Original Articles

The Effect of Combination Progressive Muscle Relaxation and Music Therapy on Blood Pressure and Pulse in Patients with Primary Hypertension

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Abstract

Background: Hypertension is one of the causes of death in the world, which is also called a "silent killer". Hypertension does not cause symptoms in patients, but the incidence of hypertension as much as 90% is the event of primary hypertension. Hypertention that is not handled can be causing stroke, infarction myocardial, kidney failure and enselopathy.

Objective: The study purpose aimed to analyse the effect of a combination of progressive muscle relaxation and music therapy on blood pressure and pulse in patients with primary hypertension in Babatan RT 07 RW 01 Surabaya.

Methods: This research used Quasi-experiment with the design of a Non-equivalent Control Group Design. The population consists of 38 people with primary hypertension. The samples of 32 respondents with primary hypertension using nonprobability sampling with purposive sampling technique which was then divided into 2 groups, each of 16 respondents. Independent variable was a combination of progressive muscle relaxation and music therapy, while the dependent variables were blood pressure and pulse. The research instrument used a stethoscope, sphygmomanometer, and stopwatch for a pulse, and observation sheets to record the blood pressure and pulse results. Data analysis was using the paired t-test and independent t-test tests.

Result: The results showed that there were differences in blood pressure and pulse in the treatment and control groups before and after the intervention of progressive muscle relaxation and music therapy relaxation.

Conclusion: The independent T-test analysis results are obtained in systole, diastole, and the pulse value of $\rho = 0,000 < \alpha = 0.05$, so that H0 is rejected means that there is an effect of a combination of progressive muscle relaxation and music therapy on blood pressure and pulse.

INTRODUCTION

Hypertension or high blood pressure is one of the causes of death in the world; this disease is also called a "silent killer" because often hypertension does not cause symptoms in patients. The hypertension incidence as much as 90% is the event of primary hypertension. Someone suffering from hypertension usually has a higher pulse frequency, so the heart muscle must work harder at every contraction, when it gets louder and often the heart muscle pumps, it will cause higher pressure-charged to the arteries (Rumiati et al., 2019).

Based on data from the World Health Organization (WHO) estimates that the number of hypertension sufferers will continue to increase until 2025, and the events of hypertension worldwide reach more than 1.3 billion people. The prevalence of hypertension in Indonesia in 2016 based on a national health indicator survey noted that the incidence of hypertension was 32.4%. Based on Riskesdas records in the population aged >18 years recorded at 34.1% estimated number of hypertension cases in Indonesia was 63,309,620 people, with a death rate due to hypertension of 427,218 deaths (Riskesdas, 2018). The percentage of hypertension in 2019 is the estimated number of hypertensive sufferers aged ≥ 15 years in East Java Province around 11,952,694 populations, with a proportion of 48% male and 52% female. Of this amount, who received health services for hypertension sufferers of 40.1% or 4,792,862 residents. The city of Surabaya is one of the cities that have high hypertension sufferers with 720,378 residents (Dinkes Jatim, 2019). Based on initial data collection and observation in Babatan RT 07 RW 01 Surabaya in February 2021 it was found that 38 residents were suffering from primary hypertension.

The occurrence of primary hypertension cannot be known with certainty, but several theories indicate that genetic factors and hormonal changes can be a supporting factors (Baradero et al., 2008). In hypertension, some factors can pose a risk to a person suffering from hypertension, including age, gender and ethnicity, obesity, genetics, alcohol, stress, excessive salt intake, smoking, and physical activity patterns (Zainuddin et al., 2018). The stress factor can affect the emergence of primary hypertension because it is influenced by increased sympathetic nerve activity, in addition to affecting blood pressure increased sympathetic nerve activity also causes increased pulse, because the pulse is stimulated by sympathetic nerve fibbers and decreased pulse frequency is stimulated by parasympathetic fibbers (Rumiati et al., 2019).

Hypertention treatment can use pharmacological therapy or drug therapy and –non-pharmacological therapy, one of the Progressive Muscle Relaxation (PMR). Progressive muscle relaxation therapy can reduce blood pressure and pulse, this relaxation involves the contraction and relaxation of various body muscle groups so that it will cause relaxed effects and stop the voltage (Zainuddin et al., 2018). In addition to PMR, alternative therapy can be given of them, namely music therapy. Music therapy is one of the psychophysical therapies that have an inseparable physical and psychological impact. Music stimulation can activate specific pathways in various areas of the brain,

namely the limbic system when the limbic system is activated it will provide a relaxed sensation. This relaxed state will cause a decrease in blood pressure (Lita et al., 2019).

