patients with hypertension and coronary artery disease. Improved patient education, simplified medication regimens, lifestyle modification, and regular follow-up may help improve adherence and clinical outcomes.

Keywords: Hypertension; Coronary Artery Disease; Medication Adherence; Blood Pressure Control; Polypharmacy.

INTRODUCTION

Hypertension is one of the most important modifiable cardiovascular risk factors and remains a major contributor to coronary artery disease, stroke, heart failure, renal dysfunction, and premature cardiovascular mortality. It is often chronic, progressive, and clinically silent for long periods, which makes regular monitoring and sustained treatment essential. In patients with coronary artery disease, the presence of hypertension increases myocardial workload, promotes endothelial dysfunction, accelerates atherosclerosis, and worsens long-term cardiovascular prognosis. Therefore, effective blood pressure control is a central component of both primary and secondary cardiovascular prevention.[1] The management of hypertension has evolved from simple blood pressure reduction to an integrated cardiovascular risk-based approach. Current recommendations emphasize accurate diagnosis, repeated blood pressure assessment, lifestyle modification, pharmacological therapy, and individualized treatment targets according to age, comorbidities, frailty, and cardiovascular risk status. In patients with established coronary artery disease, blood pressure management requires careful balancing of adequate pressure reduction with preservation of coronary perfusion, avoidance of hypotension, and prevention of recurrent ischemic events. This makes hypertension care in coronary artery disease patients more complex than in uncomplicated hypertension.[2]

Coronary artery disease is a chronic clinical condition requiring long-term medical therapy, lifestyle modification, and regular follow-up. Patients commonly receive multiple drug classes, including antiplatelet agents, statins, beta-blockers, angiotensin-converting enzyme inhibitors or angiotensin receptor blockers, calcium channel blockers, diuretics, nitrates, and other supportive therapies depending on clinical status. The overall goal is to reduce ischemic symptoms, prevent myocardial infarction, control risk factors, and improve survival. However, the effectiveness of these therapies depends not only on appropriate prescription but also on whether patients take medicines correctly and consistently.[3] Recent coronary syndrome and chronic coronary disease guidelines have increasingly highlighted patient-centered care, shared decision-making, risk-factor modification, and long-term adherence to evidence-based therapy. In real-world clinical practice, patients with hypertension and coronary artery disease often have multiple comorbidities such as diabetes mellitus, dyslipidemia, chronic kidney disease, obesity, and prior myocardial infarction. These conditions increase pill burden, follow-up requirements, treatment cost, and the possibility of adverse drug reactions. As a result, medication adherence becomes a major determinant of successful blood pressure control and cardiovascular risk reduction.[4] Lifestyle-related factors also play an important role in patients with hypertension and coronary artery disease. High salt intake, unhealthy dietary habits, physical inactivity, smoking, alcohol use, obesity, psychosocial stress, and poor health literacy may reduce the effectiveness of pharmacological treatment. Modern cardiovascular prevention strategies therefore recommend combining drug therapy with lifestyle counselling, smoking cessation, dietary modification, weight control, physical activity, and patient education. A prospective evaluation of such patients can help identify gaps in blood pressure control, adherence behavior, and modifiable barriers to treatment success.[5]

Medication adherence is a dynamic and multidimensional process that includes initiation of treatment, correct implementation of prescribed therapy, and long-term persistence. Non-adherence may be intentional, such as stopping medicine because of side effects or perceived lack of need, or unintentional, such as forgetfulness, complex dosing schedules, cost-related problems, or poor understanding of treatment instructions. In hypertension, poor adherence may remain unnoticed because patients may not experience immediate symptoms when doses are missed. This makes structured adherence assessment especially important in patients who continue to have uncontrolled blood pressure despite receiving treatment.[6]

MATERIALS AND METHODS

This was a prospective observational study conducted to evaluate medication adherence and blood pressure control in patients with hypertension and coronary artery disease. A total of 95 eligible patients were enrolled and followed prospectively as per the study protocol. The study population consisted of adult patients with a confirmed diagnosis of hypertension and coronary artery disease who were receiving antihypertensive and cardiovascular medications. Patients attending the outpatient department or admitted under the medicine or cardiology departments were considered for inclusion after obtaining informed consent.

Inclusion Criteria

Patients aged 18 years and above, diagnosed with hypertension along with coronary artery disease, and receiving prescribed medications for blood pressure control and cardiac disease were included in the study. Patients who were willing to participate and provide complete clinical and medication-related information were enrolled.

