The Effect of Exercise Habits and Low-salt Diet on Blood Pressure Control and its Impact on the Quality of Life of Hypertensive Patients

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Abstract

This study analyses the effect of exercise habits and a low-salt diet on the quality of life of hypertensive patients by mediating blood pressure control variables in the group of participants with hypertension proteins at the Technical Implementation Unit (UPT) Public Health Centre (Puskesmas) Galesong in Takalar Regency. Primary data collection was done by using observation, interview, and questionnaire/questionnaire techniques. The research sample was 144 people. The research was using a quantitative approach. Data analysis was carried out using SPSS 23 with path analyses 1 and 2. This requirement was carried out to determine the correlation between the independent variables, namely exercise habits (X1) and low salt diet (X2), on the quality of life of hypertensive patients (Y2), which was mediated by the blood pressure control variable (Y1). The results of this study indicate that 1) exercise habits have a positive and significant effect of 36.6% on blood pressure control, 2) a low-salt diet has a positive and significant effect of 62.6% on blood pressure control, 3) Exercise habits have a positive and significant effect of 33,9% on the quality of life of patients with hypertension, 4) A low-salt diet has a positive and significant effect of 27.1% on the quality of life of patients with hypertension, 5) Blood pressure control has a positive and significant effect of 38.3% on the quality of life of patients with hypertension, 6) Exercise habits have a positive and significant effect of 1.4% on the quality of life of patients with hypertension through controlling blood pressure, and 7) A low-salt diet has a positive and significant effect by 2.4% of the quality of life of patients with hypertension through blood pressure control.

Keywords
Exercise Habits, Low-Salt Diet, Control of Blood Pressure, Quality of Life, People Hypertension

1. Introduction

Changes in the pattern and spread of disease parallel to changes in applied science in Indonesia today have caused a shift in disease from infectious diseases (infectious diseases) to non-infectious/non-communicable diseases. Such as diseases that occur due to the degeneration process as a cause of morbidity and mortality. The development of applied science in developing countries also causes changes in patterns. The spread of disease and population can be seen from the shift in behavior patterns and the emergence of cases of Non-Communicable Diseases (Fitriana 2012). This shift is due to environmental, demographic, and socio-economic changes. Unhealthy daily life patterns such as smoking, lack of exercise, consumption of foods high in fat and calories, and alcohol consumption cause this non-communicable disease.

The type of non-communicable disease that many people suffer from today is hypertension. Hypertension is now a global problem because its prevalence increases with lifestyle changes such as smoking, obesity, physical inactivity, and psychosocial stress.

Hypertension is a global public health issue that must be resolved. A survey conducted by NHS (The National Health and Nutrition Examination Survey) shows data from 1999 to 2000. The number of people aged over 18 years who suffer from hypertension is 29 to 31%, meaning that there are around 58 to 65 million. The American population who suffers from hypertension shows an increase of 15 million sufferers compared to the previous NHNES data from 1988 to 1991. According to the WHO world health organization, the number of deaths caused by hypertension is 7.5 million, which means 12.8% of deaths. It causes a life disability rate of approximately 57 million (WHO, 2013). Data from the 2018 Basic Health Research (Riskesdas) provides an overview of the prevalence of hypertension (over the age of 18 years) in developing countries, such as Indonesia, which tends to increase. From 25.8% in the 2013 Riskesdas data to 34.1% in 2018, with the highest prevalence in South Kalimantan (44.1%), while the lowest in Papua (22.2%). In South Sulawesi, the prevalence of hypertension in the age group 18 years is 31.7%. The estimated number of hypertension cases in Indonesia is 63,309,620 people, while the death rate in Indonesia due to hypertension is 427,218 deaths. (Riskesdas, 2018). Meanwhile, in UPT Puskesmas Galesong, the prevalence is 3.5%.

High blood pressure can cause complications such as stroke, cardiovascular disease, retinopathy and cause a chronic decline in kidney function (Purnomo, 2009). Epidemiological studies have proven a linear relationship between hypertension and cardiovascular disease morbidity and mortality. Hypertension is a challenge for us in the future. Therefore, it must be prevented and treated. (Setiawan, 2006).

