KEMAS 10 (1) (2014) 1-6

Jurnal Kesehatan Masyarakat

http://journal.unnes.ac.id/nju/index.php/kemas

# PROGRAM *PHYSICAL FITNESS* DALAM MENINGKATKAN KESEHATAN PARU (VO2 max)

Ahmad Nasrulloh[1]✉

[1]Pendidikan Jasmani Kesehatan dan Rekreasi Universitas Negeri Yogyakarta, Indonesia

**Info Artikel**

*Sejarah Artikel:*
Diterima 15 April 2014
Disetujui 5 Mei 2014
Dipublikasikan Juli 2014

*Keywords:*

Physical Fitness Programme; Maximum Oxygen Uptake (VO2 Max)

**Abstrak**

Penelitian ini bertujuan untuk mengetahui pengaruh *physical fitness programme terhadap maximum oxygen uptake* (VO2 max) mahasiswa IKORA FIK UNY. Penelitian ini menggunakan metode eksperimen dengan desain the one group pretest-posttest design. Populasi penelitian adalah mahasiswa IKORA angkatan 2010. Sampel dalam penelitian ini melibatkan seluruh mahasiswa prodi IKORA FIK UNY angkatan 2010 yang mengambil konsentrasi keahlian kebugaran. Instrumen yang digunakan adalah menggunakan tes lari 15 menit dengan metode balke. Teknik analisis data menggunakan uji normalitas, uji homogenitas dan uji t. Berdasarkan hasil analisis diperoleh nilai t hitung sebesar 11,261 dengan nilai signifikansi sebesar 0,000. Oleh karena nilai signifikansi sebesar 0,000 lebih kecil dari 0,05 ($p<0,05$), maka dapat disimpulkan ada perbedaan yang signifikan VO2 Max mahasiswa saat pre test dan post test. Hasil ini dapat diartikan bahwa ada pengaruh yang signifikan antara *physical fitness programme* terhadap *maximum oxygen uptake* (VO2 max) mahasiswa IKORA FIK UNY.

## *PHYSICAL FITNESS PROGRAMME IN IMPROVING LUNG HEALTH (VO2 MAX)*

***Abstract***

*This research aims at investigating the effect of physical fitness programme towards maximum oxygen uptake (VO2 max) of students of Sport Science Study Program Faculty of Sport Science Yogyakarta State University. This study used an experimental method with one-group pretest-posttest design. The study population was class of 2010 Sport Science Study Program (Ikora) students. The samples in this study involved the entire students of Ikora class of 2010 who took the concentration of fitness expertise. The instrument used is a 15-minute test run using the balke method. The data analysis technique used normality test, homogeneity test and T-test. Based on the analysis results obtained, the t value is 11.261 with a significance value of 0.000. Because the significant value of 0.000 is less than 0.05 ($p<0.05$), it can be concluded that there are significant differences in VO2 Max of the students when in pre-test and post-test. These results imply that there is a significant relationship between physical fitness program to the maximum oxygen uptake (VO2 max) of Ikora students in Faculty of Sport Science YSU.*



✉ Alamat korespondensi:
Jalan Colombo Yogyakarta, 55281
Email: ahmadnasrulloh@yahoo.co.id

ISSN 1858-1196

## Introduction

Being healthy and fit is one thing which becomes the goal of one's life in order to gain happiness. Various ways and attempts are made by anyone in order to obtain health and fitness. The most appropriate way to get health and fitness is to do a physical activity such as sports. If someone can do a physical exercise routine, regular, scalable and programmable, hence, physical fitness will be obtained. Once someone has physical fitness, thus he or she will automatically be healthy.

Nowadays, the most favored place for exercise is a gym (fitness center). Fitness center is much favored because in fitness center has a variety of tools and facilities that have been designed so that it can be used as a tool for physical exercise. In addition to well-equipped facilities, a fitness center is also very easy to find because it has been a lot of fitness center that was established as a service to community. One of the founding objectives of fitness center is to help people to be more likely to do physical activities in order to improve their health and physical fitness (Fauzi, 2013).