Exclusion Criteria

Patients who were unwilling to participate, patients with incomplete medical records, critically ill patients unable to respond to the study questionnaire, and patients with severe cognitive impairment or psychiatric illness affecting reliable communication were excluded from the study.

Methodology

Data were collected using a structured data collection form prepared for the study. Information regarding demographic profile, clinical history, medication use, blood pressure readings, comorbid conditions, lifestyle factors, and adherence-related factors was recorded. Relevant clinical details were obtained from patient interviews, prescriptions, case records, and hospital documentation.

Study Parameters

The parameters assessed in the study included age, gender, residence, education level, occupation, socioeconomic status, body mass index, duration of hypertension and coronary artery disease, family history, smoking status, alcohol use, dietary habits, physical activity, associated comorbidities such as diabetes mellitus, dyslipidemia, chronic kidney disease, and history of myocardial infarction or revascularization. Medication-related parameters included number of drugs prescribed, type of antihypertensive therapy, antiplatelet use, statin use, beta-blocker use, angiotensin-converting enzyme inhibitor or angiotensin receptor blocker use, calcium channel blocker use, diuretic use, frequency of dosing, polypharmacy, adverse drug reactions, missed doses, self-discontinuation of medicines, affordability, availability of drugs, and patient knowledge regarding treatment.

Blood Pressure Assessment

Blood pressure was measured using a calibrated sphygmomanometer or digital blood pressure monitor following standard clinical procedure. Systolic and diastolic blood pressure values were recorded after the patient had rested adequately. Blood pressure control was assessed based on recorded readings, and patients were categorized as having controlled or uncontrolled blood pressure according to accepted clinical cut-off values, preferably blood pressure below 140/90 mmHg unless otherwise specified by individual clinical condition.

Assessment of Medication Adherence

Medication adherence was assessed using a structured medication adherence questionnaire along with patient interview and prescription review. Patients were asked about missed doses, frequency of medication intake, difficulty in following prescriptions, forgetfulness, intentional non-adherence, adverse effects, cost-related problems, and understanding of the importance of long-term therapy. Based on the adherence assessment, patients were categorized into good, moderate, or poor adherence groups.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 27.0. Descriptive statistics were used to summarize demographic and clinical variables. Continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as frequency and percentage. The association between medication adherence and blood pressure control was analyzed using the Chi-square test or Fisher's exact test as appropriate. Independent t-test or Mann–Whitney U test was used for comparison of continuous variables where applicable. Logistic regression analysis was performed to identify predictors of poor medication adherence and uncontrolled blood pressure. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The socio-demographic characteristics of the 95 study participants are presented in Table 1. The majority of patients belonged to the age group of 61–75 years, accounting for 38 patients (40.00%), followed by 46–60 years with 26 patients (27.37%). Patients aged 18–45 years and those older than 75 years constituted 16.84% and 15.79% of the study population, respectively.

With respect to gender distribution, males constituted a significantly larger proportion of the study population, with 61 patients (64.21%), whereas females accounted for 34 patients (35.79%). Regarding place of residence, 53 patients (55.79%) were from urban areas and 42 patients (44.21%) were from rural areas, indicating a slightly higher representation of urban patients in the study. Analysis of educational status revealed that secondary education was the most common educational level, reported by 31 patients (32.63%). This was followed by primary education among 24 patients (25.26%) and graduate-level education or above among 22 patients (23.16%). Notably, 18 patients (18.95%) had no formal education. Occupational status showed that 34 patients (35.79%) were employed, while 28 patients (29.47%) were retired. Homemakers accounted for 23 patients (24.21%), whereas unemployed individuals constituted the smallest group with 10 patients (10.53%). Assessment of socioeconomic status demonstrated that more than half of the patients belonged to the middle socioeconomic class (56.84%), followed by the lower socioeconomic class (29.47%) and upper socioeconomic class (13.68%). Body mass index assessment revealed that 42 patients (44.21%) had normal BMI, while 39 patients (41.05%) were overweight and 14 patients (14.74%) were obese. Thus, more than half of the study population (55.79%) had BMI values above the normal range, highlighting the contribution of excess body weight as a cardiovascular risk factor. (Table 1)

