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Back Massage and Noni Fruit (*Morinda citrifolia*) Reduced Blood Pressure in People with Hypertension

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Abstract

Hypertension is an increase in blood pressure caused by decreased elasticity of blood vessels and that often found in the elderly. Blood pressure is the resistance of blood vessels when the blood flow throughout the body. Hypertension can be treated with non-pharmacological therapy such as back massage and drink noni fruit (Morinda citrifolia) processed. Back massage can decrease blood pressure caused by the presence of mechanoreceptor as vasodilators. Noni fruits have scopoletin as vasodilators and xeronin as deuretics. This study aimmed to determine the effect of back massage and consuming processed from noni fruit to blood pressure in hypertension at Clinical Region of Public Health Center II North Denpasar. This research used Quasi-experiment with nonequivalent control group design. Samples of 26 respondents were divided into the treatment (intervention) group and the control group. Results showed that Paired T-test of systolic pressure had p=0.001; Diastolic pressure had p=0.003; And Mean Arterial Pressure p=0,001. Result of the Independent T-test showed that systolic pressure p was 0,048; Diastolic pressure p was 0.011; And Mean Arterial Pressure p was 0.005 (≤α=0,05). There was significant effect of back massage and noni fruit processed on the decreased blood pressure in people with hypertension. Expected back massage and noni fruit preparations can be used as an alternative to decreasing blood pressure in people with hypertension.

***Keywords**: hypertension, blood pressure, back massage, noni fruit*

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INTRODUCTION

Hypertension is a condition in which a systolic blood pressure is equal to or greater than 140 mmHg and diastolic blood pressure is equal to or greater than 90 mmHg. Hypertension is a disease that can lead to other diseases such as stroke. Many factors affect hypertension, such as genetics, sympathetic nervous system hyperactivity, renin angiotensin system, increased intracellular Na^+ and Ca^+ and risk-boosting factors such as emotions, obesity, alcohol, smoking (1).

Hypertensive disease is estimated to cause 7.5 million deaths or about 12.8% of total deaths (2). WHO estimates the number of hypertensive patients will continue to increase

about 29% of the world's citizens by 2025 as the population grows. The prevalence of hypertension in Indonesia shows alarming figures. Prevalence of hypertension in Indonesia based on measurement result at age ≥18 year equal to 25,8%. Interviews (diagnosed or had taken drugs) increased the prevalence of hypertension from 2007 by 7.6% to 9.5% in 2013. Most (63.2%) of cases of hypertension in the community were not diagnosed (3).

Based on the data recorded in 2015, the highest hypertension was in Tabanan regency about 14,081 people, Denpasar 13,551 people, Bangli 3,457 people, Jembrana 2,700 people, Karangasem 793 people, Badung 775 people and Klungkung 759 people (4). Based on data from Denpasar Health Office in 2017, puskesmas with highest hypertension patient in Denpasar area was Puskesmas II North Denpasar recorded in period of December 2016 as many as 247 people and on female gender equal to 128 people and men 119 people. The dominant cases entered the elderly category from the age of 55 years until the age of >70 years as many as 211 people. Based on data on February 14, 2017, hypertensive patients in 3 villages included in Guided Posing Post as many as 106 visits with 43 elderly people aged above or equal to 60 years (4).

There are two techniques of management of hypertension, namely pharmacology and non-pharmacology. Nonpharmacology management including relaxation is an intervention that can be performed on any hypertension (1). One method that can be used in massage which is one of the relaxation of back massage with massage techniques in the form of interval of hand, squeeze, friction, efluration, petriation and pressure brushing (5).

Back massage will be more effective when combined with other actions such as the use of aromatherapy oils and the consumption of foods or drinks that can lower blood pressure. One of the other actions with the processing of noni fruit. The previous study proved that Noni fruit can lower blood pressure because of the active ingredients such as scopoletin that can reduce peripheral resistance and xeronin work as deuretic that can reduce the volume of urine, so that blood pressure can decrease with the reduced of urine produced in the body (6). According to other studies, Noni fruit can lower blood pressure and raise blood pressure to normal (7). The working system of scopoletin is as a vasodilator that can lower blood pressure by relaxing the vascular smooth muscles so that the decreased arterial pressure also results in decreased blood pressure (8).

The purpose of this study was to determine the effect of back massage and noni fruit preparations in hypertensive patients in the Work Area Puskesmas II North Denpasar.

