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# THE VALUES OF FITNESS INDEX AND VO2max OF STUDENTS USING INDIRECT METHOD AEROBIC TESTS

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**Abstract:**

Aerobic fitness, endurance, and cardiovascular endurance are synonyms for work capacity, which itself is an important prerequisite for the health and life of every man. A very common way of assessing the state of aerobic fitness of a particular population are diagnostic tests on the basis of which we receive the necessary information when it comes to general physical condition of a defined population. This diagnostic evaluation is usually performed in the laboratory (direct methods), however, available and reliable data are about high reliability in the performance of some field tests (indirect methods). Depending on the field conditions, very often these measurements are performed using estimates of general ability (test UKK 2km). To perform this test data about body height, body weight, BMI, the values of the pulse rate and walking time during the test must be contained in it. Based on testing using the UKK 2km are obtained Fitness Index values (FINDEX) and maximal oxygen consumption ($VO^2max$) of 35 male students of the Faculty of Physical Education and Sport, University of East Sarajevo (BIH) in order to determine and define the physical condition of respondents. The results showed that the fitness index (103.22) in the upper zone average (103.22) and $VO^2max = 49.12$ reflects good shape, but still the results indicate toward decreasing trend in students' aerobic fitness, and have fitness index values below the standard norms of the Swedish

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population. The general trend of decreasing aerobic fitness of the population can be seen in the sport and physical education students, as a consequence of lifestyle in which there is not enough adequate physical activity.

**Keywords:** students, aerobic fitness and VO²max level, UKK 2km.

## 1. Introduction

A number of studies point to the key role of physical activity in order to ensure proper physical and mental growth and development, environmental health, improvement of working capacity and quality of life. For it is precisely through physical activity, the development of aerobic fitness, or cardiovascular endurance important prerequisite. However, despite the large number of information available on the various benefits of physical activity in general, remain the most vulnerable people such as children, adolescents, persons exposed to stressful situations, and the elderly (Prebeg, Mihajlović, & Mitić, 2012) If we consider only the categories of adolescents, this group, in addition to high school age, and belong to the students as well as older adolescents. Adolescents, the majority, have stabilized work habits, social behavior in the area are still searching for their own identity and self-affirmation. The way of life is such that there is not enough physical activity, with great psychological stress, especially during exam preparation. On the other hand, modern lifestyles and modern technologies contributing to spare the man from physical strain and fatigue, but denied physical activity. Leisure is becoming a victim of this technology, in which all forms of communication and movement to the use of its products (Mitić, 2001).

According to Prebeg, Mihajlović, & Mitić (2012) at universities in Serbia, in the period between 1963 to 1998, regular physical education classes for all first year students were organized. In addition, a number of recreational activities was offered at nearby resorts. However, repeated testing of students from the Faculty of sport and physical education in Belgrade, using the Cooper UKK test brisk walking 2 km, known in the literature as a test to assess aerobic endurance (Laukkanen, 1992), indicated a declining trend in aerobic capacity, as a result of less physical activity. Insufficient physical activity is a major health problem of one nation, a factor that greatly contributes to the emergence and development of chronic diseases and disorders, before all of the cardiovascular system, heart and blood vessel diseases, diabetes occurs (Blair, La Monte, & Nichaman, 2004; MS Omar-Fauzee, et al. 2010). There are many reasons for the scientific research of man's mental and physical abilities, such as: determination of certain parameters to assess the current capabilities as the basis for the development and implementation of training programs in the future, determining the

effects of certain exercise programs, exercise programs verification. In physical education, one of the reasons for the psychophysical research of the human abilities is the determination of certain parameters in order to evaluate the current capabilities among the respondents of the population defined. On the basis of obtained results it can be determined the current state of psychological and physical abilities of the examined population, furthermore, a plan and some of the training program can be proposed. Some authors (Wilmore, & Costill, 1986, Nikolić, 2003, Mišigoj-Duraković, 2008; Sharma, Subramanian, & Arunachalam, 2013) believe that functional capabilities (cardiovascular fitness and cardiovascular endurance) are accepted as the most important indicators of active health. Given that, the level of physical fitness is usually defined by successfulness of the task performance or by the health status, it could be concluded that physical fitness depends on the development of various physical abilities and good body composition. Consequently, it can be altered because of the adaptation process of those abilities and body composition to a different stressor (Stojković, Čvorović, Jeknić, & Kukić, 2017).

