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Physical Development of Plovdiv Students

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The purpose of the present study is to determine the somatometric status of young men and women, students from the city of Plovdiv by characterizing the specificity of their physical development and determining the differences in the body stature and the individuals of both sexes. Object of the study are 136 clinically healthy individuals (88 girls and 48 boys), students from different majors of the University of Plovdiv, at the average age of 20-21 years. The data of 9 basic somatometric indicators, 7 body proportions and indexes have been analyzed, as well as their distribution by categories according to the rubrics generally accepted in anthropology. Statistically significant intersexes differences were established according to all body length indicators, diameters and circumferences of body. More information about significant intersexes differentiation, provide the features for body weight and dimensions (absolute and relative) of the upper body part.

Key words: anthropometry, proportions, categories, students.

Introduction

Human ontogenesis is a long and versatile process, which stages are characterized with processes different in their strength and nature. One of the external expressions of these features, are the body dimensions and proportions typical for a specific moment. Body measurements provide possibility the growth and development of individuals throughout different age periods to be controlled [1, 3, 5], analysis of the social variants to be conducted [2, 3], the effectiveness of activities to be inspected, stimulating health and working capacity of population [4]. The purpose of the present study is to determine the somatometric status of young men and women, students from the city of Plovdiv by characterizing the specificity of their physical development and determining the differences in the body stature and the individuals of both sexes.

Material and Methods

Object of the study are 136 clinically healthy individuals (88 girls and 48 boys), students from different majors of the University of Plovdiv, at the average age of 20-21 years. A standard anthropometric instrumentarium had been used. The data of 9 basic somatometric indicators, 7 body proportions and indexes have been analyzed, as well as their distribution by categories according to the rubrics generally accepted in anthropology. The data are statistically processed.The authenticity of the obtained results was checked by means of ANOVA — tukey test for independent extract of significance level $p \leq 0{,}05$.

Results

The average values of investigated features and their proportions of both sexes are presented in Table 1. The percentage distribution of the investigated students by cat-

T a b l e 1. Metrical data abaut the investigated features and their proportions

Lengths and Body Weight					
Features	Female students, n=88	Male students, n=48	Difference		ANOVA-Tukey HSD test
	Mean / SD	Mean / SD	Absolute (cm)	%	
Stature, cm	162.85 6.30	178.02 6.39	15,17	8.52	0.000 *
Body weight, kg	57.06 9.30	77.97 13.14	20,91	26.82	0.000*
Trunk length, cm	47.43 2.80	53.30 3.15	5,87	11.01	0.000*
Lower extremity length (troh.), cm	82.81 4.46	89.76 4.63	6.95	7.74	0.000*
Chest Circumference and Body Diameters					
Features	Female students, n=88	Male students, n=48	Difference		ANOVA-Tukey HSD test
	Mean / SD	Mean / SD	Absolute (cm)	%	
Chest ircumference-pause, cm	75.09 7.17	90.61 9.95	15.52	17.13	0.000*
Transversal chest diameter, cm	23.56 2.45	27.82 2.58	4.26	15.31	0.000*
Sagital chest diameter, cm	15.84 2.31	19.71 2.80	3.87	19.63	0.201
Biakromial diameter, cm	31.83 2.60	37.66 2.79	5.83	15.49	0.000*
Bicristal diameter, cm	26.38 2.60	28.61 2.71	2.23	7.79	0.000*
Body proportions, %					
Proportions and indexes	Female students, n=88	Male students, n=48	Difference		ANOVA-Tukey HSD test
	Mean / SD	Mean / SD	Absolute (cm)	%	
(TRL / S) x 100	29.34 2.11	29.93 1.25	0.59	1.97	0.120
(LEL / S) x 100	50.84 2.9	50.41 1.85	0.43	0.85	0.234
(CC / S) x 100	46.15 4.56	50.87 5.00	4.72	9.28	0.000*
(BAD / S) x 100	19.55 1.53	21.16 1.53	1.61	7.61	0.000*
(BCD / S) x 100	16.20 1.49	16.06 1.36	0.14	0.87	0.644

Abbreviations: Stature — S, Trunk length — TRL, Lower extremity length — LEL, Chest circumference — CC, Bicristal diameter — BCD, Biakromial diameter — BAD

Table 2. Distribution according to the proportion of the investigated features, %

1. Distribution according to the proportion of lower extremity's length- Brugsch's rubrics					
Categoty		Male students		Female students	
		n	%	*n*	%
short	x - 50.4	25	52.08	36	40.91
middle	50.5 – 52.9	16	33.34	47	53.41
long	53.0 - x	7	14.58	5	5.68

2. Distribution according to the proportion of trunk length- Brugsch's rubrics					
Categoty		Male students		Female students	
		n	%	*n*	%
short	x - 27.9	3	6.25	21	23.86
middle	28.0 - 29.9	22	45.83	43	48.78
long	30.0 - x	23	47.92	24	27.27

3. Distribution according to the proportion of Chest circumference- Brugsch's rubrics					
Categoty		Male students		Female students	
		n	%	*n*	%
narrow	x - 50.9	25	52.08	77	87.5
middle	51.0 – 55.9	18	37.5	7	7.95
wide	56.0 - x	5	10.42	4	4.55

4. Distribution according to the Biacromial diameter's proportion -Brugsch's rubrics						
Categoty	Male	Male students		Female	Female students	
		n	%		*n*	%
narrow	x - 22.0	17	35.42	x – 21.5	71	80.68
middle	22.1 -23	15	31.25	21.6 – 22.5	15	17.05
wide	23.1 - x	14	29.17	22.6 - x	2	2.27

