

# An assessment of treatment compliance using the Morisky scale-8 tool in adult hypertensive patients of Eastern India

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## ABSTRACT

**Background:** Adequate management of hypertension is crucial for decreasing the likelihood of cardiovascular ailments and associated complications. Nonetheless, in the Indian context, maintaining compliance with prescribed hypertensive therapies presents a notable hurdle, impeding the attainment of favorable health outcomes. Thus, this study was conducted with the aim to evaluate the prevalence of treatment adherence and explore the diverse factors that impact adherence patterns among individuals diagnosed with hypertension. **Material and Methods:** A community-based cross-sectional questionnaire-based study was carried out among the diagnosed hypertensive patients from 12 purposefully selected villages of Khagaul block, Patna. A total of 262 participants were recruited in the study by using non-probability sampling. The 8-item Morisky Medication Adherence Scale (MMAS-8) was used for measuring adherence. The Statistical Package for the Social Sciences (SPSS) for Windows version 21.0 (SPSS Inc; Chicago, IL, USA) was used for statistical analysis of data. **Result:** As per MMAS scores, 10 (3.8%) had high, 133 (50.8%) moderate, and 119 (45.4%) poor adherence. However, good adherence was reported among geriatric patients [1.65 (1.01–2.7)], those with a history of absence of comorbidities [2.15 (1.21–3.85)], more than 5 years' duration of hypertension [3.2 (1.89–5.41)], once-a-day drug intake [2.8 (1.61–4.87)], and having controlled blood pressure [5.2 (3.08–8.96)]. Controlled blood pressure (AOR = 0.048, 0.023–0.098), perception of high benefit of treatment [0.497 (0.255–0.97)], and absence of comorbidity [0.016 (0.168–0.832)] were identified as predictors of good treatment adherence. **Conclusion:** Overall medication adherence in the current study was 54.6%. Achieving treatment adherence frequently demands proactive patient engagement, highlighting their active role in disease management. Also, involving the patient's caregivers can offer an additional tactic to tackle non-adherence stemming from forgetfulness of the patient.

**Keywords:** Blood pressure control, compliance, hypertension, Morisky adherence scale, self-reported adherence, treatment adherence

## Background

Hypertension, also known as high blood pressure, is the biggest cause of premature mortality and affects millions of individuals worldwide. By 2030, this global burden is projected to rise fivefold.<sup>[1,2]</sup>

With a population of over 1.3 billion people, India faces a substantial burden of hypertension and its associated

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complications. Effective management of hypertension is essential in reducing the risk of cardiovascular diseases and related complications.<sup>[3]</sup> Recognizing the importance of addressing this issue, India has set specific goals and implemented strategies to tackle hypertension and improve the health outcomes of its population.

According to the National Family Health Survey (NFHS-5) conducted in 2019–2021, the prevalence of hypertension in India among individuals aged 15–49 years was 21.3% and 24% among women and men, respectively.<sup>[4]</sup> Furthermore, the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) has been instrumental in addressing hypertension at the national level.<sup>[5]</sup> However, adherence to hypertensive treatment remains a challenge in India, hindering the achievement of optimal health outcomes. Several factors contribute to the lack of adherence to hypertensive treatment in India.<sup>[6]</sup> These factors encompass various dimensions, including socioeconomic factors, healthcare access and affordability, patient–provider communication, and medication-related issues.<sup>[7]</sup> Understanding and addressing these factors are crucial for improving treatment adherence and enhancing the overall management of hypertension in India.

Various methods and scales have been developed to evaluate medication adherence, providing healthcare professionals with valuable insights into patient behavior and treatment outcomes. One

such scale widely utilized for assessing adherence is the Medication Adherence Self-Report Scale 8-item version (MMAS-8).<sup>[8]</sup>

The utilization of the MMAS-8 scale offers several advantages in evaluating patient adherence. Firstly, it provides a standardized and quantifiable measure, allowing for consistent assessment and comparison of adherence levels across different patient populations and settings. The scale's brevity and simplicity make it practical for routine clinical use, minimizing the burden on patients and healthcare providers while still providing valuable information.<sup>[9,10]</sup>

In this study, we intend to determine the prevalence of treatment adherence and the various factors influencing adherence among hypertensive patients in the field practice area of a tertiary care institute. Drawn upon the study findings, existing literature, and research studies, this study paper may contribute to understanding the challenges and potential solutions for developing effective interventions that can enhance treatment adherence and ultimately improve the management of hypertension in India.

