UDC 796.011.3-057.875

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The organization of classes by physical education of students of higher educational institutions taking into account their interests and individual physical development

Abstract. ***Purpose:*** *the definition of criteria of an assessment of specific features of physical development and adequate to it norms of the motive activity.* ***Material and Methods:*** *the analytical synthesis of data of literature, clinical anthropometry of the investigated contingent, the use of sign semantic spaces, methods of an assessment of a biological age.* ***Results:*** *the nature of creation of standards is considered for a control of the level of physical development and an assessment of physical fitness of students.* ***Conclusions:*** *the organization of classes by physical training in HEI has to be based on the accounting of individual physical development, the available level of physical fitness and the current physical state.*

Keywords: *physical development, physical state, physical fitness, individual norm, biological age*.

Introduction. The organization of classes by physical education of students of HEI taking into account their individual physical development, physical fitness, the current physical condition and their interests defines the need of creation of the system of the continuous monitoring and the subsequent processing of the obtained data with the purpose of correction of the content of the given classes depending on the operability of the trained contingent.

The observed sharp decrease of the level of physical fitness and physical condition leads not only to the decline in production of student's activity and emergence of the whole sort of characteristic violations in a condition of physical health of students, but also to the subsequent decline in production and duration of their professional activity that suffers an essential loss to the economic level of the state.

The norm of physical condition, physical development, physical fitness as the general scientific category, reflects regularities of the process of the reproductive property of a viable organism which provides the preservation of the steady relations with the environment, including the production activity as mechanisms of adaptive adaptations. The dynamics of change of adaptive opportunities of the available interaction with the environment is the cornerstone of the proceeded natural selection and continuous change of "the line of measures" – the norm [1].

One of the difficult parties of definition of the norm of development, and the individual norm, in particular, is connected with the need of the account as the chronological age of an investigated and the definition of his biological age. The main reason for the existing complexity consists the available large number of methods of definition of the biological age or maturing of the corresponding morpho-functional formation.

Owing to the available heterosynchronism in speed of maturing of the educations which is used for an assessment of biological age of morpho-functional formations, it is necessary to use the universal way of its definition and to speak in that case not only about the biological age in general, but also about the qualitative structure of its course. This task is solved in KhSAPC and stated in a number of publications of its employees [2–7].

Communication of the researches with scientific programs, plans subjects. The solution of objectives belongs to a problem of providing a healthy lifestyle of student's youth and is directly connected with a performance of a subject of the Consolidating plan of the research works of the Ministry of education and science of Ukraine "Innovative approaches of health-forming technologies in school sports education", the number of the state registration is 0115U004856.

The objective of the researches: the definition of criteria of an assessment of specific features of physical development and norms of the motive activity which are adequate to it.

Research problems: to establish the connection between the population standard of physical development, physical fitness, physical condition and the individual standard of these characteristics. To establish the basic provisions which define the structure of creation of physical training of student's youth on the basis of these comparisons.

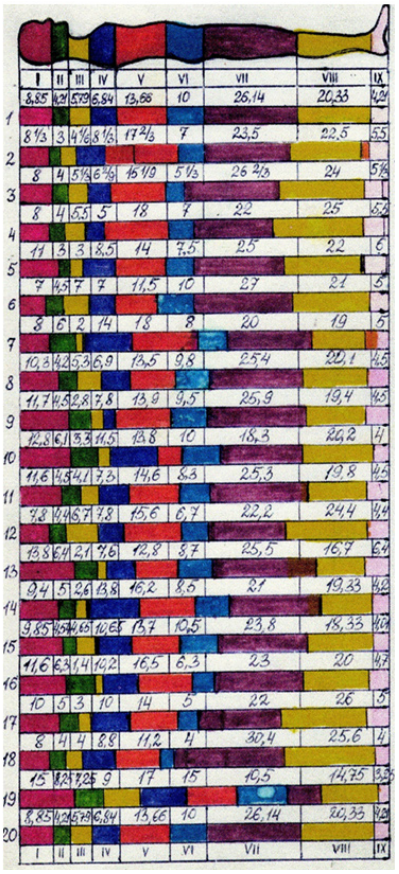
Material and methods of the research: the method of the theory of similarity and dimension, clinical anthropometry, methods of mathematical modeling with the use of computer technologies, statistical processing of the obtained data. Materials of the researches were results of screening inspections of various age categories of student's youth of Poltava university of economics and trade.

Results of the researches and their discussion. It was established on the basis of the conducted examinations and the received statistical processing of results that all controlled indicators submit to the law of normal distribution. The reason of such result is connected with that the principle of the dichotomizing organization is the cornerstone of the structure of the studied processes. It, in turn, defines the manifestation of the principle of the statistical organization of receiving the equivalent final result. The control of any separate characteristic can be executed with any degree of accuracy. Thus the carried-out comparisons of separate measurements are carried out in shares of sigma particles [8].

