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COMPARATIVE CHARACTERISTICS OF CHANGES WITHIN SOMATOTYPE COMPONENTS OF YOUNG PEOPLE (RURAL AND CITY RESIDENTS) DURING STUDYING IN A HIGHER EDUCATIONAL INSTITUTION

Abstract. Relevance of the research topic*. The constant trend towards reforms in the spheres of health care, education, and sanitary-epidemic service leads to changes in the control over the conditions of obtaining education from a medical point of view, and also confirms the urgency of finding solutions to improve the conditions of education in aim to preserve the health of those receiving education. In our opinion, control and observation of changes in physical development makes it possible to solve some urgent needs. Determination of the type of constitution, and especially somatotypological signs, is of actual practical and theoretical importance. The somatotypological characteristic of the human body is a biological portrait of a person that integrates and a set of hereditary somatic characteristics, as well as the influence of socio-economic and environmental factors.*

The aim of the study. *Determining the features somatotype components changes of the rural and urban young main in full time education across the span of a year.*

Research materials and methods*. A somatometric and somatotypological study of 200 practically healthy young men was carried out (100 residents of a village, 100 residents of the city) in the 1st, 2nd and 3rd years of study at the University of Life Safety. To determine the somatotype, the mathematical scheme of somatotyping according to J. L. Carter, B. H. Heath was used.*

The results. *On the basis of the obtained data, a decrease in the indicators of the endomorphic component of the somatotype was discovered during education in both groups of young men, whereby the decrease prevailed in the first year of education, while the indicator of the mesomorphic component of the somatotype showed a tendency to increase throughout the entire course of education of residents of rural area and in the second year of education for urban residents, following the falling in the first year. The indicator of the ectomorphic component decreased during the span of education of students residing in rural areas, mainly in the second year, and remained unchanged among urban residents.*

***Conclusion**. The change of intergroup indicators across the span of a year for most components of the somatotype in the first year of education of the villagers were greater compared to that of the city residents, and the indicator for change of the endomorphic component across the span of a year had significant differences. In the second year of study, the intergroup change of somatotype components across the span of a year was again greater among rural residents, and the change of the ectomorphic component had significant differences.*

***Key words:** youth, somatotype components, rural residents, urban residents.*

ПОРІВНЯЛЬНА ХАРАКТЕРИСТИКА ЗМІН КОМПОНЕНТІВ СОМАТОТИПУ ЮНАКІВ, СІЛЬСЬКИХ ТА МІСЬКИХ МЕШКАНЦІВ ПІД ЧАС НАВЧАННЯ У ЗАКЛАДІ ВИЩОЇ ОСВІТИ

***Анотація. Актуальність теми дослідження**. Константна тенденція до реформ у сферах охорони здоров'я, освіти, санітарно-епідемічної служби призводить до змін у контролі за умовами здобуття освіти з медичної точки зору, а також підтверджує актуальність потреби знаходження рішень покращення умов навчання задля збереження здоров'я здобувачів освіти. На нашу думку, контроль та спостереження за змінами фізичного розвитку дає можливість вирішити деякі актуальні потреби. Актуальне практичне та теоретичне значення має визначення типу конституції, а особливо соматотипологічних ознак. Соматотипологічна характеристика організму людини є біологічним портретом людини, що інтегрує у собі комплекс спадково обумовлених соматичних характеристик, а також вплив соціально-економічних та екологічних факторів.*

***Мета дослідження.** Визначення особливостей річних змін компонентів соматотипу сільських та міських юнаків в умовах навчально-виховного процесу.*

***Матеріали та методи дослідження**. Проведено соматометричне та соматотипологічне дослідження 200 практично здорових юнаків (100 мешканців села, 100 мешканців міста) на I, II та III курсах навчання в університеті безпеки життєдіяльності. Для визначення соматотипу використовували математичну схему соматотипування за J. L. Carter, B. H. Heath.*

***Результати.** На основі отриманих даних встановлено зменшення протягом навчання показників ендоморфного компоненту соматотипу в обох групах юнаків, причому зменшення переважало на першому році навчання, тоді як показник мезоморфного компоненту соматотипу виявив тенденцію до зростання протягом усього навчання сільських юнаків та на другому році навчання містян, після падіння на першому році. Показник ектоморфного компоненту зменшився протягом навчання сільських юнаків, переважно на другому році та виявився незмінним у міських юнаків.*

