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Original Research

Dietary Adherence and Diet Quality based on Healthy Eating Index in Hypertensive Inpatients

Kepatuhan Diet dan Kualitas Diet berdasarkan Indeks Gizi Seimbang pada Pasien Hipertensi

Andi Sri Rahayu Kasma[1*], Riska Mayangsari[2], Aulia Nurul Pratiwi[3], Andi Yulia Kasma[4], Nurul Muchlisa[5]
[1,2,3,]Program Studi Gizi, Universitas Sulawesi Barat, Majene, Indonesia
[4]Program Studi Kesehatan Masyarakat, Sekolah Tinggi Ilmu Kesehatan, Makassar, Indonesia
[5]Instalasi Gizi RSUD Hj Andi Depu, Polewali Mandar, Indonesia

* Email corresponding author: a.srirahayukasma@unsulbar.ac.id

Abstract: *Hypertension is a non-communicable disease with a high prevalence in Indonesia (30.8%) and is the main cause of morbidity and mortality due to cardiovascular disease. Dietary adherence and diet quality are non-pharmacological factors that can be modified in blood pressure control. This study aims to analyze the relationship between dietary adherence and diet quality based on Healthy Eating Index (HEI) and hypertension in patients at Hj. Andi Depu Polewali Hospital, West Sulawesi. The research design is cross-sectional observational analysis with accidental sampling techniques. The sample was 34 inpatient hypertension patients aged 20–65 years who received a low-salt diet, in the period September–October 2024. Dietary adherence was measured using a Likert-scale questionnaire (12 items, scores 12–48) and categorized as non-compliant, moderately compliant, and compliant. Dietary quality was assessed using the HEI instrument based on a 2x24-hour food recall processed with Nutrisurvey, categorized into poor diet (≤50), need improvement (51–80), and good diet (>80). Bivariate analysis uses the Spearman Rank test. The results showed that 67.6% of respondents were quite adherent to the diet and 82.4% had poor dietary quality; None of the respondents reached the category of a good diet. There was a significant relationship between dietary adherence and hypertension (p=0.010; r=0.438) and between HEI diet quality and hypertension (p=0.014; r=–0.418). Dietary adherence and diet quality are important determinants that need to be prioritized in the management of nutrition for hypertensive patients in hospitals.*

Key word: Healthy Eating Index, Hypertension, Dietary Adherence, Diet Quality, Blood Pressure

1. INTRODUCTION

Hypertension or often called The Silent Killer Disease is a condition of increased blood pressure detected in several measurements with values that exceed the normal threshold of >140 mmHg (systolic) and >90 mmHg (diastolic) (1). As one of the most common cardiovascular diseases in society, the prevalence of hypertension continues to increase and is a global health issue (2). The number of adults with hypertension increased from 650 million in 1990 to 1.4 billion in 2024, with the increase seen largely in low- and middle-income countries (3).

In Indonesia, Indonesia Health Survey (SKI 2023) documented a decline in hypertension prevalence among adults aged ≥18 years based on blood pressure measurement, from 34,1% in 2018 to 30,8% in 2023. At the provincial level, West Sulawesi recorded an increase in physician-diagnosed hypertension from 6,58% in 2018 to 7,0% in 2023, while prevalence based on blood pressure measurement

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decreased from 34,77% in 2018 to 28,4% in 2023 (4,5) . Despite this decline, the figures remain above the 20% threshold at which hypertension constitutes a significant population-level health problem. The results of the Individual Food Consumption Survey (SKMI) in 2014 which consisted of a collection of spice consumption, including salt, and calculated sodium intake from foodstuffs other than salt, 29.7% of Indonesia's population or 77 million people consumed salt exceeding the WHO recommendation (6).

Evidence from Indonesian clinical settings indicates that non-adherence or partial adherence to prescribed hypertension diets is prevalent among inpatients. Research conducted in Indonesian hospitals has reported that 40–70% of hypertensive inpatients consume sodium in excess of their dietary prescription, with external food brought by family members constituting a key contributing factor (7). Good dietary management plays a pivotal role in normalizing blood pressure, prior research has demonstrated a significant relationship between dietary adherence and blood pressure outcomes in hospitalized patients (8) .

