

ORIGINAL ARTICLE

Adherence Level and Health-Related Quality of Life In Hypertensive Heart Disease Patients In Indonesia: A Cross-Sectional Study

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ABSTRACT

Introduction: Health-related quality of life (HRQoL) is a key indicator of patient well-being, particularly in individuals with chronic conditions such as hypertension. In hypertensive heart disease (HHD), HRQoL may decline due to prolonged symptoms and cardiovascular risks. Medication adherence is essential for blood pressure control and maintaining HRQoL, yet low adherence remains a major challenge. This study aimed to investigate the factors associated with medication adherence, HRQoL, and the correlation between medication adherence and HRQoL in patients with HHD. **Methods:** This cross-sectional study was conducted from November 2023 to April 2024 among 152 HHD outpatients at the Cardiology Department of Dr. H. Abdul Moeloek Regional General Hospital, Lampung, Indonesia. Participants were selected through purposive sampling. Data were collected using the Hill-Bone Compliance to High Blood Pressure Therapy Scale (HBCTS) and the EQ-5D-5L questionnaire. The Spearman rank correlation test was used for analysis, with significance set at $p < 0.05$. **Results:** The average utility score was 0.773, and the mean EQ-VAS score was 75. The most frequently reported issue was pain/discomfort. Most patients demonstrated high therapy adherence, particularly in the doctor visit domain (53.3%). Age, duration of illness, number of medications, and comorbidities were significant factors that affected medication adherence and HRQoL ($p < 0.05$). A significant correlation was found between medication adherence and utility value ($p < 0.001$) as well as EQ-VAS score ($p = 0.002$). **Conclusion:** Higher medication adherence is significantly associated with better HRQoL in patients with hypertensive heart disease (HHD). The level of adherence and HRQoL is also affected by age, duration of hypertension, number of medications, and comorbidities. Hence, interventions to improve medication adherence are needed to attain better HRQoL.

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INTRODUCTION

Hypertensive heart disease (HHD) is a chronic condition resulting from sustained high blood pressure, which significantly increases the risk of cardiovascular complications and contributes to elevated morbidity and mortality rates (1). In 2019, it was estimated that approximately 19.60 million people were affected by HHD (2). Hypertensive heart disease involves both functional and structural abnormalities that develop in the left ventricle, left atrium, and coronary arteries

as a consequence of prolonged, poorly managed hypertension (3). HHD is commonly associated with complications such as diastolic heart failure, systolic heart failure, or a combination of both. Additionally, individuals with this condition exhibit an elevated risk of developing atrial fibrillation, perioperative ischemia, and coronary artery disease. Over the past three decades, the global prevalence of HHD among older adults has shown a consistent upward trend (4).

Given the significant burden of hypertension, prioritizing the improvement of its detection, management, and control is essential. Patient evaluation is important to assess achievement of the goal therapy, and also determine the plan and monitoring therapy (5,6). One of the primary challenges to achieving optimal hypertension

management, as highlighted in several studies, is poor patient adherence to treatment. Adherence to restricted sodium intake and other non-pharmacological strategies is crucial in managing hypertension and heart diseases. The Dietary Approaches to Stop Hypertension (DASH) diet, which emphasizes low sodium intake, has been particularly effective in this regard. Patient adherence is a critical factor that must be thoroughly assessed and evaluated, as it plays a vital role in achieving successful treatment outcomes. Ensuring adherence is essential to preventing disease progression, managing symptoms, and minimizing complications. HHD necessitates long-term, often lifelong, therapy, which can lead to adherence challenges and subsequently result in suboptimal blood pressure control (7). Nonadherence to pharmacotherapy is a major factor contributing to suboptimal blood pressure control, which often leads to uncontrolled hypertension and increases the risk of secondary diseases (8).

