The Effect of Aerobic Exercise on Improving

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The Effect of Aerobic Exercise on Improving Sleep Quality and Flexibility in Overweight Women in the Era of the Covid-19 Pandemic

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Abstract

This study aims to determine the effect of aerobic exercise on improving sleep quality and anxiety in overweight women in the era of the COVID-19 pandemic. Physical activity is needed following aerobic exercise To maintain body fitness and ideal body shape. This research is a single-group pretest-posttest experimental study. The subjects in this study were overweight women aged 25-55, with 47 respondents. The measurement instruments in this study were the PSQI and the Sit and Reach Test. The data analysis technique used the normality test with the Kolmogorov-Smirnov test, the homogeneity test using the Levene test, and the significance test using a paired t-test. The results of the analysis of this study indicate that the results of the PSQI t-test (13.858) are greater than the t-table and the results of the t-count flexibility (-12.786), so aerobic exercise is effective in improving sleep quality and flexibility in overweight women in Purwokerto.

Keywords: Aerobic Gymnastic, Sleep Quality, Flexibility, Overweight

INTRODUCTION

In the era of the COVID-19 pandemic, health problems have become very serious. Research (Sales-Peres et al., 2020) shows that there is an increase in diseases caused by obesity, such as hypertension, diabetes, and cardiovascular disease. Social restrictions and quarantine limit physical activity (Clemmensen et al., 2020). Clemmensen et al. (2020) research proves that the COVID-19 pandemic hurts health, including increased body weight. Less physical activity will result in overweight. Overweight occurs when food intake is greater than expenditure so that it will accumulate fat (Markowitz, 2018; Luzi & Radaelli, 2020).

Physical activity can affect physical fitness (Indra, 2016; Bopp et al., 2018). Activities that are carried out regularly and measured will have an impact on body fitness. Physical fitness is the ability a person has to carry out activities easily. Physical fitness is

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synonymous with increased body strength. When doing physical activity, the body also needs time to rest to restore fitness. The organs of the body also need time to rest to be healthier (Smyth, 2000)

Sleep or sleep quality disorders are abnormalities in a person's sleep patterns. Sleep disorders occur due to low sleep quality. Research conducted by Huang Zhao (2020) during the COVID-19 pandemic found that sleep disorders were quite influential. Another study stated that 57.1% of respondents experienced poor sleep quality, 32.1% experienced high anxiety, 41.8% were high stress, and 7.6% were affected by post-traumatic disorder (P.T.S.D.)(Casagrande et al., 2020).

Lack of physical fitness also has an impact on reducing the physical components of the body. The body's physical components include strength, flexibility, agility, speed, and movement coordination. Decreased physical components result in reduced movement. Reduced movement inhibits physical activity. The activity needed so that the body can move freely is with joint flexibility. Joints are said to be good if they have a good range of motion (Kusuma et al., 2020). The older we get, the more our flexibility decreases. Adults to the elderly often experience back pain because the flexibility in the Lumbar region is not trained. It is due to bad habits when sitting and standing. Less physical activity also causes decreased flexibility in the lumbar region (Muhammad, 2018). Flexibility in adults is decreasing over time. Therefore, proper exercise is needed to maintain body flexibility. The activities should adjust to the circumstances and conditions during the Covid-19 pandemic.

Physical activities that can be done at home and are fun are the right choice during the COVID-19 pandemic. One sport that is possible to do at home is aerobic exercise. Aerobic exercise is a movement activity using oxygen carried out to the rhythm of music. Aerobic exercise is done with a duration of 45-60 minutes. Aerobic exercise becomes interesting because the exercise is accompanied by music. Previous research revealed that aerobic exercise can improve sleep quality (Kause et al., 2019) and flexibility(Candrawati et al., 2016). The research is expected to provide solutions to overcome sleep quality and decreased flexibility in overweight women during the COVID-19 pandemic.

METHOD

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This study uses a single-group experimental pre and post-test design method, where the researcher intervenes without using a control group (Marsden & Torgerson, 2012). The research to be studied is the effect of aerobic exercise on improving sleep quality and flexibility in overweight women in the COVID-19 pandemic era. In this study, subjects were given an intervention in the form of aerobic exercise to determine the difference in results between before the intervention and after the intervention. The variables studied in this study were the sleep quality and flexibility level of overweight women in North Purwokerto. The population in this research were overweight women in north Purwokerto, and the sample in this study amounted to 47 respondents.

