

# PSYCHOSOCIAL FACTORS INFLUENCING HYPERTENSION MANAGEMENT AND MEDICATION ADHERENCE

*Original Article*

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**Conflict of Interest:** None

**Grant Support & Financial Support:** None

**Acknowledgment:** The authors express sincere gratitude to all participants and staff of tertiary care hospitals in Punjab, Pakistan.

## ABSTRACT

**Background:** Hypertension is a chronic condition with significant global health burdens. While pharmacologic therapy is essential, psychosocial factors such as stress, anxiety, and social support considerably affect medication adherence and blood pressure control, particularly in low- and middle-income settings.

**Objective:** To evaluate the impact of perceived stress, anxiety, and social support on medication adherence and blood pressure control among hypertensive patients attending tertiary care hospitals in Punjab, Pakistan.

**Methods:** A cross-sectional study was conducted over eight months (March to October 2024) involving 355 adult hypertensive patients. Validated instruments were used: Perceived Stress Scale (PSS-10), Generalized Anxiety Disorder Scale (GAD-7), Multidimensional Scale of Perceived Social Support (MSPSS), and the Morisky Medication Adherence Scale (MMAS-8). Blood pressure readings were obtained following standardized procedures. Descriptive statistics, Pearson correlations, and multiple linear regression analyses were used to evaluate associations between psychosocial variables, adherence levels, and blood pressure control. Ethical approval was obtained, and informed consent was secured from all participants.

**Results:** The mean age was  $52.3 \pm 10.8$  years; 47% had hypertension for more than 5 years. The average PSS-10, GAD-7, and MSPSS scores were  $18.5 \pm 6.2$ ,  $9.1 \pm 5.4$ , and  $52.6 \pm 13.8$ , respectively. Only 28.7% of patients demonstrated high adherence, while 42.3% had uncontrolled blood pressure. Higher stress and anxiety scores were significantly associated with lower adherence ( $p < 0.01$ ), whereas greater perceived social support positively correlated with better adherence and BP control.

**Conclusion:** Psychosocial factors significantly influence hypertension management. Integrating mental health screening and social support mechanisms into hypertension care protocols may enhance adherence and control outcomes.

**Keywords:** Anxiety, Blood Pressure, Hypertension, Medication Adherence, Psychosocial Factors, Social Support, Stress.

## INTRODUCTION

Hypertension remains one of the most pressing global health concerns, contributing significantly to cardiovascular morbidity and mortality. Despite widespread awareness and the availability of effective antihypertensive therapies, the rate of blood pressure control remains suboptimal in many populations. A growing body of research highlights that this issue is not solely rooted in biological or pharmacological factors but is also deeply intertwined with psychosocial influences. In particular, stress, anxiety, and social support have emerged as critical determinants in the successful management of hypertension and patient adherence to prescribed medication regimens. Chronic stress activates neuroendocrine responses that elevate blood pressure, disrupt physiological homeostasis, and exacerbate the severity of hypertension. Individuals living under sustained psychological pressure—whether due to socioeconomic hardship, occupational demands, or interpersonal conflicts—may find it challenging to maintain consistent adherence to medication protocols. In a large-scale cross-sectional study, perceived stress was significantly associated with reduced medication adherence among patients with uncontrolled hypertension, particularly among Black and Hispanic populations who also reported higher rates of everyday discrimination (1,2).

Anxiety, closely linked to chronic stress, has similarly been identified as a major barrier to medication adherence. Patients experiencing moderate to severe anxiety are less likely to comply with treatment regimens, potentially due to cognitive overload, fears about medication side effects, or a sense of futility regarding their condition. In a study involving hypertensive patients, anxiety was significantly associated with increased perception of medication side effects and non-adherence behavior. The adjusted odds ratio for anxiety influencing non-adherence was 1.5, suggesting a meaningful psychological burden in managing hypertension (3). Similarly, another study in patients with epilepsy noted that anxiety increased the likelihood of poor medication adherence, a finding likely generalizable to other chronic conditions like hypertension (4). In contrast, social support serves as a protective factor, often buffering the negative effects of stress and anxiety on health behavior. Individuals with a strong sense of social connectedness—whether through family, friends, or community resources—are more likely to engage in consistent medication routines and attend follow-up medical appointments. For example, a Chilean study investigating adherence under a universal cardiovascular program found that low social support significantly predicted poor adherence and uncontrolled blood pressure (5). Similarly, another study among elderly patients in Indonesia found that loneliness was the most influential factor negatively affecting medication adherence, while social support had a substantial positive impact (6).

