



Effect of tera Indonesia exercise on BMI and resting pulse rate in people aged 50 years and above

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Abstract

Changes experienced by the elderly are a decrease in physical fitness such as heart-lung and circulatory fitness. This results in the elderly getting tired easily when doing physical activity. So it takes a physical activity that produces results for the elderly with the right dose and dose. This article aims to examine the Indonesian Tera Gymnastics on BMI and pulse frequency. The method used is an experimental research model, using a one group pre-test and post-test design framework through a process before and after treatment in the form of Tera Gymnastics carried out 3 times 1 week in 4 weeks. The instrument used in collecting BMI data is measuring body weight and height. The technique of collecting assessment samples using Purposive Sampling. The sample obtained was 33 people with the research subject was COOM (Branch of Community Sports Organization) Gymnastics Tera Indonesia who participated in training at Slamet Park, Malang City. Data processed descriptively using statistical tests. The results of the analysis showed that Tera Gymnastics did not have a significant effect on reducing BMI ($p = 0.281 > 0.05$). However, there was a significant effect on the decrease in resting pulse rate before and after exercise ($p = 0.000 < 0.05$). In addition, the average pulse rate after exercise was in the light intensity category, according to the fitness level of the elderly. In conclusion, Tera Gymnastics is effective in reducing resting pulse rate, which contributes to improved cardiovascular health, although it does not significantly affect BMI.

INTRODUCTION

The elderly are part of a specific period of life that must always be cared for. Because society views the elderly as weak, incapable and unhealthy, it treats them as helpless and limits their ability to engage in all activities. The lack of time, space and opportunities for the elderly to engage in daily activities exacerbates this. Therefore, it is very important for the elderly to maintain their physical fitness, including tera gymnastics (Anshori, 2016).

In 1970, there were 5.30 million elderly people in Indonesia; by 2010, this number had increased to 18.10 million; by 2014, there were 20.7 million; and by 2020, there will be 27 million elderly people. The elderly population in Indonesia has grown dramatically over the past 30 years (Dharmawan, 2022). At that stage, anything can be experienced by someone such as physical and mental changes. One of the changes experienced by the elderly is a decrease in physical fitness such as lung fitness, blood circulation, and heart failure. Heart failure is a public health problem with a prevalence of more than 23 million worldwide, associated with mortality and morbidity values (Lumi, 2021). This can affect daily activities, where the elderly will get tired easily with just a little physical activity. This change can be illustrated by the maximum pulse rate of early adults reaching 195/minute, but at the age of 65 it is only 170/minute (Agus, 2015).

Resting pulse rate is strongly related to cardiovascular fitness. Resting pulse rate can also be used as a review to improve one's physical condition (Janssen in Budriarsa, 2014). Through organized and disciplined exercise, resting pulse frequency can decrease (Budriarsa, 2014). Exercise can be interpreted as a process of activity that is repeated, training can improve the system and function of a person's organs (Budriarsa, 2014).

In addition to heart rate / pulse, when a person experiences age, it can result in an increase in BMI. The lack of portion and intensity in doing physical activity can cause the elderly to have a higher BMI (Sofa, 2018). This can be attributed to the inability of the elderly to do physical work anymore and the accumulation of large amounts of fat (Sofa, 2018).

For this reason, an activity that has a good impact on one's body is needed, of course with the right dose and dose. Physical work that is carried out continuously is proven to overcoming degenerative disorders, maintaining , mental health, good quality of life, and well-being (Chaeroni et al., 2021).

According to WHO (2010), physical work is divided into three phases, namely light, medium and heavy physical work. Light physical work is an activity that moves the body, such as walking, cleaning, and other light work. Moderate physical work is an activity that causes more or less power, triggering breathing faster

than usual, for example cycling, dancing, climbing stairs, and other medium work. And finally heavy physical work, is a large energy dissipation activity until breathing is much faster, for example, big ball sports (Welong et al., 2020).

Sports for the elderly are low-intensity type exercises, one of which is tera gymnastics, tera gymnastics is a physical exercise that has an impact on a person's physical abilities if done optimally. Tera gymnastics has a duration of approximately 45-60 minutes in one training session with the contents of stretching, joint, and breathing movements. (Parwati, 2013) conducted research related to the provision of the Indonesian Tera Gymnastics course to improve heart health, lungs in the elderly. The study produced results, Tera gymnastics training 3 times a week within 8 weeks can provide an increase in physical health of the elderly lungs (Astuti, 2023).

Based on the problems in the background above regarding health problems and overweight or obesity, the researcher seeks to find out and examine whether there is an effect of community exercise on pulse rate and BMI in the elderly.

