

Foot Soaking Therapy with Warm Water Decrease Blood Pressure of Patients with Hypertension

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Abstract: The goal in caring patients with hypertension is to maintain normal blood pressure. Foot soaking therapy is a relaxation technique that could be used to manage blood pressure. This study analyzed the effect of foot soaking therapy with warm water on blood pressure in elderly. This research used quasy experimental with control group pretest-posttest design. The sampling technique was purposive sampling involving 30 respondents divided into 15 respondents as experimental group and 15 respondents as control group. Foot soaking therapy was done in 5 days within 15 minutes for each session. Data were analyzed by using dependent and independent t test with confidence interval of 95% ($\alpha = 0.05$). There was significant difference of blood pressure after therapy (p sistolic = 0.001; p diastolic = 0.001). Meanwhile, there was no significant difference of blood pressure in control group (p sistolic = 0.682; p diastolic = 0.185). In both groups, the blood pressure of elderly with hypertension declined but higher in the intervention group than in the control group. There was a significant difference of blood pressure between two groups (p sistolik = 0.001 and p diastolic = 0.001). The relaxation effect of foot soaking therapy stimulates the pituitary gland to release endorphine hormone, causing systemic vasodilation. Therefore, foot soaking therapy using warm water affects the blood pressure on elderly with hypertension.

1 BACKGROUND

Elderly characterized by decreased of ability to improve or maintain its normal function due to degenerative health problems such as hypertension (Nugroho, 2000). Hypertension is an asymptomatic disorder accompanied by elevated systolic and diastolic blood pressure and is often referred to as "the silent killer" (Potter & Perry, 2005) (G, B, & Izzo, 2003). Raised blood pressure is the biggest single contributor to the global burden of disease and to global mortality. (Poulter, Prabhakaran, & Caulfield, 2015). Hypertension occurring in the elderly is due to changes in the structure and function of the blood vessels (Setyaningsih et al., 2014). Based on data from World Health Organization (WHO), in 2013 the number of uncontrolled hypertension clients increased from 600 million in 1980 to 1 billion in 2008 (World Health Organization, 2013).

Data based on Basic Health Research in Indonesia held in 2013 revealed that the prevalence of hypertension was the highest prevalence of degenerative diseases in elderly (based on measurement result at age ≥ 18 years). East Java is one

province with hypertension prevalence is high enough 26.2% (Badan Penelitian dan Pengembangan Kesehatan, 2013). Based on data from the health clinic at a social service in Jember as one district at East Java, Indonesia, the number of elderly who experienced hypertension in July to September 2017 as many as 53 people.

Management of hypertension aims to maintain blood pressure in the normal range and improve the health status and quality of life of the elderly. Generally, the management of hypertension is divided into pharmacological and nonpharmacological therapy. However, pharmacological therapy for the elderly has various problems such as dependency effects, elderly disobedience in taking antihypertensive drugs, and side effects that may arise due to drug administration (Aronow & Banach, 2012). Therefore, non pharmacological treatment can be done to support pharmacological treatment (Muttuqin, 2009). Non-pharmacological management such as foot soak therapy is a therapy with warm water to dilate muscle tissue of the blood vessels to make blood circulation smoothly (Solechah, Masi, & Rottie, 2016). Thus,

researchers want to analyze effect of foot soak therapy using warm water against blood pressure elderly in a Social Service at Jember Indonesia.

2 METHODS

This research was a quasy-experimental design used pretest-posttest design with control group. The sampling technique used purposive sampling involving 30 respondents divided into two groups, 15 respondents as treatment group and 15 respondents as control group. Elderly can be included at this research when they met the criterias such as: elderly with hypertension grade I with independent care, and agree to receive the therapy. While the exclusion criteras were: elderly with complicated hypentension, diabetes mellitus, and drop out. This research was conducted in a social service at Jember, Indonesia.

The study was conducted in March 2017 until December 2017. Elderly in intervention group got foot soak therapy that was given 1x daily (once a day) for five days with a duration of 15 minutes per session. While elderly at control group they did not got intervention or foot soak therapy so they did regular activities as usual. They got therapy as in intervention group after the research finished or in other word after the measurement at post test. Data collection techniques used mercury sphygmomanometer and stethoscope. Data analysis using descriptive and inferential analysisist that is dependent t-test and independent t-test with 95% confidence interval ($\alpha = 0.05$). This research applied ethics principals such as anonimity, confidentiality, justice, and beneficency.

3 RESULTS

3.1 Characteristics of Respondents

Table 1 below described characteristics of respondents determined by age, gender and history of smooking. It can be concluded that in both group, intervention and control group, the mean of age almost same, more than 70 years old. For gender, in both groups dominated by male, and most of respondents did not have history of smooking (66,7 % in intervention group, and 73,3 % elderly did not smooking in control group).

