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Article

Body Composition and Nutritional Status in a Group of University Students

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Abstract: The anthropometric features offer an overall image of the nutritional status. The investigated groups were aged 19 and 21. The anthropometric measurements of height and weight were recorded following standard procedures. The objectives of this study were to evaluate the harmonious body development, the nutrition status and the body composition. The evolution of the stature increases until 20 years after which stagnation follows. The body mass index of subjects was found to be normal. The body fat may vary over time in subjects depending on age and gender. Body water and body muscle mass content increased with age. The harmony of body development was assessed by means of the Amar index. Regarding the constitutional index, the women subjects belong to the leptosome type and the male subjects belong to the picnic type. The status of the investigated subjects is within the average stature.

Keywords: students; body composition; nutritional status; constitutional index

1. Introduction

Anthropometry is a key component of nutrition status assessment in adults. Anthropometric data reflects the general health and dietary status [1,2].

Simple measurements of height and weight serve as reliable means to evaluate the growth and to detect gross abnormalities even when no other clinical sign of illness is manifested. Ancel Keys invented the body mass index [5]. Body mass index (BMI) is used to diagnose obesity. One of the best clinical uses of anthropometric data is to define obesity. BMI correlates with body fat. Obesity is an important risk factor for cardiovascular disease, diabetes mellitus, dyslipidemia, and hypertension [3,4]. Obesity and overweight are significant problems at the global level. They have increased a lot in advanced and developing countries [5].

BMI has been used in epidemiological studies and integrated into clinical settings. One crucial drawback of BMI is that weight as an index numerator fails to differentiate between lean and fat mass. BMI greater than 30 kg/m^2 is known with excess adiposity in 50% of cases, which indicates that 50% of people with increased body fat are not diagnosed as obese [6]. People who are normal weight or overweight but have an unhealthy distribution of body fat will not be accurately recognized by BMI [7,8]. Despite all the drawbacks, BMI is used in clinical trials.

The body height or the stature has been considered one of the main indices of somatic growth. Body weight is the second most important index of global growth. The variation in weight evolution is ranging in much wider limits than that of the stature. That is why weight is a sensitive index. By comparing the weight with the stature, we can make judgments regarding the degree of corporeality and harmony in the somatic development [9,10].

Studying body composition is indispensable to understanding physical growth. The examination of the physical development aims the following objections: the assessment of the physical development degree, the harmony assessment and the relationship existing in the

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development of the various body segments, the assessment of the nutrition status and of the corporal composition.

Carbohydrates, proteins, lipids, vitamins, and minerals are essential for the body's needs. The nutritional assessment provides information used for the general improvement of health quality [11–13].

The WHO was interested in promoting a global strategy regarding the increase of physical activity at the global level through the global action plan on physical activity 2018–2030: more active people for a healthier world [14]. The global strategy's main objectives: reduce risk factors for chronic diseases; understanding the diet and physical activity on health; improve diets and increase physical activity and promote research on diet and physical activity [14].

This study aimed to evaluate the harmonious body composition, body development and nutritional status (weight, height and body mass index).

2. Materials and Methods

The analytical study has been applied on 300 students with ages ranging from 19 to 21 years old, the average age being 19.78 years; 100 subjects are men and 200 subjects are women. The students' selection has taken into consideration their health situation. The data statistical processing was performed separately, according to the student's sex and age. The testing took place in December 2017.

In this study we have used the type form (biometric file). We studied assessed parameters: height (Iv-sol), body mass (weight), biacromial and bitrochanteric breadths. The most used anthropometric indicators weight-for-height, height for-age, and weight-for-age can be constructed by comparing indicators based on weight, height, age and gender.

The recommended procedures for the anthropometric measurements are the subjects in orthostatic lightly dressed. The measurements were performed following the recommended procedures [13–15].

The biacromial and bitrochanteric breadths have been measured by the means of an anthropometric compass, the results being expressed in centimeters. The biacromial breadth - represents the width of the scapular belt, and the bitrochanteric breadth - represents the width of the coxofemoral belt.

In order to assess the harmony in the torso development, we have calculated the proportion of the belts to the height using the formulas (1, 2) [16].

Biacromial index (%) = (biacromial breadth/height) x 100 (1)

Bitrochanteric index (%) = (bitrochanteric breadth/height) x 100 (2)

The Amar index is calculated from ratio torso to height. The constitutional index can be obtained through the following formula (3):

Ik = D/W x 100 (3)

Where: D = biacromial breadth and W = body weight.

