

The role of stress in hypertension treatment adherence: Findings from Cimahi City



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Abstract Studies on elderly patients with hypertension revealed that levels of depression, stress and anxiety correlated with their adherence to treatment. Hypertension patients who undergo regular treatment in Cimahi city still show low achievement, with 26.95% not meeting the target, while the number of hypertension cases continues to increase each year. Our objective was to analyze the role of stress in hypertension treatment adherence to address gaps identified in literature. This quantitative study involved cross sectional design conducted across 3 health centers with the highest hypertension cases in Cimahi city, namely, Padasuka, Cibereum and Cipageran Health Centers. The study was conducted for 4 months. A total of 160 participants were enrolled, and data were collected through interviews using the Hill Bone High Blood Pressure Compliance Scale to measure compliance and Perceived Stress Scale to measure stress level. Ethical approval was obtained from Health Research Ethics Commission, Immanuel Health Institute and participants provided informed consent. The primary outcome of the study was majority of respondents were aged between 50-59 years (38.1%), female (88.1%), completed elementary school education (48.8%), and 9.4% did not have health insurance. Respondents who experienced moderate stress were 52.5% and those who were disobedient were 65.6%. Statistical analyses revealed p value: 0.0001 and r value of 0.615. The higher the stress felt by the patient, the lower the level of compliance. Additionally, Stress can significantly interfere with a person's ability to comply with medication recommendations. Elderly patients with hypertension who is experiencing stress can increase the risk of forgetting or avoiding medication due to psychological effects. In conclusion, our study contributes to the understanding of relationship between stress and compliance with hypertension treatment. Future studies should address efforts to reduce stress in patients by creating more attractive intervention models to increase adherence in hypertensive patients.

Keywords: adherence, elderly, hypertension, stress

1. Introduction

Stress is an inevitable aspect of life. When left unmanaged or allowed to escalate, it can affect daily behavior and negatively impact an individual's health. Elevated stress levels are linked to the progression of hypertension and can lead to a sense of detachment from treatment (Gunawan & Adriani, 2020). Stress often arises from challenging life events or crises, which may include personal illness, internal pressures, family expectations, or demands from the social environment. These situations, perceived as threatening or harmful, can exacerbate stress levels (Halawa et al., 2023).

The rate of compliance with pharmacological treatment for patients with hypertension is still low, namely, approximately 50–70% of patients whose blood pressure is not controlled, 50% of whom have compliance problems (Feldman et al., 1998). Hypertension sufferers' noncompliance with treatment is often caused by behavioral factors and factors related to treatment. Attitudes of compliance and noncompliance with treatment can appear interchangeably in a person with hypertension. At certain times, a person can be compliant with the treatment plan, and at other times, the sufferer can behave the opposite way, namely, disobedient. This change in attitude usually occurs in sufferers who do not yet have a strong personal awareness of the importance of complying with treatment rules. This change in attitude usually follows the onset of symptoms of illness. An increase in blood pressure accompanied by symptoms of illness results in sufferers complying with taking medication, and if there are no symptoms of illness, sufferers become noncompliant with taking antihypertensive medication. This is indeed a common obstacle to the successful treatment of hypertension in the community (Suhat et al., 2022).

Older adults in Asia are particularly vulnerable to the combined effects of hypertension and mental health issues. Research suggests a two-way relationship between mental health conditions and hypertension, which can lead to reduced quality of life, poorer adherence to medication, and increased mortality rates among this population. Addressing these obstacles and providing comprehensive care for high-risk elderly individuals are essential to reduce this burden. Studies also indicate that elderly people with hypertension are more prone to experiencing depression, anxiety, and stress (Turana et al., 2021).



Compliance with medical advice is closely linked to the support individuals receive, particularly from their families. Those who have family support tend to be more receptive to medical recommendations than those without such support. Family social support plays a crucial role in addressing health challenges. When family members provide support, they can significantly benefit those undergoing treatment for health issues. This is especially true for individuals with hypertension; family support can positively impact their adherence to treatment, leading to higher compliance levels among these patients (Kusumawardana & Tamtomo, 2017). Chronic conditions such as hypertension require ongoing treatment, which poses a challenge for both patients and their families to sustain motivation for adherence over the years. Family support is a key factor in enhancing this motivation (Osamor, 2015).