METHODS

This article uses an experimental research model, using a one group pre-test and post-test design framework. Instruments used in collecting BMI data are measuring body weight and height, pulse rate is measured by palpating arterial blood vessels in the wrist and counting the number of beats per minute. Data was taken at the beginning of the exercise and the end of the exercise. Data collection was carried out at Slamet Park in March - April 2024. The technique of collecting assessment samples using Purposive Sampling. The sample obtained was 33 people with the research subject was COOM (Branch of Community Sports Organization) Tera Indonesia Gymnastics who participated in training at Slamet Park, Malang City. The data processed descriptively using statistical tests, namely by paired t test and Manova test to see whether there is a difference in data.

RESULTS

The research was conducted on elderly COOM (Branch of Community Sports Organization) Gymnastics Tera as many as 33 people. Based on age there is a sample age between 52 to 77 years with an average age of 64.96 in the entire sample with a standard deviation of 6.98876. Age characteristics in the following table.

Table 1 **Results of Descriptive Analysis of Age Characteristics**

Characteristics	Mean	Std. Deviation
Age	64,96	6,98876



Based on the weight characteristics of elderly COOM (Branch of Community Sports Organization) tera gymnastics, it can be seen that of the 33 research samples, the initial body weight of the sample was between 40 to 75.9 kg with an average body weight of 58.11 in all samples with a standard deviation of 1.35639. Body weight characteristics in the following table.

Table 2 Descriptive Analysis of Weight Characteristics

Characteristics	Mean	Std. Deviation
Body weight	58,11	1.35639

Based on the characteristics of the height of the elderly COOM (Branch of Community Sports Organization) tera gymnastics, it can be seen that of the 33 research samples there were sample heights between 138 to 168 cm with an average height of 155.09 in all samples with a standard deviation of 6.63025. Height characteristics in the following table.

Table 3 Descriptive Analysis of Height Characteristics

Characteristics	Mean	Std. Deviation
Height	155,09	6,63025

Based on BMI data, the average pre-test gets 24.1670 and post-test 24.0218, and gets a median value of pre-test 24.0300 and post-test 23.8200, with a std. deviation value gets pre-test 29.4833 and post-test 29.6973. Then the lowest pre-test value got 17.54 and post-test 17.76, for the highest data the pre-test got 30.40 and post-test 30.72. Based on istirat pulse data, the average pre-test got 76.2187 and post-test 85.2424, and got a median value of pre-test 80 and post-test 80, with a std. deviation value got pre-test 96.1528 and post-test 70.5350. Then the lowest value of the pre-test got 61 and post-test 52, for the highest data the pre-test got 98 and post-test 96. BMI pre-test and post-test data and resting pulse rate can be seen in the table as follows.

Table 4 Results of Descriptive Analysis of Pre-test Post-test BMI and Resting Pulse Rate Data

Variable	Mean	Median	Std. Dev	Min	Max
BMI_Pre-Test	24,1670	24,0300	29,4833	17,54	30,40
BMI_Post-Test	24,0218	23,8200	29,6973	17,76	30,72
DN_Pre-Test	76,2187	80	96,1528	61	98
DN_Post-Test	85,2424	80	70,5350	52	96



Table 5 **BMI According to WHO**

CATEGORY	BMI
Thin or underweight	<18,5
Normal or healthy	18.5-24.9
Overweight 25.0-29.9 Class I Obesity	30,0-34,9
Class II Obesity	35,0-39,9
Obesity Class III (very obese)	>40.0

Source : (Science, 2024)

Table 6 **Normal Resting Pulse Rate by Age** Beats

Per Minute
Infant-1 year old 100-160/minute
Age 1-10 years 70-120/min Age
11-17 years 60-100/min Adult age
60-100/minute

Source : (Ministry of Health, 2024)

Based on BMI data obtained from 33 samples from pre-test values that have a BMI category of thin light, namely 2 people, normal 19 people, light fat 6 people, and heavy fat 6 people. From the post-test values that have a BMI category of thin light, namely 2 people, normal 20 people, light fat 5 people, and heavy fat 6 people. Pre-test and post-test BMI category data can be seen in the following table.

