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Original Research Article

Medication Adherence and Associated Factors Among Hypertensive Patients Attending a Tertiary Care Hospital in Gujarat: A Community-Based Cross-Sectional Study

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Abstract

Introduction: Poor medication adherence remains a major obstacle to blood pressure control among hypertensive patients. Despite a rising burden of hypertension in India, data on adherence from community-based settings in Gujarat remain scarce. This study assessed antihypertensive medication adherence and its associated factors among hypertensive patients in a rural–urban community setting in Gujarat, India.

Materials and Methods: A community-based cross-sectional study was conducted among 400 hypertensive patients (200 from rural and 200 from urban field practice areas) attached to a medical college in Gujarat. Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8). Binary logistic regression was applied to identify independent predictors of poor adherence.

Results: The mean age of participants was 57.3 ± 11.8 years. Poor adherence was found in 23.0% of participants. Forgetfulness (52.2%), busy schedule (39.1%), and complex regimen (32.6%) were the most common reasons for non-adherence. Significant independent predictors of poor adherence included age ≥60 years (AOR=1.69), low education (AOR=1.86), lower socioeconomic status (AOR=1.62), disease duration >5 years (AOR=1.84), polypharmacy ≥3 drugs (AOR=2.11), ≥2 daily doses (AOR=2.41), and smoking (AOR=2.09).

Conclusion: Nearly one-quarter of hypertensive patients had poor medication adherence. Targeted patient education, simplified regimens, and reminder-based strategies are needed to improve adherence and blood pressure control in this population.

Keywords: Antihypertensive Agents; Blood Pressure Control; Gujarat; Hypertension; Medication Adherence; MMAS-8; Predictors.

Introduction

Hypertension is a leading modifiable risk factor for cardiovascular disease, stroke, chronic kidney disease, and premature mortality worldwide. The World Health Organization (WHO) estimates that approximately 1.28 billion adults aged 30–79 years have hypertension globally, with nearly two-thirds residing in low- and middle-income countries. [1] Despite the availability of effective antihypertensive therapy, blood pressure remains uncontrolled in the majority of patients,

primarily due to suboptimal medication adherence. [2]

In India, the burden of hypertension has escalated substantially over the past two decades. A systematic review and meta-analysis by Anchala et al. estimated the overall prevalence of hypertension in India at 29.8%, with rural prevalence of 25.1% and urban prevalence of 41.9%, accounting for approximately 10% of all deaths in the country. [3] The National Family Health Survey-5 (NFHS-5, 2019–21) further documented that only a fraction of hypertensive individuals in India have their blood pressure adequately controlled, underscoring a persistent gap in effective hypertension management. [4] Gujarat, one of the rapidly industrializing states of India, has witnessed a rise in non-communicable disease burden including hypertension; however, state-specific community-level data on medication adherence remain limited.

Adherence to antihypertensive medication is defined by the WHO as "the degree to which the person's behavior corresponds with the agreed recommendations from a health care provider. [5] It is a complex, multidimensional behavior influenced by patient-related, disease-related, therapy-related, healthcare system–related, and socioeconomic factors. Evidence consistently demonstrates that poor adherence leads to suboptimal blood pressure control, increased risk of cardiovascular events, higher hospitalization rates, and avoidable mortality. [6]

Studies from India have reported substantial variation in antihypertensive medication adherence, with rates of non-adherence ranging from approximately 20% to 80% depending on the study setting, population, and adherence assessment tool used. [7,8] Goswami, in a tertiary care hospital study in Gandhinagar, Gujarat, documented non-adherence in 24.3% of hypertensive participants and identified age, religion, marital status, occupation, substance abuse, education, and family history of hypertension as significant sociodemographic predictors. [9] Shah et al. reported a compliance rate of only 39.4% in a tertiary care hospital in Mumbai, with forgetfulness and a subjective feeling of wellness as the predominant reasons for non-adherence. [10] Badhe et al. similarly found only 34.8% adherence in Navi Mumbai, with alcoholism and older age being key determinants. [11] Balasubramanian et al. in a community-based study in rural Kerala reported that poor knowledge of complications, utilization of government pharmacies, and asymptomatic presentation at diagnosis were independent predictors of poor adherence. [12]

Despite this evidence, there remains a paucity of community-based studies from Gujarat that comprehensively evaluate both the prevalence of poor medication adherence and its associated factors across rural and urban populations using a validated adherence assessment tool. Most existing studies from Gujarat are hospital-based, which may not accurately reflect the true extent of non-adherence at the community level. Understanding the community-level burden and determinants of non-adherence is crucial for designing targeted public health interventions aligned with national programs such as the National Programme for Prevention and Control of Non-Communicable Diseases (NPCDCS).

