

**ORIGINAL RESEARCH**

# An observational study on level of adherence to antihypertensive treatment and its associated factors at SMS Hospital, Jaipur

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**ABSTRACT**

**Background:** Hypertension is a primary contributor to cardiovascular morbidity worldwide and requires lifelong treatment. Medication adherence is crucial for achieving optimal blood pressure (BP) control and preventing complications. However, adherence rates remain suboptimal due to multifaceted factors. Understanding adherence levels and associated determinants can guide targeted interventions to improve patient outcomes. **Methods:** This descriptive, hospital-based observational study was conducted in the General Medicine Outpatient Department at SMS Hospital, Jaipur, over one year. A total of 400 adult hypertensive patients (aged 18–80 years) receiving at least one antihypertensive medication were randomly selected. Informed consent and Institutional Ethical Committee approval were obtained. The 8-item Morisky Medication Adherence Scale (MMAS-8) and the Hill-Bone Compliance to High Blood Pressure Therapy Scale (CHBPTS) were used to assess adherence. Socioeconomic, demographic, patient-related, medication-related, and healthcare system-related factors were recorded. **Results:** Of the 400 participants, 30% demonstrated high adherence (MMAS-8 score=8), 45% showed moderate adherence (MMAS-8 score=6–7), and 25% had low adherence (MMAS-8 score<6). According to the Hill-Bone CHBPTS, 14% had perfect adherence, 1% were non-adherent, and the majority fell in-between. Key factors promoting adherence included patient knowledge ( $p<0.001$ ), self-monitoring of BP ( $p<0.01$ ), and a supportive patient-provider relationship ( $p<0.001$ ). Common barriers were forgetfulness (29.4%) and complex medication regimens (17.6%). High adherence was associated with better blood pressure control ( $p<0.001$ ). **Conclusion:** Adherence to medication continues to be an issue for hypertensive patients, with a significant percentage showing moderate or low levels of adherence. Sociodemographic, patient, medication, and healthcare factors all contribute to influencing adherence behavior. Patient-specific interventions including patient education, regimen simplification, increasing affordability, and enhancing patient-provider relationships are critical to improve adherence and ensure optimal BP control.

**Keywords:** Hypertension, medication adherence, Morisky Medication Adherence Scale, Hill-Bone Compliance Scale, antihypertensive therapy, patient-related factors

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**INTRODUCTION**

Hypertension is internationally recognized as a significant and modifiable risk factor for cardiovascular disease and premature mortality across the globe [1]. Despite considerable advances in medical therapy, a very high proportion of patients fail to achieve optimal blood pressure (BP) control largely because of poor compliance with recommended antihypertensive medications [2]. Low compliance erodes the efficacy of treatment and leads to disease worsening, producing complications such as stroke, myocardial infarction, and chronic kidney disease [3]. Consequently, enhancing medication

compliance has become a strategic imperative to better control hypertension and outcomes [4].

Medication adherence is a multifaceted phenomenon that is influenced by an interaction of sociodemographic, patient, drug, and system factors [5]. Sociodemographic factors like age, sex, and education influence health beliefs and attitudes and thus adherence in medication taking [6]. Further, personal health beliefs and awareness of hypertension influence adherence behavior substantially. Patients who understand the asymptomatic nature of hypertension, potential complications of untreated blood pressure, and benefits of treatment regimens are more compliant [7].

At the same time, medication-related factors are also of great importance. Polypharmacy, adverse effects of medications, and complex dosing regimens discourage patients from taking medication on a regular basis. Additionally, the efficacy of the healthcare system to provide uninterrupted drug supply, easy access, and low-cost treatments is pivotal in sustaining long-term adherence [8]. Communication between patient and provider is another important factor; an empathetic and educative relationship between patients and healthcare providers fosters trust, motivation, and problem-solving, enhancing medication-taking behavior [9].