Hypertension has been shown to be a contributing factor to the decline in health-related quality of life (HRQoL) the patients due to progressive and developing of the disease (9). Some studies reported the health-related quality of life of hypertensive patients were found low in all domains including physical, psychological, social, environmental and mental health (10). The decrease in HRQoL among hypertensive patients is influenced by several factors, including the chronic-degenerative nature of hypertension, the effects of antihypertensive medication therapy, and various physical, emotional, and social aspects (10). These conditions will worsen with poor medication adherence, which has a detrimental impact on patients' HRQoL (11). It can increase the risk of cardiovascular events, kidney failure, and further impact HRQoL (8,12). Therefore, evaluating patients' quality of life is essential for assessing treatment outcomes and achievements.

HRQoL or quality of life related health status is the value of overall function and wellbeing of the patient over the treatment. HRQoL is a measure of a person's life satisfaction due to the impact of disease and therapy which evaluates the physical, mental, and social dimensions of health (13). The functioning value in HRQoL refers to an individual's ability to perform several activities, while the well-being value refers to an individual's subjective feelings that include happiness, sadness, depression, and anxiety (14,15). A cross sectional study in Ethiopia reported that patients' quality of life declined in all aspects (10). The prevalence of quality of life among hypertensive patients varies across different countries and regions, showcasing notable differences in HRQoL based on various factors. Studies from Vietnam (16), Indonesia (17), and Spain highlight that factors such as age, comorbidities, medication adherence, social activities involvement, self-management, and target organ damage significantly impact the HRQoL of hypertensive patients.

By taking into account aspects of quality of life, HHD treatment will be more appropriate to the patient's condition, because each patient has different problems in each quality of life domain. Patients with lower HRQoL in certain aspects may experience improvement through modifications in treatment, which can enhance their overall well-being (18). Moreover, HRQoL has become an important area of clinical research over the past 15 years, as it evaluates patients' physical, emotional, and social functioning (19). Studies on the relationship between medication adherence and HRQoL in hypertensive patients are still limited, particularly in those with HHD. Therefore, there is a need to investigate how adherence to antihypertensive therapy affects HRQoL in patients with HHD. We address this gap by analyzing the factors affecting medication adherence, HRQoL, and correlation between medication adherence and HRQoL in patients with HHD, providing a more comprehensive understanding of treatment outcomes.

MATERIALS AND METHODS

Research Design

This study used a cross-sectional approach in order to determine factors affecting medication adherence, HRQoL, and the correlation between the level of adherence and HRQoL. The study sample includes patients with hypertensive heart disease who meet the inclusion and exclusion criteria.

Inclusion and Exclusion Criteria

Eligible participants included individuals aged 18 years or older with a clinical diagnosis of hypertensive heart disease (HHD), a documented history of hypertension for at least 1 year, and current receipt of antihypertensive therapy for at least 6 months; they were also required to possess the capacity to understand the study instruments, communicate effectively, make independent decisions, and provide informed consent. Conversely, patients were excluded if they had a diagnosis of secondary hypertension, were currently pregnant, or presented with severe physical, cognitive, or psychiatric impairments that precluded effective communication or completion of the questionnaires.

Data Collection

Data collection was carried out through direct interviews at the Cardiology Clinic of Dr. H. Abdul Moeloek Regional General Hospital, Lampung Province, Indonesia, from November 2023 to April 2024. The hill-bone compliance to high blood pressure therapy scale (HBCTS) and the European quality of life 5 dimensions 5 level version (EQ-5D-5L) questionnaires were used to measure the adherence level and HRQoL of patients with hypertensive heart disease. The data taken by interviewed directly, and the respondent signed the informed consent. We collected characteristics data including age, gender, weight, occupational status, education background, income level, history of

hypertension, duration of diseases, other diseases, number of medications that are currently taking by.

Adherence Level Assessment

HBCTS is a self-reported adherence measurement instrument developed by Kim et al., (2000). The HBCTS consists of 14 questions with three subscales: Medication taking Subscale, Appointment Keeping Subscale, Reducing Sodium Intake. The questions are answered using a four-point response format: always (4), often (3), sometimes (2), and never (1). Higher scores indicate lower adherence. The score range was 14-56, which the high score categorized by high adherence. We used the cut off median 51, therefore score ≤ 51 defined as low adherence, while > 51 categorized by high adherence.