The objectives of this study were: (i) to assess the prevalence of poor antihypertensive medication adherence using the MMAS-8 scale among hypertensive patients residing in rural and urban field practice areas of a medical college in Gujarat; (ii) to determine the distribution of adherence levels and identify common reasons for non-adherence; and (iii) to identify independent sociodemographic, clinical, and treatment-

related predictors of poor medication adherence.

Materials and Methods

Study Design and Setting: A community-based cross-sectional study was conducted in the Rural Health Training Centre (RHTC) and Urban Health Training Centre (UHTC) field practice areas attached to a medical college in Gujarat, India. The study was carried out over a period of 1 years. The RHTC field practice area comprised five villages, whereas the UHTC field practice area included four urban wards.

Study Population: The study population consisted of adult patients diagnosed with hypertension and residing in the selected rural and urban field practice areas during the study period.

Inclusion Criteria

- Adults aged 18 years and above.
- Diagnosed with hypertension by a registered medical practitioner.
- Receiving antihypertensive medication for at least three months.
- Permanent residents of the study area.
- Willing to participate and provided written informed consent.

Exclusion Criteria

- Patients who were seriously ill or unable to participate in the interview.
- Individuals with cognitive impairment or severe psychiatric illness that precluded reliable responses.
- Pregnant women with gestational hypertension.
- Participants who declined to provide informed consent.

Sample Size: The sample size was calculated using the single population proportion formula:

$$n = \frac{Z^2 pq}{d^2}$$

where Z = 1.96 (95% confidence level), p = 50%, q = 1 − p, and d = 5% absolute precision. The calculated minimum sample size was 384 participants. To ensure equal allocation between the Rural Health Training Centre (RHTC) and Urban Health Training Centre (UHTC) field practice areas and across the selected villages and wards, the final sample size was rounded to 400 participants.

Sampling Technique: A multistage community-based sampling approach with consecutive household recruitment within each selected village and ward.

A total of 400 hypertensive patients were included in the study.

Equal representation was ensured from both study settings:

- Rural Health Training Centre (RHTC): 200 participants
- Urban Health Training Centre (UHTC): 200 participants

Within the RHTC field practice area, five villages were included, and 40 participants were selected from each village (5 × 40 = 200). Within the UHTC field practice area, four urban wards were included, and 50 participants were selected from each ward (4 × 50 = 200).

Participants were selected through house-to-house visits. In each village or urban ward, data collection commenced from the approximate geographical center. The survey team proceeded in one predetermined direction and consecutively visited households until the required number of eligible hypertensive patients had been interviewed. If more than one eligible participant was present in a household, one participant was selected using simple random selection. Households without an eligible participant were skipped, and the survey continued to the next household until the desired sample size for that village or ward was achieved.

Study Tool and Data Collection: Data were collected through face-to-face interviews using a predesigned and

pretested structured questionnaire administered during home visits. Questionnaire included sections on socio-demographic characteristics, clinical profile and comorbidities, lifestyle-related factors, antihypertensive medication utilization, medication adherence, blood pressure control, and reasons for medication non-adherence.

Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8). Based on the total MMAS-8 score, participants were categorized as having high, medium, or low medication adherence. For regression analyses, adherence was further dichotomized into good adherence (high and medium adherence) and poor adherence (low adherence).

Clinical Measurements: Blood pressure was measured using a standardized, calibrated digital or mercury sphygmomanometer following standard recommendations. Participants were asked to rest for at least five minutes before measurement. Two readings were recorded at an interval of approximately two minutes, and the average was considered for analysis. Blood pressure was categorized as controlled (<140/90 mmHg) or uncontrolled (≥140/90 mmHg).

Body weight and height were measured using standard procedures, and body mass index (BMI) was calculated as weight (kg) divided by height squared (m^2).

