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Assessment of Medication Adherence and Its Associated Factors Among Hypertensive Patients Using the MMAS-8 Scale at a Tertiary Care Hospital in Peshawar

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Abstract

Objective: This research aims to determine the level of adherence to medication in patients with hypertension, along with its associated factors, in a tertiary care hospital in Peshawar, Khyber Pakhtunkhwa.

Methodology: A cross-sectional descriptive study was conducted at a Tertiary Care Hospital, Peshawar, Khyber Pakhtunkhwa, from September 2025 to November 2025. Data was collected from adult hypertensive patients admitted in Medical A Ward, Medical B Ward and Cardiology Ward. Adherence to medication was assessed using Morisky Medication Adherence Scale, and data was then subsequently analyzed using IBM SPSS Statistics version 20. Associations between medication adherence and demographic/clinical variables was estimated using chi square tests and Pearson's correlation coefficient.

Results: Total of 150 hypertensive patients were participated in this study. Out of which 135 patients showed low, 11 patients showed moderate and 4 patients showed high adherence to antihypertensive medications. No statistical association was found between medication adherence and age, gender, educational status, duration of hypertension, or presence of other chronic conditions ($p>0.05$). The internal consistency of MMAS-8 was also found to be low.

Conclusion: Hypertensive patients in the study showed mostly low to moderate medication adherence, with few achieving high levels. No demographic or clinical factors were linked to adherence. Due to weak reliability of the MMAS-8 and study limitations, results should be viewed cautiously, and larger multicenter studies with stronger tools are needed.

Keywords: hypertension, medication adherence, Morisky scale

Introduction

Hypertension is included amongst the most prevalent, chronic, non-communicable diseases, worldwide. It still remains as the main modifiable risk factor for cardiovascular diseases as well as premature mortality. Clinically, it is defined as persistently elevated blood pressure, a systolic reading of ≥140 mmHg and a diastolic of ≥90 mmHg. The worldwide prevalence of hypertension is continuously rising, exerting a notable burden on the healthcare systems of low or middle income countries as they often struggle with long-term disease management and continuity of care.[1]

Although effective antihypertensive medications are widely available, maintaining and achieving ideal blood pressure control remains a major challenge. A known significant contributor to poor blood pressure control, is inadequate adherence to prescribed medication regimens. Adherence to medication describes to what extent patients follow prescribed therapeutic regimens in terms of dose, schedule, and duration. Suboptimal adherence is linked to uncontrolled hypertension, increased hospital admissions, higher healthcare costs, and a greater risk of cardiovascular complications.[2,10]

Adherence to long-term therapy is determined by many different factors. These include determinants related to patients such as beliefs about illness and its treatment, assumed need of medication, fear of side effects, and forgetfulness; therapy-related factors such as treatment complexity and polypharmacy; as well as socioeconomic and healthcare system-related barriers.[7,9] Because hypertension is frequently asymptomatic, many patients may not perceive an immediate benefit from consistent medication use, which can contribute to intentional or unintentional non-adherence.[7]

Several studies conducted in South Asian and African countries have reported high rates of poor medication adherence amongst hypertensive patients.[1-5] Such findings highlight that non adherence to medication remains a widespread problem across diverse settings. However, adherence behavior is often shaped by local cultural, economic, and healthcare system characteristics, underscoring the need for context-specific research. In Pakistan, particularly in Khyber Pakhtunkhwa, published data regarding medication adherence in hypertensive patients, remain limited.

The Morisky Medication Adherence Scale (MMAS-8) is a common questionnaire used to assess adherence to medication in people with chronic diseases, including hypertension. It has been applied in multiple clinical and cultural contexts due to its simplicity and practicality.[3-6] Nevertheless, its reliability and performance may vary across populations, making local evaluation important.