The current study was performed in the General Medicine Outpatient Department (OPD) of SMS Hospital, Jaipur, covering a wide cross-section of Rajasthan patients from India. The study will measure the degree of adherence using two standardized tools: the 8-item Morisky Medication Adherence Scale (MMAS-8) and the Hill-Bone Compliance to High Blood Pressure Therapy Scale (CHBPTS) [10]. Furthermore, a multifactorial analysis of determinants of non-adherence was performed, encompassing socioeconomic determinants, patient attitudes and knowledge, medication complexity, and factors related to the healthcare system [11,12]. The primary hypothesis postulated that an estimable proportion of patients exhibit suboptimal adherence and that some modifiable determinants can be targeted to maximize overall treatment outcomes.

By identifying these influences, the findings can inform targeted interventional strategies at both clinical and community levels, ultimately enhancing patient health outcomes and reducing the burden of hypertension-related complications [13]. This research aims to offer robust evidence on local patterns of adherence to inform the creation of targeted educational, behavioral, and policy-level interventions aimed at improving medication adherence and hypertension control [14].

## MATERIALS AND METHODS

**Study Design and Setting:** This was a descriptive, hospital-based observational study conducted in the General Medicine Outpatient Department (OPD) at SMS Hospital, Jaipur. The study period lasted one year following approval from the Institutional Ethics Committee (IEC).

**Study Population:** A total of 400 adult hypertensive patients aged 18–80 years, receiving at least one antihypertensive medication, and attending the General Medicine OPD were included through random sampling. Participants were informed about the study's objectives, and written informed consent was obtained. Confidentiality was assured throughout the study.

## Inclusion Criteria

1. Patients with hypertension aged above 18 years and below 80 years, of either sex.
2. Patients willing to provide written, informed consent.

## Exclusion Criteria

1. Illiterate patients with visual or hearing impairments.
2. Any condition compromising the ability to comprehend and respond to the study questionnaires.

**Sample Size:** A sample of 400 cases was derived at a 95% confidence level and a 10% allowable relative error to obtain statistically significant results.

## Data Collection Tools

1. **Socio-Demographic Proforma:** A structured proforma captured age, gender, education, marital status, employment status, and details regarding comorbidities and duration of hypertension.
2. **Morisky Medication Adherence Scale (MMAS-8):** This self-reported scale includes eight items, with seven yes/no items and one 5-point Likert scale. Possible scores range from 0 to 8, classified as follows:
  - High adherence (score = 8)
  - Moderate adherence (score = 6–7)
  - Low adherence (score < 6)
3. **Hill-Bone Compliance to High Blood Pressure Therapy Scale (CHBPTS):** Comprising 14 items scored on a 4-point scale (“None of the time”=1, “Some of the time”=2, “Most of the time”=3, “All of the time”=4). Higher scores indicate poorer adherence, ranging from 14 (perfect adherence) to 56 (non-adherence).

## Data Collection Procedure

- Institutional permission was sought from the General Medicine Department, and ethical clearance was obtained from the IEC.
- Eligible patients were approached; after explaining the study, written informed consent was acquired.
- Participants completed the MMAS-8 and Hill-Bone CHBPTS. Face-to-face interviews ensured clarity and minimized missing data.
- Information related to patient-related, medication-related, and healthcare system-related factors was gathered via a researcher-administered questionnaire.

## Statistical Analysis

Data were entered into statistical software and analyzed. Continuous variables (e.g., age) were summarized as mean  $\pm$  standard deviation. The Student's t-test was used to compare means. Categorical variables (e.g., adherence classification) were expressed as frequencies and percentages, and

the chi-square test was applied for group comparisons. Logistic regression was employed for multivariate analysis of factors significantly associated with adherence. A p-value <0.05 was considered statistically significant.