HRQoL Assessment

EQ-5D-5L is a preference-based classification system developed by EuroQol to measure HRQoL. The EQ-5D-5L assesses utility and health state to evaluate patient health. It consists of 25 questions covering 5 domains: mobility, self-care, daily activities, pain or discomfort, and anxiety or depression. We also measured the self-rating of overall health status on a visual analogue scale (EQ-VAS) ranging from 0 ('worst imaginable health state') to 100 ('best imaginable health state') the quality of life with EuroQol. We used the value set from Indonesia which is a highly representative sample of the Indonesian general population (21).

Data Analysis

Data analysis was performed using the Spearman rank correlation test to examine the correlation between adherence level and HRQoL. The relationship between variables was analyzed using the Chi-Square, Mann-Whitney, and Kruskal-Wallis methods. Data were considered statistically significant if they had a $p < 0.05$.

Ethical Clearance

This study was approved by the Ethics Committee at Dr. H. Abdul Moeloek Regional General Hospital, Lampung Province, Indonesia, with the number 037/KEPK-RSUDAM/X/2023 and by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Lampung, Indonesia, with the number 4017/UN26.18/PP.05.02.00/2023.

RESULTS

Patient characteristics

A total of 152 patients with hypertensive heart disease (HHD) were included in this study. More than half of the respondents were aged 19-59 years ($n = 92$, 60.5%) and were male ($n = 81$, 53.3%). Most respondents were married ($n = 135$, 88.8%) and had completed secondary education ($n = 62$, 40.8%). In terms of occupation, 78 respondents (51.3%) were employed, while 63 respondents (41.4%) were unemployed. The largest

income group reported no income ($n = 63$, 41.4%). Regarding clinical characteristics, 58 respondents (38.2%) had hypertension for 6-10 years, while 46 respondents (30.3%) had hypertension for more than 10 years. Most respondents were taking more than three medications ($n = 106$, 69.7%) and had comorbidities ($n = 106$, 69.7%). High medication adherence was observed in 81 respondents (53.3%), while 71 respondents (46.7%) had low adherence (Table I).

Table I: Sociodemographic and Clinical Characteristics of Patients with Hypertensive Heart Disease ($n = 152$)

Patient Characteristics	Frequency (n)	Percentage (%)
Sex		
Male	81	53.3
Female	71	46.7
Age		
19-59	92	60.5
>60	60	39.5
Marital Status		
Single	1	0.7
Married	135	88.8
Divorced	16	10.5
Education Level		
No Education	10	6.6
Primary Education	51	33.6
Secondary Education	62	40.8
Tertiary Education	29	19.1
Occupation		
Unemployed	63	41.4
Employed	78	51.3
Retired	11	7.2
Income Level		
Rp. 0	63	41.4
<Rp. 2.633.284	43	28.3
> Rp. 2.633.284	46	30.0
Duration of Hypertension		
1-5 years	48	31.6
6-10 years	58	38.2
>10 years	46	30.3
Number of Medication		
1-3	46	30.3
>3	106	68.4
Comorbidities		
No	48	31.6
Yes	106	69.7
Medication Adherence		
High adherence	81	53.3
Low adherence	71	46.7

Medication adherence based on the Hill-Bone Compliance Scale

The Hill-Bone Compliance to High Blood Pressure Therapy Scale responses are presented in Table II. The highest mean score was observed for the appointment-keeping subscale (mean = 3.74), followed by the medication-taking subscale (mean = 3.60) and the sodium intake reduction subscale (mean = 3.33). These findings indicate that respondents showed the most favourable adherence in keeping appointments and the least favourable adherence in reducing sodium intake. For the medication-taking subscale, most respondents reported favourable adherence across several items, particularly taking someone else's blood pressure pills, skipping medication before seeing the doctor, and missing medication when feeling sick. However, forgetting to take medication remained a common issue, as 87 respondents (57.2%) reported forgetting their medication some of the time. Similarly, 75 respondents (49.3%) reported missing medication when careless some of the time. These findings suggest that although medication-taking adherence was generally acceptable, forgetfulness and carelessness remained important barriers.

