

THE EFFECT OF PHYSIOTHERAPY EXERCISES AND THERAPEUTIC COMMUNICATION ON REDUCING BLOOD PRESSURE AND BALANCE COMPONENTS IN THE ELDERLY

Ummu Laila Malik ^{1*}, Nukrawi Nawir ² and Irfan Idris ³

¹ Biomedical Science Study Program, Graduate School, Hasanuddin University, Makassar, Indonesia. * Corresponding Author Email: lhailha@gmail.com

² Department of Physiotherapy, Faculty of Sport and Health Science, Universitas Negeri Makassar, Indonesia.

³ Department of Physiology Faculty of Medicine Hasanuddin University, Makassar, Indonesia.

Abstract

The high life expectancy in recent years is due to the increase in health facilities, where the elderly or people over 60 years of age are increasing in population every year. The elderly with various degenerative diseases suffered began to realize their health and began to maintain it, one of the health maintenance efforts carried out was physiotherapy exercises. This study aims to determine the effect of physiotherapy exercises (slow deep breathing & tandem stance) and therapeutic communication (laughter therapy) on changes in blood pressure and balance components in the elderly. This study used a randomized control-group design pretest-posttest two groups. The sample obtained was 74 subjects consisting of 37 people in the control group who were not given intervention, and 37 people in the experimental group who were given physiotherapy exercises (slow deep breathing & tandem stance) and therapeutic communication (laughter therapy) and with exercise intensity 2 times a week. The study was conducted for 6 weeks with measuring instruments Sphygmomanometer for blood pressure, Geriatric Anxiety Scale (GAS) for anxiety and Timed up and go test (TUGT) for Balance. This study shows that there is a very significant effect on blood pressure in the experimental group pretest and post-test after being given physiotherapy exercises in the form of slow deep breathing along with therapeutic communication (laughter therapy) ($P = 0.000$) while in the control group the pretest and post test results show no effect ($P = 0.285$), while for the results of anxiety and balance measurements in the control and experimental groups there is no significant difference ($P = 0.000$). The combination of physiotherapy exercises (slow deep breathing & tandem stance) and therapeutic communication (laughter therapy) shows significant results in reducing blood pressure in the elderly but is not effective for balance and anxiety in the elderly.

Keywords: Elderly, Physiotherapy Exercises, Therapeutic Communication, Blood Pressure Values.

INTRODUCTION

The elderly or commonly called the elderly are individuals who experience a decrease in physical and mental function, which has difficulty in adapting to changes in themselves and the surrounding environment [1] [2]. Decreased physical function will lead to several diseases that lead to elderly balance where the risk of falling will increase [3]. Decreased physiological functions in the elderly such as muscle strength and during changes in body position can affect balance, elderly people with these disorders are less able to control their balance when walking so that the walking process will be a little slow and there are changes in walking patterns due to maintaining their balance [4].

Changes that occur in the neuromuscular elderly are a decrease in muscle mass and atrophy of leg muscles which will be assisted by the nervous system when working to contract will result in a decrease in the strength of the gastrocnemius muscle, as well as changes in somatosensory function in the form of proprioceptive disorders which will have a bad effect on the elderly balance system. This happens because muscle

strength and sensory system are included in the balance component [5]. The elderly with various functional declines that occur will become more vulnerable to more than one degenerative disease which will affect the mental and psychosocial conditions of the elderly [6].

Recent research has confirmed that doing regular exercise in the form of some physiotherapy exercises is very effective for controlling balance and blood pressure management. In a study given to elderly people with abnormal blood pressure with a total sample of 12 people who then got the results of one component of their balance and the risk of falling experienced a very significant change after several interventions, namely physiotherapy exercises [7]. Non-pharmacological therapy that can be done to be used as Physiotherapy Exercises in the elderly when there is an abnormal increase in blood pressure in their arteries continuously for more than one period, namely Slow Deep Breathing Exercise, research that proves it can affect blood pressure when 26 samples do Slow Deep Breathing Exercise for 15 minutes 3 times a week get a difference in blood pressure which can be concluded that the exercise is very influential on lowering blood pressure [8].

