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The Effect of SKJ 2017 Exercise and Low Impact Aerobic Exercise on Balance and Vo2Max

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Abstract

The purpose of this study was to analyze the effect before and after the 2017 SKJ exercise to improve balance, to analyze the effect before and after the 2017 SKJ exercise to increase VO2Max, to analyze the effect before and after aerobic Gymnastics exercise Low Impact to improve balance. after the aerobics exercise Low Impact to increase VO2Max, analyze the differences between SKJ 2017 and aerobic exercises Low Impact on balance, and analyze the differences in SKJ 2017 and aerobic exercises Low Impact on VO2Max. This study uses a method (quasi-experimental research quasi-experimental research). The quasi-experimental research method is used as experimental research. This research method is carried out by conducting experiments (trials) with the type of subject installation design through a pre-test and a post-test with the control group. The matching only pretest-posttest control group design type of design is a study that matches subjects in the control group and the experimental group with data analysis using ANOVA. The data collection process was taken by testing the balance using the test balance beam and VO2Max using the MFT. Then the data were analyzed using the SPSS 23 series. The target of this study was members of the UNESA Gymnastics UKM with 30 members, divided into 3 groups with 10 people in each group, this research was conducted for 6 weeks. Results Pairedsamplest-test, strength, and paired sample t-test limb muscle power that the level of significance of each variable obtained sig 0.000 <0.05 so that there is a significant or significant difference between pretest and posttest of the dependent variable balance and VO2Max.The results of the ANOVA test revealed that the significance value was less than 0.05 (0.03 <0.05), the conclusion was that the average balance results of the three groups were significantly DIFFERENT. Then it is known that the significance value is less than 0.05 (0.00 <0.05), the conclusion is that the average results VO2Max from the three groups are significantly DIFFERENT. Based on the analysis above, it can be concluded that there is an increase in balance and VO2Max for each group, through ANOVA analysis. Where the aerobics exercise Low Impact has a better effect than the 2017 SKJ exercise and the control group, on balance and VO2Max.

Keywords
SKJ 2017; low impact aerobics; balance: VO2Max

I. Introduction

Regular exercise is the main key to prevent various diseases, one of which is diabetes mellitus, most people who get diabetes mellitus are caused by an inactive

lifestyle. (Kementrian Kesehatan RI, 2014; Putra and Berawi, 2015; Soelistijo et al., 2015; Yendi and Adwiyana, 2014).

Doing physical activity and sports will increase the body's ability to consume oxygen optimally, it will automatically affect physical fitness. So, physical fitness is the ability and ability of the body to make adjustments (adaptation) to the physical loads given to it (from work done daily) without causing excessive fatigue. To improve physical fitness, it is necessary to carry out regular sports exercises and carry out daily work that is useful for improving thinking.

The most effective way to improve physical fitness is to exercise regularly. Sports activities that can improve physical fitness are sports that are enough to give a burden to the heart and lungs. This type of sport is an aerobic sport, including gymnastics. Gymnastic exercises that can put a burden on the heart and lungs include physical fitness and aerobics. Likewise, the Ministry of Health of the Republic of Indonesia has the concept of "physical activity to be healthy and fit" which is expected to be able to actively participate in efforts to prevent and overcome the negative impacts caused by lack of exercise and sports injuries (Kemenkes RI, 2012).

Progress, especially SKJ and aerobic exercise which are very attractive to mothers and young women both in big cities and in small towns. Gymnastics is one type of physical exercise that is used as a means of preventing and losing weight as well as an effective means of rehabilitation or therapy. Indeed, many benefits can be obtained from this activity, ranging from increasing the work of the heart, increasing muscle strength, burning fat, and other benefits for the body (Utomo et al, 2012).

According to Suharti (2019 p. 5) "2017 SKJ is a gymnastics that has almost the same duration of exercise and variety of motion, so physiologically movements in gymnastics can improve one's body fitness". Physical Fitness Gymnastics (SKJ) is a government program regularly every four years and has just been reinvented by the 2017 SKJ at the end of 2017. This activity is carried out to support the government's program to re-invigorate the physical fitness program for the masses. SKJ 2017 is a series of gymnastic movements that have been determined and aim to improve or maintain a person's physical fitness (Ministry of Youth and Sports RI, 2017).

Aerobic gymnastics is a series of movements performed to the rhythm of the music that has been selected for a certain duration. Along with the development of the era of aerobics became popular with a variety of movements and modern music. So aerobics is very closely related to the use of oxygen. By this means that aerobic exercise is an exercise that uses a working system using an oxygen working system. There are various types of aerobic exercise, one of which is aerobic Gymnastics Low Impact. Aerobic Gymnastics Low Impact is a physical exercise that is used to stabilize body weight or an effective therapeutic tool and is performed with a rhythmic beat where one foot is still resting on the floor (Brick, 2002 p. 31).