For the sodium intake reduction subscale, adherence

was less favourable. A total of 98 respondents (64.5%) reported eating salty food some of the time, and 106 respondents (69.7%) reported eating fast food some of the time. However, 88 respondents (57.9%) reported that they did not add salt to food before eating. These findings suggest that limiting sodium intake, especially through salty and fast foods, remains a challenge among HHD patients.

For appointment keeping, most respondents reported favourable behaviour. A total of 129 respondents (84.9%) reported that they did not miss scheduled appointments, while 23 respondents (15.1%) missed appointments some of the time. Although 102 respondents (67.1%) reported that they made their next appointment before leaving the doctor's office, this item should be interpreted cautiously because appointment scheduling may be managed by nurses or clinic staff rather than by patients themselves.

Health-related quality of life

The EQ-5D-5L descriptive responses and HRQoL scores are shown in Table III. The mean utility score was 0.773, while the mean EQ-VAS score was 75.00. Among the five EQ-5D-5L dimensions, the highest proportion of respondents reporting no problems was

Table II: Medication Adherence Behaviours Based on the Hill-Bone Compliance Scale (n = 152)

Medication Adherence		Responses				Mean score
		None of the Time (n, %)	Some of the Time (n, %)	Most of the Time (n, %)	All of the Time (n, %)	
A Medication taking Subscale						
A1	How often do you forget to take your high blood pressure medicine?	48 (31.6)	87 (57.2)	16 (10.5)	1 (0.7)	3.19
A2	How often do you decide NOT to take your high blood pressure medicine?	87 (57.2)	57 (37.5)	8 (5.3)	0 (0.0)	2.52
A3	How often do you forget to get prescriptions filled?	100 (65.8)	48 (31.6)	4 (2.6)	0 (0.0)	3.63
A4	How often do you run out of high blood pressure pills?	105 (69.1)	42 (27.6)	5 (3.3)	0 (0.0)	3.66
A5	How often do you skip your high blood pressure medicine before you go to the doctor?	122 (80.3)	29 (19.1)	1 (0.7)	0 (0.0)	3.80
A6	How often do you miss taking your high blood pressure pills when you feel better?	91 (59.9)	54 (35.5)	7 (4.6)	0 (0.0)	3.55
A7	How often do you miss taking your high blood pressure pills when you feel sick?	119 (78.3)	32 (21.1)	1 (0.7)	0 (0.0)	3.78
A8	How often do you take someone else's high blood pressure pills?	138 (90.8)	13 (8.6)	0 (0.0)	0 (0.0)	3.89
A9	How often do you miss taking your high blood pressure pills when you are careless?	69 (45.4)	75 (49.3)	8 (5.3)	0 (0.0)	3.40
Total mean						3.60
B Reducing Sodium Intake						
B1	How often do you eat salty food?	46 (30.3)	98 (64.5)	8 (5.3)	0 (0.0)	3.25
B2	How often do you shake salt on your food before you eat it?	88 (57.9)	64 (42.1)	0 (0.0)	0 (0.0)	3.58
B3	How often do you eat fast food?	36 (23.7)	106 (69.7)	10 (6.6)	0 (0.0)	3.17
Total mean						3.33
C Appointment Keeping Subscale						
C1	How often do you make the next appointment before you leave the doctor's office?	102 (67.1)	46 (30.3)	3 (2.0)	1 (0.7)	3.64
C2	How often do you miss scheduled appointments?	129 (84.9)	23 (15.1)	0 (0.0)	0 (0.0)	3.85
Total mean						3.74

Table III: Health-related quality of life and comparison by medication adherence status among HHD patients (n = 152)

