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Body Composition and Intercorrelation Connection in Students: Cross-Sectional Study

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Abstract

It is widely presumed that young who study physical education at one of several universities of physical education (Sarajevo-BIH) could be characterized with proper physique and body composition (BC). Aim of the current study was to analyze the body composition of a male students Physical Education and Sport (PES), University in Sarajevo, by BIA and determine the significance of inter correlation coefficients (ICC).

In study the participants consist 38 male students of Faculty of Physical Education and Sport, University of Sarajevo, the III year of study (Body height = 181.07 ± 6.15 cm; Body weight = 82.41 ± 13.69 kg; BMI = 25.07 ± 3.32 kg/m²).

Results of the study showed that the body composition is within the healthy (allowed) values recommended for this population of students (Body Fat = 13.23 kg or 15.28 %; Body Muscle = 65.28 kg or 79.21 %; Body Water = 50.70 %; BMR = 1864.24 kCal and segmental ...). ICC showed inverse and significantly high correlation (p = 0.000) between (ICC Fat-Muscle = -0.945), and while direct ICC was achieved (ICC Muscle vs. Water = 0.998; ICC Height vs. Muscle = 0.625; ICC Weight vs. Muscle = 0.919; ICC Weight vs. Water = 0.921; ICC Weight vs. Fat = 0.845).

The obtained results of the study defined the appropriate body composition of the students, which is a consequence of their adequate physical activity and well-designed curricula at the home faculty. In parameters of body composition, students of physical education and sports in Sarajevo had good results of body composition in comparison with similar research on the student population of some European countries, which is the result of their somatotype, way of learning, teaching and extracurricular physical activities.

Keywords: students PE, body composition (BC), bioelectric impedance analysis (BIA).

1. Introduction

In today's era of modern lifestyle, there is less and less physical activity (PA), resulting in many negative consequences for human health. At a younger age, numerous deformities of the locomotor system appear, while in the elderly population, various metabolic and cardiovascular diseases are present (Tanaka et al., 2002; Cho et al., 2009; Onisto et al., 2009; Gokulakrishnan et al., 2011; Chuang et al., 2012). According to Fiorese et al. (2019) an action of a body that is done through muscles and it is conducted repeatedly, planned, and structured is called as physical

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exercise, which is primary for the general psychophysical health of the individual. To increase strength, muscles perform body movements using energy. If it is done regularly, physical exercise has positive health impacts, includes the reduction and prevention of various cardiovascular illness, metabolic syndrome disorders (diabetes mellitus, hypertension, obesity), and osteoporosis (Pedersen, Hoffman-Goetz, 2000).

Low levels of physical activity are not only associated with the failure of health related physical fitness, but also inactivity correlates with the development of hypercholesterolemia, hypertension, metabolic syndrome, type 2 diabetes an increased risk of obesity and cardiovascular diseases, in both adults and children (Sacheck, Kuder, 2010; King et al., 2011). Physical activity (PA) has important health benefits for children, adolescents and adults, and is associated with more favorable biological cardiovascular diseases (lower blood pressure, more favorable serum lipids and lipoproteins, and reduced adiposity) than less active or fit individuals, improving their ability to perform everyday tasks (Hennessy et al., 2010; Pavlović, 2022). More generally, regular PA has been shown to effectively reduce various health risk factors, especially those related to cardiovascular disease and metabolic syndrome (Reimers et al., 2012; Wagner et al., 2012). Previous studies (Blumenthal et al., 2000; Hagberg et al., 2000; Hu, Tian, 2001; Whelton et al., 2002; Hu et al., 2003; Seals, 2003) confirmed that PA or aerobic exercise is inversely related to blood pressure. The American College of Sports Medicine recommends that adults engage in at least 150 min – wk–1 of moderate intensity cardiovascular exercise and at least 75 min wk–1 of vigorous intensity training, in order to maintain a sufficient level of cardio-respiratory fitness (Garber et al., 2011).