The clinical characteristics and lifestyle-related risk factors of the study participants are summarized in Table 2. The duration of hypertension ranged widely among participants. The largest proportion of patients, 42 (44.21%), had hypertension for 5–10 years, followed by 28 patients (29.47%) with a disease duration exceeding 10 years and 25 patients (26.32%) with hypertension duration less than 5 years. The duration of coronary artery disease was less than 5 years in 54 patients (56.84%), while 30 patients (31.58%) had disease duration of 5–10 years

and 11 patients (11.58%) had coronary artery disease for more than 10 years. Among associated comorbidities, dyslipidemia was the most prevalent condition and was observed in 64 patients (67.37%). Diabetes mellitus was present in 43 patients (45.26%), while chronic kidney disease was reported in 13 patients (13.68%). A family history of cardiovascular disease was reported by 36 patients (37.89%), suggesting a significant hereditary component among the study population. Previous myocardial infarction was documented in 41 patients (43.16%), indicating a high burden of established cardiovascular disease. Additionally, 24 patients (25.26%) had undergone coronary revascularization procedures. Lifestyle-related risk factors were common among participants. Current smoking was reported by 26 patients (27.37%), while alcohol consumption was reported by 22 patients (23.16%). Inadequate physical activity was observed in 57 patients (60.00%), making it the most common modifiable lifestyle risk factor. Furthermore, 52 patients (54.74%) reported consumption of a high salt or high-fat diet. (Table 2)

The medication profile and adherence-related characteristics of the study participants are presented in Table 3. Polypharmacy was common among the study population, with 58 patients (61.05%) receiving more than four medications, whereas 37 patients (38.95%) were prescribed four or fewer medications. Only 18 patients (18.95%) were receiving antihypertensive monotherapy, indicating that the majority required combination therapy for adequate blood pressure control. Among prescribed medications, statins were the most frequently used drugs, being prescribed to 90 patients (94.74%), followed closely by antiplatelet agents in 88 patients (92.63%). Beta-blockers were used by 72 patients (75.79%), while ACE inhibitors or angiotensin receptor blockers were prescribed to 66 patients (69.47%). Calcium channel blockers and diuretics were used by 48 patients (50.53%) and 31 patients (32.63%), respectively. Nitrates were prescribed to 35 patients (36.84%). Regarding dosing frequency, 39 patients (41.05%) were taking medications once daily, 35 patients (36.84%) twice daily, and 21 patients (22.11%) more than twice daily. Increased dosing frequency may negatively influence medication adherence. Missed medication doses were reported by 36 patients (37.89%), indicating that more than one-third of participants experienced adherence-related challenges. Adverse drug reactions were reported by 18 patients (18.95%), while 22 patients (23.16%) experienced cost-related difficulties in obtaining medications. Poor availability of medications was reported by 14 patients (14.74%). Knowledge regarding treatment was inadequate in 46 patients (48.42%), suggesting that nearly half of the participants lacked sufficient understanding of their disease and prescribed therapy. Additionally, 19 patients (20.00%) admitted self-discontinuation of medications, which may contribute to poor disease control and adverse cardiovascular outcomes. (Table 3)

The relationship between medication adherence and blood pressure control is shown in Table 4. Among patients with good medication adherence, 24 out of 32 patients (75.00%) achieved controlled blood pressure, whereas only 8 patients (25.00%) had uncontrolled blood pressure. In the moderate adherence group, controlled blood pressure was observed in 17 patients (44.74%), while 21 patients (55.26%) had uncontrolled blood pressure. A marked decline in blood pressure control was observed among patients with poor adherence. Only 5 patients (20.00%) in this group achieved blood pressure control, while 20 patients (80.00%) had uncontrolled blood pressure. Overall, controlled blood pressure was achieved by 46 patients (48.42%), whereas 49 patients (51.58%) had uncontrolled blood pressure. Statistical analysis demonstrated a highly significant association between medication adherence and blood pressure control ($p<0.001$). (Table 4)