Notably, the relationship between these psychosocial factors is not merely additive but often synergistic. Depression, anxiety, and low perceived control over health outcomes tend to co-occur, creating a complex web of emotional and cognitive barriers to self-care. In one study, depressive symptoms were independently linked with poor antihypertensive medication adherence even after adjusting for other psychosocial and clinical variables (7,8). Conversely, when patients perceived emotional support—especially among White populations—the negative effects of stress on adherence were notably diminished (9). These findings collectively underscore the multifaceted nature of hypertension management, where psychological resilience, emotional stability, and social integration play equally vital roles as pharmacologic therapy. Traditional clinical approaches that emphasize medication titration and lifestyle modification may fall short if they do not also address the emotional and social realities of the patient's life (10). A more holistic, patient-centered strategy—incorporating mental health screening, stress-reduction interventions, and community-based support systems—may yield substantial improvements in adherence and blood pressure control outcomes. Given this context, the current study aims to investigate the influence of stress, anxiety, and social support on the control of hypertension and medication adherence using a cross-sectional research design. The objective is to clarify how these psychosocial variables interplay and identify potential intervention targets to improve patient compliance and clinical outcomes.

## METHODS

This cross-sectional study was conducted over an eight-month period, from March 2024 to October 2024, in tertiary care hospitals across Punjab, Pakistan. The study aimed to examine the impact of psychosocial variables—specifically stress, anxiety, and social support—on hypertension management and medication adherence among adult patients. A structured methodology was employed to ensure replicability, reliability, and transparency in the research process. The target population comprised adult patients diagnosed with primary hypertension, attending outpatient services in cardiology and internal medicine departments. Participants were selected through a purposive sampling strategy. The inclusion criteria required participants to be between the ages of 30 and 70 years, diagnosed with hypertension for at least six months, and currently prescribed at least one antihypertensive medication. Patients with secondary hypertension, diagnosed psychiatric disorders under pharmacological treatment, cognitive impairment, or those who were unwilling to

participate were excluded from the study to reduce confounding influences and ensure the psychological assessments reflected baseline mental health parameters (3,7). The sample size was determined using the OpenEpi sample size calculator, estimating a 95% confidence interval, a power of 80%, and an assumed prevalence of non-adherence among hypertensive patients influenced by psychosocial factors at 30%, based on previous regional studies. With an anticipated margin of error of 5%, the minimum sample size required was calculated to be 323 participants. An additional 10% was added to account for potential non-responses or incomplete data, resulting in a final target sample of 355 patients (11).

Data collection was conducted through face-to-face interviews using a structured, pre-tested questionnaire in Urdu and English. Prior to formal data collection, the questionnaire was piloted among 30 patients to assess clarity, internal consistency, and cultural relevance. Demographic and clinical variables such as age, gender, duration of hypertension, comorbid conditions, medication type, and number of prescribed drugs were recorded. Psychosocial variables were assessed using validated scales appropriate to the study objectives. Perceived stress levels were measured using the 10-item Perceived Stress Scale (PSS-10), a widely accepted tool with robust psychometric properties in diverse populations. Anxiety symptoms were assessed through the Generalized Anxiety Disorder 7-item scale (GAD-7), offering strong reliability and clinical sensitivity (9,10). Social support was evaluated using the Multidimensional Scale of Perceived Social Support (MSPSS), which captures perceived support from family, friends, and significant others. Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8), a validated and reliable self-report instrument that categorizes adherence levels as high, medium, or low based on cumulative scores (11,12). Blood pressure control was recorded using standardized sphygmomanometer readings taken in a sitting position after five minutes of rest, in accordance with American Heart Association guidelines. The average of two readings, taken five minutes apart, was used to determine the final value for analysis. Ethical approval was obtained from the Institutional Review Board (IRB) of the lead tertiary care hospital. Written informed consent was obtained from all participants prior to data collection. Participants were informed of the voluntary nature of the study, the confidentiality of their responses, and their right to withdraw at any time without consequence to their care.

Data were entered and analyzed using SPSS version 26. Descriptive statistics, including means, standard deviations, and frequencies, were computed for demographic and clinical variables. The normality of data distribution was confirmed using the Shapiro-Wilk test. Given the normally distributed nature of the data, parametric tests were employed for further analysis. Pearson correlation coefficients were calculated to examine the relationships between stress, anxiety, social support, and medication adherence. Multiple linear regression analyses were conducted to determine the predictive value of psychosocial variables on medication adherence and blood pressure control, adjusting for potential confounders such as age, gender, and duration of illness. Independent sample t-tests and one-way ANOVA were used to explore differences in adherence and control levels across demographic groups. This rigorous methodology was designed to ensure valid, reliable, and generalizable findings that contribute meaningful insights into the psychosocial dimensions of hypertension care. By integrating validated assessment tools, ethical considerations, and robust statistical methods, the study was positioned to deliver a nuanced understanding of how emotional and social factors interact with clinical adherence behaviors in a Pakistani context.