The introduction of a single measure of distribution of the controlled indicators from their norm of manifestation in shares of a sigmal deviation enters the dimensionless units of measure. It allows to carry out measurements of the observed rejections of individual characteristics from their population standards of the investigated contingent. Besides, it is possible to carry out an assessment of an individual share of the controlled signs in the form-building process of biological maturing of morpho-functional structures. The results of inspections, which are presented in absolute values of the measured indicators, don't allow to carry out such comparison of the qualitative structure of their relations.

Geoffroy Saint-Hilaire paid attention to the importance and need of division of the concepts of the growth and the shaping which are making the concept of physical development in 1836 [9]. In this representation the growth (the increase) of a body weight against which various shapings develop, acts as the first-defined basis of the development. This process

Percentage		№	Denomanation	Part of a length body
Women	Men			
–	–	I	Top face	Head with neck
10	10	II	Lower face	
		III	Neck	
7	6,23	IV	Acromial-mammillary distance	Trunk
14	13,3	V	Mamillar-umbilical distance	
10	10	VI	Umbilical-inguinal distance	
–	–	VII	Hip	Foot
–	–	VIII	Shin	
–	–	IX	Foot	
9	10	X	Half acromial distance	Horizontal distance
6	6,3	XI	Half intermamillar distance	
14	15	XII	Foot length from a heel until the end of a thumb	
–	–	XIII	Shoulder	Part of an arm
–	–	XIV	Forearm	
–	–	XV	Hand	



1. Standard
2. “Muscular” type
3. “Respiratory” type
4. “Digestive” type
5. ”Cerebral” type
6. “Asthenic” type
7. “Arthritic” type
8. Infantilism
9. Premature ageing
10. Rachitis (at adults)
11. Osteopsathyrosis
12. Giantism
13. Acromegalia
14. Hypophysial-sexual fatty dystrophy
15. Basedow’s disease
16. Myxedema and cretinism
17. Dysthymiasm
18. Eunuchoidism
19. Micromelia
20. Standard

Pic. 1. The technique of carrying out researches

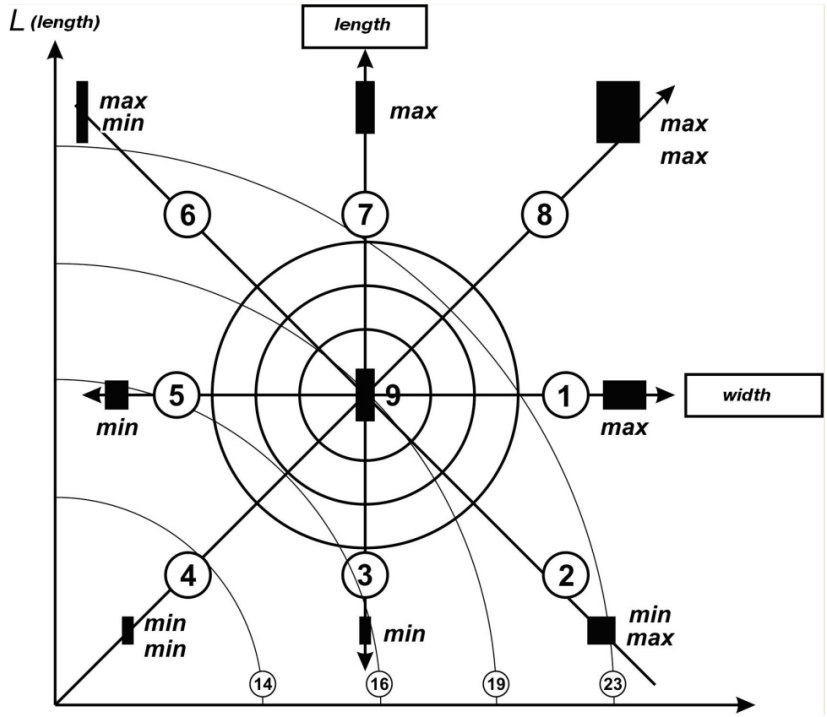
is an external display of the interdependent exchange processes which are generating a shape of a body and providing the corresponding to them level of viability of the developing organism [10].

