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The regular gymnastics program on the quality of life for elderly people with hypertension

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Abstract

Background: Quality of life of the elderly may determine their well-being for the remainder of their lives. According to The World Health Organization Quality of Life (WHOQOL), quality of life is an elderly functional condition that encompasses physical health, namely daily activities. One of the primary health problems in the elderly is hypertension. The conventional management of hypertension may be carried out with pharmacological and non-pharmacological therapies. Non-pharmacological methods include improving lifestyle, one of which by starting doing physical exercise regularly such as gymnastics for the elderly.

Purpose: To determine the relationship the regular gymnastics program on the quality of life for elderly people with hypertension

Method: Using the cross-sectional research method, the samples were taken randomly from the elderly population domiciled in the area of the East Curup Public Health Center totaling 87 elderly people who met our inclusion and exclusion criteria. The inclusion criteria were men and women aged ≥ 60 years and the elderly with hypertension based on the diagnosis established by the officials of public health center. While the exclusion criterion was the elderly with emergency situation.

Results: The mean systolic and diastolic blood pressure of respondents who gymnastics was lower than those who did not gymnastics.

Conclusion: Elderly gymnastics is associated with lower systolic and diastolic blood pressure of the elderly with hypertension, even though it is still higher than the target of hypertension management, and their quality of life.

Keywords: Elderly; Hypertension; Quality of Life; Gymnastics.

INTRODUCTION

Hypertension is defined as increased systolic blood pressure to at least 140 mmHg or diastolic blood pressure to at least 90 mmHg (Fagard, 2002; Trisnawati, Pontang, & Mulyasari, 2016). Hypertension is a multifactorial condition. Blood pressure will increase after the age of 45-55 years and the arterial walls will be thickened by the accumulation of collagen in the muscle layer so that the blood vessels will gradually narrow and become stiff (Zhang, & Cai, 2022).

Aging will result in physiological changes. In old age peripheral resistance and sympathetic activity increase. Peripheral resistance is the resistance of blood vessels (mainly arterioles) to blood flow. This resistance is mainly affected by the radius of the blood vessels and the viscosity of the blood. Meanwhile, increased sympathetic activity causes arteriolar vasoconstriction, where these nerve fibers innervate arteriolar smooth muscle throughout the body except in the brain. Vascular resistance increases with age

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because the vascular wall becomes less compliant. These changes are combined with general age-related conditions (Setters & Holmes, 2017). Reduced physiological capacity with age can affect the ability to multitask and potentially affect quality of life. Physical activity or mobility is particularly important as a way to improve organic conditions and slow down physical degeneration (Pernambuco, Rodrigues, Cleria, & Bezerra, 2012).

Elderly gymnastics is considered a light and simple exercise. It is relatively non-taxing for the elderly. Elderly exercise activity helps the body stay fit and refreshed because it promotes strong bones, optimal cardiac performance and eradicates excess free radicals in the body (Widianti & Proverawati, 2010). Elderly gymnastics is a low impact aerobic exercise with light to moderate intensity in which the movements involve most of the body's muscles, in accordance with everyday movements which balance the load between the right and left movements (Udzakirah, Riyadi, Nugroho, Annisa, & Pardosi, 2019). Gymnastics for the elderly performed routinely will improve physical fitness, indirectly improving heart function and reducing blood pressure and the risk of fat accumulation on the walls of blood vessels, preserving their elasticity. On the other hand, the heart muscle is trained to contract so that its pumping ability is preserved. Exercise causes a significant reduction in systolic and diastolic blood pressure (Kazeminia, Daneshkhah, Jalali, Vaisi-Raygani, Salari & Mohammadi, 2020).

Regular exercise and movement such as elderly gymnastics may mitigate problems arising from changes in body functions and exercise plays an important role in the treatment of hypertension. The benefits of exercise include improving the body, promoting the optimal functioning of the heart, improving blood circulation, strengthening muscles, preventing bone loss, burning calories, reducing stress, and lowering blood pressure. Available evidence suggests that exercise in the elderly can prevent or slow functional loss. In fact, regular exercise can lower both systolic and diastolic blood pressure by 5-10 mmHg. For the elderly, gymnastics is a highly

recommended form of exercise (Ben-Sira & Oliveira, 2007).