***Висновок**. Міжгрупові показники річної зміни більшості компонентів соматотипу на першому році навчання мешканців села були більшими порівняно з жителями міста, а показник річної зміни ендоморфного компоненту мав достовірні відміни. На другому році навчання міжгрупова річна зміна компонентів соматотипу знову виявилася більшою у мешканців села, а показник річної зміни ектоморфного компоненту мав достовірні відміни.*

***Ключові слова:** юнацький вік, компоненти соматотипу, сільські мешканці, міські мешканці.*

Introduction. Adolescence is the period of completion of growth processes, a turning point in the formation of indicators of physical development, which begins in high school, continues into adolescence, and passes into the first period of adulthood in the last courses of study at university. The anatomical and physiological "tension" of this age is explained by a sharp change in the influence of exogenous factors such as: the area of residence, climate, social conditions, everyday routine, quality of nutrition, physical, mental stress etc. The most common reason for these changes is graduation from school and studying at university [1; 10; 11].

It is out of question that exogenous environmental factors affect the human body in different ways, for example ecological and socio-economic ones. Some examples of them are: the daily regime, nutrition, activity and emotional stress is the most significant of factors. The specified exogenous factors, along with others, are an essential fragment of the academic development, which is a multifaceted arrangement of organizing educational activities; namely educational and scientific plans, this includes: seminars, lectures, practical classes, breaks, work experience practices, scientific research works, trips, sports recesses, etc. [10; 11]. At the time of entering a higher educational institution, most young men and women gain only a particular level of bodily maturity. Yet, the full progression of physiological and intellectual maturation lasts [13]. Human evolution comes through a quantity of successive phases, each of which is categorized by its own characteristics, the structure of cerebral activity, the peculiarities of the formation of connections between mental processes and personality qualities, and the connection of the individual with the atmosphere. Junior year undergraduates are dissimilar in age and individual progress, as well as in territorial belonging to a city or village areas. Considering the full difficulty and significance of education for the formation of the nature of the upcoming professional, managing educational activities is impossible without knowledge and consideration of the development peculiarities in the youth period [7; 17].

Thus, to date there are numbers of publications in which the influence of endogenic and exogenic factors on the anthropometric parameters of young males are considered [8; 12; 16]. Nevertheless, no one worked on the determination and comparison of the annual changes in the components of the somatotype, namely the ectomorphic, endomorphic and mesomorphic indicators of the components of city and village populaces in the conditions of the education.

The aim of the study. To determine the features of somatotype components changes of rural and urban youth in full time education during the academic year.

Research materials and methods. A comprehensive anthropometric study of 200 young men (100 city residents, 100 rural residents) who studied at the Higher Professional School of Civil Defense of the Lviv University of Life Safety (Vinnytsia) was conducted using Bunak's method, modified by P. P. Shaparenko. All young men were 17–18 years old at the time of the study. To determine the somatotype, the mathematical scheme of somatotyping according to J. L. Carter, B. H. Heath was used [9]. The study is longitudinal and was conducted three times, specifically one month after the beginning of the first, second and third year of study. Statistical work and interpretation of results was made in the "STATISTICA 6.1" package using parametric and non-parametric methods [14].

The study was conducted within the framework of the research program of Vinnytsia National Pirogov Memorial Medical University «Influence of exogenous factors (socio-economic, ecological, geological, territorial) on anthropometric parameters and physiological indicators of the younger demographic" (№ state registration: 0114U000990) and meets all ethical and moral and legal requirements according to the order of the Ministry of Health of Ukraine № 66 from 13.02.2006 p. (protocol of the bioethics commission of the VNMU № 8 from 25.10.2018)

Research results and their discussion. The parameters of the endomorphic, mesomorphic and ectomorphic components of the somatotype of rural and urban young men during their studies at the university were determined.