Maintaining the ability of the body and posture stability is an effort to support the body against gravity. Balance is the ability to maintain the body in a balanced position or in a static or dynamic state, and use minimal muscle activity. Static balance is the body's ability to maintain balance in position (while standing on one leg, standing on a balance board), dynamic balance is the ability to maintain balance while moving. One form of balance that is very important in walking and running activities is dynamic balance. Balance training is important for the elderly 3 because it can help the body to remain stable so as to prevent the risk of falling. How to maintain muscle strength, flexibility, and balance in the elderly is carried out in various sports programs (Stanley et al, 2007).

The development and progress of science and technology at the present time, provides changes in various fields of science, including in the field of sports. With the advancement of sports science and technology, many new findings have been obtained, both in terms of practice and theory that support and are useful for increasing VO2Max and sports achievement. Socializing sports in today's era is not as easy as turning your hand. Physical education as part of sports has not been able to fulfill its role until now (Arsani, 2020). Sports for athletes with special needs have many benefits including improving quality of life, increasing endurance and strength, increasing brain performance, and restoring the mind (Haris, 2020). E-Sportstands for Electronic Sport, electronic means something that works using many small components, especially microchips and transistors, which control an electric current (Pradana, 2020). By doing aerobic exercise regularly, it can increase VO2Maxwithout experiencing excessive fatigue, which is largely determined by cardiovascular endurance, namely the ability of the heart, lungs, and blood vessels to carry oxygen optimally to the muscles. Therefore, cardiovascular aerobic endurance by measuring maximal oxygen uptake (VO2Max) is an indicator or determinant of VO2Max and a person's level of physical fitness (Sukadiyanto, 2011).

Based on the above discussion, it can be concluded that the research title of the effect of SKJ 2017 exercise and aerobic exercise low impact on balance and VO2Max in aerobic UKM, State University of Surabaya.

II. Research Methods

This study used a method quasi-experimental research. The quasi-experimental research method is used as experimental research. This research method is carried out by conducting experiments (trials). With this type of design, the subjects underwent a pre-test and a post-test with the control group. According to Syamsudin and Damaianti (2006, p. 163), the matching only pretest-posttest control group design type is a study that matches subjects in the control group and the experimental group, by conducting an initial test of the final test. This design does not guarantee the fulfillment of equivalence, because the installation process is not carried out randomly.

Table 1. Research Design

T_A1	M	X1	T_A2
T_B1	M	X2	T_B2
T_C1	M	X3	T_C2

Source: Maksum (2012 p.98)

Specification:
M : Matching
TA1 : Group pre-test the balance and VO2max
TB1 : Group of two pre-test balances and VO2max
TC1 : A group of three pre-test balance and VO2max
X1 : Treatment form of exercise SKJ 2017
X2 : Treatment in the form of Low Impact Aerobics Exercise
X3 : No treatment (control group)
TA2 : Group one post test balance and VO2Max
TB2 : Group two post test balance and VO2Max
TC2 : Group three post test balance and VO2Max

This research will be carried out in the Bima Loka building, Faculty of Sports Science, and the SSFC, Lidah Wetan campus. The time needed to carry out the research is pre-test 1x meeting, treatment 18x meeting for 6 weeks, 1 week 3 times meeting, and post-test 1x meeting.

Winarno (2011, p. 83) sample is part of the population that is the center of research attention, within the specified scope. The sample in this study amounted to 30 people. The sample was divided into 3 groups, each totaling 10 people. The purpose of using ordinal pairing is to equalize the ability of subjects in each group. So the overall pattern used in this study is matched subject ordinal pairing. With the following steps:

a. Subjects were given an initial test (pre-test).
   In the initial test, the subject was tested for balance with a balance beam and VO2Max with a Multistage Fitness Test (MFT). The test results are ordered from the largest to the smallest (ranked).
b. To make it easier to divide, enter the test result data that has been sorted into the following table:

Table 2. Examples of Ordered Test Results

K1	1	6	7	12	13	18	19	24	25	30
K2	2	5	8	11	14	17	20	23	26	29
K3	3	4	9	10	15	16	21	22	27	28

Description:
K1 = Group 1 (Experiment 1)
K2 = Group 2 (Experiment 2)
K3 = Group 3 (Experiment 3)

After dividing the groups, treatment only the experimental group was given. Experimental group 1 exercise SKJ 2017, experimental group 2 exercises aerobics Low Impact and experimental group 3 is the control group.

c. Subjects were given a final test (post test). In the final test, the subject was tested for balance with a balance beam and VO2Max with a multistage fitness test (MFT).