2.1. Body mass index (BMI)

When we have assessed the nutrition status, we have used the body mass index. This represents the ratio of weight in kg and the square of the height measured in cm [13–15]. For its calculation we have used the Excel BMI calculator program.

2.2. Body composition

Body fat percentage was calculated using the following formula (4) [17]:

Body fat% = (1.29 x BMI) + (0.20 x age) - (11.4 x gender) - 8.0 (4)

Where: BMI = body mass index; male gender = 1; female = 0

The water content in the body and muscle mass was calculated for each gender separately, using the [18] formula:

Total water (men) = 0.184 x G + 0.345 x T – 35.270 (5)

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Total water (women) = 0.295 x G + 0.195 x T – 14.013 (6)

Where: G = weight, T = subject`s height.

The muscle mass is obtained by using the formula (7) [19]:

Muscle mass = (total water/73) x 100 (7)

For the body composition we have also calculated fat free body mass [21]. Fat–free body mass represents the body mass devoid of all extractable body fat. The measurements were made under standard conditions by the same investigator.

2.3. Mathematic methods

The data processing has been performed through various mathematical methods. In certain cases, we have calculated the frequencies, in other cases, the results have been processed statistically, by using the T test Student [22,23].

The statistical processing has been done with Microsoft Office 2010. In all analyses, the statistical significance was set at $p < 0.05$. The current WHO recommendation is to use the Z-score. Z-score (weight-for-age, height-for-age, weight-for-height) were classified by WHO [24]. Z-score and percentile values were calculated using reference values [25]. Values above the mean have positive Z-scores, while values below the mean have negative Z-scores.

The correlation has been achieved by using the Pearson correlation coefficient [26].

The people who participated in the study gave their consent to participate in the study and data processing.

3. Results

3.1. Anthropometric measurements

Weight is a very sensitive index of the body quantity growth. Taken separately, it has a limited importance, but if it is considered in its relation to age, gender, body height and the nutrition status, it gets an important significance. Weight changes quite fast. It may increase or it may diminish under the influence of certain internal and external factors that can be normal or pathological such as: food; physical effort; metabolic disorders; etc.

The average values and the statistical estimation regarding the subject's weight and the stature (height) are presented in Table 1. The average and the standard error have been calculated separately for each studied age interval.

Table 1. Average values and statistical estimation of the weight and height to investigated subjects.

Subjects	Age (years)	Weight (kg) X + Es	Height (cm) X + Es	BMI (kg/m²) X + Es
Women	19	54.36±1.28	164.25±1.10	20.22±0.49
	20	55.15±1.02	164.47±0.49	20.41±0.39
	21	52.07±2.19	162.53±0.76	19.57±0.53
Average	**19-21**	**54.68±0.77**	**164.23±0.59**	**20.06±0.47**
Male	19	68.65±0.93	172.20±1.15	22.08±0.87
	20	68.75±1.02	178.33±1.10	22.15±0.53
	21	69.16±0.72	178.16±0.95	21.91±0.55
Average	**19-21**	**68.76±1.55**	**176.26±6.12**	**22.04±0.65**

Note: X ± Es represents the average ± the standard deviation; BMI = body mass index.

In the case of women subjects, the weight average values range from 54.36±1.28 kg at 19 years old, 55.15±1.02 kg at 20 years old and 52.07±2.19 kg at 21 years old. In the case of male subjects, their weights have values ranging from 68.65±0.93 kg (19 years old) and 69.16±0.72 kg (21 years old). Studies conducted by [25] showed that in the age range 20-24 years the weight in men subjects was 69.9 kg and in women subjects was 56.7 kg.

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The average values and the statistical estimation, and the limits of the weight and height to investigate subjects are presented in Table 2.

The stature of the women subjects varies from 164.47±0.49 cm (20 years; Z=2; 50th) to 162.53±0.76 cm (21 years; Z=2; 60th) with an average of 164.23±0.59 cm. The percentile values for stature-for-age were 50th (Z=0). During the last years the stature of the women subjects also increased from 157 cm in 1980 to 164 cm in 2018. The stature of the male subjects was between 178.33±1.10 cm (20 years; Z=0.5; 70th) and 178.16±0.95 cm (21 years; Z=0.5; 70th) with the average of 176.26±6.12 cm.

Table 2. The average values, statistical estimation and the limits of the weight and height to investigate subjects.