Certain effects of increased physical activity include changes in the body composition (BC) of each organism where level and magnitude of the observed changes depend on the type of physical activity or sport that the individual engages in as well as on his individual characteristics, abilities and predispositions (usually includes gender, age, somatotype and specific dynamics of one's metabolic process in the body), which is a prerequisite for the formation of an appropriate body composition (Hagerman et al., 2000; Burdukiewicz et al., 2010; Gremeaux et al., 2012; Stachon, Pietraszewska, 2013). Several methods are used to analyze and measure BC, and the most accurate measurement methods are magnetic resonance imaging and computed tomography. Unfortunately, these methods are expensive and are mainly used in medical diagnostics. However, the use of bioelectrical impedance analysis (BIA) is a relatively simple and non-invasive method for indirectly estimating overall body composition. BIA analysis is used in studies to assess body composition (e.g. total extracellular, intracellular water compartments, muscle mass, adipose tissue, body mass, resistance, basal metabolism) (Pavlović, 2022). Body composition assessment is used to monitor performance and training in the athletic community, and to verify the health status of the population in general (Zaccagni et al., 2014). The Body Mass Index (BMI) is often used to evaluate the weight status, even if it does not discriminate between different components of the overall body mass by definition (BMI = weight/height^2).

According De Lorenzo et al. (2013) the adoption of BMI as a predictor of adiposity and of consequent health risk should be used with caution, especially with physically active individuals, who usually have a higher body density and fat free mass (FFM) than the general population (Zaccagni et al., 2009; Barbieri et al., 2012; Klungland-Torstveit, Sundgot-Borgen, 2012). Its use is becoming increasingly popular because it is safe, fast, easy to use and suitable for laboratory, clinical and field assessments of the composition of the human body (Cerit et al., 2009). Due to its confirmed high repeatability, BIA is widely used in population studies as well as in replicating research (Kutáč, Gajda, 2011) to enable comparative analysis of study results in different populations. The obtained information on body structure is multifunctional and can be used in different cases and with different population groups, including the student population. With the transition to university, there are changes in the lifestyle of individuals, in terms of greater independence and increased social relations with peers, with many colleges becoming a sensitive population group in terms of diet and lifestyle (Carrascosa et al., 2013). Thus established new social relations and way of life most often shorten the time towards physical activity, reduce the quality of nutrition, which results in deterioration of physical composition and physical fitness of students during the school year (Martínez Roldán et al., 2005) show the findings of studies in several countries where poor activity, poor diet and smoking are serious health problems among students (Irwin, 2004).

According to Pavlović (2022) students of physical education and sports (PES) represent a special population of healthy young people for whom PA is primary, which is in line with the specifics of their study plans and programs. Physical activity is manifested through various forms of sports, most of which are included in the program of the Summer and Winter Olympic Games. In this regard, it is considered and expected that students of these faculties will have a different body composition compared to the population of the same chronological age, bearing in mind the continuity of their physical activities during their studies, also through various extracurricular activities (engagement in sports clubs and other types of recreation).

A study by Grima, Blay (2016) conducted in Spain showed that students of physical education and sports have a healthier lifestyle, better cardiovascular profile and less body fat than students of other faculties, which may be due to the curriculum, which promotes active and a healthy lifestyle, in addition to having practical classes in which students participate in PA. In this regard, some research on the population of students of physical education and sports (Almagià Flores et al., 2009; Smolarczyk et al., 2012; Stachon, Pietraszewska, 2013; Zaccagni et al., 2014; Zaccagni et al., 2014; Chacón-Cuberos et al., 2018; López-Sánchez et al., 2019; Pavlović, 2022) analyze issues of body composition, impact on motor manifestations, fitness index, correlation with physical activity of students, differences between students of different geographical regions, correlations between body composition with physical fitness, nutritional habits, fitness and anthropometric parameters, which leads to the conclusion that physical status is a variable category and is primarily dependent on adequate PA of the individual and their lifestyle. When enrolling at the faculty of physical education and sports, it is understood that future students have an adequate level of motor and functional potentials as well as an appropriate body composition that will, in the best possible way, enable them to realize planned PA during their studies. Almagià Flores et al. (2009) suggest that the body composition of the student is of vital importance because it will be an excellent profit in subjects that require physical effort. It is widely believed that young people studying at the faculty of physical education and sports at could be characterized by proper morphological structure, appropriate motor-functional potential and appropriate body composition. However, this assumption cannot be confirmed because so far there has been no research regarding the detection and analysis of physical status with students this faculty in Sarajevo. Due to this fact, it was considered useful to analyze and learn more about the physical development of these young people (students) who chose to study to become physical education teachers, sports coaches, instructors of recreational and sports activities or organizers of sports and recreation. Students of physical education are a priori considered to play on a regular basis, and with firm commitment, a variety of sports (sport games, martial arts, basic sport, individual sport, winter sport, ...). Therefore, it is frequently believed that, in examining their body weight, it is more important to determine the share of muscles mass within the total body mass rather than to compare the body weight to the population standards (Ružbarský et al., 2015).

