

of the upper thyroid artery are preserved. The obtained data are important in reconstructive and restorative surgery of the head and neck for a clear understanding of the limits of the guaranteed blood supply of the specified flap.

Key words: head and neck neoplasms/surgery, plastic surgery procedures, subclavian artery/abnormalities, sternocleidomastoid myocutaneous flap.

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*Khapitska O. P., *Bilash S. M., Vuzh T. Ye., Radoha R. V.*

RELATIONSHIPS OF THE AMPLITUDE INDICATORS OF THE RHEOVASOGRAM OF THE THIGH WITH THE PARAMETERS OF THE EXTERNAL BODY STRUCTURE IN TRACK-ATHLETES-SPRINTERS WITH THE ECTO-MESOMORPHIC TYPE OF CONSTITUTION

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Determining the state of peripheral hemodynamic indicators is one of the modern challenges, which can be a barrier for athletes of a particular type of sport of a certain somatotype in relation to individual constitutional features and prevent achieving sports results. The aim of the work was to study the relationship between the parameters of the rheovasogram of the hip with anthropometric dimensions and components of body weight and somatotype in track and field athletes with a high level of mastery of the ecto-mesomorphic somatotype. We conducted a study of high-level sprinters using the method of P.P. Shaparenka where 50 anthropometric body sizes were determined. The component composition of body weight was carried out using the Matejko method, and the Heath-Carter method was used for score assessment of the somatotype components. It was determined that 28 track and field athletes belonged to the ecto-mesomorphic constitutional type. Rheovasographic indicators of the thigh were measured on a computer diagnostic multifunctional complex by using tetrapolar rheography. Correlation analysis was performed using Spearman's non-parametric statistical method in the STATISTICA 5.5 program.

It was established that in sprinters who belong to the ecto-mesomorphic somatotype, there are numerically reliable correlations between the amplitude parameters of the hip rheovasogram with anthropometric dimensions and somatotypological indicators. The greatest strength and number of relationships was seen between longitudinal, girth, transverse, body dimensions, the thickness of skin and fat folds, components of somatotype and body weight and basic impedance, amplitudes of the systolic wave and rapid blood filling, where the average strength of the connections prevail. The characteristics of the relationship between the amplitude indicators of the rheovasogram of the thigh and the indicators of the external structure of the body, which we determined, confirm the conditioning of the indicators of peripheral hemodynamics by constitutional features.

Key words: correlation, peripheral hemodynamics, anthropometry, somatotype, athletics.

Connection of the publication with planned research works.

The work is a fragment of the planned research work of National Pirogov Memorial Medical University, Vinnytsya "Somato-viscerometric features of the human

body in different periods of ontogenesis", state registration number 0121U113772.

Introduction.

In sports selection, somato-morphological approaches are significantly relevant for identifying signs of the

prospects of success of athletes of certain sports [1, 2]. When conducting sports selection, a number of parameters of the external structure of the body, determined by the external morphological elements of the constitution, are taken into account [3, 4]. It is well known that individuals belonging to a certain constitutional type differ not only in somatometric and somatoscopic characteristics, but also in features of the cardiovascular system [5, 6, 7]. The results of scientific research have shown that the morpho-functional characteristics of central and peripheral hemodynamics can be dominant factors influencing sports performance [8, 9, 10, 11]. Therefore, the problem of determining the factors that affect and determine the variability of hemodynamic parameters, especially indicators of peripheral blood circulation in athletes of various specializations, does not lose its relevance. Scientists note that the hemodynamic parameters of athletes are determined by the nature and magnitude of their muscle activity, which is manifested especially by the indicators of central hemodynamics, the values of which also depend on the indicators of peripheral blood flow. Unfortunately, however, there are very few studies that analyze the relationship between local blood flow and indicators of external structures of the body.

The aim of the study.

To study the relationship between the parameters of the rheovasogram of the thigh with anthropometric dimensions and components of body weight and somatotype in track and field athletes of a high level of skill of the ecto-mesomorphic somatotype.

Object and research methods.