MATERIALS AND METHODS

This research was a quantitative research using Quacy Esperimental research design that is Nonequivalent Control Group Design. The population in this study was 43 visits in January 2017 with a sample size of 26 samples obtained by probability sampling technique in accordance with inclusion criteria and exclusion criteria. The inclusion criteria were: people age 60-74 years, systolic blood pressure and diastolic ≥140 / 90 mmHg to 200/100 mmHg, consuming or not hypertension drugs, patients willing to be respondents in this study by signing informed consent. The selected samples were divided into 2 groups, namely the treatment group and the control group.

This research was conducted at Work Area of Puskesmas II North Denpasar from April 10th, 2017 until May 22th, 2017. Variable in this research was blood pressure of hypertension patient obtained by measurement with sphygmomanometer digital before and after 4 weeks as result of pre-test and post-test treatment in the treatment group and control group. The statistical test used was independent t test and paired t test to know

the difference and influence of back massage treatment and processed noni fruit.

RESULTS AND DISCUSSION

The characteristics of respondents in the control and treatment groups based on sex were presented in **Table 1**.

Table 1. Characteristics of Respondents by Gender at Puskesmas II North Denpasar in the Year 2017

Gender	Control		Intervention	
	f	%	f	%
Male	5	38.5	2	15.4
Female	8	61.5	11	84.6
Total	13	100.0	13	100.0

Source: Primary Data Year 2017

Based on **Table 1**, 38.5% of respondents in the control group were male and 61.5% were female, while 15.4% and 84,6% of respondents were male and female in the intervention group. This showed the majority of respondents were female in both groups. Another factor that affects blood pressure elevation was gender where women had a higher risk to have high blood pressure in the elderly. This was due to hormonal changes in women after menopause so the elasticity of blood vessels in women was lower. Women who had not menopause yet protected by estrogen hormones that play a role in increasing levels of High Density Lipoprotein (HDL). Low HDL cholesterol levels and high LDL cholesterol (Low Density Lipoprotein) affected the occurrence of the process of atherosclerosis (9).

Based on **Table 2** it can be interpreted that most of the respondents in the control group was aged 60-64 years (7 people, 53%). In the treatment group, most of elderly had the aged 65 -69 years (13 people). The results of this study showed that the average age of respondents in the control group was 64.92 years and in the treatment group 67.85 years.

The age affected the increased of blood pressure, because the physiological blood

Table 2. Characteristics of Respondents by Age at Puskesmas II North Denpasar Year 2017

Age (years old)	Control		Intervention	
	f	%	f	%
60-64	7	53.8	1	7.7
65-69	5	38.5	7	53.8
70-74	1	7.7	5	38.5
Total	13	100.0	13	100.0

Source: Primary Data Year 2017

vessels from the age of the infant to the elderly have a change. At the age of the children the blood pressure tended to be low whereas in elderly it tended to increase due to changes in elasticity of blood vessels (10).

According to **Table 3**, in the treatment group, mean systolic blood pressure before and after treatment respectively were 157,08 mmHg and 146,62 mmHg. The mean diastolic blood pressure before and after treatment were 82,08 mmHg and 78,85 mmHg respectively. The average of MAP (Mean Artery Pressure) before and after treatment equal to 107,08 mmHg and equal to 102,10 mmHg respectively. The results of this study showed that the average blood pressure in the treatment group of systolic, diastolic, and MAP tended to decrease.

Table 3 also showed that in the control group the mean systolic blood pressure before treatment (pre-test) was 156.23 mmHg and after treatment (post-test) was 159.08 mmHg. The mean diastolic blood pressure before treatment (pre-test) was 87,85 mmHg and after treatment (post-test) was 88,00 mmHg. The average of MAP (Mean Artery Pressure) before treatment (pre-test) was equal to 110,64 mmHg and after treatment (post-test) was equal to 111,69 mmHg. The results showed that the mean values in the control group tended to increase. From the result, it can be said that hypertension patients before and after treatment in treatment group at Puskesmas II North Denpasar was included in hypertension stage 1 but decreased compared to control group. This was supported by research

Table 3. Table of Blood Pressure Observation Pre-Post Test Back Massage and Noni Fruit Processed Fruit Processing at Intervention Group and Control Group at Puskesmas II North Denpasar

