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## **CORRELATION ANALYSIS OF SOMATIC GROWTH OF ADOLESCENTS WITH INDICES OF SUCCESS LEVEL AND PHYSICAL EXERTION DURING THREE COURSES OF STUDIES IN DIFFERENT EDUCATION INSTITUTIONS**

**Abstract.** *Correlation analysis was carried out and indices of correlation of parameters of somatic growth with indices of success level and physical exertion in apparently healthy adolescent cadets, attendees and students during three courses of studies in different education institutions were investigated. Based on the evidence found, consistency of annual changes of correlational indices during three-year studies under the conditions of educational process in different education institutions - civil preparedness academy and medical university was found. Comparison of quantitative and qualitative correlational changes for each of groups during three-year studies was carried out.*

**Key words:** *correlation analysis, adolescent age, somatic growth, pedagogical process.*

**Introduction.** Health status of rising generation as before keeps unfavorable tendency and requires alert attention of all the society. For the full awareness about health status of rising generation except for disease rate, demographic data, investigation of leading criteria such as somatic growth is needed. Somatic growth is complex of morphological and functional abilities of organism which determines ability of organism coming through physical exertions, significant changes of external ambient keeping functionality of body systems in the range of physiological constants [5].

Complex of different environmental factors that influent on organism includes exopathic causes: natural, ecological and socio-economic [7, 9]. Day regimen and diet, mobility regimen, emotional strain have special place among exopathic causes [8]. Indicated exopathic causes also are the components of pedagogical process. Anatomic physiological "strain" in adolescent age is explained by drastic change of influence of exopathic causes: relocation, climate change, change of social conditions, day regimen change, diet change, change of nutrition, physical and mental strain. Graduation of school and entering and studies in higher education institution (HEI) is the most common cause of foresaid changes [3, 6].

During the last decades, health status and somatic growth status of child and adolescent population of Ukraine deteriorate [2]. Among the factors, which facilitate decrease of somatic growth level, academic load takes important place especially during "critical" stage of formation of somatic growth indices during the switching from school to HEI and studies on early courses. Processes of reformation of education, health care and health and disease control service led to changes in health maintenance and control after learning environment, also facilitated persistence of actuality of issue of students' health maintenance and required appropriate response, while longitudinal study of indices of somatic growth during 3 years of academic study would allow to resolve the range of challenging issues.

So identification of consistency in the "educational-bringing-up process – somatic growth of adolescents" system, while basing on special aspects of pedagogical process of education institutions of different types and levels of accreditation and studying of changes of anthropometric measurements, indices of components of somatotype, body weight component composition, somatic growth balance index is topical because it will allow to optimize the influence of factors of educational-bringing-

up process, improve somatic growth level of adolescents.

**Objective:** Determine consistency of correlations between anthropometric measurements, indices of components of somatotype, body weight component composition, somatic growth balance indexes and results of success level of cadets, attendees and students during three-year studies in education institutions of different types and levels of accreditation.

**Materials and methods.** Investigation was carried out on the basis of Vinnitsya Higher Vocational School of Civil Preparedness and National Pirogov Memorial Medical University. Education process of cadets has its own unique features connected with cadetship in authorities and subunits of the State Emergency Service. Conditions of stay of students differ from conditions of stay of cadets and attendees because of absence of scheduled day regimen, lesser physical exertions and higher intensity of teaching load. Longitudinal (on the I, II, III courses of studies) determination and analysis of anthropometric body measurements, somatotype components, success level of 87 adolescent cadets, 93 attendees, 92 students upon conditions of pedagogical process during education process were carried out. Determination of anthropometric measurements was carried out by the V.V. Bunak procedure [4]. Correlation analysis of actual parameters was carried out by the use of STATISTICA-6,1 software [1].

**Results and discussion.** While carrying out of correlation analysis of somatic growth indices with indices of success level and physical exertion during three courses of studies in each group and comparison between the groups of cadets, attendees, students were determined that in cadets was observed 177 correlations during the studies. Each of them had average potential and was rising during the I, II, III courses. Thus 36 correlations were detected on the I course, prevailing amount had place for physical training and special disciplines:

- 11 correlations of success level indices in physical training. The largest number of links was determined with following parameters of body girth – 4 (36,4%) including 3 indirect and 1 direct ones.

- 12 correlations of success level indices in special disciplines. The largest number of links was determined with following diametrical body size – 4 (33,3%) wherein each of them was indirect, 3 links (1 direct, 2 indirect) with longitudinal parameters were determined, 3 direct links with indices of adipodermal rugosity and 2 indirect correlations with parameters of body girth were detected.

On the II course the number of correlations raised to 61, prevailing amount had place for humanitarian disciplines:

- 31 correlations of success level indices in humanitarian disciplines. The largest number of links was determined with following parameters of body girth – 14 (45,2 %), wherein each of them was indirect.

On the III course the number of correlations raised to 80, prevailing amount had place for special and humanitarian disciplines:

- 31 correlations of success level indices in special disciplines. The largest number of links was determined with following diametrical body size – 12 (38,7 %) of indirect correlations and with parameters of body girth – 10 (32,3 %) of indirect links.

