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Research Article

Medication Adherence and Its Associated Factors Among Patients with Hypertension

Sahbaeiroy Faezeh* and Mohamadi Zahra

Department of Nursing, TeMS.C., Tehran Medical Sciences, Islamic Azad University, Tehran, Iran

***Corresponding Author:** Sahbaeiroy Faezeh, Department of Nursing, TeMS.C., Tehran Medical Sciences, Islamic Azad University, Tehran, Iran.

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Abstract

Background: Medication adherence is essential for effective hypertension management; however, various socioeconomic, cultural, disease-related, and healthcare-related challenges may interfere with consistent medication use. This study aimed to assess medication adherence and its associated factors among patients with hypertension in Iran.

Methods: This cross-sectional study was conducted in 2025 among 400 patients with hypertension attending hospitals affiliated with Kermanshah University of Medical Sciences, Iran. Data were collected using a structured questionnaire covering sociodemographic characteristics, medication adherence, and perceived social, economic, cultural, disease-related, and healthcare-team-related challenges. Data were analyzed using descriptive statistics and chi-square tests, with statistical significance set at $P < 0.05$.

Results: Poor medication adherence was reported in 66.25% of participants, while 19.75% had moderate adherence and 14.00% had good adherence. Educational attainment was significantly associated with medication adherence ($P = 0.006$). Significant associations were also reported between adherence and social ($P = 0.006$), economic ($P = 0.008$), cultural ($P = 0.019$), disease-related ($P < 0.001$), and healthcare-team-related challenges ($P = 0.002$). Insufficient information about medication was reported by 83.0% of participants, 87.5% perceived benefits from using traditional medicine alongside conventional treatment, 75.25% expressed concerns about medication adverse effects, and 61.25% reported a lack of trust in the healthcare team.

Conclusion: Poor medication adherence was common among patients with hypertension and was associated with educational attainment and multiple perceived challenges. Individualized medication education, attention to treatment concerns and affordability, culturally sensitive communication, and stronger patient-provider relationships may help address barriers to adherence.

Keywords: Hypertension; Medication Adherence; Treatment Adherence; Patient Education; Socioeconomic Factors; Cross-Sectional Study

Introduction

Hypertension is a major global public health concern and a leading modifiable risk factor for cardiovascular disease, stroke, chronic kidney disease, and premature mortality [1-3]. Despite the availability of effective antihypertensive medications, maintaining adequate blood pressure control remains challenging. Long-term treatment success depends not only on access to appropriate medication but also on patients' consistent adherence to prescribed regimens [2,3].

Medication adherence refers to the extent to which patients' medication-taking behaviour corresponds to agreed treatment recommendations. It includes treatment initiation, implementation of the prescribed regimen, and persistence over time [4]. Non-adherence may be intentional, reflecting concerns or beliefs about treatment, or unintentional, resulting from forgetfulness, practical difficulties, or limited access to medication [4,5]. Because hypertension is frequently asymptomatic, patients may not recognize the immediate benefits of treatment, potentially reducing their motivation to continue medication regularly.

Poor adherence can compromise blood pressure control and increase the risk of cardiovascular complications. It may also contribute to unnecessary treatment intensification, additional healthcare visits, and preventable healthcare expenditure [2,3,6]. Assessing adherence is therefore essential for identifying patients who require further education, clinical review, or practical support.

Medication adherence is influenced by interacting patient-related, socioeconomic, treatment-related, disease-related, and healthcare-system factors [3,5,7]. These may include limited health literacy, concerns about adverse effects, complex medication regimens, financial difficulties, insufficient social support, cultural beliefs, and ineffective communication with healthcare professionals. Consequently, adherence should not be considered solely a matter of patient motivation; it should be understood within the broader context of patients' daily circumstances and healthcare experiences [5,7].

Evidence from Iran indicates that adherence varies across populations and healthcare settings. Iranian studies have identified knowledge, treatment beliefs, social circumstances, healthcare experiences, and practical barriers as potentially relevant factors [8-10]. Differences in measurement instruments and definitions of adherence, however, make comparisons between studies difficult. Context-specific research is therefore needed to characterize adherence and the challenges experienced by patients receiving care in different settings.

Assessing medication adherence alongside social, economic, cultural, disease-related, and healthcare-team-related challenges may help identify areas requiring further attention in hypertension care. Accordingly, this study aimed to assess medication adherence and identify challenges associated with prescribed medication regimens among patients with hypertension attending hospitals affiliated with Kermanshah University of Medical Sciences, Iran, in 2023.