HRQoL measure / EQ-5D-5L dimension	Overall result	Low adherence (n=71)	High adherence (n=81)	p-value
Mobility				
No problem	34.21%	-	-	-
Slight problems	50.00%	-	-	-
Moderate problems	12.50%	-	-	-
Severe problems	3.29%	-	-	-
Extreme problems	0.00%	-	-	-
Self-care				
No problem	83.55%	-	-	-
Slight problems	14.47%*	-	-	-
Moderate problems	1.97%	-	-	-
Severe problems	0.00%	-	-	-
Extreme problems	0.00%	-	-	-
Usual activities				
No problem	67.11%	-	-	-
Slight problems	31.58%	-	-	-
Moderate problems	1.97%	-	-	-
Severe problems	0.00%	-	-	-
Extreme problems	0.00%	-	-	-
Pain/discomfort				
No problem	20.39%	-	-	-
Slight problems	54.61%	-	-	-
Moderate problems	20.39%	-	-	-
Severe problems	4.61%	-	-	-
Extreme problems	0.00%	-	-	-
Anxiety/depression				
No problem	66.45%	-	-	-
Slight problems	30.92%	-	-	-
Moderate problems	1.32%	-	-	-
Severe problems	0.66%	-	-	-
Extreme problems	0.00%	-	-	-
Summary scores				
Utility score, mean $\pm$ SD	0.773	0.673 $\pm$ 0.19	0.860 $\pm$ 0.12	<0.001
EQ-VAS score, mean $\pm$ SD	75.00	72.10 $\pm$ 8.51	77.56 $\pm$ 8.50	<0.001

Note. EQ-5D-5L = EuroQol 5-Dimension 5-Level; EQ-VAS = EuroQol Visual Analogue Scale; HRQoL = health-related quality of life. The original Table III reported self-care slight problems as 24.34%, but this exceeds 100% when added to the other self-care categories. The corrected value shown here, 14.47%, is derived from the remaining percentage after no, moderate, severe, and extreme problems. The p-values for summary scores are from Mann-Whitney U tests. Verify the corrected percentage against the raw dataset before submission.

observed for self-care (83.55%), followed by usual activities (67.11%) and anxiety/depression (66.45%). In contrast, slight problems were most frequently reported for pain/discomfort (54.61%) and mobility (50.00%). These findings indicate that although many respondents reported no problems in self-care, usual activities, and anxiety/depression, mobility and pain/discomfort were the main HRQoL concerns.

Factors associated with medication adherence and HRQoL

The associations between patient characteristics, medication adherence, and HRQoL are presented in

Table IV. Age, duration of illness, number of medications, and comorbidities were significantly associated with medication adherence ($p < 0.05$). Respondents aged 19-59 years, those with a shorter duration of illness, those taking one to three medications, and those without comorbidities were more likely to have high adherence. In contrast, sex, marital status, education level, occupation, and income level were not significantly associated with medication adherence ($p > 0.05$).

The same clinical pattern was observed for HRQoL. Age, duration of illness, number of medications, and comorbidities were significantly associated with both utility scores and EQ-VAS scores ($p < 0.05$). Respondents aged 19-59 years, those with shorter illness duration, those taking fewer medications, and those without comorbidities had higher utility and EQ-VAS scores. Occupation was significantly associated with utility scores ($p = 0.018$), but not with EQ-VAS scores ($p = 0.229$). Other sociodemographic variables, including sex, marital status, education level, and income level, were not significantly associated with HRQoL scores.

Medication adherence and HRQoL

Patients with high adherence had significantly better HRQoL than patients with low adherence (Table III). The high-adherence group had a higher overall utility score than the low-adherence group (0.860 $\pm$ 0.12 vs. 0.673 $\pm$ 0.19, $p < 0.001$). Similarly, the high-adherence group had a higher mean EQ-VAS score than the low-adherence group (77.56 $\pm$ 8.50 vs. 72.10 $\pm$ 8.51, $p < 0.001$). Significant differences between low- and high-adherence groups were also observed across all EQ-5D-5L dimensions, including mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.

