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## High-Impact Aerobic and Zumba Fitness on Increasing VO<sub>2</sub>MAX, Heart Rate Recovery and Skinfold Thickness

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**Abstract** Purpose of this study is to determine the significant effect of high-impact aerobics exercise, and Zumba fitness on increasing VO<sub>2</sub>Max, decreasing of heart rate recovery, and decreasing of skinfold thickness. A sample of this study is 30 members aerobics of student activity. Type of this study was quantitative by using a quasi-experimental design method. The design of this study used Matching-Only Design. Data were Analyzed by using the t test (paired t-test). The samples divided into three groups consisted of experimental group I, experimental group II, and control group. They were given a treatment for 8 weeks or 24 meeting. For the data, retrieval is done by MFT test, heart rate recovery test, and skinfold thickness test. Furthermore, the result was analyzed by using SPSS 21 series. In conclusion, significant effect of high-impact aerobics and Zumba fitness on increasing VO<sub>2</sub>Max, heart rate recovery, skinfold thickness.

### 1. Introduction

Physical fitness requires power, endurance and flexibility in order to do any physical activity. Sport is defined as physical activity formed of a game that contains the efforts against the elements of nature, other people, ourselves and the complexity of the organization. Furthermore, pulse rate is the basis for the correct and measurable physical activity. From the pulse rate intensity of a person in physical activity will be known, and it can also show how hard the heart works. Someone who has a normal pulse rate (slower) is believe that person has good VO<sub>2</sub>Max and will not get exhausted when they doing high-impact aerobics and Zumba exercise. VO<sub>2</sub>Max has an influence on the body's ability to perform the recovery. Faster recovery allows athletes to reduce the interval of rest between training sessions and matches, also to improve overall training load [3]. In addition, fat in the body can be detected through anthropometric examination [4] conclude that skinfold fat can be determined by using a skinfold thickness, more than 85% body fat stored in the subcutaneous tissue, whereas subcutaneous fat thickness was significantly associated with weight. The aim of this study is to examine significant effect on high-impact aerobics and Zumba toward VO<sub>2</sub> Max, heart rate recovery, and skinfold thickness). In this this research, I would to bring forward the idea that my study will be reference for high-impact aerobics, heart rate recovery as well as skinfold thickness.



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### 1 Research Methods

This research is categorized as quantitative by quasi-experimental methods (quasi-experimental design). The design of this research is using the Matching Only Design. This design does not use random as a way to incorporate the subject into the group, but by matching. The instruments used in this study are Multistage Fitness Test (MFT) to test VO<sub>2</sub>Max, the pulse oximeter to measure pulse, and skinfold thickness to measure the thickness of subcutaneous fat.

### 3. Results

The Experiment Group I of high-impact aerobics was given a pre-post results on each dependent variable which is VO<sub>2</sub>Max, heart rate recovery, and skinfold thickness. The data will be shown in the table 1.

**Table 1.** Initial Test Data Acquisition And Final Test Group I

	VO <sub>2</sub> MAX (ml / kg / min)		PULSE RECOVERY (dt / min)		THICK FAT (ml)	
	Pre	Post	Pre	Post	Pre	Post
Average	30.73	32,82	100.7	94.7	26.37	22.78
St Dev	2.51	2.59	1.27	7.61	3.77	4.92
Increased%	6.37%		5.96%		13.61%	

The Table 1 shows significant improvement after being given a treatment for eight weeks with 24 sessions. It can be seen from the final tests average of 32.82 and 30.73 on average initial test. The increased percentage of from pretest to post test is amounted to 6.37%. So the differences of the average show an increase after given the treatment during training for eight weeks with the frequency of exercise for three times in a week.