Information regarding duration of hypertension, family history, comorbidities, antihypertensive medications, and treatment characteristics was obtained through participant

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation (SD). Associations between categorical variables and medication adherence were assessed using the Chi-square test or Fisher's exact test, as appropriate. Variables with a p-value <0.20 in the bivariate analysis and those considered clinically relevant were included in a binary logistic regression model to identify independent predictors of poor medication adherence. Crude odds ratios (ORs), adjusted odds ratios (AORs), 95% confidence intervals (CIs), and corresponding p-values were reported. A two-tailed p-value <0.05 was considered statistically significant.

Results

A total of 400 hypertensive patients were included in the study, comprising 200 participants from the Rural Health Training Centre (RHTC) field practice area and 200 participants from the Urban Health Training Centre (UHTC) field practice area.

Socio-demographic Characteristics: The mean age of the participants was 57.3 ± 11.8 years, with the largest proportion belonging to the 50–59 years age group (30.5%), followed by 60–69 years (27.0%). Overall, 51.5% were males and 48.5% were females. Most participants were married (78.5%), while 14.5% were widowed. The majority were Hindus (86.0%). Regarding educational status, 27.5% had completed secondary education, 23.0% had primary education, and 16.0% were illiterate. Homemakers constituted the largest occupational group (28.0%), followed by farmers (21.0%). Most participants belonged to Socioeconomic Class III (36.5%), followed by Class IV (28.5%). Equal numbers of participants were recruited from rural and urban field practice areas (50.0% each)

Table 1: Socio-demographic Characteristics of Study Participants (N = 400)

Variable	Category	n	%
Age (years)	<40	36	9.0
	40–49	74	18.5
	50–59	122	30.5
	60–69	108	27.0
	≥70	60	15.0
Gender	Male	206	51.5
	Female	194	48.5
Marital Status	Single	12	3.0
	Married	314	78.5
	Widowed	58	14.5
	Divorced/Separated	16	4.0
Religion	Hindu	344	86.0
	Muslim	44	11.0
	Others	12	3.0
Education	Illiterate	64	16.0
	Primary	92	23.0
	Secondary	110	27.5
	Higher Secondary	62	15.5
	Graduate	50	12.5
	Postgraduate	22	5.5
Occupation	Homemaker	112	28.0
	Farmer	84	21.0
	Skilled worker	48	12.0
	Unskilled worker	56	14.0
	Professional	24	6.0
	Retired	48	12.0
	Unemployed	28	7.0
Socioeconomic Class	Class I	28	7.0
	Class II	70	17.5
	Class III	146	36.5
	Class IV	114	28.5
	Class V	42	10.5
Residence	Rural	200	50.0
	Urban	200	50.0

Clinical and Lifestyle Characteristics: The largest proportion of participants had hypertension for 1–5 years (40.5%), while 18.5% had hypertension for more than 10 years. A family history of hypertension was reported by 46.5% of participants. Nearly half (49.5%) had at least one comorbidity. Diabetes mellitus was present in 33.0%, dyslipidemia in 26.5%, and chronic kidney disease in 6.0% of participants. The mean body mass index was 26.1 ± 4.2 kg/m². The mean systolic and diastolic blood pressures were 144.8 ± 16.7 mmHg and 88.6 ± 10.8 mmHg, respectively. Regarding lifestyle factors, 20.5% of participants were smokers, 24.0% reported tobacco chewing, and 17.0% consumed alcohol. Regular physical exercise was reported by 41.5%, while 59.5% practiced dietary salt restriction.

Table 2: Clinical and Lifestyle Characteristics of Study Participants3

Clinical Characteristics	Category	n (%) / Mean ± SD
Duration of Hypertension	<1 year	48 (12.0)
	1–5 years	162 (40.5)
	6–10 years	116 (29.0)
	>10 years	74 (18.5)
Family History of Hypertension	Yes	186 (46.5)
	No	214 (53.5)
Any Comorbidity	Yes	198 (49.5)
	No	202 (50.5)
Diabetes Mellitus	Yes	132 (33.0)
Dyslipidemia	Yes	106 (26.5)
Chronic Kidney Disease	Yes	24 (6.0)
BMI (kg/m²)	Mean ± SD	26.1 ± 4.2
Systolic BP (mmHg)	Mean ± SD	144.8 ± 16.7
Diastolic BP (mmHg)	Mean ± SD	88.6 ± 10.8
Lifestyle Characteristics		
Smoking	Yes	82 (20.5)
Tobacco chewing	Yes	96 (24.0)
Alcohol consumption	Yes	68 (17.0)
Regular exercise	Yes	166 (41.5)
Salt restriction	Yes	238 (59.5)

