

Research Article

The Influence of Foot Massage on Blood Pressure and Anxiety in Hypertensive Patients

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Abstract. Hypertension is one of the most common conditions in the world, and if it is not treated promptly, it can create not only physical but also psychological issues. Anxiety is a psychological issue that can exacerbate hypertension symptoms. In people with hypertension, foot massage reflexology is a non-pharmacological therapy. The purpose of this study was to see if foot massage reflexology may help patients with hypertension lower their blood pressure and anxiety. The research design used was a quasi-experimental pretest-posttest design with a control group. The sample consisted of 56 respondents, who were separated into two groups, with 28 respondents in the intervention group and 28 respondents in the control group. The HARS questionnaire was used to collect the data on anxiety levels, and a digital sphygmomanometer was used to assess blood pressure. The results of this study indicated that there was a decrease in systolic blood pressure of 24.54 mmHg and diastolic blood pressure of 9.75 mmHg, and a decrease in the anxiety score of 8.94 in the intervention group. The results of the ANCOVA statistical test suggested that there was a significant impact. This study concludes that giving foot massage therapy can significantly reduce systolic blood pressure, diastolic blood pressure and anxiety.

Keywords: anxiety, foot massage, hypertension

1. Introduction

High blood pressure often known as hypertension, is a condition in which the force of squeezing blood against the walls of the cavity where the blood is held rises [13]. Hypertension is a condition when systolic blood pressure is more than 140 mmHg and diastolic blood pressure is more than 90 mmHg on 2 measurements with an interval of 5 minutes in a state of enough rest/quiet [1].

Based on data in World Health Organization in 2017, Hypertension is thought to be responsible for 35.6 million fatalities annually, the majority of which are caused by heart disease and stroke. Hypertension also known as "The Silent Killer of Death". Hypertension affects around 1.13 billion individuals worldwide, which means that 1 in every three people is affected by Hypertension.

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Hypertension, if left untreated, can lead to medical complications such as chronic renal disease, coronary heart disease and stroke. However, it can also affect to psychological conditions such as anxiety [2]. Anxiety is an emotional reaction to subjective individual judgments influenced by the subconscious and the cause isn't known specifically [3]. Anxiety disorders that last a long time cause sleep disruptions, digestive problems, a weakened immune system, excretory system problems, and heart rhythm problems, all of which can contribute to hypertension [4].

If blood pressure and anxiety are not controlled, the condition of hypertension and anxiety will worsen [5]. Hypertension can be controlled in 2 methods, pharmacological and non-pharmacological methods. The use of medications to assist reduce and regulate blood pressure is known as pharmacological therapy. Pharmacological treatment, on the other hand, has adverse effects that can exacerbate the disease. This is due to the fact that each person's reaction to a medicine is different [6]. Complementary therapy can be used for a variety of non-pharmacological treatments. Complementary therapy can be one of the options for reducing the side effects of pharmaceutical treatment. Non-pharmacological treatments for hypertensive patients include stress reduction techniques, alcohol and smoke restrictions, exercise, relaxation and acupuncture [5]. Relaxation therapy, such as foot massage reflexology, is one of the supplementary therapies that can be used [7].

Foot massage reflexology is a method of massaging certain points on the feet, the benefits for health are unquestionable. Since the days of the ancestors, massage is believed to be able to overcome complaints such as muscle disorders, blood pressure disorders, and psychological disorders. Massage in the foot area will send a signal that stimulates the release of hormones such as endorphins, causing a relaxing effect so that blood pressure and anxiety will decrease. The body will produce many hormones such as serotonin, histamine, and bradykinin if the massage is done at a point. These hormones stimulate capillary and arteriolar dilation, which increases the circulation of small blood vessels and has a relaxing impact on stiff muscles, As a result blood pressure will decrease steadily [8].

2. Methods

This study is a quantitative study using a Quasi Experimental Pre-Posttest Design with Control Groups, which was carried out in the work area of the UPT Puskesmas Pasir Kaliki Bandung City on April 20, 2021 to May 2, 2021.

Sample size prediction is calculated with *G-Power Software 3.1.9.7* using *F-Test, ANCOVA : Fixed effect, main effects and interaction* with assumption *two-tails*, score $\alpha = 0.05$, *effect size = 0.6*, *power level = 0.8*. So that a sample of this study is 58 hypertensive patients who visited UPT Puskesmas Pasir Kaliki in Bandung City and were chosen using a purposive sampling technique. The inclusion criteria were that the patients were 35-65 years old, not pregnant, and had no skin damage on their lower extremities, such as burns, gangrene wounds or tumors.

