

The Effect of Mixed Impact Aerobic Training on Vo2max and the Students' Vital Capacity in the Faculty of Sports Science Universitas Negeri Padang

Atradinal^{1*}, Jonni¹

¹*Faculty of Sport Science, Universitas Negeri Padang, Prof. Dr. Hamka, Padang, Indonesia*

^{*}*Corresponding author. Email: atr_pykh@yahoo.co.id*

ABSTRACT

This study aims to see: (1) Whether mixed impact aerobic can increase VO2Max of students; (2) Whether mixed impact aerobic can increase the vital capacity of students; and (3) Whether mixed impact aerobic can increase VO2Max along with vital capacity of students. This study involved 33 students of the Sports Education Department, Faculty of Sports Science, Universitas Negeri Padang by employing the VO2Max test (Bleep Test) and Spirometer (CC) test. The data were analyzed using the t-test formula (Paired Sample t-test), a t-test paired between pre-test and post test data. The results showed that the treatment for the VO2Max section obtained that $t_{observe} = 4,871$ while $t_{table} = 1,694$ with $\alpha 0,05 (n-1)$, meaning that mixed impact aerobic could significantly increase VO2Max of students. The results for vital capacity obtained that $t_{observe} = 2,433$ while $t_{table} = 1,694$ with $\alpha 0,05 (n-1)$, meaning that mixed impact aerobic exercise could significantly increase the vital capacity of Sports Faculty students at Universitas Negeri Padang. There was an increase of 7.49% for VO2Max and 4.70% of vital capacity.

Keywords: *Aerobic Training, Vo2max*

1. INTRODUCTION

From several physical activities that have been developed widely and rapidly among the society along with the development of the science and technology one of it is aerobic. The development of this sport year by year have developed rapidly. It can be seen by increasing the number of activities and championships that implemented in ES, JHS, SHS, and Collage, or in a community group. Besides, it can be seen by the increasing of aerobic studio, or even fitness center, sport center both in the area and in urban area.

The progressing and the developing also can be seen from the increasing number of new kind of aerobics that appeared namely: Asthma Gymnastic, Osteoporosis Gymnastic, Santri Gymnastic, Traffic Gymnastic, *Ayo Bangkit* Gymnastic, Scout Gymnastic, *Ayo Bersatu* Gymnastic, and Gymnastic for the Elderly, Pocharena Gymnastic, Physical Fitness Gymnastic and *Gemu Famire* Gymnastic. All of this are the gymnastics that have been standardized nationally, in order to maintain and to increase the physical fitness to prevent some illness.

This gymnastic is popular among the society because aerobic gymnastic gives a lot of advantages for the doer. Hairy (2013, p. 147-148) states the advantages that is gotten from the aerobic gymnastic exercise, namely: the gymnastic activity can increase the cardiovascular endurance namely the lungs, heart, and blood vessel ability to supply enough oxygen and nutrients to all cells to fulfill the physical activity that could take long time. It is because aerobic gymnastic is physical exercise in order to increase the lungs, heart, and blood circulation ability where the oxygen is a main factor as the energy generator for the body cells. Various fitness organizations, institutions or agencies develop aerobic gymnastic exercise as an effort to maintain the physical, body, heart, lungs ability to increase the physical fitness or VO2Max.

VO2Max is the maximum oxygen that uptaken per minutes that figured the aerobic capacity of someone. Hairy Junusul (2013, p. 186), says that VO2Max is the maximum ability to take the oxygen during the exercise. VO2Max often called as the maximum oxygen consumption value, it means VO2Max shows the oxygen volume consumed that is usually showed in

liter or milliliter. So, if there is a statement like $VO_{2Max}=31/\text{minutes}$, it means someone can consume oxygen maximally 3 liters per minute.