Antihypertensive Drug Utilization Pattern: Among the study participants, 40.5% were receiving two antihypertensive medications, 37.0% were on monotherapy, 17.5% were taking three drugs, and 5.0% were prescribed four or more antihypertensive agents. Overall, 63.0% of participants received combination therapy, whereas 37.0% were managed with monotherapy. Most participants (66.0%) received once-daily dosing, while 29.5% received medications twice daily and 4.5% required three daily doses. Angiotensin receptor blockers were the most frequently prescribed antihypertensive drug class (47.0%), followed by calcium channel blockers (44.0%), beta blockers (26.0%), diuretics (24.0%), ACE inhibitors (15.5%), and other antihypertensive agents (4.5%). Because several participants received combination therapy, drug-class percentages exceeded 100%.

Medication Adherence: Based on the MMAS-8 scale, 35.5% of participants demonstrated high medication adherence, 41.5% had medium adherence, and 23.0% had low adherence. When categorized into two groups, 308 participants (77.0%) exhibited good adherence (high or medium adherence), whereas 92 participants (23.0%) had poor medication adherence.

Item-wise Responses to MMAS-8: Among the MMAS-8 items, the most frequently reported adherence problem was forgetting to take medication (30.5%), followed by difficulty remembering medication (29.5%) and forgetting medication while travelling (23.5%). Missing medication for reasons other than forgetfulness was reported by 21.5%, while 18.5% admitted missing medication on the previous day. Stopping medication after feeling better and stopping medication after feeling worse were reported by 14.5% and 9.0% of participants, respectively.

Table 3: Antihypertensive Drug Utilization Pattern3

Variable	Category	n (%)
Number of Drugs	One	148 (37.0)
	Two	162 (40.5)
	Three	70 (17.5)
	≥4	20 (5.0)
Therapy Type	Monotherapy	148 (37.0)
	Combination therapy	252 (63.0)
Dosing Frequency	Once daily	264 (66.0)
	Twice daily	118 (29.5)
	Three times daily	18 (4.5)
Drug Class	ACE inhibitors	62 (15.5)
	ARBs	188 (47.0)
	Calcium channel blockers	176 (44.0)
	Beta blockers	104 (26.0)
	Diuretics	96 (24.0)
	Others	18 (4.5)

Table 4: Medication Adherence Status

Medication Adherence Category		n	%
Good adherence (High + Medium) 308, (77.0%)	High adherence	142	35.5
	Medium adherence	166	41.5
Poor adherence (Low) 92, (23.0%)	Low adherence	92	23.0