The study was conducted on the basis of the scientific research center of National Pirogov Memorial Medical University, Vinnytsya. An anthropometric study was conducted with the determination of total: length, mass, surface area of the body, and 47 partial dimensions according to the recommendations of P.P. Shaparenko [12] in male track and field athletes of a high skill level (from the second adult category to masters of sports in Ukraine). In the study group, all the athletes were sprinters that were required to run for short distances, in particular, ran 100 m, 200 m, 400 m and 110 m with hurdles. The average age in the group of track and field athletes was 18.35 ± 1.622 years. The component composition of body mass (fat, muscle, bone) was determined according to the Matejko method [13]. The score assessment of the components of the somatotype was carried out according to the calculated modification of the Heath-Carter method [14]. It was found that 28 track and field athletes belonged to the ecto-mesomorphic constitutional type, which is equally characterized by the signs of ectomorphic and mesomorphic somatotypes, in particular, the advantage of longitudinal body dimensions, good muscle development, massive tubular bones, which was indicated by the width of the lower epiphyses of the limbs [15]. Rheovasographic indicators of the thigh were measured on a computer diagnostic complex by tetrapolar rheography. Correlation analysis was performed using Spearman's non-parametric statistical method in the STATISTICA 5.5 program.

The study was conducted in accordance with the principles of the Helsinki Declaration on the Protection of Human Rights, the Council of Europe Convention on Human Rights and Biomedicine, and the provisions of the relevant laws of Ukraine. The study protocol was

approved by the Local Ethics Committee for all participants. Written informed consent was obtained from all participants.

Research results and their discussion.

After analyzing the relationships between the amplitude parameters of the hip rheovasogram and indicators of the external structure of the body in track and field athletes-sprinters of the ecto-mesomorphic somatotype, it is necessary to note their significances. Thus, the basic impedance had reliable, strong and moderate connections with different groups of anthropometric and somatotypological parameters. There were direct correlations between this parameter of peripheral hemodynamics and the sagittal arc of the head ($r=0.40$), the width of the distal epiphyses of the forearm ($r=0.34$), thigh ($r=0.67$) and lower leg ($r=0.64$), indicators of subcutaneous fat deposition: folds under the shoulder blade ($r=0.34$), on the abdomen ($r=0.49$), side ($r=0.32$), lower leg ($r=0.62$) as well as endomorphic values ($r=0, 59$) and ectomorphic ($r=0.45$) components of somatotype and bone mass ($r=0.35$). Basic impedance was inversely correlated with all total body dimensions ($r=-0.46 - -0.59$), longitudinal body dimensions, the value of which was indicated by the height of anthropometric points ($r=-0.44 - -0.58$), with girth sizes, while the correlations with the circumferences of the forearm, leg, neck, and hand were of medium strength ($r=-0.43 - -0.58$), and in regards to the circumferences of the shoulder, waist and chest there were strong correlations ($r=-0.61 - -0.79$). In addition, inverse relationships were found between basic impedance and body diameters (these had a strong correlation) – with transverse mid-chest ($r=-0.78$), (this a medium correlation) – with chest and pelvis sizes ($r=-0.31 - -0.42$) and muscle mass ($r=-0.52$). Thus, the value of the basic impedance, which indicates the capacitive properties of biological tissues during the passage of an alternating electric current through them [16], had sufficiently numerous correlations. This rheovasographic indicator was correlated with the value of 62.5% of all constitutional parameters that we determined in this study. Of the established reliable correlations, 27 were of medium strength, 8 were strong; 11 of them are direct, 25 are reverse. Scientific research by O. Di Vincenzo with co-authors [16] proved that the value of basic impedance differs in athletes depending on the specifics of the sport and is affected by the age and gender and body weight of athletes [17]. Comparing the results of this study with the work in which the correlations of the data of the amplitude indicators of peripheral blood circulation on the thigh in highly specialized young male volleyball players of the ecto-mesomorphic somatotype were studied [15], it should be pointed out that the basic impedance in track and field athletes has significantly more statistically significant connections with indicators of external body structure than volleyball players, they only had correlations with 6 parameters (smallest head width, shoulder girth, intercostal and intertrochanteric diameters of the pelvis, hip fold, and bone mass).