Aerobic gymnastic is combination of energetic and creative movements, fast rhythm. The advantages of aerobic gymnastic is to increase the healthiness of heart and body stamina, but if it done incorrectly can cause injury. In fact, the movement of this aerobic gymnastic is really appropriate for young people, who is 30 years old and under. "Because this gymnastic has fast rhythm and various variations of movement". Bick Lynne (2016, p. 7) explains that aerobic gymnastic is an easy and fun sport, because it is only moves following the instructor's movements and follows the rhythm of the music.

Because this gymnastic can be practiced with various variations, so that for someone who is over 30 years old wanted to practice aerobic gymnastic, to prevent injury it should be practiced correctly.

On its progressing, aerobic gymnastic consists of Low Impact Aerobics. Low Impact Aerobics is an aerobic that is done without any movement and one of foot is still on the floor. Sumosardjono (2006, p. 662) says that this gymnastic is allowed for those who cannot follow the aerobic gymnastic with the hard crush, knee or ankle injury, because this low impact aerobic gymnastic is a safe exercise from risk. Furthermore, Lodyelen (2006) adds that low impact aerobic gymnastic is slower, with basic walk movement, and there is no jumping movement at all.

Besides the Low Impact Aerobics, the other aerobics is High Impact Aerobics, it is aerobic gymnastic that directed to jumping movement, namely when the feet is moved (Brick, 2002, p. 34). This exercise is suggested for someone who is often to do this aerobic gymnastic or have been trained, and this movement is not allowed to be done for someone who had gotten injury. According to Sumasardjono (2006, p. 62), high impact aerobic exercise can cause accidental injury to the feet, ankle, shinbone and pelvis but if this exercise is practiced with the appropriate technique, so this movement will be safe and fun also easy to be practiced.

Another kind of aerobic gymnastic is Mixed Impact Aerobic. According to Sumasardjono (2006, p. 64), mixed impact aerobic is the combination between low impact and high impact movements. This movement can help to increase the stamina, improve the heart condition and the blood circulation, it is because leg muscles that is used jumping to carry the body and cause the heart inflate harder, however the mixed

impact aerobic, where the legs move leave the floor or sometime not move.

Faculty of Sport Science State University of Padang, is one of the higher institutions that is engaged in sports science which always responsive with the development in the field of sports and physical education. From several departments and programs that is provided, the students are equipped with aerobic knowledges and skills and prepared become the instructor, coach, judge, fitness center manager and teacher through aerobic courses. Various gymnastic activities that have been given to the students, as the compulsory courses for the sport education and sport science study programs. For the coaching education is an optional courses also called as aerobic gymnastic courses. The lecture syllabus is provided in the curriculum of Faculty of Sport Science State University of Padang. Especially for those who takes aerobic 3 as their course.

Sometimes there is question among the society, can mixed impact aerobics give impact for the same or different exercise towards VO_{2Max} and the vital capacity of students. That is why, it needs deepest analysis, so that it can obtain the correct data or information in order to find the solution or the problem solving.

Problem Statements

The main problem in this research is (1) Is mixed impact aerobics able to improve the VO_{2Max} of students Faculty of Sport Science State University of Padang? (2) Is mixed impact aerobic able to improve the vital capacity of students Faculty of Sport Science State University of Padang? And (3) Is mixed impact aerobic able to improve the VO_{2Max} and the vital capacity of students Faculty of Sport Science State University of Padang?

Hypothesis

Hypothesis that is submitted in this research are: (1) there is a significant increasing of VO_{2Max} towards the students of Faculty of Sport Science State University of Padang after following the exercise of mixed impact aerobics; (2) there is a significant increasing of vital capacity towards the students of Faculty of Sport Science State University of Padang trough the exercise of mixed impact aerobics and the increasing is faster.

2. METHOD

The kind of this method is the apparent experiment, this research was conducted on March 2017 to September 2017 which took place at Faculty of Sport Science State University of Padang.

The population in this research was all of the students or Sports Education Department in Faculty of Sports Science State University of Padang who was taking course the Basic Rhythmic Activity which were 118 students registered in January-June 2017 semester.

