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Factors Associated with DASH Diet Therapy in Blood Pressure Control among the Elderly

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ABSTRACT/ ABSTRAK

ABSTRACT*. Hypertension is one of the non-communicable diseases with a high prevalence among the elderly in Indonesia. Efforts to control blood pressure through the Dietary Approaches to Stop Hypertension (DASH) diet therapy are essential; however, various factors are believed to influence its effectiveness at the primary healthcare level. This study aimed to analyze factors associated with DASH diet therapy in blood pressure control among the elderly at the Cempaka Public Health Center, Banjarmasin. This study employed a cross-sectional design with a sample of 188 elderly patients with hypertension selected using purposive sampling. Data were collected using a structured questionnaire covering age, sex, educational level, and dietary adherence, as well as data on the frequency of healthcare visits obtained from patients' medical records. Blood pressure measurements were conducted after the implementation of the DASH diet for 30 days. Data analysis was performed using the Spearman Rank correlation test with a significance level of α = 0.05. The results showed significant associations between age (p = 0.000), sex (p = 0.000), educational level (p = 0.000), dietary adherence (p = 0.000), and frequency of healthcare visits (p = 0.000) with DASH diet therapy in blood pressure control. Age, sex, educational level, dietary adherence, and frequency of healthcare visits significantly influenced the success of DASH diet therapy.*

Kata kunci:

Diet DASH, Hipertensi, Lansia, Kepatuhan Pola Diet, Frekuensi Berobat, Tekanan Darah

ABSTRAK. Hipertensi merupakan salah satu penyakit tidak menular dengan prevalensi tinggi pada lansia di Indonesia. Upaya pengendalian tekanan darah melalui terapi diet DASH sangat penting, namun berbagai faktor diduga memengaruhi keberhasilannya pada tingkat pelayanan primer. Penelitian ini bertujuan untuk menganalisis faktor-faktor yang berhubungan dengan terapi diet DASH dalam pengendalian tekanan darah pada lansia di Puskesmas Cempaka Banjarmasin. Penelitian ini menggunakan desain *cross-sectional* dengan sampel sebanyak 188 lansia penderita hipertensi yang dipilih melalui teknik *purposive sampling*. Pengumpulan data dilakukan menggunakan kuesioner terstruktur yang mencakup usia, jenis kelamin, tingkat pendidikan, dan kepatuhan pola diet, serta data frekuensi berobat yang diperoleh dari kartu pengobatan pasien. Pengukuran tekanan darah dilakukan setelah penerapan diet DASH selama 30 hari. Analisis data menggunakan uji *Spearman Rank* dengan tingkat signifikansi α = 0,05. Hasil penelitian menunjukkan adanya hubungan yang signifikan antara usia (p = 0,000), jenis kelamin (p = 0,000), tingkat pendidikan (p = 0,000), kepatuhan pola diet (p = 0,000), dan frekuensi berobat (p = 0,000) dengan terapi diet DASH dalam pengendalian tekanan darah. Usia, jenis kelamin, tingkat pendidikan, kepatuhan diet, dan frekuensi berobat berpengaruh signifikan terhadap keberhasilan terapi diet DASH.

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INTRODUCTION

Non-communicable diseases (NCDs) are a global health problem and remain the leading causes of morbidity and mortality worldwide. This group of diseases, which includes cardiovascular diseases, diabetes mellitus, cancer, and chronic respiratory diseases, develops gradually and requires long-term management. The increasing prevalence of NCDs is closely associated with lifestyle changes, such as unhealthy dietary patterns, low levels of physical activity, and increased life expectancy, thereby placing a substantial burden on healthcare systems (Patnaik et al., 2025; Kumar et al., 2025).

One of the most common NCDs and a major public health concern is hypertension, which is often referred to as a silent killer because it is frequently asymptomatic in its early stages but can lead to severe complications, including coronary heart disease, stroke, and renal failure if not properly managed (Kementerian Kesehatan Republik Indonesia, 2023). The prevalence of hypertension increases with advancing age, making the elderly a particularly vulnerable population (Alhawassi et al., 2015). In Indonesia, approximately one in three individuals suffers from hypertension, with a prevalence of 34.1% based on the 2018 national survey, corresponding to more than 70 million people. This high prevalence is influenced by unhealthy dietary patterns, low physical activity, and poor adherence to routine blood pressure monitoring (Kementerian Kesehatan Republik Indonesia, 2023).