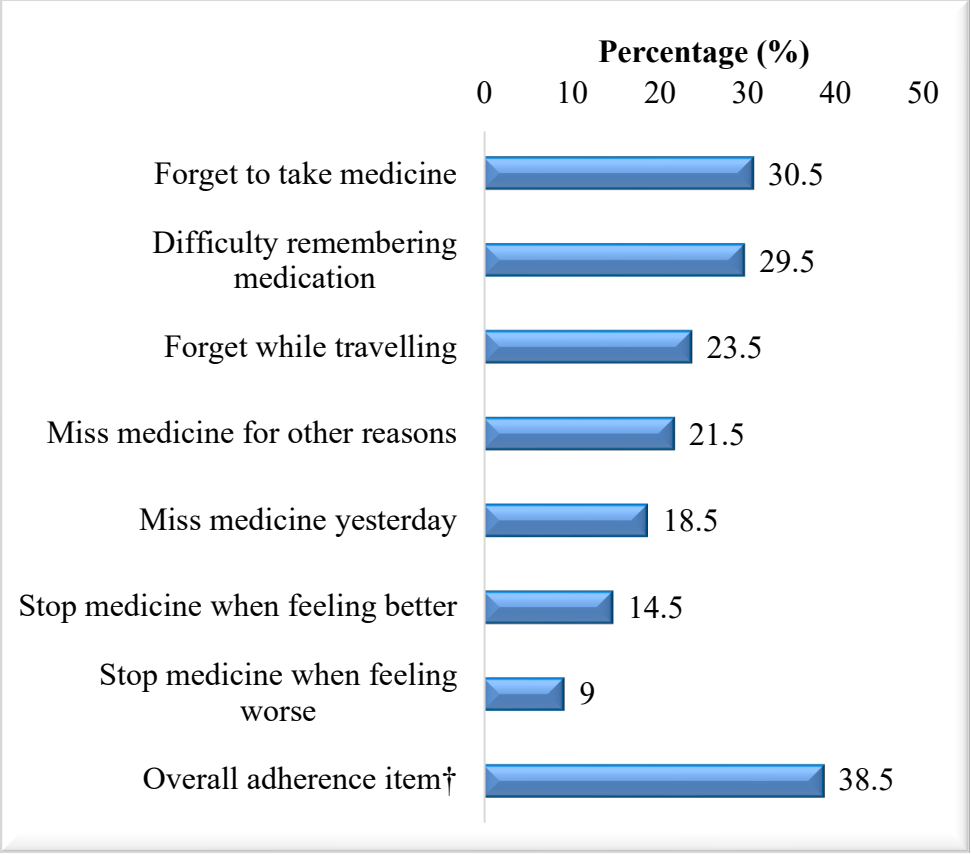

Figure 1: Item-wise Responses of MMAS-8

Blood Pressure Control: Overall, 236 participants (59.0%) had controlled blood pressure (<140/90 mmHg), whereas 164 participants (41.0%) had uncontrolled blood pressure. Participants with good medication adherence demonstrated a higher proportion of controlled blood pressure compared with those with poor adherence.

Table 5: Blood Pressure Control Status

Blood Pressure Status	n	%
Controlled (<140/90 mmHg)	236	59.0
Uncontrolled (≥140/90 mmHg)	164	41.0

Predictors of Poor Medication Adherence: Binary logistic regression analysis identified several independent predictors of poor medication adherence (Table 7). Participants aged 60 years or older had significantly higher odds of poor adherence compared with younger participants (adjusted OR [AOR]=1.69, 95% CI: 1.01–2.84; p=0.047). Participants with lower educational attainment were 1.86 times more likely to have poor adherence than those with secondary or higher education (AOR=1.86, 95% CI: 1.09–3.16; p=0.022). Similarly, lower socioeconomic status independently predicted poor medication adherence (AOR=1.62, 95% CI: 1.01–2.62; p=0.047). Longer duration of hypertension (>5 years) was significantly associated with poor adherence (AOR=1.84, 95% CI: 1.09–3.09; p=0.022). Participants prescribed three or more antihypertensive medications had more than twice the odds of poor adherence (AOR=2.11, 95% CI: 1.19–3.74; p=0.010). Similarly, participants receiving medications two or more times daily were significantly more likely to report poor adherence (AOR=2.41, 95% CI: 1.39–4.18; p=0.002). Smoking remained an independent predictor of poor adherence (AOR=2.09, 95% CI: 1.15–3.79; p=0.016). Although alcohol consumption was associated with poor adherence in unadjusted analysis, the association did not remain statistically significant after adjustment (AOR=1.82, 95% CI: 0.97–3.41; p=0.062).

Reasons for Medication Non-adherence: Among the 92 participants with poor medication adherence, the most commonly reported reason for non-adherence was forgetting to take medication (52.2%), followed by busy schedule (39.1%) and complex medication regimen (32.6%). Other commonly reported reasons included stopping medication after feeling better (26.1%), high medication cost (23.9%), side effects (19.6%), poor knowledge regarding hypertension (17.4%), non-availability of medicines (15.2%), lack of family support (13.0%), and stopping medication after feeling worse (10.9%). Other miscellaneous reasons were reported by 8.7% of participants. Since multiple responses were permitted, percentages exceeded 100%.

Discussion

The present community-based cross-sectional study assessed medication adherence and its determinants among 400 hypertensive patients in Gujarat, India. The overall prevalence of poor antihypertensive medication adherence (MMAS-8 low adherence category) was 23.0%, with 77.0% of participants demonstrating good adherence (high or medium adherence). This finding is consistent with Goswami's hospital-based study from Gandhinagar, Gujarat, which reported non-adherence in 24.3% of participants. [9] The comparable figures between the two Gujarat-based studies, despite differences in study design and setting, suggest that roughly one in four

hypertensive patients in this region has suboptimal medication adherence.