Hospitals are health resources needed to support the process of implementing improved health efforts that provide individual health services, both inpatient, outpatient, and emergency services (9). Hj. Andi Depu Polewali Mandar Hospital is a referral center hospital and is the only teaching hospital in West Sulawesi. Hj. Andi Depu Polewali Hospital in 2020 showed that patients with hypertension were one of the highest diseases of the 10 largest diseases that had ever been treated with a percentage of 54.5% or the number of patients as many as 1,292 cases, the increase in the population experiencing hypertension made nutritional and health problems such as malnutrition, overnutrition and several degenerative diseases for elderly sufferers, So that the nutritional problems experienced will have a direct impact on the quality of life (10).

Hypertension requires medical nutritional therapy intervention to support the healing process (11). One of the most common dietary approaches used in hypertensive patients during treatment is a low-salt diet. The purpose of this diet is to help reduce salt and fluid retention in the body and lower blood pressure in patients with hypertension (12). Adherence to diet is a challenge for hypertensive patients, especially when dietary rules must be followed regularly and over a long period of time. Non-adherence to a hypertensive diet can increase the risk of morbidity, mortality, as well as worsen complications with other diseases (13). Evidence from Indonesian inpatient settings indicates that a substantial proportion of hypertensive inpatients consume sodium in excess of their dietary prescription; high-sodium snacks and condiments added during cooking are among the most frequently consumed sources of excess sodium, with food brought by family members constituting a key contributing factor (14). Good diet management plays an important role in normalizing blood pressure, research that also shows that there is a significant relationship between diet adherence and blood pressure (7).

In addition, the overall quality of the diet plays an important role in the control of hypertension. Dietary recommendations that have been set according to the needs of each age group can be a reference to assess the quality of a person's diet. The Healthy Eating Index (HEI) was selected in this study for several reasons. First, HEI is a validated, comprehensive tool that evaluates the degree to which an individual's dietary pattern aligns with evidence-based nutritional guidelines, simultaneously assessing multiple food components including fruits, vegetables, whole grains, low-fat

dairy, and the restriction of saturated fats, added sugars, and sodium (15). Second, unlike sodium-only assessment, HEI captures the full spectrum of dietary quality relevant to cardiovascular health, encompassing potassium, magnesium, and calcium minerals that directly regulate blood pressure. Third, HEI has been validated across diverse population settings, including clinical and inpatient contexts, making it appropriate for this study population (16).

Based on the background description above, the researcher is interested in conducting research on "Dietary Adherence and Diet Quality based on Healthy Eating Index (HEI) in Hypertensive Patients".

2. METHODS

This study uses an observational analytical research design with a cross-sectional approach, carried out at Hj. Andi Depu Polewali Hospital, Polewali Mandar Regency, West Sulawesi, in September–October 2024. The study population was all hypertension patients who were hospitalized at Hj. Andi Depu Polewali Hospital who received a low-salt diet. The sampling technique uses non-probability sampling in the form of accidental sampling, which is the collection of respondents available at the research site during the data collection period. The sample size is based on the minimum number of 30 respondents, corrected with an estimated drop out of 10% so that the total sample is 34 respondents.

Inclusion criteria include: (1) inpatient hypertensive patients aged 20–65 years, (2) on a low-salt diet, and (3) willing to participate in stable health conditions. Exclusion criteria include: patients with severe complications who are unable to communicate or be treated in the ICU, patients who are unable to stand for height measurements, and pregnant women. This research has received research ethics approval from related institutions.

The dependent variable in this study is hypertension, which is obtained from medical record data based on the JNC VII classification: normal (<120/<80 mmHg), hypertension degree I (140–159/90–99 mmHg), and hypertension degree II (≥160/≥100 mmHg). Independent variables consisted of two variables, namely: (1) Dietary adherence, measured using a questionnaire, consisting of 12 statements on a Likert scale (scores of 1–4), then categorized into non-compliant (score 12–24), moderately compliant (score 25–37), and compliant (score 38–48); (2) Diet quality was assessed using the Healty Eating Index (HEI) instrument based on 2x24-hour food recall data processed using the Nutrisurvey application, then categorized into poor diet (score ≤50), need improvement (score 51–80), and good diet (score >80).