Among the elderly, hypertension represents a complex health problem as it increases the risk of cardiovascular disease, stroke, and renal failure, and contributes to high morbidity and mortality. Its management is further complicated by age-related physiological changes, a high prevalence of frailty and multimorbidity, and clinical conditions such as orthostatic hypotension, resistant hypertension, and polypharmacy, which increase the risk of adverse treatment effects and complicate the determination of blood pressure targets. Blood pressure variability, as well as the phenomena of white-coat and masked hypertension, may also hinder accurate diagnosis. Therefore, hypertension control in the elderly requires an individualized and personalized approach through comprehensive assessment of functional status and frailty level, involving patients, families, and caregivers to maintain therapeutic effectiveness while preserving quality of life (Wu et al., 2024; Dhiman & Chourasia, 2024; Guasti et al., 2025).

Hypertension control does not rely solely on pharmacological therapy but also requires non-pharmacological interventions, one of which is the Dietary Approaches to Stop Hypertension (DASH) diet. The DASH diet emphasizes high consumption of fruits, vegetables, whole grains, low-fat protein sources, and low-fat dairy products, while limiting sodium, added sugars, and saturated fat. Evidence from clinical trials demonstrates that the DASH diet significantly reduces systolic and diastolic blood pressure, making it effective for both the prevention and control of hypertension, including among the elderly (Daley & Vadakekut, 2025).

The success of DASH diet therapy is influenced by individual, social, and healthcare system factors. Non-adherence is often attributed to limited access to healthy foods, forgetfulness, decreased appetite, and inadequate attitudes toward and understanding of the diet. Demographic and socio-economic characteristics, such as age, sex, educational level, marital status, and food security, also affect dietary adherence. Among the elderly, structured nutrition education, family support, and the role of primary healthcare services have been shown to be crucial in improving knowledge and adherence to the DASH diet, thereby

contributing to more optimal blood pressure control (Oose et al., 2024; Olusola-Bello et al., 2024; Sakdiah et al., 2024; Gusty, 2023; Groves et al., 2024).

Primary healthcare centers (Puskesmas) play a strategic role in hypertension control through health promotion, nutrition education, and routine blood pressure monitoring. However, data on factors influencing the success of DASH diet therapy among the elderly at the primary healthcare level remain limited, particularly in the Cempaka Public Health Center area of Banjarmasin. Therefore, this study aimed to analyze factors associated with DASH diet therapy in blood pressure control among the elderly, as a basis for developing more effective intervention strategies and improving elderly adherence to the DASH diet.

RESEARCH METHOD

This study was an analytic quantitative study with a cross-sectional design aimed at analyzing factors associated with the success of Dietary Approaches to Stop Hypertension (DASH) diet therapy in controlling blood pressure. The study was conducted in the working area of the Cempaka Public Health Center, Banjarmasin, from October 2024 to May 2025. The study population comprised all elderly patients with hypertension, totaling 355 individuals, with a sample size of 188 respondents determined using the Slovin formula (5% margin of error). Purposive sampling was applied based on the following inclusion criteria: age ≥60 years, having undergone the DASH diet program for at least 30 days, and having complete medical records. The exclusion criteria included elderly individuals with severe systemic complications (renal failure, diabetes mellitus, and heart disease) and those who were uncooperative.

The independent variables examined included demographic factors (age, sex, and educational level), dietary adherence, and frequency of healthcare visits, while the dependent variable was blood pressure control. The research instruments consisted of a structured questionnaire adopted from Talebong and Rannu (2022), which included 12 items assessing dietary adherence using a Likert scale (score range: 12–50), as well as an observation sheet based on secondary data obtained from medical records and patient control cards. Blood pressure was measured using a digital sphygmomanometer after the implementation of the DASH diet intervention for 30 days. Data analysis was conducted in stages, including univariate analysis to describe respondent characteristics and bivariate analysis using the Spearman Rank correlation test ($\alpha = 0.05$) to examine the significance of associations between variables. This study received ethical approval from the Research Ethics Committee of Universitas Muhammadiyah Banjarmasin (Ethical Approval Letter No. KEPK: 0128226371) and adhered to the ethical principles of respect for persons, beneficence, and justice.

RESULTS

Characteristics of Study Respondents

Table 1. Frequency Distribution of Respondents by Age

No	Respondent Age	Frequency (f)	Percentage (%)
1.	>90 years	28	14.9
2.	75–90 years	69	36.7

3.	60–74 years	91	48.4
	Total	188	100

Based on Table 1, most respondents at the Cempaka Public Health Center, Banjarmasin, were aged 60–74 years (91 respondents; 48.4%), while the smallest proportion comprised those aged over 90 years (28 respondents; 14.9%).