Thus, the defining indicator of the biological age is a body weight, and characteristics of its shaping reflect the qualitative structure of the process of biological maturing which is connected with its redistribution by morpho-functional formations [11]. It is possible to allocate the identical structure of a shaping of a body at different body weight and different constitution of a body with its identical weight by the consideration of results of a ratio of a body weight in its observed redistributions in various shapings of a body in the corresponding signed semantic spaces. Ranges of variation of a body weight are allocated and concerning each its value ranges of variation of its shaping are allocated for each chronological age. The mathematical expectation of density of a distribution of a body weight reflects a norm of biological maturing in each chronological age, and the observed shaping of a body at the persons, who are in this point, acts as a norm of the qualitative constitution of a body of this biological age. Such shape of a body has the greatest occurrence in its distribution for this weight. The meeting variability of shapings of this weight concerning such constitution of a body submits also to the law of a normal distribution.

The most widespread reflection of a shaping of weight in the structure of a body construction which is widely used in practice, is its length. It defined a wide use of height-weight indexes. The ratio of a body length (L) to a body weight (P) is the most convenient and recommended among the used indexes which provide minimum sufficient requirements for the definition of the biological age and representation of variability of its qualitative structure. A various weight which is found with an identical growth is possible due to its distribution on a wider plane of s horizontal section of a body. Rules of the creation of a body construction taking into account methods of the clinical anthropometry of M. Y. Breytman and more difficult characteristics of multidimensional displays which are used in need of a deep specification of the compared morpho-functional formations are given in works [2–4]. The clinical anthropometry of M. Y. Breytman was used in the conducted researches which is necessary for comparison of a body construction with the observed nosology at student's youth. The simplified method of the multidimensional representation of physical development was applied to more evident interpretation of the obtained data which is used and recommended in works of K. Hirata that is sufficient for the carried-out classification in the necessary approach of the primary data.

The modified techniques of the clinical anthropometry of M. Y. Breytman, the height-weight index of K. Hirata, which are presented in works [2-7] of KhSAPC, were used at an assessment of physical development of students by a technique of definition of their biological age and qualitative structure of its course. Results of the conducted researches and methods of their representation are reflected in pic. 1, 2.

The integrated indicator of a shaping of a body with growth of its weight is a body length of its body and its sizes (it is longitudinal – cross and front – back) which make a horizontal section. They were replaced with a half sum of humeral and pelvic belts in the conducted researches. The entered relation of a body length to its average horizontal section or a body weight by the modified Hirata's technique which is developed in KhSAPC, was used for an assessment of anthropometrical characteristics of a body construction of the investigated contingent, that is presented in pic. 2.



Pic. 2. The reflection of the structure of constitution of the investigated contingent on signs: elongation of a body (length) and its completeness (average width)

The distribution of height-weight relations of the investigated contingent of the chronological age of 19 years old is given in the system of coordinates of LP. The axis (1-5) characterizes a body width (narrow/wide); the axis (3-7) characterizes a body length (short/long); the axis (4-8) represents persons of an identical shaping with different length and body weight.

When the relation of length and width is equally to constant, and weight is different; the point of intersection of all axes (9) meets standard of the development of constitution in which chronological and biological age coincide; the point (4), (min, min) corresponds to the advancing development; the point (8) (max, max) corresponds to the late development. The axis (2-6) reflects various options of a shaping of constitution at an identical value of a body weight, the corresponding point (9). Arches of the circle having the center at the beginning of coordinates, correspond to the chronological age (14, 16, 19, 23). The relation of the chronological time to the biological reflects coefficient of speed (advancing/lateness) of physical development. It is equal to one in the point 9.

The similar structure of construction is observed at each chronological age. The consecutive association of points, in which the coefficient of speed of development is equal to 1, represents the line of norm of physical development. The comparison of norm of physical development expressed in coefficient of height-weight relations, established for the controlled population with the individual allows establishing a deviation between the chronological and biological age. The concentric circles having the center in the point (9) correspond to zones of an optimum deviation of the plane of distribution of the considered signs concerning the value of norm which is characterized by parameters of their center in the used sign semantic space. The internal circle with a radius of one sigma defines a zone of a functional optimum. The average circle with a radius of two sigma limits a zone of the increased manifestation of certain predispositions to specific factors of the environment. On the one hand, sensitivity to one factors is shown, and on the other hand – the increased resistance to another. The external circle with a radius of three sigma defines a zone of the maximum deviation in physical development, their expressivenesses causing the emergence of painful violations with a force in size of sigmal deviations from value of norm. The orientation radius vector, connecting points of this zone to the center, reflects a certain nosology. The presented system of the ordered reflection of height-weight relations allows establishing the donosological forecast that is used in the conducted researches for the establishment of the communication between the constitution of somatotype and the most characteristic deviations in a state of health of students.

The data of the clinical anthropometry are used in need of a deeper specification of diagnostic inferences about features of the course of individual physical development and donosological predisposition. In this case other geometrical multidimensional creation of the sign semantic space is used. The detailed description of their construction is given in works [5; 6; 7; 12].