Risk factors that cause hypertension include heredity, gender, race, and age (significant risk factors / uncontrollable). and obesity, lack of exercise or activity, smoking, drinking coffee, sodium sensitivity, low potassium levels, alcohol consumption, and stress (minor/controllable risk). (Anggraeni, 2009).

WHO has recommended non-pharmacological treatment for the primary treatment of hypertension since the beginning of 1983? In this case, it is necessary to control hypertension risk factors with lifestyle modifications. one of which is exercise habits, such as research conducted in Hong Kong by Nicholls. who found that Exercise/physical activity is the most appropriate non-pharmacological treatment for patients with hypertension? (Nicholls, 1990).

JNC VII (Joint National Committee VII) stated that the main thing in managing hypertension is lifestyle changes, among others, can be done by taking a leisurely walk several times a week for at least 30 minutes. According to Agustin, 2008 this walking can be done by people with hypertension of all ages because it is light, cheap, and straightforward.

JE Martin and the team have conducted a study. The results showed decreased systolic blood pressure of 5.7 mm Hg and a diastolic pressure of 3.2 mm Hg in hypertensive patients who did light aerobic exercise without treatment (Aram V. Chobanian et al., 2003). Meanwhile, hypertension patients who walked for 30 minutes daily actually experienced a decrease in blood pressure of 9.0% in systolic and 7.42% in diastolic pressure, while in the group without walking intervention, the decrease in blood pressure was only 0., five concluded in the study of Augustine J. Sohn et al. in Africa.

The health sector is working with various health programs, especially in controlling hypertension PTM by early detection and prevention of hypertension to reduce the prevalence of hypertension in Indonesia, reduce morbidity and mortality due to hypertension, and improve the quality of life of people with hypertension. This can be done with a

non-pharmacological approach through lifestyle modification, so the authors feel the need to research "The Influence of Exercise Habits and Low Salt Diet on Blood Pressure Control on Quality of Life of Hypertension Patients at UPT Puskesmas Galesong."

2. Literature Review

JNC VII (Seventh Report of the JNC on Prevention. Detection, Evaluation. and Treatment of High Blood Pressure). has made a classification of blood pressure for adults aged 18. and over who are not being treated for high blood pressure not. suffer from other chronic diseases. (Dalimartha, 2008).

Table 1. Classification of hypertension according to JNC VII

Blood Pressure Classification	Systolic Pressure, Diastolic (mmHg)
Normal	Systolic <120, Diastolic <80
Prehypertension	Systolic 120-139, Diastolic 80-89
Level I hypertension	Systolic 140-159, Diastolic 90-99
Level II hypertension	Systolic >160, Diastolic >100

Management of hypertension begins with a single treatment and a long duration of action so that the dose is once a day; then, the dose will be reduced. If a single dose of treatment is no longer effective, several drugs (combinations of drugs) can be added, selected based on the severity of the disease and the patient's response to antihypertensive drugs.

JNC VII recommends non-pharmacological therapy (by making lifestyle modifications) to avoid and treat hypertension, in addition to pharmacological treatment. Modified lifestyles include reducing body weight, doing Dietary Approach to Stop Hypertension (DASH), hypertension diet, salt restriction, proper and regular exercise, and reducing or even stopping alcohol consumption. Each has a blood pressure-lowering effect, which influences preventing hypertension complications, and when carried out in an integrated manner, will have a more significant blood pressure-lowering effect.

2.2 Sports Habits

The definition of sport is a series of regular and planned exercises to maintain life, improve the quality of life, and achieve physical ability by the objectives (Giriwoyo and Sidik, 2012). Brisk walking, jogging, cycling, swimming, and gymnastics are types of aerobic exercise, which, if done regularly, can reduce the risk of atherosclerosis which is one of the causes of hypertension but can also lower blood pressure by 5-10 mmHg.

For individuals with mild hypertension, the role of physical activity as a non-pharmacological treatment is to delay blood pressure-lowering drugs in addition. Regular exercise in hypertensive patients undergoing pharmacological therapy will make the drug work more effectively (Sheps, 2005). However, exercise should not be done in patients with hypertension if their blood pressure is more than 170/110 mm Hg.