Analisis data penelitian menggunakan uji prasyarat yang meliputi Normalitas dan Homogenitas data penelitian. Then, to determine the influence between variables, utilize a different test using SPSS, specifically the t-test, provided that if the significance value is <0.05, then the variables have a significant influence.

RESULT

The variable that affects this research is aerobic exercise. The population in this study were overweight women in the North Purwokerto area. This study's sample was overweight women of married age (25-55 years) in Grendeng and Pabuaran villages. The sampling technique used was random sampling. It collected research data using instruments matching sleep quality and calculating lumbar flexibility. Sleep quality improvement is measured using the Pittsburgh Sleep Quality Index (PSQI). The data was collected using a questionnaire about sleep problems, while Lumbar flexibility was measured by the Sit and Reach tool.

Table1. PSQI Scale Norms

Score	Criteria
0 – 5	No issues
6 – 10	Minor issues
11 – 15	Medium issues
16 – 21	Severe issues

Flexibility is measured using the Sit and Reach tool, where participants sit with their legs and arms straight and push forward to the maximum reach.

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Model and Norms

Tabel Modified Sit-And-Reach Test

Pria Usia	20-29 th	30-39 th	40-49th	50-59 th	60+ th
Tinggi	≥19	≥18	≥17	≥16	≥15
Rata-Rata	13 - 18	12 - 17	11 - 16	10 - 15	9 - 14
Di bawah Rata	10-12	9-11	8-10	7-9	6-8
Rendah	<9	< 8	< 7	< 6	< 5

Wanita Usia	20-29 th	30-39 th	40-49th	50-59 th	60+ th
Tinggi	≥22	≥ 21	≥ 20	≥19	≥18
Rata-Rata	16-21	15-20	14-19	13-18	12-17
Di bawah Rata	13-15	12-14	11-13	10-12	9-11
Rendah	< 12	< 11	< 10	< 9	< 8

Figure 1. Reach

The data analysis method used in this study used an experimental pre-and post-test design. Aerobic exercise activities were carried out twice a week for six weeks. The t-test was conducted to determine the effect of aerobic exercise on sleep quality and flexibility. The normality test used Kolomogorov-Smirnov, the homogeneity test used the Levene test, and the significance test used the paired t-test.

This research was conducted in north Purwokerto, in the Pabuaran and Grendeng areas. The subjects of this study were overweight women in North Purwokerto, with as many as 47 respondents. In this study, data collection used tests and measurements. The research data consisted of sleep quality levels measured by the PSQI (Pittsburgh Sleep Quality Index) and flexibility measured by the Sit and Reach tool. The respondents who participated in this study ranged from 25 to 55 years. The data distribution of respondents based on age is presented in the following table.

Table 2. Frequency Distribution of Respondents' Age

No	Age Categories	Frequency	Percentage
1	20-29 Years	3	6,38%
2	30-39 Years	21	44,68%
3	40-49 Years	21	44,68%
4	50-59 Years	2	4,26%
	Total	47	100%
Average age		36 Years	

Based on Table 2, the frequency distribution of the age of respondents out of 47 respondents was: 3 respondents (6.3%) aged 20–29 years, 21 respondents (44.68%) aged 30-39 years, 21 respondents (44.68%) aged 40–49 years, and two respondents (4.26%)

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aged 50–59 years. The average age of respondents is 36 years. Respondent distribution data based on age can be seen in the bar chart in Figure 2.

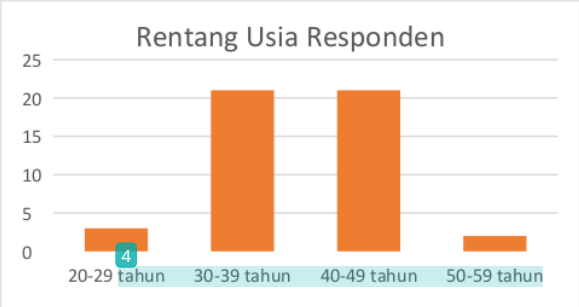

Figure. 2 Respondent's Age Range

A data description is obtained from the results of research that has been conducted. The research data will be presented in tables and graphs of data processing results about pre-test flexibility and post-test flexibility, pre-test sleep quality, and post-test sleep quality.