Therefore, the present research was conducted to find out the level of adherence to medication in patients with hypertension, in a tertiary care hospital in Peshawar using the MMAS-8 scale and to examine its association with selected demographic and clinical variables. Generating local evidence on adherence patterns may help inform targeted strategies aimed at improving long-term hypertension management and reducing preventable complications.

Methodology

Study Design and Setting

A cross-sectional descriptive study was undertaken at Khyber Teaching Hospital located in Peshawar, Pakistan. The study was carried from September to November 2025. Data was collected prospectively between 12 September and 2 November 2025 from patients admitted to Medical A Ward, Medical B Ward, and the Cardiology Ward.

Study Population

The research included patients aged 18 years and above who have been already diagnosed with essential hypertension, as recorded in the hospital medical records by the treating physician. Patients were eligible for inclusion if at least one antihypertensive medication had been prescribed to them and they had been on treatment for a minimum duration of one month prior to enrollment. Patients with secondary hypertension, pregnancy-induced hypertension, severe cognitive impairment preventing effective communication, or those who declined to give consent, were excluded from the study.

Sample Size and Sampling Technique

The sample size was calculated using the single-population proportion formula. Based on an expected prevalence of low medication adherence of 90% from previous studies in similar populations, a 95% confidence level and 5% margin of error were used. The calculated minimum sample size was approximately 139 participants. To account for possible incomplete responses or missing data, the sample size was increased to 150 participants.

A non-probability consecutive sampling technique was used. Patients who met the inclusion criteria and provided informed consent were recruited consecutively from the Medical A Ward, Medical B Ward, and Cardiology Ward until 150 participants were enrolled.

The sample size was considered adequate for estimating medication adherence with a 95% confidence level and approximately 5% margin of error. However, it may not have been sufficient to detect small associations between medication adherence and individual demographic or clinical factors. Therefore, the findings regarding associated factors were interpreted with caution. The single-center setting and non-probability sampling also limited the generalizability of the findings.[1-3]

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Data Collection Instrument and Procedure

Data from patients was collected using a structured, interviewer led questionnaire. It consisted of two main components. The first component included demographic information like age, gender, educational status, and then clinical information like, number of prescribed antihypertensive medications, duration of hypertension and the presence of comorbid conditions such as ischemic heart disease, diabetes mellitus, or chronic kidney disease.

The second component was the 8-item Morisky Medication Adherence Scale (MMAS-8) questionnaire in English on one side and translated in Urdu on the other. Scoring followed the standard algorithm recommended by the developers.[4-6] Questions 1 to 4, 6, and 7 were scored as 1 for answering "No" and 0 for answering "Yes". Question 5 was reverse-scored, while question 8 was measured using a five-point Likert scale and converted according to standard scoring guidelines. The total score ranged from 0 to 8 and was categorized as low adherence if score was < 6, medium adherence if score was 6–7, and high adherence if score was 8, as recommended by the scale developers and prior studies.[4,5]

Ethical Considerations

Ethical approval for this research was received from the Institutional Review and Ethics Board, Peshawar (Ref: 858/DME/KMC). Informed consent was taken from the participants prior to answering the questionnaire. The participation was completely voluntary, and confidentiality was maintained by assigning unique codes to each participant instead of using personal identifiers. All data was handled in accordance with ethical principles outlined in the Declaration of Helsinki.

Statistical Analysis

Data were entered and analysed using IBM SPSS Statistics version 20. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as means and standard deviations. The internal consistency of MMAS-8 scale's in the study population was assessed using Cronbach's alpha coefficient. For analysis of factors associated with medication adherence, the MMAS-8 total score(0-8) was treated as approximately continuous composite adherence measure, rather than using the low-, medium-, high-adherence categories for correlation analysis. Pearson's correlation coefficient was therefore uses to assess the linear relationship between the total MMAS-8 adherence score and continuous variables, specifically age and duration of hypertension. This approach was based on the use of overall MMAS-8 score as a composite numerical measure and allowed estimation of both the direction and magnitude of the linear association. Because the MMAS-8 score is bounded and consists of discrete values, Spearman's rank correlation coefficient would also be an appropriate non-parametric alternative, particularly if the assumptions of linearity, normality or absence of influential outliers required for Pearson's correlation was retained because the objective was the examine the relationship between the numerical total adherence score and continuous clinical/demographic variables. The adherence categories(low, medium, high) were analysed separately using the chi-square test when assessing associations with categorical demographic and clinical variables. A two-tailed p-value <0.05 was considered statistically significant.