The aim of this study is the analysis of body composition of male students at the Faculty of Physical Education and Sports, University of Sarajevo, using BIA. The study made it possible to identify the components of body composition that define and distinguish this physically active population from the physically less active population. There will also be information on the possibilities of students for the realization of practical classes at the faculty.

2. Materials and methods

Participants in study

The research carried out on of sample 38 male students, Faculty of Sport and Physical Education, University of Sarajevo (III year of study) (Body height = 181.07 ± 6.15 cm; Body weight = 82.41 ± 13.69 kg; BMI = 25.07 ± 3.32 kg/m^2. A total of 17 variables were measured to assess BC:

1. Body fat (kg),
2. Body fat (%),
3. Body muscle (kg),
4. Body muscle (%)
5. Body water (%),
6. Right arm muscle (kg)
7. Left arm muscle (kg)
8. Trunk muscle (kg)

9. Right leg muscle (kg)
10. Left leg muscle (kg)
11. Right arm fat (%)
12. Left arm fat (%)
13. Trunk fat (%)
14. Right leg fat (%)
15. Left leg fat (%)
16. Bones (kg)
17. Basal metabolic rate – BMR (kCal)

Experimental design

This study followed a cross-sectional design. The standard metric instruments were applied according to the methodology of the International Society for the Advancement of Kinanthropometry (ISAK). Body weight and Body composition (BC) were assessed with the Bioelectrical Impedance Analysis (BIA) using a professional body composition analyzer (In Body 370, Korea), in accordance with the measurement protocol (Abdollah et al., 2021). The participants were informed in about the nature of the study and investigational procedures, and all the participants have voluntarily given their consent to be the part of this study. The study was realized out with the approval of the Council of the Faculty, number 01-2067/22. The measurements were according to the procedures in the Helsinki declaration.

Data analysis

The central and dispersion parameters (Mean, SD, Min, Max, Range, CI ±95,00 %; CV %) were calculated for all variables and ICC. The statistical package Statistica, version 10.0 was used for data processing.

3. Results

The obtained results define the physical status of students of PES. More than 80 % of student respondents engage in extracurricular physical activities (sports clubs, gym, martial arts, fitness clubs, body building, ...). The presents the statistical parameters of the BC of the analyzed sample of male students (Table 1 and Figure 1). The results confirmed that mean body fat determines 15.28 ± 4.86 % (min-max, 6.49-25.71 %) of body composition, which is mean 13.23 ± 6.37 kg of fat mass (min-max, 5.19-8.24 kg). Of the total body mass of the sample (82.41 kg), muscle mass is contained in 79.21 ± 6.53 % or (min-max, 61.88-92.23 %), wich is mean 65.28 ± 8.43 kg (min-max, 51.00-93.40 kg), while bones as part of the skeleton and total body mass take part with 3.86 kg (min-max, 2.50-5.50 kg) which is an indicator of the appropriate mineral status of the bones of the organism, where is a higher body mass is a presumption of a higher bone mineral status. Students showed the greatest heterogeneity in body fat and they are more homogeneous in muscle mass. An identical relationship (CV %) is also evident in the segmental measures of students.