## Materials and Methods

### Study design and study participants

A community-based cross-sectional questionnaire-based study was carried out among the diagnosed hypertensive patients

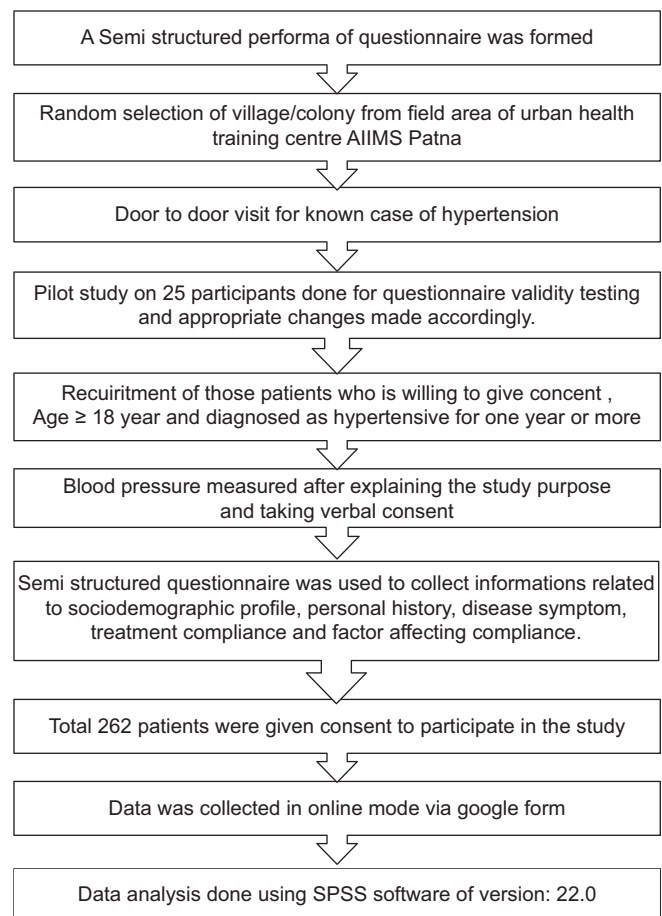
from Patna, the capital city of Bihar from January 2021 to June 2022. Patna has 23 blocks and a population of 2,580,000. The survey was conducted in the 12 purposefully selected villages of Khagaul block, which is under the field area of the urban training health center of AIIMS Patna. Door-to-door approach was adopted wherein one of the investigators visited door-to-door in the selected village to inquire about hypertensive patients. The eligible participant was recruited in the study, and their blood pressure was measured using a sphygmomanometer on the left arm in sitting position. The patients were asked to relax and avoid smoking for half an hour before the measurement of BP. Thereafter, a pretested questionnaire was administered to collect the relevant information from the recruited participants [Figure 1].

### Inclusion criteria

All known cases of hypertensive patients aged 18 year and above diagnosed to have hypertension for at least 1 year or more who gave their consent were recruited in the study.

### Exclusion criteria

Individuals who were too sick to respond, suffering from dementia, and pregnant state were excluded from the study.



**Figure 1:** Flowchart showing the study procedure and recruitment of participants in the study

## Study tool

Face-to-face interview was conducted by the investigators by using a pre-designed questionnaire. The questionnaire was designed similar to that used in the extensive literature review of similar studies. Prior testing of the questionnaire was done by conducting a pilot study on 25 hypertensive patients for questionnaire validity testing, and the questionnaire was revised accordingly. Patients included in the pilot study were not included in the final study.