	Systolic		Diastolic		MAP	
	Pre	***Post***	***Pre***	***Post***	***Pre***	***Post***
Intervention						
Mean	157.08	146.62	82.08	78.85	107.08	102.10
Median	152.00	145.00	80,00	77.00	105.33	102.33
Variance	198.41	344.25	31.57	50.64	37.74	69.993
Minimum	142	124	73	67	100	86
Maximum	186	185	91	89	121	118
Control						
Mean	156.23	159.08	87.85	88.00	110.64	111.69
Median	153.00	159.00	90.00	90.00	110.00	112.33
Variance	131.85	119.41	56.47	92.83	42.21	56.762
Minimum	143	144	78	70	101	98
Maximum	185	181	98	100	122	123

Source: Primary Data Year 2017

on the influence of back massage on the blood pressure. Blood pressure decreased in hypertension patients from the value of 17,34 / 10,31 mmHg from before the average treatment of blood pressure equal to the value of 160,78 / 96,56 mmHg to 143,43 / 86,09 mmHg (11). This occured because of the mechanoreseptor that changes the stimulation of touch to vasodilatation on blood vessels so that blood pressure decreases (5). In addition to the back massage, the drop in blood pressure was also occured caused by the provision of Noni fruit. Megawati mentioned that Noni fruit could lower the blood pressure with systolic average of 158 mmHg and diastolic 93 mmHg while MAP of 106.13 mmHg. This was occured due to the vasodilation of blood vessels derived from the scopolotin substance in Noni fruit that was able to widen scopoletin capable of widening the narrowed blood vessels (8).

Based on **Table 4,** there was difference of systolic blood pressure in treatment group with p value of 0,001. The 0.003 result stated that there was a difference in diastolic blood pressure in the treatment group. This was a difference in blood pressure of MAP (Mean Artery Pressure) in the treatment group. The results of this study were in line with research conducted by Udani which reported that there was a difference in blood

Table 4. Blood Pressure Differences Analysis Before and After Treatment Back Massage and Giving Noni fruit on Intervention Group

Dependent Variables	*Test*	*Mean (mmHg)*	Difference	*p-value*
Systolic	*Pre* *Post*	157.08 146.62	10.46	0.001
Diastolic	*Pre* *Post*	82.08 78.85	3.23	0.003
Average (MAP)	*Pre* *Post*	107.08 102.10	4.98	0.001

Source: Primary Data Year 2017

pressure before and after massage. It could be concluded that there was influence of massage to blood pressure due to relaxation effect (12).

Table 5. Blood Pressure Difference Analysis Before and After Treatment Back Massage and Giving Noni fruit in Control Group

Dependent Variables	*Test*	*Mean (mmHg)*	Difference	*p-value*
Systolic	*Pre* *Post*	156.23 159.08	-2.85	0.256
Diastolic	*Pre* *Post*	87.85 88.00	-0.15	0.965
Average (MAP)	*Pre* *Post*	110.64 111.69	-1.05	0.658

Source: Primary Data Year 2017

Based on **Table 5,** blood pressure of respondent in control group before and after 4 weeks had p-value of 0,256. It was stated that states there was no difference of systolic blood

pressure in group control. The p-value of 0.965 was indicated that there was no difference in diastolic blood pressure in the control group. The p-value of 0.658 was also stated that there was no difference in MAP (Mean Artery Pressure) blood pressure. Based on the results of the above study there were a decrease of blood pressure in respondents that received treatments higher than those in not treated respondents. Increased blood pressure in the control group occurred as a result of factors that affected blood pressure, such as higher levels of stress due to no stimulus that deliberately given to the body.

Table 6. Blood Pressure Differential Analysis of Treatment Group after Treatment of Back Massage and Noni Fruit Fruit Processing and Control Group without Back Massage and Giving Treatment of Noni fruit

Dependent Variables	Group	*p-value*
Systolic	Intervention Control	0.048
Diastolic	Intervention Control	0.011
Average (MAP)	Intervention Control	0.005

Source: Primary Data Year 2017

Based on **Table 6**, it was found that there was a difference in systolic blood pressure after the treatment between two groups with p-value of 0,048. Diastolic blood pressure in the treatment group and control group after treatment also different with p-value of 0.011. Mean blood pressure (MAP) in the treatment group and control group after treatment was a different with p-value of 0.005. These results indicated that there was influence of giving backage and processed Noni fruit to blood pressure in patients with hypertension (p-value <0.05).

