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**THEORETICAL BASES OF FORMATION OF APPLIED MOTOR ACTIONS
OF FUTURE OFFICERS OF THE NATIONAL POLICE OF UKRAINE**

The term biomechanics is made up of two Greek words: "bios" - life and "mexane" - tools. Biomechanics, in turn, is a branch of science that studies the motor capabilities and motor activity of living beings. The most practical interest is the study of human and higher animal movements. The first scientific works were written by Aristotle (384 - 322 BC), who was interested in the laws of movements of terrestrial animals and humans. Fundamentals of human movements in water, the first scientific data were collected by another scientist - Archimedes (287 - 212 BC).

The formation of biomechanics as a science was influenced by prominent thinkers of the past: the Roman physician Galen (131 - 201), Leonardo da Vinci (1452 - 1519), Michelangelo (1475 - 1564), Galileo Galilei 1564 - 1442), I. Newton (1642 - 1727), a student of Galileo Giovanni Alfonso Borelli (1608 - 1679) - author of the first book on biomechanics "On the movements of animals" (year of publication) 1679). All movements of an individual are mechanically determined, they involve forces of various origins from gravitational forces (gravity) to elastic forces (muscles). In turn, all the complex processes of organization of forces in a single interaction are guided by a complex system of nervous processes that underlie the human psyche.

Biomechanics of sport studies the movements of a person (athlete) during the performance of various actions depending on environmental conditions. For sports, biomechanics is involved in solving three tasks: who to teach, why to teach and how to teach. This provision is an important dominant for law enforcement officers of various categories, especially in the process of developing applied skills in the application of measures of physical influence, force.

Key words: *biomechanics, physical activity measures, future officers, police officers, applied exercises, motor actions, special physical training, physical qualities.*

Target setting. According to the scientific views of H. Gross, today kinesiology is a synthesis of biomechanics and pedagogy, in this case the features of individual movements are studied, and the rational organization of actions is determined, methods of learning, methods of technical self-control and improvement of movement techniques are developed.

System – structural approach to the study of movements is manifested in the theory of structural movements, laid down by the ideas of the famous biomechanic M. Bernstein. In his scientific works, M. Bernstein noted that the improvement of motor actions is by overcoming external and internal resistance.

It is established that in highly qualified athletes during progressive fatigue, changes in environmental conditions there is a compensatory restructuring of movement techniques, which in turn helps to maintain the effectiveness of actions. To do this, those involved must have a sufficient set of motor skills. At present, the issues related to the mechanisms of individual adaptation to exercise technique are insufficiently studied.

According to A. Ukhtomsky, biomechanics investigates how the obtained mechanical energy and stress can be used, ie scientific substantiation of the educational – training process, selection of auxiliary exercises, control of the effectiveness of training methods. It is also important that motor actions in biomechanics are considered as complex systems that consist of many movements. This determines the need for a system - structural approach in the study of movements.

System analysis in the study of movement technique involves the following main stages:

- 1) determining the composition of the movement system (its subsystems);
- 2) establishment of actual parameters of subsystems of highly professional law enforcement officers (athletes - high-class wrestlers);
- 3) study of the variability of the characteristics of subsystems and the influence of factors that determine it.

Tasks are defined for each of the subsystems and the requirements necessary for its implementation are developed. In turn, system synthesis provides the study of optimal interactions in the holistic structure of motor coordination, in order to determine the most informative structures for self-control and management in the formation, as well as improved movement systems.

As part of the system of movements are kinematic and dynamic structures. The kinematic structure reflects the laws of interaction of elements and subsystems of motion in space and time, dynamic - the relationship of external and internal forces. Dynamic features of movements that reflect the content of the action are common to all law enforcement officers (athletes). It should be emphasized that kinematic - in the vast majority due to the manifestation of individual-typological characteristics of the individual (height, length of arms, legs, body proportions, etc.). Diagnosis and analysis of the most informative spatial, temporal and dynamic characteristics of movements allows you to assess the technique of law enforcement (athletes) and determine the direction of their further motor improvement.