Table 1: Characteristic of respondents.

Characteristics	Intervention	Control
Age		
Mean \pm SD (year)	73.73 (8.77)	72.73 (7.95)
95%CI	68.88-78.59	68.33-77.14
Gender		
Male	8 (53.3%)	10 (66.7%)
Female	7 (46.7%)	15 (33.3%)
History of smooking		
Yes	5 (33.3%)	4 (26.7%)
No	10 (66.7%)	11 (73.3%)

3.2 Blood Pressure Measurements

Blood pressure in two groups were measured twice, firstly for pre test and second for post test for both systolic (SBP) and diastolic blood pressure (DBP) without any intervention in between pre test and post test. While in intervention group, pre test score was measured before elderly got foot soak therapy and post test was done after the therapy finished. Measurement results can be seen in Table 2.

Table 2: Blood Pressure in intervention and control group.

Variable	Mean (mmHg) (\pm SD)		Mean (Δ)	95% CI		P
	Pre	Post		Pre	Post	
Control Group						
BPS*	150.7 \pm 8.5	149.8 \pm 8.9	-0.8	146.5-154.9	145.5-154.1	0.68
DBP*	87.1 \pm 10.0	91.7 \pm 8.7	4.67	82-92.13	87.4-95.6	0.18
Intervention Group						
SBP*	161.3 \pm 13.4	134.5 \pm 9.8	-26.8	154.5-168.1	130-139.6	0.001**
DBP*	87.1 \pm 9.0	77.5 \pm 6.6	-9.6	82.7-91.9	74.5-80.7	0.001**

*SBP: systolic Blood Pressure

DBP: diastolic blood presssure

** : significance at $\alpha = 0,05$

Table 2 showed the differences of blood pressure for both SBP and DBP in pre test and

post test. There was a silence decreased for SBP from 150.7 (\pm 8.5) in pre test became 149.8

(± 8.9) in pos test. Meanwhile, the DBP increased from 87.1 (± 10.0) to 91.7 (± 8.7) at post test. But, based on statistically analyses used dependent t-test there were no differences of blood pressure between pre test post test in control group because the p value got 0.68 for SBP and 0.18 for BPP, that is $\text{mean} > \alpha$ ($\alpha = 0.05$).

In intervention group, the blood pressure decreased significantly in both SBP and DBP, that there were decreased as 26.8 point for SBP and 9.6 point for DBP. Therefore, there were differences of blood pressure (SBP and DBP) after the elder people got foot soak therapy ($p = 0.001$).

3.3 Effect of Foot Soak Therapy

Table 3 figured the result of independent t-test that suggest the differences of blood pressure in two group after foot soak therapy. The results showed that there was a significance difference of blood pressure mean (SBP and DBP) in between intervention and control group ($p = 0.001$). Hence, foot soak therapy can decrease the blood pressure in elderly with hypertension at a social service in Jember.

Table 3: The difference of blood pressure between intervention and control group.

Variable	<i>n</i>	Mean(mmHg) (\pm SD)	<i>p</i>
SBP*			
Intervention	15	-26.8(± 8.2)	0,001**
Control	15	-0.8 (± 7.3)	
DBP*			
Intervention	15	-9.6 (± 5.5)	0.001**
Control	15	4.67 (± 12.9)	

4 DISCUSSION

The average age of respondents in the treatment of foot soak treatment group was 73.73 years and the mean age in the control group was 72.73 years. Age is one of hypertension risk factors. The higher the age, the increase of the prevalence of hypertension (Davey, 2006). This is due to changes in the structure and function of blood vessels that occur in the elderly due to aging, where the blood vessels lose their elasticity thereby decreasing the blood vessel strain (Smeltzer and Bare, 2001) (Black & Hawks, 2014). Decreased stretching of the arteries and aorta causes a decrease in the ability to accommodate the volume of blood pumped by the heart. Thus, resulting in

cardiac output decreased and peripheral resistance increased (Stanley and Beare, 2006).

The results of this study also found that most of the respondents were dominated by male in each group, that is as many as 18 people (60%). Gender, as we know also one of hypertension risk factors. It is because male tend to be exposed to risky behaviors such as smoking (Howteerakul, Suwannapong, Sittilerd, & Rawdaree, 2006). Most of the respondents in this study did not have a smoking history of 21 (70%). Smoking can increase the risk of hypertension in the elderly (Aronow, 2011). The nicotine content in cigarettes can stimulate the adrenal expulsion so that the heart beats faster and increases the risk of thrombosis (ASH, 2013).

Based on the result, posttest mean of systolic and diastolic blood pressure in treatment group of foot soak therapy decreased equal to 26.8 mmHg and 9.6 mmHg. The changes in systolic and diastolic blood pressure can occur related to the relaxation response felt by the respondents after the intervention of foot soak given for five consecutive days and within the same time frame.