The mean of the endomorphic component of the somatotype of rural youths at the beginning of their studies was 1.06±0.04, for urban youths this indicator was lower in the first year and equaled 0.96±0.04. In the second course, the indicator of the endomorphic component of the somatotype in rural residents decreased to 0.81±0.04, and in urban residents to 0.80±0.03. In the 3rd year of study, this indicator among young men from the village did not change and remained 0.81±0.04. The mean of this indicator for urban residents decreased slightly to 0.79±0.04 The average value of the change in the indicator of the endomorphic component of the somatotype of rural residents in the first year of study was (–0.25±0.02), the minimum indicator was equal to (–1.32), the maximum was 0.13. In urban residents, it was equal to (-0.17±0.02), the minimum and maximum indicators were (-0.93) and 0.31, respectively. In contrast to the first year of study, in the second year the average value of the change in the indicator of the endomorphic component of the somatotype of young men from the village was (-0.01±0.01), the minimum indicator was equal to (-0.13), the maximum was 0.38. Among city residents, the average indicator was also (-0.01±0.01), the minimum indicator was equal to (-0.14), the maximum was 0.13. Thus, the indicator of the endomorphic component of the somatotype of the villagers decreased by 0.26 during their time in education, and it became smaller by 0.18 among the city residents, and the predominant decrease occurred in the first year of education in both groups of young men. The annual change in the indicator of the endomorphic component of the somatotype in the first year of study of rural residents was significantly greater (by 0.08) compared to urban residents ($t=2.59$ at $p<0,05$); while in the second year of study, this indicator did not differ among residents of the village and the city.

The mean value of the mesomorphic component of the somatotype of rural young men at the beginning of their studies was 2.93±0.11, for young men from the city this indicator was higher in the first year and equaled 3.54±0.40. In the second course, the indicator of the mesomorphic component of the somatotype in rural residents decreased to 3.20±0.11, and to 3.44±0.11 in urban residents. In the 3rd year of study, this indicator among young men from the village increased slightly and amounted to 3.27±0.12. The mean value of this indicator for urban residents also increased to 3.50±0.11. The average value of the change in the indicator of the mesomorphic component of the somatotype of rural residents in the first year of study was 0.27±0.04, the minimum indicator was equal to (–0.97), the maximum was 1.27. In urban residents it was equal to (-0.10±0.03), the minimum and maximum indicators were (-1.75) and 1.00, respectively. In the second year, the average value of the change in the indicator of the mesomorphic component of the somatotype of young men from the village was 0.07±0.02, the minimum indicator was equal to (–0.43), the maximum was 0.94. In the city residents, the average indicator was 0.06±0.01, the minimum indicator was equal to (–0.16), the maximum was 0.65. Thus, the indicator of the mesomorphic component of the somatotype of the villagers increased by 0.34 during the education, and the predominant increase occurred in the first year. While among the city residents it became smaller by 0.04, and the decrease occurred only in the first year, and in the second – a slight increase was observed. The annual change in the indicator of the mesomorphic component of the somatotype in the first year of study of rural residents was greater by 0.37 compared to urban residents; while in the second year of study, this indicator among villagers was higher by only 0.01. It should be noted that the annual change in the indicator of the mesomorphic component of the somatotype in the first and second year of study when comparing groups of young men had no significant difference.

The mean value of the ectomorphic component of the somatotype of rural residents at the beginning of their studies was 2.88±0.09, in the case of urban residents this indicator was almost the same and equal to 2.87±0.09 in the first year. In the second course, the indicator of the ectomorphic component of the somatotype in rural residents slightly decreased to 2.87±0.10, while in urban residents it increased to 2.89±0.10. In the 3rd year of study, this indicator among young men from the village decreased again and amounted to 2.80±0.10. The mean value of this indicator for city residents also decreased to 2.86±0.10. The average value of the change in the indicator of the ectomorphic component of the somatotype of rural residents in the first year of study was (–0.01±0.01), the minimum indicator was equal to (–1.05), the maximum was 1.52. In urban residents it was equal to 0.03±0.01, the minimum and maximum indicators were (-0.85) and 0.88, respectively. In contrast to the first year of study, in the second year the average value of the change in the indicator of the ectomorphic component of the somatotype of young men from the village was (-0.08±0.02), the minimum indicator was equal to (-0.71), the maximum was 0.31. In the city residents, the average indicator was (-0.03±0.01), the minimum indicator was equal to (-0.27), the maximum was 0.56. Thus, the indicator of the ectomorphic component of the somatotype of the villagers decreased by 0.08 during education, and the predominant decrease occurred in the second year of training, while it remained unchanged among the city residents. The annual change in the indicator of the ectomorphic component of the somatotype in the first year of study of rural residents was lower by 0.03 compared to urban residents, but there was no significant difference; while in the second year, the annual change of this indicator for rural residents was significantly greater (by 0.05) compared to urban residents ($t=2,20$ when $p<0,05$).

