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Dietary Approaches to Stop Hypertension (DASH) Intervention and Nutrition Education in A Patient With Hypertension: A Case Report

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Abstract: Hypertension is a leading cause of mortality worldwide. The Dietary Approaches to Stop Hypertension (DASH) diet is a recommended nutritional intervention to help control blood pressure through sodium restriction and increased intake of potassium, fiber, fruits, and vegetables. This case report aimed to describe the implementation of a DASH diet intervention combined with nutrition education in a hypertensive patient. A 59-year-old female client with a history of hypertension and obesity (BMI 35.6 kg/m^2) presented with a baseline blood pressure of 151/92 mmHg and an unbalanced dietary pattern. Nutritional assessment identified excessive energy and sodium intake, as well as inadequate fruit consumption. The intervention consisted of a hypocaloric DASH diet with a 500-kcal energy deficit and high-fiber menu modification, implemented over a short intervention period of five days, accompanied by nutrition education using leaflet media. Following the intervention, blood pressure decreased from 151/92 mmHg to 123/83 mmHg, while body weight slightly decreased from 84.4 kg to 84.1 kg. In addition, the nutrition knowledge score improved from 60 to 90. Although the intervention duration was short, these changes indicate a positive short-term response to the DASH diet and nutrition education. In conclusion, a short-term DASH diet intervention combined with nutrition education may provide preliminary benefits in improving blood pressure, dietary behavior, and nutrition knowledge in hypertensive patients. However, longer-term interventions are required to confirm sustained clinical effects.

Keywords: blood pressure, DASH diet , hypertension, nutrition education

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INTRODUCTION

Hypertension is a leading cause of death worldwide, affecting approximately 1.28 billion adults aged 30–79 (WHO, 2023). In Indonesia, data from the 2018 Basic Health Research (Riskesdas) showed an increase in the prevalence of hypertension from 25.8% in 2013 to 34.1% in 2018 (Kemenkes, 2021). However, according to the 2023 Indonesian Health Survey (SKI), the prevalence of hypertension among adults aged >18 years decreased to 30.8% (BKPK, 2023).

Various factors contribute to an increased risk of hypertension, including genetic, body mass index (BMI), smoking, physical activity, dietary patterns, and resting habits (Amelia et al., 2024; Yunaria et al., 2025). Additionally, a high-sodium and low-fiber diet is also known to promote hypertension (Santoso et al., 2025). Hypertension prevention can be achieved through dietary modification, such as a low-salt diet, obesity control, and lifestyle modification. The success of lifestyle changes largely depends on an individual's level of knowledge regarding hypertension prevention strategies, as nutritional knowledge has been shown to be significantly associated with the incidence of hypertension (Sistikawati et al., 2021; Telaumbanua et al., 2025).

Dietary Approaches to Stop Hypertension (DASH) is one of the dietary patterns recommended for the prevention and management of hypertension. It emphasizes reducing sodium intake while promoting consumption of fruits, vegetables, lean protein sources, low-fat dairy products, and limiting sugar and saturated fat (Yannakoulia & Scarmeas, 2024). The DASH diet has been shown to reduce blood pressure in patients with hypertension (Wahyuningsih et al., 2024).

Eating behavior results from long-term processes influenced by the social environment and habitual practices, particularly among older adults who tend to maintain dietary patterns established since a younger age. This behavior is also shaped by limited nutritional knowledge. Therefore, dietary modification and improvement of nutrition-related knowledge are necessary to help control blood pressure. Dietary modification can be implemented through the DASH diet (Khoiriyah et al., 2025), and knowledge improvement can be achieved through nutrition education (Rohman et al., 2023)

Although the effectiveness of the DASH diet has been widely reported, scientific evidence regarding its short-term implementation remains limited, particularly in the context of home-care-based services. Most previous studies have applied the DASH diet over medium- to long-term periods. Therefore, this study aims to evaluate the effects of a five-day short-term DASH diet intervention combined with nutrition education in a hypertensive client. The findings are expected to provide insight into the implementation of the DASH diet in home care services and to expand the scientific evidence on nutrition interventions for patients with hypertension.

METHODS

Study Design

This study was a case study conducted through home care nutrition services in Semarang City from July 13 to 21, 2025. The research subject was selected through purposive sampling: a client with hypertension who agreed to participate as a research respondent and receive a five-day dietary intervention.