Table 2. Frequency Distribution of Respondents by Sex

No	Sex	Frequency (f)	Percentage (%)
1.	Male	48	25.5
2.	Female	140	74.5
	Total	188	100

Table 2 shows that most respondents were female (140 respondents; 74.5%), while males accounted for 48 respondents (25.5%).

Table 3. Frequency Distribution of Respondents by Educational Level

No	Educational Level	Frequency (f)	Percentage (%)
1.	Primary school	14	7.4
2.	Junior high school	71	37.8
3.	Senior high school	85	45.2
4.	Higher education	18	9.6
	Total	188	100

As shown in Table 3, most respondents had a senior high school education (85 respondents; 45.2%), while the smallest proportion had primary school education (14 respondents; 7.4%).

Univariate Analysis

Table 4. Frequency Distribution of Respondents by Dietary Adherence

No	Dietary Adherence Category	Frequency (f)	Percentage (%)
1.	Non-adherent	33	17.6
2.	Moderately adherent	108	57.4
3.	Adherent	47	25.0
	Total	188	100

Table 4 indicates that most respondents were moderately adherent to the diet (108 respondents; 57.4%), while a smaller proportion were non-adherent (33 respondents; 17.6%), suggesting a need for enhanced education and support to achieve optimal adherence.

Table 5. Frequency Distribution of Respondents by Frequency of Healthcare Visits

No	Frequency of Healthcare Visits	Frequency (f)	Percentage (%)
1.	Irregular	53	28.2
2.	Regular	135	71.8
	Total	188	100

As shown in Table 5, more than half of the respondents had regular healthcare visits (135 respondents; 71.8%), while 53 respondents (28.2%) had irregular visits. Regular healthcare visits are an important factor in successful hypertension control.

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Table 6. Frequency Distribution of Respondents by Blood Pressure after DASH Diet Implementation

No	Blood Pressure Category	Frequency (f)	Percentage (%)
1.	Increased	25	13.3
2.	Stable/Normal	103	54.8
3.	Decreased	60	31.9
	Total	188	100

Based on Table 6, most respondents who implemented the DASH diet experienced stable/normal blood pressure (103 respondents; 54.8%), while the smallest proportion still showed increased blood pressure (25 respondents; 13.3%).

Bivariate Analysis

The analysis of factors associated with DASH diet therapy in controlling blood pressure among the elderly at the Cempaka Public Health Center, Banjarmasin, is presented below.

Table 7. Spearman Rank Test Results for the Association between Age and DASH Diet Therapy in Blood Pressure Control

No	Age Category	Blood Pressure Classification						Total	%	p-value
		Increased		Normal		Normal				
		f	%	f	%	f	%			
1	Very old elderly	21	84	6	6	1	2	28	15	0.000
2	Middle elderly	1	4	55	53	13	22	69	37	
3	Young elderly	3	12	42	41	46	77	91	48	
	Total	25	100	103	100	60	100	188	100	

The analysis showed a Spearman correlation value (ρ) with $p = 0.000 < \alpha = 0.05$, indicating a significant association between age and DASH diet therapy in controlling blood pressure among the elderly.

Table 8. Spearman Rank Test Results for the Association between Sex and DASH Diet Therapy in Blood Pressure Control

No	Sex	Blood Pressure Classification						Total	%	p-value
		Increased		Normal		Normal				
		f	%	f	%	f	%			
1	Male	16	64	31	30	1	2	48	26	0.000
2	Female	9	36	72	70	59	98	140	74	
	Total	25	100	103	100	60	100	188	100	

The results demonstrated a p-value of $0.000 < \alpha = 0.05$, indicating a significant association between sex and DASH diet therapy in blood pressure control among the elderly.

Table 9. Spearman Rank Test Results for the Association between Educational Level and DASH Diet Therapy in Blood Pressure Control

No	Educational Level	Blood Pressure Classification						Total	%	p-value
		Increased		Normal		Decreased				
		f	%	f	%	f	%			
1	Primary school	13	52	1	1	0	0	14	7	0.000
2	Junior high school	9	36	54	52	8	13	71	38	
3	Senior high school	3	12	42	41	40	67	85	45	
4	Higher education	0	0	6	6	12	20	18	10	

Total	25	100	103	100	60	100	188	100

The analysis yielded a p-value of 0.000 < α = 0.05, indicating a significant association between educational level and DASH diet therapy in controlling blood pressure among the elderly.