Quality of life can be defined as the extent to which a person can feel and enjoy the occurrence of all important events in their life so that it becomes prosperous (Rapley, 2003). Getting old has anatomical and physiological signs which is the aging process and will results in decreasing quality of life, leading to disease or sickness. The elderly tends to experience a decrease in the physical, psychological, psychosocial systems which greatly limits their productivity.

The results of a literature review of previous research concluded that elderly exercise brings several benefits, namely: physical benefits such as increased physical fitness, body balance, breathing, and lowering blood pressure in the elderly with hypertension. Psychological benefits include better quality sleep, lower rates of insomnia, depression and stress, and pain management. Social and environmental benefits include cognitive function benefits (Handayani, Sari, & Wibisono, 2020).

RESEARCH METHOD

This study uses a cross-sectional method. The sample used was all the elderly in the East Curup Health Center work area in 2021. The sample size was 87 elderly who met the inclusion and exclusion criteria. The inclusion criteria were men and women aged ≥ 60 years and elderly with hypertension based on the diagnosis determined by the health center staff. Exclusion criteria were elderly with emergency situations. The measuring instrument used to measure elderly exercise activity is the elderly gymnastic attendance book. The sphygmomanometer which is usually used by the East Curup Health Center staff is used to measure blood pressure. Furthermore, the SF-36 quality of life questionnaire was used to measure quality of life.

Data analysis used univariate and bivariate analysis. The bivariate analysis in this study was intended to determine differences in systolic and diastolic blood pressure variable scores between sports and non-exercise groups as well as differences in quality of life scores which include 8 domains across gymnastics and non-exercise gymnastic group.

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Before conducting bivariate analysis, systolic and diastolic blood pressure data and quality of life data were tested for normality. The normality test results show that the data is not normally distributed as indicated by the p value <0.05 . Thus the bivariate analysis in this study used nonparametric statistics, namely the Mann Whitney test.

This research has received ethical exemption from the Ministry of Health of the Republic of Indonesia Directorate General of Health Workers of the Bengkulu Health Polytechnic with the number KEPK/151/05/2022.

RESEARCH RESULTS

Table 1. Demographic Characteristic of Respondents (N=87)

Variable	Results
Age (Mean\pmSD)(Range)(Years)	(69.27 \pm 6.625)(60-83)
Gender (n/%)	
-Men	31/35.6
-Women	56/64.4
Education Level (n/%)	
-Elementary School	48/55.2
-Middle School	34/27.6
-High School	13/14.9
-Colleges	2/2.3
Systolic Blood Pressure (Mean\pmSD)	
- Gymnastics Group	(152,82 \pm 30,43)
- Non Gymnastics Group	(171,56 \pm 20,26)
Diastolic Blood Pressure (Mean\pmSD)	
- Gymnastics Group	(90.00 \pm 7,94)
- Non Gymnastics Group	(94.47 \pm 7,80)

The table above shows that the age of the respondents with the mean and standard deviation (69.27 \pm 6.625) ranges from 60 to 83 years. The majority are female as much as 64.4%, and the majority have an elementary school level education as much as 55.2%. And the average systolic blood pressure in the non-gymnastics group was higher (171.56) compared to the gymnastics group (152.82). Likewise, the non- gymnastics group's diastolic blood pressure was higher (94.47 \pm 7.80) than the gymnastics group (90.00 \pm 7.94).

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Table 2. The Average Blood Pressure Levels and SF 36 Scores (N=87)