Correlation between medication adherence and HRQoL

Spearman rank correlation analysis showed significant positive correlations between medication adherence, utility score, and EQ-VAS score (Table V). Medication adherence was strongly and positively correlated with utility score ($r = 0.611$, $p < 0.001$), indicating that higher adherence was associated with better HRQoL. Medication adherence was also weakly but significantly correlated with EQ-VAS score ($r = 0.295$, $p < 0.001$). In addition, utility score was moderately and positively correlated with EQ-VAS score ($r = 0.486$, $p < 0.001$), suggesting that patients with higher utility scores also tended to report better self-rated health.

DISCUSSION

A total of 152 patients dominantly had high levels of adherence therapy. However, the portion of patients with low adherence remains significant, highlighting challenges in maintaining medication routines and adherence to non-pharmacological therapies as part of disease management. Similar findings have been reported in other studies, where more than half the respondents

Table IV. Patient characteristics associated with medication adherence and health-related quality of life among HHD patients (n = 152)

Patient characteristic	High adherence n (%)	Low adherence n (%)	p-value for adherence	Utility mean ± SD	p-value for utility	EQ-VAS mean ± SD	p-value for EQ-VAS
Sex							
Male	42 (27.6)	39 (25.7)	0.829	0.759 ± 0.19	0.382	74.75 ± 9.64	0.760
Female	39 (25.7)	32 (21.1)		0.787 ± 0.17		75.30 ± 8.06	
Age							
19-59 years	60 (39.5)	32 (21.1)	<0.001*	0.838 ± 0.13	<0.001*	77.18 ± 7.53	0.001*
>60 years	21 (13.8)	39 (25.7)		0.672 ± 0.19		71.67 ± 9.86	
Marital status							
Single	1 (0.7)	0 (0.0)	0.623	0.895 ± -	0.639	70.00 ± -	0.683
Married	72 (47.4)	63 (41.4)		0.767 ± 0.18		75.12 ± 8.94	
Divorced	8 (5.3)	8 (5.3)		0.805 ± 0.16		74.38 ± 9.17	
Education level							
No education	4 (2.6)	6 (3.9)	0.220	0.679 ± 0.16	0.148	73.30 ± 10.5	0.141
Primary education	23 (15.1)	28 (18.4)		0.754 ± 0.19		73.37 ± 7.74	
Secondary education	39 (25.7)	23 (15.1)		0.791 ± 0.18		75.92 ± 9.71	
Tertiary education	15 (9.9)	14 (9.2)		0.797 ± 0.17		76.52 ± 8.41	
Occupation							
Unemployed	31 (20.4)	32 (21.1)	0.085	0.735 ± 0.19	0.018*	73.95 ± 9.16	0.229
Employed	47 (30.9)	31 (20.4)		0.815 ± 0.16		75.60 ± 8.13	
Retired	3 (2.0)	8 (5.3)		0.684 ± 0.23		76.82 ± 12.5	
Income level							
Rp. 0	31 (20.4)	32 (21.1)	0.458	0.735 ± 0.19	0.067	73.95 ± 9.16	0.058
< Rp. 2.633.284	22 (14.5)	21 (13.8)		0.786 ± 0.18		74.12 ± 9.01	
> Rp. 2.633.284	28 (18.4)	18 (11.8)		0.812 ± 0.17		77.28 ± 8.21	
Duration of illness							
1-5 years	38 (25.0)	10 (6.6)	<0.001*	0.824 ± 0.16	<0.001*	78.13 ± 7.41	<0.001*
6-10 years	34 (22.4)	24 (15.8)		0.836 ± 0.13		76.19 ± 8.02	
>10 years	9 (5.9)	37 (24.3)		0.639 ± 0.18		70.26 ± 9.61	
Number of medications							
1-3	38 (25.0)	8 (5.3)	<0.001*	0.900 ± 0.07	<0.001*	80.00 ± 8.92	<0.001*
>3	43 (28.3)	63 (41.4)		0.717 ± 0.19		72.84 ± 8.02	
Comorbidities							
No	39 (25.7)	9 (5.9)	<0.001*	0.905 ± 0.07	<0.001*	80.42 ± 7.96	<0.001*
Yes	42 (27.6)	62 (40.8)		0.711 ± 0.18		75.51 ± 8.22	