Athletes, as part of their physical preparation must train components of fitness (cardio-respiratory endurance, muscular endurance, muscular strength, flexibility, body composition). Each sport requires these components to some extent, because it cannot be any progress in the skill of any kind of sport, if it is not accompanied by the development of appropriate capabilities: strength, endurance (cardio-respiratory and muscular) and flexibility so that these components are taken as the most important physical skills (Cooper, 1982; Olja, & Tuxwort, 1995). In the USA, most authors believe that the components of physical fitness are: cardiovascular endurance, muscular endurance, muscular strength, mobility and Body Composition (Brick, L.G. 1996, Stojiljković, Mitić, Mandarić, & Nešić 2005). The difference between the definitions of the components of fitness by local authors in relation to American version is in body composition. Body composition cannot be treated as physical ability, but can be changed under the influence of exercise focused on the development of the mentioned abilities (strength development is usually accompanied by an increase in muscle mass, increase of aerobic endurance is often accompanied by a reduction of subcutaneous adipose tissue). It can be an indirect indicator of the level of body fitness while on the other hand body composition can influence the physical ability and health (Guerra, Ribeiro, Costa, et al.2002; Mc Ardle et. all, 2006.)

Physical inactivity and obesity in children and adolescents are considered as independent risk factors for the development of lifestyle related disorders like coronary artery disease, diabetes, hypertension in later life. Anthropometry is generally considered as the single most easily obtainable, inexpensive, and noninvasive method that reflects body composition (Tarnus, & Bourdon, 2006). Body composition measures

like height, weight, BMI, waist and hip circumference, body fat percentage (BF%) and fat free mass (FFM) are also accepted globally amongst the sensitive indicators of health status of children and adolescents (Chatterjee, Chatterjee, & Bandyopadhyay, 2006). Cardiorespiratory fitness (CRF) or $VO^2$max reflects the functional capabilities of the heart, blood vessels, blood, lungs, and relevant muscles during various types of exercise demands. CRF is related to the ability to perform large muscle, dynamic, moderate-to-high intensity exercise for prolonged periods. Can be defined as the amount of oxygen from the blood by the heart to pump and transport the active muscle, and also, and how effectively the muscles use oxygen obtained (www.howtobefit.com). It is the efficiency of the heart, lungs and vascular system to deliver oxygen to the active muscle that contrasts to physical work could take place for some time. For his capacity to bring oxygen to active muscles are affected by many physiological parameters, including heart rate, blood pressure and maximum oxygen consumption. Due to an increase in aerobic capacity increases and general metabolism, muscle metabolism, hemoglobin increases, venous blood flow is improved and others. (www.asmi.org).

In sports practice a different number of index or methods is used in order to estimate physical fitness (fitness abilities), aerobic and anaerobic systems. All diagnostic tests for assessing fitness abilities are divided into direct (Shutlle Run, Conconi test) and indirect (Cooper test, UKK-2km). Depending on intensity, given tests are divided into maximal and sub-maximal. Which tests will be used, depends on the population being tested, whether they are athletes or amateurs. It also depends on the test requirements, whether they need some special conditions, or some terrain tests that have a high correlation with those in the laboratory. To measure the recreational endurance, tests of sub-maximal intensities are more suitable. UKK 2km walking test is used more and more in Europe and in our country in order to measure amateurs' endurance (EUROFIT test battery for adults 18-65 years old). These tests are recognized as the endurance tests and they are based on the assessment of maximal oxygen consumption. In terms of terrain outdoor research, UKK-2km walk test is the most appropriate to use, because it allows simultaneously testing of more respondents with high reliability of the results (Stojiljković, et al. 2005). This test gives us the ability to determine the fitness index (general skills) and evaluation of maximal $VO^2$ max oxygen consumption. The final test result is influenced by: gender, age, body height, body weight, heart pulse and time achieved during the final test.