Subjects/old	Indices	Average	Statistical estimation	Limits
Women				
19 years	Weight	54.36 (Z=-0.5)	1.28	41-69.5
	Height	164.25 (Z=0)	1.10	155-180
20 years	Weight	55.15 (Z=-0.5)	1.02	40-88
	Height	164.47 (Z=0)	0.49	144-180
21 years	Weight	52.07 (Z=-0.5)	2.19	42-69
	Height	162.53 (Z=0)	0.76	154-168
Male				
19 years	Weight	68.65 (Z=0)	0.93	56-99
	Height	172.20 (Z=-0.5)	1.15	165-186
20 years	Weight	68.75 (Z=0)	1.02	51-80
	Height	178.33 (Z=-0.5)	1.10	168-187
21 years	Weight	69.16 (Z=0)	0.72	64-85
	Height	178.26 (Z=-0.5)	0.95	166-186

3.2. Body mass index

The detection of the obesity risk may be quantified through the measuring of the body mass index (BMI). The body mass index is a better indicator of the population nutrition status (Table 1). The body mass index found out in the investigated subjects has values ranging from 16.80 kg/m^2 to 38.10 kg/m^2 (women subjects) and from 16.90 kg/m^2 to 30.70 kg/m^2 (male subjects).

The mean values of the groups studied have been calculated separately by age and gender. In the case of woman subjects, BMI has the following results: 20.22±0.49 kg/m^2 (19 years; Z=2), 20.41±0.39 kg/m^2 (20 years; Z=2) and 19.57±0.53 kg/m^2 (21 years; Z=2) with an average of 20.06±0.47 kg/m^2.

For male subjects, BMI values were 22.08±0.87 kg/m^2 (19 years; Z=2), 22.15±0.53 kg/m^2 (20 years; Z=2) and 21.91±0.55 kg/m^2 (21 years; Z=2) with an average of 22.04±0.65 kg/m^2. The values recorded in male subjects are higher because the indices used in calculating the body mass index are increased. Male participants had BMI values on average 2.02 kg/m^2 higher than those of women participants.

3.3. Harmony of the torso development

In order to assess the harmony of the torso development, we have calculated the belts proportion as they are related to the height. The biacromial breadth in male subject range from 37 cm to 45 cm, and at women subjects, it ranges from 33 cm to 41 cm. The biacromial breadth has been used in the calculation of the biacromial index. The bitrochanteric breadth has been used for the calculation of the bitrochanteric index (Table 3).

The biacromial index in women subjects was between 22.42±0.49% (19 years, Z=1, 85th), 22.73±0.16% (20 years, Z=1, 85th) and 22.50±0.27% (21 years, Z=0, 50th) with an average of 22.55±0.30%. The bitrohanteric index was lower, the results obtained indicate the percentages between 18.50±0.15% (21 years, Z=0, 50th) and 19.14±0.18% (20 years, Z=1, 85th) with an average of 18.83±0.19%. In male subjects, the mean statistical estimation was 23.07±0.32% for the biacromial index and 18.30±0.34% for the bitrochanteric index.

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Table 3. The average values and the statistical estimation of the biacromial index and of the bitrochanteric index.

Subjects	Age (years)	Biacromial index (%) X ± Es	Bitrochanteric index (%) X ± Es
Women	19	22.42±0.49	18.86±0.26
	20	22.73±0.16	19.14±0.18
	21	22.50±0.27	18.50±0.15
Average	**19-21**	**22.55±0.30**	**18.83±0.19**
Male	19	22.41±0.28	18.44±0.20
	20	23.47±0.26	18.39±0.30
	21	23.34±0.43	18.07±0.52
Average	**19-21**	**23.07±0.32**	**18.30±0.34**

Explanation in Table 1.

3.4. Body muscle mass and the body water

In Table 4, we present the results regarding the body muscle mass and the total body water content. The body muscle mass has mean values and statistical estimation of 52.03±1.70 kg (male subjects) and of 46.36±0.81 kg (women subjects). Body muscle mass in women subjects is smaller with 5.67 kg.

Table 4. The average values and the statistical estimation regarding the body muscle mass and the body water content.

Subjects	Age (years)	Body muscle mass (kg) X±Es	Body water content (l) X±Es
Women	19	46.62±0.65	34.04±0.47
	20	46.81±0.52	34.24±0.38
	21	45.56±1.27	32.26±0.93
Average	**19-21**	**46.33±0.81**	**33.51±0.59**
Male	19	51.36±1.15	37.68±0.87
	20	51.50±1.02	37.91±0.73
	21	53.23±1.06	38.85±1.46
Average	**19-21**	**52.03±1.07**	**38.14±1.02**

Explanation in table 1.