We found that the amplitude of the systolic wave in sprinters of the ecto-mesomorphic somatotype had mainly reliable inverse correlations, in particular with the smallest head width ($r=-0.49$); mass ($r=-0.59$) and surface area ($r=-0.54$) of the body; the height of all 5 anthropometric points ($r=-0.31 - -0.46$); most girth sizes of the body ($r=-0.35 - -0.66$), it should be noted that there

were strong connections with the circumferences of the leg, hand and chest during inhalation; transverse diameters of the chest and pelvis ($r=-0.52 - -0.75$), the strongest – with the transverse average chest size; muscle mass ($r=-0.58$). In this group of subjects, the amplitude of the systolic wave was directly correlated with the ectomorphic component of the somatotype and the bone mass of the body (in both cases $r=0.49$), the width of the distal epiphyses of the forearm ($r=0.36$), the thigh ($r=0.58$) and lower legs ($r=0.63$), the sagittal arch of the head ($r=0.49$). This rheovasographic indicator was interconnected with the value of 57.14% of all anthropo-somatotypological parameters that we determined in this study. Among the established reliable correlations, 27 were of medium strength, 5 – strong; 6 of them are direct, 26 are reverse. It is known that the amplitude of the systolic wave is one of the significant indicators for determining pulse blood filling in a separate basin of the vascular bed, it indicates the state of the vessels, in particular their tone. Therefore, the relationships we discovered make it possible to predict that the amplitude of systolic waves will decrease in track and field athletes with an increase in mass and growth indicators, girth and transverse dimensions of the body. This does not contradict the previously discovered [7] peculiarities of peripheral hemodynamics, that with a greater tone of blood vessels, the indicators of this rheovasographic parameter will decrease. Based on this, we can predict an unfavorable mechanism of adaptation of the cardiovascular system to physical exertion in track and field athletes when their body mass increases.

Incisor amplitude was significantly correlated with fewer anthropometric measurements compared to other amplitude measures. It should be noted that the lines of average strength of correlation were with head circumference ($r=0.52$), the width of the distal epiphyses of the thigh ($r=0.36$) and lower leg ($r=0.47$), the thickness of the skin-fatty folds on the shoulder ($r=0.54$) and abdomen ($r=0.35$), the endomorphic component of the somatotype ($r=0.49$); and direct strong correlations were with the sagittal arch of the head ($r=0.65$) and the shin folds ($r=0.64$). The inverse reliable relationships of the mean strength were with the smallest width of the head ($r=-0.58$) and the width of the lower jaw ($r=-0.45$), girth of the flexed shoulder ($r=-0.33$), foot ($r=-0.47$), chest on exhalation ($r=-0.38$).

The amplitude of the diastolic wave in track and field athletes engaged in short-distance running had direct correlations with the sagittal arc of the head ($r=0.49$), the width of the distal epiphyses of the forearm ($r=0.56$), thigh ($r=0.32$) and lower leg ($r=0.45$), thicknesses of skin and fat folds on the shoulder ($r=0.33$), abdomen ($r=0.41$), side ($r=0.62$) and lower leg ($r=0.41$), endomorphic component of the somatotype ($r=0.39$), bone ($r=0.58$) and fat ($r=0.34$) body masses. Inverse relationships were found with the smallest width of the head ($r=-0.63$) and width of the lower jaw ($r=-0.40$), chest girths ($r=-0.34$), transverse average ($r=-0.57$) and lower ($r=-0.38$) chest diam-

eters, intervertebral ($r=-0.63$) and inter-ridge ($r=-0.50$) pelvic distances. This rheovasographic indicator reflects the ratio of parameters that characterize arterial and venous blood flow [5]. The relationships we identified may indicate that in athletes, with an increase in subcutaneous fat deposition and a decrease in muscle development, the amplitude of the diastolic wave may increase, such a phenomenon may occur as a result of the layering of reflection waves from more centrally located sections of the femoral arteries [7], which may be a consequence of vascular pathology.