Several mechanisms that occur when people with hypertension perform physical activity to lower blood pressure are adjustments to the structure of blood vessels due to neurohormonal changes. And a decrease in catecholamines and total peripheral resistance. Exercise, if regularly done, will increase the quality of life both physically and mentally the individual. Physically improved quality of life occurs through increased glucose metabolism mechanisms, bones and muscles are strengthened, and cholesterol levels in the blood are reduced. Meanwhile, the mental quality of life that increases mentally due to regular exercise is due to reduced stress, increased enthusiasm and self-confidence, and reduced anxiety and depression due to the illness.

2.3 Low Salt Diet

The definition of a low-salt diet is a diet that contains foods low in sodium content (contained in MSG flavoring, baking powder, baking soda, and table salt. This is a safe hypertension diet because it is controlled using natural methods (Purwanti, 1997). People view the hypertension diet as complicated and uncomfortable because there will be favorite foods to avoid, such as french fries, flavorings, salty popcorn, and salt. Ignatius divides several types of low-salt diets as follows:

Low Salt Diet I (Sodium intake 200-400 mg). Patients who received the Low Salt Diet I was patients with severe hypertension, patients with ascites and edema. There is no added salt to the food, and foods that contain high sodium levels should also be avoided. Low Salt Diet II (Sodium intake 600-1200 mg). Patients who received the Low Salt Diet II were patients with mild hypertension, edema, and ascites. The principle of processing food is like that of the Low Salt Diet I. The food can be added with 2 grams of table salt or half a teaspoon. Foods with high sodium content should still be avoided. Low Salt Diet III (Sodium intake 1000-1200 mg). Patients who received the Low Salt Diet III were mild hypertensive patients with edema and ascites. The food can be added with 4 grams of table salt or a teaspoon.

2.4 Quality of Life for Patients with Hypertension

Quality of life is a view of their position in life individually, according to the value system in which they are located and the cultural context and relationship to standards, expectations, life goals, and other related matters. Quality of life includes very complex and broad problems, including physical health problems, psychological status, and the level of freedom, social relationships, and the environment in which they are located (World Health Organization, 2012). The more tenuous between the level of hope and desire, the lower the quality of life.

Trevisol et al. (2011) stated that someone with hypertension has a lower quality of life when compared to someone with normal blood pressure. Meanwhile. Hypertensive patients who receive treatment regularly have a better quality of life. Then uncontrolled hypertensive patients. Because they do not take blood pressure-lowering drugs, patients' quality of life with uncontrolled hypertension is low, especially in the physical dimension. (Li et al., 2005) This level of quality of life is a complication of hypertension itself. Therefore, various efforts have been made to improve the quality of life of people with hypertension to reduce morbidity and mortality (Table 2).

Table 2. Assessment of aspects and domains in WHOQOL-BREF

Domain	Assessed aspects
General health and quality of life	a. Satisfaction with his health b. The overall quality of life
I. Physical health	1. Pain or discomfort 2. Dependence on medical care 3. Energy and fatigue levels 4. Rate of movement 5. Rest and sleeping habits 6. Implementation of daily activities 7. Ability to work
II. Health psychology	8. Positive aspects 9. Spiritual aspects 10. Ability to think, concentrate, memory, and learn 11. Appearance and body image 12. Self-esteem 13. Negative effect
III. Social relationships	14. Personal relationships 15. Sexual activity 16. Social support
IV. Milieu	17. Freedom, security, and physical safety 18. Physical environmental conditions (climate, pollution, traffic, and sound) 19. Financial resources 20. Opportunities for skills and information 21. Opportunities and roles in every fun and recreational activity 22. The state of the neighborhood around the house 23. Health care and social protection 24. transportation

3. Methods

This study uses a quantitative approach to test specific theories through research on the relationship between each variable. The research design uses a survey type because it is carried out to knowing the general description of the characteristics of the population. Also, analyzing supporting data and facts in the field in the discussion of research aims to solve and answer the main problems proposed, namely the influence of exercise habits and a low salt diet on blood pressure control on the quality of life of hypertensive patients at UPT Puskesmas Galesong. A total of 144 respondents were sampled in this study, calculated by the Slovin formula, taken from a population of 224 hypertensives prolongs patients. The research lasted for two months, starting in December 2020 - January 2021.

Variable Measurement

Data were collected using observation, interviews, and personally administered questionnaires to obtain data on exercise habits, low salt diet, and quality of life of hypertensive patients. Each statement is rated on a Likert scale of 1-5. Sports habits are regular exercise activities carried out with a frequency of 3x a week and 30 minutes. Reasonable, correct, measurable, and regular physical activity and exercise will improve physical fitness, which is essential for maintaining body stamina.