There are several exercise programs that can be offered in a fitness center among other fitness exercise programs, such as (physical fitness program), weight loss, weight gain, muscle hypertrophy (body building), body shaping, and also training programs for therapy and post-injury rehabilitation. The number of training programs offered by the fitness center can be easily managed if at the time doing weight training exercises is conducted in accordance with the training dosage. Weight training is an exercise that is carried out systematically by using weights as a means to increase the strength of muscle function in order to improve the physical condition, prevent injury or for medical purposes. Weight training can be done by using its own weight (the load) or using external weight that is a free weight like a dumbbell, barbell, or engine load (gym machine). The forms of exercise using weights in the most widely used are such as chin-ups, push-ups, sit-ups, or back-up, while using external loads are numerous and various according to the purpose of the exercise.

Physical fitness is the ability of one's body to perform tasks and daily work without causing significant fatigue, so that the body still has the energy savings to cope with the additional workload. According to Utami (2012) One of the characteristics of people who have a good level of physical fitness is the presence of high morale, always trying to implement a more efficient job and have resistance to disease and stress is not easy.

The physical fitness will be obtained for each person if the person is willing to do the exercises in accordance with the proper exercise program. One of the training programs that can be used to improve fitness is the fitness workout program (physical fitness program). The exercise program should be prepared in accordance with the appropriate dose of good exercise frequency, intensity, type and duration latihanagar desired goal can be achieved by a person. In addition it should also apply the basic principles of physical exercise in order to achieve maximum performance for someone. The training principles include: (1) individual, (2) adaptative, (3) overload, (4) the burden is progressive, (5) specification (specificity), (6) varies, (7) warm-up and cool down, (8) periodicity, (9) reverse (reversible), (10) a moderate load (not excess), and (11) should be a systematic practice.

Physical fitness of a person can be seen from the endurance capacity of the lung in a person's heart to supply oxygen throughout the body. To determine the quality of cardiac pulmonary resistance, it can be seen from the heart lung's ability in performing maximal oxygen uptake (VO2 max) or the maximum amount of oxygen consumed. Maximum oxygen uptake (VO2 max) is defined as the greatest rate at the which oxygen can be consumed during exercise. So it can be said that to know the physical fitness of a person can be seen from the ability of the heart lung to supply oxygen throughout the body and can be measured by knowing the maximum oxygen uptake (VO2 max).

## Methods

This type of research used in this study is experimental research. Experimental research is basically intended to examine the relationship between causes with the results (effects). It

is said that this study is an experimental study because this study will examine the relationship of cause and effect on the influence of physical fitness program to the maximum oxygen uptake (VO2 max).

The research design in this study is the use of the one-group pretest-posttest design. According to Leedy (1980: 169), the one-group pretest-posttest design is a type of experiment where a single group has (1) a pre-experimental evaluation, than (2) the influence of the variables, and, finally (3) a post-experimental evaluation. From the opinion above, it can be said that the one-group pretest-posttest design is a form of experimental research in which a group becomes an evaluation before the experiment, then the effect on the variable and the last gives an evaluation after the experiment. So it can be said that the results of the pretest control of this research. The design of this study can be described as follows:

**O1** ⟶ **P** ⟶ **O2**

Note:
O1 : *Pre test*
P : *Treatment*
O2 : *Post test* (tes akhir),
Zaenuddin (1988:71).