Table 6: Binary Logistic Regression Analysis for Predictors of Poor Medication Adherence

Variable*	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	β	SE	Wald	p-value
Age ≥60 years	2.18 (1.35–3.52)	0.001	1.69 (1.01–2.84)	0.525	0.264	3.95	0.047
Male gender	1.46 (0.91–2.34)	0.114	1.28 (0.76–2.14)	0.244	0.264	0.85	0.356
Low education†	2.14 (1.34–3.43)	0.002	1.86 (1.09–3.16)	0.620	0.271	5.24	0.022
Lower socioeconomic class‡	1.81 (1.12–2.91)	0.016	1.62 (1.01–2.62)	0.482	0.243	3.94	0.047
Hypertension duration >5 years	2.27 (1.41–3.65)	<0.001	1.84 (1.09–3.09)	0.610	0.266	5.27	0.022
≥3 antihypertensive drugs	2.83 (1.67–4.78)	<0.001	2.11 (1.19–3.74)	0.747	0.292	6.55	0.010
≥2 daily doses	3.14 (1.93–5.12)	<0.001	2.41 (1.39–4.18)	0.881	0.280	9.91	0.002
Smoking	2.75 (1.60–4.71)	<0.001	2.09 (1.15–3.79)	0.737	0.305	5.85	0.016
Alcohol consumption	2.49 (1.39–4.44)	0.002	1.82 (0.97–3.41)	0.599	0.321	3.48	0.062

Table 7: Reasons for Medication Non-adherence

Reason	n	%*
Forgot to take medicine	48	52.2
Busy schedule	36	39.1
Complex medication regimen	30	32.6
Felt better and stopped medicine	24	26.1
High cost of medicines	22	23.9
Side effects	18	19.6
Poor knowledge regarding hypertension	16	17.4
Medicine unavailable	14	15.2
Lack of family support	12	13.0
Felt worse after taking medicine	10	10.9
Other reasons	8	8.7

The non-adherence prevalence observed in our study was lower than that reported by Shah et al. (60.6% non-compliant) in Mumbai [10] and by Badhe et al. (65.5% non-adherent) in Navi Mumbai, [11] as well as the 58.7% reporting medium or low adherence in the community-based study by Balasubramanian et al. in Kerala. [12] These differences may be explained by variations in the tools used to define adherence, the threshold chosen for poor adherence, and inherent differences in sociodemographic profiles across study populations. Our study utilized the MMAS-8, which provides a more granular, three-category classification compared to the dichotomous or Likert-based tools used in some comparison studies, potentially yielding a lower

estimate of strict "poor" adherence. However, even the 23.0% burden translates to approximately one in four hypertensive individuals in the community being at high risk of inadequate blood pressure control, with attendant cardiovascular consequences.

Forgetfulness was the most commonly reported reason for non-adherence, cited by 52.2% of participants with poor adherence, followed by a busy schedule (39.1%) and a complex medication regimen (32.6%). These findings are closely mirrored in the literature. Shah et al. found forgetfulness in 42.1% and stopping medication when feeling well in 30.3% of non-adherent patients. [10] Badhe et al. similarly reported forgetfulness (44%) and stopping medication after feeling well (31.1%) as predominant reasons. [11] The high frequency of forgetfulness across these studies points to a system-level gap in patient education and reinforcement strategies, and suggests that reminder-based interventions—such as mobile health (mHealth) reminders, pill organizers, or pharmacy-based refill alerts—could meaningfully reduce non-adherence in this population.

Older age (≥60 years) was identified as an independent predictor of poor adherence (AOR=1.69, 95% CI: 1.01–2.84, p=0.047). This finding contrasts with some Indian studies that reported better adherence with older age. Badhe et al. found that adherence decreased with increasing age, and Shah et al. observed a trend of declining compliance in older age groups, attributing this to forgetfulness and polypharmacy. [10,11] In the AIIMS, New Delhi study using the Hill-Bone Compliance Scale, Mutneja et al. found that older patients (>60 years) were more compliant, possibly attributing it to greater health concern among elderly. [12] The association of older age with poor adherence in our study could reflect the compounded challenges of cognitive decline, polypharmacy, and inadequate social support that are particularly prevalent in community-dwelling elderly patients in rural Gujarat, where access to structured follow-up care is limited.