The information was collected about the patient's general information, treatment details of hypertension, and treatment outcome. Adherence was measured using the 8-item Morisky Medication Adherence Scale (MMAS-8) [Table 1].<sup>[8]</sup> It is self-reporting tool to access medication-taking behavior. MMAS-8 consists of a set of eight questions with a yes or no answer. Items 1 to 7 offer "yes" or "no" response, with "0" point for every "Yes" response and a "1" point for every "No". While Item 8 included a 5-point Likert response option wherein a patient's score was "0" if they choose response "0", and "1" if they choose response "4". The responses "1, 2, 3" are graded as "0.25, 0.50, 0.75" respectively. The total score ranged from 0 to 8. Furthermore, each patient was classified as high adherence, moderate, and low adherence to treatment if the MMAS score was "8", "6 to <8", and "<6", respectively.

## Outcome variable

The outcome variable was adherence to antihypertensive treatment.

## Explanatory variable

Demographic variables, tobacco intake, comorbidity, family history of hypertension, duration of hypertension, frequency of drug intake, drug regime, cost of medication, perception regarding benefit of treatment, and present status of systolic blood pressure (controlled or uncontrolled).

## Operational definition used in the study

**Controlled Blood pressure:** Systolic blood pressure less than 140 mmHg and diastolic blood pressure less than 90 mmHg were regarded as controlled BP.<sup>[11]</sup>

**Comorbidity:** Any concomitant medical condition, which necessitates the patient to take medicine for a minimum of 6 months before the interview.<sup>[12]</sup>

## Ethics

The Institutional Ethics Committee granted approval prior to the commencement of the study. The study's purpose was explained to the participants, and their verbal informed consent was obtained. It was made very apparent to the participants that they had complete discretion over whether or not to participate. The study was carried out in conformity with the Helsinki Declaration.

## Sample size calculation

- A cross-sectional study conducted in the field practice areas of J N Medical College, Aligarh (Uttar Pradesh) in 2016 reported a good compliance rate of 23%. Taking this prevalence into account, 95% level of confidence, 5% absolute error, and population size of hypertensive cases (total registered cases of hypertension at UHTC Khagaul) as 600, the calculated sample size came out to be 188 using the single population proportion formula. Furthermore, anticipating a response rate of 80%, the final sample size was 235. However, 262 participants were recruited in the study.<sup>[13]</sup>

## Sampling technique

- Non-probability sampling was used, and door-to-door search was done to identify the known hypertensive cases from 12 randomly selected villages in the field practice area of the urban health training center of AIIMS Patna.

**Table 1: Morisky Medication Adherence Scale (MMAS)**

Question number	Question	Valid response
1	Do you sometimes forget to take your medications?	Yes or No
2	People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medications?	Yes or No
3	Have you ever cut back or stopped taking your medications without telling your doctor, because you felt worse when you took it?	Yes or No
4	When you travel or leave home, do you sometimes forget to bring along your medications?	Yes or No
5	Did you take your medications yesterday?	Yes or No
6	When you feel like your health condition is under control, do you sometimes stop taking your medications?	Yes or No
7	Taking medications every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	Yes or No
8	How often do you have difficulty remembering to take all your medications?	Never/rarely-4 Once in a while -3 Sometime-2 Usually-1 All the time -0

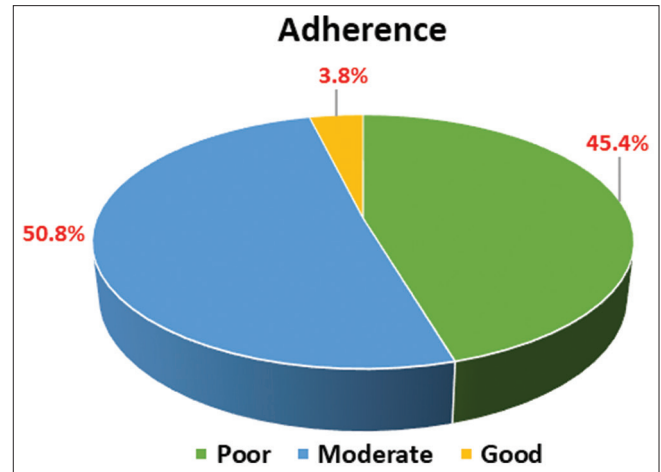
### Data management and statistical analysis

The association between different categorical variable such as demographic, treatment and treatment outcome variable, and the adherence category were observed using the Chi-square test of association. For continuous variable, normality test was done and accordingly Student’s t-test/Mann–Whitney U-test was used to compare the difference in the systolic BP, duration of hypertension among the good adherer and poor adherer. Adjusted odds ratios (aOR) and their 95% confidence intervals (95% CI) were calculated by applying multiple logistic regression by including all the variables having *P* value <0.2 in the bivariable analysis. *P* value <0.05 was considered as statistically significant for all calculations. The SPSS for Windows version 21.0 (SPSS Inc; Chicago, IL, USA) was used for statistical analysis of data.