In addition to our study, anthropometric parameters, components of somatotype and some indices of harmony of physical development of persons within the younger demographic were identified in the works of other authors. Thus, when comparing the data obtained by us on the indicators of the components of the somatotype with the results of studies conducted under the leadership of P. P. Shaparenko (1994), Y. Y. Huminsky (2000), I. V. Gunas (2006) and conducted on young men students and soldiers of the Podilsk and Polissky regions found that there was no significant difference between the results [3; 4; 5]. Comparing the results obtained by us with the data of recent longitudinal studies of indicators of physical development of soldiers, cadets and students, which were carried out on the basis of the Vinnytsia National Pirogov Memorial Medical University, no significant difference was found either [2; 6] Taking into account the fact that the young men we studied were under uniform conditions and the influence of the educational system, which was due to the consistency of methods to the organization and the intensity of physical and mental workloads, belonging to a rural or urban place of residence becomes the dominant factor. There are quite a lot of works, the purpose of which was to study the influence of living conditions on physiological and psychological indicators. Such studies were usually conducted on groups of schoolchildren or students of individual educational institutions [15]. In contrast to the above-mentioned works, we obtained the results of the study of indicators of the components of the somatotype in the conditions of the educational process and compared the changes in intragroup parameters during education period. Furthermore, we determined the intergroup differences of these indicators and the features of their changes in rural and urban youths during education.

Conclusions. Thus, during our research, the specifics of changes in indicators of components of the somatotype of rural and urban young people studying in a higher educational institution were revealed.

At the beginning of the study, the indicators of the somatotype components of young men from the village and the city did not have a significant difference, although the endomorphic and ectomorphic indicators of the components were higher in the inhabitants of the village, and the mesomorphic indicators turned out to be higher in city residents. During education, indicators of the endomorphic component of the somatotype decreased in both groups of young men, and the decrease prevailed in the first year of training; the indicator of the mesomorphic component of the somatotype showed a tendency to increase during the entire span of education of rural residents and in the second year of urban residents education, following its declining in the first year; the indicator of the ectomorphic component decreased during the education of rural residents, mainly in the second year, and remained unchanged among urban residents.

Intergroup indicators of annual change of most components of the somatotype in the first year of study of rural residents were greater compared to city residents, and the indicator of annual change of the endomorphic component had significant differences. In the second year of study, the intergroup annual change of the components of the somatotype again turned out to be greater in the villagers, and the indicator of the annual change of the ectomorphic component had significant differences.

Bibliography:

1. Андрійчук, В., Тихолаз, В., & Гумінський, Ю. (2010). Порівняльна характеристика соматометричних параметрів тіла чоловіків першого зрілого періоду мешканців різних регіонів України. *Український морфологічний альманах*, Том 8(1), 130–136.
2. Андрійчук В.М., Ходак Т.В., Дамзін О.С. Закономірності річних змін антропометричних, соматотипологічних параметрів та показників успішності юнаків, що навчаються у різних навчальних закладах, *Вісник морфології*, 2016. № 2, Т. 22. С. 303–307.
3. Гумінський Ю.Й. Закономірності річних змін соматометричних та спірометричних показників юнаків (студентів та військовослужбовців) / Ю.Й. Гумінський, В.М. Андрійчук, Н.А. Шпакова. *Biomedical and Biosocial Anthropology.* 2015. № 24. С. 152–158.
4. Кореляції основних показників дерматогліфіки з обхватними розмірами тіла у практично здорових міських юнаків і дівчат мешканців Подільського регіону України / Гунас І.В., Блажиєвська Г.Й., Прокопенко С.В. [та ін.]. *Biomedical and Biosocial Anthropology.* 2005. № 4. С. 14–17.
5. Шапаренко П. П. Антропометрична та соматотипологічна характеристика практично здорових міських підлітків обох статей Української етнічної групи. *Вісник морфології.* 2006. Т. 8, № 1. С. 339–341.
6. Шпакова, Н. А. Порівняльна характеристика функціонального стану дихальної системи військовослужбовців строкової служби і студентів. *Вісник морфології*, 2015. 21(1), 190–193.
7. Aberle N, Blekić M, Ivanis A, Pavlović I. The comparison of anthropometrical parameters of the four-year-old children in the urban and rural Slavonia, Croatia, 1985 and 2005. *Antropol*. 2009; 33(2): 347–351.
8. Anczewska M, Charzynska K. Educational assessment of pupils in Poland. *Educ. Journal.* 2012; 9(1):11–19.
9. Carter J. Somatotype and size of elite female basketball players. J. Carter, T. Ackland, D. Kerr. *Journal of Sports Sciences.* 2005. 23 (10). P. 157–163.
10. Carrillo Ramírez C. E., Triana Reina H. R. Relacion de la composición corporal y la velocidad de procesamiento cognitivo en estudiantes universitarios. *Nova*. 2021. Vol. 19, no. 36. P. 144–156. URL: https://doi.org/10.22490/24629448.5297 (date of access: 24.01.2024).
11. Flores Ferro, E., Morales, C., Osorio, J., & Maureira Cid, F. Independence of the anthropometric profile, attention and intelligence in higher education students in the field of physical activity in Chile. 2023. Nutrición Hospitalaria. https://doi.org/10.20960/nh.04719
12. Hernández-Camacho, J. D., Fuentes-Lorca, E., & Moya-Amaya, H. Anthropometric characteristics, somatotype and dietary patterns in youth soccer players. *Revista Andaluza de Medicina del Deporte*, 2017. 10(4), 192–196. https://doi.org/10.1016/j.ramd.2017.01.004
13. Kurlyand Z. N. [Pedagogika vishhoyi shkoli]. Kiev : Znannya; 2010. 495 p. Ukrainian.
14. Lescay NR, Becerra AA, González AH. Anthropometry. Comparative analysis of technologies for the capture of anthropometric dimensions. *Revista EIA.* 2016; 26:47-59.
15. Modern students in megapolis: morphofunctional features and lifestyle / V. Kuchma, N. Skoblina, N. Bokareva, O. Milushkina. Abstracts of the 4 European Conference on health promoting schools "Equity, Education and Health". – Odense, Denmark. 2013. P. 269–270.
16. Pomohaci M, Sopa IS. The importance of anthropometry measurements in analyzing the impact of sports activities on students. *Revista academiei forţelor terestre*. 2017; 1(85):40–48.
17. Vinué G. An R Package for Analysis of Anthropometric Data. *Journal of Statistical Software. Anthropometry*. 2017; 77(6). doi: 10.18637/jss.v077.i06

References:

1. Andriychuk, V., Tykholaz, V., & Huminsky, Yu. (2010). Porivnialna kharakterystyka somatometrychnykh parametriv tila cholovikiv pershoho zriloho periodu meshkantsiv riznykh rehioniv Ukrainy [Comparative characteristics of the body somatometrical parameters of men in the first mature period residents of different regions of Ukraine]. *Ukrainskyi morfolohichnyi almanakh – Ukrainian Morphological Almanac*, Volume 8(1), 130–136. [in Ukrainian].
2. Andriychuk, V.M., Khodak, T.V., & Damzin, O.S. (2016). Zakonomirnosti richnykh zmin antropometrychnykh, somatotypolohichnykh parametriv ta pokaznykiv uspishnosti yunakiv, shcho navchaiutsia u riznykh navchalnykh zakladakh [Patterns of annual changes in anthropometric, somatotypological parameters and success rates of young men studying in different educational institutions]. *Visnyk morfolohii – Bulletin of Morphology*, No. 2, Vol. 22. P. 303-307 [in Ukrainian].
3. Huminsky, Y.Y., Andriychuk, V.M., & Shpakova, N.A. (2015). Zakonomirnosti richnykh zmin somatometrychnykh ta spirometrychnykh pokaznykiv yunakiv (studentiv ta viiskovosluzhbovtsiv) [Patterns of annual changes in somatometric and spirometric indicators of young men (students and military personnel)]. *Biomedical and Biosocial Anthropology.* No. 24. P. 152–158. [in Ukrainian].
4. Gunas I.V., Blazhievska G.Y., Prokopenko S.V. [etc.] (2005). Koreliatsii osnovnykh pokaznykiv dermatohlifiky z obkhvatnymy rozmiramy tila u praktychno zdorovykh miskykh yunakiv i divchat meshkantsiv Podilskoho rehionu Ukrainy [Correlations of the main indicators of dermatoglyphics with girth body measurements in practically healthy urban boys and girls of the Podil region of Ukraine]. *Biomedical and Biosocial Anthropology*. No. 4. P. 14–17. [in Ukrainian].
5. Shaparenko, P.P. (2006). Antropometrychna ta somatotypolohichna kharakterystyka praktychno zdorovykh miskykh pidlitkiv obokh statei Ukrainskoi etnichnoi hrupy [Anthropometric and somatotypological characteristics of practically healthy urban adolescents of both sexes of the Ukrainian ethnic group]. *Visnyk morfolohii – Bulletin of Morphology*. Vol. 8, No. 1. P. 339–341. [in Ukrainian].