The population in this study was the students of Sport Science Study Program in Faculty of Sport Science Yogyakarta State University. The samples in this study involved the class 2010 entire students of Sport Science Study Program in Faculty of Sport Science Yogyakarta State University who took the fitness expertise concentration. The instruments to collect data in this study used 15 minute test run using the Balke method. The standard assessment is to calculate the distance traveled during the 15-minute run that is recorded in meters. Having obtained the distance in meters, the VO2 max is then calculated using the following formula:

$$\text{VO2 max} = \left(\frac{\text{X metre}}{15} - 133\right)\text{X } 0{,}172 + 33{,}3$$

Note:
VO2 max = Aerobic Capacity (ml/kg.BB/menit)
X = Distance covered in metres
15 = The 15 minute period (Iskandar, 1999: 15)

**Result and Discussion**

This study aims to determine the effect of physical fitness programs to the maximum oxygen uptake (VO2 max) students IKORA UNY FIK. The data were obtained by measuring the student VO2 max. The data collection was performed twice before and after the treatment.

The research data is described by presenting research data based on the results of a descriptive analysis of the calculation results include the minimum score, maximum, mean, median, mode, and deviation standard. The results of a descriptive analysis of the data in each study are as follows:

The analysis results of VO2max pre-test taken indicate the lowest score is 29.57 and the highes score is 46.54. The results are obtained by descriptive statistical analysis of the mean (M) = 39.72; Standard Deviation (SD) = 4.26; the Median (Me) = 39.55; and the mode (Mo) = 39.09.

The results of VO2max post-test data analysis are obtained the lowest score that is 31.06 and the highest is 49.18. The results obtained by descriptive statistical analysis of the mean (M) = 42.33; Standard Deviation (SD) = 4.99; the median (Me) = 42.53; and the mode (Mo) = 41.38.

The results of the t test is to prove the hypothesis of this study which is the effect of physical fitness program to the maximum oxygen uptake (VO2 max) of the students of Sport Science Study Program in Class 2010 in Sport Science Faculty in YSU.

Based on the results of the ANOVA analysis, it is obtained the t value of 11.261 with a significance value of 0.000. Because of the significant value of 0.000 is smaller than 0.05 ($p < 0.05$), it can be concluded that there are significant differences in VO2max students when pre-test and post-test were performed. These results imply that there is the influence of physical fitness program to the maximum oxygen

**Table 1.** Research Data

| Number | Gender | Pree Test in Distance (in metre) | Pre test VO2 Max (ml/ kg.bb/minute) | Post Test Distance (Metre) | Post Test VO2 Max (ml/kg.bb/minute) |
|---|---|---|---|---|---|
| **001** | M | 2.950 | 44,25 | 3.300 | 48.26 |
| **002** | M | 2.710 | 41,50 | 3.090 | 45,86 |
| **003** | M | 3.000 | 44,82 | 3.350 | 48,84 |
| **004** | M | 2.810 | 42,65 | 3.100 | 45,97 |
| **005** | M | 2.500 | 39,09 | 2.650 | 40,81 |
| **006** | M | 3.150 | 46.54 | 3.380 | 49,18 |
| **007** | M | 2.800 | 42,53 | 3.147 | 46,51 |
| **008** | M | 2.400 | 37,94 | 2.500 | 39,09 |
| **009** | M | 2.840 | 42,99 | 3.050 | 45,40 |
| **010** | M | 2.880 | 43,45 | 3.130 | 46,31 |
| **011** | M | 2.590 | 40,12 | 2.800 | 42,53 |
| **012** | M | 2.540 | 39.55 | 2.840 | 42,99 |
| **013** | M | 2.200 | 35,65 | 2.340 | 37,26 |
| **014** | M | 2.460 | 38,63 | 2.700 | 41,38 |
| **015** | M | 2.100 | 34,50 | 2.230 | 35,99 |
| **016** | M | 2.500 | 39,09 | 2.700 | 41,38 |
| **017** | F | 2.050 | 33,93 | 2.250 | 36,22 |
| **018** | F | 2.390 | 37.83 | 2.510 | 39,21 |
| **019** | F | 1.670 | 29,57 | 1.800 | 31,06 |