Physiological changes in an elderly person are a result of the degeneration process, one of which is the main balance component in the body of an elderly person such as visual, vestibular sense threshold, muscle strength, joint motion scope, and sensomotoric, due to these changes, the balance in the elderly has decreased and tends to be disturbed. One form of physiotherapy exercise that will be given to the elderly with these disorders is Tandem Stance. The results of previous research conducted on 64 samples concluded that there was an influence on the elderly after giving Exercise on Tandem Stance an improve the system on balance and can reduce the risk of falls in the elderly [9]. Based on the previous explanation, this research aims to determine the effect of physiotherapy exercises (slow deep breathing & tandem stance) and therapeutic communication (laughter therapy) on changes in blood pressure and balance components in the elderly.

METHODS

Data Collection

The research subjects were 74 elderly people at Yayasan batara hati mulia gowa who met the inclusion criteria and did not include exclusion criteria, namely the elderly aged 60 to <90 years, hypertensive patients, patients who consumed medical menthosa in the form of amlodipine 5 mg, exclusion criteria were patients with physical disabilities, patients who had been diagnosed by doctors with stroke, vertigo, patients who were taking sedatives. This study has received approval from the Health Research Ethics Commission (KEPK) of the Faculty of Public Health, Hasanuddin University, Makassar and has received a recommendation for ethical approval with Number: 4949/UN4.14.4.1/TP.01.02/2023.

Subjects were divided into 2 groups, each consisting of 37 people. The first group is an intervention group that is given physiotherapy exercises in the form of breathing exercise (slow deep breathing) and balancing exercise (tandem stance) as well as therapeutic communication in the form of laughter therapy. And the second group is a control group whose respondents are only given medical menthosa. The intervention group was given physiotherapy exercises in the form of breathing exercise (slow deep breathing) and balancing exercise (tandem stance) as well as therapeutic

communication (laughter therapy) 2 times a week for 6 weeks and the control group remained with the consumption of medical menthosa regularly for 6 weeks.

The physiotherapy exercises given were a combination of breathing exercise, balancing exercise, and therapeutic communication. Each exercise session is carried out in several 3 stages. The first is to hold the provision of physiotherapy exercises in the form of breathing exercise, the respondent will be given a slow deep breathing intervention then the second stage of providing therapeutic communication (laughter therapy) accompanied by the last stage of providing physiotherapy exercises in the form of balancing exercise in the form of tandem stance carried out in an open room.

Before starting the treatment, the respondents were given a pre-test examination in the first week to assess pulse rate, exercise zone, blood pressure, anxiety level, and balance score. Then at week six a post-test was conducted after 12 treatments.

Balance examination using the timed up and go test (TUGT) instrument where the respondent walks 3 meters according to the line on the floor at a normal speed, then turns around and sits back down, while walking the time is counted and the time ends after the respondent sits back in the chair. Blood pressure checks using a sphygmomanometer 5 minutes after the intervention,

Data Analysis Method

Statistical analysis was performed with the SPSS version 26 program [10]. Data are presented as mean, standard deviation, and categorical data in frequencies and percentages. The collected data will be tested for normality using the Kolmogorov Smirnov test which is declared as normally distributed data if $P > 0.05$. Wilcoxon test to see the effect before and after the intervention in the experimental group, and paired t test to see the effect before and after the administration of medical menthosa in the control group. Then the Mann Whitney test aims to compare the experimental group that was given intervention in the form of physiotherapy exercises and therapeutic communication with the control group that was only given medical menthosa on changes in blood pressure, GAS scores, and scores from TUGT after a 6-week program between the two groups. The significance level was set at $P \leq 0.05$.

RESULTS AND DISCUSSIONS

The characteristics of the respondents are shown in Table 1 with frequency distribution of data including age, gender, and blood pressure for the 2 groups.

Table 1: Characteristics of Respondents

Characteristics	Experiment Group		Control Group	
	Quantity	Percent (%)	Quantity	Percent (%)
Age (years)				
60-74	29	78.4	20	54.1
75 – 90	8	21.6	17	45.9
Total	37	100	37	100
Type of Gender				
Men	8	21.6	13	35.1
Women	29	78.4	24	64.9
Total	37	100	37	100
Blood Pressure				
<120-139	0	0	2	5.4
140-149	21	56.8	19	51.4
160-179	12	32.4	13	35.1
180-209	4	10.8	2	8.1
Total	37	100	37	100

Based on the sample characteristics table above, all research samples are elderly people with hypertension. Based on the age category obtained in the intervention group given physiotherapy exercises and therapeutic communication, the largest age category was at the age of 60-74 years as many as 29 or 78.4%, while in the control group the age category was only 20 people or 54.1%. According to the World Health Organization, the age of 60-74 years is an elderly category and old age between 75 and 90 years [11].