**Table 2.** Preliminary Test Data Acquisition And Final Test Group II

	VO <sub>2</sub> MAX (ml / kg / min)		PULSE RECOVERY (dt / min)		THICK FAT (ml)	
	Pre	Post	Pre	Post	Pre	Post
Average	30.1	34.74	97.2	92.1	26.89	23.43
St Dev	3.16	2.63	5.69	3.95	3.24	2.52
Increased%	13.36%		5.25%		12.87%	

The Table 2 above show a significant improvement after being given treatment for eight weeks with 24 sessions. It can be seen from the average of the final test of 34.74 and the main test of 30.1. it happens at increased percentage from pretest to post test amounted to 13.36%. So the difference of the average showed an increasing trend after a treatment was given during the training for eight weeks with a frequency of exercise for three times in a week.

**Table 3.** Initial Test Data Acquisition And Final Test Group III (control)

	VO <sub>2</sub> MAX (ml / kg / min)		PULSE RECOVERY (dt / min)		THICK FAT (ml)	
	Pre	Post	Pre	Post	Pre	Post
Average	28.86	29.61	97.5	106.1	27.61	31.79
St Dev	3.37	3.41	4.76	3.24	2.71	2.90

Increased%	1.96%	4.15%	4.96%
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Based on Table 3, the control group also showed an increase in the dependent variable at the third  $VO_2\text{Max}$ , decreased of pulse rate recovery, and decreased of fat thickness. It can be seen from the final of the data test, at the variable of  $VO_2\text{Max}$  that the result final test and the initial test are respectively 29.61 and 28.86 with a percentage increase of 1.96%. The pulse rate of recovery variable that the result final test and the initial test are respectively 97.5 and 106.1 with a percentage increase of 4.15%. While the reduction of the fat variable in the final test data obtained 27.61 and initial tests 31.79 with an percentage of increasing as much as 4.96%. In summary, the control group also got an increased impact at the third dependent variables although the increases are relatively small if compared to the experimental group.

#### 4. Discussion

High-impact aerobic have benefits to help in improving the immune system, heart, and circulatory conditions [5]. High-impact aerobics are aerobic exercises that lead to movements in which feet do not touch the floor. Alex, et al [6] define high-impact aerobic exercise as an aerobic exercise which done with fast movement fast rhythm tempo. High-impact aerobics are conducted with movement and hard pounding such as: running, jumping, jogging, or movements that are done quickly and accompanied by the music with strong tempo. A physical exercise that classified in high-impact is when it reaches the maximum heart rate as much as 80-89%, where the resting rate of heart is increased. Furthermore, after the strenuous physical activities on such high-impact aerobics, if it more rapidly toward normal pulse rate, then the heart rate recovery will improve too.

Increasing the intensity of exercise can be done by adding weight training with jumping jacks movement by accelerating the movement frequency. The pulse rate is a reduction of heart rate recovery after an activity, where the heart rate returns to normal as before physical activity. Pascoal et al., [7] stated that heavy physical activities such as Zumba increase the pulse rate faster. Ljubojević [2] explains that "The Zumba fitness is a new kind of dance workout, inspired by Latin American music and Latin American dances. The exercise combines the basic of dance merengue, salsa, samba, cumbia, reggaeton and other Latin American dances. The movement uses not only basic aerobic steps, but Also enriches their composition with the other dance like hip-hop, belly dancing, Indian, African dance, etc ". Meanwhile, according to Maryann [8], Zumba is a Latin inspired aerobic dance with a strong Latin influence with a fusion of rhythms roommates are merengue, salsa, cumbia, reggaeton, mambo, chachacha, soca, Bhangra, belly dance, flamenco, hip hop, tango, and samba ". Jayanti [9] explains that Zumba is a dance that can quickly burn calories and fat in the body because the movement in Zumba dance is the characteristic of cardio movement such as jumping, spinning, moving faster, etc.