Since students of the Faculty of Physical Education and Sports are the sports active population, a homogeneous group, the idea for the study arose precisely from the necessity to use the test-UKK 2 km evaluate the aerobic abilities of students. The goal of this research was to estimate mean values of fitness index and maximal oxygen consumption (VO2 max) of students.

## 2. Methods

The method that was used is Survey method of a non- research, concluding on the basis of the transverse section of the results. The research was conducted among the population of third year students of the Faculty of Physical Education and Sport, University in East Sarajevo (BIH). The sample of respondents consisted of 35 male students, 20-21years old, average height (Body Height=180,15±5,8cm; Body weight =78,00±6,13kg) and Body Mass Index (BMI=23,01±1,32kg/m²).

To estimate the capability of anaerobic fitness index and maximal oxygen consumption (VO²max) test was used UKK2km Walk (submaximal test), brisk walking test, according to Dr. Kenneth Cooper, the 2 km long track. It is intended for testing of healthy adults aged 18 to 65 years.

The test is relatively simple and does not require major research skills, is generally performed under field conditions, to work on multiple subjects simultaneously, and gives quite a high reliability when it comes to testing amateurs. Walking, as an activity, engage the large muscle groups, but not among the high-risk activities that could lead to the rapid fatigue. Treated aerobic fitness test, known as aerobic endurance test, based on an indirect estimate of maximum oxygen consumption, which forms the basis of physical work capacity. Test protocol demands respect for outside air temperature in the range of 5 - 25ºC, moderate humidity, loose-fitting clothing, and warm-up 5-10 minutes prior to testing (stretching the muscles of the legs and spine, brisk walking about 200 meters).

After completion of brisk/vigorous two miles walk on the clean and flat track, the walking time and heart rate are recorded. Precise test performance enables determination of fitness index (general fitness), as well as estimation of indirect maximum oxygen consumption, calculating BMI (body mass index) and the possibility of calculating the energy input required calories per day in relation to body composition (Kcal / KJ). The time that was scheduled for the test of a group accounted for about 30 minutes. For easier testing, 35 male students were divided into 5 subgroups with 7 examinees in the group. After completing the task all went according to the further procedure, which included individual metering pulse palpation in the area of the carotid artery for 10 sec, and the value is multiplied by six, and the data were entered in the records. Fitness calculates the index and determination of maximal oxygen uptake realized the indirect method using formulas derived from UKK 2 km walk test (Oja & Tuxworth, 1995; Stojiljković, et al. 2005). Results are calculated from the time of 2 km walking, heart rate (HR) at the end of walking, body mass index (BMI) and age. Categorization and values Fitness Index (FINDEX) and maximal oxygen consumption (VO²max) are presented in Tables 1, 2 and 3.

**Table 1:** Categories of men on the basis of VO²max values up to 29 years of age (Cooper, 1982; Mc Ardle, Katch, Lippincot, 2006)

| **Cooper, K. 1982** | **McArdle, Katch, Lippincot. 2006** | **Physical condition** |
|---|---|---|
| Do 32,9 mlO²/kg/min | Do 24,9 mlO²/kg/min | Very weak condition |
| 33-36,4 mlO²/kg/min | 25-33,9 mlO²/kg/min | Weak condition |
| 36,5-42,4 mlO²/kg/min | 34-43,9 mlO²/kg/min | Moderate fitness |
| 42,5-46,4 mlO²/kg/min | 44-52,9 mlO²/kg/min | Kilter |
| 46,5- 52,4 mlO²/kg/min | 53mlO²/kg/min | Excellent condition |