Based on the category of blood pressure obtained in the experimental group, most of them were in grade 1 as many as 21 people or 56.8% and in the control group as many as 19 people or 51.4%. 29% of the world's citizens suffer from hypertension and are supported by the incidence of hypertension in Indonesia of 26.5% increasing every year [12].

Furthermore, the Normality test is used to determine the difference test in the analysis of research data. The results of the normality test can be seen in table 2 for the experimental group and table 3 for the control group. The normality test uses the Shapiro-Wilk test because the sample is <50 respondents.

Table 2: Normality Test of Experimental Group

Test of Normality	Shapiro-Wilk			Information
	Statistics	df	P-value	
Pre Test TD	0,861	37	0,000	Abnormal
Post Test TD	0,836	37	0,000	Abnormal
Pre Test GAS	0,924	37	0,015	Abnormal
Post Test GAS	0,925	37	0,016	Abnormal
Pre Test TUGT	0,875	37	0,001	Abnormal
Post Test TUGT	0,828	37	0,000	Abnormal

Shapiro-Wilk test

Based on table 2 shows the results that the data is not normally distributed because $P < 0.05$ so that the Wilcoxon test can be done. The same as table 3 shows the results that the data is not normally distributed because $P < 0.05$ so that the Wilcoxon test can be done.

Table 3: Control Group Normality Test

Test of Normality	Shapiro-Wilk			Information
	Statistics	df	P-value	
Pre Test TD	0,857	37	0,000	Abnormal
Post Test TD	0,866	37	0,000	Abnormal
Pre Test GAS	0,905	37	0,004	Abnormal
Post Test GAS	0,937	37	0,036	abnormal
Pre Test TUGT	0,871	37	0,000	Abnormal
Post Test TUGT	0,870	37	0,000	Abnormal

Shapiro-Wilk test

The effect of physiotherapy exercises and therapeutic communication on blood pressure measurements using a Sphygmomanometer, balance measurements using the timed up to go test (TUGT), and anxiety scales using the Geriatric anxiety scale (GAS) instrument based on respondent characteristics are presented in tables 4 and 5.

Table 4: Wilcoxon Test Experimental Group

Group Experiment	Blood Pressure (BP)		Anxiety Scale (GAS)		Balance of scale (TUTG)	
	Median± (min-max)	P value	Median± (min-max)	P value	Median± (min-max)	P value
Age (years)						
60-74 years (n=29)	150±(140-180)	0.000	62±(40-75)	0.000	14±(13-16)	0.000
Pretest	130±(120-150)		29±(20-36)			
Posttest						
75-90 years (n=8)	150±(140-180)	0.010	59±(38-73)	0.12	14±(13-16)	0.010
Pretest	140±(130-150)		29±(20-35)			
Posttest						
Type of Gender						
Men (n=8)	150±(140-160)	0.009	62±(45-72)	0.012	14±(13-16)	0.009
Pretest	130±(130-140)		29±(20-36)			
Posttest						
Women (n=29)	150±(140-180)	0.000	60±(38-75)	0.000	14±(13-16)	0.000
Pretest	130±(120-150)		29±(20-36)			
Posttest						

Wilcoxon test

In Table 4, the results of the Wilcoxon test of the experimental group based on characteristics, obtained results where for blood pressure measurements for the pre and post-test age category there was a very significant change in the age category 60-74 years $P = 0.000$ and there was a significant change in the age category 75-90 years with a value of $P = 0.010$, while for the category of male gender pre and post-test there was a significant effect with a value of $P = 0.009$ and for the female gender category there was a very significant effect with a value of $P = 0.000$. for anxiety measurements measured using the Geriatric anxiety scale (GAS) for the pre and post-test age categories there was a very significant change in the age category 60-74 years $P = 0.000$ and there was a significant change in the age category 75-90 years with a value of $P = 0.012$, while for the male gender category pre and post-test there was a significant effect with a value of $P = 0.012$ and for the female gender category there was a very significant effect with a value of $P = 0.000$. For balance

