

Functional and psychometric characteristics of students from Plovdiv

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The purpose of this study was to characterize the physiological status and mental ability of students aged 19-21 years. To implement this purpose transverse data were collected from 192 students of the Biological Faculty at Plovdiv University. Functional signs (systolic and diastolic pressure and pulse rate) were recorded with OMRON MX Plus. The analysis of mental abilities are attached five psychometric tests. The material is processed using the statistical package "STATISTICA 6.0".

Our results showed that high blood pressure often occurs in young and low blood pressure in young women. In both sexes the highest percentage of individuals with a fast pulse rate. Gender differences in muscle strength of right hand is a very high degree of statistical significance and priority for young people. There are personal differences in the indicators characterizing the mental capacity of an individual. Young people surveyed are faster and more skillful than girls, while in terms of emotional stability and intensity of attention intersexual differences are insignificant.

Key words: pulse rate, systolic and diastolic blood pressure and, psychometric characteristics.

Introduction

Contemporary ideas of human morphology are combined best in its definition as a process of forming the structures and functions of the body, according to genetic traits and environmental conditions. Functional studies are very important for clarifying the general tendencies in body changes in the course of ontogenesis. The results of these studies are important for assessing the health condition of the surveyed population [1,2]. Now, in the beginning of the new millennium, the development of anthropological studies requires the extension of the usual morpho-functional approach by involving the psycho-physiological characteristics as well. This implies the creation of interdisciplinary connections, and in particular – links and synthesis of anthropological, physiological and psychological knowledge, that give interesting information about people at a higher hierarchical level [3,4,5,6,]. Such complex anthropological studies, concerning a large number of morpho-functional and psychometric indicators, aim to characterize, in a more complete and comprehensive way, the physical development, functional reactivity, motor and psychomotor capabilities of an organism.

Material and Methods

For implementing this goal we collected transverse data for 192 students from the Biological Faculty of the University of Plovdiv "P. Hilendarski" – 80 boys and 112 girls, at the age of 19-21 years.

The functional features (systolic and diastolic blood pressure and pulse rate) were recorded with OMRON MX Plus. The measurements were performed in a sitting position of the body, on the right hand.

A series of five psychometric tests were used for recording the mental abilities:

Intensity of attention test, speed of visual-motor reaction at a specified rate (Speed of reaction test), maximum frequency of hand movement – Tapping test, emotional stability test, finger dexterity test.

The material was processed using the statistical package "STATISTICA 6.0"

To establish the statistically significant gender differences, we used t-test of Student at the level of significance $P \leq 0.05$.

Results and Discussion

Pulse rate is the main physiometric feature for cardiac activity and the condition of cardiovascular system.

Mean pulse rates in both sexes are relatively equal – 86 beats per minute (table 1), which is 10 beats more than grown men and women in the country [7]. For boys the lowest pulse rate measured is 54 beats per minute and for girls respectively – 60 beats per minute. The highest pulse rate measured in boys is 135 beats per minute and in girls – 122 beats per minute. Mean pulse rates do not give a characterization of the heart activity, and due to this fact we characterize the frequency data of individuals with slow (up to 59 beats per minute), fast (more than 80 beats per minute) and normal heart rate (between 60 and 80 beats per minute). In our sample we found that slow pulse rate occurs only in boys and with very low frequency – 2.5%. The percentage of boys with a normal pulse rate is relatively equal to that of girls (boys – 36.71%, girls – 35.71%). However, it is worrying that in both sexes individuals with fast heart rate dominates, which in the future could possibly be a prerequisite for the occurrence of arterial hypertension – 60.79% for boys and 64.29% for girls.

Arterial blood pressure is another major physiometric indicator that reflects the work and condition of the cardiovascular system.

Mean systolic blood pressure for the boys in the survey is 133.26 mm Hg (table 1), and 116.67 mm Hg in girls, and were higher compared with grown men and women (men of the country's average systolic blood pressure 125, 77 mm Hg, while the female 115,4 mm). The comparison between genders showed that in girls it is 12.45% (16.59 mm Hg) lower than that of boys. Since the average values of systolic blood pressure did not give information about deviations from the norm, we analyze the data of individuals according to the categories of hypotension (up to 109 mm Hg of mercury), normal tension (from 110 to 140 mm Hg of mercury) and hypertension (above 140 mm Hg of mercury). The analysis of results showed that the individuals with normal systolic blood pressure are more (boys – 62.5%, girls – 69.46%). It is interesting to note that low systolic blood pressure occurs more frequently in girls 26.78% (7.5% boys), while high systolic blood pressure – in boys 30% (3.86% girls), indicating that boys are more burdened by the occurrence of risk situations.

Our data on diastolic blood pressure show no gender differences – 76 mmHg (table 1). It was 3 mm Hg lower than grown men and 3 mm Hg higher than grown women.

Table 1. Results of statistical analysis physiometrics signs for research students.

№	Boys							Girls							T♂/♀
	n	X	SD	SEM	V	min	max	n	X	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	

We calculated the frequency of occurrence of individuals according to the three categories of diastolic blood pressure with the following limits – up to 69 mm Hg of mercury, from 70 to 90 mm Hg of mercury, more than 90 mm Hg of mercury. In both sexes, the individuals with diastolic blood pressure between 70 mm Hg and 90 mm Hg (boys – 66.25%, girls – 68.75%) are more. The percentage of boys with diastolic blood pressure lower than 69 mm Hg is 25%, for girls – 23.21%. Students with diastolic blood pressure above 90 mm Hg (boys – 8.75 %, girls – 8.03%) are of the lowest frequency of occurrence.