The sample of this research were 33 students Sport Education Department Faculty of Sport Science State University of Padang who were drawn from the population through purposive sampling technique, by considering: 1) Wellness; 2) Male; 3) Have flexible time (for pretest, treatment, and posttest); 4) First year student (to prevent contamination movement in sports activities).

Based on the aims that wanted to be reached, this research was conducted in apparent experiment. This research was given one form treatment with one different increasing target in order to see the impact on VO2Max and then to see the increasing of vital capacity, pretest should be done before giving the treatment, then after the experiment was given, the posttest should be conducted in order to see the effectiveness from both purposes.

The research design is sampling total of Group Extended Pretest-Posttest Design, Zainuddin (2010). In order to see the effectiveness of the mixed impact aerobic exercise on VO2Max, measurement were taken by using BLEEP TEST or the multi-stage running test of Sport Development Index (SDI) Method that created by the State Minister For Youth and Sports Affairs on 2007. Meanwhile, to see the effectiveness of Mixed Impact Aerobic exercise on the Vital Capacity, Spirometer (CC) test were taken. Department of National Education of Physical Fitness and Recreation Center (1999).

The data in this research was collected from the test that had been conducted namely VO2Max test (Bleep Test) and Spirometer (CC) test where the first test before the respondent got the Mixed Impact Aerobic treatment, meanwhile on the last test was conducted after the respondent got the Mixed Impact Aerobic treatment about a half months or 18 times meeting with the frequency 4 times a week.

The data that had been collected should be analyzed well by using descriptive analysis technique. Descriptive analysis was used in answering the question of research that had been found before it. So that in analyzing the research data, the formula of t-test (Paired Sample t-test) was used.

3. RESULT AND DISCUSSION

The Research Result

The result of this research about the Impact of Mixed Impact Aerobic Exercise on VO2Max (Multistage Fitness Test) and The Students' Vital Capacity of Faculty of Sport Science State University of Padang. The description of data from the pretest and posttest result as follows:

Pretest

The result of the pretest VO2Max Faculty of Sport Science students

Based on the measurement result with the Multistage Fitness Test (VO2 Max) can be described that description of the research data (pretest), the higher score was 51.70 and the lower was 30.27 and mean 42.5, the standard deviation 5.83, mode 45.23, and then median 41.27, with variance 34.03, and range 21.43.

To know more the magnitude of the VO2Max of FIK UNP students, the data were tabulated to see their frequency distribution. Based on the frequency distribution, from 33 students who become the sample of this research, 8 students were at the score 48.2-51.7 with percentage 24.4%, 5 students were at score 44.6-48.1 with percentage 15.2%, 6 students were at score 41.0 with percentage 21.2%, 4 students were at 33.9-37.4 with percentage 12.1%, 3 students were at score 30.3-33.8 with percentage 9.1%.

The result of the pretest vital capacity of Faculty of Sport Science Students

Based on the measurement by using Spirometer, before doing the treatment to the sample, pretest should be conducted. From the test result that had been conducted, the higher score was 5100, and the lower was 2400, where the mean 3485, the standard deviation 629, mode 3200, median, 3400, with the variance 395701, and the range 2700.

Meanwhile the frequency distribution for the vital capacity that FIK UNP students have was also tabulated. Based on the frequency distribution, from 33 students who become the sample of this research, 1 student was at level 4647-5100 with the percentage 3.0%, 6 students were at level 4197-4646 with the percentage 18.2%, 3 students were at level 3748-4197 with the percentage 9.1%, 9 students were at level 3299-3748 with the percentage 27.3%, 10 students were at level 2850-3298 with the percentage 30.3%, 4 students were at level 2400-2849 with the percentage 12.1%.

After giving the treatments like Mixed Impact Aerobic to the students who become the sample of this

treatments, the posttest was the next step that should be done in order to see the result of gymnastic exercise that had been conducted.

Posttest

The result of the posttest VO2Max Faculty of Sport Science students.