Materials and Methods

Study design and setting

A cross-sectional study was conducted in 2025 among patients with hypertension attending hospitals affiliated with Kermanshah University of Medical Sciences, Kermanshah, Iran.

Participants

A total of 400 patients were recruited using convenience sampling. The inclusion criteria were age 18-65 years, a documented diagnosis of hypertension, antihypertensive medication use for at least three months, no self-reported history of psychiatric, psychological, or cognitive disorders, and no previous participation in a similar study. Both male and female patients were eligible.

Patients who were unwilling to continue or submitted incomplete questionnaires were to be excluded; neither circumstance occurred during data collection.

Data collection instrument

Data were collected using a structured questionnaire comprising seven sections: sociodemographic characteristics, medication adherence, social challenges, economic challenges, cultural challenges, disease-related challenges, and healthcare-team-related challenges.

The sociodemographic section recorded age, sex, marital status, educational attainment, occupation, housing type, and number of children among married participants.

The medication-adherence section contained eight items identified in the study questionnaire as the Morisky questionnaire. Seven items required yes/no responses and addressed medication-taking behaviours, including forgetting doses, missing or discontinuing medication, reducing doses without medical advice, and taking medication as prescribed. The eighth item assessed how frequently participants remembered to take all their medications, using five response options ranging from never to always.

The total score for the eight-item Morisky Medication Adherence Scale (MMAS-8) ranged from 0 to 8, with higher scores indicating

better medication adherence. Items 1, 2, 3, 4, 6, and 7 were scored as 1 for "No" and 0 for "Yes," whereas Item 5 was scored inversely (1 for "Yes" and 0 for "No"). Item 8 was scored from 0 to 1, with values of 0, 0.25, 0.50, 0.75, and 1 assigned to the five response options, respectively, from "always" to "never/rarely." The scores for all eight items were summed to obtain the total adherence score. Medication adherence was categorized as low (total score < 6), moderate (total score ≥ 6 and < 8), and high (total score = 8).

The social-challenges section addressed support from family, friends, and the community; information received about medication use and adverse effects; and sources of medication-related information. The economic section recorded healthcare and medication expenditure, insurance coverage, supplementary insurance, and perceived sufficiency of family income.

The cultural section comprised 16 items concerning medication beliefs, perceived benefits of treatment, traditional remedies, trust in physicians and medication, and support from relatives and friends. Responses were recorded on a five-point scale ranging from 1 (not at all confident) to 5 (completely confident).

The disease-related section included 11 statements concerning knowledge and beliefs about hypertension, treatment benefits, cardiovascular complications, and medication-related concerns. Responses ranged from 1 (strongly disagree) to 5 (strongly agree). Additional questions addressed disease duration, treatment duration, comorbidities, and the number of medications used.

The healthcare-team-related section contained 14 items addressing explanations provided by physicians and pharmacists, medication availability, trust in healthcare professionals and pharmaceutical manufacturers, and educational needs. Responses ranged from 1 (never) to 5 (always), with the intermediate options specified in the questionnaire.

The researcher-developed questionnaire was designed by the research team based on relevant textbooks and scientific literature, with guidance from the study supervisors and advisors. The questionnaire assessed perceived challenges across five domains: social, economic, cultural, disease-related, and healthcare-team-related challenges. Content validity was assessed by 10 university faculty members. Their feedback was considered, and the necessary revisions were made before the final version of the questionnaire was used for data collection.

Study variables and statistical analysis

The primary outcome was self-reported medication adherence. Secondary variables included perceived social, economic, cultural, disease-related, and healthcare-team-related challenges. Sociodemographic and clinical characteristics were collected to describe the participants and examine potential associations with adherence.

Data were analysed using IBM SPSS Statistics, version 27 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequencies and percentages, and continuous variables as means and standard deviations or medians and interquartile ranges, as appropriate. Chi-square tests were used for the reported analyses of associations between adherence and challenge domains. Cramér's V was calculated to quantify the strength of associations between categorical variables, based on the reported chi-square statistics, sample size, and contingency-table dimensions. The corresponding p-values were recalculated using the reported chi-square statistics and degrees of freedom. Statistical significance was set at $P < 0.05$.

Ethical considerations

Ethical approval was granted by the Ethics Committee of Islamic Azad University, Tehran Medical Sciences Branch (approval code: IR.IAU.TMU.REC.1404.133) on 27 March 2025. Data collection began on 28 March 2025 and continued for six weeks, concluding on 9 May 2025.