In previous studies, music therapy was used to lower blood pressure. However, in this study, the researcher updated music therapy combined with progressive muscle relaxation to lower blood pressure and pulse in hypertension patients. Therefore the researcher wants to know whether doing a combination of progressive muscle relaxation exercises and music therapy routinely can be more effective in influencing blood pressure and pulse in patients with primary hypertension in Babatan RT 07 RW 01 Surabaya.

METHODS

Study Design

This type of research used quasi-experimental research, using the Non-equivalent Control Group Design, a design that uses the treatment group and the control group.

Settings

This research was conducted in July 2021 at Babatan RT 07 RW 01 Surabaya, East Java Province, Indonesia.

Research Subject

The population of this study was primary hypertension sufferers in Babatan RT 07 RW 01 Surabaya, the research sample was 32 respondents with primary hypertension, each group was consisting of 16 respondents.

Instruments

The instrument used was a general data observation sheet, observation sheet of blood pressure and pulse measurement, stethoscope, sphymomanometer, natural sound music, and a stopwatch used to measure the pulse, pulse measurement was carried out for 1 minute.

Data Collection

Data collection in this study was carried out observations of blood pressure and pulse on the first day (pre-test) by both groups. Then in the treatment group, a combination of progressive muscle relaxation and music therapy (natural sounds) was given for 10 consecutive days, in the control group, hypertensive care education was given with leaflet media and without any treatment. Then on the 10th day, the two groups will be observed blood pressure and pulse after (post-test) given intervention. The two groups were not given the hypertension drug.

Data Analysis

Data analysis used the paired t-test and independent t-test with SPSS.

RESULTS

The data collected based on the examination results consists of several data, namely general data and special data according to the variables studied. General data of respondents includes respondents' characteristics. All of these data are presented in table 1.

Table 1. Respondent's Characteristics (July 2021)

Characteristics of Respondents	Treatment Group		Control Group	
	n	%	n	%
Gender				
Male	6	37,5	5	31,25
Female	10	62,5	11	68,75
Amount	16	100	16	100
Age				
35-45 Years	8	50	6	37,5
46-55 Years	8	50	10	62,5
Amount	16	100	16	100
Hypertension Hystory				
Yes	12	75	8	50
No	4	25	8	50
Amount	16	100	16	100
Routine Inspection Blood Pressure				
Yes	10	62,5	9	56,25
No	6	37,5	7	43,75
Amount	16	100	16	100
High Salt Consumption				
Yes	13	81,25	5	62,5
No	3	18,75	11	37,5
Amount	16	100	16	100
Smoking Habit				
Yes	5	31,25	5	31,25
No	11	68,75	11	68,75
Amount	16	100	16	100
Sport Habit				
Often	5	31,25	4	25
Seldom	6	37,5	8	50
Never	5	31,25	4	25
Amount	16	100	16	100

Source: Primary Data, July 2021.

Based on table 1 in the treatment group, the characteristics of the respondents are most (62,5%) are female, with half of them (50%) aged 35-45 and 46-55 years, most (62,5%) of respondents have the habit of routine blood pressure checks, almost all (81,25%) have high salt consumption habits, most (68,75%) of respondents have a smoking habit, almost half (37,5%) of respondent have infrequent exercise habits. In the control group, the characteristics of the respondents are most (68,75%) are female, most (62,5%) are aged 46-55 years, half of the respondents (50%) respondent have a hypertension hystory , most (56,25%) of respondents have routine blood pressure checks habit, the majority (62,5%) have high salt consumption habits, most (68,75%) of respondents have a smoking habit, and a half (50%) of respondent have rarely exercising habit.

Special data of respondents includes distribution of blood and pulse pressure before and intervention in the treatment and control group in table 2 and table 3, distribution of differences in the blood pressure and pulse of respondents before and after intervention in the treatment and control group in table 4, and in table 5 distribution of Independent t-test in the treatment and control group.

Table 2. Distribution of blood and pulse pressure before intervention in the treatment and control group

Group	(n)	Mean	SD
Treatment			
Systole Pre	16	154,25	9,574
Diastole Pre	16	97,31	4,571
Pulse Pre	16	89,31	4,012
Control			
Systole Post	16	152,63	7,719
Diastole Post	16	94,88	4,703
Pulse Post	16	87,69	2,983

Source: Primary Data, July 2021.

Based on table 2 shows blood pressure and pulse before giving a combination of progressive muscle relaxation and music therapy in the treatment group obtained average systole of 154,25 mmHg which means mild hypertension and with an SD Value of 9,574 the average diastole of 97,31 mmHg which means that means mild hypertension and with an SD Value of 4,571 and the average pulse is 89,31 which is more than adequate with an SD Value of 4,012. In the control group, the average systole of 152,63 mmHg which means mild hypertension and with an SD Value of 7,719 the average diastole of 94,88 which means mild hypertension and with an SD Value of 4,703 and the average pulse of 87,69 which means good with SD Value of 2,983.