Age showed a significant association with blood pressure control ($p=0.019$). Among patients aged 60 years or younger, 61.90% achieved controlled blood pressure, compared with only 37.74% among those older than 60 years. Diabetes mellitus was significantly associated with uncontrolled blood pressure ($p=0.005$). Among diabetic patients, only 32.56% achieved blood pressure control, whereas 67.44% remained uncontrolled. In contrast, 61.54% of non-diabetic patients achieved controlled blood pressure. Polypharmacy also demonstrated a significant association with blood pressure control ($p=0.003$). Patients receiving more than four medications showed lower rates of blood pressure control (36.21%) compared with those receiving four or fewer medications (67.57%). Medication dosing frequency greater than two times per day was significantly associated with poor blood pressure control ($p=0.002$). Only 30.00% of these patients achieved controlled blood pressure compared with 61.82% among patients receiving medications two times daily or less. Treatment knowledge showed one of the strongest associations with blood pressure control ($p<0.001$). Patients with adequate treatment knowledge demonstrated substantially higher rates of blood pressure control (67.35%) compared with those having inadequate knowledge (28.26%). Current smoking was significantly associated with uncontrolled blood pressure ($p=0.035$). Among smokers, 69.23% had uncontrolled blood pressure, whereas among non-smokers the corresponding figure was 44.93%. Body mass index ≥ 25 kg/m² showed a trend toward poorer blood pressure control, with 60.38% of overweight or obese patients having uncontrolled blood pressure compared with 40.48% among patients with normal BMI. However, the association did not reach statistical significance ($p=0.054$). (Table 5)

Table 1: Socio-demographic characteristics of study participants

Variable	Category	Frequency	Percentage (%)
Age group	18–45 years	16	16.84
	46–60 years	26	27.37
	61–75 years	38	40.00
	>75 years	15	15.79
Gender	Male	61	64.21
	Female	34	35.79
Residence	Rural	42	44.21
	Urban	53	55.79
Education status	No formal education	18	18.95
	Primary education	24	25.26
	Secondary education	31	32.63
	Graduate and above	22	23.16
Occupation	Employed	34	35.79
	Homemaker	23	24.21
	Retired	28	29.47
	Unemployed	10	10.53
Socioeconomic status	Lower	28	29.47
	Middle	54	56.84
	Upper	13	13.68
Body mass index	Normal BMI	42	44.21
	Overweight	39	41.05
	Obese	14	14.74

Table 2: Clinical profile and lifestyle-related characteristics

Variable	Category	Frequency	Percentage (%)
Duration of hypertension	<5 years	25	26.32
	5–10 years	42	44.21
	>10 years	28	29.47
Duration of coronary artery disease	<5 years	54	56.84
	5–10 years	30	31.58
	>10 years	11	11.58
Diabetes mellitus	Present	43	45.26
Dyslipidemia	Present	64	67.37
Chronic kidney disease	Present	13	13.68
Family history of cardiovascular disease	Present	36	37.89
Previous myocardial infarction	Present	41	43.16
History of revascularization	Present	24	25.26
Current smoking	Present	26	27.37
Alcohol consumption	Present	22	23.16
Inadequate physical activity	Present	57	60.00
High salt/fat diet	Present	52	54.74

Table 3: Medication pattern and adherence-related factors

Variable	Category	Frequency	Percentage (%)
Number of prescribed drugs	≤4 drugs	37	38.95
	>4 drugs	58	61.05
Antihypertensive therapy	Monotherapy	18	18.95
Beta-blocker use	Yes	72	75.79
ACE inhibitor/ARB use	Yes	66	69.47
Calcium channel blocker use	Yes	48	50.53
Diuretic use	Yes	31	32.63
Nitrate use	Yes	35	36.84
Antiplatelet use	Yes	88	92.63
Statin use	Yes	90	94.74
Daily dosing frequency	Once daily	39	41.05
	Twice daily	35	36.84
	More than twice daily	21	22.11
Missed medication doses	Present	36	37.89
Adverse drug reactions	Present	18	18.95
Cost-related difficulty	Present	22	23.16
Poor availability of medicines	Present	14	14.74
Inadequate knowledge about treatment	Present	46	48.42
Self-discontinuation of medicines	Present	19	20.00

Table 4: Association between medication adherence and blood pressure control

Medication adherence level	Total patients	Controlled BP n (%)	Uncontrolled BP n (%)	p-value
Good adherence	32	24 (75.00)	8 (25.00)	<0.001
Moderate adherence	38	17 (44.74)	21 (55.26)	
Poor adherence	25	5 (20.00)	20 (80.00)	
Total	**95**	**46 (48.42)**	**49 (51.58)**	