5. Distribution according to the Bicristal diameter's proportion -Brugsch's rubrics						
Categoty	Male	Male students		Female	Female students	
		N	%		N	%
narrow	x – 16,5	34	70,83	x – 17,5	77	87,5
middle	16,6 – 17,5	9	18,75	17,6-18,5	5	5,68
wide	17,6 - x	5	10,42	18,6 - x	6	6,82

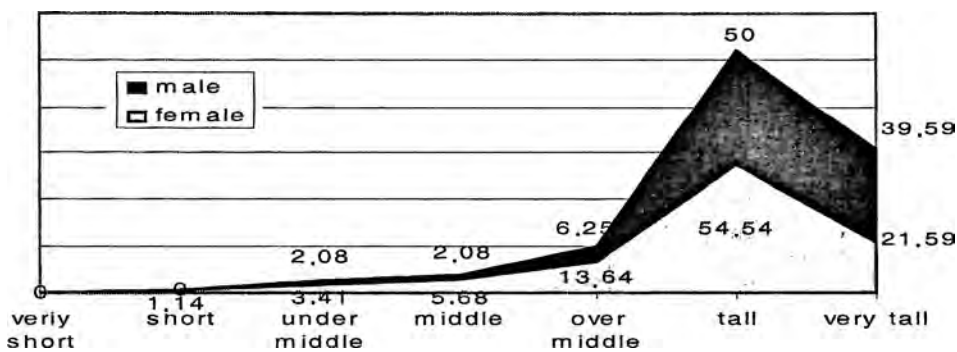

Fig. 1. Distribution according to the Stature - Martin's rubrics, %

egories according to generally accepted rubrics is presented in Table 2. The absolute values for stature, weight and lengths of body (trunks length and lower extremity length) are reliably higher among men. The percentage distribution of the individuals of both sexes according to the rubrics generally accepted in Anthropology by Martin. R for the stature is presented in the Fig. 1.

The results show that the prevailing multitude of young men and women are individuals of high stature having height significantly over the middle one (54.54 % in young women and 50.00 % in young men). The average values of the proportions

of trunk length and lower extremity length of both sexes are statistically insignificant. We established more essential differences in percentage distribution of the individuals by categories.

Among the rubrics of Brugsh the prevailing part of men have short lower extremities (52.08 %) and long (47.92 %) or middle trunk (45.83 %). The larger part of women has middle trunk (48.78 %) and middle lower extremity (53.41 %).

The absolute values of chest circumference and diameters of body are reliably higher among men (excluding the sagital diameter). According to Brugsh's rubrics the larger part of men has narrow chest and narrow pelvis. Regarding shoulder width the distribution is almost equal in the three of the categories — narrow, middle and wide shoulders. Among women the distribution of the larger part is in the following categories — narrow chest, narrow shoulders and narrow pelvis.

Generalize results of the our investigation we can indicate that they are in regular and quite normal biological — all investigated somatometric features are with larger values in young men than young women. More interesting to us is to establish which of the investigated features the differences between two sexes are more clear. The results show (Fig. 2) that the young men and women differ significantly in their body weight and the features characterizing the proximal body part (shoulder width, chest circumference, transversal chest diameter) and differ not so significantly in the features characterizing the distal body part (pelvis) and the linear dimensions - trunk length, lower extremities length and their proportions.

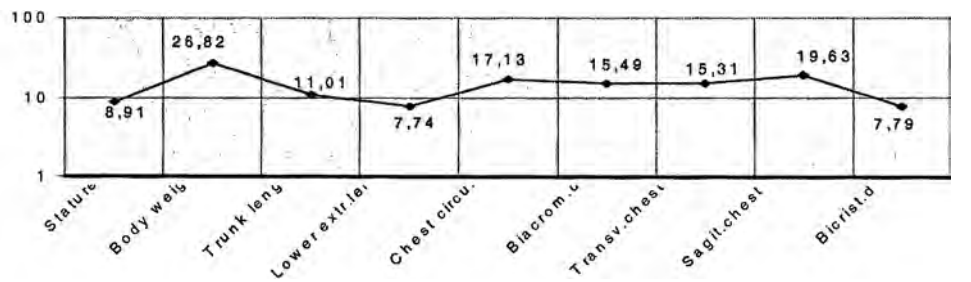

Fig. 2. Degree of intersexual differences about the investigated features, %

Conclusions

1. A characteristics of the basic somatometric status of young men and women, students from Plovdiv University at the age 20-21 years was made. Statistically significant intersexes differences were established according to all body length indicators, diameters and circumferences of body excluding the sagital diameter. More information about significant intersexes differentiation, provide the features for body weight and dimensions (absolute and relative) of the upper body part.

2. Young men are with high and very high statute according to the standards of the European population, with shorter lower extremities and with middle to long trunk. In the body configuration there are combined: a narrow pelvis, proportionally smaller chest circumference with slight predominance of narrow and middle shoulders over the wide shoulders. Young women are tall in respect of the height according to the standards of the European population, with middle lower extremities and middle trunk according to the length. They are with narrow shoulders and a narrow pelvis.

3. The general evaluation of physical development, body stature and proportionality of body made of Plovdiv students contributes for supplementing the total anthropometric characteristics of young men and women from Bulgarian population at the beginning of 21st century.

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