Table 1. Descriptive statistics Body composition

Parameters BC	Mean	Min	Max	SD	CI SD +95%	CV
Body fat (kg)	13.23	4.70	29.80	6.37	5.19-8.24	48.14
Body fat (%)	15.28	6.49	25.71	4.86	13.96-16.29	31.83
Body muscle (kg)	65.28	51.00	93.40	8.43	6.87-10.90	12.91
Body muscle (%)	79.21	61.88	92.23	7.34	4.98-8.93	9.26
Body water (%)	50.70	39.70	72.50	6.53	5.32-8.45	12.88
Bones (kg)	3.86	2.50	5.50	0.61	0.50-0.79	15.85

Right arm muscle (kg)	4.05	3.01	6.39	0.67	0.55-0.87	16.63
Left arm muscle (kg)	4.10	2.86	6.32	0.68	0.55-0.87	16.93
Trunk of muscle (kg)	35.33	24.10	43.90	3.89	3.17-5.03	12.79
Right leg muscle (kg)	10.94	8.82	14.26	1.15	0.94-1.49	10.69
Left leg muscle (kg)	10.86	8.72	14.12	1.16	0.94-1.49	10.83
Right arm muscle (%)	11.57	3.00	32.90	7.33	5.98-9.49	63.40
Left arm muscle (%)	12.03	3.00	36.00	7.70	6.28-9.96	63.98
Trunk fat (%)	17.00	4.60	32.30	6.74	5.50-8.72	39.67
Right leg fat (%)	14.27	7.30	26.80	4.19	3.41-5.42	29.34
Left leg fat (%)	14.22	7.30	27.00	4.20	3.42-5.43	29.55
BMR (kCal)	1864.24	1535.00	2507.00	193.92	158.09-250.88	10.40