A low-salt diet is measured by presence/absence and sodium consumed in 1 day. Blood pressure is under control if the systolic pressure is <140 mm Hg and diastolic pressure <90 mm Hg. The quality of life of patients with hypertension was measured using the WHOQOL instrument.

4. Results and Discussion

4.1. Path Analysis

The effect of Exercise Habits and Low Salt Diet on Partial Blood Pressure Control can be seen in the following Table 3:

Table 3. Analysis Line Model 1 X1, X2 against Y1

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.701	.195		-3.591	.000
	Influence OR	.141	.019	.366	7.488	.000
	DRG	.245	.019	.626	12.826	.000

a. Dependent Variable: Control TD

The magnitude of the coefficient of each independent variable can be explained that:
The regression coefficient on the X1 exercise habits variable is 0.366. For every increase in X1 exercise habits by 1 unit, the blood pressure will also be controlled by 0.366 points assuming the other independent variables are constant; The regression coefficient on the low-salt diet variable X2 is 0.626, meaning that for every 1 unit increase in the implementation of the low-salt diet, the blood pressure will also be controlled by 0.626 points assuming the other independent variables are constant; From the table above, the exercise habit variable (X1) value is 0.000 <0.05, which means that H1 is accepted. The significant value of the low-salt diet variable X2 is 0.000 <0.05, which means that H2 is accepted; From the table above, it can be seen from the standardized coefficient figures, the influence of exercise habits (X1) on blood pressure control (Y1) is 0.366 or 36.6%; For a low-salt diet (X2) to control blood pressure (Y1) of 0.626 or 62.6%; For the value of e1 = V 1 - 0.942, V 0.058 = 0.240 (Table 4).

Table 4. Model 1 Determinant Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.970a	.942	.941	.67832

a. Predictors: (Constant), DRG, Influence OR

The effect of exercise habits and a low-salt diet on blood pressure control and its impact on the quality of life of hypertensive patients. The influence of exercise habits and a low-salt diet on blood pressure control and its impact on the quality of life of hypertensive patients can be seen in the following Table 5:

Table 5. Analysis Path model 2 X1, X2, Y1 against Y2

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.048	.778		6.491	.000
	Influence OR	.511	.085	.339	6.006	.000
	DRG	.412	.107	.271	3.846	.000
	TD Control	1.493	.321	.383	4.649	.000

a. Dependent Variable: Quality of Life

The magnitude of the coefficient of each independent variable can be explained that:
The regression coefficient on the X1 exercise habit variable is 0.339; This means that for every 1 unit increase in exercise habits, the quality of life of people with hypertension will increase by 0.339 points, assuming the other independent variables are constant; The regression coefficient on the X2 low-salt diet variable is 0.271. This means that for every 1 unit increase in implementing a low-salt diet, the quality of life of people with hypertension will increase by 0.271 points, assuming other independent variables are constant; The regression coefficient on Y1 blood pressure control is 0.383. This means that for every controlled increase in blood pressure of 1 unit, the quality of life of people with hypertension will increase by 0.383 points, assuming other independent variables are constant; The significant value of X1 exercise habits of 0.000 <0.05 means H3 is accepted; The significant value of the low-salt diet X2 is 0.000 <0.05, which means that H4 is accepted; The significant value of blood pressure control is 0.000 <0.05 means that H5 is accepted.

Table 6. Model 2 Determinant Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	. .972ᵃ	.944	.943	2.58679

From the Table 6, R Square is 0.944 or 94.4%. This figure shows the total influence of exercise habits, low salt diet, blood pressure control on the quality of life of hypertensive patients is 94.4%. In comparison, the remaining 5.6% is influenced by other factors not studied, while the value of e2 = V1 - 0.944 = V 0.056 = 0.23.