The amplitude of rapid blood filling in track and field athletes had inverse reliable correlations with craniometric characteristics: the smallest width of the head ($r=-0.62$), the width of the lower jaw ($r=-0.39$), the largest width of the head ($r=-0.33$), the width face ($r=-0.51$); all total body dimensions ($r=-0.32 - -0.43$); the height of the suprasternal and shoulder anthropometric points (in both cases $r=-0.36$); most girth sizes of the body ($r=-0.39 - -0.64$), transverse diameters of the thorax and pelvis ($r=-0.36 - -0.64$), thicknesses of skin and fat folds on the forearm ($r=-0.53$) and chest ($r=-0.61$). There were direct reliable correlations only with the width of the distal epiphyses of the thigh ($r=0.56$) and lower leg ($r=0.64$). Thus, the amplitude of rapid blood filling, the value of which is determined by the elastic properties of the vascular wall [5], in track and field athletes of the ecto-mesomorphic somatotype, correlated with the value of 53.57% of anthropometric body dimensions, among them inversely proportional connections of medium strength prevailed, in contrast to ecto-mesomorphic somatotype volleyball players, in which all the detected correlations were direct [15].

Thus, the peculiarities of the relationship between the amplitude indicators of the hip rheovasogram and indicators of the external structure of the body, which we determined, confirm the previously known facts [18] that peripheral hemodynamic indicators are conditioned by constitutional features, which is important for predicting the course of adaptation processes or the occurrence of maladaptive states during athletics training and competition activity

Conclusions.

Reliable correlations were established between amplitude rheovasographic indicators of the thigh and anthropo-somatotypological parameters in track and field athletes-sprinters of a high level of sportsmanship of the ecto-mesomorphic somatotype. Baseline impedance, systolic wave amplitude, and rapid blood filling had the most numerous and strongest connections with indicators of external body structure.

Prospect for further research.

The obtained results provide an opportunity for a new scientific approach in the practical monitoring of track and field athletes and in the future to carry out statistical modeling to establish the appropriate parameters of the rheovasogram of the thigh in athletes of various constitutional types.

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ВЗАЄМОЗВ'ЯЗКИ АМПЛІТУДНИХ ПОКАЗНИКІВ РЕОВАЗОГРАМИ СТЕГНА З ПАРАМЕТРАМИ ЗОВНІШНЬОЇ БУДОВИ ТІЛА У ЛЕГКОАТЛЕТІВ-СПРИНТЕРІВ ЕКТО-МЕЗОМОРФНОГО ТИПУ КОНСТИТУЦІЇ

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Резюме. Для проведення якісного медичного огляду у професійних спортсменів практичного значення набуває моніторингу стану показників регіональної гемодинаміки у взаємозв'язку з індивідуальними конституціональними особливостями.

Метою роботи було вивчити зв'язки між параметрами реовазограми стегна з антропометричними розмірами та компонентами маси тіла і соматотипу у легкоатлетів високого рівня майстерності екто-мезоморфного соматотипу.

Дослідження проводилося на базі науково-дослідного центру ВМУ ім. М.І. Пирогова. Провели дослідження легкоатлетів-спринтерів високого рівня майстерності, яким за методикою П.П. Шапаренка: було визначено 50 антропометричних розмірів тіла. Компонентний склад маси тіла провели за методом Матейко, а бальну оцінку компонентів соматотипу – за методом Heath-Carter. Було виявлено, що 28 легкоатлетів належали до екто-мезоморфного конституціонального типу. Реовазографічні показники стегна вимірювали на комп'ютерному діагностичному багатофункціональному комплексі шляхом використання тетраполярної реографії. Аналіз кореляцій проводили з використанням непараметричного статистичного методу Спірмена у програмі STATISTICA 5.5.

Встановлено, що у легкоатлетів-спринтерів, які належать до екто-мезоморфного соматотипу, наявні чисельні достовірні кореляції між амплітудними параметрами реовазограми стегна й антропометричними розмірами та соматотипологічними показниками. Визначено найбільшу силу і чисельність взаємозв'язків між поздовжніми, обхватними, поперечними, розмірами тіла, товщиною шкірно-жирових складок, компонентами соматотипу та маси тіла та базовим імпедансом, амплітудами систолічної хвилі та швидкого кровонаповнення, де переважають середньої сили зв'язки.