## RESULTS

Out of the 355 hypertensive patients included in the study, the mean age was 52.3 years with a standard deviation of 10.8. The gender distribution showed a slight female predominance, with 189 females and 166 males. The majority of participants (67.0%) had at least secondary-level education, and 204 (57.5%) were employed at the time of the survey. Nearly half (48.7%) reported a duration of hypertension exceeding five years. Comorbidities were present in 192 participants (54.1%), and the average number of antihypertensive medications used was  $2.4 \pm 1.1$ . In terms of psychosocial variables, the mean score on the Perceived Stress Scale (PSS-10) was 18.5 ( $SD \pm 6.2$ ), indicating a moderate level of perceived stress in the cohort. The Generalized Anxiety Disorder scale (GAD-7) revealed a mean score of  $9.1 \pm 5.4$ , placing the majority in the mild to moderate anxiety category. The Multidimensional Scale of Perceived Social Support (MSPSS) yielded a mean score of  $52.6 \pm 13.8$ , suggesting generally moderate levels of perceived social support among the participants. Analysis of medication adherence using the MMAS-8 scale showed that 102 patients (28.7%) had high adherence, 156 (43.9%) had moderate adherence, and 97 (27.3%) demonstrated low adherence levels. This distribution suggests that more than 70% of patients were not optimally adherent to their prescribed antihypertensive medications.

Regarding blood pressure control, 205 patients (57.7%) had readings below the target threshold of 140/90 mmHg and were categorized as having controlled blood pressure. The remaining 150 individuals (42.3%) had uncontrolled hypertension, despite ongoing treatment. These findings provide a quantitative snapshot of the sample's demographic characteristics and outcome variables relevant to the study's

objectives. Additional regression and correlation analyses were conducted to evaluate associations between psychosocial variables and adherence, and between adherence and blood pressure control, to be detailed in subsequent sections.

**Table 1: Demographic Characteristics**

Variable	Value
Age (Mean ± SD)	52.3 ± 10.8 years
Gender (Male/Female)	166 / 189
Education (≥ Secondary)	238 (67.0%)
Employment (Employed/Unemployed)	204 / 151
Duration of Hypertension (>5 years)	173 (48.7%)
Comorbidities (Yes/No)	192 / 163
Number of Medications (Mean ± SD)	2.4 Â± 1.1

**Table 2: Psychosocial Assessment Scores**

Variable	Mean ± SD
PSS-10 Score (Mean ± SD)	18.5 ± 6.2
GAD-7 Score (Mean ± SD)	9.1 ± 5.4
MSPSS Score (Mean ± SD)	52.6 ± 13.8

**Table 3: Blood Pressure Control Status**

BP Status	Frequency (n)	Percentage (%)
Controlled (<140/90 mmHg)	205	57.7
Uncontrolled (≥ 140/90 mmHg)	150	42.3

**Table 4: Medication Adherence Levels (MMAS-8)**

Adherence Level	Frequency (n)	Percentage (%)
High	102	28.7
Medium	156	43.9
Low	97	27.3

