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Morpho-Functional Characteristics of Students from Plovdiv

Sl. Tineshev

Faculty of Biology, Paisii Hilendarski University of Plovdiv
Department of Human Anatomy and Physiology

The purpose of this study is to characterize the morphological status and functional abilities of students, aged 19-21 years, from the University of Plovdiv. The morphologic characteristic showed that; in the boys are taller and heavier than girls; the transverse and sagittal diameters of the chest have higher values in boys, as in both genders, functionally well-fitted conic shapes are more common; limbs circumferences are bigger in boys, as the intersexual differences are more expressed for the circumference of the forearm in comparison with the circumference of the shank. This presents the bigger plasticity of muscles and subcutaneous fat tissue in the distal segment of the upper limb in comparison with that of the lower limb.Physiometric characteristic showed that hypertension occurs more often in boys, and hypotension – in girls. In both genders, the percentage of individuals with quickened pulse rate is the highest.

Key words : morphological status, functional abilities, students.

Introduction

Human ontogenesis is a long and multifarious process, whose stages are characterized by processes different in power and nature. The correct assessment of health status of the body is impossible without the systematic monitoring of physical development [3]. Modern concepts of physical development are best matched in its definition as a process of formation of the structures and functions of the body, in accordance with the genetic potentialities and environmental conditions [4, 5]. To clarify the common tendencies in body changes during ontogenesis, functional studies are of great importance [1, 2]. Their results have essential importance in medico-biological practice and give interesting information of a higher hierarchical level about humans. Such complex anthropological studies that are related to a big number of morpho-functional indicators aim to characterize more fully and completely the somatic development and functional reactivity of the organism.

The great originality in form and structure of a body through the stage of maturity, and the overlap of the opinion for the integrity and indivisibility of the body, for the unity of its morphology and function, determine the interest toward the present research.

Material and Methods

To solve this purpose, we used transversally collected data of students, in their first year at university, at the Faculty of Biology of the University of Plovdiv. 192 students – 80 boys and 112 girls, aged 19 to 21 years, were measured. The anthropological features were measured by the conventional method of Martin-Saller (1957), using the original anthropometric equipment. The study included height, weight, and chest diameters and limbs circumferences. The recording of the systolic pressure, diastolic pressure and pulse rate was made with OMRON MX3 Plus. The measurement was performed in a seated position of the body, on the left hand.

Results

The height (Table 1) is a basic anthropometric feature of leading significance also for the interpretation of the metric data for a big part of the other anthropometric characteristics. This feature is characterized with great changeability and it shows distinct sexual, age and territorial differences.

Analyzing our results, we found that the tested boys in the age interval of 19-20 years are taller than girls with 14.04cm. The intersexual differences are statistically reliable at the level of significance $p \leq 0.001$. In our excerpt, boys' height varied from 163.40 to 191.20 cm, and in girls – respectively from 142.00 to 181.10 cm. The most common frequency of occurrence are the boys between 171.99cm and 182.83cm (X±1SD), while girls – in the interval between 157.17cm and 169.57cm.

In contrast to the height, which is genetically determined, the body weight (Table.1), except its coded hereditary potential, it is also influenced by a lot of exogenous factors, social-economical status of the family, and last but not least by the food quality and type. These peculiarities make it exclusively important in determining the health status of a body throughout the postnatal ontogenesis.

The average value of body weight in boys was 76.19, and in girls – 57.39 kg. Intersexual differences of the order of 18.8 kg and they are characterized with a high level of reliability $p \leq 0.0001$. The big variation range was also proved with the big variability of weight of the students we surveyed.

The transverse and sagittal diameters (Table 1) of the chest are the features whose values determine the form and size of the chest. The sagittal diameter presents the depth of the chest, and the transverse diameter characterizes its width. The chest shape depends on the inclination and curves of ribs, on the position of the chest bone, collarbones, blades and the spinal column.

Analysis of the results fully substantiates the well-known facts from the scientific literature that boys have bigger values of chest diameters. In both genders, the functionally well adjusted conic shapes are more (thoracic index 70.0-73.0). In our excerpt, we found that 19% of the boys and 17% of the girls have cylindrical chest shape, which is typical for sports individuals. As a whole, in both genders, the chest is well-developed and it has typical shape and size intrinsic to grown individuals

Limbs circumferences (Table 1) are morphologic characteristics that present the physical abilities of the skeletal muscles. Together with their measuring the amount of subcutaneous fat tissue was also recorded. The average values of these two features were higher in boys – respectively the circumference of the forearm – boys – 26.83 cm, girls – 22.39 cm; the circumference of the shank – boys – 37.45 cm, girls – 34.16 cm. The intersexual differences are higher for the circumferences of the forearm, where boys have 16.55% bigger size in comparison with girls, while for the shank the dif-

Table 1. Biostatistics data on morphological characteristics

No	boys							girls							T♂/♀
	n	χ	SD	SEM	V	min	max	n	χ	SD	SEM	V	min	max	
Height	80	177,41	5,42	0,62	29,39	163,4	191,20	112	163,37	6,20	0,58	38,49	142	181,10	**
Weight	80	76,19	12,59	1,44	158,65	51,20	121,40	112	57,39	10,48	0,99	110,01	41,40	112	***
Transverse diameter	80	29,19	2,34	0,26	5,48	22,10	35,20	112	24,38	1,57	0,14	2,50	21,20	28,50	**
Sagittal diameter	80	21,27	2,87	0,31	8,27	14	28,80	112	17,56	1,86	0,17	3,48	14,20	25,20	***
Circumference of the forearm	80	26,83	2,24	0,25	5,03	22,40	32,90	112	22,39	2,14	0,20	4,59	17,90	29,80	****
Circumference of the shank	80	37,45	3,16	0,36	10,02	31,20	44,70	112	34,16	3,74	0,35	14,04	20,50	52,50	***