Table 5: Factors associated with blood pressure control among study participants

Factor	Category	Total n (%)	Controlled BP n (%)	Uncontrolled BP n (%)	p-value
Age group	≤60 years	42 (44.21)	26 (61.90)	16 (38.10)	0.019
	>60 years	53 (55.79)	20 (37.74)	33 (62.26)	
Diabetes mellitus	Present	43 (45.26)	14 (32.56)	29 (67.44)	0.005
	Absent	52 (54.74)	32 (61.54)	20 (38.46)	
Polypharmacy	Present	58 (61.05)	21 (36.21)	37 (63.79)	0.003
	Absent	37 (38.95)	25 (67.57)	12 (32.43)	
Dosing frequency >2 times/day	Present	40 (42.11)	12 (30.00)	28 (70.00)	0.002
	Absent	55 (57.89)	34 (61.82)	21 (38.18)	
Treatment knowledge	Adequate	49 (51.58)	33 (67.35)	16 (32.65)	<0.001
	Inadequate	46 (48.42)	13 (28.26)	33 (71.74)	
Current smoking	Yes	26 (27.37)	8 (30.77)	18 (69.23)	0.035
	No	69 (72.63)	38 (55.07)	31 (44.93)	
BMI ≥25 kg/m²	Present	53 (55.79)	21 (39.62)	32 (60.38)	0.054
	Absent	42 (44.21)	25 (59.52)	17 (40.48)	

DISCUSSION

The present study included 95 patients with hypertension and coronary artery disease, with the majority belonging to the 61–75 years age group (40.00%), followed by 46–60 years (27.37%). Males were predominant in this study (64.21%), and urban patients constituted 55.79% of the sample. This pattern is comparable with the Indian CREATE registry by Xavier et al. (2008), in which patients with acute coronary syndromes had a mean age of 57.50 years and males were predominant, as women constituted only 23.60% of the registry population. In comparison, the present study had a slightly lower male predominance but showed a similar trend of coronary disease being more common in older age groups and among men. The middle socioeconomic group was the largest group in the present study (56.84%), while Xavier et al. reported that 52.50% of patients belonged to the lower-middle class and 19.60% belonged to poor socioeconomic groups, suggesting that cardiovascular disease affects a broad socioeconomic spectrum in India.[7] In the present study, 44.21% of patients had normal BMI, while 41.05% were overweight and 14.74% were obese, meaning that 55.79% had BMI above the normal range. This finding is lower than the study by Khayyat et al. (2017), in which 64.70% of hypertensive patients were obese and only 7.40% had normal BMI. However, both studies indicate that excess body weight is common among patients with hypertension and contributes to poor cardiovascular risk control. In the present study, BMI ≥25 kg/m² was associated with a higher proportion of uncontrolled blood pressure (60.38%) compared with normal BMI patients (40.48%), although this association was borderline and not statistically significant (p=0.054). Khayyat et al. also found that overweight patients had significantly lower odds of blood pressure control compared with normal-weight patients (OR 0.40, p=0.03), supporting the role of weight management in blood pressure control.[8] The clinical profile of the present study showed that dyslipidemia was the most common comorbidity (67.37%), followed by diabetes mellitus (45.26%), previous myocardial infarction (43.16%), and family history of cardiovascular disease (37.89%). These findings are comparable with Kaul et al. (2017), who analyzed the Indian cohort of the CLARIFY registry and reported a high burden of cardiovascular risk factors among stable coronary artery disease patients in India. In their study, diabetes was present in 42.90% of Indian patients compared with 28.80% in the rest of the world. The diabetes prevalence in the present study (45.26%) was slightly higher than the CLARIFY India cohort, showing that diabetic status remains an important contributor to coronary artery disease and poor blood pressure control in Indian patients.[9] Lifestyle-related risk factors were also frequent in the present study, with inadequate physical activity in 60.00%, high salt or high-fat diet in 54.74%, current smoking in 27.37%, and alcohol consumption in 23.16% of patients. These findings are similar to the study by Aseri et al. (2024), in which coronary artery disease patients had a higher prevalence of smoking (19.00% vs 4.00%, p=0.001), heavy alcohol intake (21.00% vs 10.00%, p=0.032), physical inactivity (70.00% vs 51.00%, p=0.019), diabetes mellitus (44.00% vs 11.00%, p<0.001), and low HDL cholesterol (69.00% vs 46.00%, p=0.001) compared with their siblings. The physical inactivity rate in the present study (60.00%) was slightly lower than that reported by Aseri et al. (70.00%), whereas smoking and alcohol use were slightly higher in the present study, suggesting that lifestyle modification should remain a key intervention in this patient group.[10] The medication pattern in the present study showed good use of evidence-based cardiovascular drugs, with statins prescribed to 94.74%, antiplatelets to 92.63%, beta-blockers to 75.79%, ACE inhibitors or ARBs to 69.47%, calcium channel blockers to 50.53%, and diuretics to 32.63% of patients. These rates were much higher than those reported by Yusuf et al. (2011) in the PURE study, where only 25.30% of patients with cardiovascular disease were using antiplatelet drugs, 17.40% beta-blockers, 19.50% ACE inhibitors or ARBs, and 14.60% statins. The better drug utilization in the present study may be due to the tertiary care hospital setting, regular specialist consultation, and availability of cardiology-based prescriptions. However, despite high prescription rates, only 48.42% of patients achieved controlled blood pressure, indicating that prescription alone is insufficient without adherence, education, and