Source: The Analyzed Primary Data

**Table 2.** The Descriptive Analysis Result of Research Result

| Data | *Min* | *Max* | *Mean* | *Median* | *Modus* | *Std. Dev* |
|---|---|---|---|---|---|---|
| Pre test VO2Max | 29,57 | 46,54 | 39,72 | 39,55 | 39,09 | 4,26 |
| Post test VO2Max | 31,06 | 49,18 | 42,33 | 42,53 | 41,38 | 4,99 |

Source: The Analyzed Primary Data

uptake (VO2 max) of the students of Sport Science Study Program in Class 2010 in Sport Science Faculty in YSU, so the hypothesis of this study is acceptable.

Everyone needs physical activity to be able to gain physical fitness. Physical activity is defined as any bodily movement produced by sceletal muscles that results in energy expenditure. But the physical fitness is a person's ability to perform everyday tasks with ease, without feeling excessive fatigue, and still have more or backup power to enjoy their leisure time, and for unexpected purposes. According Khairuddin (2014) said that physical fitness is defined as students' ability to do daily activities without fatigue and, has remaining energy, to face urgent and unexpected situations. It can be concluded that physical fitness is the ability of an individual to do any heavy work in everyday life to not experience excessive fatigue, so it still has the power or energy to fill his spare time and is still able to do the job suddenly. So it can be said that everyone really needs physical fitness in order to perform daily activities well without feeling tired. Therefore, we need a proper exercise program to improve physical fitness.

Physical fitness can be seen from the ability of someone's heart lung endurance in maximal oxygen consumption to meet the body's needs. Meanwhile, the quality of cardiac pulmonary resistance can be seen from the heart lung's ability in performing maximal oxygen uptake (VO2 max). Other laboratory procedures, such as maximum oxygen consump-

tion (e.g., VO2 max), are more valis and realible measures of aerobic fitness (Darla, 2007). The terms of maximal oxygen consumption, maximal oxygen intake, and maximal aerobic power have the same sense, that is the biggest difference between the oxygen that is inhaled into the lungs and oxygen is exhaled out of the lungs.

According Joseph (2004: 56) maximal oxygen uptake (VO2 max) is traditionally defined as the maximal rate at which oxygen can be taken up and used by the body during exercise (1). VO2 max has been widely accepted as the best measure of functional capacity of the cardiovascular system and is regarded as a measurement of one's overall aerobic fitness (2). Indeed, determination of VO2 max has become a routine procedure in exercise physiology laboratories. States that the maximum aerobic power is often called maximal oxygen consumption that is the fastest tempo at which a person can use oxygen during exercise. The quality of cardiacresporatory resistance is expressed by the magnitude of VO2 max, or the maximum amount of oxygen consumed to the maximum in units of ml / kg. bb / minute.

The measurement of maximal oxygen uptake (VO2 max) has been available for more than half a century and provides useful information about an individual's maximal cardiorespiratory fitness and level of physical performance (Elisabeth, 2014). According to Santosa (2007) maximal oxygen uptake is a measure of the combined ability of the muscles that contract to consume oxygen for the purposes of processing the energy source with the ability of chemo-hydro-lymphatic, respiratory system and cardiovascular system. The maximum use of oxygen to a person can be known at the time of exercise. Maximal oxygen uptake during exercise is based on the speed when using oxygen, not just the amount of oxygen being used at that time. So it can be said that the maximum uptake oksogen is the ability to take up and the amount of oxygen rapidly as much as possible.

Maximal oxygen uptake requires the support of the cardiovascular and respiratory systems. The support respiratory system can be seen from the lung's ability to be able to inhale as much oxygen which is bound by blood. The cardiovascular system acts as an oxygen pump that has been tied by blood to be passed through the body as energy. There are several factors that can affect the VO2 max; they are the function of the heart lung (cardiorespiratory), aerobic muscle metabolism, overweight bodies, circumstances and descent exercises.