4.2. Hypothesis Testing Results

Hypothesis testing is carried out to determine whether the independent variable affects the dependent variable, both direct and indirect effects through the intervening variable. The hypothesis is accepted if the value of t-count > from t-table and the value of Sig < 0.05. As for the hypothesis on the indirect effect, it is accepted if the t-count value > t-table or Sig value <0.05 where the determination of the t-count value and significant value or p-value is carried out using the Sobel test. The results of the calculation are shown in the attachment of the hypothesis test results. Seen in the following table the table of hypothesis test results (Table 7):

Table 7. Hypothetical Test Results are

Variable	Coefficient of influence immediately	Coefficient of influence Indirect	T-count	Sig
Exercise habits towards blood pressure control	0,366	0	7,488	0,000
Low-salt diet against blood pressure control	0,626	0	12,826	0,000
Exercise habits on the quality of life of people with hypertension	0,339	0	6,006	0,000

Low salt diet to the quality of life of people with hypertension	0,271	0	3,846	0,000
Blood pressure control on the quality of life of people with hypertension	0,383	0	4,694	0,000
Exercise habits to control blood pressure to the quality of life of people with hypertension	0	0,211	3,898	0,000
Low-salt diet against blood pressure control to the quality of life of people with hypertension44	0	0,366	4,355	0,000

5. Discussions

There are systems in the body that try to maintain stable blood pressure in the long term by preventing sudden changes in blood pressure due to circulatory disorders. The blood pressure system is very complex controlled. Initial control begins through the nervous system, namely cardiovascular reflexes, chemoreceptor reflexes, ischemia responses, CNS (central nervous system) originating from the atria, and smooth muscle of the pulmonary arteries. The hormones vasopressin and angiotensin control fluid movement in the capillary and cavity circulations in the next phase. Finally, the control of blood pressure stability will be continued by a potent and long-lasting system that regulates the number of body fluids with various organs. In primary hypertension, the increase in blood pressure is caused by changes in cell membranes and kidneys, the activity of the sympathetic nerves, and the renin-angiotensin system (a role in hemodynamics, sodium intake, and sodium metabolism in the kidneys), and endothelial factors.

Control of hypertension and prevention of coronary heart disease can be done by changing the risk factors, namely: 1. Lose excess weight / overcome obesity; 2. Reduce salt intake in the body; 3. Create a relaxed state; 4. Doing regular exercise; 5. Quit smoking; and 6. Reduce alcohol consumption.

Hypertension management aims to get a blood pressure of less than 140/90 mmHg and less than 130/80 mmHg for diabetes mellitus and kidney failure. Reducing cardiovascular mortality and preventing complications of kidney disease are also goals for treating hypertension. Management can be done through non-pharmacological therapy (with lifestyle modifications) and pharmacological therapy. (http://intissarisainsmedis.weebly.com/)

Exercise is safe enough for people with hypertension. However, you should still use blood pressure-lowering drugs from a doctor before starting a blood pressure-lowering program with exercise training in hypertension sufferers with blood pressure more than 180/110 mm Hg. However, the medical condition of people with hypertension is different from that of healthy people. Therefore, it is necessary to exercise that is also explicitly done. Exercises that are done must be gradual and should not be forced. Exercise is done with light intensity slowly according to ability.

The quality of a person's life can be measured from various aspects of human life. One of them is the WHO designed the manufacture of an instrument for measuring the quality of human life, which we knew as the World Health Organization Quality of Life 100 (WHOQOL-100), where the World Health Organization Quality of Life Life-BREF (WHOQOL-BREF) is a simpler version. This instrument measures the quality of human life in terms of several aspects such as physical, psychological, social, and environmental relationships. This instrument has been used widely, including. To assess the quality of—the life of a person suffering from certain diseases (WHO, 2012).

6. Conclusion

Based on the results of research and discussion in the previous chapter related to exercise habits, low-salt diet, blood pressure control, and quality of life of people with hypertension, the following conclusions can be drawn: Exercise habits positively affect blood pressure control by 36.6%; A low-salt diet has a positive effect on blood pressure control by 62.6%; Exercise habits positively affect the quality of life of hypertensive patients by 33.9%; A low-salt diet has a positive effect; The quality of life of hypertensive patients is 27.1%; Blood pressure control has a positive effect on the quality of life of hypertensive patients by 38.3%; Exercise habits have an indirect positive effect on the quality of life of hypertensive patients through blood pressure control of 1.4%; In comparison, the total effect is 1.4%. It is 35.3%, and a low-salt diet positively affects patients' quality of life with hypertension by controlling blood pressure by 2.4%, while the total effect is 29.5%.

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