Case Description

The client, Mrs. M, is a 59-year-old female who works as a home-based tailor and engages in moderate physical activity and infrequent exercise. She has had a five-year history of hypertension and regularly consumed antihypertensive medication (candesartan) and monitored her blood pressure every two weeks at the hospital. The client reports no other chronic diseases or symptoms such as severe dizziness or chest pain.

Anthropometric measurements included body weight (BW) and height (HT). Body weight was measured using a digital scale with two-decimal-place accuracy. Measurements were taken at the beginning and the end of the intervention. The scale was placed on a flat, hard surface, and the indicator was set to zero (0) before measurement. The client stood upright, facing forward, without carrying any items that could affect the measurement results. After the indicator showed the measurement result, body weight was recorded. The client's body weight was 84.40 kg.

Height was measured using a stadiometer at the beginning of the intervention. The stadiometer was placed on a flat surface, with all bolts securely locked. The client stood upright without footwear, ensuring that the heels, calves, buttocks, back, and head were in contact with the measuring pole, with the head facing straight forward. The measuring bar was lowered until it touched the top of the head vertically. The recorded height was 154 cm. Based on body weight and height measurements, the client's body mass index (BMI) was calculated as 35.6 kg/m^2, classified as obesity.

Blood pressure was recorded daily in the morning using a digital sphygmomanometer. The client was in a seated position with the arm aligned at heart level, and the cuff was placed on the upper arm without being too tight. The initial blood pressure measurement was 151/92 mmHg, classified as stage I hypertension. Nutritional screening using the Malnutrition Universal Screening Tool (MUST) resulted in a score of 0, indicating that the client was not at risk of malnutrition; however, further assessment due to a history of hypertension and obesity is required.

The client's nutrition knowledge was assessed using a 10-items true-false questionnaire. The questionnaire covered topics related to the definition of hypertension, risk factors for hypertension, the impact of hypertension, unhealthy dietary patterns, and hypertension prevention strategies. Each correct answer was scored as 1, and each incorrect answer as 0. A pre-test was administered prior to nutrition education, and a post-test was administered after nutrition education.

Based on data from the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ), it was found that the client often consumes high-sodium foods, such as fried foods and crackers. The results of the SQ-FFQ calculation are presented in Table 1.

Table 1

Baseline Dietary Intake Using SQ-FFQ

Nutrient	Energy	Protein	Fat	Carbs	Fiber	Sodium	Potassium
Intake	1845	42.6	53.6	284	7.89	1,652	621
Requirement	1689	63	47	253	30	1500	4700
% Intake	109%	68%	114%	112%	26%	110%	13%
Interpretation	Adequate	Deficit	Excess	Excess	Deficit	Excess	Deficit

Source: primary data

Dietary intake data from a 24-hour recall conducted prior to the dietary intervention are presented in Table 2.

Table 2

Dietary Intake Using 24-Hour Recall

Nutrient	Energy	Protein	Fat	Carbs	Fiber	Sodium	Potassium
Intake	1741	24	45	309	11	1570	1516
Requirement	1689	63	47	253	30	1500	4700
% Intake	103%	38%	96%	122%	37%	105%	32%
Interpretation	Adequate	Deficit	Adequate	Excess	Deficit	Excess	Deficit

Source: primary data

Based on SQ-FFQ results, the client had excessive energy, fat, and sodium intake, while protein, fiber, and potassium intake were below requirements. The 24-hour recall data supported these findings, showing excessive carbohydrate and sodium intake, with deficits in protein, fiber, and potassium. Overall, the client demonstrated an unbalanced dietary pattern with a notable tendency toward excessive sodium intake. Based on the nutrition assessment, the following nutrition diagnoses were established:

- NI.5.3 Decreased sodium requirement linked to hypertension, indicated by a history of hypertension, blood pressure of 151/92 mmHg, SQ-FFQ sodium intake of 110 %, and 24-hour recall sodium intake of 105 %.
- NI.5.3 Decreased energy requirement associated with obesity, demonstrated by a BMI of 35.6 kg/m^2.
- NI.5.6.2 Inadequate protein intake related to lack of nutrition knowledge, evidenced by protein intake of 68 % from SQ-FFQ and 38 % from 24-hour recall.
- NC.3.3 Obesity linked to an unbalanced diet, indicated by carbohydrate intake of 122 % and protein intake of 38 %, along with frequent consumption of high-fat snacks such as fried foods and crackers twice daily.
- NB.1.1 Lack of nutrition-related knowledge, as shown by frequent consumption of high-sodium foods, such as fried foods twice daily and salted fish twice weekly, due to insufficient nutrition information exposure.