Summarized results of data analysis for blood pressure in students, aged 19 to 21 years, show that these with normal blood pressure prevail for both sexes. For our students hypertension is more common in boys, while hypotension – in girls, i. e. the tested adolescents at this age have physiological status characteristic of adult men and women.

Mental activity means a higher function of the highly organized matter in the brain, which reflects and changes the surrounding world. It precedes, accompanies, and regulates every human activity.

Speed of reaction is one of the vital qualities of a man, having in mind the dynamics in living conditions in the first decade of the twenty-first century. To analyze the data for speed of reaction we used two pulse frequencies – 75 pulses with 45 light signals and 105 pulses with 60 light signals, as the reaction time was 1 minute. Our results for the low pulse frequency showed that boys have a greater number of accurate hits – an average of 41.50 light signals, and girls – 36.34 light signals, i.e. our boys have a faster reaction 12.43% more than girls, a fact which has been confirmed in other literature data. However, the result for the speed of reaction at the higher pulse frequency is very interesting. With a maximum of 60 light signals both sexes respond successfully to 35, i.e. there are no differences in the speed of reaction between boys and girls, as well as in the average number of light signals successfully turned off and in the maximum and minimum number.

To characterize the state of psychical stability of students, we examined the intensity of attention, which a person performing an activity pays. A main feature of attention is concentration and it has a certain duration and persistence when solving a task.

The students in our survey were asked to find and cross out the circles consecutively in every row of figures in 1 minute. The aim was as many circles as possible to be crossed out, without any misses or another shape to be crossed out. The results show that the average values of the amount of correctly crossed shapes was the same in both sexes. Regarding the number of wrongly crossed ones and missed shapes, there is also a similar intensity of psychical activity between boys and girls. This lack of difference in intersexual aspect shows that our students have the same intensity of attention, i.e.

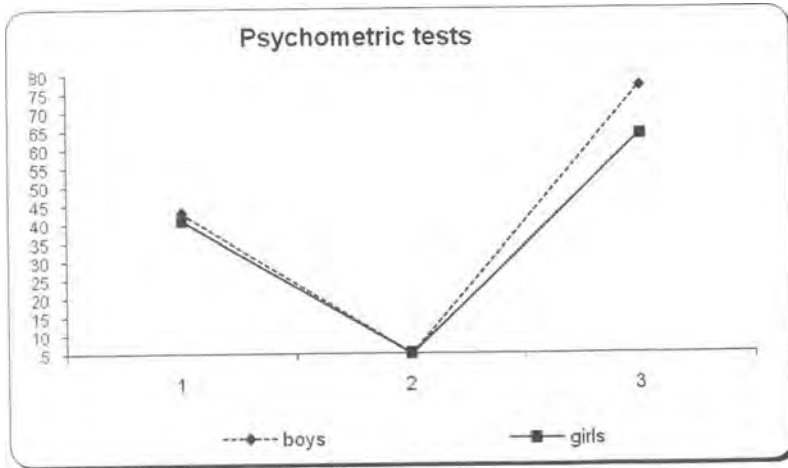


Fig.1 Results of psychological tests for research students.

Legend

1. Dexterity of the fingers
2. Emotional stability
3. The maximum frequency of hand movement

socio-economic factors, lifestyle and academic atmosphere at the university affect the stability and intensity of attention in the same way.

Our boys appeared to be more skillful than girls. They arranged the block board 2.6 seconds faster. Obviously, the quickness of mind and dexterity as human personalities are determined by the specific of the activities between the sexes.

One of the indicators of human emotional stability is its static tremor. The study of tremor shows the extent to which one can regulate their emotional states.

The data from the tremor-meter show that fluctuations recorded in the psycho-emotional stability in both sexes did not reach statistical value ($p \geq 0.05$). The boys and girls from our survey have similar processes for controlling the micro-movements when performing the task.

The maximum frequency of hand movement that a man makes is an indication of the level of activation of the higher nervous activity controlling the motor rate of recurrence of different movements. The dynamics of processes in higher nervous activity is defined by the characteristics of the motor activity, the type of higher nervous activity, as well as by the upcoming goal that man should achieve.

The results show that the number of movements of a maximum frequency is bigger in boys than in girls. For 10 seconds they made an average of 14 strokes more than girls. Gender differences in this psychological test are of high level of reliability $p \leq 0.00001$.

From the psychological tests done we can conclude that there are no gender differences in terms of emotional stability, but our boys dominate the girls in terms of quickness of mind, dexterity and agility of fingers (fig. 1).

Conclusions

The physiometric characterization showed that, hypertension is of higher frequency of occurrence in boys, and hypotension – in girls. In both sexes, the percentage of individuals with a fast pulse rate is the highest;

Psychometric characteristics showed that, There are personal differences in the indicators that characterize the mental capacity of an individual. The boys surveyed are faster and more skillful than girls, while gender differences are insignificant in terms of emotional stability and intensity of attention.

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