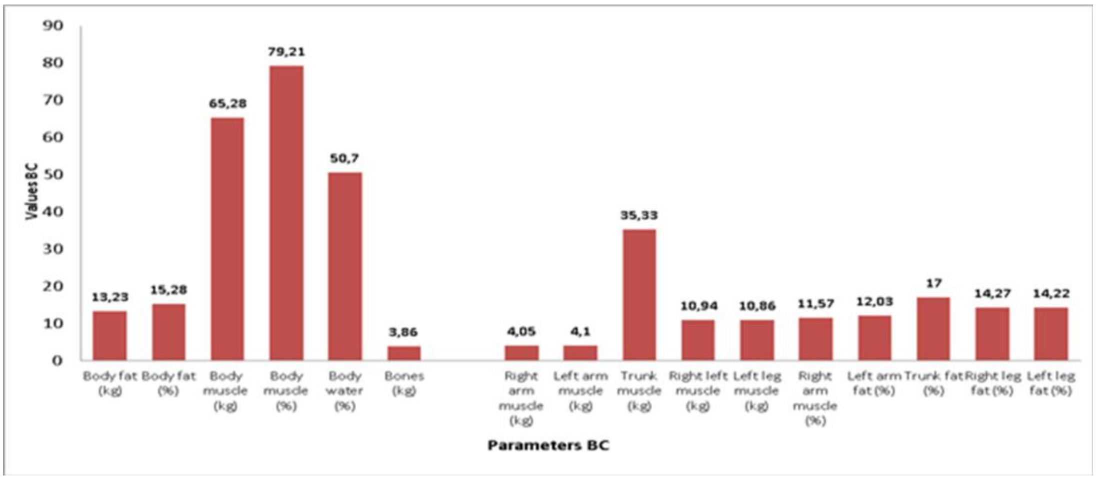

Fig. 1. Body composition of students Physical Education and Sport

It is evident that numerical analysis of segmental muscle status defines significant symmetry between the left and right sides of the cranial and caudal extremities. The right arm 4.05 kg (min-max 3.01-6.39 kg) contains identical mean muscle mass than the left arm 4.10 kg (2.86-6.32 kg). Right leg 10.94 kg (8.82-14.26 kg) contains slightly more in relation to the left leg 10.8 6 kg (8.72-14.12 kg). The largest muscle mass is present in the trunk muscle 35.33 kg (24.10-43.90 kg). Regarding the average representation of adipose tissue for trunk (17.00 %). differences between the cranial and caudal extremities is evident (Table 1, Figure 1). They generally maintain an inverse relationship with muscle tissue and water values (water, 50.70 %) as expected. The right arm contains an average of 11.57 % adipose tissue (3.00-32.90 %) and is slightly less than the fat percentage of the left arm 12.03 % (min-max, 3.00-36.00 %). The proportion of adipose tissue in the caudal extremities recorded identical average values (right leg. 14.27 % vs. left leg 14.22 %) as well as ranges of min. and max. results. Trunk fat content contains close to 17 % (4.60-32.30 %), which is within healthy limits, without the possibility of amenorrhea with loss of minerals in the bone. Body composition reflects a slight heterogeneity within the sample for body fat (kg), which may be due to poorer selection when selecting biological differences, training process, extracurricular physical activities, acceleration growth, physical fitness, etc... Out of a total of five inter correlation coefficients (ICC) between anthropometric parameters (height, weight) with the amount of fat, muscle component and body water content, four showed a middle and very high statistical correlation (Figure 2-6). Body height records a positive correlation with muscle mass (r = 0.625; p = 0.000), that students with higher body weight also had a larger muscle component. In contrast to height, body weight is in a significant linear relationship with the amount of fat in the body (r = 0.845; p = 0.001), muscle component (r = 0.919; p = 0.000) and to the amount of water in the body (r = 0.921; p = 0.000). ICC body fat and muscle component content (r = -0.945; p = 0.000) is maintained a strong inverse relationship (Figure 6). This point to the fact that students who had a pronounced muscle component have more water and less fat in the body.

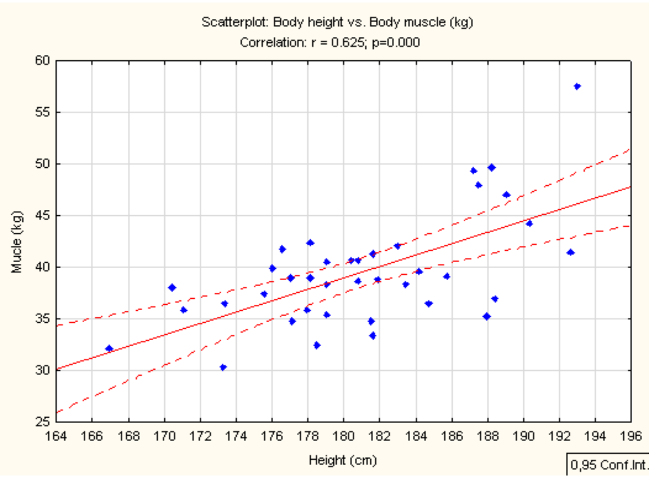

Fig. 2. Correlation Body height (cm) vs. Body muscle (kg)

Fig. 3. Body weight (kg) vs. Body muscle (kg)

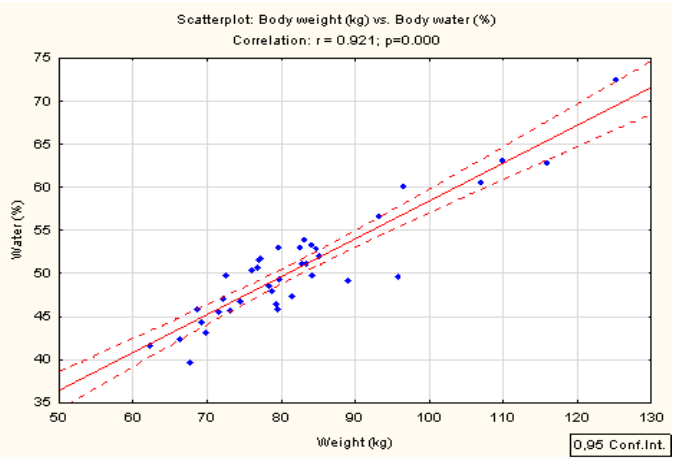

Fig. 4. Correlation Body weight (kg) vs. Body water (%)