6. Shpakova, N. A. (2015). Porivnialna kharakterystyka funktsionalnoho stanu dykhalnoi systemy viiskovosluzhbovtsiv strokovoi sluzhby i studentiv [Comparative characteristics of the functional state of the respiratory system of conscript soldiers and students]. *Visnyk morfolohii – Bulletin of Morphology*, 21(1), 190–193. [in Ukrainian].

7. Carter, J., Ackland, T., Kerr, D., & Stapff, A. (2005). Somatotype and size of elite female basketball players. Journal of Sports Sciences, 23(10), 1057–1063. https://doi.org/10.1080/02640410400023233

8. Carrillo Ramírez C. E., Triana Reina H. R. (2021). Relacion de la composición corporal y la velocidad de procesamiento cognitivo en estudiantes universitarios. Nova. Vol. 19, no. 36. P. 144–156. Retrieved from https://doi.org/10.22490/24629448.5297 (date of access: 24.01.2024).

9. Flores Ferro, E., Morales, C., Osorio, J., & Maureira Cid, F. (2023). Independence of the anthropometric profile, attention and intelligence in higher education students in the field of physical activity in Chile. Nutrición Hospitalaria. https://doi.org/10.20960/nh.04719

10. Hernández-Camacho, J. D., Fuentes-Lorca, E., & Moya-Amaya, H. (2017). Anthropometric characteristics, somatotype and dietary patterns in youth soccer players. Revista Andaluza de Medicina del Deporte, 10(4), 192–196. https://doi.org/10.1016/j.ramd.2017.01.004

11. Independence of the anthropometric profile, attention and intelligence in higher education students in the field of physical activity in Chile / E. Flores Ferro et al. Nutrición Hospitalaria. (2023). URL: https://doi.org/10.20960/nh.04719

12. Hernández-Camacho J. D., Fuentes-Lorca E., Moya-Amaya H. (2017). Anthropometric characteristics, somatotype and dietary patterns in youth soccer players. Revista Andaluza de Medicina del Deporte. Vol. 10, no. 4. P. 192–196. URL: https://doi.org/10.1016/j.ramd.2017.01.004

13. Kurlyand Z. N. (2010). [Pedagogika vishhoyi shkoli]. Kiev: Znannya; 495p. [in Ukrainian].

14. Modern students in megapolis: morphofunctional features and lifestyle / V. Kuchma, N. Skoblina, N. Bokareva, O. Milushkina (2013). Abstracts of the 4 European Conference on health promoting schools «Equity, Education and Health». Odense, Denmark. P. 269–270.

15. Lescay NR, Becerra AA, González AH. (2016). Anthropometry. Comparative analysis of technologies for the capture of anthropometric dimensions. Revista EIA. 26:47–59.

16. Pomohaci, M., & Sopa, I. S. (2017). The importance of anthropometry measurements in analyzing the impact of sports activities on students. Land Forces Academy Review, 22(1), 40–48. https://doi.org/10.1515/raft-2017-0007

17. Vinué, G. (2017). Anthropometry: An R Package for Analysis of Anthropometric Data. Journal of Statistical Software, 77(6). https://doi.org/10.18637/jss.v077.i06