Results

One hundred and fifty hypertensive patients participated in the study. Majority of participants showed low-moderate adherence to antihypertensive medications based on MMAS-8 scores. High adherence was observed in only a small proportion of patients.

No statistically significant associations were found between medication adherence and gender, educational status, or presence of other chronic conditions ($p > 0.05$). Similarly, Pearson correlation analysis depicted no significant relationship between adherence scores and age or duration of hypertension. Although the Cronbach's alpha value (0.308) was low and below the commonly accepted level for good internal consistency, it reflects how the MMAS-8 performed in our study population and should therefore be reported. A low Cronbach's alpha does not mean that the MMAS-8 is completely invalid or unsuitable for measuring medication adherence. The eight questions assess different aspects of medication-taking behavior, such as forgetting doses, stopping medication intentionally, and difficulties with taking medicines. Since these behaviors are different, participants may not respond to all questions in the same way, which can result in a low Cronbach's alpha.

In this study, the MMAS-8 was used according to its standard scoring method to assess self-reported medication adherence. Therefore, the adherence categories reflect the responses given by the participants. However, because the internal consistency was low, the results should be interpreted with caution. The low Cronbach's alpha is best considered a limitation of the measurement rather than a reason to completely reject the findings.

Table 1. Demographic and Clinical Characteristics of Participants (n = 150)

Adherence level	n (%)
Low (< 6)	135 (90.0)
Medium (6–7)	11 (7.3)
High (8)	4 (2.7)

Table 2. Medication-Adherence Categories (MMAS-8 Classification)

Variable	Category / Mean ± SD
Age (years)	67.8 ± 11.1
Gender	Male = 60 (40 %) Female = 90 (60 %)
Education level	None = 100 (66.7 %) Primary = 19 (12.7 %) Secondary = 17 (11.3 %) Graduate = 14 (9.3 %)
Duration of hypertension (years)	12.7 ± 5.9
Number of antihypertensive drugs	2.12 ± 0.79
Comorbidity (any)	Diabetes = 44 (29.3 %) CKD = 6 (4 %) IHD = 8 (5.3 %)

Table 3. Association Between Adherence Level and Patient Variables

Variable	Statistical test	Value	p-value	Significance
Gender	Chi-square	2.133	0.344	NS
Education	Chi-square	11.242	0.081	NS
Chronic condition	Chi-square	10.250	0.853	NS
Age	Pearson r	–0.002	0.977	NS
Duration of hypertension	Pearson r	0.059	0.470	NS

Discussion

This study evaluated medication adherence in patients with hypertension, at a tertiary care hospital in Peshawar and examined its association with selected demographic and clinical variables. The results indicate that the majority of patients showed low to moderate adherence to antihypertensive medications, highlighting a substantial gap between the prescribed treatment and actual adherence behavior.

Adherence below standard levels has often been reported in the healthcare settings,particularly low- or middle- income countries. Studies conducted in Africa and South Asia have documented similar high rates of non-adherence, despite the availability of effective pharmacotherapy options.[1-5] The findings of this study are consistent with these observations and suggest that non-adherence to medication remains a persistent challenge in the management of hypertension, particularly within the Pakistani healthcare context.