A variable is a concept that has variability or diversity that is the focus of research. While the concept is an abstraction or depiction of a certain phenomenon or symptom (Maksum, 2012, p. 29). The variables in this study consisted of the(independent variable dependent variable) and the(dependent variable dependent variable). These variables can be explained as follows:

1. Thevariable (independentindependent)
   Sugiyono (2011, p. 39) is a variable that affects or causes changes in the dependent variable. The independent variables in this study were SKJ 2017 and aerobics Low Impact.
2. Dependent Variable (dependent) This a variable is a variable that is influenced or which is the result, because of the independent variable (Sugiyono, 2011, p. 39), from this opinion, it is intended that the dependent variable is a variable or construct which is the output of the treatment or the previously given relationship to determine the effect (both high and low, strong and not strong, and so on) of the influence of the independent variable. In this study, the related variables are balance and VO2Max.

In the process of data analysis, the researcher used the help of the IBM Statistical Product and Service Solution (SPSS) Statistics 23 program. The aim was to give meaning to the data generated by the test, with the following details:

1. Data Requirements Test Data requirements test is needed to determine whether data analysis for hypothesis testing can be continued or not. Some data analysis techniques require testing of data requirements. Analysis of variance requires that the data come from a normally distributed population and the groups being compared are homogeneous. Therefore, analysis of variance requires tests for normality and homogeneity of the data.
2. Hypothesis testing

III. Discussion

The results of this study were obtained through research that has been carried out and produced data. This study aims to compare the 2017 SKJ gymnastics and Low Impact Aerobics Gymnastics on balance and VO2Max in members of the Aerobic Gymnastics UKM, State University of Surabaya. This study used a sample of 30 members of the Aerobic Gymnastics UKM, who did treatment for 6 weeks. This research began on July 1, 2020, and was completed on August 9, 2020, and was conducted in the fitness room of the Faculty of Sports Science, State University of Surabaya. The 30 UKM members were divided into 3 groups with different beats. The division of groups in this study are as follows: Group 1, is a group that conducted Physical Fitness Gymnastics 2017 using a beat of 80 bpm. In this group a sample of 10 members of UKM Aerobic Gymnastics.

a. Group 1, is a group that performs Physical Fitness Gymnastics 2017 using a beat of 80 bpm. In this group the sample consists of 10 members of the Aerobic Gymnastics UKM.
b. Group 2 is a group that performs Aerobic Gymnastics (low impact) using a beat of 96 bpm. In this group the sample consists of 10 members of the Aerobic Gymnastics UKM.
c. Group 3, is a group that does not do physical activity or exercise, only daily activities. In this group the sample consists of 10 members of the Aerobic Gymnastics UKM.

The first stage, namely the initial data collection, was carried out on July 1, 2020. The data taken were in the form of weight, height, balance, and VO2Max. After doing the pre-test, the sample will be treated. Gymnastics with a group that has been determined to do treatment for 18 meetings. Treatment is done every two days. Treatment in the first week started on July 3, 2020, and ended in week six which fell on August 7, 2020. After doing treatment for six weeks, the sample took post-test data. The data taken are height, weight, balance, and VO2Max. The following is the data obtained after taking pre-test and post-test data:

1. *VO2Max* Data

Table 3. VO2Max Data

	Mean and Standard Deviation		
	Group 1	Group 2	Group 3
Pre-test	23.35 ± 2.6	23.4 ± 2.22	16.15 ± 5.7
Post-test	24.79 ± 3.01	26.84 ± 3.2	17.54 ± 5.05
Peningkatan	1.45 ± 0.73	3.52 ± 1.62	1.39 ± 0.28

The VO2Max data obtained in the table above shows that there is an average difference between the two groups. In group 1, the average pre-test was 23.35 mm and after the 2017 SKJ treatment, the average skinfold in group 1 became 24.79 mm. Group 1 has a VO2Max difference of 1.45 mm. Meanwhile, group 2 has a pre-test average of 23.4 mm after doing aerobic exercise treatment, has an average skinfold of 26.84 mm, and has a VO2Max difference of 3.52 mm. In group 3, the average pre-test was 16.15 mm and after 6 weeks without any treatment, it was 17.57 mm. Group 3 has a VO2Max difference of 1.39 mm. To find out whether or not there is an effect caused by the two activities, in this study a test was conducted using the paired sample t-test.