Warm foot water soak therapy is an intervention by utilizing the application of heat to the body to increase the blood circulation, refresh the body and provide an effect of increased relaxation (Handoyo, 2014; Permadi, 2015). The relaxation effect of foot soak therapy is the effect of hot water that stimulates the baroreceptor nerves thereby driving the impulses to the vasomotor center and resulting in vasodilation of the veins and arterioles. Vasodilation occurring in the arterioles causes peripheral resistance to decrease, thereby reducing venous return, and causing a decrease in cardiac output (Khotimah, 2012; Damayanti et al., 2014).

Foot soak therapy also stimulates the pituitary gland to release endorphin hormones that activate the parasympathetic nervous system and inhibit work rather than the sympathetic nerves. This results in systemic vasodilation resulting in decreased peripheral resistance and decreased blood pressure. In addition, the impulses received by the parasympathetic nerves will be sent to the SA node through the Vagus nerve. This encourages the release of acetylcholine stimulated decrease in heart rate. Stimulus that occurs in the parasympathetic nervous system also causes decreased contractility, stroke volume, and cardiac output as inotropic negative impact. This resulted in decreased stroke volume and cardiac output resulting a decrease in blood pressure (Muttaqin, 2009; George, 2007).

The result of statistical test showed that $p = 0.001$ which means that there was a significant difference

between pretest and posttest blood pressure value in elderly with hypertension after foot soak therapy. The results of this study are consistent with previous studies that found that a 3-day foot bath treatment with a duration of 30 minutes showed a significant decrease in blood pressure with mean systolic blood pressure drop -3.994 mmHg and diastolic -2.722 mmHg (Zahrah Z., 2016).

The difference results occurred in control group. Based on the results, it was obtained the average value of systolic blood pressure or diastolic pretest and posttest 150.67/87.07 mmHg and 149.87/91.73 mmHg. The results of pretest and posttest mean differences in systolic and elderly blood pressure with hypertension in the control group were -0.8 mmHg and 4.667 mmHg.

Based on the results of the study it was found that seven elderly respondents in the control group did not experience a decrease in blood pressure but increased blood pressure after 5 days observation on blood pressure. Researchers argue that this, influenced by excessive weight of the elderly. Obesity and aging process that occurs in the elderly can affect the structure of the heart, kidneys, and blood vessels so that the risk of incidence of cardiovascular disease increases (Aronow et al., 2011).

The results also showed six elderly people had decreased blood pressure after 5 days of observation. Researchers argue that this was influenced by physical activity carried out by the elderly. Increased physical activity is done to increase blood flow to the heart and improve arterial function (Kowalski, 2010). This is supported by the results of research that by doing regular physical activity for 30-45 minutes a day is effective in reducing the relative risk of hypertension to 30 % (Kemenkes.RI, 2014).

Table 3 showed the results of independent t-test of systolic and elderly diastolic blood pressure with hypertension in the treatment and control group, ie p value of Systolic = 0.001 and p value of diastolic which means $p < \alpha$ ($\alpha = 0,05$) a significant difference in systolic and diastolic blood pressure between the treatment group and the control group. Foot soak therapy with warm is an intervention by utilizing the application of heat to the body to smooth the blood circulation, refresh the body and provide an effect of increased relaxation (Handoyo K., 2014; Permadi, 2015).

Relaxation technique is a type of non-pharmacological management that can be given to the elderly and has been proven to lower blood pressure (Muttaqin, 2009). This study provides foot soak therapy for five days with a duration of 15 minutes in each session. Relaxation responses felt by the elderly

can affect the physiological body. The effects of foot soak therapy can stimulate the pituitary gland to release endorphin hormone. This will activate the parasympathetic nervous system and inhibit the sympathetic nervous system so that it can cause a drop in blood pressure (Muttaqin, 2009; George, 2007). The stimulus of foot soak therapy can also stimulate baroreceptor nerves to push the implus into the vasomotor center and lead to vasodilation of the veins and arterioles resulting in a decrease in blood pressure (Damayanti et al., 2014).

This study showed the differences of blood pressure between the two groups, so it can be concluded that foot soak therapy can lower blood pressure through stimulus in the pituitary gland to release endorphin hormones that cause stress on the sympathetic nervous system and improve the parasympathetic nervous system, increased activity of the parasympathetic nervous system that causes peripheral resistance decreased. The final result is blood pressure also can decrease.

5 CONCLUSIONS

Based on the result of research and discussion it can be conclude that there is significant influence of foot doak therapy with warm water against blood pressure elderly with hypertension. It is expected that warm food bath soak therapy can be applied by nurses as a nonpharmacological treatment to maintain blood pressure in hypertension on elderly.

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