In this study, no significant association was found between medication adherence and demographic variables such as gender, age, or educational status. Similar findings have been reported in Ethiopia and Nepal, where demographic variables alone were poor predictors of adherence behavior.[2-5] These findings reinforce the fact that multiple domains influence medication adherence, and simply correlating adherence with demographic variables maybe of little value.

One of the noteworthy findings in this study is the absence of an association between educational status and adherence. Although a higher educational level is often assumed to improve health-related knowledge and medication-taking behavior, evidence from previous studies, as well as findings of the current study, has been inconsistent.[4,6] This suggests that knowledge alone may be insufficient for long-term adherence to medication, especially for chronic conditions such as hypertension that are frequently asymptomatic and often require lifelong therapy.

Similarly, no meaningful association was observed between age and medication adherence in this study. Patients across different age groups may experience similar barriers, such as forgetfulness, treatment fatigue, financial constraints, and misconceptions regarding the importance of continuous medication use.[2,7] These opposing influences may counterbalance one another, resulting in no clear age-related trend in adherence behavior, as shown in this study.

Similarly, medication adherence was not associated with the presence of other comorbidities. While patients with multiple chronic illnesses maybe expected to have greater health awareness and exercise greater caution due to more frequent interactions with healthcare personnel, likewise, they may also experience polypharmacy and complex treatment regimens, which can negatively affect adherence, as demonstrated in previous studies.[6,8] The findings of this study show that comorbidity alone does not ensure improved adherence and may, in some cases, contribute to additional barriers.

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An important methodological finding of this study was the low internal consistency of MMAS-8 in the study population. Reduced reliability of the MMAS-8 has been reported in other culturally diverse settings and may be attributed to differences in patient interpretation of questionnaire items, social desirability bias during interviewer-administered surveys, or limitations in self-reported adherence measures.[3,4] Despite these limitations, the MMAS-8 remains a practical and widely used screening tool for medication adherence.

Overall, the findings emphasize the need for comprehensive strategies to improve adherence to medication among hypertensive patients. Interventions should extend beyond patient education and address behavioral, socioeconomic, and healthcare system-related barriers, and it requires a multifaceted approach. Simplified treatment regimens, regular follow ups, patient counseling, and involvement of multidisciplinary healthcare teams in patient care, have all been shown to improve blood pressure control and medication adherence in previous studies.[2,6,9,10]

This research has different limitations that should be considered to understand its findings. First, because this study was cross sectional, it only looks at adherence at one specific point in time. This means it cannot show how things change over time or prove that once factor directly causes another. Second, participants were selected using a consecutive sampling approach from a single tertiary care hospital, which limits the study's ability to apply its results to other similar healthcare setups.

Medication adherence was evaluated using a self-reported instrument (MMAS-8). Thus, the results may be influenced by recall inaccuracies or the tendency of participants to provide responses that may seem socially desirable to them, rather than truthful/accurate ones. As a result, adherence levels may have been overestimated or underestimated. Additionally, the small sample size of 150 participants, could have possibly reduced the statistical power to detect subtle associations between adherence and certain demographic or clinical variables as well.

Despite these limitations, this study offers crucial initial insights into antihypertensive medication adherence patterns in a tertiary care setup in Khyber Pakhtunkhwa.

Conclusion

Medication adherence in hypertensive patients in a tertiary care healthcare system in Peshawar was suboptimal, with majority of them demonstrating low to moderate adherence. No significant demographic or clinical predictors of adherence could be identified. Addressing behavioral and healthcare system-related barriers, as well as having a multifaceted approach, is essential to improve medication adherence, and reduce hypertension-related complications in this population.

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Authors' Contribution Statement

UTK contributed to the conception, design, analysis, interpretation of data and drafting of the manuscript. MZ contributed to the acquisition, analysis, interpretation of data, and revision of the manuscript. BHI contributed to the conception, design, analysis of data, and interpretation of data. ZSK contributed to the acquisition of data and revision of the manuscript.

Conflict of Interest

Authors declared no conflict of interest

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None

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.