Визначені нами особливості зв'язків між амплітудними показниками реовазограми стегна та показниками зовнішньої будови тіла підтверджують обумовленість показників периферичної гемодинаміки конституціональними особливостями.

Результати дослідження можуть бути застосованими при практичному моніторингу легкоатлетів і у подальшому для проведення статистичного моделювання належних параметрів реовазограми стегна у спортсменів різних конституціональних типів.

Ключові слова: кореляція, периферична гемодинаміка, антропометрія, соматотип, легка атлетика.

RELATIONSHIPS OF THE AMPLITUDE INDICATORS OF THE RHEOVASOGRAM OF THE THIGH WITH THE PARAMETERS OF THE EXTERNAL BODY STRUCTURE IN TRACK-ATHLETES-SPRINTERS WITH THE ECTO-MESOMORPHIC TYPE OF CONSTITUTION

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Abstract. To conduct a high-quality medical examination of professional athletes, monitoring the state of regional hemodynamic indicators in relation to individual constitutional features is of practical importance.

The aim of the work was to study the relationship between the parameters of the rheovasogram of the hip with anthropometric dimensions and components of body weight and somatotype in track and field athletes with a high level of mastery of the ecto-mesomorphic somatotype.

We conducted a study of high-level sprinters using the method of P.P. Shaparenko where 50 anthropometric body sizes were determined. The component composition of body weight was carried out using the Matejko meth-

od, and the Heath-Carter method was used for score assessment of the somatotype components. It was determined that 28 track and field athletes belonged to the ecto-mesomorphic constitutional type. Rheovasographic indicators of the thigh were measured on a computer diagnostic multifunctional complex by using tetrapolar rheography. Correlation analysis was performed using Spearman's non-parametric statistical method in the STATISTICA 5.5 program.

It was established that in sprinters who belong to the ecto-mesomorphic somatotype, there are numerically reliable correlations between the amplitude parameters of the hip rheovasogram and anthropometric dimensions and somatotypological indicators. The greatest strength and number of relationships between longitudinal, girth, transverse, body dimensions, the thickness of skin and fat folds, components of somatotype and body weight and basic impedance, amplitudes of the systolic wave and rapid blood filling, where the average strength of the connections prevail, were determined.

The characteristics of the relations between the amplitude indicators of the rheovasogram of the thigh and the indicators of the external structure of the body, which we determined, confirm the conditioning of the indicators of peripheral hemodynamics by constitutional features.

The results of the study can be applied in the practical monitoring of track and field athletes and in the future for conducting statistical modeling of the appropriate parameters of the rheovasogram of the thigh in athletes of various constitutional types.

Key words: correlation, peripheral hemodynamics, anthropometry, somatotype, athletics.

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FEATURES OF ANATOMICAL VARIABILITY OF SUPERFICIAL NECK MUSCLES IN FETUSES AND NEWBORNS

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*D*Clarifying embryological data on the sequence of laying and syntopic relationships, critical periods, and diversity of muscle topography will help improve existing surgical approaches and treatment methods, considering the diagnostic criteria of normality. The study aimed to determine the peculiarities of anatomical variability of the superficial neck muscles in fetuses and newborns. The study was performed on 63 human fetuses aged 4 to 10 months and seven newborns (including five isolated organ complexes) using macromicrodissection, topographic and anatomical sections, radiography, computed tomography, morphometry, and statistical analysis. An additional omosternohyoid area was identified on the anterior neck of fetuses and newborns, which is formed by the medial edges of the right and left sternohyoid muscles on the sides and the hyoid bone and jugular notch of the sternum from above and below, respectively. This area had an elongated rectangular shape in 35% of cases, a trapezoidal shape with a larger upper base in 40%, and a trapezoidal shape with a wider lower base in 25%. Variants of the sternocleidomastoid origin in this age group are determined by the peculiarities of its structure. In 35% of cases, the sternocleidomastoid arose with three pedicles: medial, middle and lateral; in 50% - with two pedicles, medial and lateral; and in the remaining observations (15% of cases), the muscle arose from the anterosuperior part of the sternoclavicular joint in