### Result

In this study, out of 262 patients 154 (58.8%) were males and 108 (41.2%) were females. The age group of patients ranged from 28 to 85 years, and the mean age was 58.4 (±10.8) years. Based on the participant’s responses to the MMAS scores, 10 (3.8%) had high, 133 (50.8%) moderate, and 119 (45.4%) had poor adherence [Figure 2]. For bivariate comparison, the

participants with high and moderate level of adherence were reported as having good adherence [143 (54.6%)] and low level of adherence as poor adherence [119 (45.4)]. Table 2 depicts no difference in adherence level as per gender, education, type of family, occupation, family history of hypertension, BMI, and tobacco intake. However, good adherence was



**Figure 2:** Distribution of study participants as per adherence category [N = 262]

**Table 2: General characteristics of study participants (n=262)**

Variable	Poor adherence n (%)	Good adherence n (%)	Odds Ratio (95% CI)	P
Age				
<60	64 (52.03)	59 (48)	1.65 (1.01-2.7)	0.04 *
>60	55 (39.6)	84 (60.4)		
Gender				
Male	71 (46.1)	83 (53.9)	1.06 (0.65-1.75)	0.89
Female	48 (44.4)	60 (55.6)		
Education				
Illiterate	69 (42.3)	94 (57.7)	0.17 (0.43-1.18)	0.24
literate	50 (50.5)	49 (49.5)		
Type of family				
Nuclear	122 (53.2)	107 (46.7)		
Joint	15 (45.5)	18 (54.5)	1.36 (0.65-2.84)	0.51
BMI				
Underweight	13 (43.3)	17 (56.7)		
Normal	71 (43.8)	91 (56.2)	--	0.67
Overweight/Obese	35 (50)	35 (50)		
Occupation				
1	74 (46.5)	85 (53.4)		
2	3 (60)	2 (40)	---	0.37
3	20 (52.6)	18 (47.4)		
4	22 (36.7)	38 (63.3)		
Family history of hypertension				
Present	93 (46.5)	107 (53.5)	1.4 (0.76-2.59)	0.34
Absent	26 (38.2)	36 (61.8)		
Comorbidity				
Present	97 (50.3)	96 (49.7)		
Absent	22 (41.9)	47 (58.1)	2.15 (1.21-3.85)	0.01*
Tobacco intake				
No	89 (45.7)	106 (54.3)		
Yes	30 (44.8)	37 (55.2)	1.03 (0.59-1.8)	0.9

reported among elderly patients (>60 years) than among those aged <60 years [1.65 (1.01–2.7)]. Also, a history of absence of comorbidities was also found to be significantly associated with good adherence [2.15 (1.21–3.85)].

Table 3 shows that among variables pertaining to treatment, more than 5 years' duration of hypertension [3.2 (1.89–5.41)] and once-a-day drug intake as compared with twice or more per day was associated with good adherence to antihypertensive treatment [2.8 (1.61–4.87)]. The drug regime (single or multiple drugs) and the cost of drugs were not observed to be significantly associated with the adherence category. Regarding adherence related to treatment outcome, patients who perceived high benefit of treatment had good adherence compared to those perceiving low benefit 3.71 (2.19–6.27). Also, participants with their blood pressure under control had better adherence than those having uncontrolled blood pressure [5.2 (3.08–8.96)].

As per MMAS, the most common reasons reported for non-compliance among poor adherers were forgetfulness

in taking medication (70.9%), followed by discontinuing the medicine once they felt improvement (72.6%), and improper consumption while traveling (66.4%) [Table 4].