Zumba Fitness burns on average 369 calories, or about 9.5 kcal per minute. The average heart beat recovery was 154 beats per minute (bpm). In this research, exercises that given is the high-impact aerobics exercise that carried out in 24 meetings has an increase of 6.37% with average before treated as much as 30.73 ml/kg/min and after treated increased to 32.82 ml/kg/min to the ability of  $VO_2\text{Max}$ . The test results show paired sample *t* test with significance level of 0.001-5.195 ( $p = 0.05$ ), which means there is a significant effect of high-impact aerobic exercises to  $VO_2\text{Max}$ . This is supported by research conducted by Jaywant, [10] that aerobic exercise influence on the increasing in  $VO_2\text{Max}$  and lose weight. Therefore, many women choose high-impact aerobics exercises for fitness activities. It also in line with the research of Mustedanagić, et. al.,[11] that aerobic exercise performed for 60 minutes, consisted of 10 minutes warm up, 35 minutes halves aerobics, body shape for 10 minutes and cooling for 10 minutes, can reduce the folds of fat under the skin and can reduce weight gain in women who are obese.

In some sports activities, which require speed and explosive power, exceeding fat will decrease. In detail, acceleration of fat declination is proportional increases when force are applied. Conducted research, suggest that the skinfold thickness is recorded in 7 skinfold sites including triceps, biceps,

subscapular, supra spaniel, abdominal, front high medial calf [12]. The need for an increase of  $O_2$  during exercise recovery (excess post-exercise oxygen consumption, or EPOC) is caused by several factors, but the most known is the factor of oxygen deficit or payment oxygen that occurs during exercise when the contractile activity supported by ATP from the sources of non-oxidative e.g. creatine phosphate and anaerobic glycolysis [13]. Both energy supply and energy demand will be increased because of increasing body composition [14]. Munzirini [15] suggest that high-intensity aerobic exercise influences body fat reduction in adolescent girls. When someone is doing Zumba and aerobics Kaori combustion occurs more. it can be marked on how much the sweat out. There are several other benefits of Zumba exercise, for example, can lose weight, accelerate blood flow, improve the respiratory tract and relieve stress, Sukma [4] suggest that Zumba is a sport combined from 30% fitness movement and 70% dance movement, Zumba exercise can burn 600 to 1000 calories/hour. The fast movement also generates not only burning calories and fat but at the same time also nourish the heart [16]. Gunawan, et al [17] find that exercise Zumba can also increase  $VO_2Max$ , if it is conducted over 8 weeks and exercised for 60 minutes. Haghjoo et al. [18] said that Zumba physical fitness training within a period of 8 weeks had a significant effect on the reduction of body fat percentage of women with a significant level ( $p = 0.001$ ).

### 4 Conclusion

Based on the results of research about the influence of high-impact aerobics and Zumba to the  $VO_2Max$ , Pulse Recovery (Heart Rate Recovery), and the decreases of the fat thickness (skinfold Thickness), it can be concluded that: (1) there are significant effects between high-impact aerobics of the  $VO_2Max$ , pulse Recovery (Heart Rate Recovery), and the decrease in thickness of the fat (skinfold thickness), (2) there are significant effects between Zumba exercises to the  $VO_2Max$ , pulse Recovery (Heart Rate Recovery) and a decrease in thickness of the fat (skinfold thickness), and (3) there is significant difference between high-impact aerobics and Zumba to the  $VO_2Max$ , pulse Recovery (Heart Rate Recovery), and the decrease in fat thickness (skinfold thickness).