Table 10. Spearman Rank Test Results for the Association between Dietary Adherence and DASH Diet Therapy in Blood Pressure Control

No	Dietary Adherence	Blood Pressure Classification						Total	%	p-value
		Increased		Normal		Decreased				
		f	%	f	%	f	%			
1	Non-adherent	13	52	19	18	1	2	33	18	0.000
2	Moderately adherent	11	44	64	62	33	55	108	57	
3	Adherent	1	4	20	19	26	43	47	25	
	Total	25	100	103	100	60	100	188	100	

The results showed a p-value of 0.000 < α = 0.05, indicating a significant association between dietary adherence and DASH diet therapy in controlling blood pressure among the elderly.

Table 11. Spearman Rank Test Results for the Association between Frequency of Healthcare Visits and DASH Diet Therapy in Blood Pressure Control

No	Frequency of Healthcare Visits	Blood Pressure Classification						Total	%	p-value
		Increased		Normal		Decreased				
		f	%	f	%	f	%			
1	Irregular	21	84	28	27	4	7	53	28	0.000
2	Irregular	4	16	75	73	56	93	135	72	
	Total	25	100	103	100	60	100	188	100	

The analysis demonstrated a p-value of 0.000 < α = 0.05, indicating a significant association between frequency of healthcare visits and DASH diet therapy in controlling blood pressure among the elderly at the Cempaka Public Health Center, Banjarmasin.

DISCUSSION

The results showed that the early elderly group (60–74 years) dominated the respondents, comprising 91 individuals (48.4%). This finding is consistent with previous studies indicating that the prevalence of hypertension increases with age due to structural and functional changes in the cardiovascular system, including decreased vascular elasticity and increased peripheral resistance (Jensen, 2024; Poliakova et al., 2024). Furthermore, Arik & Yavuz (2014) reported that the risk of hypertension increases significantly after the age of 45 years. Although age is a non-modifiable factor, the implementation of the DASH diet can be tailored to the physiological and cognitive characteristics of different elderly age groups. Ardiana and Widjaja (2022) emphasized the need to adapt the DASH diet to the Indonesian population by considering local dietary patterns and age-related characteristics, while Fitriyana & Wirawati (2022) highlighted that elderly individuals require specific education regarding the DASH diet to ensure adherence, given the cognitive and physical changes associated with aging.

The majority of respondents were female, totaling 140 individuals (74.5%). Previous studies have shown that women, particularly after menopause, have a higher risk of

hypertension due to decreased estrogen levels that affect vascular structure. In addition, women tend to demonstrate better adherence to antihypertensive diets due to higher health awareness and knowledge, which consistently reduces hypertension risk, whereas men show more variable dietary adherence and effects (Weng et al., 2024; Mathur et al., 2020). This finding is consistent with Annisa & Sari (2024), who reported that women often play a key role in regulating family dietary patterns. Therefore, in addition to responding personally to the DASH diet, they may also serve as agents of change for other family members. DASH diet interventions among elderly women should consider hormonal risks while leveraging their higher adherence and social roles to enhance program effectiveness.

Most respondents had a senior high school education or equivalent (85 individuals, 45.2%). This result aligns with previous studies indicating that educational level influences an individual's ability to absorb information and implement dietary behaviors for hypertension management (Olstad & McIntyre, 2025; Ramawat et al., 2025). Lubis (2021) demonstrated that health education regarding the DASH diet significantly improved knowledge among patients with hypertension ($p < 0.000$). Individuals with higher educational attainment tend to understand and apply dietary information more quickly, whereas those with lower education levels require more intensive educational approaches, such as visual media and simplified language, to optimize comprehension of the DASH diet. Lou et al. (2022) further emphasized that the ability to adopt healthy lifestyle behaviors is positively correlated with educational level.

Most respondents demonstrated moderate dietary adherence (108 individuals, 57.4%). Safutri et al. (2021) reported that dietary adherence significantly contributes to blood pressure stabilization and the prevention of hypertension-related complications. Ayu et al. (2024) found that education on the DASH diet significantly reduced systolic blood pressure. These findings confirm that dietary adherence is a key determinant of successful hypertension control through the DASH diet, highlighting the importance of continuous education to achieve optimal adherence.