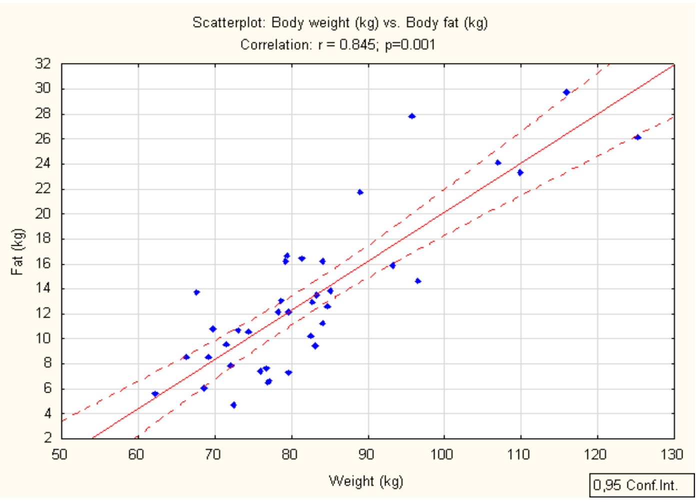

Fig. 5. Correlation Body weight (kg) vs. Body fat (kg)

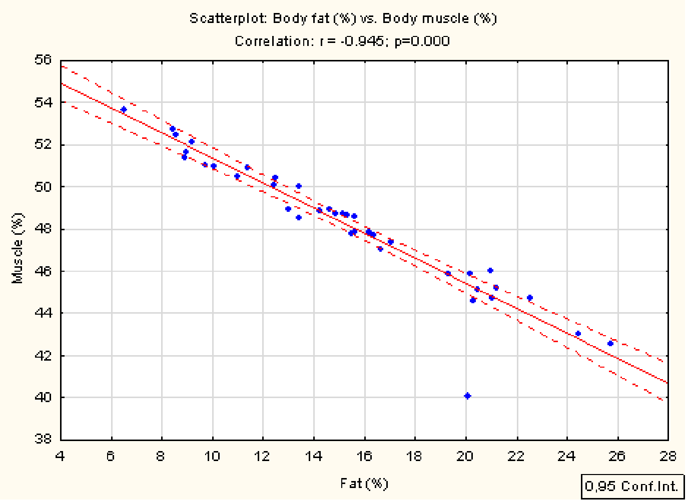

Fig. 6. Correlation Body fat (%) vs. Body muscle (%)