Determinants of good adherence to treatment among the participants were identified by applying multivariate logistic regression analysis which is presented in Table 5. Controlled blood pressure (AOR = 0.048, 0.023–0.098), perception of high benefit of treatment [0.497 (0.255–0.97)], and absence of comorbidity [0.016 (0.168–0.832)] had significant adjusted odds ratios in favor of good adherence.

## Discussion

The WHO defines medication adherence as the extent to which an individual's actions align with the agreed-upon recommendations provided by a healthcare professional.<sup>[14]</sup> Identifying factors affecting medication adherence to appropriate hypertension therapy is crucial in achieving blood pressure control and reducing adverse health

**Table 3: Adherence of study participants as per treatment status (n=262)**

Variable	Poor adherence n (%)	Good adherence n (%)	Odds Ratio (95% CI)	P
<b>Duration of hypertension</b>				
>5 year	34 (30.4)	78 (69.6)		
1 to 5 year	85 (56.7)	65 (43.3)	3.2 (1.89-5.41)	<0.001*
<b>Frequency of drug intake</b>				
Once a day	27 (30.3)	62 (69.7)		
Twice or more/day	92 (52.5)	81 (47.5)	2.8 (1.61-4.87)	<0.001*
<b>Drug regime</b>				
Single drug per day	88 (47.3)	98 (52.7)		
Multidrug per day	31 (40.9)	45 (59.2)	0.76 (0.44-1.31)	0.409
<b>Cost of medication (in rupees/month)</b>				
≤500	93 (48.7)	98 (51.3)	0.61 (0.34-1.06)	0.108
>500	26 (36.6)	45 (63.4)		
<b>Treatment outcome variable</b>				
<b>Perception regarding benefit of treatment</b>				
High benefit	31 (27.7)	81 (72.3)	3.71 (2.19-6.27)	<0.001*
Low benefit	88 (58.7)	62 (41.3)		
<b>Systolic blood pressure (mmHg)</b>				
Controlled (≤139)	44 (28.9)	108 (71.2)	5.2 (3.08-8.96)	<0.001**
Not controlled (≥140)	75 (68.2)	35 (31.8)		

**Table 4: Adherence scores in modified medication adherence scale (n=262)**

Question	Poor	Moderate	Good
Do you sometimes forget to take your medications?	95 (70.9)	39 (29.1)	0 (0)
In last 15 days, were there any days when you did not take your medications for reason other than forgetting?	89 (75.4)	29 (24.6)	0 (0)
Have you ever cut back or stopped taking your medicine because you felt worse when you took it?	84 (78)	24 (22)	0 (0)
Do you sometimes, forget to bring along your medicine when you travel or leave home?	87 (66.4)	44 (33.6)	0 (0)
Did you take your medications yesterday?	35 (22.7)	109 (70.8)	10 (6.5)
Do you sometimes stop taking your medicine because you feel better?	93 (72.6)	35 (27.4)	0 (0)
Do you ever feel hassled about sticking to your treatment plan as taking medications every day is a real inconvenience for some people.	84 (72.4)	32 (27.6)	0 (0)

**Table 5: Determinants of good adherence to antihypertensive treatment (n=262)**

Variable	AOR (95% CI)	P
Gender		
Female	1	0.598
Male	1.201 (.608-2.372)	
Duration of hypertension		
1 to 5 year	1	0.16
>5 year	2.058 (.752-5.6)	
Frequency of drug intake		
Twice or more/day	1	0.096
Once a day	2.513 (.849-7.439)	
Hypertension control status		
Not controlled ( $\geq 140$ )	1	<0.001*
Controlled ( $\leq 139$ )	20.791 (10.1-42.5)	
Perception regarding the benefit of treatment		
Low benefit	1	0.041*
High benefit	2.011 (1.031-3.926)	
Comorbidity		
Present	1	0.016*
Absent	2.671 (1.202-5.939)	