2. Balance Data

Table 4. Balance Data

	Mean and Standard Deviation		
	Group 1	Group 2	Group 3
Pre-test	18.48 ± 5.4	15.94 ± 6.5	17.61 ± 4.88
Post-test	21.31 ± 4.9	22.09 ± 5.94	19.08 ± 5.01
Peningkatan	2.83 ± 1,5	6.1 ± 2.33	1.47 ± 1.22

Based on the table above shows that the average VO2Max in group 1 obtained an average pre-test data of 18.48 seconds and after the 2017 SKJ treatment the average post-test data in group 1 became 21.31 seconds from the data it can be seen that in group 1 there was an increase of 2.83 seconds. While in group 2, the average pre-test data was 15.94 seconds after doing aerobic exercise treatment, there was an increase of 22.09 seconds and it is known that in the group doing Low Impact Aerobic Gymnastics there was an increase of 6.1 seconds. While in group 3, the average pre-test data was 17.61 seconds and the post-test was 19.08 seconds, there was an increase of 1.47 seconds. To find out whether there is an effect caused by the three activities, in this study a test was conducted using the paired sample t-test.

3. Normality Test

Table 5. Normality Test

BALANCE

Tests of Normality

Group 1

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
PreTest	.118	10	.200*	.966	10	.852

PostTest	.148	10	.200*	.970	10	.892

Tests of Normality

Group 2

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTest	.232	10	.136	.843	10	.408
PostTest	.210	10	.200*	.870	10	.100

Tests of Normality

Group 3

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTest	.162	10	.200*	.947	10	.635
PostTest	.183	10	.200*	.907	10	.258

From the three tables above, it can be concluded that the data obtained is normal because Sig. is more than 0.05.

VO_2MAX

Tests of Normality

Group 1

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Pretest	.183	10	.200*	.933	10	.475
Posttest	.254	10	.068	.893	10	.181
peningkatan	.230	10	.144	.878	10	.123
presentase	.168	10	.200*	.928	10	.425

Tests of Normality

Group 2

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest	.261	10	.052	.903	10	.238
postest	.155	10	.200*	.912	10	.295
peningkatan	.155	10	.200*	.934	10	.485
presentase	.193	10	.200*	.881	10	.133

Tests of Normality

Group 3

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest	.200	10	.200*	.868	10	.094
posttest	.212	10	.200*	.875	10	.115
peningkatan	.173	10	.200*	.915	10	.318
presentase	.208	10	.200*	.861	10	.079

4. Homogeneity

Table 6. Homogeneity

VO2MAX

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
post test	Based on Mean	3.554	2	27	.043
	Based on Median	2.359	2	27	.114
	Based on Median and with adjusted df	2.359	2	26.435	.114
	Based on trimmed mean	3.336	2	27	.051

Significance value more than 0.05 (0.051>0.05) then it can be concluded that the data variance is **homogeneous**

KESEIMBANGAN

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
post test	Based on Mean	.749	2	27	.482
	Based on Median	.504	2	27	.610
	Based on Median and with adjusted df	.504	2	26.310	.610
	Based on trimmed mean	.722	2	27	.495

Significance value is more than 0.05 (0.495> 0.05) then it can be concluded that the data variance is **homogeneous**

5. Anova Test

Table 7. Anova Test

ANOVA

BALANCE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.805	2	24.402	.863	.003
Within Groups	763.174	27	28.266		
Total	811.979	29			

Based on the table above (ANOVA) it is known that the significance value is smaller than 0.05 (0.03 <0.05), the conclusion is that the average balance results of the three groups are significantly **DIFFERENT**.

ANOVA

VO_2MAX

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	478.621	2	239.310	16.132	.000
Within Groups	400.534	27	14.835		
Total	879.155	29			

Based on the table above (ANOVA) it is known that the significance value is less than 0.05 (0.00 <0.05), the conclusion is that the average results *VO_2Max* from the three groups **DIFFERENT** are significantly.

IV. Conclusion

1. There was a significant effect on increasing balance in the group that took the 2017 SKJ with an average increase in the balance of 18%.
2. There was a significant effect on the increase in VO2Max in the group that took the 2017 SKJ with an average increase in VO2Max of 1.44 ml/kg/min or 6%.
3. There was a significant effect on increasing balance in the group that did Low Impact Aerobics with an average increase in the balance of 48%.
4. There was a significant effect on increasing VO2Max in the group that did the aerobic exercise with a beat of 96 bpm with an average increase in VO2Max of 3.52 ml/kg/min or 15%.
5. There was a significant difference in improving the body balanced between the groups that performed the 2017 SKJ and Low Impact Aerobics.
6. There was a significant difference in the increase in VO2Max between the group that did the 2017 SKJ and Low Impact Aerobics.

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