## RESULTS

**Overview of Participant Characteristics:** A total of 400 hypertensive patients participated. The mean age was 55.6 years, with 59% falling in the 41–60 age group. Males comprised 55% of the sample, and 45% were females. Three-quarters of patients had secondary or higher education. Notably, 95.5% were married, suggesting substantial familial support. Comorbidities were common, with 38% having diabetes mellitus, followed by 12% with COPD and 11% with hypothyroidism. Around 70.5% of participants were employed, which may influence medication affordability and regular follow-up. Most participants (82%) reported having hypertension for more than four years, indicating a potentially long therapeutic engagement.

### Adherence Levels According to MMAS-8 and Hill-Bone Scale

#### MMAS-8 Results

- **High adherence (score=8):** 30%
- **Moderate adherence (score=6–7):** 45%
- **Low adherence (score<6):** 25%

Forgetfulness was the most commonly cited barrier to adherence (29.4%), followed by complex medication regimens (17.6%) and lack of knowledge (11.8%). Overall, 75% of patients displayed suboptimal adherence (moderate or low), underscoring a need for targeted interventions.

#### Hill-Bone CHBPTS Results

- Perfect adherence (score=14): 14%
- In-between adherence (score=15–55): 84.5%
- Non-adherence (score=56): 1%

Stratification by subscale indicated that 60% of patients exhibited consistent medication-taking

behavior, 45% adhered to sodium-restricted diets, and 65% maintained regular follow-up appointments.

**Association of Adherence with Patient-Related and Sociodemographic Factors:** Analysis revealed statistically significant relationships ( $p<0.05$ ) between adherence and several variables:

- **Age:** Higher adherence among individuals aged  $\geq 41$  years.
- **Gender:** Females showed slightly higher adherence than males (72.2% vs. 68.2%).
- **Employment:** Employed individuals were more adherent (66.7%) than unemployed (33.3%).
- **Knowledge and Belief:** Patients aware of hypertension complications and benefits of consistent therapy were more likely to be adherent ( $p<0.001$ ).
- **Forgetfulness:** Strongly associated with non-adherence (29.4%).

### Association of Adherence with Medication-Related and Healthcare System Factors

- **Multiple Prescribed Drugs:** Interestingly, having multiple medications did not universally translate to non-adherence if combined with adequate patient education.
- **Side Effects:** Patients reporting fewer adverse drug reactions adhered better ( $p<0.001$ ).
- **Patient-Provider Relationship:** The majority (91.2%) of patients who reported positive interactions with providers achieved better adherence levels ( $p<0.001$ ).
- **Affordability and Availability:** Affordability was significantly associated with adherence, whereas unavailability of medications in pharmacies correlated with higher non-adherence.