Nutrition Intervention

The client received a nutrition intervention involving the DASH diet for five consecutive days. This dietary pattern aimed to lower blood pressure by increasing intake of potassium-, calcium-, fiber-, and protein-rich foods, while restricting intake of sodium, saturated fat, and cholesterol. It prioritizes the consumption of whole grains, fruits, vegetables, low-fat dairy products, fish, poultry, and legumes, while limiting the intake of fatty meats, processed foods high in sodium, tropical oils (coconut and palm oil), sweets, and sugar-sweetened beverages.

The target sodium intake for this intervention was based on the American Heart Association (AHA) recommendations, which advise limiting sodium intake to ≤1500 mg/day for individuals with

hypertension to reduce blood pressure and cardiovascular risk. In addition to sodium restriction, increased fiber intake of approximately 25–30 g/day is also recommended (Whelton et al., 2018).

The intervention consisted of regular meals, with three main meals and two snacks per day. Daily energy requirements were determined based on obesity status, with a reduction of approximately 500 kcal from total energy requirements to achieve a moderate caloric deficit. The client's overall nutritional needs were 1689 kcal of energy, 63 g of protein, 47 g of fat, 253 g of carbohydrates, 25 g of fiber, 1500 mg of sodium, and 3500 mg of potassium. The nutrient composition of the intervention menu was designed to meet 90–110% of total nutritional requirements. The five-day intervention menu is presented in Table 3, and the corresponding daily nutrient composition is shown in Table 4.

Table 3

Five-Day Dietary Intervention Menu

Siklus	Breakfast	Snack	Lunch	Snack	Dinner	Pictures
Day 1	Rice	Dimsum & Starfruit	Rice	Corn Pudding	Rice	
	Egg balado		Sour-spiced fish		Honey grilled chicken	
	Stir-fried empeh		Fried tofu skin		Yellow spiced tempe	
	Spinach and loofah soup		Stir-fried green beans and carrots		Stir-fried water spinach	
			Papaya		Watermelon	
Day 2	Rice	Fruit pie & Banana	Rice	Steamed sweet potato cake	Rice	
	Rolled omelet		Chicken curry		Beef patty	
	Stir fried tofu broccoli, carrot		Tofu fritter		Spicy stir-fried tempeh	
			Scrambled vegetable		Pickle vegetable	
			Watermelon		Melon	
Day 3	Rice	Solo sausage	Rice	Banana stew	Rice	
	Fried egg stir fry		Steamed spiced fish		Satay lilit	
	Mashed fried tempeh		Fried tempeh		Tofu bali spiced	

Siklus	Breakfast	Snack	Lunch	Snack	Dinner	Pictures
	Mixed vegetable		Stir-fried water spinach		Vegetable salad with spiced coconut dressing	
			Melon		Orange	
Day 4	Rice	Lemper	Rice	Purple sweet potato pudding	Rice	
	Egg		Shredded chicken with basil		Kecap chicken	
	Stir-fried bean sprouts and mushrooms		Satay tofu		Stir-fried chayote, mushrooms, and carrots	
	Orange		Vegetable soup starfruit		Stewed tempeh	
					Dragon fruit	
Day 5	Rice	Steamed bun & Melon	Rice	Tofu meatball	Rice	
	Boiled egg		Balado meat roulade		Grilled fish	
	Battered fried tempeh		Grilled tempeh		Soft tofu with carrot	
	Vegetable salad with peanut sauce		Stir-fried mushrooms carrot		Stir-fried mustard greens	
			Dragon fruit		Starfruit	

Table 4

Nutrient Composition of The Intervention Menu

Nutrient	Day 1	Day 2	Day 3	Day 4	Day 5	Average
Energy (kcal)	1655 (98%)	1687 (100%)	1650 (98%)	1648 (98%)	1703 (101%)	1669 (99%)
Protein (g)	65 (103%)	63 (100%)	63 (100%)	63,8 (101%)	63,5 (101%)	63,6 (101%)
Fat (g)	46,9 (100%)	45,7 (97%)	47,3 (101%)	46,7 (99%)	47 (100%)	46,7 (99%)
Carbohydrate (g)	252 (100%)	261 (103%)	250 (99%)	251,5 (99%)	257 (102%)	254 (101%)
Fiber (g)	24 (96%)	24 (96%)	23 (92%)	25,5 (102%)	23,5 (94%)	24 (96%)
Sodium (mg)	890 (59%)	588 (39%)	645 (43%)	728 (49%)	867 (58%)	743,6 (50%)
Potassium (mg)	3226 (92%)	3345 (96%)	3353 (96%)	3112 (89%)	3055 (87%)	3218 (92%)