Research involving individuals with HIV/AIDS has indicated a connection between the stress they experience and their adherence to medication (Nurani, 2022). Similarly, studies on diabetes mellitus patients have demonstrated a relationship between stress levels and medication compliance. Research conducted in Surabaya revealed a link between stress coping mechanisms and adherence to tuberculosis treatment (Dakhi et al., 2022). Research in Surabaya shows that there is a relationship between coping with stress and compliance with TB medication (Rumkhullah & Qomaruddin, 2015). Additionally, studies on elderly patients with hypertension revealed that levels of depression and anxiety were correlated with their adherence to treatment (Putra et al., 2023). Elderly people with good knowledge can increase their ability to manage stress so that it can influence their behavior in treating hypertension (Setyaningsih et al., 2022).

Cimahi city is one of the cities in West Java Province with the lowest blood pressure measurement coverage, at just 1.17%. According to Cimahi city's 2019 health profile, three community health centers reported the highest numbers of residents with hypertension: the Cibereum Community Health Center (4,034 people), the Cipageran Community Health Center (3,460 people), and the Padasuka Community Health Center (3,079 people). This issue has continued to escalate, remaining a significant problem that requires urgent solutions (Suhat et al., 2022).

Psychological stress affects blood pressure through the activation of the sympathetic nervous system and the release of stress hormones such as cortisol. High stress levels can exacerbate hypertension and hinder the effectiveness of treatment. Many patients with hypertension fail to adhere to their treatment regimens for various reasons, including stress burden, lack of understanding about the disease, medication side effects, or other psychosocial factors. This study is essential for identifying the relationship between stress and treatment adherence, which can assist healthcare providers in developing holistic approaches that address not only blood pressure management but also stress management and psychological interventions. By understanding the link between stress and adherence, the findings of this research can help improve treatment compliance, reduce blood pressure levels, and ultimately enhance the overall quality of life of patients with hypertension. Research has shown that compliance with medication is related to a person's stress level. This research aims to analyze the compliance of hypertension patients receiving treatment on the basis of the level of stress they experience.

2. Materials and methods

This research is a quantitative study with a cross-sectional approach. Samples were taken by purposive sampling from 160 hypertension sufferers on the basis of data available at the community health center in Cimahi city. The respondents were selected from 3 selected health centers, namely, Cibereum, Padasuka and Cipageran health centers, and as many as 160 hypertension sufferers whose names were recorded at the health centers were randomly selected. The inclusion criteria were patients who were willing to take part in the research, while the exclusion criteria were patients aged over 60 years and less than 40 years and who had made contact visits to the health center and received antihypertensive medication. The patients involved in the research were not high-risk patients.

The research variables consisted of stress levels and patient compliance in treating hypertension. The instrument used to measure stress levels is the Perceived Stress Scale, which consists of 10 questions. To calculate the total PSS score, the responses to the four items were positive (items 4, 5, 7, and 8), and the rest were negative. For positive questions, the score ranges from 0 to 4, indicating an increase, whereas for negative items, the calculation method is the opposite of that for positive items. A score of 4 indicates a negative or bad condition. The categories are determined by adding the PSS scores and then making several categories. Individual scores on the PSS can range from 0--40, with higher scores indicating greater perceived stress. The categories of perceived stress are as follows: scores ranging from 0--13 indicate low stress, scores ranging from 14--26 indicate moderate stress, and scores ranging from 27--40 indicate high stress.

To measure respondent compliance, the Hill-Bone Compliance to High Blood Pressure Therapy Scale consists of 14 questions. The compliance of hypertension patients receiving treatment was measured via the Hill Bone scale, which involves adding the scores obtained by each respondent. If the score obtained is 14, then it is said to be compliant, whereas if the score is above 14, then it is included in the noncompliant category. The instrument used in this study is a standard instrument that has been widely used in research in Indonesia.

The collected data are presented univariately via a frequency distribution, which includes presenting data on respondent characteristics and analyzing the relationship between the two research variables via cross tables. The statistical analysis used to determine the relationship between the perception of stress experienced by hypertension sufferers and

treatment compliance was the Spearman rank test with a 5% error rate. Statistical tests are carried out with the help of a computer program.

The study was conducted over four months, and to assess the compliance of hypertensive patients and the stress they experienced, data from the last three months were used. This research has received a letter of approval through a statement letter from the Health Research Ethics Commission, Immanuel Health Institute number 194/KEPK/IKI/II/2024.

3. Results

Research was conducted in Cimahi city on 160 hypertension sufferers. The data were collected via a questionnaire given to the respondents with the help of health cadres at each community health center involved in the research. The results of the data collection are presented in the form of a frequency distribution table for univariate analysis in Table 1 and a cross table for bivariate analysis in Table 2.

Table 1 Research variables and respondent characteristics.