The dependent variable was hypertension severity, obtained from medical records and classified according to the JNC VII criteria (17) : normal (<120/<80 mmHg), Stage 1 hypertension (140–159/90–99 mmHg), and Stage 2 hypertension (≥160/≥100 mmHg). Two independent variables were examined: (1) Dietary adherence, measured using the questionnaire developed by (18), comprising 12 statements rated on a Likert scale (score 1–4, total range 12–48), categorized as non-adherent (score 12–24), moderately adherent (score 25–37), and adherent (score 38–48); and (2) Diet quality, assessed using the Healthy Eating Index (HEI) instrument, based on 2×24-hour food recall data processed with Nutrisurvey, categorized as poor diet (score ≤50), needs improvement (score 51–80), or good diet (score >80) (15,16).

Data analysis consists of two stages. Univariate analysis is used to describe the frequency and percentage distribution of each variable. Bivariate analysis uses the Spearman Rank test to analyze the relationship between dietary adherence to hypertension and diet quality with hypertension. The level of statistical significance was set at α=0.05. Data analysis was carried out using SPSS software version 26.0.

3. RESULTS

This study involved 34 respondents of hospitalized hypertension patients at Hj. Andi Depu Polewali Hospital. The distribution of the general characteristics of the respondents is presented in Table 1.

Table 1. Characteristics of Respondents of Hypertension Patients at Hj. Andi Depu Polewali Hospital (n=34)

Features	n	%
Gender		
Male	17	50,0
Female	17	50,0
Age (years)		
20–39	3	8,8
40–49	15	44,2
50–59	11	32,3
60–65	5	14,7
Final Education		
Elementary School	8	23,5
Junior High School	5	14,7
Senior High School	17	50,0
College	4	11,8
Jobs		
Housewives	8	23,5
Entrepreneur	15	44,1
Civil Servants	3	8,8
Fisherman	1	2,9
Farmer	7	20,6
Hypertension Medication Consumption		
Yes	23	67,6
No	11	32,4
History of Nutrition Education		
Ever	25	73,5
Never	9	26,5

Source: Primary Data , 2024

Based on Table 1, respondents had a balanced gender distribution between males and females (50% each). The most common age group was 40–49 years old (44.2%), then 50–59 years old (32.3%). Most of them are educated at the end of high school (50%) and work as self-employed (44.1%). The majority of respondents (67.6%) took antihypertensive drugs and most (73.5%) had received nutrition education.

The distribution of the variables of dietary adherence, diet quality, and degree of hypertension of respondents is presented in Table 2.

Table 2. Distribution of Dietary Adherence, Diet Quality, and Degree of Hypertension of Respondents (n=34)

Variabel	n	%
Diet Adherence		
Non-Compliant (score 12–24)	5	14,7
Simply Obey (score 25–37)	23	67,6
Obediently (Score 38–48)	6	17,6
Total	**34**	**100**
Diet Quality		
Good Diet (score >80)	0	0,0
Needs Repair (score 51–80)	6	17,6
Poor Diet (score ≤50)	28	82,4
Total	**34**	**100**
Degree of Hypertention		
Normal (<120/<80 mmHg)	8	23,5
Hypertention Degree I (140–159/90–99 mmHg)	17	50,0
Hypertention Degree II (≥160/≥100 mmHg)	9	26,5
Total	**34**	**100**

Source: Primary Data , 2024

Based on Table 2, most of the respondents were classified as quite compliant with the diet (67.6%), while 17.6% were compliant and 14.7% were non-compliant. In terms of diet quality based on HEI, none of the respondents reached the good diet category. The majority of respondents (82.4%) were in the poor diet category (score ≤50) and only 17.6% in the category in need of improvement. For the degree of hypertension, half of the respondents (50%) were diagnosed with grade I hypertension, 26.5% had grade II hypertension, and 23.5% had normal blood pressure.

The results of a bivariate analysis of the relationship between diet adherence and hypertension are presented in Table 3.