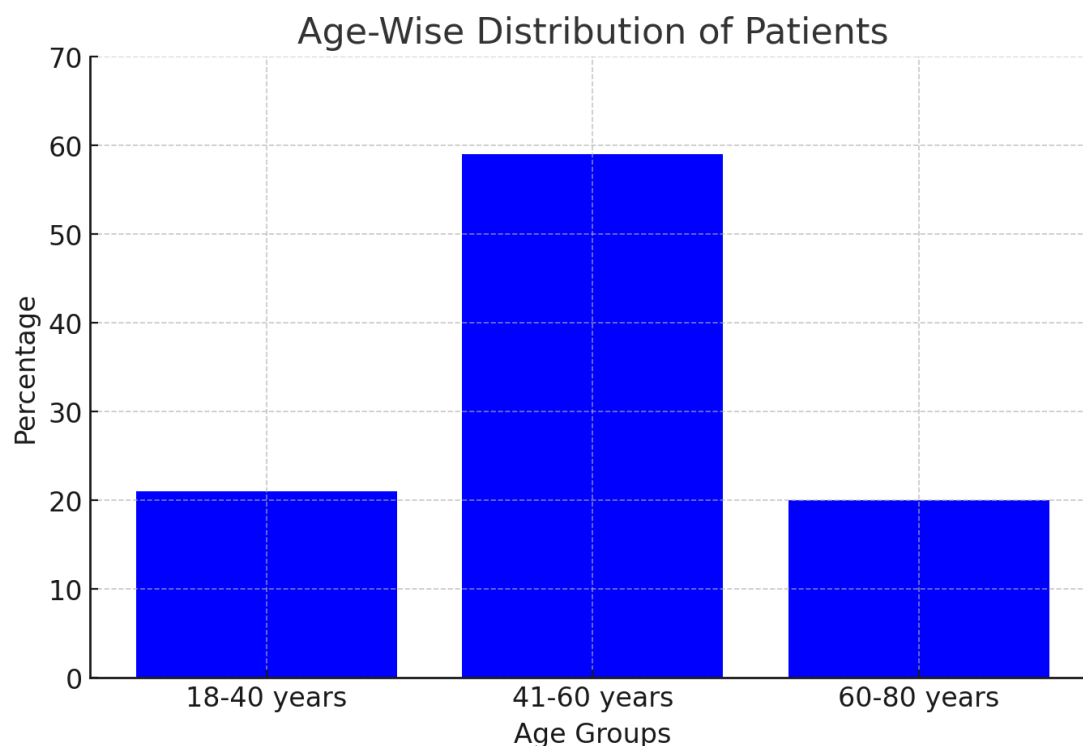
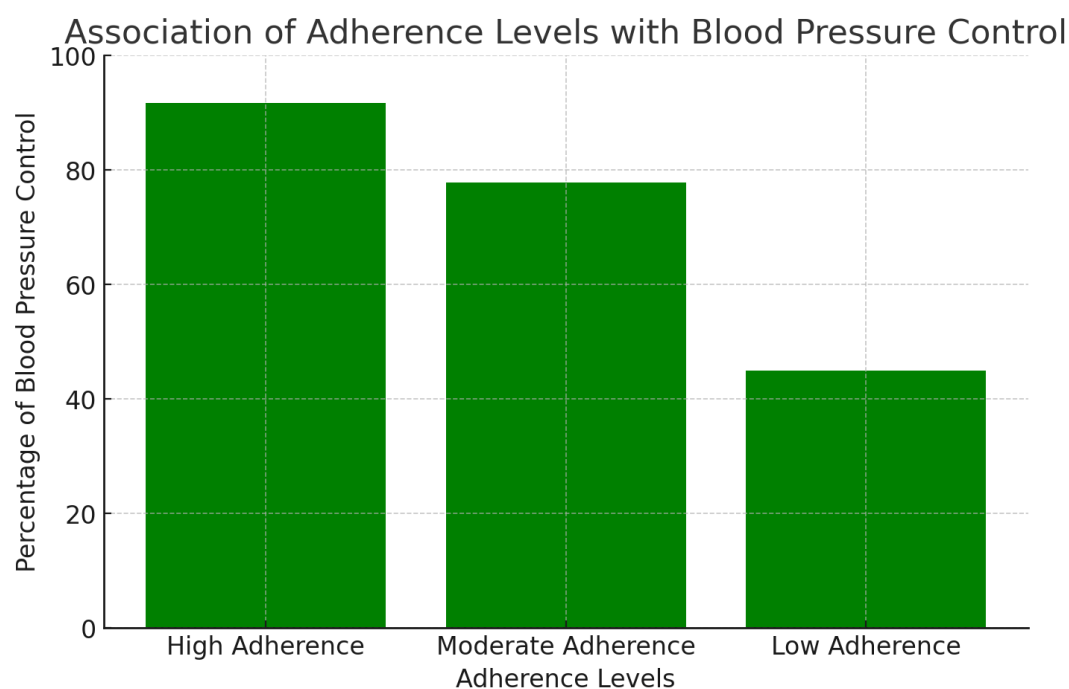
**Blood Pressure Control and Adherence:** High adherers (MMAS-8 score=8) achieved significantly better BP control (91.7%) compared to low adherers (45%) ( $p<0.001$ ). This finding highlights the clinical impact of adherence on achieving optimal treatment outcomes.