**Table 2**: Categorization on the basis of Fitness index and BMI index (Wilmore, et all. 1986)

| **Fitness Index Values** | **Categories according to Body Mass Index** |
|---|---|
| <70 ..... well below the average | <20 ..... below optimum weight |
| 71-89 .... somewhat below average | 21-25…..normal weight |
| 90-109 ...average | 26-30 ..... Chubby |
| 110-130 .. something above average | 31-40…….fat |
| > 130 ..... well above average | > 40 ..... Pathology |

**Table 3**: The formula for calculating the Fitness Index and VO²max for people from 18 to 65 years (Oja, & Tuxworth, 1995, Stojiljković, 2005*)*

| |
|---|
| a. **The formula for calculating the Fitness index**<br>**Men FINDEX=** 420 - (11.6 + min +0,2 x sec x + 0.56 x HR + 2.6 x BMI) +0.2years |
| b. **The formula for calculating maximum oxygen consumtion-VO²max (ml/min/kg):**<br>**Men VO²max** = 184.9 - 4.65 x time- 0.22 x HR - 0.26 x years -1.05xBMI |

The main statistical operations were performed in Statistica 6.0 package through which we calculated the basic central and dispersion parameters and determined the value of fitness index (FINDEX) and maximal oxygen consumption (VO²max). On the basis of their values, we made the appropriate conclusions.

## 3. Results and Discussions

A number of studies point to the key role of physical activity in order to ensure proper physical and mental growth and development, environmental health, improvement of working capacity and quality of life. For it is precisely through physical activity, the development of aerobic fitness, or cardiovascular endurance important prerequisite. Physical activity promoters are increasingly recognizing that to keep people active, they need to help them develop physical activity habits that fit their lifestyle (De Bess, Forsyth, 2009)

The human body is created to function well when it is in an active condition. Physical fitness prevents an individual from being infected or suffering from illness, and assists them in staying healthy both mentally and physically throughout their lives. Cardio-respiratory fitness and body composition are associated with the risk of emergence of cardiovascular diseases. Accordingly, these factors are related to health and relationships existing between the two have been the focus of researchers in the field of sports sciences (MS Omar-Fauzee, et al. 2010). The incidence of cardiovascular disease is statistically and physiologically related to obesity. It is considered that VO2 max or maximal aerobic capacity is one of the best to measure functional capacity of the oxygen system, the cardio-respiratory system or the oxygen transport system. (Koley, 2007). According to ACHA (2006, 2010) in the recent decade, a decline in physical activity among college students has been observed. Physical fitness is an important thing in life. Physical fitness is not only needed by an athlete but also by non-athlete for better life (students population).

**Table 4:** Descriptive statistics of variables

| | **Mean±SD** | **Min** | **Max** | **Range** |
|---|---|---|---|---|
| **PULS (otk/m)** | 139,12 ± 17,01 | 96,00 | 184,00 | 88,00 |
| **UKK 2km (min)** | 15,02 ± 1,88 | 12,58 | 16,08 | 3,50 |
| **FINDEX** | 103,22 ± 18,34 | 62,43 | 141,30 | 78,87 |
| **VO²max (ml/O/kg)** | 49,12 ± 8,17 | 39,03 | 70,55 | 31,52 |

The parameters of the variables relating to the value of the anthropometric characteristics of students (defined in the sample of respondents) and the value of the pulse (PULS) after walking test (UKK-2km), the Fitness Index (FINDEX) and the maximal oxygen consumption (VO²max) are presented in table 4.