Variable	Mean	Mean rank	Z value	p-value
Systolic BP				
-Gymnastics	152,82	34.76	-3.116	0.02
-Non-Gymnastics	171,56			
Diastolic BP				
-Gymnastics	90.00	51.51	-2.836	0.05
-Non-Gymnastics	94.47			
Physical Function				
-Gymnastics	741	54.18	-3.116	0.22
-Non-Gymnastics	631	34.57		
Physical Limitation				
-Gymnastics	225	50.59	-2.648	0.08
-Non-Gymnastics	187	38.35		
Body Pain				
-Gymnastics	171	54.72	-3.622	0.00
-Non-Gymnastics	143	35.29		
General Health				
-Gymnastics	367	53.97	-3.343	0.01
-Non-Gymnastics	303	35.90		
Vitality				
-Gymnastics	306	52.31	-2.784	0.05
-Non-Gymnastics	269	37.25		
Social Function				
-Gymnastics	160	49.88	-1.780	0.48
-Non-Gymnastics	132	39.08		
Emotional Limitation				
-Gymnastics	201	55.00	-4.010	0.00
-Non-Gymnastics	137	35.06		
Mental Health				
-Gymnastics	389	55.19	-3.744	0.00
-Non-Gymnastics	307	34.91		

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Table 2 above shows that there is a statistically significant relationship between elderly exercise and systolic blood pressure with a Z score of -3.116 and a p value of 0.002. Elderly gymnastics also has a statistically significant relationship with diastolic blood pressure with a Z score of -2.836 and a p value of 0.005. The 8 domains of quality of life, there were statistically significant differences with $p < 0.05$. This means that the quality of life of respondents who do elderly exercise is higher than that of respondents who do not do elderly exercise.

The average value of the physical function of respondents who did elderly exercise was higher than that of respondents who did not exercise. The Z score is -3.11 statistically significant with a p-value of $0.022 < 0.05$. This means that respondents who do elderly exercise have better physical function compared to those who don't. The mean value of the physical limitations of respondents who did elderly exercise was higher than respondents who did not do elderly exercise. The Z value of -2.648 is statistically significant with a p value of $0.008 < 0.05$. This means that respondents who do elderly exercise have minimal physical limitations compared to those who do not.

The average body pain score of respondents who did elderly exercises was higher than respondents who did not do gymnastics. The Z value of -3.622 is statistically significant with a p value of $0.000 < 0.05$. This means that respondents who do elderly exercise experience pain in the lower body compared to those who don't. The average value of the general health of respondents who did elderly exercise was higher than that of respondents who did not do gymnastics. The Z value of -3.343 is statistically significant with a p value of $0.001 < 0.05$. This means that respondents who do elderly exercise have better general health than those who do not.

The mean value of the vitality of the respondents who did the elderly exercises was higher than the respondents who did not do the exercises. The Z value of -2.784 is statistically significant with a p value of $0.005 < 0.05$. This means that respondents who do elderly exercise have better vitality than those who do not. The mean value of the social function of respondents who did elderly exercise was higher than

that of respondents who did not do elderly exercise. A Z score of -1.780 is statistically significant with a p value of $0.048 < 0.05$. This means that respondents who do elderly exercise have better social functions than those who do not. The average value of the emotional limit of respondents who did elderly exercise was higher than respondents who did not do elderly exercise. A Z score of -4.010 is statistically significant with a p value of $0.000 < 0.05$. This means that respondents who do elderly exercise are more emotionally stable than those who do not.

The average value of the mental health of respondents who did elderly exercise was higher than that of respondents who did not exercise. Z score -3.744 is statistically significant with a p value of $0.000 < 0.05$. This means that respondents who do elderly exercise have better mental health than those who don't.

DISCUSSION

Elderly is a person aged 60 years and over. Old age is a natural process which everyone will go through. It is the last period in life. In old age, a person will experience gradual physical, mental and social decline (Stewart, Bacher, Turner, Fleg, Hees, Shapiro, Tayback, & Ouyang, 2005).

Quality of life can be defined as the extent to which a person can feel and enjoy the occurrence of all important events in their life so that it becomes prosperous (Rapley, 2003). If a person has good quality of life, they are likely to have good wellbeing. Conversely, if a person has low quality of life, they probably have poor wellbeing (Wen & Wang, 2017).

Some things that affect elderly quality of life include age, chronic disease conditions, social interaction, depression level, family support, economic status (occupation/income), education level, levels activity of daily living, and gender. In this study, quality of life is measured from 8 aspects, namely physical function, physical limitation, body pain, general health, vitality, social function, emotional limitation, mental health.