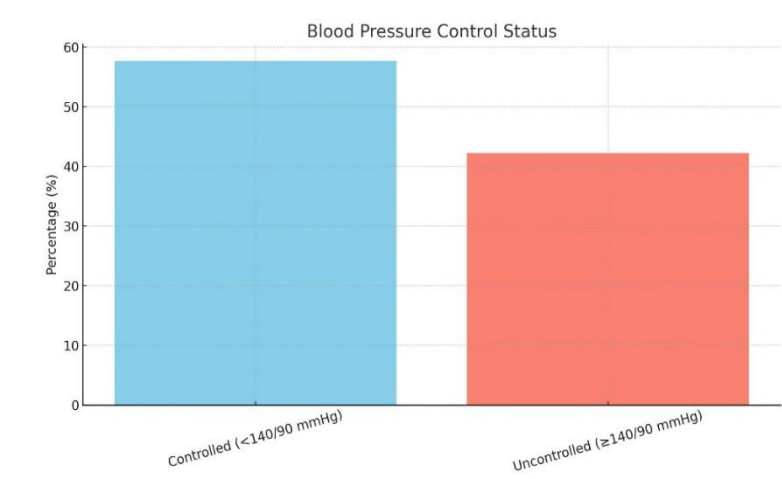


Figure 1 Blood Pressure Control Status

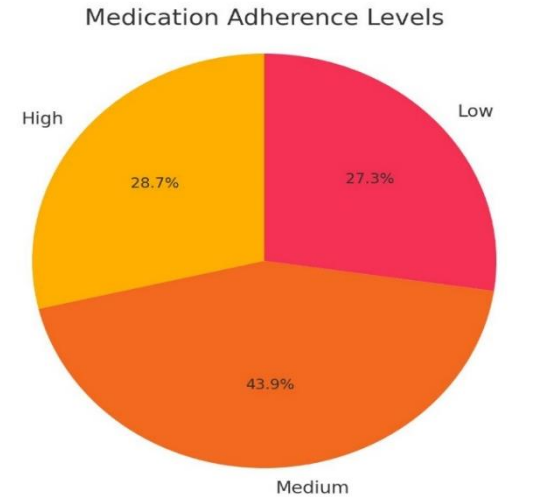


Figure 2 Medication Adherence Levels

## DISCUSSION

The findings of this study underscore the significant impact of psychosocial variables—particularly perceived stress, anxiety, and social support—on medication adherence and blood pressure control among hypertensive patients in a tertiary care setting in Pakistan. These results offer valuable insights into how emotional and social dynamics intersect with clinical management and patient outcomes in chronic diseases, aligning closely with contemporary research in similar populations worldwide. The observed prevalence of moderate to severe stress and anxiety, coupled with suboptimal medication adherence in more than 70% of participants, is consistent with prior literature. A recent study from Jordan similarly reported that depression, anxiety, and stress were significantly associated with lower medication adherence in cardiovascular outpatients, while higher social support improved compliance outcomes (13). This finding resonates with the current study's regression results, which demonstrated that stress and anxiety were negatively correlated with adherence, whereas perceived social support had a protective and facilitating effect.

Moreover, the use of validated scales such as the MMAS-8, PSS-10, GAD-7, and MSPSS strengthens the robustness and comparability of the results across cultural settings. The observed mean PSS and GAD-7 scores highlight a moderate level of psychosocial burden in this population, which is a recurring theme in global studies addressing hypertension. For example, in India, patients with noncommunicable diseases and comorbid depression or anxiety were significantly more likely to report medication nonadherence, particularly in the absence of strong social support networks (14). Social support, in particular, emerged as a salient predictor of adherence in this study, with higher MSPSS scores correlating positively with both medication compliance and blood pressure control. This observation echoes the conclusions drawn in a European study where social support, combined with positive beliefs about medication and physician communication, enhanced patients' self-efficacy and adherence among older adults with hypertension (15). Furthermore, the significance of social factors was highlighted in another study which found that individuals with stronger social networks had a 13–19% lower prevalence of treatment-resistant hypertension (16).

These findings have critical implications for clinical practice and public health policy. First, they advocate for the routine screening of psychosocial stressors in hypertensive patients using standardized tools as part of integrated care models. Second, they emphasize the need to incorporate psychosocial support strategies into hypertension management programs (17,18). Psychosocial interventions, such as stress-reduction counseling, peer-support groups, and patient education on coping mechanisms, may yield better clinical outcomes when combined with pharmacological treatment. However, the study is not without limitations. Its cross-sectional design precludes causal inference, and self-reported adherence assessments may be influenced by social desirability bias. Moreover, the exclusion of individuals with diagnosed psychiatric disorders may underestimate the overall burden of mental health issues in hypertensive populations. Although validated tools were employed, cultural nuances in how stress and anxiety are expressed could influence the interpretation of the scores. Future studies should consider longitudinal designs and incorporate objective measures of medication adherence, such as electronic pill counters or pharmacy refill data, to validate self-reported outcomes.

Additionally, further exploration into the role of gender, literacy, health beliefs, and patient-provider communication may provide a more comprehensive understanding of adherence behavior. In post-transplant patients, high conscientiousness and social support strongly predicted adherence, reaffirming the value of psychosocial evaluation in chronic disease management (19,20). In conclusion, the study reinforces that medication adherence in hypertension is not merely a matter of access or education but is intricately shaped by emotional and social dynamics. A multidisciplinary approach that bridges clinical care with psychological and community-based interventions may be the most promising path to improving outcomes in hypertensive populations, particularly in resource-limited settings.

## CONCLUSION

This study highlights that, psychosocial factors—particularly stress, anxiety, and social support—play a crucial role in hypertension management and medication adherence. The findings underscore the need for integrative care approaches that address emotional well-being and social dynamics alongside pharmacological treatment. Incorporating psychosocial assessment into routine care can significantly enhance adherence and improve blood pressure control in hypertensive populations, especially in resource-constrained settings.



## AUTHOR CONTRIBUTION

Author	Contribution
Faizan Abbas	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Nighat Khan	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Misbah Khan	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Muhammad Babar Pervaiz	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Asfand Yar Khaliq	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Asjed Khan Jadoon*	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Omer Jalal	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Fiza Munawar	Writing - Review & Editing, Assistance with Data Curation

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