Table 3. The Relationship between Diet Adherence and Hypertension in Patients at Hj. Andi Depu Polewali Hospital

Diet Adherence	Normal		HT Degree I		HT Degree II		p*	r
	f	%	f	%	f	%		
Non-Compliant	3	8,8	2	5,9	0	0,0		
Simply Obey	5	14,7	12	35,3	6	17,6	0,010	0,438
Obediently	0	0,0	3	8,8	3	8,8		
Total	**8**	**23,5**	**17**	**50,0**	**9**	**26,5**		

Source: Primary Data , 2024
Ket: p: Rank Spearman Test; r: correlation value; HT: Hypertentiion*

Based on Table 3, the results of the Spearman Rank test showed a value of p=0.010 (<0.05) with a correlation value of r=0.438, which indicates that there is a significant relationship between dietary adherence and hypertension with the direction of positive correlation and moderate strength. Respondents who had non-compliant dietary adherence mostly had normal blood pressure (8.8%), while respondents with adherence were moderately compliant with the most degree I hypertension (35.3%). All respondents with adherence actually experienced grade I or II hypertension, which can be attributed to the fact that patients with more severe degrees of hypertension tend to be more motivated to adhere to the diet due to more serious clinical conditions.

The results of the bivariate analysis of the relationship between diet quality based on HEI and hypertension are presented in Table 4.

Table 4. The Relationship between Diet Quality (HEI) and Hypertension in Patients at Hj. Andi Depu Polewali Hospital

Diet Quality (HEI)	Normal		HT Degree I		HT Degree II		p*	r
	f	%	f	%	f	%		
Needs Repair	0	0,0	2	5,9	4	11,8		
Poor Diet	8	23,5	15	44,1	5	14,7	0,014	−0,418
Total	**8**	**23,5**	**17**	**50,0**	**9**	**26,5**		

Source: Primary Data , 2024. Ket : p: Rank Spearman Test; r: correlation value; HT: Hypertention; HEI: Healthy Eating Index*

Based on Table 4, the results of the Spearman Rank test showed a value of p=0.014 (<0.05) with a correlation value of r=−0.418, which indicates a significant relationship between the quality of the diet based on HEI and hypertension, with a negative correlation direction and moderate strength. All respondents with normal blood pressure had poor dietary quality scores (23.5%), while all respondents with dietary quality scores that only needed improvement experienced grade I (5.9%) or grade II (11.8%) hypertension. This negative correlation pattern indicates that respondents with relatively higher dietary quality (category in need of improvement) are distributed in the group with more severe degrees of hypertension, which can be explained by clinical conditions that encourage patients with higher degrees of hypertension to pay more attention to their food intake.

4. DISCUSSION

The results showed that most of the hypertension patients hospitalized at Hj. Andi Depu Polewali Hospital were in the category of being fairly compliant with the diet (67.6%), while only 17.6% were compliant. These findings are in line with the general picture of dietary adherence of hypertensive patients in Indonesia, where full non-compliance and partial adherence dominate. This non-compliance or suboptimal compliance is influenced by various factors, including the difficulty of limiting salt consumption in daily life, the habit of consuming processed and salty foods that are already entrenched, and the limited understanding of the direct relationship between diet and blood pressure. In this study, the data from the respondents' recall results showed that the majority consumed more than 2,000 mg of sodium per day, exceeding the recommended limit.

The significant association between dietary adherence and hypertension found in this study is consistent with a number of previous studies. Previous research has shown a significant relationship between dietary adherence and blood pressure in hypertensive patients, where adherence is caused by the knowledge or attitude of hypertensive patients (8). Family support in nutrition education also affects the diet adherence of patients in hospitals (19).

A similar study at Soekandar Hospital in Mojokerto also showed the same thing, where the majority of hypertension patients had moderate dietary adherence and this was significantly related to uncontrolled blood pressure (7). A literature review of 30 studies from 2014 to 2024 shows that adherence to dietary modifications in hypertensive patients is still a global challenge, with the main obstacles being lack of

motivation, limited knowledge, and lack of social support (20). In this study, the dominant employment factor (44.1%) and the sodium-rich culinary culture of West Sulawesi also played a role in the difficulty of maintaining full dietary adherence.