Table 7 **Pre-test and Post-test BMI Category Data**

Pre-Test		Post-Test	
Category	Total	Category	Total
Skinny Weight	0	Skinny Weight	0
Mildly Thin	2	Mildly Thin	2
Normal	19	Normal	20
Light Fat	6	Light Fat	5
Heavy Fat	6	Heavy Fat	6
Total	33	Total	33

1. Normality and Homogeneity Test

Table 8 **Results of Normality and Homogeneity Test Analysis**

Variables	Pre-Test	Std. Deviation	Normality	Homogeneity
BMI	24.16	2.94	.431	.918
DN Before exercise	76.21	9.46	.091	.256
DN After exercise	85.24	7.05	.091	.256

Table 6 significance values in the Shapiro Wilk test pre-test data of BMI variables, pulse rate before exercise, and pulse rate after exercise got a value greater than 0.05 or ($p > 0.05$), Shapiro Wilk normality test normal data. In table 4 also mentioned the number (p) on the F test and Levene's test for pre-test data of BMI variables and Levene's test of pulse rate before exercise, and pulse rate after exercise got a number higher than 0.05 or ($p > 0.05$) so that based on the homogeneity test of the F test and Levene's test the data varies homogeneous.

2. Hypothesis Test

Hypothesis testing aims to determine if there is a significant difference between before and after treatment. The treatment is in the form of Tera Gymnastics training which lasts ± 60 minutes, the exercise is carried out 4 weeks with a frequency of 3 times a week. The hypothesis tests used are the Paired Sample T Test and the Manova test.

Table 9 **Analysis Results of Paired Sample T Test and Manova Test**

Variables	Mean	std. deviation	Paired Sample T Test			Multivariate Test			
			t	df	sig.	Pillai's Trace	Wilks' Lambda	Hotelling's Trace	Roy's Largest Root
DN Before Training	0,14515	0,7599	1.097	32	0,281	0,000	0,000	0,000	0,000
DN After Exercise						0,000	0,000	0,000	0,000

Table 10 Tests of Between-Subjects Effects

Source	Dep. Variable	Mean Square	F	Sig.
Class	Pre_Test	1322.871	18.697	.000
	Post_Test	2627.694	55.592	.000

Based on the data table above, it can be seen that:

1. The results of the analysis in table 7 using the Paired Sample T Test on community sports Gymnastics Tera got a BMI significance number of $0.281 > 0.05$ then it was decided that Gymnastics Tera had no significant effect on reducing BMI.
2. The results of the analysis in table 7 regarding the resting pulse variable using the Manova test on community sports Gymnastics Tera got a figure of $0.000 < 0.05$ then it was decided that community sports Gymnastics Tera had an effect on reducing the pulse frequency before exercise.
3. The results of the analysis in table 7 regarding the exercise pulse variable using the Manova test on community sports Gymnastics Tera got a figure of $0.000 > 0.05$ then it can be decided that community sports Gymnastics Tera there is an influence on the decrease in pulse frequency after exercise. The results of the analysis in table 8 value (p) $0.000 < 0.05$ then it was decided that there was an influence of gymnastics tera on the decrease in pulse rate before exercise. And the value (p) $0.000 < 0.05$ then it was decided that there was an effect of tera gymnastics on the decrease in pulse rate after exercise.
4. From Table 7 regarding the average pulse rate data after exercise is 85.24 which when associated with the intensity of the exercise, the intensity is a mild category. This can be seen through the average age of the elderly studied, which is 64.96 or can be rounded to 65 years. Then to find out the intensity of the exercise by calculating the formula $MHR = 220 - \text{age}$. Getting a value of 155 ($85.24/155 \times 100\%$) the result is 54.9 then rounded to 55%. There are three exercise intensity zones, namely low (blue zone) 50 - 65% MHR, moderate (yellow zone) 65 - 80% MHR, to high (red zone) 80 - 100% MHR. So from these results the elderly do exercise intensity in the light category (Trees, 2022).

DISCUSSION

1. The Effect of Tera Indonesia Gymnastics on BMI in the Elderly

Based on the results of the analysis using the Paired Sample T Test on Tera Gymnastics, significance value is 0.281 on the BMI variable, with a mean pre-test value of 24.1670 for post-test 24.0218. So the decision was made that the significance level was $0.281 > 0.05$. Then it was decided that Tera Gymnastics had



no significant effect on reducing BMI. The possibility of uncontrolled variables such as food monitoring, which researchers do not control how calories in and out. It could be that the incoming calories are greater than those expended, making the excess calories needed by the body.

Tera gymnastics is an exercise that sharpens the body and mentality and combines limb movements through breath techniques through the emphasis of thought and is carried out in an organized, commensurate, certain, and continuous manner. The statement allows to explain that tera gymnastics does not have a direct influence on BMI demotion. The research conducted at this time obtained an average pre-test result of 24.16 and the post-test value got a result of 24.02. From these data after testing the hypothesis it turns out that the tera exercise does not provide significant changes to BMI (Segita, 2019).