Based on the table above, the average intakes of energy, protein, fat, and carbohydrates were 99–101% of estimated requirements, while fiber and potassium intake reached 96% and 92%, respectively. Sodium restriction was successfully achieved, with an average intake of 743.6 mg/day (50% of the maximum recommended level), consistent with DASH diet principles. These findings indicate that the provided meals adequately met the client's nutritional requirements and aligned with the objectives of the intervention.

In addition to dietary intervention, nutrition education was delivered on the final day through an interactive lecture and discussion, supported by leaflets. The materials covered the definition of hypertension, principles and objectives of the DASH diet, sample menus, and daily portion distribution. The goal was to enhance the client's knowledge, awareness, and adherence to healthy dietary practices for blood pressure control.

Throughout the intervention period, food preparation and delivery consistently adhered to the hygiene and sanitation standards, from ingredient preparation to meal distribution. Cooking techniques focused on minimizing oil use, employing methods such as boiling, steaming, and sautéing.

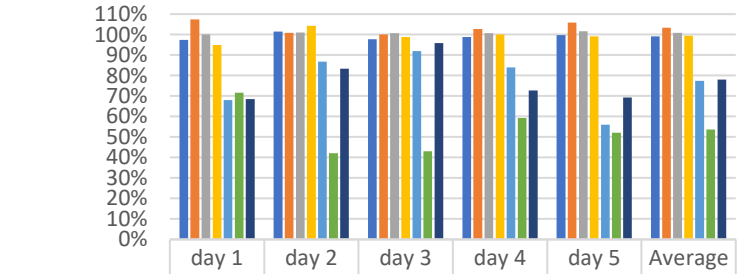
RESULTS AND DISCUSSION

Dietary Intake

The implemented dietary intervention was followed by monitoring to assess the adequacy of the client's dietary intake. Intake monitoring was conducted using a 24-hour dietary recall. The client's daily dietary intake during the five-day intervention is presented in the following graph.

Figure 1

Client's Dietary Intake During Intervention



	day 1	day 2	day 3	day 4	day 5	Average
energy	97%	101%	98%	99%	100%	99%
protein	107%	101%	100%	103%	106%	103%
fat	100%	101%	101%	101%	102%	101%
carbohydrate	95%	104%	99%	100%	99%	99%
fiber	68%	87%	92%	84%	56%	77%
sodium	72%	42%	43%	59%	52%	54%
potassium	69%	83%	96%	73%	69%	78%

The results of dietary intake monitoring indicated that the client's average intake over the five-day intervention period met 99% of energy needs, 103% of protein, 101% of fat, 99% of carbohydrates, 77% of fiber, 54% of sodium, and 78% of potassium. These findings suggest that the client's macronutrient intake was adequate (>90% of requirements). However, micronutrient intake, particularly fiber and potassium, remained inadequate (<90%). The primary sources of fiber and potassium in the provided intervention were fruits and vegetables (Okuda et al., 2020). Throughout the intervention period, the client did not consistently consume the entire portion of fruit provided, mainly due to early satiety after main meals, resulting in partial consumption of fruit servings. Consequently, fiber and potassium intake remained below the recommended levels.

The DASH diet was selected as the dietary intervention for the hypertensive client because it emphasizes not only sodium restriction but also increased potassium and fiber intake through greater consumption of fruits and vegetables. Sodium intake is limited to ≤2300 mg and can be further reduced to 1500 mg. This level of restriction is manageable, making it more feasible to implement, particularly among older adults who tend to have decreased taste sensitivity, while remaining effective in lowering blood pressure (Kim et al., 2024).

Knowledge Level

Knowledge level is one of the key factors influencing attitudes and behaviors related to hypertension management. One effective strategy to improve individuals' knowledge regarding hypertension control is nutrition education (Ambarwati et al., 2024). In this study, alongside the dietary intervention, nutrition education was provided to enhance the client's understanding of hypertension and its nutritional management.