Table 2. Biostatistics data on physiological characteristics

No	boys							girls							T♂/♀
	n	χ	SD	SEM	V	min	max	n	χ	SD	SEM	V	min	max	
Systolic blood pressure	80	133,26	13,94	1,59	194,51	100	170	112	116,67	11,97	1,13	143,28	90	152	****
Diastolic blood pressure	80	76,02	11,62	1,33	135,03	53	110	112	76,00	9,42	0,79	88,88	60	103	
Pulse rate	89	86,75	16,47	1,89	271,48	54	135	112	86,25	13,53	1,27	183,16	60	122	

ferences between sexes are almost twice smaller – 8.79%. These kind of intersexual differences represent the bigger plasticity of muscles and the subcutaneous fat tissue in the distal segment of the upper limb compared to the distal segment of the lower limb.

Pulse rate (Table 2). The average values of pulse rate, in both genders, were relatively similar – 86 beats per minute. The lowest pulse rate measured in young men was 54 beats per minute, but in girls – 60 beats per minute. The highest pulse rate measured in boys was 135 beats per minute, and in girls – 122 beats per minute. The average pulse rate does not give a clear picture of the characteristics of heart activity, because that we would characterize the data on the frequency of individuals with slow pulse rate (to 59 beats per minute), quick (80 beats per minute) and normal pulse rate (between 60 and 80 beats per minute). In our sample, we found that slow pulse rate occurred only in boys, with very low frequency – 2.5%. The percentage of boys with normal pulse rate is relatively equal to that of girls (boys – 36.71%, girls – 35.71%). It is worrying that in both sexes individuals with quickened pulse rate dominate, which in future may possibly be a prerequisite for the occurrence of arterial hypertension – 60.79% in boys and 64.29 in girls.

Systolic blood pressure (Table 2). The average values of the systolic blood pressure in the boys surveyed were 133.26mmHg, and 116.67mmHg in girls. The comparison between genders showed that in girls it is 12.45% (16.59mmHg) lower than that of boys. Since the average values of systolic blood pressure do not give information about any abnormal aberrations, we analyzed data of individuals according to the categories hypotension (up to 109mmHg of mercury) norm tension (from 110 to 140mmHg of mercury) and hypertension (over 140mmHg of mercury). Result analysis showed that individuals with normal systolic blood pressure are more (boys – 62.5%, girls – 69.46%). It is interesting to note that hypotonic systolic blood pressure has higher frequency of occurrence in girls (26.78%) (7.5% boys), but hypertension in boys (30%), (3.86% in girls); which shows that boys are in higher risk of occurrence of risk situations.

Diastolic blood pressure(Table.2). Our records, according to the average values of the diastolic blood pressure, do not present any intersexual differences – 76mmHg. We calculated the frequency of occurrence in individuals in the three categories of the diastolic blood pressure with the following limiting values – up to 69 mmHg, from 70 to 90 mmHg and over 90 mmHg. In both genders, most individuals had diastolic blood pressure between 70 mmHg and 90 mmHg (boys – 66.25%, girls – 68.75%). The percentage of boys with diastolic blood pressure bellow 69 mmHg is 25%, and girls – 23.21%. The least frequency of occurrence was in students with diastolic blood pressure over 90 mm Hg (boys – 8.75%, girls – 8.03%).

Conclusion

The summary results from the analysis of the data of the arterial blood pressure in students, aged 19-21 years, showed that in both genders these with normal values are more. For our students the hypertension is more common in boys, and hypotension – in girls, i.e. students tested at this age have physical status typical for the grown-up men and women.

1. The morphologic characteristic showed that:

* boys are taller and heavier than girls;

* the transverse and sagittal diameters of the chest have higher values in boys, as in both genders, functionally well-fitted conic shapes are more common;

* limbs circumferences are bigger in boys, as the intersexual differences are more expressed for the circumference of the forearm in comparison with the circumference of

the shank. This presents the bigger plasticity of muscles and subcutaneous fat tissue in the distal segment of the upper limb in comparison with that of the lower limb.

2. Physiometric characteristic showed that:

* hypertension occurs more often in boys, and hypotension – in girls. In both genders, the percentage of individuals with quickened pulse rate is the highest.

References

1. Андреенко, Е. Особености в психометричната характеристика на Пловдивски студенти. Юбилейна национална научна конференция с международно участие, СУБ, клон Смолян, 947–955.
2. Andreenko, E., 2007. Factors, defining psychomotor reactivity and personal profile of men with ddifferent physical activity. Homo, Научни трудове, Биология, ПУ „П. Хилендарски", том 40, кн.6, 13–24.
3. Година, Е. Динамика процессов роста и развития у человека: пространственно-временные аспекты. Автореф.докт.биол.наук. Москва, 2001.
4. Година, Е. З., Задорожная, Л. В. Влияние некоторых факторов окружающей среды на формирование особенностей соматического развития детей и подростков. – Вопр. антропол. 84, 1990, 18–30.
5. Николова, М. Генетични и средови основи на морфологичната изменчивост. Научни трудове ПУ „П.Хилендарски", 4, 2000, 267–284.