### 6. References

- [1] Brick L 1996 *Fitness Aerobics (Fitness Spectrum Series)* (New Zealand: Human Kinetics)
- [2] Ljubojevic A, Jakovljevic V, and Poprzen M 2014 Effects Of Zumba Fitness Program On Body Composition Of Women *Original Scientific Paper (Online)* **10** (1) pp 29-33 (<http://www.sportlogia.com/no9engl/eng4.pdf>)
- [3] Whyte G 2006 *Advances in sport and exercise science series "the physiology of training"*. Philadelphia: Elsevier's Health Sciences Rights Department. (<http://www.imd.inder.cu/adjuntos/article/613/The%20Physiology%20of%20Training.pdf>)
- [4] Sukma 2013 Efek Zumba Terhadap Penurunan Tebal Lemak Bawah Kulit Dan Berat Badan Member Df Fitness Dan Aerobic *Jurnal FIK UNY*
- [5] Rosidah 2013 *Perbedaan Pengaruh Latihan Senam Aerobik Low Impact Dan Mix Impact Terhadap Tingkat Kesegaran Jasmani Pada Siswa Putri Smk Negeri 1 Surakarta Tahun Pelajaran 2012/2013* (Jurusan Pendidikan dan Kesehatan Universitas Sebelas Maret: Surakarta)
- [6] Alex M S, Subiono H S, and Sutarji 2012 Pengaruh Latihan Senam Aerobik Low-Impact dan High-impact Terhadap Kesegaran Jasmani *Journal Of Sports Science and Fitness* pp41-45
- [7] Pascoal M E, Robert D, and Poluan H 2014 Studi Senam Zumba Sesaat Terhadap Kadar Kolesterol Total Pada Mahasiswa Jurusan Gizi Politeknik Kesehatan Kementerian Kesehatan Manado *GIZIDO* **6** 1
- [8] Maryann 2012 *Energy Expenditure and Physiological responses to 60 minute Zumba Aerobic Sessions (group class versus home) in Healthy Adult Female* (United Kingdom: University of Chester)

- [9] Jayanti Y, Jimmy F R, and Wenny S 2013 *Pengaruh Latihan Zumba Terhadap Nilai FEV1 Forced Expratory Volume in one Second*. (Manado: Fakultas Kedokteran Universitas Sam Ratulangi)
- [10] Jaywant P J 2013 Effect of Aerobic Dance on the Body Fat Distribution and Cardiovascular Endurance in Middle Aged Women (2013) *Journal of Exercise Science and Physiotherapy* **9** 1 pp 6-10
- [11] Mustedanagić J, Bratić M, Milanović Z, and Pantelić S 2016 The Effect Of Aerobic Exercise Program OnThe Cardiorespiratory Fitness And Body Composition Of Female College Students *Acta Universitatis Physical Education And Sport* **14** 2 Pp 145 – 158
- [12] Kusnanik N W 2001 *A comparison Of Field And Laboratory Testing Of Sport Specific Fitness For Female Field Hockey Players* (Australia: University Of Canberra)
- [13] Sherwood L 2012 *Fisiologi manusia: dari sel ke sistem (6th Ed.) (Terjemahan Brahm U. Pndit)*. (Singapore: Cengage Learning Asia Pte Ltd 5 Shenton Way)
- [14] Kusnanik N W and Hartati H 2017 Physical and Physiological Profil Of Junior High Student In Indonesia *Sports Science* **10** 1 pp 96-99
- [15] Munzirini M R 2016 *Perbedaan Pengaruh Senam Aerobik Intensitas Sedang Dengan Senam Zumba Di Air Terhadap Penurunan Lemak Tubuh Pada Remaja Putri Universitas 'Aisyiyah Yogyakarta* (<http://opac.unisayogya.ac.id>)
- [16] Schiff T N 2014 *Dampak Aktivitas Senam Aerobik, Tari Zumba, Dan Jaipong Terhadap Perubahan Kadar Lemak Tubuh* (Bandung: Universitas Pendidikan Indonesia)
- [17] Gunawan A, Polii, and Damajanti 2015 Pengaruh Senam Zumba Terhadap Kebugaran Kardiorespiratori Pada Mahasiswa Fakultas Kedokteran Universitas Sam Ratulangi Angkatan 2014 *Jurnal e-Biomedik* **3** 1
- [18] Hoghjo M, Zar A, and Hosseini A S 2016 Effect of 8-week Zumba training on overweight women's body composition *Pars Journal of Medical Sciences* **14** 2

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