

# Relationship between Body Fat Percent and Maximal Oxygen Uptake among Young Adults

<sup>1</sup>A.R Amani, <sup>2</sup>M.N. Somchit, <sup>3</sup>M.M. B Konting, <sup>4</sup>Kok L Y

<sup>1,3,4</sup>Department of Sport Science, Faculty of Educational Studies, Universiti Putra Malaysia

<sup>2</sup>Department of Biomedical Science, Faculty of Health and Medical, Universiti Putra Malaysia

<sup>1</sup>[Alireza.daryasar@gmail.com](mailto:Alireza.daryasar@gmail.com) , [nazrul.hakim@gmail.com](mailto:nazrul.hakim@gmail.com)

**Abstract:** The present study was conducting to examine the relationship between maximum oxygen uptake (VO<sub>2</sub>max) and body fat percent among international students in Universiti Putra Malaysia. VO<sub>2</sub>max and body fat percent are importance factors at health and sport research. Twenty six male student (26 +/- 5 years old in age and 168 +/- 5 cm in high and 73 +/- 5 kg in weight) at Universiti Putra Malaysia. Maximal were participated at this investigation. Oxygen Uptake and body fat percent have been measured by the routine protocols. At the end of this research have been shown signification and negative correlation (-0.042) between the VO<sub>2</sub>max and body fat percent. Results of this investigation show that there is negative correlation between maximum oxygen uptake and body fat percent. Increase the VO<sub>2</sub>max have been shown with decrease and improve on body composition. [Journal of American Science 2010;6(4):1-4]. (ISSN: 1545-1003).

**Key Words:** Maximum Oxygen Uptake, Body Fat Percent, Aerobic Capacity, Physical Activity

## 1. Introduction

Living in recent century and specifically after Second World War is difference with the all of previous centuries. Non-activity and changing over in life style is the result of machining method in every work. Advancements in using the technology may help the human to make daily work easier and also in most jobs technology has helped to alleviate the high risk of injury for many type of physically demanding jobs. However while the technology has increased the safety of the daily work and also was the main cause to reduce the physical activity level among the people (Brooks, 2002). There are several factors which are importance in health and fitness level. Cardiovascular, muscular, cardio respiratory fitness with normal and standard level of the body composition are the main factors that researcher have been focused. Have been reported several investigation to examine effect of the exercise and training methods to theses factors (LaMonte et al., 2000; Sergi et al., 2009; Suzuki et al., 1998). Have been shown that functional capacity and cardiovascular fitness improved by the regular exercise (Collins et al., 2004). Among the fitness factors, aerobic fitness is the main factors that enhance human to doing daily jobs and also improve the ability to long time duration exercise. VO<sub>2</sub>max is maximum oxygen that human cans consume during exercise in one minute (D. W. Hill & Rowell, 1996). There are several methods to improve aerobic capacity. Regular aerobic exercise is the most importance factors to improve the human aerobic power and also maximum oxygen uptake (Tan & Yang, 2007). Have been shown other fitness factor such as body composition is closely related with aerobic fitness and VO<sub>2</sub>max. Daily diet are using to doing daily work. Food before using by the body to provide the

energy was converted to ATP. Adenosine three phosphates is the main source of the energy. Extra foods in body will be stored as the fat in some area of the bodies such as the abdominal (Gause-Nilsson & Dey, 2005; White et al., 2008). Regular exercise and physical activity is the main cause to improve body composition and cardiovascular fitness. Body fat percent, body mass index, water cells, muscle mass are factors which are influenced by exercise. Recent investigations have been shown that there are the closely relationship between the body composition factors and aerobic and cardiovascular and aerobic fitness (Bandyopadhyay et al., 2006). Have been reported improve at both of the cardiovascular fitness and aerobic capacity with improve at body composition. And also improve at some body composition aspect such as body fat percent, body mass index and body muscle mass at result by the exercise and improve on maximum oxygen uptake (A. M. Hill et al., 2007; Tomassoni et al., 1985). There are several aims to do exercise. One of the main reason to doing exercise is improve the body composition factors. This research is going to examine relationship between the body fat percent and maximum oxygen uptake among health student. Actually the health and fitness are the importance issue among student and specifically among international student which have sedentary manner their daily works.