Table 3. Data Description

Description	N	Mean	Median	Mode	SD	Min	Max
Pre-test PSQI	47	11.08	11.00	8.00	5.95	2.00	21.00
Posttest PSQI	47	8.17	7.00	2.00	5.33	1.00	18.00
Pre-test Flexibility	47	27.38	28.00	29.00	4.68	16.00	39.00
Post-test Flexibility	47	29.68	30.00	32.00	4.53	18.00	41.00

PSQI Pre-test Data Description

PSQI pre-test data was obtained from the results of measurements using sit and reach. The effectiveness test subjects in the study totaled 47 people. PSQI pre-test data for research subjects can be seen in Table 16.

Table 4. PSQI Pre-test Data Description (Sleep Quality)

No.	PSQI Category	Norm/ Interval Category	Frequency	
			f (n)	%
1.	No issues	0-5	10	21.29%
2.	Minor issues	6-10	12	25.53%
3.	Medium issues	11-15	12	25.53%
4.	Severe issues	16-21	13	27.65%
Total			**47**	**100**

PSQI pre-test data of the research subjects showed that as many as 21.29% (10 people) were in the category of no problems, and as many as 25.53% (12 people) were in the category of mild problems. As many as 25.53% (12 people) have moderate problems.

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As many as 27.65% (13 people) experienced severe problems. It can be concluded that the majority of research subjects experienced severe problems.

Figure 3. PSQI Pre-test Histogram

a. PSQI Post-test Data Description

PSQI post-test data is obtained by measuring the level of sleep quality using a questionnaire after doing aerobic exercise treatment for seven weeks. The results of the post-test assessment are entered into the table and calculated based on the changes obtained after treatment. The post-test data of the research subjects can be seen in Table 5.

Table 5. PSQI Post-test Data Description (Sleep Quality)

No.	PSQI Category	Norm/ Interval Category	Frequency	
			f (n)	%
1.	No issues	0-5	17	36.17
2.	Minor issues	6-10	15	31.91
3.	Medium issues	11-15	8	17.03
4.	Severe issues	16-21	7	14.89
Total			**47**	**100**

PSQI post-test data of research subjects showed that as many as 36.17% (17 people) of research subjects were categorized as having no problems, as many as 31.91% (15 people) of research subjects experienced mild problems, as many as 17.03% (8 people) experienced moderate problems. As many as 14.89% (7 people) experienced severe problems. PSQI post-test data is presented in the following histogram image:

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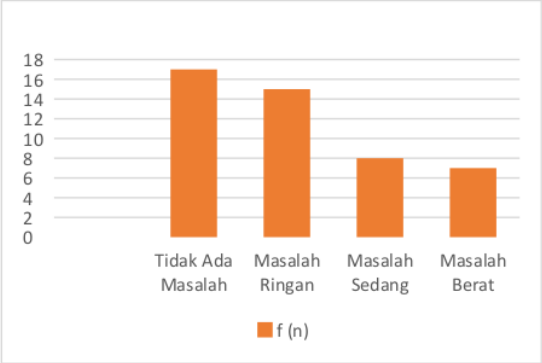

Figure 4. Post-test PSQI Histogram

Figure 4 shows that there were 17 respondents in the no-problem range. Fifteen respondents were in mild trouble. Eight respondents had moderate problems, and seven respondents experienced severe problems. From the data that has been presented, it can be concluded that there are changes in each category from PSQI pre-test to PSQI post-test. It can be concluded that after aerobic exercise, there are changes in post-test data.

Table 6. PSQI Pretest-Posttest Result Comparison

No.	PSQI Category	Interval Category	Pre-test	Post-test
1	No issues	0-5	10	17
2	Minor issues	6-10	12	15
3	Medium issues	11-15	12	8
4	Severe issues	16-21	13	7
Total			47	47

In Table 6, the comparison of the PSQI pre-test and post-test results in the no-problem category increased by seven samples. In the mild category, there was an increase of 3 samples. In the moderate problem category, it decreased by four samples, while in the severe problem category, it decreased by six. The following histogram image presents changes in PSQI pre-test and post-test data.

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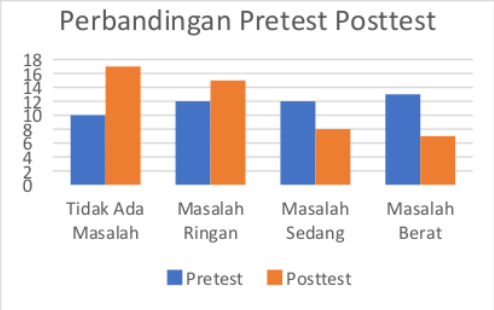

Figure 6. Histogram Data: Pre-test and Post-test PSQI

In Figure 6, it was found that there was an increase in the number of respondents with no problems. In the pre-test, there was an increase in the number of respondents from 10 respondents to 17 respondents. In mild problems, there was an increase from 12 respondents to 15 respondents. Moderate problems from the pre-test with 12 respondents to 8 respondents in the post-test. Severe problems from 13 to 7 respondents.