Note. EQ-VAS = EuroQol Visual Analogue Scale. a Chi-square test was used for adherence comparisons; Mann-Whitney U test or Kruskal-Wallis test was used for HRQoL comparisons, depending on the number of groups. *Significant at p < 0.05. The table title has been revised from "correlations" to "associations" because the analyses are group comparison tests rather than correlation analyses.

Table V. Spearman rank correlation between medication adherence, utility score, and EQ-VAS score among HHD patients (n = 152)

Variable	Adherence	Utility score	EQ-VAS score
Adherence	1.000	0.611*	0.295*
Utility score	0.611*	1.000	0.486*
EQ-VAS score	0.295*	0.486*	1.000

Note. Spearman rank correlation was used. *p < 0.001. Diagonal cells represent correlations of each variable with itself; p-values are not applicable and are therefore omitted.

admitted to forgetting to take their medication. Poor adherence has been associated with inadequate blood pressure control, increased complications (22), and a decline in quality of life (23).

Health-Related Quality of Life is an essential long-

term outcome of therapy and illness that needs to be evaluated. In this study, the utility scores for patients with hypertensive heart disease were relatively lower than studies conducted in China (24), Vietnam (25), Ethiopia (26), and (27) Pakistan (28). The utility value in this study was 0.783 and the VAS score was 75, which showed that the quality of life of patients with hypertensive heart disease is at a fairly good level. The variation in utility scores across these studies could be attributed because of participant characteristics (26,29). Therefore, the value set must be used to interpret utility scores and also generate varying results due to cultural and population differences. Comorbidity including number and types of diseases strongly contributed to the lower utility score (30).

As a representation of health states, the evaluating quality of life is crucial, as it reflects an individual's overall health condition across multiple dimensions (31). In the mobility domain, predominantly indicated slight problems, suggesting that the most of patients experienced minor difficulties in performing daily physical activities. A study involving 300 hypertensive patients reported notably low mean scores in physical health domains, highlighting significant impairments in this aspect (10). Pain or discomfort emerged as the most frequently reported issue among patients with hypertensive heart disease (HHD) in the study, typically associated with complications arising from the disease (3). A possible contributing factor is comorbidity, as the majority of patients (69.7%) had coexisting conditions. Several studies have similarly emphasized the adverse effects of comorbidities, which contributes to a decline in quality of life (29). A recent meta-analysis has highlighted that individuals with hypertension tend to experience diminished quality of life compared to those without the condition. Specifically, hypertensive patients exhibited lower scores in both physical and mental health components. The physical component showed a mean difference of -2.43 points (95% confidence interval [CI]: -4.77 to -0.08), while the mental component had a mean difference of -1.68 points (95% CI: -2.14 to -1.23)(32). Study in the American hypertension population reported there was a positive association between hypertension and pain, and it is more prevalent in older patients. This study suggested that routine pain assessment and proper management would be essential to improve the quality of life of patients (33).

HRQoL is significantly associated with age, occupation, and disease-related factors. These findings are consistent with studies conducted in China (34), Nepal (27), Vietnam (16), and Poland (35). As people age, they tend to experience a decline in physiological functions and are more likely to suffer from multimorbidity, which significantly impacts the deterioration of quality of life (34). Elderly patients are also more prone to physical and mental disabilities (10). Social and emotional changes that occur with aging are also known to influence the decline in HRQoL (36). Disease-related factors such as the duration of the disease and the number of medications taken are associated with HRQoL. Prolonged hypertension increases the risk of cardiovascular diseases like ischemic stroke, left ventricular hypertrophy (LVH), and organ damage (37,38). The long duration of hypertension can also lead to psychological stress, including fear, anxiety, and depression, which can negatively impact HRQoL (39). An excessive number of medications can increase the risk of adverse drug interactions. Polypharmacy can also raise the risk of depression, as certain medications tend to cause or worsen depressive symptoms (40).