A digital sphygmomanometer was used to take blood pressure readings, which had been calibrated with wearable findings. Meanwhile, anxiety is measured using the HARS (Hamilton Anxiety Rating Scale) questionnaire, which has been tested for validity and reliability with valid and reliable results. Data analysis in this study was carried out using IBM SPSS statistical software version 23 with Paired T Test and ANCOVA statistical tests

3. Result

3.1. Characteristics of respondents

Based on Table 1, As can be seen, the majority of respondents (64.3%) are women with an average age of 55.46 (SD=5.27) with the majority of the last education (26.8%) being Vocational School and working as housewives (50.0%). Most respondents (42.9%) had been diagnosed with hypertension for 2 years. All respondents (100%) took anti-hypertensive drugs.

The results of the Independent T Test (p value >0.05) and Chi-Square (p value <0.05) indicate that there wasn't significant difference between the control group and the intervention group in the matter of age, last education, duration of hypertension and taking antihypertensive drugs. And there are significant differences in gender.

3.2. Lowering Blood Pressure and Anxiety Before and After the Foot Massage Intervention

The Paired T Test was carried out to prove the hypothesis that had been made previously, namely the effect of foot massage on reducing blood pressure and anxiety in hypertension sufferers in the intervention group and the control group because it tested two paired samples on the same subject.

Based on the table above, the average systolic blood pressure in the intervention group decreased from 165.18mmHg (SD=13.004) to 140.64mmHg (SD=12.535) with a p

TABLE 1: Characteristics of Respondents Based on Gender, Age, Last Education, Occupation, Length of Suffering from Hypertension and Consuming Anti Hypertension Drugs (n : 56)

Variable	Total n=56 (%)	Intervention n=28 (%)	Control n=28 (%)	p-Value
Gender				0.093
Male	20 (35.7)	11 (19.6)	9 (16.1)	
Female	36 (64.3)	17 (30.4)	19 (33.9)	
Age (Mean±SD)	55.46±5.27	53.57±5.37	57.36±4.47	0.200
Education				0.049
Elementary	16 (28.6)	5 (8.9)	11 (19.6)	
Junior High	10 (17.9)	6 (10.7)	4 (7.1)	
Senior High	24 (42.9)	15 (26.8)	9 (16.1)	
Bachelor	6 (10.7)	2 (3.6)	4 (7.1)	
Occupation				0.008
Employee	5 (8.9)	4 (7.1)	1 (1.8)	
Government	8 (14.3)	4 (7.1)	4 (7.1)	
Entrepreneur	12 (26.8)	7 (12.5)	8 (14.3)	
House Wife	28 (50.0)	13 (23.2)	15 (26.8)	
Hypertensive Time Suffering (Mean±SD)	3.20±2.77	4.25±3.58	3.13±3.08	0.471
Anti-Hypertensive Drug Consumption				0.000
Yes	56 (100.0)	28 (50.0)	28 (50.0)	
No	0 (00.0)	0 (00.0)	0 (00.0)	

value of 0.000 (p value <0.05). Then the average diastolic blood pressure decreased from 91.93mmHg (SD=9.970) to 82.18mmHg (SD=7.124) with a p value of 0.000 (p value < 0.05) and then the average anxiety score also decreased from 33.57 (SD=4.574) to 24.61 (SD=3.119) with a p value of 0.000 (p value <0.05). Based on the results of the Paired T Test statistical test, it was known that the P Value < ($\alpha = 0.05$) there was a significant decrease between the average systolic pressure, diastolic blood pressure and anxiety score after being given foot massage intervention. The data analysis can conclude that there are significant differences in blood pressure and anxiety before and after being given foot massage intervention in the intervention group.

In addition, in the control group the average systolic blood pressure decreased from 168.64mmHg (SD=12.664) to 165.96 (SD=12.802) with a p value of 0.001 (p value <0.05), while the average diastolic blood pressure decreased from 93.32 mmHg (SD=9,460) to 89.57mmHg (SD=6,298) with a p value of 0.010 (p value < 0.05). Then for the average anxiety score decreased from 31.18 (SD = 5,690) to 30.43 (SD = 5,322) with a p value of 0.000 (p value < 0.05).The ANCOVA statistical test was carried out to determine the

TABLE 2: Blood pressure and anxiety levels were compared before and after the foot massage intervention (n=56)

Variable	Mean±SD		Mean Difference	t	p-Value
	Pre Test	Post Test			
Systolic					
Intervention	165.18±13.004	140.64±12.535	25.54	-19.438	0.000
Control	168.64±12.664	165.96±12.802	2.68	-3.543	0.001
Diastolic					
Intervention	91.93±9.970	82.18±7.124	9.75	-7.266	0.000
Control	93.32±9.460	89.57±6.298	3.78	2.760	0.010
Total Score Anxiety					
Intervention	33.57±4.574	24.61±3.119	8.96	-18.528	0.000
Control	31.18±5.690	30.43±5.322	0.75	4.104	0.000
Psychology					
Intervention	13.46±3.636	9.89±2.499	3.57	-10.660	0.000
Control	12.46±3.666	12.25±3.503	0.21	2.274	0.031
Somatic					
Intervention	20.11±3.035	14.71±2.209	5.40	-14.493	0.000
Control	18.71±2.774	18.18±2.539	0.53	4.920	0.000

difference between giving foot massage to reducing blood pressure and anxiety in the intervention group and the control group before and after being given treatment.