The frequency of healthcare visits had a significant influence on the successful implementation of the DASH diet. The majority of respondents attended healthcare visits regularly (135 individuals, 71.8%), while 53 individuals (28.2%) attended irregularly. Regular visits enable healthcare providers to monitor patient progress, provide ongoing education, and adjust dietary programs according to individual conditions (Banerjee, 2022). Family support also plays an important role in encouraging dietary adherence and blood pressure control (Timba et al., 2024; Asnuddin & Dioso, 2025). These findings are consistent with studies by Wulandari et al. (2023) and Kim & Andrade (2021), which showed that DASH diet education delivered during healthcare visits increased dietary adherence by up to 38.5% and significantly reduced systolic blood pressure. More broadly, hypertension remains a major global health issue. According to the WHO Global Report on Hypertension (2023), more than one billion people worldwide are affected, yet only 54% are diagnosed, 42% receive treatment, and only 21% achieve controlled blood pressure. These statistics underscore the importance of consistency in treatment adherence, blood pressure monitoring, and healthy lifestyle implementation, including low-sodium and potassium-rich diets, as key factors in successful hypertension control at both individual and population levels.

Most respondents who implemented the DASH diet experienced stable or normal blood pressure (103 individuals, 54.8%), while increased blood pressure was observed in only 25 respondents (13.3%). Savitri & Romina (2021) reported that a 30-day DASH diet intervention significantly reduced both systolic and diastolic blood pressure, and Fitriyana (2022) documented a reduction in blood pressure from 156/100 mmHg to 140/95 mmHg

among study participants. Zavira et al. (2025) emphasized that the effectiveness of the DASH diet increases when combined with education and positive behavioral changes. Overall, scientific evidence supports the DASH diet as an effective non-pharmacological intervention for hypertension control among the elderly.

Bivariate analysis demonstrated that age, sex, educational level, dietary adherence, and frequency of healthcare visits were all significantly associated with the success of the DASH diet ($\rho = 0.000$ for all variables). Early elderly individuals showed the best response due to relatively preserved physiological and cognitive function, whereas older elderly groups required more intensive support (Guo et al., 2021; Na et al., 2022; Wahyuningsih et al., 2024; Olusola-Bello et al., 2024). Women tended to exhibit higher adherence and better biological responses than men, despite an increased risk of hypertension after menopause (Abdul Halim et al., 2024; Riyadina, 2019). Higher educational attainment facilitated understanding and adherence to dietary recommendations, while respondents with basic education required tailored educational approaches (Ramawat et al., 2025; Lubis, 2021; Mahardika et al., 2022). Dietary adherence emerged as the primary determinant of success, with adherent individuals demonstrating more stable blood pressure and lower complication risk (Fitria et al., 2025; Safutri et al., 2021). Regular healthcare visits enhanced the effectiveness of the DASH diet through monitoring, continuous education, and family support (Didipu, 2025; Suciana et al., 2025).

This study has limitations, as it did not analyze the dominant factor with the greatest influence on the success of the DASH diet. Nevertheless, the findings provide important contributions to understanding the factors associated with successful DASH diet implementation among elderly individuals with hypertension and may serve as a basis for developing more effective interventions in primary healthcare settings.

The implications for nursing practice include the development of DASH diet education programs tailored to respondents' age and educational characteristics, as well as strengthening monitoring and evaluation systems to improve dietary adherence and regular healthcare visits. Through these approaches, nurses can optimally support elderly patients in controlling blood pressure using dietary interventions.

CONCLUSION

Based on the findings of this study on factors associated with DASH diet therapy in blood pressure control among the elderly at the Cempaka Public Health Center, Banjarmasin, it can be concluded that the implementation of the DASH diet is effective in stabilizing blood pressure in elderly individuals. The success of this therapy is influenced by age, sex, educational level, dietary adherence, and frequency of healthcare visits. Early elderly individuals, women, and those with moderate to high educational attainment tend to demonstrate better responses to dietary interventions. Adherence to the DASH diet and regular healthcare visits were identified as key factors in achieving stable blood pressure, while elderly individuals who continued to experience increased blood pressure require additional attention through more intensive education and support. Therefore, it is recommended that elderly individuals improve their understanding of the importance of adherence to the DASH diet, actively involve family members in supporting dietary implementation at home, including the provision of healthy meals and monitoring adherence, and strengthen the regularity of healthcare visits. These measures are expected to enhance the effectiveness of DASH diet implementation and provide optimal benefits in blood pressure control among the elderly.

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