Results

Sociodemographic characteristics

A total of 400 patients with hypertension participated. Men accounted for 50.5% of the sample. The largest educational group comprised participants with a high school diploma (23.2%), while 29.0% were retired. In addition, 26.5% lived in rented accommodation, 42.0% had Social Security insurance, and 46.0% reported that their income was sufficient to meet their needs.

Medication adherence

Poor adherence was observed in 265 participants (66.25%), moderate adherence in 79 (19.75%), and good adherence in 56

(14.00%). The reported mean adherence score was 3.75 (SD = 1.83). Poor adherence was therefore the most prevalent category (Table 1).

Medication adherence	Frequency, n	Percentage (%)
Poor	265	66.25
Moderate	79	19.75
Good	56	14.00
Total	400	100.00
Mean adherence score (SD)	3.75 (1.83)	—

Table 1: Medication adherence among patients with hypertension (n = 400).

Educational attainment and medication adherence

Educational attainment was significantly associated with medication adherence in the reported analysis (P = 0.006). Participants with a high school diploma constituted the largest educational group (n = 93, 23.2%), followed by those educated below high school level (n = 88, 22.0%) and those with primary education or less (n = 84, 21.0%) (Table 2).

Educational attainment	Frequency, n	Percentage (%)
Primary education or less	84	21.0
Below high school diploma	88	22.0
High school diploma	93	23.2
Associate degree	63	15.8
Bachelor's degree or higher	72	18.0
Total	400	100.0

Table 2: Educational attainment of participants (n = 400).

Perceived challenges associated with medication adherence

Challenges were reported across all five domains. In the social domain, insufficient information about medication was reported by 83.0% of participants. In the cultural domain, 87.5% believed that traditional medicine used alongside conventional treatment could help improve their condition. In the disease-related domain, 75.25% expressed concern about potential adverse effects of medication. Lack of trust in the healthcare team was reported as a challenge by 61.25% of participants.

Associations between challenge domains and medication adherence

The reported chi-square analyses indicated statistically significant associations between medication adherence and all five challenge domains. The P values are presented in Table 3.

Challenge domain	χ^2	df	Recalculated P value	Reported η
Social challenges	21.33	8	0.006	0.273
Economic challenges	9.63	2	0.008	0.178
Cultural challenges	15.12	6	0.019	0.235
Disease-related challenges	17.83	2	s0.001	0.285
Healthcare-team-related challenges	12.43	2	0.002	0.216

Table 3: Associations between perceived challenge domains and medication adherence.

The largest reported coefficient was for disease-related challenges (η = 0.285), followed by social (η = 0.273), cultural (η = 0.235), healthcare-team-related (η = 0.216), and economic challenges (η = 0.178).

Effect sizes and associations

To quantify the magnitude of the observed associations, Cramér's V was calculated based on the reported chi-square statistics, sample size (N = 400), and contingency-table dimensions. The values were 0.163 for social challenges, 0.155 for economic challenges, 0.137 for cultural challenges, 0.211 for disease-related challenges, and 0.176 for healthcare-team-related challenges. Among these domains, disease-related challenges showed the largest estimated effect size, followed by healthcare-team-related challenges, social challenges, economic challenges, and cultural challenges. Based

on the reported chi-square statistics and degrees of freedom, the recalculated p-values were 0.006 for social challenges, 0.008 for economic challenges, 0.019 for cultural challenges, less than 0.001 for disease-related challenges, and 0.002 for healthcare-team-related challenges. These findings indicate statistically significant unadjusted associations between medication adherence and all five challenge domains.

Discussion

This study assessed medication adherence and associated challenges among 400 patients with hypertension attending hospitals affiliated with Kermanshah University of Medical Sciences. Poor adherence was reported in 66.25% of participants, and only 14.00% were classified as having good adherence. Educational attainment was significantly associated with adherence, and statistically significant associations were reported for all five challenge domains. These findings support a multidimensional understanding of medication adherence.

Medication adherence

The high proportion of participants classified as having poor adherence highlights a potential challenge in maintaining long-term antihypertensive treatment. Previous research has similarly identified non-adherence as an important barrier to effective hypertension management, with patient beliefs, forgetfulness, treatment concerns, social circumstances, and healthcare experiences contributing to medication-taking behaviour [3,5,8].