Based on the measurement result with the Multistage Fitness Test (VO2 Max), after the sample got the treatments like mixed impact aerobic exercise, it could get the posttest, where the higher score was 54.59 and the lower was 35.73 and mean 45.43, the standard deviation 4.76, mode 42.08, and then median 45.86, with variance 22.64, and range 18.86.

To know more the magnitude of the VO2Max of FIK UNP students, the data were then tabulated to see the frequency of distribution. Based on the frequency distribution, out of 33 students who become the sample of this research, 4 students were at the score 51.5-54.6 with percentage 12.2%, 5 students were at score 48.4-51.4 with percentage 15.2%, 9 students were at score 45.2-48.3 with percentage 27.3%, 5 students were at score 42.1-45.1 with percentage 15.2%, 9 students were at score 39.0-42.0 with percentage 27.3%. 1 student was at the score 35.7-38.9 with the percentage 3.0%.

The result of the posttest vital capacity of Faculty of Sport Science Students

Based on the measurement by using Spirometer, after the sample got treatment like mixed impact aerobic exercise, the posttest was obtained. So that, the description of the research data where the higher score was 5100, and the lower was 2700, where the mean 3648, the standard deviation 608, mode 4300, median, 3600, with the variance 370076, and the range 2400.

The frequency distribution for the vital capacity that FIK UNP students have was also distributed to see the frequency distribution. Based on the frequency distribution, of all 33 students who become the sample of this research, 2 students were at level 4697-5100 with the percentage 6.1%, 5 students were at level 4298-4696 with the percentage 15.2%, 8 students were at level 3898-4297 with the percentage 24.2%, 5 students were at level 3499-3897 with the percentage 15.2%, 6 students were at level 3100-3498 with the percentage 18.2%, 7 students were at level 2700-3099 with the percentage 21.2%.

Analysis Requirements

The purpose of analysis requirement as one of the requirements in conducting the research in order to be examined and analyzed until it can be concluded. In this research used the normality testing with the liliefors test based on the normal curve with the 0.05 significant level, if the value of $L_h < L_t$, it meant that data normally distributed and if the value of $L_h > L_t$, it meant the data is not normally distributed. The data that tested the normality of pretest and posttest, as follows:

Table 1. Normality Tested *Pre test* and *post test* VO2 Max and Vital Capacity

	mean	D	variance	df(n-1)	t _{count}	t _{table}	information
Pre	42.26	3.16	3.73	32	4.871	1.694	significant
Post	45.43						

Hypothesis Testing

In hypothesis testing, showed that the hypothesis that had been made by estimating the result with the statistics by using Paired Sample t-test testing with $t_{hit} > t_{tab}$ hypothesis was significantly different (H0 declined), it meant the hypothesis was not significant. The following hypothesis that the truth will be found:

Mixed Impact Aerobic exercise effected on the increasing VO2Max

(Multistage Fitness Test) Faculty of Sport Science State of University of Padang students)

The analysis result that had been done by using paired simple t-test technique with $t_{hit} > t_{tab}$ hypothesis was significantly different 35 (h0 declined) and if $t_{hit} < t_{tab}$ was not significantly different (H0 accepted) where the significant value of alpha (α 0.05) for the first hypothesis result could be seen on the following table:

Table 2. Mixed Impact Aerobic Test on VO2Max

After t-test paired between pretest and posttest data with the Mixed Impact Aerobic treatment could be counted 4.871 meanwhile $t_{table} 1.694$ $df \alpha 0,05 (n-1)$. Thus, the proposed hypothesis “has a significant increasing in VO2Max for FIK UNP students who took the Mixed Impact Aerobic exercise. The difference value in increasing was found about 7.5%.