4. Discussion

The aim of the study was to detect and analyze the body composition of a group of 38 male students of Faculty PES at the University of Sarajevo. The analysis assessed 17 body composition parameters and determined ICC. The obtained results confirm the positive numerical values of all parameters of body composition. From the health aspect, i.e. possible negative consequences for the health of our sample, these are good results, which define this population as physically healthy and working active. The values of body fat (15.28 %) and body muscle (around 80 %) are healthy norms so that their values were not detected as risk factors for some diseases and a negative factor in PA. Good body composition of individuals is a prerequisite for good realization of both motor and functional abilities. Body composition and aerobic capacity are important components of health-related physical fitness. Often scoring a low score on the field test estimates of aerobic capacity may be influenced by many factors including body composition (Lloyd et al., 2003). Excess amount of body fat negatively correlates with other fitness components, especially with aerobic fitness (Bovet et al., 2007; Laframboise, de Graauw, 2011; Razak et al., 2013). Several studies have shown that children with high cardiorespiratory fitness have lower overall and abdominal fatness and a healthier cardiovascular profile by meeting physical activity guidelines (Morrow et al., 2013; Ortega et al., 2013; Stigman et al., 2009). Physical fitness is known to be a powerful predictor of chronic disease morbidity and mortality. Prospective observational studies in adults have shown that low physical fitness is strongly associated with risk for developing coronary heart disease, hypertension (Laukkanen et al., 2004), and type 2 diabetes mellitus (Sawada et al., 2003), as well as mortality from cardiovascular disease (Church et al., 2005) and all causes of mortality (Lohman et al., 2008). According to Vehrs, Hager (2006) most body fat is deposited in fat cells (adipocytes) under the skin (subcutaneous fat) and around organs (visceral fat). Some fat (3-5 % in men; 8-12 % in women) is necessary for normal bodily functions, such as fat that is part of the nervous system or surrounding visceral organs in women (Kaminsky, Dwyer, 2006). Body fat has three important functions in the human body (serves as an insulator to preserve body heat. is a source of fuel for metabolic energy and as a basis for protection) but excess increases the risk of cardiovascular disease, type 2 diabetes, hypertension, hyperlipidemia, metabolic syndrome, coronary artery disease, intermittent claudication, stroke (Efstratopoulos et al., 2006). In the current study, significantly high ICC of anthropometric and body composition parameters of students are evident. Body height is directly related only to muscle mass, while body weight is directly related to the amount of fat and muscle in the body and water in the body. The measured impedance is related to the size and shape of the body and the amount of water in the body. Since a large part of skeletal muscle is only water, the measured impedance is used to estimate the total water content in the body (%), which in turn can be used to estimate FFM. Factors affecting the water content in FFM will affect the accuracy of predicting body fat percentage (% BF). The higher presence of fat in the body prevents the presence of water, especially in muscles (Vehrs, Hager, 2006). These changes are due to the positive effects of student physical activity during studies which supports the findings of some earlier studies (Hagerman et al., 2000; Gremeaux et al., 2012; Stachon, Pietraszewska, 2013).

The muscular component of our sample is dominant with about 80 % participation (65 kg) which is a good result and an indicator of a significant presence of student physical activity and different training loads. Increased calorie intake can be explained by the fact that in this population a better metabolic product is necessary, i.e. higher caloric consumption as a result of consumption in physical activity, which is in line with a study (Westerterp, Goran, 1997) that defines a negative correlation between physical activity, energy expenditure, and fat percentage in men. Men are more likely to engage in team sports (football, basketball, volleyball, handball) or in strength-related activities, e.g. body building, fitness, martial arts, athletics involving intense repetitive efforts, which are positively correlated with fat loss (Tremblay et al., 1994). It turns out that different adaptations of the organism can be related to the type of sport. Considering that they are students of physical education and sports, these results are therefore expected.