Table 3. Distribution of blood pressure and pulse after intervention in the treatment and control group

Group	(n)	Mean	SD
Treatment			
Systole Pre	16	143,44	8,107
Diastole Pre	16	90,60	4,193
Pulse Pre	16	84,50	3,843
Control			
Systole Post	16	149,75	6,777
Diastole Post	16	93,75	4,187
Pulse Post	16	87,00	3,142

Source: Primary Data, July 2021.

Based on table 3 also shows blood pressure and pulse after giving a combination of progressive muscle relaxation and music therapy in the treatment group obtained average systole of 143,44 mmHg which means mild hypertension and with an SD Value of 8,107 the average diastole of 90,63 mmHg which means that means mild hypertension and with an SD Value of 4,193 and the average pulse is 84,50 which is more than adequate with an SD Value of 3,843. In the control group, the average systole of 149,75 mmHg which means mild hypertension and with an SD Value of 6,777

the average diastole of 93,75 which means mild hypertension and with an SD Value of 4,187and the average pulse of 87,00 which means good with SD Value of 3,142

Table 4. Distribution of differences in the blood pressure and pulse of respondents before and after intervention in the treatment and control group

Variable	Group	Mean	SD	ρ Value
Blood Pressure Systole	**Treatment**			
	Pre-Test	154,25	9,574	0,000
	Post-Test	143,44	8,107	
	Control			
	Pre-Test	152,63	7,719	0,000
	Post-Test	149,75	6,777	
Blood Pressure Diastole	**Treatment**			
	Pre-Test	97,31	4,571	0,000
	Post-Test	90,63	4,193	
	Control			
	Pre-Test	94,88	4,703	0,042
	Post-Test	93,75	4,187	
Pulse	**Treatment**			
	Pre-Test	89,31	4,012	0,000
	Post-Test	84,50	3,483	
	Control			
	Pre-Test	87,69	2,983	0,022
	Post-Test	87,00	3,141	

Source: Primary Data, July 2021.

Table 5. Distribution of Independent *T-Test* in the treatment and control group

Variable	Mean	SD	Difference	ρ Value
Systole Treatment	10,81	3,146		
Systole Control	2,88	2,553	7,938	0,000
Diastole Treatment	6,69	2,089		
Systole Control	1,50	1,751	5,188	0,000
Pulse Treatment	4,81	1,047		
Pulse Control	0,56	1,263	4,250	0,000

Source: Primary Data, July 2021.

Based on table 5 with Independent *T-Test* analysis, it shows a comparison of systole values, diastole blood pressure and pulse rate in the treatment and control groups after giving a combination of progressive muscle relaxation and music therapy, the value ρ=0,000 in addition to the value α < 0,05 which means ρ<α, then H_0 is rejected, meaning that there is a difference or influence of the combination of progressive muscle relaxation and music therapy on blood pressure and pulse in the treatment and control group.

DISCUSSION

Based on the study results showed blood pressure and pulse before giving a combination of progressive muscle relaxation and music therapy in the treatment group obtained an average Blood Pressure Systole of 154.25 mmHg, and Blood Pressure Diastole has obtained an average of 97.31 mmHg which means mild hypertension and average pulse obtained 89.31 which means more than enough. In the control group before hypertensive treatment was given an average of 152.63 mmHg, and Blood Pressure Diastole has obtained at an average of 94.88 mmHg which means mild hypertension and an average of 87.69 which was good. This study increased blood pressure and pulse in patients with primary hypertension due to several factors including, age, gender, hereditary medical history, high salt consumption habit, smoking, and physical activity. According to researchers, the factors that influence increased blood pressure and pulse in patients with primary hypertension in the Babatan RT 07 RW 01 are poor eating habits; this is evidenced by many people with hypertension sufferers who consume high salt foods. In addition, a medical history of a person's offspring can affect the occurrence of hypertension and increased pulse, in someone who has a high blood pressure history will cause the pulse to become fast, strong and irregular (Muhammad, 2017).

Based on the study results showed blood pressure and pulse after giving a combination of progressive muscle relaxation and music therapy in the treatment group obtained an average Blood Pressure Systole of 143.44 mmHg and the average Blood Pressure Diastole was obtained 90.63 mmHg which means mild hypertension and the average pulse was obtained 84.50 which is good. This is supported by the theory that was put forward by Sherwood (2011) explains that progressive muscle exercise can produce responses that can reduce stress, thus when doing progressive muscle relaxation with relaxed, calm and full of concentration for 30 minutes, there will be a decrease in the secretion of CRH (Corticotrophin Releasing Hormone) and ACTH (Adrenocorticotropic Hormone) hormone in the hypothalamus. The decrease in the two hormones will reduce sympathetic nerve activity so that the removal of adrenaline and non -adrenaline will decrease.