Nutrition education was delivered through individual counseling using a lecture and question-and-answer approach, supported by a leaflet as a means of education. The leaflet contained brief information on hypertension, preventive strategies, the goals and principles of the DASH diet, as well as sample menus and portion sizes tailored to the client's nutritional needs, including calorie reduction for weight loss. The use of visual and practical educational materials was intended to facilitate the client's understanding and independent application of dietary management at home, thereby extending the intervention beyond knowledge acquisition to support meaningful behavioral change (Nuraisyah et al., 2023).

The effectiveness of the nutrition education was evaluated using pre- and post-tests to measure the client's knowledge before and after the intervention. The pretest score was 60, indicating a limited understanding of dietary principles for hypertension management. Following the educational session, the post-test score increased to 90, reflecting a substantial improvement in the client's knowledge.

Effect of Dietary Intervention on Weight Reduction

Dietary intervention for obesity management was implemented through a low-calorie diet by reducing the total energy requirement by approximately 500 kcal per day. This approach aims to achieve gradual weight loss of 0.5–1 kg per week (Contreras et al., 2024).

Anthropometric monitoring showed a reduction in body weight from 84.4 kg to 84.1 kg after five days of intervention. This 0.3 kg loss suggests an initial response to the applied energy deficit. Although the target weight loss was not fully achieved, this outcome remains promising and may continue if the dietary intervention is consistently maintained over a longer period.

Overall adherence to the prescribed diet was generally good. However, on day 1 and day 5, the client consumed foods outside the intervention menu due to attending social events. These foods included fried snacks, sweetened beverages, and coconut milk–based dishes, which are relatively high in energy and sodium. Despite the overall adequate average daily intake, these deviations likely contributed to the relatively modest weight loss observed (0.3 kg over five days).

In addition to caloric restriction, the intervention also emphasized adequate fiber intake. The client was prescribed a daily fiber intake of 25 g, with an average actual intake of 77% of the target (classified as inadequate). Fiber sources were primarily provided in the form of fruits, offered 3–4 times per day. The client reported that the fruit portions felt excessive, resulting in incomplete consumption.

Dietary fiber is vital for supporting gut health, regulating blood glucose and lipid levels, and improving intestinal function. The United States Department of Agriculture (USDA) Dietary Guidelines for Americans specify that daily fiber intake varies by age and sex: for individuals under 51 years, 25 g for women and 38 g for men; for individuals over 51 years, 21 g for women and 30 g for men (USDA, 2020).

Fiber intake is closely associated with a lower risk of obesity through multiple metabolic mechanisms. It increases food volume and satiety, delays gastric emptying, and regulates the secretion of gut hormones involved in appetite control. Fiber fermentation by the gut microbiota produces short-chain fatty acids (SCFAs), which suppress appetite, improve insulin sensitivity, and support energy expenditure. Additionally, fiber helps reduce inflammatory markers, modulating metabolic function through enteroendocrine pathways, and decreases cholesterol absorption. Collectively, these mechanisms explain the role of dietary fiber in preventing obesity and improving metabolic health (Lai et al., 2025).

Effect of the DASH Diet on Blood Pressure Reduction

The effectiveness of the DASH diet on blood pressure was evaluated through regular monitoring throughout the intervention period. The monitoring results are presented in the table below to illustrate changes in the client's blood pressure following the implementation of the DASH diet.

Blood pressure monitoring results showed a reduction in blood pressure on days 1 and 2, which fell into the elevated (prehypertension) category. On days 3 and 4, blood pressure increased and returned to stage I hypertension, while on day 5, blood pressure decreased again to the elevated category. The increase in blood pressure on days 3 and 4 was likely associated with the client's reported consumption of foods high in sodium outside the intervention menu, such as bread and fried foods. The client also reported poor sleep quality and frequent nighttime awakenings. Previous studies have identified several factors influencing blood pressure, including age, sex, education level, sodium intake, body mass index, history of hypertension, and smoking status (Li et al., 2023). In addition, stress and sleep quality have been shown to significantly affect blood pressure regulation (Nuraeni et al., 2024).