measurements measured using the Timed up to go test (TUGT) for the pre and post-test age categories there was a very significant change in the 60-74 years age category $P = 0.000$ and there was a significant change in the 75-90 years age category with a value of $P = 0.010$, while for the pre and post-test male gender category there was a significant effect with a value of $P = 0.009$ and for the female gender category there was a very significant effect with a value of $P = 0.000$. So it can be concluded that physiotherapy exercises and therapeutic communication based on characteristics using the Wilcoxon test in table 4 above are very effective in elderly people aged 60-74 years with female gender. When compared with the control group who only consumed mentosa medication in table 5 it can be concluded that the pretest and posttest really need to be combined with Physiotherapy exercises and therapeutic communication.

Table 6 presents the results of the paired t test and the comparison between the control group that used medical mentosa and the experimental group that was given physiotherapy exercises and therapeutic communication is presented in table 7.

Table 5: Wilcoxon Test Control group

Group Control	Blood Pressure (BP)		Anxiety Scale (GAS)		Balance Scale (TUTG)	
	Median \pm (min-max)	P-value	Median \pm (min-max)	P-value	Median \pm (min-max)	P-value
Age						
60-74 years (n=20)	150 \pm (140-180)	0.157	58 \pm (38-73)	0.000	14 \pm (13-16)	0.001
Pretest	150 \pm (140-180)		46 \pm (25-61)		11 \pm (9-13)	
Posttest						
75-90 years (n=17)	150 \pm (140-180)	1.000	64 \pm (55-75)	0.000	14 \pm (13-16)	0.001
Pretest	150 \pm (140-180)		51 \pm (40-65)		13 \pm (12-15)	
Posttest						
Gender						
Men (n=13)		0.414	59 \pm (40-70)	1.000	14 \pm (13-15)	0.005
Pretest	150 \pm (140-180)		59 \pm (40-70)		13 \pm (12-15)	
Posttest	150 \pm (140-180)					
Women (n=24)		0.480	62 \pm (38-75)	0.000	14 \pm (13-16)	0.000
Pretest	150 \pm (140-180)		50 \pm (25-65)		11 \pm (9-13)	
Posttest	150 \pm (140-180)					

In table 6, paired t test on blood pressure obtained a p-value of 0.003, because $P < 0.05$, it can be concluded that there is a very significant effect on the provision of physiotherapy exercises and therapeutic communication, paired t test on the anxiety scale obtained a p-value of 0.000, because $P < 0.05$, it can be concluded that there is a very significant effect on the provision of physiotherapy exercises and therapeutic communication, paired t test on the balance scale using TUGT obtained a p-value of 0.000, because $P < 0.05$, it can be concluded that there is a very significant effect on the provision of physiotherapy exercises and therapeutic communication.

Table 6: Paired t test

GROUP	Blood Pressure (BP)		Anxiety Scale (GAS)		Balance Scale (TUTG)	
	Median \pm (min-max)	P-value	Median \pm (min-max)	P-value	Median \pm (min-max)	P-value
Experiment Group	-20 \pm (-40-0)	0.000**	34 \pm (15-53)	0.000**	2 \pm (1-4)	0.000**
Control group	0 \pm (-10-20)		13 \pm (10-15)		1 \pm (0-2)	

In this study, both the experimental group given physiotherapy exercises and therapeutic communication and the control group who only consumed medication for 6 weeks of the study period showed changes in the form of improved balance, decreased anxiety levels in the elderly, and decreased blood pressure in the elderly who experienced hypertension and balance disorders and excessive anxiety. The combination of physiotherapy exercises performed in the form of slow deep breathing, tandem stance with therapeutic communication is useful to see changes in the results of blood pressure, anxiety and balance measurements. Previous research that combined breathing exercises and laughter therapy said that this combination could relax muscles and reduce depression in improving the quality of life of the elderly [13]. Tandem stance is very influential for the elderly in terms of M / L (medial / lateral) walking, the control of the ankle, the mechanism of movement in the foot, the occurrence of several movements of the hip abduction and adduction, tandem stance can also increase the extensor and flexor strength of the hip so as to improve sensory and motor skills in order to maintain the balance of neural control perspective according to Winter, 2009 in [14]. The benefits obtained in terms of smoothing blood pressure and relaxing the body when given a combination treatment between breathing therapy and laughter therapy [15].