Based on the results of the ANCOVA statistical test on systolic blood pressure, diastolic blood pressure and anxiety scores, the P Value < α ($\alpha = 0.05$), so it can be concluded that H_0 was rejected and H_a was accepted. The data analysis shows that after receiving foot massage, the intervention and control groups have substantial variations in systolic blood pressure, diastolic blood pressure, and anxiety.

4. Discussion

4.1. Characteristics of respondents

The total number of persons that took part in this study was 56, with 36 women and 20 men. Women are more vulnerable to stress because their brain cells are more sensitive to stress hormones, which can cause hypertension by activating the sympathetic nervous system, resulting in an intermittent (uncertain) rise in blood pressure. When someone is stressed, adrenaline hormone rises, causing an increase in blood pressure due to artery constriction (vasoconstriction) and a rise in heart rate [9].

TABLE 3: Comparison of Systolic Blood Pressure Decreases in the Intervention and Control Groups before and after receiving Foot Massage (n=56)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Sistolik Blood Pressure					
Corrected Model	7747.310	2	3738.655	125.949	.000
Intercept	250.141	1	250.141	8.427	.005
Group	2693.176	1	2693.176	90.729	.000
Pre Test Systolic	7309.292	1	7309.292	246.238	.000
Error	1573.244	53	29.684		
Total	1569165	56			
Corrected Total	9050.554	55			
Diastolik Blood Pressure					
Corrected Model	2371.599	2	1185.799	22.808	.000
Intercept	23.579	1	23.579	.454	.504
Group	365.065	1	365.065	7.022	.011
Pre Test Systolic	2344.438	1	2344.438	45.093	.000
Error	2755.526	53	51.991		
Total	485573	56			
Corrected Total	5127.125	55			
Anxiety Score					
Corrected Model	1327.560	2	663.780	183.647	.000
Intercept	5.599	1	5.599	1.549	.219
Group	742.864	1	742.864	205.527	.000
Pre Test Systolic	1247.399	1	1247.399	345.116	.000
Error	191.565	53	3.614		
Total	60215	56			
Corrected Total	1519.125	55			

In addition, women who enter menopause tend to have higher blood pressure because the level of the hormone estrogen, which functions to protect women from cardiovascular disease, is decreasing [7]. The outcome of this study are supported by research [6], from 30 respondents, 25 respondents were female. This is because women are more prone to experiencing hormonal imbalances due to menopause and stress.

The respondents in this study were 55.46 years old on average (SD = 5.27). Increasing age causes hormonal changes and changes in the vascular, the elasticity of the arteries decreases and becomes stiff [6]. This situation can cause the arteries to not expand when the heart pumps blood so that the blood flowing isn't smooth, cause increase in blood pressure [7]. These findings are consist with research conduct by [10] that the respondents average age is 55.77 years because as age goes on, the elasticity of

blood vessels will decrease so that it can cause blood flow not smooth as a result blood pressure increases.

In this study, 24 of the 56 participants had completed high school. The ability to manage and process information before it becomes harmful to one's health is influenced by one's educational degree [6]. This is in line with the findings of [2], who found that 17 out of 40 respondents have a vocational education, indicating that a person's attempts to preserve his health are influenced by his educational level.

In this survey, a total of 28 respondents worked as housewives. Physically active people have a greater heart rate, which means the heart muscle has to work harder every time it pumps blood [6]. This is in line with [6] research, which found that 19 out of 30 respondents experience greater stress as a result of excessive activity at home.

The results of this study showed that the average respondent has been diagnosed with hypertension for 3.20 years (SD = 2.77) and has a 100% medication adherence rate. However, over time a person tends to disobey because he feels tired of taking medication. The saturation factor of hypertensive patients undergoing treatment and the cure rate achieved isn't as expected can also be a factor in non-compliance [11]. This is in line with research by [11], many of the 21 respondents who had been diagnosed with hypertension for less than 5 years had a high degree of drug adherence because they still cared about their health.