The average height of the sample (AVIS = 180.15 cm) is an indication of extreme longitude, and with the body weight of 80 kg and a BMI value of 23.01, it depicts a normal body mass index measured in the study sample (Wilmore, Buskirk, Digirolamo, & Lohman, 1986; Prebeg, Mihajlović, & Mitić, 2012; Mudassir, Aparna, & Sreemala, 2012; Pavlović, 2016). Bearing in mind that these are students of PE and sport, then this value defines normal weight of students and these values are more rooted in lean mass, i.e. muscle mass, skeleton and internal organs. Mean values of functional abilities measured by pulse after performing the walking test is PULS=139,12 beats/min and ranges from min. 96 beats/min. to max. 184 beats/min., indicating that this test was relatively easy for certain students while for some it was too difficult, although it is a test of submaximal burden and for the 65 years of age. These results are on average better than the results obtained on the same sample (Prebeg, Mihajlović, & Mitić, 2012;

Mudassir, Aparna, & Sreemala, 2014; Pavlović, 2016). The results show that this measured generation of students is physically and conditionally superior to those previously tested. It can be concluded that the values of central and dispersion parameters for the assessment of Fitness Index and VO²max indicate that the group involved in the experiment, is still homogenous (Table 4). The mean FINDEX value of sample amounts Mean = 103.22, and the value of VO²max is Mean=49.12ml/O/kg, and they are significantly different from the results of Pavlović (2016) on the same population, but different generations. Similar results of the VO²max and fitness index were obtained in the study Badau, Prebeg, Mitic, & Badau 2015 (Romanian students, VO²max. = 50.90 Fitness index = 103.90), but the students of Serbia had a lower value of (VO²max = 46.10 and Fitness index = 91.10) of our sample.

However, these results illustrate a situation that can be characterized as a state that is present among students of Physical Education and Sport and is related to their current physical ability, confirming the allegations of the human body as a complex and dynamic self-regulation system that changes its composition under the influence of some external factors (Blagajac, Stejić, & Ćorović, 1991).

If we compare the value of the FINDEX results with the tabular values of recreationists (Table 2) it can be noticed that the students of East Sarajevo have an "average'' category. These results are worrying because these are not examples of the total population, but of people who take care of their physical preparedness, fitness and mainly regularly exercise some form of recreation or are involved in sports clubs (Milojević and Jakonić, 1991). Although in comparison with previous research, our students achieved a lower average oxygen consumption, however, they are still in the range of average values in the studies previously carried out by some authors (Mišigoj-Duraković and associates, 1999; Živanić, 2004; Venkata, Suryakumari, Sudhakar & Balkrishna, 2004; Heyward, 2006; Tarnus & Bourdon, 2006; Prebeg, Mihajlović, & Mitić, 2012, Badau, Prebeg, Mitić, & Badau, 2015; Pavlović, 2016).

Understanding the factors that motivate health-enhancing physical activity has considerable merit given the role of this lifestyle behavior in combating disease and promoting quality of life (Wilson, Mack, Grattan, 2008). However, despite the large number of information available on the various benefits of physical activity in general, remain the most vulnerable people such as children, adolescents, persons exposed to stressful situations, and the elderly. If we consider only the categories of adolescents, this group, in addition to high school age, and belong to the students as well as older adolescents. Personal lifestyle changes however can correct the lack of physical exercise. New research indicate integrating mindfulness to physical exercise interventions increase exercise adherence, self-efficacy and also has positive effects both psychologically and physiologically (Kennedy, & Resnick, 2015). The benefits of

practicing physical activities during leisure time, the temptations of modern life with the index of fitness and physical activity, is fully in line with the modern tendencies of investigating ways of optimization of the motoric, functional and mental abilities specific to an active style of life. Motivation and students' orientation towards spending their free time in an active manner embody a feasible alternative in order to change mentalities and behaviors of the young generation. (Badau, et al., 2012)

In fact, research in the last three decades has shown that physical inactivity with a negative impact of everyday life is seriously threatening the health and physical condition of the human body. As a result of hypokinesian lifestyle we have a situation that it is the most common risk factor for cardiovascular diseases. It is especially important to note, bearing in mind the growing number of evidence, that physical activity and regular exercise can reduce the risk of chronic diseases and death in particular of coronary heart diseases (Paffenbarger, et all. 1984; Kingwell & Jennings, 1993).