Flexibility Pre-test Data Description

Flexibility pre-test data was obtained by measuring waist and strike flexibility before and after aerobic exercise treatment. The effectiveness test subjects in the study totaled 47 people. Pre-test data of research subjects can be seen in Table 7.

Table 7. Flexibility Pre-test Data Description

Category	Age				F (n)	%
	20-29th	30-39th	40-49th	50-59th		
Excellent	0	1	0	0	1	2.13%
Good	1	11	7	0	19	40.42%
Simply	0	6	10	1	17	36.17%
Less	1	2	5	1	9	19.14%
Poor	0	1	0	0	1	2.13%
Total					47	100

In Table 7, the pre-test data for the flexibility of the research subjects shows that as many as 2.13% (1 person) are in the excellent category. A total of 40.42% (19 people) are in the good category, while 36.17% (17 people) are in the sufficient category. 19.14% (9 people) were in the poor category, while 2.13% (1 person) were in the very poor category. The majority of research subjects are in the good category. The flexibility pre-test data distribution of respondents based on age can be seen in the bar chart in Figure 6.

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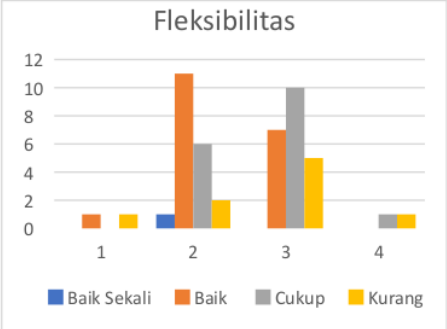

Figure 6. Histogram of Pre-test Flexibility data

Flexibility Post-test Data Description

Flexibility post-test data is obtained by measuring waist and strike flexibility after treatment. The results of the post-test assessment are entered into a table and calculated based on the changes obtained after treatment for seven weeks. The flexibility post-test data of the research subjects can be seen in Table 8.

Table 8. Description of Flexibility Post-test Data

Category	Age				F (n)	%
	20-29th	30-39th	40-49th	50-59th		
Excellent	1	3	1	0	5	10.63
Good	2	12	10	1	25	53.20
Simply	0	4	10	0	14	29.78
Less	0	2	0	1	3	6.39
Poor	0	0	0	0	0	0
Total					47	100

Post-test data on the flexibility of research subjects showed that as many as 10.63% (5 people) were in the excellent category, as many as 53.20% (25 people) of research subjects were in the good category, as many as 29.78% (14 people) of research subjects were inadequate. As many as 33% (4 people) of subjects were in the poor category. Respondent distribution data based on age can be seen in the bar chart in Figure 5.1.

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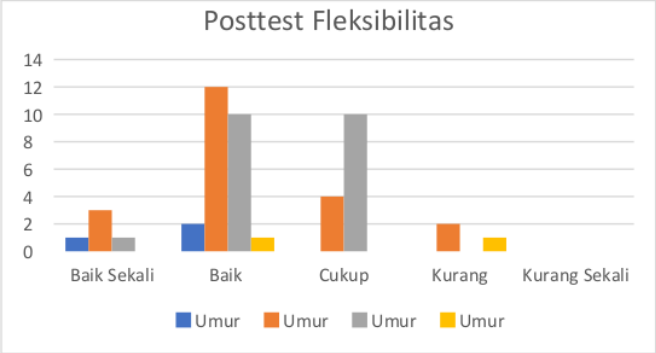

Figure 7. Histogram of Pre-test Flexibility data

It can be concluded that after doing aerobic exercise treatments for seven weeks, the research subjects experienced increased body flexibility. The following histogram of pre-test and post-test data for the research subjects is presented in more detail.

Table. 9 Comparison of Pre-test and Post-test Flexibility

Category	Pre-test	Post-test
Excellent	1	5
Good	19	25
Simply	17	14
Less	9	3
Poor	1	0
Total	**47**	**47**

The pre-test and post-test data on the flexibility of the research subjects showed that the excellent category had increased by four subjects. In the good category, there was an increase of 6 samples. The moderate category decreased by three subjects. Research subjects in the poor category decreased by six subjects, while those in the very poor category decreased by 1 sample. The majority of research subjects experienced an increase in flexibility.