4.2. The Influence Foot Massage

According to the findings of this study, hypertension patients who given foot massage therapy 3 times in a row for 30-45 minutes in 3 days indicate significant changes in systolic blood pressure, diastolic blood pressure and anxiety. This is evidenced by the decrease in mean systolic blood pressure from the intervention group from 165.18mmHg to 140.64mmHg (Decreased by 24.54mmHg) and diastolic blood pressure decreased from 91.93mmHg to 82.18mmHg (Decreased by 9.75mmHg). In addition, the average anxiety score in the intervention group decreased from 33.57 to 24.61 (decreased by 8.97).

Foot massage is a type of passive exercise that can have a soothing effect by reducing sympathetic nervous system activity, lowering blood pressure and increasing blood circulation in the body. Blood arteries dilate reflexively when nerve receptors are stimulated [6].

These findings are consist with research conduct by [12], in 57 people (5 men and 52 women) who received aroma foot massage intervention, which significantly reduced

the average SBP (p value = 0.02) before 114.1 mmHg and after the intervention 110.0 mmHg, DBP before intervention 70.5 mmHg and after intervention 68.8 mmHg (p value = 0.006), and There was a significant reduction in anxiety scores from 40 to 35 (p value = 0.003).

Massage induces the production of the hormone histamine, which aids in blood vessel dilatation [10]. As a result, blood flow, nutrient circulation, and oxygen distribution to body cells improve. Smooth blood circulation provides a calming and refreshing effect on all body members, the result in a balanced state for the body [7]. In addition, the impact of foot massage therapy is able to manipulate the body system, causing a relaxed condition, balancing blood flow throughout the body and reducing anxiety [4].

Based on the results of this study, the control group also decreased, this is evidenced by the results systolic blood pressure reduce from 168.64mmHg to 165.96mmHg (Decreased 2.68mmHg) and in diastolic it decreased from 93.92mmHg to 89.57mmHg (Decreased 4.35mmHg). Then, the decrease in anxiety scores in the control group from 31.18 to 30.43 (only decreased by 0.75). Because the control group's respondents had been diagnosed with hypertension for an average of 5 years, they had a high level of drug adherence. The opinion of World Health Organization, Antihypertensive medications aid in the reduction of hypertension-related problems by lowering and stabilizing blood pressure.

Based on research that has been done, there are differences in systolic blood pressure, diastolic blood pressure and anxiety scores after being given foot massage therapy in the intervention and control groups. This is evidenced by the p -Value of the ANCOVA test in the intervention group and control group is 0.000 (p value <0.05) on systolic blood pressure, 0.003 (p value <0.05) on diastolic blood pressure and 0.000 (p value <0.05) in anxiety score.

The data analysis states that there are significant differences in blood pressure and anxiety before and after being given foot massage intervention in the intervention group and the control group. This study concluded that giving foot massage therapy can significantly reduce systolic blood pressure, diastolic blood pressure and anxiety.

Therapy massage performed on a regular basis can lower levels of the stress hormone cortisol, as well as sources of depression and anxiety, allowing blood pressure to stable and physiological functions to improve [10]. According to [12], one of the best ways to reduce blood pressure and anxiety is with foot massage therapy.

The respondent felt calmer, his body felt lighter, and his headache was lessened after receiving this foot massage therapy. As a result, foot massage therapy may be advised as a supplemental therapy for blood pressure and anxiety prevention.

5. Conclusion

In this study, it was found that most of the respondents (64.3%) were female with 55.46 years old on average (SD=5.27) with the majority of the last education (26.8%) being Vocational School and working as housewives (50.0%). The average respondent has been diagnosed with hypertension for 3.20 years (SD=2.77). All respondents (100%) took anti-hypertensive drugs.

According the results of statistical tests using the Paired T Test in the control group and the intervention group, the results obtained with p-Value values of 0.000 each (p-Value < ($\alpha = 0.05$)). This means that an effect of foot massage on systolic, diastolic blood pressure and anxiety in patients with hypertension in each group.

The results of the ANCOVA statistical test on systolic blood pressure, diastolic blood pressure and anxiety scores, P Value < ($\alpha = 0.05$). The results of this study showed that the first hypothesis, that is H_0 is rejected and H_a is accepted, so it can be stated that there are significant differences in systolic blood pressure, diastolic blood pressure and anxiety in the intervention and control groups after being given foot massage intervention.

6. Suggest

6.1. For the Development of Nursing Science

This study can serve as a new reference for nursing science, particularly in the management of foot massage to controlled blood pressure and anxiety in hypertensive patients, as well as scientific evidence for controlled of foot massage on lowering blood pressure and anxiety in hypertensive patients.

6.2. For Further Research

It is intended that this study may be used as evidence-based research and as a title for future studies on the other benefits of foot massage therapy. REFERENCES

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