lifestyle control.[11] Medication adherence in the present study showed that 33.68% of patients had good adherence, 40.00% had moderate adherence, and 26.32% had poor adherence. This differs from Balasubramanian et al. (2018), who reported high adherence in 46.00%, medium adherence in 41.30%, and low adherence in 12.70% of hypertensive patients in rural Kerala. Compared with their study, the present study had lower good adherence and higher poor adherence, despite being conducted in a tertiary care setting. This difference may be due to the higher burden of coronary artery disease, polypharmacy, multiple daily dosing, adverse drug reactions, and cost-related barriers in the present study. Inadequate knowledge was also present in 48.42% of patients, which may have contributed to missed doses and self-discontinuation of medicines.[12] The present study demonstrated a significant association between medication adherence and blood pressure control ($p<0.001$). Among patients with good adherence, 75.00% had controlled blood pressure, compared with 44.74% in the moderate adherence group and only 20.00% in the poor adherence group. Overall, blood pressure was controlled in 48.42% of patients. Pallangyo et al. (2022), in a tertiary cardiovascular hospital in Tanzania, reported good adherence in 76.90% of hypertensive outpatients, but blood pressure control was achieved in only 43.20%. Compared with their study, the present study had a lower proportion of good adherence but a slightly higher blood pressure control rate. Both studies suggest that medication adherence is strongly related to blood pressure control, but other factors such as diet, physical activity, obesity, comorbidities, and health-system barriers may also influence final blood pressure outcomes.[13] Polypharmacy and dosing frequency were important treatment-related factors in the present study. Patients receiving more than four medications had lower blood pressure control (36.21%) compared with those receiving four or fewer medications (67.57%), and this association was statistically significant ($p=0.003$). Similarly, patients taking medications more than twice daily had lower blood pressure control (30.00%) than those with less frequent dosing (61.82%, $p=0.002$). Daugherty et al. (2012) studied patients with resistant hypertension and found that blood pressure control improved from 22.00% to 55.00% over one year, while treatment intensification was associated with better control (adjusted OR 1.64). In contrast, the present study highlights that complex regimens and polypharmacy may reduce adherence and impair blood pressure control, especially in patients already receiving multiple cardiovascular drugs.[14] Patient knowledge showed one of the strongest associations with blood pressure control in the present study. Patients with adequate treatment knowledge had better blood pressure control (67.35%) compared with those having inadequate knowledge (28.26%), and this was statistically significant ($p<0.001$). Wright-Nunes et al. (2012) similarly reported that patients who correctly identified their systolic blood pressure goal had lower systolic blood pressure than those who did not know their goal (134 mmHg vs 141 mmHg, $p=0.05$), and correct knowledge remained independently associated with lower systolic blood pressure after adjustment. In the present study, inadequate knowledge, smoking, diabetes mellitus, older age, and polypharmacy were all linked with poorer blood pressure control, emphasizing the need for structured counselling, simplified medication regimens, smoking cessation advice, and repeated patient education during follow-up visits.[15]

CONCLUSION

The present study showed that medication adherence plays an important role in achieving blood pressure control among patients with hypertension and coronary artery disease. Good adherence was associated with better blood pressure control, while poor adherence, polypharmacy, frequent dosing, inadequate treatment knowledge, diabetes, older age, and smoking were linked with uncontrolled blood pressure. Patient education, simplified drug regimens, lifestyle modification, and regular follow-up may help improve adherence and treatment outcomes in this high-risk group.

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