Stated that the physiological functions involved in the capacity of maximal oxygen consumption (VO2 max) are: (1) the heart, lungs, and blood vessels to be functioning properly, so that the oxygen that is inhaled into the lungs and subsequent entry to into the blood. (2) the process of delivering oxygen to tissues by red blood cells to be normal; the function of the heart, blood volume, the number of red blood cells and hemoglobin concentration and blood vessels to be able to divert blood from tissues that are not active to active muscles which need greater oxygen. (3) tissues, especially muscles, which normally must have the capacity to utilize oxygen delivered to them, metabolism and mitochondrial functions should be normal.

How important role of lung and heart is to supply oxygen throughout the body to maintain the stability of one's life, thus, the lung and heart conditions should always be fit. Therefore, we need a physical exercise program that can maintain health and heart and lung fitness. The exercise program is one of a planned reference used as a basis for doing exercises. The preparation of training programs needs to be made so that the training process can be run effectively, efficiently, and safely. The exercise program is a program that is used as a guideline in conducting training exercises in order to achieve the desired goal. There are several exercise programs that are created to help the process of fitness exercises. One such training program is a physical fitness program.

This physical fitness program aims to improve heart and lung fitness with physical exercise. The training program emphasizes aerobic exercise as the main exercise. The model of aerobic exercise that can be done is like jogging, cycling, aerobics, swimming and others. Aerobic exercise is best done on a regular basis as much as 3 to 4 times a week in order to be an intensive exercise. The intensity of aerobic exercises performed is ranged from 70% to 85% maximum heart rate. In addition to the frequency, intensity and type of exercise, we also need to consider the duration of the exercise.

The duration of exercise should be done for 20 to 30 minutes.

In addition to this physical fitness training program, there is the main form of aerobic exercise which is also supported by a complementary form of weight training exercises. Weight training is done with a frequency of 3-4 times a week. The intensity of the exercise performed is 70% of maximum reps. This exercise is done with reps for 3 sets of 12 repetitions that are performed with a fast rhythm. This exercise is done with a set of systems with rest periods between sets that is only 20 to 30 seconds. The number of items in the exercises are 12 stations involving large muscles i.e. chest press, butterfly, abdominal, leg press, pull down, side bench, leg extension, arm curl, upright row, triceps extension, leg curl, and lower back .

The program is completed by combining the principles of aerobic exercise and weight training with the appropriate dose of proper exercise. A combination of aerobic exercise with strength training is expected to contribute positively to the increase in maximum oxygen uptake (VO2 max). Based on the analysis results, it is taken t value of 11.261 with a significance value of 0.000. Because of the significant value of 0.000 is smaller than 0.05 ($p < 0.05$), it can be concluded that there are significant in VO2 Max differences during student pre-test and post-test. From these results, it can be proven that there is significant relationship between physical fitness program towards the maximum oxygen uptake (VO2 max) of the students of Sport Science Study Program in Class 2010 in Sport Science Faculty in YSU so the hypothesis of this study is acceptable.

## Conclusion

Physical fitness program is an exercise program to improve physical fitness. Physical fitness of a person can be seen from the ability of the lungs to pick up oxygen maximal. This training program combines aerobic exercise with strength training. The aerobic exercise is performed 3 times in a week. The intensity of aerobic exercises performed is ranged between 70 to 85% of maximum heart rate. The duration of exercise should be done for 20-30 minutes. The weight training is conducted using a set system and organized into 12 stations or posts, with a maximum load of 70% loading, 12 repetitions, performed 3 sets, among posts is given a break for 30 seconds. The program of physical fitness when applied to a person will have a positive impact on the increase in VO2 max. As the research has been conducted on 19 students of Sport Science Study Program in Faculty of Sport Science Yogyakarta State University, it can be concluded that there is a significant relationship between physical fitness program to the maximum oxygen uptake (VO2 max) with a t value of 11.261 and a significance value of 0.000 that is smaller than 0.05 ($p < 0.05$).

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