**TABLE 1. DISTRIBUTION OF ANTIHYPERTENSIVE DRUGS USED (N=400)**

Drug	No. of Patients	Percentage (%)
Amlodipine	228	57.0
Telmisartan	148	37.0
Hydrochlorothiazide (HCTZ)	100	25.0
Losartan	92	23.0
Torsemide	52	13.0
Others (Beta-blockers, etc.)	-	-

**TABLE 2. MEDICATION ADHERENCE LEVELS USING MMAS-8**

MMAS-8 Category	Score Range	No. of Patients (N=400)	Percentage (%)
High adherence	8	120	30
Moderate adherence	6–7	180	45
Low adherence	<6	100	25

**FIGURE 1. AGE-WISE DISTRIBUTION OF PATIENTS****FIGURE 2. ASSOCIATION OF ADHERENCE LEVELS WITH BLOOD**

## DISCUSSION

Optimal blood pressure control remains a cornerstone in the prevention of cardiovascular and renal complications [15]. This study underscores that while 30% of participants displayed high adherence, a sizeable 70% had moderate or low adherence, reflective of global data showing suboptimal compliance to antihypertensive regimens [16]. The 8-item Morisky scale corroborated findings from the Hill-Bone CHBPTS, lending reliability to these

observations [17]. Our analysis revealed that forgetfulness, knowledge deficits, and complexities in medication schedules are principal barriers—echoing previous studies that highlight the role of psycho-educational and behavioral components in long-term medication adherence [18].

Interestingly, demographic variables such as age and gender demonstrated significant associations with adherence, suggesting that tailored patient education programs may benefit younger adults and males [19].

Females often exhibit higher health-seeking behaviors and better medication compliance, potentially due to enhanced health awareness and frequent healthcare engagement [20]. Employment status emerged as a strong determinant; employed individuals tended to manage medication schedules effectively, possibly because of greater financial stability and consistent access to healthcare resources [21]. However, the need to juggle work schedules could also contribute to missed doses in some cases, indicating that interventions should be context-specific [22].

Medication-related factors, including polypharmacy and adverse drug reactions, remain a hurdle, although our study found that patient education and supportive supervision can mitigate the negative impact of multiple prescriptions [23]. Healthcare system factors, particularly affordability and a reliable supply of medications, were pivotal. Strengthening pharmaceutical supply chains and introducing cost-reduction programs can significantly boost adherence rates [24]. The patient-provider relationship repeatedly surfaced as an essential element in fostering trust, reinforcing positive health behaviors, and addressing individual patient challenges such as forgetfulness or side effects [25].

Finally, the robust link between high adherence and controlled blood pressure in this cohort underlines the critical clinical implications of adherence promotion. By ensuring patients consistently take their medication, the incidence of hypertension-related morbidity, including cerebrovascular and cardiovascular events, can be effectively reduced.

Overall, these findings suggest that adherence-enhancing strategies should be multifaceted. Health policies need to address medication costs and availability, while clinicians are encouraged to foster a patient-centered approach with clear communication, motivational interviewing, and frequent follow-up. Patient education must be integrated into routine clinical care to strengthen disease knowledge and empower self-monitoring, ultimately improving adherence and health outcomes. Further research in larger, diverse populations is warranted to refine these observations and develop scalable, culturally sensitive interventions.

## CONCLUSION

This observational study found that a significant proportion of hypertensive patients at SMS Hospital, Jaipur, have moderate or low adherence to antihypertensive treatment, which may jeopardize blood pressure control. A range of factors—such as age, gender, employment status, knowledge, complexity of medication, and affordability of healthcare—substantially influence patterns of adherence. Individualized approaches involving patient education, regimen simplification, affordability of medication, and strong patient-provider relationships are critical. Increasing adherence directly correlates with better BP control,

eventually lowering the incidence of cardiovascular and renal complications associated with uncontrolled hypertension.

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