This condition decreases the frequency of the pulse, widening blood vessels, reduced resistance in blood vessels and decreased heart pumping. Progressive muscle relaxation will be more optimal if combined with music therapy, various studies show that music can inhibit and balance brain waves and be able to taunt the limbic system associated with emotions. When the limbic system is activated, the individual will feel relaxed. Music can affect shipmate adrenergic activity which has a role in the concentration of plasma catecholamine and also affects the release of the stress-released hormone and stimulates the body to produce nitric oxide (NO) molecules that work in tone blood vessels. The mechanism of action has a role in lowering blood pressure and pulse (Astuti, 2017). Based on the t-test independent analysis results shows the ratio of the blood pressure values of the systole, diastole and pulse of the treatment group treatment and control group after giving a combination of progressive muscle relaxation and music therapy obtained the value of $\rho = 0,000$ besides that the value of $\alpha < 0.05$ which means $\rho < \alpha$, then H0 is rejected, meaning that there is an

effect of a combination of progressive muscle relaxation and music therapy on blood pressure and pulse in the treatment and control group.

The study results are supported by the research results conducted by (Azzam et al., 2018) titled Effect of Progressive Muscle Relaxation Techniques and Music Therapy on Blood Pressure in the Elderly with Hypertension at Sasana Tresna Werdha (STW) Development = 0.04 <0.05 which means there is an effect on blood pressure before and after progressive muscle relaxation.

Non-pharmacological therapy that is recommended for lowering blood pressure includes progressive muscle relaxation and music therapy. Both of these therapies would be better if simultaneously because they would provide a more optimal effect in lowering blood pressure and pulse (Astuti, 2017). When a person performs progressive muscle relaxation, it can produce a response in the body, reducing stress, in addition when doing progressive muscle relaxation in a relaxed, calm and full concentration for 30 minutes there will be a decrease in hormones in the hypothalamus, where these hormones will reduce sympathetic nerve activity so that adrenaline and noradrenaline will decrease. This condition lowers blood pressure, pulse rate, and dilates blood vessels. Giving this music can be effective in stabilizing blood pressure if it is done for 15 until 20 minutes (Astuti, 2017).

Giving music therapy as a relaxation technique can make people with hypertention achieve a relaxed state and a stable emotional stateso that it can provide a decrease in blood pressure and pulse. The type of music is nature sound (calming music) without lyrics with a set tempo that makes a person feel comfortable and relaxed. Nature sound music is a mixture of music with a slow beat and nature sound such as the sound of gurgling water in the river, the sound of wind rustling in the trees, the sound of raindrops, birds chirping, and other natural sounds that can have a calming effect on everyone because the nature sound is close to the daily life of individuals (Lita et al., 2019). The combination of these two therapies can be used to control and reduce blood pressure and pulse in hypertensive patients when done regularly (Astuti, 2017).

Limitation
1. The implementation of this intervention cannot be carried out together at one time due to pandemic conditions so researchers come to respondents one by one (door to door) while still obeying health protocols.
2. Researchers cannot control other factors that can affect blood pressure such as the drugs use.

Conclusion
1. Patients with primary hypertension in the treatment and control group before the intervention has an average Blood Pressure Systole of 154.25 (mild hypertension), Blood Pressure Diastole of 97.31 (mild hypertension), and pulse of 89.31 (meaning more than enough). While the average

control group of Blood Pressure Systole was 152.63 (mild hypertension), Blood Pressure Diastole 94.88 (mild hypertension), and pulse was 87.69 (meaning more than enough).

2. Patients with primary hypertension in the treatment and control group after the intervention has an average Blood Pressure Systole of 143.44 (mild hypertension), Blood Pressure Diastole 90.63 (mild hypertension), and pulse of 84.50 (good meaning). While the average control group of Blood Pressure Systole was 149.75 (mild hypertension), Blood Pressure Diastole was 93.88 (mild hypertension), and pulse was 87.69 (good meaning).

3. There is an influence of a combination of progressive muscle relaxation and music therapy on blood pressure and pulse in patients with primary hypertension in Babatan RT 07 RW 01 Surabaya.

AUTHOR CONTRIBUTION

Vandarina Dwi Mayangsari   : Conceptualization, writing-original draft supervision, visualization

Yurike Septianingrum   : Methodology, formal analysis, writing-review and editing

Khamida   : Project administration, software, validation, and investigation

Farida Umamah   : Resources, data duration and funding acquisition

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CONFLICT OF INTEREST

The authors have consented and have no conflicting interests.

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