A 2024 meta-analysis involving more than 23 million patients in the United States reported a non-adherence rate of 31% among insured adults with hypertension [11]. This estimate is lower than the proportion classified as having poor adherence in the present study. However, direct comparison is limited by differences in populations, measurement instruments, adherence definitions, and healthcare systems. The present estimate should therefore be interpreted in relation to the questionnaire and classification procedures used rather than as definitive evidence of a higher underlying rate of non-adherence.

Because hypertension is often asymptomatic, patients may not perceive an immediate benefit from regular medication use. Concerns about adverse effects and difficulties incorporating treatment into daily routines may further affect adherence [5,12]. Routine, non-judgmental assessment can help healthcare professionals identify missed doses, intentional discontinuation, treatment concerns, and practical barriers.

Sociodemographic characteristics and education

Educational attainment was significantly associated with medication adherence (P = 0.006). Education may influence the ability to understand medication instructions, evaluate health information, and communicate concerns. However, formal education is not equivalent to health literacy, and the available subgroup results do not establish whether higher or lower educational attainment was associated with better adherence.

A randomized controlled trial among older adults with hypertension found that self-management education tailored to health literacy improved medication adherence and reduced mean blood pressure, although the proportions achieving blood pressure control did not differ significantly between groups [13]. This evidence supports the potential value of accessible, individualized education. Future studies should measure health literacy directly and examine whether educational attainment remains associated with adherence after adjustment for relevant confounders.

The reported analyses found no statistically significant associations between adherence and sex (P = 0.093), occupational status (P = 0.452), or marital status (P = 0.553). These results do not establish that demographic characteristics are irrelevant. Rather, their associations may depend on factors such as financial security, work schedules, practical support, and access to healthcare, which are not captured fully by demographic categories alone.

Social and economic challenges

Insufficient medication information was reported by 83.0% of participants, making it a prominent challenge. Iranian qualitative studies have identified forgetfulness, environmental barriers, family influences, and healthcare-related difficulties among the factors that may complicate adherence [9,14,15]. Clear explanations of medication purpose, dosing, treatment duration, and possible adverse effects may help patients manage their treatment more confidently.

Education should be adapted to patients' needs and comprehension rather than relying solely on written instructions or one-time verbal explanations. Asking patients to explain how they

will take their medication can help identify misunderstandings. Nevertheless, insufficient information should not be assumed to be the sole cause of non-adherence, as patients may continue to face financial, cultural, or practical barriers despite receiving adequate education.

Economic challenges were also significantly associated with adherence. Previous research has identified socioeconomic circumstances and insurance-related barriers as potentially important, although their effects vary across healthcare systems and study populations [10,11]. Insurance coverage alone may not guarantee affordable medication or access to services. Medication costs, out-of-pocket expenditure, medicine availability, and the extent to which patients delay or skip purchases because of cost should therefore be examined separately.

Because the supplementary-insurance result in this study was inconsistent, no conclusion can be drawn about whether having such insurance was associated with better adherence. In practice, asking patients about affordability and access to prescribed medication may help clinicians identify problems and consider clinically appropriate alternatives.

Cultural and disease-related challenges

A total of 87.5% of participants reportedly believed that traditional medicine could improve their condition when used alongside conventional treatment. Cultural beliefs and treatment expectations may influence adherence, as described in qualitative research among Iranian patients with hypertension [8]. However, the use of traditional remedies does not necessarily indicate discontinuation of prescribed medication. Patients may use them as complementary practices or, in some cases, as substitutes for conventional treatment.

Healthcare professionals should ask about herbal and traditional remedies respectfully, assess potential safety concerns, and explain that prescribed antihypertensive treatment should not be stopped or replaced without appropriate clinical advice.

Concern about medication adverse effects was reported by 75.25% of participants and was associated with adherence in the reported analysis. Previous research has identified perceived medication barriers and beliefs about treatment necessity as relevant to antihypertensive adherence [7,12]. Patients may be particularly concerned when treatment benefits are not immediately noticeable but perceived adverse effects occur soon after medication initiation or a change in dose.

Healthcare professionals should encourage patients to report adverse effects and review concerns individually. Clear explanations of expected benefits and potential risks, appropriate clinical assessment, and follow-up may support informed decisions. Nevertheless, the present cross-sectional findings cannot establish whether these concerns led to poor adherence or whether other experiences influenced both concerns and medication-taking behaviour.