Considering the analysis of individual cases within the actual sample of respondents, it can be concluded that from the total number of students, 25 of them (71,4%) have a fitness index above the average (range from 110-140) and VO²max. (from 46.5 to 68ml/O/kg), which represents an excellent shape (Cooper, 1982; Mc Ardle, Katch, & Lippincot, 2006). Students who had the higher value of the fitness index mainly train some of the winter sports (skiing, biathlon), football, athletics, handball, martial arts or sports that require good physical condition, physical fitness. Also, these sports require a large maximum oxygen consumption, given the altitude at which they train (winter sports) as well as the area where they train (aerobic, anaerobic). Somewhat lower values of Fitness Index achieved 10 students involved in other sports (29,6%), such as volleyball, basketball, ranging from 59 to 109 (below average and average) and values of VO²max. from 30 to 46.4 ml/O/kg, moderate and good fitness (Table 1). A higher BMI were realized by the students of martial arts (judo), bodybuilding, who possess a large body mass or that lean mass, where the mass goes to skeletal and muscle mass, yet in general, they contribute to a finding of excessive weight which also recorded maximum values of BMI (25.23 kg/m²). From this arises the fact that the higher value of maximal oxygen consumption and fitness index have those respondents who have a higher body mass, which is generally misunderstood (Kline, Porcari, Hintermeister, Freedson, Ward, Mc Carron, et al., 1987). As the main advantages are cited the abilities of the respiratory and cardiovascular systems to transport oxygen to the active working muscles, regardless of the weight (Nikolić, 2003; Hardman, & Stensel, 2009; Mazurek, et al. 2010).

Certain studies involving the population of university students (Watanabe, Nakadoma, & Maeda, 1994; Stojiljković, 2005; Tongprasert, & Wattanapan, 2007; Pantelić, Savić, & Randjelović, 2008, Mazurek, et al., 2010; Pavlović, & Branković, 2011,

Pavlović, Savić, & Tosic, 2012; Prebeg, Mihajlović, & Mitić, 2012; Mudassir, Aparna, & Sreemala, 2014) have shown that students who have less value of FINDEX and $VO^2$ max. are at increased risk of cardiovascular diseases (Kingwell & Jennings, 1993; Kokkinos, et al., 1995; Guerra, Ribeiro, Costa, et al., 2002; Sadhan, Koley, Sandhu, 2007; Sharma, Subramanian & Arunachalam, 2013). In the report of the American Department and Centre for Disease Control and Prevention (US Department of Health and Human Services, Centers for Disease Control and Prevention, taken from Physical activity and Health, 1996) the following fact is pointed - moderate and regular physical activity and fitness have a very big role in preventing the development of blood pressure, a suitable type of activity reduces the value of blood pressure for both male and female persons of different ages. Many times it has been proven that applied and programmed physical activity has a positive effect on blood pressure (Stein, Ehsani, Domitrovich, Kleiger & Rottman, 1999), which is reflected in the reduction of both systolic (an average of 3.84 mmHg) and diastolic blood pressure ( an average of 2.58 mmHg) (Whelton, Chin, Xin & He, 2002). Factors that limit $VO^2$ max. are central, while they are the peripheral limiting factor is the diffusion capacity of $O^2$ in tissues, and it depends on the difference in partial pressure of $O^2$ ($PO^2$) between the capillaries and the mitochondria. This also includes the peripheral blood flow and enzyme activity of muscle cells, which depend on the type of muscle fibers (Wilmore & Costill, 1999; Hoeger, W, & Hoeger, S., 2002; Kearns, Mckever, John, Abe, & Brechve 2002; Nikolić, 2003). As well as the central, the peripheral limiting factors are also in a huge dependence on the heritage, age, gender, muscle mass involved in the work, body composition, training status and the type and character of training loads (Stojković, et al. 2017). Genes play a decisive role in sports activities that require a high-value $VO^2$ max, however, numerous studies have shown that aerobic capacity, cardiac output, oxidative capacity of skeletal muscle and lipid oxidation, are phenotypes which can be changed by the training (Cheng et al. 2003; Blair, La Monte & Nichaman, 2004). In order to prevent cardiovascular diseases, it would be necessary to increase students' awareness of the possible consequences and to draw attention to meet their coaches from parent sports with their condition in order to have time to eliminate possible shortcomings in terms of the training process, which is clearly inadequate or is not in accordance with the development and upgrading of physical abilities (Tulppo, et al. 2003; Osei-Tutu & Campagna, 2005).