The success of antihypertensive therapy depends on adherence to the therapeutic recommendations provided

by the entire medical team at each stage of treatment. In this study, the majority of respondents (56.9%) exhibited a high level of adherence. However, the domain of salt intake restriction showed the highest level of non-adherence compared to the other two domains. The habitual use of salt in food and the reduction of flavor due to salt restriction contributed to difficulties in managing salt consumption (41). Addressing non-adherence, particularly to non-pharmacological measures, requires a multifaceted approach. Patient education and counseling play a crucial role in increasing awareness of the benefits of lifestyle modification, such as reduced sodium intake, regular physical activity, and weight control (42). Behavioral change interventions, including motivational interviewing and goal-setting strategies, can help improve patients' willingness to modify dietary habits (43).

The adherence level to antihypertensive therapy in patients with hypertensive heart disease can be influenced by various internal and external factors. Patient condition, disease, social economic factors, and healthcare system, are all factors that can affect adherence (44). The domains in the questionnaire like appointment keeping subscale, reducing sodium intake, medication taking subscale are key factors influencing blood pressure control in patients with all three domains playing an important and interrelated role in maintaining proper blood pressure (45). The adherence level in this was also affected by selected sociodemographic and clinical factors; the patient's age, duration of the disease, number of medications, and comorbidities also turned out to be significant. A decline in adherence over the duration of hypertension is often due to feelings of fatigue and frustration from long-term treatment. This is especially true if patients do not perceive any significant changes or effects from the medication (44). Individuals who have had hypertension for an extended period may experience side effects, which can reduce their motivation to take medication regularly (46). However, long-term hypertensive patients may also have increased anxiety and knowledge about hypertension, which can enhance their awareness and adherence to treatment instructions (47).

Poor quality of life is associated with low levels of adherence and this can be caused by various factors, including aspects of psychosocial well-being and patient attitudes towards the use of hypertension medication (48). The success of treatment depends on the extent to which the patient follows the prescribed treatment regimen (49). When patients adhere to taking medication, disease symptoms will be reduced, clinical outcomes can improve in the short term, and disease control can be improved in the long term, which ultimately improves HRQoL. The belief that adherence actively contributes to disease management can also have a positive impact on HRQoL (50). However, there may be a possibility of reverse causality, where

HRQoL may also influence adherence. Patients may stop taking the drug because they feel better and their quality of life has improved, which they assume means the disease has been cured. Conversely, patients may also stop taking the drug if it gets worse, and consider the treatment ineffective. In addition, a complex and mutually influencing relationship can occur, where non-compliance can affect HRQoL which in turn can trigger more non-compliance (50). Considering the quality of life, the tailored management of hypertension heart diseases would be appropriate and suits patients' condition due to the variety of patients' problems in each domain.

This study highlights the significant relationship between medication adherence and health-related quality of life (HRQoL) in patients with hypertensive heart disease (HHD). Patients with higher adherence levels demonstrated better HRQoL, as reflected in both the utility value and EQ-VAS score. Despite a majority of patients exhibiting high adherence, pain or discomfort remained a commonly reported issue, suggesting the need for comprehensive management strategies beyond medication adherence alone. The study's cross-sectional design limits causal inference, and further longitudinal studies are recommended. Future research should explore factors influencing adherence behaviors and interventions that could further improve HRQoL in hypertensive patients. Qualitative approaches may also provide deeper insights into patient experiences and barriers to adherence.

CONCLUSION

This study revealed that higher levels of medication adherence were positively associated with improved HRQoL among hypertensive heart disease patients. The level of adherence and HRQoL is also affected by age, duration of hypertension, number of medications, and comorbidities. The findings emphasize the importance of improving adherence to antihypertensive therapy to enhance patient well-being. Interventions aimed at reinforcing adherence, particularly in regular doctor visits, may contribute to better health outcomes and quality of life.

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