It is possible to prove the structure of creation of standards for an assessment of physical development, level of physical fitness adequate to it and physical condition, having the single system of reflection of interconditionality of multidimensional priznakovy representation of a condition of physical development and physical condition.

The modern organization of classes by physical education of students assumes the obligatory existence of standards of an assessment of the level of physical development which comprehensiveness are defined by the list of signs which are the cornerstone of its characteristic. The list of the entered standards is defined depending on the level of specification of the maintenance of the level of physical development. The creation of standards has to be based on the population norm of the biological development. Their value has to be represented in two forms: absolute values of the used signs and in relative sizes of their characteristics which are specifying a measure of a deviation of individual estimates in a share representation of rather population norm. Such representation reflects a measure of proximity of structure of a body constitution of the individual concerning of population norms of physical development and physical activities which are accepted for it.

The remoteness measure from norm; the sign sequence in the ranged number of their representation that reflects the qualitative characteristic of a shaping of a body enter their assessment. The set of these characteristics allows classifying the engaged students of the investigated contingent by groups of distribution taking into account their measure of predisposition to various constitutional nosology. The full list of standards makes the descriptor of physical development which defines the structure of the carried-out monitoring of physical development and physical fitness of student's youth.

If the age standard isn't established, and only the used signs are defined on which it is necessary to carry out an assessment, in this case it is possible to use the method of the conditional beginning or conditional average [13].

Basing on the static principle of receiving the equivalent final result, follows that the share importance of each sign can be absolutely various at the multicomponent system of its receiving. Therefore the assessment is carried out not as the unambiguous size characterizing the compliance of qualifying standards and as the range of an admissible variation of a sign within which it is given a compliance of an indicator to the shown standard. Such border of a variation is estimated by an single-sigmal rejection of rather existing standard (its norm).

Borders of a sigmal rejection of the standard from the age norm of the biological age of the controlled signs are that variable range which allows providing the admissible uniformity of the engaged groups at one optimum mode of the transferable physical activity. The main requirement when using standards in an assessment of the qualitative characteristic of course of the process of physical development is necessary completeness of their base for this level of accuracy of qualifying standards.

The standard as the suitability level assessment, is a function of a continuous age changes of physical development. Considering the specific features of age development, it is necessary to accept to data that speed of such changes can not correspond to the population speed of age development. It is necessary to carry out not only screening supervision and static processing of the received material, and to conduct the prolonged supervision over each individual for the accounting of these features at control and the organization of monitoring of physical development of the surveyed contingent of students. It is required that the passport of control of these indicators was entered into the organization of classes of physical education of students of higher educational institutions for the accounting of specific features of physical development and physical condition. Such statement of a question allows establishing individual criteria of physical development which can significantly differ from average characteristics of these norms of student's population which appear unsuitable in this case for forecasting of the process of an individual course of physical development.

The existence of standards and control of their compliance to physical development, physical fitness and physical condition, causes the necessity of existence of tests. Tests have to be an integral part of certification of the exercised control providing a sign deviation measure assessment from the standard of its manifestation. The main requirement to creation of tests is their necessary adequacy of reflection of an assessment of high-quality manifestation of a sign and sensitivity to dynamics of its change.

Tests made a touch function in an assessment of compliance of the individual of his stay in a certain formation environment and its suitability for ensuring normal physical development. As each touch system, the used tests have to possess sensitivity change range, strictly correspond to the qualitative nature the measured characteristic of a sign.

The existence of necessary qualitative standards and tests allow carrying out the quantitative and quality standard of physical development, physical fitness and physical condition, but aren't the obligatory requirement of the achievement of their values. The criteria of an assessment of the current state of physical development of the controlled contingent of students are formed on the basis of the available level of their performance that allows to estimate the dynamics of course of these processes in various conditions of the student's environment of activity and to bring necessary corrections in providing and the organization of a healthy image of their life.

Conclusions.

The construction which is based on the accounting of specific features of physical development, physical fitness, physical condition of students and their interests in various forms of physical activity is required at this stage of the development of HEl education and necessary reorganization of physical training.

The implementation of these requirements assumes an indispensable condition of carrying out monitoring of physical development, physical fitness, physical state; screening control with the prolonged supervision over each student that will allow establishing biological age and features of its course, defining individual norm of physical development, physical fitness and physical condition.

The norms of physical development, physical fitness, physical condition, standards of age physical fitness and the used tests have to be applied as criterion of an assessment of physical capacities of an organism of students, but not their obligatory achievement. The received results allow tracing the dynamics of course of these processes and to carry out the comparative characteristic of their course for the purpose of the possible correction of adverse deviations.

The further prospects of the development of this problem are connected with its realization at Poltava university of economics and trade.

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Received: 19.11.2015.
Published: 30.12.2015.

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