The results of this study indicated that students fit in the average values. A specific type of study, where in addition to lectures, there are practical, based on the diversity of physical activity for many sports, is surely influenced this end result. On the other hand, students at these colleges have developed a habit for sports and recreation, and prior to entering college, what is the impact on the commitment for

future jobs, and probably kept the habit today, through extracurricular activities and recreation (Badau, et al. 2015).

Not everyone benefits equally from exercise. There is tremendous variation in individual response to training; where most people will see a moderate increase in endurance from aerobic exercise, some individuals will as much as double their oxygen uptake, while others can never augment endurance (Bouchard, et all, 2007; Kolata, 2002). However, muscle hypertrophy from resistance training is primarily determined by diet and testosterone (Hubal, Gordish-Dressman, Thompson, Price, Hoffman,…, & Clarkson 2005). This genetic variation in improvement from training is one of the key physiological differences between elite athletes and the larger population (Brutsaert, Parra, 2006**;** Geddes, 2007).

The current life style, temptations and negative factors affecting the quality of life determined the decrease of the physical activity level among population, especially young people, which may have major long-term adverse effects on health and job performance.

Changing mindsets and behaviors for an active and healthy lifestyle should be the main goal of any current and future societies. A permanent personal concern was identifying ways to promote a healthy and active lifestyle by identifying motivation and preferences for practicing physical exercise in relation to combating the negative effects induced by the health risk factors. Scientific research in motoric field contributes to knowledge about how our bodies perform, what is the relationships between components of motor capacity related to the factors of psychic, social etc.

## 4. Conclusions

Based on these results it can be concluded that the general situation of aerobic (cardiovascular) fitness of students on the basis of Fitness Index in the upper zone of average (FINDEX=103,22 ) is still (un) satisfactory, considering that this is a population of students of physical education and sport, who are engaged in sports activities, through teaching and extra-curricular activities, mainly sports clubs. Also the value of maximal oxygen consumption of the students ($VO^2max$=49.12) implies a fairly good fitness, so that this consumption is closely linked to the Fitness Index. Attention must be directed at upgrading their aerobic capacity in terms of raising awareness about the benefits of good physical condition of each individual, the possible unintended consequences that may result in extremely unpleasant consequences. All the more because this is the period when it can still be affected, in a much greater extent, to the physical condition which is accompanied by aimed physical exercise at college, with the exception of involvement in sports clubs.

The results showed that the fitness index in the upper zone average and VO²max reflects good shape, but still the results indicate toward decreasing trend in students' aerobic fitness, and have fitness index values below the standard norms of the Swedish population. The general trend of decreasing aerobic fitness of the population can be seen in the sport and physical education students, as a consequence of lifestyle in which there is not enough adequate physical activity.

For students the problem may be in the reduction of the material in college (the number of hours of practical training), which is related to physical activity, and reduced students interest in extracurricular or recreational activities. It is important to note that the implementation of the test was at the beginning of the school year, after the exams, when students where occupied in exam preparation and most of the time during the day they spend in a seated position, which may be the cause of physical inactivity (Prebeg, Mihajlović, & Mitić, 2012).

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