Healthcare-team-related challenges

Lack of trust in the healthcare team was reported by 61.25% of participants, and healthcare-team-related challenges were significantly associated with adherence. Communication, continuity of care, and opportunities to discuss treatment concerns may influence patients' willingness to follow prescribed regimens and disclose missed doses or adverse effects. A systematic review of doctor-patient communication in hypertension has also examined the relevance of communication to adherence and blood pressure control [16].

A patient-centred approach should include active listening, clear instructions, shared decision-making, and non-judgmental discussion of medication use. These practices may help identify misunderstandings and support treatment decisions. However, the present findings do not demonstrate that lack of trust directly caused non-adherence, and further research is needed to identify which aspects of healthcare interactions are most influential.

Implications for clinical practice

The findings suggest that adherence assessment should consider informational needs, treatment concerns, affordability, cultural beliefs, and experiences with healthcare professionals. Individualized education, discussion of adverse effects, respectful inquiry about traditional remedies, and assessment of medication access may help identify problems requiring attention.

Additional research has examined medication literacy and adherence among patients with hypertension [17], health literacy and treatment adherence [18,19], medication-adherence prevalence in Iran [20], beliefs about medicines among Iranian

patients with hypertension [21], adherence in an Iranian hypertension sample [22], self-care and quality of life among Iranian patients [23], health beliefs and adherence among patients in Oman [24], and the association between antihypertensive adherence and cardiovascular morbidity [25]. Together, these studies provide additional context for understanding the diverse factors that may influence medication-taking behaviour.

These strategies should be tailored to individual patients rather than applied as a uniform intervention. The present study did not test an intervention and cannot determine which approach would be most effective. Future studies should assess changes in adherence alongside blood pressure control, persistence with treatment, medication safety, and patients' experiences of care.

Strengths and limitations

A strength of this study is its examination of adherence alongside five domains of perceived challenges, providing a broader description of patients' reported experiences. However, several limitations should be considered. First, the cross-sectional design precludes causal conclusions. Second, self-reported measures may be affected by recall and social-desirability biases. Third, convenience sampling in hospitals affiliated with one university limits generalizability to other populations and community settings.

Finally, the analyses primarily examined bivariate associations between medication adherence and the study variables. Therefore, potential confounding by sociodemographic and clinical characteristics was not accounted for in multivariable models. Accordingly, the findings should be interpreted as unadjusted associations, and further studies using multivariable analyses are warranted to establish the independent relationships between medication adherence and the identified challenge domains.

Conclusion

Poor medication adherence was common among patients with hypertension in this study. Significant associations were found between medication adherence and educational attainment, as well as social, economic, cultural, disease-related, and healthcare-team-related challenges. These findings highlight the importance of considering medication adherence as a multidimensional issue influenced by patients' knowledge, beliefs, financial circumstances, concerns about treatment, and experiences with healthcare services. Addressing these factors may help healthcare professionals better understand patients' needs and develop more effective approaches to supporting long-term treatment adherence.

Individualized medication education, clear explanations of the benefits and proper use of antihypertensive medications, and assessment of patients' concerns about potential adverse effects may help improve their understanding and confidence in treatment. In addition, evaluating medication affordability and access, respectfully discussing the use of traditional remedies, and strengthening communication and trust between patients and healthcare professionals may help identify barriers to adherence and facilitate appropriate clinical support. Family involvement, when appropriate and acceptable to patients, may also contribute to treatment support and encourage consistent medication-taking behaviours.

Integrating regular medication-adherence assessment into routine hypertension care, together with patient-centred education and attention to social, economic, cultural, and healthcare-related needs, may support better medication management and sustained engagement in treatment. Further prospective and interventional studies are recommended to identify independent predictors of medication adherence and evaluate effective, tailored strategies for improving long-term adherence and hypertension management.

Author Contributions

Faezeh Sahbaeiroy contributed to the study conception, design, data analysis, and manuscript drafting. Zahra Mohamadi contributed to data collection, interpretation of the findings, and critical revision of the manuscript. All authors read and approved the final manuscript.

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Institutional Review Board Statement

The study was approved by the Ethics Committee of Islamic Azad University, Tehran Medical Sciences Branch (approval code: IR.IAU.TMU.REC.1404.133).

Informed Consent Statement

Informed Consent Statement Written informed consent was obtained from all participants before data collection. Participation

was voluntary, and participants were informed of their right to withdraw from the study at any time.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The author declares no conflicts of interest.

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