Variabel	n =160	%
Age (years)		
31-39	8	5.0
40-49	43	26.9
50-59	61	38.1
60-69	48	30.0
Gender		
Male	19	11.9
Female	141	88.1
Education		
Elementary School	78	48.8
Junior high school	41	25.6
Senior high school	37	23.1
University/High school	4	8.5
Marital status		
Married	132	82.5
Unmarried	28	17.5
Health insurance		
Yes	15	9.4
No	145	90.6
Stress level		
Light	76	47.5
Moderate	84	52.5
Medication adherence		
Adherence	55	34.4
Non adherence	105	65.6

Table 1 shows that the majority of the respondents were aged 50--59 years (38.1%), 88.1% were female, and the education level of the majority of the respondents was elementary school (48.6%). As many as 82.5% of the respondents still had a partner or were married. No more than 10% of the respondents had health insurance. The stress conditions at the time of the study were almost the same between the respondents with mild stress, 57.5%, and those with moderate stress, 52.5%. The majority of respondents' compliance with hypertension treatment was in the noncompliant category, namely, 65.6%. The results of the bivariate analysis of the relationship between stress levels and hypertension patient compliance with treatment are shown in Table 2.

Table 2 Cross-tabulation analysis of the relationship between stress level and patient adherence to medication.

Perceived Stress	Medication Adherence				p value OR (CI 95%)
	Yes		No		
	f	%	f	%	
Light	31	40.8	45	59.2	0.001**
Moderate	74	88.1	10	11.9	(2.70-9.16)

There were 76 respondents with mild stress levels, but 59.2% were noncompliant with hypertension treatment. Overall, 84 respondents who experienced stress in the moderate category were mostly noncompliant with hypertension treatment. The proportion of respondents with moderate stress who were disobedient was greater than the proportion of respondents who were under mild stress.

The results of statistical tests using the Spearman rank correlation test at an alpha of 5% revealed that there was a



significant relationship between stress levels and compliance in hypertension patients receiving treatment. Spearman's r value is 0.615; thus, the relationship between stress levels and hypertension is closely related to compliance with treatment.

4. Discussion

Medication adherence refers to the extent to which patients follow healthcare professionals' recommendations, including consistent use of prescribed medications, lifestyle modifications, and dietary changes (Panahi et al., 2022). This study focused on individuals with hypertension who received treatment at community health centers and were prescribed daily antihypertensive medication by their doctors. The research involved 160 participants in Cimahi city who were selected through random sampling. The findings revealed that many respondents were not fully compliant with their hypertension treatment.

The study results revealed a significant relationship between stress levels and treatment adherence among elderly individuals with hypertension. Higher stress levels were associated with lower compliance. Patients experiencing stress often neglect self-care, resulting in inadequate efforts to manage their hypertension. These findings align with those of a study conducted at the Kassi-Kassi Health Center in Makassar city, which also revealed a correlation between stress and treatment adherence among elderly hypertension patients (Turana et al., 2021).

Similarly, other research on medication adherence, such as a study suggesting that chronic stress was linked to medication nonadherence, supports these findings. A notable example is the Coronary Artery Risk Development in Young Adults (CARDIA) study, which demonstrated that high levels of chronic stress were significantly associated with lower adherence to prescribed medications. Additional studies have confirmed that chronic stress predicts medication nonadherence in individuals with conditions such as diabetes, where stress acts as a significant barrier to compliance (Oates et al., 2020). A systematic review of various studies revealed that patient-specific barriers are among the key factors influencing treatment adherence. Stressful circumstances and feelings of discouragement are notable barriers, alongside other factors such as limited knowledge, disruptions to routines, and poor health literacy (Kvarnström et al., 2021).

Stress can shape individuals' perceptions of their illness and treatment, potentially leading to resistance or reduced motivation to adhere to prescribed medication. Stress adversely impacts overall health, particularly blood pressure regulation. During stressful situations, the body releases hormones such as adrenaline and cortisol, which can increase blood pressure. Persistent stress not only contributes to the onset of hypertension but also worsens existing conditions (Kai et al., 2024). Various factors influence treatment behavior, including stress. This study specifically examined the relationship between stress levels and adherence to hypertension treatment. The findings revealed a significant association between stress levels and treatment compliance among hypertension patients. Higher stress levels corresponded with lower adherence to treatment regimens.

Managing hypertension extends beyond medication. Preventative measures such as engaging in regular physical activity, avoiding tobacco products and exposure to smoke, maintaining a balanced diet, achieving an ideal body weight, and refraining from alcohol consumption are crucial. Nonpharmacological interventions, including stress management techniques such as relaxation therapy, can benefit patients experiencing stress and hypertension (Halawa et al., 2023).