Total body water content is the total amount of body fluids expressed as a percentage of the total body weight. The average content and statistical estimation of the total body water in the investigated male subjects was 38.14±1.02 l, and in the women subjects was 33.51±0.59 l. In the age interval 19-21 years the water is accumulated in the body in different quantities, according to gender.

Data from the literature indicates [2,23,24] that body water content represents 55-65% of body weight. Body water content is an accepted indicator of hydration status [23,24]. Body water content increases with age. As the water content varies, being in strong connection with the body muscle mass, a similar evolution of the two indices is observed.

Body muscle mass develops through physical activity. After puberty, growth and development processes take place on the trunk level, through skeletal thickening and muscle mass development. Table 4 shows the results obtained regarding body fat. The average body fat had the following values: 18.12±0.76% (women subjects) and 17.02±1.47% (male subjects). Normally, the percentage of body fat is between 12-18% in men and 16-25% in women.

The skinfold had the values 2.07 cm (women subjects) and 2.09 cm (men subjects). Fat mass distribution in the body is irregular, with differences between the reserve fatty layer and essential fat. Research [25] found that for each kilogram of subcutaneous fat there were 200 g of internal fat. The body fat mass component may vary over time in subjects depending on age and gender.

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Table 4. The distribution of body fat and mean skinfold in the investigated subjects.

Age (years)	Body fat (%)		Mean skinfold (cm)	
	Women	Male	Women	Male
19	19.02±0.72 (Z-1)	17.86±1.31 (Z-1)	2.17	2.32
20	18.97±0.8 3(Z-1)	17.07±0.79 (Z-1)	2.21	1.87
21	16.38±0.74 (Z-0)	16.15±2.31 (Z-0)	1.84	2.08
Average	18.12±0.76	17.02±1.47	2.07	2.09

Explanation in Table 1.

The results regarding the body composition are shown in Table 5. The body composition comprises two compartments, namely a body fat mass and another one for the fat free mass. The assessment of body composition is useful in adults as it is used for a correct assessment of the nutritional status, which leads to the elaboration of appropriate therapeutic recommendations.

Table 5. Body composition.

Subjects/old	Fat mass (kg)	Optimal fat mass (kg)	Fat free mass (kg)	Body-weight (kg)
Women				
19 years	10.33±0.39	4.84±0.09	44.03±0.90	54.36±1,29
20 years	10.46±0.20	4.91±0.09	44.69±0.82	55.15±1.02
21 years	8.52±0.38	4.11±0.19	42.03±1.81	50.55±2.19
Average	**9.77±0.32**	**4.94±0.04**	**44.91±0.45**	**54.68±0.77**
Male				
19 years	12.25±0.41	6.20±0.05	56.40±0.52	68.65±0.93
20 years	11.75±0.53	6.27±0.05	57.02±0.49	68.77±1.02
21 years	11.16±0.55	6.38±0.01	58.00±0.17	69.16±0.72
Average	**11.71±0.49**	**6.27±0.11**	**57.05±1.06**	**68.76±1.55**

Explanation in Table 1.

The most important component of the free mass is the muscle mass. The average and statistical estimate of the current fat free mass it was 44.91±0.45 kg (women subjects) and 57.05±1.06 kg (male subjects).

Monitoring weight and body composition give us useful information about food intake, and the statistical estimation range from 54.68±0.77 kg (women subjects) to 68.76±1.55 kg (male subjects).

4. Discussion

Height in early adulthood varies substantially across countries and over time, provides a measurable indicator for development, with links to health and longevity, nutrition, education and economic productivity [31,32]. The way in which height has changed over the past 105 years also varies from country to country. The tallest men were born in the last part of the 20th century in the Netherlands and were nearly 183 cm tall on average. The shortest women were born in 1896 in Guatemala and were on average 140 cm tall. The trend of increasing height has already stopped in Norway, Denmark, the Netherlands, Slovakia and Germany [31–33].

The large increases in European men's heights in the 19th and 20th century have been highlighted [33]. The average height of a young male European (18-20 years) was 162.5 cm in 1888 and 176.0 cm in 2000. The studies achieved during a long period of time, going from 1870 to 1980 showed the acceleration of the rhythm in the individual development: thus, the population average stature grew from 167 cm to 178 cm.