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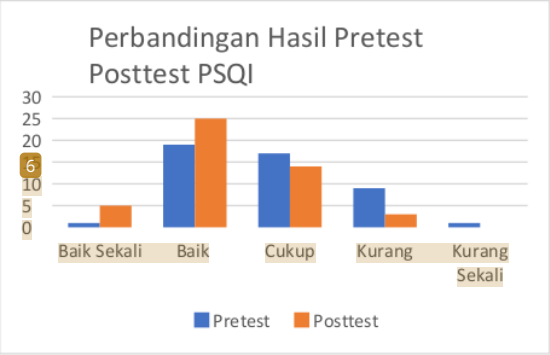

Figure 8. Histogram of Pre-test and Post-test Flexibility Data

Data Normality Test

Table 9. Data Normality Test

Data	Kol. Smirnov	Sig.	Description
Pre-test PSQI	0.123	0.070	Normal
Posttest PSQI	0.126	0.060	Normal
Pre-test Flexibility	0.086	0.200	Normal
Posttest Flexibility	0.121	0.081	Normal

Based on Table 9, the results of the data normality test show that the overall p-value on all variables at the time of the pre-test and post-test is > 0.05. It can be concluded that there is no difference in the frequency of observation (results) with the normal expected frequency, meaning that all the data in this study are normally distributed. Thus, all the data in this study fulfill the assumption of normality of distribution.

Homogeneity Test

After knowing the normality test of the data, homogeneity testing was carried out. Homogeneity testing is carried out to test the equality of variance in the population. This study's homogeneity test of population variance was carried out with the Levene Test. The results of the homogeneity test can be seen in Table 6.9.

Table 10. Homogeneity Test

Variables	Significance	Description
PSQI	0.065	Homogenous
Flexibility	0.968	Homogenous

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The homogeneity test results show a p-value (0.967) > 0.05, meaning the overall data is homogeneous. The results of the data analysis show that the research data are normal and homogeneous, so they meet the requirements for the t-test.

Significance Test/Effectiveness

The effectiveness test used a paired t-test to determine the effect of the Pilates exercise model (treatment) given on the overweight status of the research subjects. The results of the data analysis of the effectiveness test for reducing body fat percentage can be seen in Table 11.

Table 11. Effectiveness Test Results

Variable		*Mean*	Changes	t-test	Sig.	Description
PSQI	*Pre-test*	11.0851	2.9779	13.858	0,000	**Significant**
	Posttest	8.1702				
Flexibility	*Pre-test*	27.3830	2.2979	-12.786	0,000	**Significant**
	Posttest	29.6809				

In Table 11, it can be seen that there is a change in the form of a decrease in PSQI by 2.9779 points and an increase in flexibility by 2.2979 points. The paired t-test calculation results show a probability (p) 0.000, which is significant at the 0.01 level. The results of the PSQI t-test (13.858) are greater than the t table and the results of the flexibility t-test (12.786), indicating that aerobic exercise effectively improves sleep quality and flexibility in overweight women in Purwokerto.

DISCUSSIONS

Aerobic exercise adjusted to the intensity for overweight women positively impacts sleep and mattress quality. A lack of knowledge of how to perform certain exercises emerged as a barrier but was seen by the participants as surmountable given appropriate instruction (Guess, 2012). Because an instructor constantly guides the movements, aerobics is the recommended form of exercise for overweight women.

Overweight women will have difficulty getting rest (in this context, quality sleep), so appropriate and enjoyable activities, such as aerobic exercise, are needed (Dianingsih et al., 2022). Aerobic exercise also improves sleep quality for overweight women (Bakhshalipour et al., 2016; Widanita et al., 2019). Being overweight also affects movement capacity (flexibility). If overweight women have good flexibility, it will be easier to

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carry out daily activities (Bittencourt et al., 2017; Nikolaidis, 2013). So, aerobic exercise is very suitable for improving women's sleep quality and flexibility.

CONCLUSION

Based on the data analysis, description, measurement of research results, and discussion, it can be concluded that aerobic exercise significantly improves sleep quality and flexibility in overweight women during the COVID-19 pandemic. Suggestions for further research could be to examine further the factors that cause obesity in women. It can also review forms of exercise activities that can reduce body weight so that women can avoid obesity.

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