Blood Pressure

The results of this study indicate that the difference in mean systolic and diastolic blood pressure is

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statistically significant between groups of elderly who exercise and do not exercise. These results are in line with research in Surabaya which states that increased blood pressure in the elderly occurs due to increased peripheral vascular resistance (Nasrullah, Aisyah, & Fitri, 2020). Regular and consistent physical activity can reduce blood pressure and improve health status in the elderly (Jumaiyah, Rachmawati, & Choiruna, 2020). In hypertensive patients, physical activity has been associated with paradoxical regression or prevention of LVH, suggesting a mechanism by which exercise may benefit hypertensive patients (Setters, & Holmes, 2017).

The results of this study showed that elderly exercise can reduce systolic and diastolic blood pressure; thus, it can be part of the care plan for hypertensive elderly. Aerobic exercise can be a potential non-pharmacological treatment method for the essential management of blood pressure in hypertensive patients (Wen & Wang, 2017). The meta-analysis study conducted in Brazil stated that despite the heterogeneity of the training methods, all exercise intervention protocols used were effective in promoting post-exercise blood pressure reduction (Reia, Silva, Jacomini, Moreno, Silva, Monteiro, & Zago, 2020).

Even though the results of this study showed a statistically significant difference between systolic blood pressure and diastolic blood pressure, the mean systolic (152 mmHg) and diastolic (90 mmHg) blood pressure in the gymnastics group was still higher than the treatment target to be achieved in the management of hypertension in the elderly. The Indonesian Society of Hypertension in the 2019 hypertension management consensus set a target for blood pressure over 65 years of age approximately equal to 130-139/70-79 mmHg (Association of Indonesian Hypertension Physicians, 2019).

Quality of Life

Quality of life is the extent to which a person can feel and enjoy the occurrence of all important events in their life so that it becomes prosperous (Rapley, 2003). If a person has good quality of life, they are likely to have good wellbeing. Conversely, if a person has low

quality of life, they probably have poor wellbeing (Rohmah, Purwaningsih, & Bariyah, 2012).

In this study, a statistically significant relationship was found between elderly exercise and the quality of life of hypertensive elderly people. Average of 8 aspects of quality of life in the gymnastic group compared to non-gymnastics. These results are in line with previous studies which state that elderly exercise affects the quality of life of hypertensive elderly (Setiawan, Wungouw, & Pangemanan, 2013). Regular physical activity has a positive effect on HRQoL ($p < 0.05$), for both men and women (Xiao, Zhang, Xiao, Bu, Tang, & Long, 2019). Treating hypertension is important for the elderly population to improve their quality of life and reduce the incidence of cardiovascular complications (Lionakis, Mendrinos, Sanidas, Favatas, & Georgopoulou, 2012).

Physical function

The gymnastics group has better physical function compared to the non-gymnastics group. The mean SF 36 score for the gymnastics group was 741, higher than the non-gymnastics group of only 631. This result is in line with the goal of elderly gymnastics. The movements in elderly gymnastics are intended to improve components of cardio-respiratory fitness, muscle strength and endurance and flexibility and balanced body composition (Handayani, et al, 2020). Physical function describes a person's physical activity, whether they are able to perform activities to meet the needs of his daily life. Physical function reflects motor function and control, physical fitness and physical activity habits (Langhammer, Bergland & Rydwick, 2018).

Physical limitation

Elderly gymnastics may promote stronger and more flexible muscles, which can make the elderly more active in doing physical activities. This study found that the elderly in the gymnastics group had a higher SF 36 score than those in the non-gymnastics group. Physical limitation reflects a person's body weakness in doing activities. A high physical limitation score indicates that a person can carry out physical activities with not much limitations. Changes in

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physiological conditions in the elderly include changes in musculoskeletal, hearing, vision, cell, cardiovascular, respiration, innervation, gastrointestinal, genitourinary, urinary bladder, vagina, endocrine, and skin, causing physical weakness and limitation.

Body pain

The elderly in the gymnastics group had minimal body pain compared to those in the non-gymnastics. The SF 36 score of the gymnastics group is higher than the non-gymnastics group, indicating that the quality of life of the gymnastics group is better than the non-gymnastics group. Body pain describes the feeling of pain felt by the respondent while resting or during activities. A decreased immune system in the elderly will certainly increase the risk of arthritis which can cause body aches in the elderly.