Comparing the average values of the heights of men in the 19th century with those observed in the 21st century, the height of male subjects from Eastern Europe grew much faster than that of subjects from Western Europe [31]. Based on population study, rates of up to 10 mm/decade are typical for Western European countries in recent years, while Eastern Europe and Japan have

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achieved 30 mm/decade [33]. Height in early adulthood varies substantially from one country to another and over time, it provides a measurable indicator for sustainable development in relation to health and longevity, nutrition, education and economic productivity [32].

The studies undertaken by [34] on the population from North-Eastern Romania in period 1999-2006 showed a height average of 175.7 cm in men. Other studies [26,29] on the population of the capital of Romania, showed an average of 176.7 cm. For the population living in Timisoara area, the average height was 176.7 cm. Studies conducted by [32,34] highlighted the values of 176 cm for men in Romania and the prediction was 177.5 cm. Studys indicated [32] that an average height growth for all the ages occurred throughout the last decade with 2 cm for the men and of 1 cm for the women. In our study, the height results for men had an average of 176.26 cm and for women the average was 164.23 cm.

The Pearson correlation linking weight to height is a positive one: 0.467 for women subjects and 0.438 for men subjects, which points to the two parameters average relation.

The environment, the diet and the physical education may modify the stature. There is a direct relationship between physical activity and metabolic health. Data from the literature [33] indicate that 150 minutes per week of moderate physical activity has a beneficial effect on the body.

Height-for-age reflects cumulative linear growth. Height-for-age is primarily used as a population indicator rather than for individual growth monitoring [34,35,37]. As for the stature, age and sex the percentile values for men gender subjects 19 years were >25th (-1SD) and for men gender subjects 20-21 years were >50th (Z=0). The percentile values for the stature, age and sex for female gender subject were <50th (Z=0). Z score = 0 indicates that the given point is identical to the mean. On the standard normal distribution graph, Z = 0 is therefore the center of the curve.

The body stature is one of the most stable sizes, and it is influenced by endogen but also by environmental factors. The stature of the girls stops growing in the age range 17-19 years old, while the stature of the boys stops at about 20 years old. Stature generally characterizes quite properly the individual's development, and it is the size to which the other anthropometric measurements are related.

For men, the ideal weight depending on height, 173 cm, is between 63 kg - 76.6 kg and for height, 178 cm, is between 67.6 kg - 83 kg. The average weight of the men was 68.76 kg, which indicates that it falls within the normal limits.

For women, the ideal weight depending on height,163 cm, is between 49 kg - 59.9 kg and for height,175 cm, is between 51.2 kg-62.6 kg. The results obtained from the measurements fall within these limits (average 54.68 kg).

Weight-for-age is commonly used for monitoring growth and to assess changes in the magnitude of malnutrition over time. By reporting weight to age and sex the percentile values for subjects were found to be in the percentile <50th (Z=0) from WHO growth charts by age. By reporting the body mass index to age and gender the women subjects have the percentile values <50th (Z=0) and male subjects have the percentile values <50th (Z= 0) from WHO growth charts by age [38–41].

In adults, BMI < 18.5 kg/m^2 – suggests underweight; BMI = 18.5 to 24.9 kg/m^2 - suggests normal range; BMI > 24.9 to 29.9 kg/m^2 – suggests overweight and BMI ≥ 30 kg/m^2- suggests obesity [37]. In the study the average BMI is within the normal range, however, there were some individual values below 18.5 kg/m^2, some ranging from 25 kg/m^2 to 29.9 kg/m^2 and others over 30 kg/m^2. Individuals with a BMI of 25 kg/m^2 to 29.9 kg/m^2 are considered overweight, whereas individuals with a BMI ≥30 kg/m^2 are considered obese [4,13,34,41]. Individuals with a BMI and bigger than 25 kg/m^2 are considered at risk for developing associated morbidities or diseases such as hypertension, high blood cholesterol, type 2 diabetes, coronary heart disease, and other diseases [4,35]. The worldwide prevalence of obesity nearly tripled between 1975 and 2016 [5]. The prevalence of BMI obesity greater than 30 kg/m^2 in adults (>18) is 22.5% in Romania, and in children and adolescents (15-19 years) 8.10%, in 2016 [38].