Table 5

Blood Pressure Measurements During the Intervention

Time Point	Blood Pressure	Category
Before Intervention	151/92 mmHg	Hypertension St I
Day 1	123/92 mmHg	Elevated
Day 2	132/90 mmHg	Elevated
Day 3	143/92 mmHg	Hypertension St I
Day 4	148/85 mmHg	Hypertension St I
Day 5	123/83 mmHg	Elevated

Source: Primary Data

The DASH diet promotes higher intake of potassium and fiber by consuming fruits and vegetables. The intervention menu was designed followed DASH principles, focusing on increasing vegetable and fruit intake as primary sources of fiber and potassium. This strategy aims to support blood pressure reduction mechanisms through enhanced sodium excretion and improved vascular function. However, monitoring results indicated that the client's average fiber intake reached only 77% of the recommended level, and potassium intake was 78%. This occurred because the client did not consistently consume the full portions of fruits and vegetables provided. Consequently, despite adequate menu planning, actual intake remained suboptimal.

Although sodium plays a critical role in blood pressure regulation by increasing water retention to maintain homeostasis—thereby elevating blood pressure—potassium and fiber intake are expected to enhance sodium excretion. During the intervention, dietary adherence also significantly influenced the effectiveness of blood pressure reduction (Kim et al., 2024). A study by Khoiriyah et al. (2025) reported that adherence to the DASH diet is influenced by factors such as lack of family support, low educational level, low motivation, and unhealthy dietary habits.

Sodium restriction is essential for individuals with hypertension. Excessive sodium intake significantly contributes to increased blood pressure through several physiological pathways. High sodium levels lead to water retention, increasing blood volume and pressure within blood vessels. This condition contributes to endothelial dysfunction by impairing the release of vasodilatory substances, such as nitric oxide, resulting in vascular stiffness and increased vascular resistance. Moreover, high intake activates the sympathetic nervous system and the renin–angiotensin–aldosterone system (RAAS), further promoting vasoconstriction and fluid retention, thereby increasing blood pressure, particularly in salt-sensitive individuals (Hu & McLean, 2025).

In addition to sodium restriction, the DASH diet also emphasizes increasing potassium intake. Sufficient potassium intake contributes to blood pressure reduction through several physiological mechanisms. One primary mechanism is enhanced renal sodium excretion (natriuresis), which reduces fluid retention and blood volume. Potassium also relaxes vascular smooth muscle by modulating ion channels and stimulating the production of vasodilators, thereby reducing peripheral vascular resistance. Furthermore, potassium improves endothelial function and mitigates the adverse effects of sodium on the cardiovascular system by suppressing sympathetic nervous system activation and reducing oxidative stress in blood vessels. Collectively, these mechanisms highlight the importance of potassium intake from natural food sources, such as fruits and vegetables, in lowering blood pressure and reducing long-term cardiovascular risk (Chan et al., 2024).

Another nutrient that plays a significant role in blood pressure reduction is dietary fiber. It works through multiple physiological mechanisms: soluble fiber slows the absorption of glucose and lipids, contributing to weight control and improved insulin sensitivity, both of which are important for blood pressure regulation. Fermentation of fiber by gut microbiota produces short-chain fatty acids (SCFAs), such as acetate, propionate, and butyrate, which regulate vascular tone, enhance vasodilation, and reduce inflammation and oxidative stress. Additionally, fiber increases fecal sodium excretion, thereby reducing fluid retention. The combined effects—ranging from weight reduction and metabolic improvement to enhanced endothelial function and natriuresis—underscore the importance of dietary fiber as a key component of dietary strategies, including the DASH diet, for blood pressure management (Jama et al., 2024; Tejani et al., 2023).

CONCLUSION

A five-day DASH diet intervention combined with nutrition education demonstrated a positive short-term response in a hypertensive patient, particularly in reducing blood pressure and body weight. Nutrition education related to hypertension was also shown to improve the client's knowledge and is expected to serve as a foundation for healthier dietary behavior changes. Therefore, the combination of the DASH diet and nutrition education has the potential to yield more optimal outcomes if implemented consistently over a longer period. This case report provides preliminary insight into the application of a short-term DASH diet intervention in a home care setting. Further studies with longer intervention durations and larger sample sizes are needed to comprehensively evaluate the impact of the DASH diet on blood pressure control.

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Author Contribution Statement

Latifah Ratna Nur Azizah: Conceptualization; Methodology; Data Collection; Data Analysis; Writing – Original Draft. **Dyah Nur Subandriani**: Supervision; Methodological Guidance; Review & Editing. **Ana Yuliah Rahmawati**: Review Article; Validation.

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