With regard to general tasks covering the study of movements, there are private tasks that focus on the consideration and study of the impact on movements of specific issues of the studied phenomena such as:

- study of the structure of the musculoskeletal system of the individual, its mechanical properties and functions, taking into account age and individual-typological features;
- search for the rationality of the educational and training process, the applied technique of the individual due to the peculiarities of the movements of individual parts of the body, taking into account the peculiarities of the structure (anthropology);

- assessment of technical perfection of the individual - his comprehensive physical, special physical, technical, tactical, psychophysical, etc. preparedness, rationality and selection of special exercises for technical and special physical training, evaluation of training methods and control over their effectiveness.

Actual scientific researches and issues analysis. Technique of service-applied hand-to-hand combat (technique of application of measures of physical influence in different conditions of SBOD of representatives of SBOU institutions) was studied by: S. Bortnyk, O. Morhunov, V. Artemiev, I. Khomko [1], O. Morhunov, O. Yareshchenko, O. Khatsaiuk [2], O. Khatsaiuk, O. Yelisieieva, V. Zhukov, V. Klymenko, Yu. Berezhnyi [3], O. Khatsaiuk, D. Karataieva [4] and other specialists in martial arts (M. Chunosov, V. Lyalko, V. Spiridonov, A. Blair, D. Sagalakov, A. Kharlampiev, M. Shabeto, D. Gibli, M. Oyama, A. Taras, G. Cherepakhin. A number of theoretical and empirical studies found that the result of hand-to-hand combat depends on the plane, axis, degree of freedom, which in turn characterizes the biomechanics of physical measures, strength.

Research objective. The main purpose of the study is to determine the essential characteristics of the formation of applied motor actions of future officers of the National Police of Ukraine (NPU officers) taking into account the laws of "biomechanics".

The statement of basic materials. In three-dimensional space there are three planes: frontal, horizontal and vertical. Any body in space has 5 degrees of freedom (3 constants that rotate around three axes). If, in turn, the body is fixed at one point, it can perform only rotational movements (3 degrees of freedom).

The body is fixed at two points, has one degree of freedom and 5 degrees of combination. The body fixed at three points has 6 degrees of combination. All movements in the joints are rotational. The movement is performed around the axis. In planes perpendicular to these axes. Work in the joints is built on the principle of leverage. All bone levers are driven by muscles. All muscles work with levers. The distance between the point of application of force and the point of rotation is the lever.

Levers are divided into: lever of the first kind and lever of the second kind. The lever of the first kind is two-shoulder (balance lever). The model of the joint is the attachment of the skull to the spine. The lever of the second kind is single-armed (lever of speed and lever of force). The speed lever provides a speed advantage during biomechanical movements.

In the process of applying physical influence measures, the law enforcement officers perform muscular work with forces. It should also be emphasized that muscular work has its own varieties, namely: holding (when the moment of force is the same); strengthening (when the impact force is equal to the resistance force); fixing (simultaneous work of the antagonist muscles that fix the posture); overcoming (when the moment of the impact force is greater than the moment of the resistance force); inferior (when the moment of the impact force is less than the moment of the resistance force); ballistic (a kind of overcoming muscular work of an explosive nature).

In the dynamics of hand-to-hand combat with the enemy, law enforcement officers often use hit-throwing technique, painful techniques, strangulation techniques, tying techniques, handcuffing, in addition, they use different methods of escorting, which constitutes the biomechanical principles of muscular work of the corresponding direction.

The shock technique biomechanical principles play an important role for law enforcement officers, because during performing tasks for their intended purpose in various conditions of service and combat (operational) activities, representatives of the law often have to use physical measures, forces to suppress riots, detain armed criminals, eliminate terrorists and liberate hostages, etc.

The shock technique of hand-to-hand combat is characterized by its own particularities. If two forces affecting the body towards each other, interact simultaneously (same period of

time), then they compensate each other, that is, the movement of the body does not pass, but deformation occurs. In this case, the task arises due to the movements shifting to set the maximum speed.

The final accuracy of movement is estimated by the absolute and relative error from a given point. As a result of the force impulse, a body movement occurs. During these movements, impact actions appear. Impact is characterized by the time of contact (collision). If the contact time is less than 1000 ml / s, this is a blow, if more, it is a displacement (push). The degree of the second impact is estimated by the renewal factor.