General health

General health describes the conditions felt by the elderly. Healthy in general means they do not suffer from diseases that can interfere with daily activities. The results of this study found that the general health score of the elderly in the gymnastics group was higher than those in the non-gymnastics group. Exercise with an appropriate and programmed intensity can boost the immune system in the body, especially the elderly.

Elderly gymnastics can help improve the heart, so that it can improve blood circulation. Not only that, this type of activity has also been shown to help lower blood pressure thereby reducing the risk of hypertension and heart disease (Zhang & Cai, 2022). If done correctly with the right intensity, aerobic exercise can increase muscle endurance, increase strength, cardiovascular function and body systems as well as increase flexibility and other fitness components (Dwijayanti, 2016). In addition to having a positive impact on improving the function of organs, exercise for the elderly also has an effect on immunity. Physical fitness can reduce cardiovascular risk in people with hypertension (Juraschek, Blaha, Whelton, Blumenthal, Jones, Keteyian, & Al-mallah, 2009).

Vitality

Vitality reflects a strong, spirited and energized condition where there is no difficulty in doing work or activity. This study found that the vitality score of the elderly in the gymnastics group was higher compared to the non-gymnastics group. Elderly gymnastics is considered a light and simple exercise. It is relatively non-taxing for the elderly. Elderly exercise activity helps the body stay fit and refreshed because it promotes strong bones, optimal cardiac performance and eradicates excess free radicals in the body (Smith, Banting, Eime, Sullivan, & Uffelen, 2017). Exercise significantly improves cardiorespiratory fitness and several cardiometabolic biomarkers (Lin, Zhang, Guo, Roberts, McKenzie, Wu, & Song, 2015). Physical activity is the remedy for older adults (Taylor, 2014). Physical weakness is the result of a lack of physical activity in many old people (Smith et al., 2017).

Social function

Social function reflects the act of socializing with friends, family and neighbors. Socialization activities can be done when we feel happy or positive. This study found that the social function of respondents who practiced elderly gymnastics was higher compared to those who did not. It means that the quality of life of the social function domain of respondents who practiced elderly gymnastics was higher compared to those who did not. Elderly gymnastics performed at least once a week has made them interact with their gymnastics friends, resulting in better social function of those who exercised.

Emotional limitation

Being able to do activities without troubling emotional problems. Troubled emotional conditions may prevent the elderly from working or doing activities well. This study found that the emotional limitation of respondents who practiced elderly gymnastics was higher compared to those who did not. It means that the elderly who exercised are more emotionally stable than those who did not. By participating in elderly gymnastics, the minimal effects include the feeling of happiness, constant joy, better sleep quality, and fresh mind.

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Mental health

Mental health constitutes serenity, peace of mind and unstressed feeling. The results of this study showed that the respondents who practiced elderly gymnastics have higher health respondent scores than those who did not. It means that the mental health of the elderly who practiced elderly gymnastics is better. Elderly gymnastics benefits mental health. It can also have psychological benefits such as in better sleep quality, reduced levels of insomnia, depression, stress, and pain management, as well as social and environmental benefits (Handayani, et al, 2020). Physical activity can be a protective factor against non-infectious diseases such as cardiovascular disease, stroke, diabetes and some types of cancer. It is also linked with better mental health and lower rate of dementia (Langhammer et al., 2018).

CONCLUSION

The mean systolic and diastolic blood pressure of the gymnastics group are lower compared to that of the non-gymnastics group. Elderly gymnastics has an effect on systolic and diastolic blood pressure in elderly with hypertension, even though it is still higher than the target of hypertension management.

Elderly gymnastics is related to the quality of life of elderly people with hypertension. The mean score of SF 36 in the gymnastic group was higher than the non-gymnastics group. Elderly gymnastics is related to the quality of life of elderly people with hypertension.

SUGGESTION

In intervening in hypertension, policy makers are expected to consider to incorporate elderly gymnastics to the program at the public health center level.

To achieve the best possible benefits of elderly gymnastics, the technical implementation unit of the East Curup Public Health Center is recommended to increase the frequency of exercise for the elderly from once a week to twice a week.

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