Noni fruit can lower blood pressure due to the active substance of scopoletin which stimulates blood vessels to perform vasodilatation and xeronin which can increase the production of urine in order to lower blood volume and resulting in the lower blood pressure (12). The statement was also in line with previous research that reported Noni fruit extract lowered systolic, diastolic and mean artery pressure significantly due to the presence of a scopoletin substance that had capability of widening the blood vessel wall that was resulting in the flow of blood from the heart and the whole body becoming smooth and consequently reduced the pressure blood (13).

Non-pharmacological relaxation is considered to be effective in any hypertension. Back massage and fruit processing Noni fruit was 2 of several non-pharmacological techniques that would lower blood pressure in people with hypertension (12). The content of Noni fruit Scopoletin lowered high blood pressure and normal becomes low (abnormal hypotension). However, the scopoletin contained in M. citrifolia fruit may interact synergistically with other nutraceuticals to regulate high blood pressure to normal, but not lower normal blood pressure. In Noni fruit there was a mixture of acid and sugar. Acid contains chemicals in the form of potassium that can lower blood pressure through the decrease of blood cholesterol (LDL) so that blood circulation can be smooth (14). Sugar serves as a flavor enhancer in processed Noni fruit, so that the respondents could consume sugar not more than a teaspoon in 100 cc of Noni fruit extract(15).

Back massage in theory is a massage technique or relaxation technique in the form of hand interval, crushing, friction, efluration, petriation and brushing pressure that works by activating the mechanoreseptor that drains stimulation to the central nervous system to provide vasodilation effect (7). Back massage requires oil during the massage process where the oil works to lubricate the body and facilitate hand movements during the massage (16). In this case, massage gives an emphasis in the body to stimulate some nerve points that can reduce blood pressure. Pressure given using the thumb and legs used in acupressure techniques.

Acupressure can reduce blood pressure from 146,5 / 92,6 mmHg to 135,6 / 82,6 mmHg by expediting blood flow using the point on the right side of the left of the fourth backbone that serves to smooth the blood flow. In this study, indirectly researchers used acupressure techniques on strocking techniques performed during back massage, so that the drop in blood pressure occured very quickly. It could be predicted that the combination of back massage with the consumption of Noni fruit by taking the points associated with the symptoms and etiology of hypertension could be done to lower blood pressure (17).

From the reactions generated on the given treatment, back massage and noni fruit, blood pressure maybe lowered by simultaneously providing vasodilation effect of blood vessels due to increased parasympathetic nerve work and absorption of scoplotetin. In addition, the xeronin content in Noni fruit can also be deuretic by increasing the volume of fluid by expelling fluid through the urine and potassium content in acid that can lower cholesterol (LDL) which affects the blood vessels so that blood pressure can decrease. In this study stated that there was influence of back massage and fruit processed Noni fruit on blood pressure in patients with hypertension, due to equally provide vasodilating effect of blood vessels that can lower the work of the heart and lower blood pressure. It can be an alternative choice of non-pharmacological therapy and can be given to hypertensive patients every 2 times a day (3 times a week) on a regular basis.

CONCLUSIONS AND RECOMMENDATION

Blood pressure in patients with primary hypertension in the treatment group and the control group during pre-test and post-test was different. Based on the results of the test and discussion, it be concluded that there was influence of back massage and processed noni fruit on the blood pressure before and after treatment. This could be seen from the change of blood pressure, where in the treatment group there was a decrease of mean systolic blood pressure by 10,46 mmHg with p-value 0,001, diastolic 3,23 mmHg with p-value 0,003, and MAP 4,98 with p-value 0.001. Compared with the control group, the result of the difference was minus value. It can be concluded that there was significant effect of back massage and processed noni fruit on blood pressure in hypertensive patients in elderly age 60-74 (elderly) due to the same effect vasodilation of blood vessels from both treatments, ie back massage and noni fruit fruit processing.

Puskesmas II Denpasar Utara, may give health education about hypertension handling non-pharmacological by using back massage and processed Noni fruit to hypertension patient who visited in Puskesmas. For Community Nurses, it is suggested to make back massage and processed noni fruit as complementary (non-pharmacology) therapy to decrease blood pressure of primary hypertension patient. For further researchers, it is better to identify confounding factors such as stress, race, medications (especially blood pressure enhancers) so that the research can dig deeper and develop more deeply. In addition, it is expected to measure blood pressure from both arms of the right arm and left arm in sitting position, lying or standing. Further researchers are also expected to use acupressure techniques as a combination in back massage, so that it can be discussed more widely related to changes in blood pressure.

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