The musculoskeletal apparatus of a person plays an important role in the training and improvement of hand-to-hand combat techniques. The main markers used for digitization, as well as the calculation of the biomechanical parameters of an individual's movements: 1) head, 2) right shoulder, 3) right elbow, 4) right limb, 5) end of the right limb, 6) right thigh, 7) right knee, 8) right heel, 9) toe of the right foot, 10) neck, 11) left shoulder, 12) left elbow, 13) left limb, 14) end of the left limb, 15) left thigh, 16) left, 17) left heel; 18) toe of the left foot.

Except this the main markers used for digitization, as well as the calculation of the biomechanical parameters of an individual's movements: 1) head, 2) right shoulder, 3) right elbow, 4) right limb, 5) end of the right limb, 6) right thigh, 7) right knee, 8) right heel, 9) toe of the right foot, 10) neck, 11) left shoulder, 12) left elbow, 13) left limb, 14) end of the left limb, 15) left thigh, 16) left, 17) left heel; 18) toe of the left foot.

In turn, factors such as: stability, balance have a direct impact on the successful implementation of a technical action. According to H. Parkhomovych, an individual's body in a vertical position, can be in three types of equilibrium: stable, labile, disturbed. The stability factors include: the foothold area, the gravity general center and its projection on the foothold area, the axis placement of the shoulders relative to the foothold area, fluctuations in the attraction general center and the movement of its projection during movement, body weight, height, proportions of body parts, joint mobility, head position, muscle feeling, breathing, general well-being of a person.

Taking the opponent off balance is the basis for the successful implementation of shock-throw actions (the use of physical impact techniques, force). An individual's trunk can perform motor actions in three planes: wobbling (bending) forward - backward; wobbling (bending) to the sides; twisting (rotating) around a vertical axis.

Conclusions. According to the analysis of special scientific-methodical and reference literature, it was found that the issue of introducing effective pedagogical models into the system of special physical training of future NPU officers was not revealed, which emphasizes the relevance of the chosen direction of research. In addition, the members of the research group found that the concept of "readiness of future NPU officers to apply physical influence measures in different conditions of the SCOA" should be considered a derivative of the concept of "personality's readiness for professional activities."

It is important that the process of long-term special training of law enforcement officers of the above category in hand-to-hand combat (techniques and tactics of applying physical influence, force measures) involves the passage of the following stages by them: preliminary training; initial applied specialization; in-depth training of techniques and tactics for applying physical impact, strength measures, (hand-to-hand combat techniques) in various simulated conditions of service; professional improvement. The main technical skill's criterion of law enforcement officers is the effectiveness of motor actions. Implementation efficiency is determined by comparing the existing formed applied skills with the level of motor qualities' development or the level of energy input when performing movements.

Except this, it should be noted that the leading link in the management of the service training of law enforcement officers is undoubtedly the system of pedagogical control, thanks

to which it is possible to evaluate the effectiveness of the training (educational) process. Pedagogical control is considered as a control apparatus that allows objectively to characterize the state of motor function, technical skill, the psyche of law enforcement officers and the norms of training loads. At the same time, complex control ensures the determination of the level of integral preparedness of law enforcement officers.

The results of experimental and analytical work in the chosen direction of scientific intelligence, as well as the available practical (combat) experience, indicate that the development of the technique of applying physical impact, force measures was carried out in the direction of improving the training's means and methods, as well as on the basis of taking into account an individual's personal typological features.

It is also important to emphasize that the current level of technical readiness of future law enforcement officers (guards of different categories of SDS institutions) needs to be improved, which will ensure an increase in the efficiency of performing assigned tasks in various conditions of the extreme combat conditions. Given the fact that the level of functionality of law enforcement officers of the category under study has reached the appropriate level, a promising reserve of the technical skills' growth in service-applied hand-to-hand combat is the involving of urgent information media (modern scientific tools) into the educational process.

Primarily, the lack of operational control over the leading systems that form factors for optimizing the motor actions' technique of service-applied hand-to-hand combat significantly slows down the training (educational) process, and also slows down the technical skills' growth of law enforcement officers in tactical and special physical training. This provision necessitates the development of more rational methods, programs, pedagogical models (pedagogical technologies, etc.) in the direction of improving the technical skills of law enforcement officers (the formation of professional competencies).

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