The results of our sample of students in terms of height. body weight and BMI are higher average values than the Italian sample of sports science students (Zaccagni et al., 2014) for values of height (181.07 cm vs. 177.60 cm), body weight (82.41 kg vs. 75.60 kg), while the parameters of body composition are small lower (Body Fat 15.28 % or 13.23 kg vs. 17.3 % or 13.3 kg) and muscle components (65.28 kg vs. 62.4 kg). There are also significantly higher anthropometric measures compared to Japanese students (Tanaka et al., 2002) while body composition is slightly lower in Japanese students (Body Fat 12.3 % or 7.9 kg, Body Muscle 55.4 kg). In relation to the research results (Pavlović, 2022), our sample recorded a slightly lower body height (181.07 vs. 182.40 cm), higher body weight (82.41 vs. 80.06 kg) and more fat tissue in the body (15.28 % or 13.23 kg vs. 13.62 % or 10.90 kg). The average muscle mass of Sarajevo students is almost identical to the results of the study of the East Sarajevo sample (79.21 % or 65.28 kg vs. 82.40 % or 65.74 kg), while the amount of water is less by about 11 %. Authors López-Sánchez et al. (2019) analyze differences in body composition, physical activity, and diet between Polish and Spanish male sports science students. The results show that Polish students have better values of physical composition and physical activity, while Spanish students are defined by a healthier lifestyle. To avoid future risks of diseases such as obesity or diabetes. Polish physical education and sports curricula should include more lessons that promote an active and healthy lifestyle, while Spanish curricula require more physical activity and sport. Faculties of sports sciences should include more active practical classes in which students could improve their physical status and physical fitness through physical exercise. Compared to Polish sports students from Gdańsk (180 cm – 78.80 kg) our sample defines higher values of anthropometric parameters, body height and body weight, but also higher numerical values of the fat component which is smaler pronounced in Polish students (Body Fat 14.28 % - 11.69 kg) vs. our sample (Body fat 15.28 % or 13.23 kg). The percentage of water content is lower by 12 % in our sample. The muscle component recorded a higher value of Polish students (67.11 kg – 85.71 %) compared to our sample (65.28 kg – 79.21 %) but also an average higher BMR (Polish, 1995.03 vs. Sarajevo, 1864.24). Our sample of students compared to Spanish sports students from Murcia. It is primarily defined by bigger height (181.07cm vs. 178cm) and body weight (82.41 kg vs. 75.31 kg). They also have higher isolated adipose tissue in the body compared to the Spanish (Body fat 15.28 % – 13.23 kg vs. 14.73 % - 11.41 kg). The water content in the body is higher in the Spanish sample (62.8 2 %) compared to students in Sarajevo (50.70 %). The muscle component it is more dominant in the sample of our students compared to the Spanish (65.28 kg – 79.21 % vs. 63.92 kg 85.26 %) who also recorded a slightly higher BMR (1895.60). The lower fat content by about 2 kg (2 %) in physically active students compared to less active students is confirmed by the research of (Burdukiewicz et al., 2010; Ružbarský et al., 2015). Adipose tissue participates from 14.86-17 % while the muscle component occupies 44 kg of total body weight with 45 % water. The results confirm that the level of physical activity is not related to body height, body weight and absolute amounts of other studied components of body composition. Compared to the previous research, our sample defines a lower fat content a more dominant muscle component by almost 21 kg and more water by 6 %. The results of this study do not support the results of previous research, but are consistent with the results of (Grima, Blay, 2016; Pavlović, 2022) supporting the thesis on the impact of physical activity through the practical teaching of sports faculties on lower fats in the body of individuals. The results of the current study are in line with the conclusions of the research (Almagià Flores et al., 2009) which imply the negative impact of adipose tissue on the manifestations of motor skills from space speed, strength and aerobic endurance.

It can be assumed that the physical adaptation of students in Sarajevo is a positive response to the programmed physical activity that is associated with increasing muscle mass, reducing body fat and vice versa. Physical adaptation in response to a large amount of weekly physical activity through practical lectures and exercises can be correlated with a reduced percentage of fat and an increase in muscle mass and at the same time with the general health and cardiorespiratory fitness of the student. Acceptable levels of AN-AE capacity are associated with a reduced risk of high blood pressure, coronary heart disease, obesity, diabetes, some forms of cancer, and other health problems in students and adults. Increasing physical fitness in overweight children and adolescents may have many positive effects on health, including lower body fat levels (Ortega et al., 2013), which was confirmed by the research results.

5. Conclusion

The obtained results of the study defined the appropriate body composition of students of PES (Fat – 15.28 %; Muscle – 79.21 %; Water – 50.70 %; BMR = 1864.24 kCal ...) which is a consequence of their adequate PA at the home faculty and outside of teaching activities. The ICC results confirmed a highly inverse and statistically significant relationship between the amounts of fat in the body on the one hand and muscle mass and water content on the other. Students who had more muscle mass and more water also had less fat in their bodies. Compared to students from other countries, our sample of students in terms of anthropometric parameters (height, mass) is superior. In terms of body composition, students of PES in Sarajevo had a higher muscle component and lower values of fat component, than students from other countries, which is a consequence of their somatotype, way of studying, curricular and extracurricular physical activities. These results are a good indicator of the structure of the student population that enrolls in the Faculty of Sports, which is a good prerequisite for the realization of sports activities that are expected of them during their studies.

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