outcomes.<sup>[15]</sup> Estimates of adherence differ substantially based on the operational definition applied.<sup>[16]</sup> In our study which is done using MMAS-8, the adherence to antihypertensive medication was 54.6%. A similar study conducted among patients attending a healthcare facility in North India reported that 57.2% were adherent to treatment.<sup>[17]</sup> Another Indian study found that 49.3% of patients were found adherent to treatment.<sup>[18]</sup> In consensus with the Indian study findings, studies from other countries like China, Korea, and Malaysia reported prevalence ranging from 44.1% to 53.4%.<sup>[19-21]</sup> In contradiction to the current study findings, an Indian study from Mumbai<sup>[22]</sup> indicated a lower adherence rate of 39.4%. This could be attributed to a variation in sociodemographic characteristics of the research study setting. Besides this, previous studies have also reported that medication adherence improves with age.<sup>[23,24]</sup> In this study as well, the prevalence rate was higher among elderly patients (60.4%) as compared with less than those aged <60 years (48%). This could be explained based on the rationale that older patients often suffer from more severe illnesses than younger patients, which raises their awareness of their health situation and appears to favor adherence.<sup>[25]</sup>

Furthermore, our study demonstrated that there was no significant relationship between adherence with gender and education level, which is consistent with the findings of other studies.<sup>[26,27]</sup> Concurrently, a meta-analysis reported that the association between gender, and adherence level is minimal.<sup>[28]</sup>

The most common cause of non-adherence in this study was forgetfulness followed by stopping medicines when felt better. Similar to this study finding, Sethu Prabhu Shankar *et al.* also cited forgetfulness as the main reason for poor adherence.<sup>[18]</sup>

Furthermore, consistent with the findings of previous studies,<sup>[29,30]</sup> our study also highlighted that adherence was better among those who had been diagnosed with hypertension for more than 5 years (65.6%). It may be related to the fact that patients on antihypertensive therapy for a longer period of time tend to become more knowledgeable about managing their conditions as well as their own health status.<sup>[31,32]</sup>

Additionally, Studies published in the past have indicated that once-daily antihypertensives have improved adherence as well as better adherence to the prescribed schedule of doses, compared with twice-daily or multiple-daily doses.<sup>[33-35]</sup> Likewise, this study also demonstrated a higher adherence rate (65.4%) among patients taking once-daily medication as compared with others.

To add further, a significant negative association between the existence of comorbidity and good adherence to therapy was highlighted in the study (68.1%). In similar line, results from Algabbani and Algabbani study also indicated that adherence was poor among patients suffering from multiple comorbidities. They explained that the multiple complex medications required for the multiple comorbidities may contribute toward the low adherence to the antihypertensive treatment.<sup>[26]</sup> More importantly, non-compliance with antihypertensives leads to exacerbation of uncontrol blood pressure, which further increases the risk of adverse cardiovascular conditions.<sup>[23,33]</sup> In relation to this fact, 58% of patients among our study participants had their BP under control as per the JNC-8 and the majority among those were significantly associated with high adherence to treatment (71%). The magnitude of uncontrolled hypertension reported in this study is in line with the findings of Aberhe W (48.6%).<sup>[36]</sup> However, Jhaj *et al.* reported a lower prevalence of 29.5% in their study conducted in central India.<sup>[37]</sup> This disparity could be attributed to disparities in lifestyle behaviors, diet preferences, and environmental factors.

### Limitation

Since MMAS-8 relies on self-reporting, recall bias may have influenced participants' reporting of their adherence behavior in this study. As the study only provided a snapshot of adherence behavior among patients in Eastern India, it was difficult to determine whether adherence patterns changed over time. Thus, the findings of this study can be used to lay the groundwork for more in-depth and focused research on medication adherence using other study designs.

### Conclusion

Patient non-compliance with recommended antihypertensive treatment continues to pose a global concern, and inciting patient adherence is a critical therapeutic challenge that must be overcome in order to reduce cardiovascular morbidity and mortality. Overall medication adherence in the present study was 54.6%. Younger patients (<60 years), presence of comorbidity, twice or more frequency of drug intake, and perception of low benefit of treatment were found to be significantly associated

with poor adherence. Hence, it is crucial to prioritize these mentioned factors in order to optimize treatment adherence. This approach frequently requires the patient's active involvement, emphasizing their participation in managing the illness. Also, among individual with poor adherence, forgetfulness emerged as the primary cause. Consequently, involving the patient's caregivers can serve as an extra strategy to address non-adherence caused by forgetfulness.

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## Conflicts of interest

There are no conflicts of interest.

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