- 31 correlations of success level indices in humanitarian disciplines. The largest number of links was determined with following diametrical body size – 13 (41,9 %) of indirect correlations and with parameters of body girth – 11 (35,5 %) of indirect links.

Upon consideration of outcome of correlation analysis of somatic growth indices with success level and physical exertion during three courses of studies of attendees 213 correlations was detected. Each of them had weak potential and was decreasing during the I, II, III courses of studies.

Thus on the I course 80 correlations were detected, prevailing amount had place for physical training:

- 36 correlations of success level indices in physical training. The largest number of links was determined with following parameters of body girth – 26 (72,2 %) including 5 (13,9 %) indirect correlations and 21 (86,1 %) had direct link.

On the II course the number of correlations decreased to 75, prevailing amount had place for physical training:

- 36 correlations of success level indices in physical training. The largest number of links was determined with following parameters of body girth – 11 (30,5 %) including 3 indirect and 8 direct links and with diametrical body size – 12 (33,3 %) including 1 indirect and 11 direct links.

On the III course the number of correlations decreased again and estimated 58, prevailing amount had place for special and humanitarian disciplines. It is worth mentioning that on the III course of studies STEM disciplines were absent:

- 16 correlations of success level indices in special disciplines. The number of correlations in actual group of attendees has quite proportional allocation because 5 correlations (3 direct and 2 indirect for each) for both parameters of body girth and indices of thickness of adipodermal rugosities were detected, 3 direct correlations with total body sizes were determined, also 3 links (2 direct, 1 indirect) with diametrical parameters were determined.

- 31 correlations of success level indices in humanitarian disciplines. The largest number of links was determined with following parameters of body girth – 13 (41,9 %) and with diametrical parameters – 11 (35,5 %).

Analyzing correlations of indices of somatic growth with success level and physical exertion indices 300 correlations were detected during three courses of studies of students. Each of them had weak potential and decreased during the I, II, III courses.

Thus on the I course 124 correlations were detected, prevailing amount had place for humanitarian, special and STEM disciplines and there were the least amount for physical training:

- 31 correlations of success level indices in STEM disciplines. The largest number of links was determined with diametrical body size – 14 (45,2 %), wherein 5 of them were direct and 9 were indirect.

- 34 correlations of success level indices in special disciplines. The largest number of links was determined with diametrical body size - 16 (47,1 %), wherein 4 of them were direct and 12 were indirect.

- 34 correlations of success level indices in humanitarian disciplines. The largest number of links was determined with diametrical body size - 13 (38,2%), including 1 direct and 12 indirect ones,

and indices of thickness of adipodermal rugosities – 10 (29,4%), including 1 direct and 9 indirect ones.

On the II course 117 correlations were detected, prevailing amount had place for humanitarian and STEM disciplines:

- 29 correlations of success level indices in STEM disciplines. The largest number of links was determined with diametrical body size - 13 (44,8%), wherein 4 of them were direct and 9 were indirect.

- 50 correlations of success level indices in humanitarian disciplines. The largest number of links was determined with diametrical body size - 18 (36,0%), including 3 direct and 15 indirect ones; with parameters of body girth – 13 (26,0%), including 3 direct and 10 indirect ones, and with indices thickness of adipodermal rugosities – 12 (24,0%), including 11 direct and 1 indirect ones.

On the III course the number of links significantly decreased and estimated only 59 correlations, prevailing amount had place for humanitarian disciplines. It is worth mentioning that on the III course of studies STEM disciplines and physical training were absent:

- 32 correlations of success level indices in humanitarian disciplines, the largest number of links was determined with diametrical body size - 14 (43,8%), including 2 direct and 12 indirect ones.

#### **Conclusions & prospects for further research:**

Annual increase of correlations of anthropometric measurements with indices of success level of academic disciplines and physical training in cadets was observed. The largest number of correlations was detected for physical training, special disciplines and parameters of body girth. Actual links affirm the influence of physical exertion on somatic growth and explain the growth spurt of parameters during the studies.

Annual increase of correlations of anthropometric measurements with indices of success level of academic disciplines and physical training in attendees was observed. On the I and the II courses the largest number of correlations was detected for physical training and parameters of body girth. Actual links affirm the influence of physical exertion on somatic growth and explain the increase of parameters (predominantly body girth) on the I year of studies. On the III course the most number of correlations was detected for

special and humanitarian disciplines and parameters of body girth. Actual links affirm less hasty increase of anthropometric measurements on the II year of studies.

Annual decrease of correlations of anthropometric measurements with indices of success level of academic disciplines and physical training in students was observed. During whole studies the largest number of correlations was detected for humanitarian and STEM disciplines with diametrical parameters and thickness of adipodermal rugosities. Actual links inversely affirm the influence of physical exertion on somatic growth and explain the absence of favorable dynamics of increase of parameters of body girth during the whole studies of students.

Structural relationships and influence of physical exertion and mental workload on anatomic and anthropometric measurements in adolescent age depending on education institution profile on 4-6 courses of studies also require of further investigation.

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