Chronic illnesses that require long-term management or are incurable often lead to stress, fostering feelings of hopelessness and discouragement that hinder treatment adherence. Psychological factors, such as stress, are known to impact compliance in individuals with chronic conditions such as hypertension (Fitri et al., 2023). In situations where medication is primarily preventative rather than symptomatic, maintaining long-term adherence is particularly challenging. This difficulty increases the likelihood of treatment discontinuation. Among cardiovascular medications, antihypertensive and lipid-lowering drugs have the highest nonadherence rates (Roohafza et al., 2016). As hypertensive adults age, they often face additional chronic conditions and require multiple medications, which can further reduce compliance. Mental health conditions, including major depression and dementia, can also negatively affect adherence (Burnier & Egan, 2019).

The findings of this research align with studies conducted at East Selemadeg Community Health Center 1, which highlighted a link between stress, anxiety, and treatment adherence among hypertension patients (Kang et al., 2018). Stress has been shown to influence medication adherence (Horne et al., 2023). Previous studies on elderly hypertensive patients have demonstrated that stress significantly interferes with their ability to follow prescribed medication regimens. Stress increases the likelihood of patients forgetting or avoiding medication because of its physiological and psychological effects. Chronic stress, compounded by the prolonged nature of hypertension treatment, can diminish quality of life and result in the neglect of personal health, including hypertension management (Ainiyah et al., 2023). To address this, educating patients about stress management and hypertension treatment is essential to improve adherence and reduce stress levels.

Several effects of stress on health behavior and treatment adherence in hypertensive patients include the tendency to forget or miss their medication when experiencing stress. Hypertension treatment requires daily adherence, so if patients forget, they may miss taking their medication as scheduled. Stress can impair memory and focus, which can directly impact adherence to treatment.

In addition to forgetting medication, stress can also lead patients to neglect their treatment regimen. During periods of stress, some patients may no longer prioritize their prescribed treatments. Mental stress and fatigue from long-term treatment can cause patients to feel emotionally and psychologically burdened, leading to a loss of motivation to adhere to their

treatment consistently and regularly. Stress is often associated with psychosocial factors such as anxiety, depression, or economic challenges within the family. These conditions can make it difficult for patients to access or afford the necessary medication. A sense of hopelessness may arise as patients struggle to accept the reality of long-term treatment. Poor psychosocial conditions can further diminish patients' trust in the effectiveness of their treatment and reduce their confidence in the abilities of healthcare providers.

These findings indicate that stress is related to treatment adherence in hypertensive patients. Studies suggest that effectively managing stress can significantly improve adherence to treatment. Strategies implemented include engaging in activities and interventions aimed at reducing stress among hypertensive patients. One approach is patient education to enhance their knowledge and understanding of the importance of hypertension treatment and stress management. For patients experiencing higher levels of stress, therapy or counseling may be necessary to help them cope with emotional burdens. Psychological support from family members or healthcare professionals can also alleviate perceived stress, and counseling or therapy sessions might be beneficial.

Effective communication between patients and healthcare providers, including nurses and doctors, can improve trust and motivate patients to adhere to their prescribed treatments. A holistic approach may offer an effective solution for reducing stress in hypertensive patients by integrating stress management with hypertension control strategies, such as breathing exercises, meditation, or relaxation techniques. Stress has a significant effect on treatment adherence in hypertensive patients. By understanding the mechanisms of this relationship, healthcare providers can develop comprehensive approaches to enhance patient compliance, thereby improving the effectiveness of hypertension management.

This study has several limitations, particularly in establishing a causal relationship between stress levels and treatment adherence among elderly hypertension patients. However, it is evident that psychological factors, including stress, contribute to nonadherence in hypertensive patients. Further research is recommended to explore the impact of psychological factors on adherence, particularly in elderly individuals, to enhance treatment strategies and reduce stress levels, ultimately improving compliance with hypertension management.

5. Conclusions

Noncompliance with hypertension treatment remains a significant global challenge. Various factors contribute to this issue, with stress being one of the primary contributors. Efforts to address noncompliance should focus on strategies to reduce stress levels and enhance adherence among hypertension patients. Providing education is an effective approach to increase patients' awareness of stress management, the importance of adhering to hypertension treatment, and the potential consequences of noncompliance.

It is equally essential to emphasize the necessity of treatment and adherence to prescribed guidelines for managing hypertension. Support from family, friends, and social networks plays a vital role in alleviating stress and fostering better medication adherence. A strong support system can motivate patients to follow treatment protocols and manage stress more effectively, ultimately improving their commitment to their treatment plan.

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Ethical considerations

This study received ethical approval from the Health Research Ethics Committee of the Immanuel Health Institute under approval number 194/KEPK/IKI/II/2024.

Conflict of interest

All authors declare no conflicts of interest.

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