**2. Methods and Procedure of Research**

Twenty six volunteer's male students (26 +/- 5 years old in age and 168 +/- 5 cm in high and 73 +/- 5 kg in weight) were participated in this investigation. The students were recruited among postgraduate international student from the University Putra Malaysia. In physical activate level, all participate were considered untrained and had not participated in regular exercise for at least six months period to the start of this investigation. All subjects were attended on physiology laboratory to measurement or estimating the variables in this investigation. All tests were conducted at the laboratory condition with 22-25C temperature. And also all measurement and VO<sub>2</sub>max test was at the morning and before the lunch time. In the initial visit to the laboratory, subjects were asked to fill up the question paper which contained name, age and physical activity level. At the first time weight was measured by the calibrated electronic balance scale with division of 100grams. High has been measured by the standard height meter with division of the 1cm. three skin fold methods have been used to estimating the body fat percents. All measurement was in left side of the subjects (Deurenberg et al., 2007). All the measurements were made by the researcher for reducing the experimental error. Skin fold thickness measurements were done from standard anthropometrical reference points as well as the Chest, Abdomen and Thigh. Body fat Percent value was estimated by applying the standard equation. To measurement the maximum oxygen uptake researcher has been used Bruce protocol on the treadmill and gas analyzer. The Bruce treadmill protocol has now become a standardized procedure used to evaluate the aerobic capacity and cardiovascular fitness of athletes or non athletes health people. Nowadays there is the other protocol to estimate the VO<sub>2</sub>max for patients and for clinical VO<sub>2</sub>max or maximum oxygen uptake is simply the most amount of oxygen that a subject can consume from the air and utilize and is measured by the volume of oxygen per minute per kg body weight per time (mL/kg/min). Some other unite is for VO<sub>2</sub>max volume as well as oxygen per whole body weight per minutes (lit/m). To doing the Bruce protocol, subject after warm up (3-5 minutes) was stand on the treadmill and out the mask on their face hardware and software was calibrated before start the test. Maske was put on their face at star the test. Treadmill was turn on run and with click on the start menu at monitor test was started. The following steps were pointed on the default program on the software and Subject could stop their test every time that the received to exhaustion or they can not continue for every reason such as hearth disease. Treadmill had change in the shape automatically in per step. And also in the per step was increasing the speed in treadmill.

**Walk**  
 Stage 1 = 1.7 mph at 10% Grade  
 Stage 2 = 2.5 mph at 12% Grade

**Jog/walk**  
 Stage 3 = 3.4 mph at 14% Grade  
 Stage 4 = 4.2 mph at 16% Grade

**Run:**  
 Stage 5 = 5.0 mph at 18% Grade  
 Stage 6 = 5.5 mph at 20% Grade  
 Stage 7 = 6.0 mph at 22% Grade

**Recovery:**  
 00-02 min 2.5 Speed slope 12

In the recovery phase the subject should continue their walking on the treadmill for tow minute and after that device was stop automatically.

**3. Statistical Analysis and Results**

Correlation Body fat percent and maximum oxygen uptake was conducted by Paired Samples Statistics. A p-value 0.05 was considered statistically significant. Analysis proces were performed using SPSS 17 on the Windows XP (SPSS Inc, Chicago, IL, USA).

Correlation between body fat percent (BFP) and maximum oxygen uptake (VO<sub>2</sub>max) is shown at figure1. Data are expressed as the mean and standard deviation in body fat percent and maximum oxygen uptake at table 1.

After the Paired Samples Statistics has been shown that, there were relationships between the BFP and VO<sub>2</sub> max among these two groups (correlation was equal -0.402). Actually with increasing BFP, maximum oxygen reduces and by decreasing BFP, maximum oxygen increases (table 2).

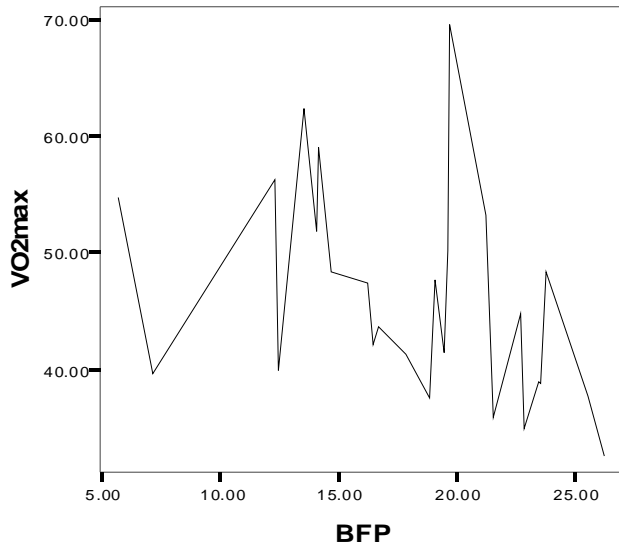


Figure 1: Correlation between maximum oxygen uptake (VO<sub>2</sub>max) and body fat percent (BFP) among students.