Lower educational attainment was an independent predictor of poor medication adherence (AOR=1.86, 95% CI: 1.09–3.16, p=0.022). Interestingly, some Indian studies have reported the opposite association, with Shah et al. and Badhe et al. both finding significantly higher adherence among illiterate individuals. [10,11] They attributed this paradoxical finding to social desirability bias—patients with lower literacy may comply more unquestioningly with physician advice. In contrast, our community-based study context, where patients may not consistently access physician supervision, may better capture the true association between low educational attainment and suboptimal self-management. Patients with lower literacy may face difficulties understanding prescription labels, recognizing the importance of lifelong therapy, and navigating healthcare systems, all of which contribute to poorer adherence. Balasubramanian et al. also noted that poor knowledge of complications, a correlate of lower education, was an independent risk factor for poor adherence in rural Kerala. [12]

Lower socioeconomic status (AOR=1.62, 95% CI: 1.01–2.62, p=0.047) independently predicted poor adherence in this study. Financial constraints were reported by 23.9% of non-adherent participants as a reason for missing medication. Economic barriers to adherence are well-documented in the global literature and are a recognized priority under India's NPCDCS and the Pradhan Mantri Jan Arogya Yojana health scheme. Goswami's Gujarat study similarly identified economic factors (42.5% of non-adherent respondents) as a major contributor to missed doses. [9]

Longer disease duration (>5 years) emerged as a significant predictor of poor adherence (AOR=1.84, 95% CI: 1.09–3.09, p=0.022). This finding aligns with data showing that the therapeutic challenge of lifelong, asymptomatic, chronic disease management increases over time, particularly when patients feel subjectively well. Balasubramanian et al. also observed higher poor adherence among those who were asymptomatic at diagnosis, a condition that worsens patient motivation as disease duration extends. [12] This highlights the importance of periodic re-counseling of long-standing patients who may develop "adherence fatigue."

Polypharmacy (≥3 antihypertensive drugs, AOR=2.11, 95% CI: 1.19–3.74, p=0.010) and higher dosing frequency (≥2 doses/day, AOR=2.41, 95% CI: 1.39–4.18, p=0.002) were the strongest treatment-related predictors of poor adherence in this study. These findings are consistent with established pharmacological literature demonstrating that treatment complexity is a major barrier to adherence. The significantly higher odds associated with twice-daily or thrice-daily dosing compared to once-daily regimens underscore the clinical importance of preferring long-acting, once-daily antihypertensive agents wherever clinically appropriate. Shah et al. similarly found a trend toward lower compliance in polytherapy compared to monotherapy. [10]

Smoking was identified as an independent predictor of poor medication adherence (AOR=2.09, 95% CI: 1.15–3.79, p=0.016). This is consistent with findings from multiple Indian studies. Shah et al. found significantly lower compliance among smokers (21%) compared to non-smokers (81.1%), and Badhe et al. similarly reported reduced adherence among those with tobacco use. [10,11] Smoking not only reflects a broader pattern of health-risk behaviors but is also associated with poorer patient–physician engagement and may be a marker of general health neglect. Smoking cessation counseling should therefore be routinely integrated into hypertension management programs.

The blood pressure control rate observed in this study (59.0% with controlled BP <140/90 mmHg) was comparable to or better than that reported in many Indian studies. Participants with good medication adherence predictably had higher rates of controlled blood pressure, reinforcing the causal link between adherence and BP outcomes.

Limitations: Limitations include the cross-sectional design, which precludes causal inference. The use of self-reported adherence (MMAS-8) is subject to social desirability and recall bias, which may lead to overestimation of adherence. The study was conducted in field practice areas of a medical college and may not be representative of all hypertensive patients in Gujarat. Additionally, the adherence tool was not validated in the local Gujarati language, which may have introduced response bias.

Conclusion

In this community-based cross-sectional study, nearly one-quarter of hypertensive patients demonstrated poor medication adherence, while approximately two-fifths had uncontrolled blood pressure. Forgetfulness, busy schedules, and complex medication regimens were the most frequently reported reasons for non-adherence. Older age, lower educational status, lower socioeconomic status, longer duration of hypertension, polypharmacy, higher dosing frequency, and smoking were identified as independent predictors of poor medication adherence. These findings highlight the importance of patient-centered interventions to improve adherence among individuals with hypertension. Regular patient education, individualized counseling, simplified treatment regimens where clinically appropriate, reminder-based strategies,

smoking cessation support, and strengthening follow-up through primary healthcare services may contribute to better medication adherence and improved blood pressure control. Future prospective studies using real-world data are warranted to evaluate the effectiveness of such interventions in improving long-term hypertension management.

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