Table 7: Mann Whitney sample t test of delta values (Δ)

Group	Blood Pressure (BP)		Anxiety Scale (GAS)		Balance scale (TUTG)	
	Median \pm (min-max)	P-value	Median \pm (min-max)	P-value	Median \pm (min-max)	P-value
AGE						
56-70 years(n=26)						
Experiment	-20 \pm (-40-0)	0.000	34 \pm (10-53)	0.000	2 \pm (1-4)	0.000
Control	0 \pm (-10-20)		13 \pm (10-15)		1 \pm (0-1)	
71-85 Years (n=4)	1 \pm (0-2)	0.000	34 \pm (7-37)	0.003		0.000
Experiment	0 \pm (-10-10)		12 \pm (10-15)		30 \pm (-40-0)	
Control					1 \pm (0-1)	
Gender Type						
Men (n=10)	-20 \pm (-20-10)	0.000	34 \pm (17-51)	0.000	3 \pm (2-3)	0.000
Experiment	0 \pm (-10-20)		13 \pm (11-15)		1 \pm (0-1)	
Control						
Women (n=20)		0.000		0.000		0.000
Experiment	-20 \pm (-40-0)		34 \pm (7-35)		3 \pm (1-4)	
Control	\pm (-10-10)		12 \pm (10-15)		1 \pm (0-2)	

Based on table 7 between the experimental group given treatment, namely physiotherapy exercises and therapeutic communication with the control group given medication, the P value is 0.000 in blood pressure and TUGT values, which means there is a very significant difference with the highest median value in the experimental group. While in table 7 the anxiety value measured using the GAS instrument obtained a P value of 0.003 which means there is a significant difference with the highest median value in the experimental group.

With an increase in arterial blood pressure, there is a narrowing of the cerebral arteries, the magnitude of which depends on the increase in blood pressure. Changes in blood pressure affect blood flow to the brain. When blood flow to the brain decreases, membrane potential also decreases, then hypoxia and hypoglycemia occur with pathological consequences. Due to lack of oxygen, energy production through the citric acid cycle to produce ATP is reduced. Otherwise, acidosis occurs,

which affects brain enzyme activity [16]. Physiotherapy exercises performed in the form of breathing exercises with slow deep breathing techniques, namely by relaxing which can be used as a non-medical treatment for stress, high blood pressure, muscle tension, pain, and breathing problems. Expansion of muscle fibers, transmission of nerve impulses to the brain decreases, brain activity and other body functions decrease when relaxation occurs. The telex response is characterized by a decrease in blood pressure. Therapeutic communication carried out with the laughter therapy technique will realize the emotional expression of a condition in terms of joy and fun, this can inhibit sympathetic nerve activity in preventing pressure increases and lowering blood pressure [17]. The next physiotherapy exercise given to the experimental group is balancing exercise with the tandem stance technique where walking movements are performed by narrowing the footing area, by walking in a straight line with the heel of the foot touching the toes of the other foot, the purpose of this exercise is to actively improve postural balance, besides narrowing the fulcrum field can train body awareness in parents by doing the right walking pattern, maintaining body position and controlling the balance of muscle coordination and body movements, where the role of body awareness processes information from the muscles and joints of the human body so that parents understand where their body and body movements are, such as when walking. Body awareness training will inform motion precision and muscular reflexes that contribute to the formation of joint dynamic stability [18].

CONCLUSIONS AND SUGGESTIONS

This research shows that physiotherapy exercises and therapeutic communication are more effective in reducing blood pressure in women aged 56-70 years, but are not as effective in improving balance in elderly people who experience hypertension with balance disorders. However, a structured physiotherapy exercise and therapeutic communication program for 6 weeks obtained more effective results than administering medical mentosa in reducing blood pressure. It is necessary to carry out further research on other physiotherapy exercises with various combinations of various exercises so that they can cover various objectives in suppressing other degenerative diseases in the elderly, and research needs to be carried out with a better time period and better preparedness of respondents than before. As the number of respondents is limited, it would be better if there were more research respondents related to gender imbalance in this research.

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