Table 1: Discreptive Data for VO<sub>2</sub>max and BFP

	N	Mean	Std. Deviation	Std. Error Mean
<b>Body Fat Percent</b>	26	18.0449 (%)	5.290	1.037
<b>Maximum Oxygen Uptake</b>	26	46.1035 (ml/kl/min)	9.116	1.7

Table 2: Correlation between BFP and VO<sub>2</sub>max

	N	Correlation	Signification
BFP-VO <sub>2</sub> max	26	-0.402	0.042

**4. Discussion**

Result of this investigation has been shown that there are a strong relationships between the Body Fat Percent and Maximum Oxygen Uptake. Body composition is the main factors that may influence on human ability to doing works. And also have been shown that any improve on aerobic ability may enhance body composition factors. Previous studies have been clarified that, there are strong relationships between healthy folks and their Body Fat Percent, also was proved that there are relationships between maximum oxygen uptake and endurance performance. Improving endurance performance can increase cardiovascular ability for working. Struggling to improve the cardiovascular performance can reduce cardiovascular diseases. In this study, shows that, increasing in body fat percent

can cause reducing VO<sub>2</sub>max. Wrong methods in livening and non-activity can bring obesity among young men. Tennis, running, swimming and some other aerobic sports, need high performance in cardiovascular system. Some factors can affect this ability. Body fat percent increases with unsuitable diet in food eating and unbalancing between the out put and input of food which is eaten. With endurance training and diet suitable, people can reduce body fat percent and reduce cardiovascular diseases. One of the most importance issue among student and international student is non activity that may increase risk factors such as body fat percent and at this result reduce ability to doing daily works. Researcher purpose at the final of this research,

giving the information to people and students may improve the physical activity level among them.

### Correspondence to

AliReza Amani  
University Putra Malaysia  
43400, Serdang, Selangor, Malaysia  
[Alireza.daryasar@gmail.com](mailto:Alireza.daryasar@gmail.com)

### Reference:

- [1] Bandyopadhyay, A., Chatterjee, S., Chatterjee, P., Papadopoulou, S. K., & Hassapidou, M. (2006). VO<sub>2</sub>max of boys according to obesity status. *Journal of Human Movement Studies*, 51(3), 167-180.
- Brooks, L. L. (2002). THE EFFECTS OF AFTER-SCHOOL PHYSICAL ACTIVITY AND ADULT ENCOURAGEMENT ON ADOLESCENTS. University of Wisconsin.
- Collins, E., Langbein, W. E., Dilan-Koetje, J., Bammert, C., Hanson, K., Reda, D., et al. (2004). Effects of exercise training on aerobic capacity and quality of life in individuals with heart failure. *Heart & Lung: The Journal of Acute and Critical Care*, 33(3), 154-161.
- Deurenberg, P., Pieters, J. J. L., & Hautvast, J. (2007). The assessment of the body fat percentage by skinfold thickness measurements in childhood and young adolescence. *British Journal of Nutrition*, 63(02), 293-303.
- Gause-Nilsson, I., & Dey, D. K. (2005). Percent body fat estimation from skinfold thickness in the elderly. Development of a population-based prediction equation and comparison with published equations in-75 year-olds. *Journal of Nutrition, Health and Aging*, 9(1), 19-24.
- Hill, A. M., Buckley, J. D., Murphy, K. J., & Howe, P. R. C. (2007). Combining fish-oil supplements with regular aerobic exercise improves body composition and cardiovascular disease risk factors. *American Journal of Clinical Nutrition*, 85(5), 1267-1274.
- Hill, D. W., & Rowell, A. L. (1996). Running velocity at VO<sub>2</sub>max. *Medicine and Science in Sports and Exercise*, 28(1), 114-118.
- LaMonte, M. J., Eisenman, P. A., Adams, T. D., Shultz, B. B., Ainsworth, B. E., & Yanowitz, F. G. (2000). Cardiorespiratory fitness and coronary heart disease risk factors: The LDS Hospital Fitness Institute Cohort. *Circulation*, 102(14), 1623-1628.
- Sergi, G., Coin, A., Sarti, S., Perissinotto, E., Peloso, M., Mulone, S., et al. (2009). Resting VO<sub>2</sub>, maximal VO<sub>2</sub> and metabolic equivalents in free-living healthy elderly women. *Clinical Nutrition*.
- Suzuki, I., Yamada, H., Sugiura, T., Kawakami, N., & Shimizu, H. (1998). Cardiovascular fitness, physical activity and selected coronary heart disease risk factors in adults. *Journal of Sports Medicine and Physical Fitness*, 38(2), 149-157.
- Tan, S., & Yang, F. (2007). The effects of regular resistance training on the elders' aerobic work capacity. *Chinese Journal of Rehabilitation Medicine*, 22(9), 776-778.
- Tomassoni, T. L., Blanchard, M. S., & Goldfarb, A. H. (1985). Effects of a rebound exercise on aerobic capacity and body composition. *Physician and Sportsmedicine*, 13(11), 110-115.
- White, M., Davies, P., & Murphy, A. (2008). Validation of percent body fat indicators in pediatric oncology nutrition assessment. *Journal of Pediatric Hematology/Oncology*, 30(2), 124-129.

19/9/2009