These results are also in line with research (Utami, 2021) The aerobic exercise was carried out at a low intensity with a duration of 30 minutes in 4 weeks. The BMI demotion rate before the intervention was 27.21 and after the intervention decreased to 26.81. From the results of this study, it states that it only gets a difference of 0.4 from aerobic exercise. The possibility that can cause tera gymnastics not to have a significant effect on reducing BMI is the lack of exercise intensity. Light and moderate intensity only reduce BMI by 0.05 kg/m² (0.21%) which means it is not significant ($p=0.24$) (Utami. et al., 2022). Exercise inappropriateness can be a factor that does not affect BMI reduction. Aerobic exercise performed 3-4 times / week with 30-60 minutes per training session only reduces serum leptin concentrations (hunger hormones produced by body fat cells) so that it does not have a direct effect on BMI (Junaidi & Listiarini, 2019).

The decrease in BMI can also be influenced by lifestyle at a young age, which at that time the habit of eating too much so that the use of energy when doing physical activity is not stable (Lestari & Weta, 2019). There are three criteria that apply to food intake habits: type, frequency and amount. A person's dietary status can be affected by these three elements. Lack of variety in daily eating habits can lead to an imbalance in the intake and needs of nutrients that are essential for healthy living. The shift from conventional diets to contemporary diets that emphasize fast food. Contributing to the accumulation of calories, fat, and cholesterol in the body can be a factor in increasing BMI (Ramadhania et al., 2024).

2. The Effect of Tera Indonesia Gymnastics on Resting Pulse Frequency in the Elderly

Based on the results of the MANOVA test conducted, a p value of 0.000 was obtained. This very small p value indicates a statistically significant difference between pre- and post-treatment in terms of resting pulse frequency. In other words, the results of this study support the hypothesis that Tera Indonesia Gymnastics has a significant effect in reducing resting pulse frequency.

These results are in line with research (Prihatini, 2022) explaining that 82 samples given Tera Gymnastics participants Posbindu Village Pancasan RW 1 with grade 1 blood pressure obtained a pulse rate decreased by an average of 10 points, which was originally 98.62 to 88.56 beats per minute, or experienced a 12% decrease from before doing tera gymnastics. Similar research conducted by (Rismayanthi, 2022) gave treatment in the form of Low Impact gymnastics to the intervention group for 1 month with a frequency of 8 exercises. Getting the results that there is a decrease in pulse rate and blood pressure becomes reduced. Another study (Isnaeni, 2023) obtained pulse data before the intervention of Tera Gymnastics and Breathing Gymnastics

averaged 89.96 ± 9.883 after doing gymnastics intervention 87.23 ± 7.886 . (Reimers, 2018) in his research explained that all kinds of exercise cause pulse rate demotion. The increase in parasympathetic muscle tone in response to beta-adrenergic stimulus has an impact on pulse rate demotion after exercise or other activities.

When the sample has a low pulse rate before exercise, physical work such as gymnastics can respond by increasing the pulse rate. Regular and correct physical work supports increasing cardiovascular fitness. However, there were also some samples with a high pulse rate before exercise, this could have happened because the sample felt nervous or nervous when being examined, causing the heart's workload to become heavier and give a high pulse response (Aminudin, 2023). In the assessment carried out (Tulak, 2017) means that good and regular exercise causes a decrease in pulse rate in the elderly who have a high pulse rate. Physical activity in the form of cardiovascular when done regularly causes the heart muscle to become strong, increase the accuracy of blood circulation, and limit the workload of the heart, then produce a pulse rate demotion (Tulak, 2017)

This research was conducted through standardized methods, but there are still limitations of researchers, namely researchers cannot control the existence of other variables that affect the sample. So that the sample still has the possibility of being influenced by other variables that cannot be controlled by the researcher.

CONCLUSIONS

There is no effect of Tera Indonesia Gymnastics on BMI at the age of 50 years and above. There is an effect of Tera Indonesia Gymnastics on resting pulse rate at the age of 50 years and above. The suggestions that must be conveyed by researchers are for COOM (Community Sports Organization Branch) Tera Indonesia Gymnastics which conducts training at Taman Slamet Malang City to explain to members how to move correctly and precisely and be more disciplined towards training time in order to get maximum and useful results. For further researchers, it is hoped that further encouragement and control will be carried out, so that the sample is of better quality. And also expected to conduct a longer research period, so as to get maximum results. For further researchers, please examine blood sugar levels in the elderly.

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