Studies from literature [35] indicated that mean BMI increased to men from 21.7 kg/m^2 (21.3–22.1 kg/m^2), in 1975, to 24.2 kg/m^2 (24.0–24.4 kg/m^2) in 2014, and to women increase from 22.1 kg/m^2 (21.7–22.5 kg/m^2), in 1975, to 24.4 kg/m^2 (24.2–24.6 kg/m^2) in 2014. Studies show an average increase

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in BMI of 0.63 kg/m^2 per decade (0.53–0.73 kg/m^2) for men and 0.59 kg/m^2 per decade (0.49–0.70 kg/m^2) for women. After, 2000 the increase of BMI was steeper than before 2000 in men from Central and Eastern Europe. The world's population has become on average more than 1.5 kg heavier every decade.

By reporting the body mass index to age and gender the woman subjects have the percentile values <50th (Z=0) and male subjects have the percentile values <50th (Z= 0) from WHO growth charts [24,39,41].

Asymmetric growth and development are differentiated by gender and it is submitted to the laws on evolutionary stages. The age examined in the study is characterized by weight gain (15-20 years) and height increase (18-25 years). Men are taller than women in every country, on average by 11 cm in the people 1896 birth and 12 cm in the people 1996 birth [32]. The Pearson correlation linking weight to height is a positive one: 0.467 for women and 0.438 for men, which points to the two parameters average relation.

The assessment of the development of the thorax and basin, respectively scapular and pelvic belts is done by the difference between biacromial breadth and bitrochanteric breadth. The difference is 4.77 cm in male subjects and 3.72 cm in women subjects. The results are consistent with those presented in the literature.

The harmony of body development is assessed by means of the Amar index. Index values were 0.54 cm in women subjects and 0.52 cm in male subjects. Compared to the height, the bust is shorter for male subjects, indicating indirectly that their lower limbs are longer than the women's ones.

Determining the body composition in adults is useful for the correct assessment of the nutritional status. 83% percent of total fat mass is fat tissue, of which 50% is located subcutaneously. Fat mass distribution in the body is irregular, with differences between the reserve fatty layer and essential fat [2].

The fat free mass is the weight of the muscles, bones, ligaments, tendons and internal organs. The evolution of body muscle mass is a dynamic process. Increased muscle mass is related to the growth and development processes of the body. Before puberty, growth concerns mainly the bones, while after this period, muscles are important.

The distribution of body fat (subcutaneous or visceral) is of great importance. Visceral fat tissue is ¼ of the total body fat mass and increases with age and with the body mass index. The visceral fat tissue deposits are located in the abdominal cavity. They account for about 20% for male subjects and 8% for female subjects of the body total fat [42]. The assessment of the abdominal fat distribution was performed by measuring the skin fold. The mean values range from 2.07 cm (women subjects) and 2.09 cm (male subjects).

In 1921, study Kretschmer developed an interesting typology, highly appreciated in clinics. This typology is used in medicine and started from the idea that there is a certain correlation between clinical examination and anthropometry.

The investigated women subjects belong to the following constitutional types: picnic (14%), athletic (29%) and leptosome (57%). Male gender subjects belong to the following constitutional types: picnic (52%), leptosome (19%) and athletic (29%). 57% of women subjects belong to the leptosome type (high-height) and 52% male subjects belong to the picnic type (mignon-type).

The leptosome type includes high-height individuals. The picnic type includes mignon-type individuals with a constitutional index of less than 58, and the athletic type includes average height individuals or quite tall with the constitutional index ranging from 58 to 67. The athletic type is characterized by a harmonious and strong development of the body as a whole. The athletic type characterizes those who perform physical activity.

5. Conclusions

Mean values of weight and height are higher in male gender subjects. These are due to sexual dimorphism. Differences heigh between age groups range from 0.22 cm to 1.72 cm (women subjects) and 5.96 and 6.13 cm (men subjects). The ascending tendency in the height is noted in both genders.

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The results are in the average values of the Romanian population (176 cm for men and 164 cm for women).

The average body mass index is significantly higher in men than in women. By further analyzing the body mass index values, we have found out very close values in the same age group.

Changes in body composition are less marked than those of body size. In the period 19-21 years, water is accumulated in the body in different quantities, according to gender. The water evolves in strict connection with increasing the amount of fat and muscle mass. The amount of water contained in the body varies with age. The total water content and muscle mass depends on age and there are differences between the two sexes.

In male subjects it was observed the decrease of the present body fat and the increase of the mass of the muscular mass in the studied interval 19-21 years.

Regarding the constitutional index the women subjects belong to the leptosome type and the male subjects are from the picnic type.

The investigated subjects are of medium stature.

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