The effect of Mixed Impact exercise on Vital Capacity (cardiopiratory) Faculty of Sport Science State University of Padang students

The result analysis that had been done by using the Paired Sample t-test technique with the $t_{hitung} > t_{table}$

No	Testing	Lh	Lt	Info
1.	The result of the pretest VO2Max Faculty of Sport Science students	0.067	0,154	Normal
2.	The result of the pretest vital capacity of Faculty of Sport Science Students	0.154		Normal
3.	The result of the posttest VO2Max Faculty of Sport Science students	0.099		Normal
4.	The result of the posttest vital capacity of Faculty of Sport Science Students	0.154		Normal

hypothesis was significantly different (H_0 declined) and if $t_{hitung} < t_{table}$ was not significantly different (H_0 accepted) where the significant value of alpha ($\alpha 0.05$) for the first hypothesis result could be seen on the following table:

Table 3. Mixed Aerobic Impact t-test on Vital Capacity

	mean	\bar{D}	variance	df (n-1)	t_{hitung}	t_{tabel}	keterangan
Pree	3484,85	163,64	386,34	32	2,433	1,694	Signifikan
Post	3648,48						

After t-test paired between pretest and posttest data with the Mixed Impact Aerobic treatment could be counted 2.433, meanwhile $t_{table} 1.694$ $df \alpha 0,05 (n-1)$. Thus, the proposed hypothesis “has a significant increasing in lungs capacity for FIK UNP students who

took the Mixed Impact Aerobic exercise. The difference value in increasing was found about 4.7%.

The increasing of VO2Max and Vital Capacity of FIK UNP students through aerobic exercise had changed which was getting better and faster.

After t-test in order to see the significant proof between VO2Max and vital capacity with the treatment of Mixed Impact Aerobic exercise, then it could be seen the amount by percent, where for this part in order to see the difference median of pretest

and posttest for more clearly as follows:

$$\% = \frac{\text{Posttest} / \text{pretest}}{\text{Pretest}} \times 100$$

Thus, after the method above was implemented the increasing of each variables were different, for the increasing of VO2Max with the treatment of Mixed Impact Aerobic exercise the increasing was about 7.49%, for the increasing of vital capacity with the treatment of Mixed Impact Exercise the increasing was about 4.70% where both results taken after the Mixed Impact Aerobic was given for 18 times per meeting (6 weeks). For more clearly could be seen on the following table:

Tabel 4. The Difference of Increasing on Mixed Impact Aerobic

Target achieved

The target that wanted to be achieved in this research is the understanding about the advantages of Mixed Impact Aerobic exercise for Faculty of Sport

Increasing percentage	
7,49%	4,70%
VO2MAX	Lung Capacity

Science State University of Padang students in order to increase the VO2Max and Vital Capacity, then it makes the students’ understanding can be improved and aerobic gymnastic more developed among the society, then the result of this research makes the researcher can be easier to i $t_{hitung} > t_{table}$ Information cess and explains how important an effectiveness of physical especially aerobic gymnastic, where the result of this research could be seen in the Significant $VO_2\text{Max}$ and Vital Capacity that used the mixed impact aerobic method.

Besides the result of this research is basic from the researcher to conduct the scientific publications and scientific orations both domestically and abroad, by looking the changes that is happening makes the

researcher getting excited in evolving the aerobic gymnastic, so that becomes the sports that easier to be accepted among the society. And for the publications planning in the near future on Journal of Educational Research and Evaluation (LPPM Undiksha Bali) Website:

4. CONCLUSION

Conclusion

Based on the analysis data that had been done, it can conclude that mixed impact aerobic gives the significant impact on the increasing VO₂Max and the Vital Capacity Faculty of Sport Science State University of Padang students. Besides, after conducting this research the students are able to manage and implement a healthy lifestyle by using aerobic gymnastic as an effort for a better and useful life.

Suggestions

Based on the analysis data that had been concluded, it can be stated some following suggestions:

- 1) For a better result, more monitoring is necessary needed such as management about the balance nutrition. So that the expected result is maximum;
- 2) Competition and regeneration have to be held for the aerobic gymnastic instructor, because it is one of the easy sports;
- 3) There is further research about how important VO₂Max in daily life;
- 4) There is further research about how important a better lungs capacity;
- 5) It is important to Socialize the result of this research to the society, so that the society know how important and effective the aerobic gymnastic.

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