The results of the Spearman Rank test showed a significant relationship between dietary adherence and hypertension (p=0.010; r=0.438). This direction of positive correlation with moderate power needs to be interpreted contextually. Paradoxically, all respondents in the compliant category had hypertension of degree I or II, while the non-compliant group mostly had normal blood pressure. This phenomenon can be explained through the concept of illness severity-induced motivation, namely patients with a more severe degree of hypertension tend to receive more intensive dietary education from medical personnel and have higher motivation to comply with dietary recommendations (17). On the other hand, respondents with low blood pressure control were most likely pharmacologically controlled, with 67.6% of respondents taking antihypertensive drugs regularly. These findings confirm that optimal hypertension management requires the integration of dietary interventions and pharmacotherapy at the same time, not just one.

Although 73.5% of respondents reported having previously received nutrition education, 67.6% remained only moderately adherent to their prescribed diet. While this gap may suggest that existing education programs have not fully translated into dietary behavior change, the nature, content, and timing of previous education received were not assessed in this study, limiting causal interpretation. Nevertheless, these findings highlight the importance of providing more structured, repeated, and family-integrated nutrition counseling during hospitalization, as family members have been shown to significantly influence patients' food consumption during inpatient stays. Evidence supports that nutrition education incorporating active family participation improves dietary adherence outcomes more effectively than patient-only counseling (21).

No respondent achieved good diet quality (HEI score >80), with 82.4% classified as poor diet (score ≤50). The HEI comprehensively assesses dietary quality across multiple food components—including fruits, vegetables, whole grains, low-fat dairy, lean proteins, and restriction of saturated fats, added sugars, and sodium. A relevant comparison is with the Dietary Approaches to Stop Hypertension (DASH) diet, widely regarded as the gold standard for hypertension dietary management. DASH emphasizes high intake of fruits, vegetables, low-fat dairy, whole grains, and lean protein, while restricting sodium, saturated fat, and added sugars—components that overlap substantially with HEI scoring criteria. However, HEI was selected over DASH adherence scoring in this study because it evaluates how closely an individual's actual dietary intake aligns with general nutritional guidelines, rather than prescribing a specific dietary pattern. This makes HEI appropriate for inpatients prescribed a low-sodium hospital diet who are not explicitly following DASH, as it permits objective evaluation of overall dietary quality regardless of which dietary pattern is consumed. A study of urban elderly in Jakarta using HEI-2015 reported similarly high prevalence of poor diet quality (>90%), with deficits in vegetable, fiber, and dairy intake (22). Conditions in this study were further compounded by acute clinical symptoms nausea and vomiting common in Stage 2 hypertension directly impairing dietary intake.

The significant relationship between the quality of the HEI diet and hypertension (p=0.014; r=−0.418) with the direction of negative correlation has a strong scientific basis. The higher the HEI score, the lower the degree of hypertension experienced.

Previous research is in line with the results of this study which showed that a higher HEI score is significantly associated with a lower odds of developing high blood pressure (23). Literature review also shows that high dietary quality as measured by HEI, AHEI, and DASH scores are consistently inversely related to cardiovascular risk (21).

Research in Indonesia also showed a similar thing, namely that low HEI scores are significantly associated with poorer biomarkers of metabolic syndrome, including blood pressure in people with cardiovascular disease (24). These findings reinforce the urgency of holistically improving the quality of diet as a key strategy for hypertension control.

5. CONCLUSION

Dietary adherence and HEI-based diet quality are significantly associated with hypertension severity among hypertensive inpatients at Hj. Andi Depu Hospital, Polewali. The low proportion of fully adherent respondents (17.6%) and the absence of any respondent achieving good diet quality (82.4% poor diet) indicate that both require substantial improvement. For further research, it is recommended to use longitudinal or quasi-experimental designs with structured educational interventions to establish a stronger causal relationship between dietary adherence, diet quality, and blood pressure control. The addition of confounding variables such as antihypertensive drug consumption, physical activity, and potassium intake also needs to be considered to produce a more accurate estimate of the effect. The HEI-based approach to dietary quality assessment can be adapted into a routine screening tool in inpatient nutritional care, given its ability to comprehensively identify dietary component deficits that are not captured by sodium assessment alone.

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