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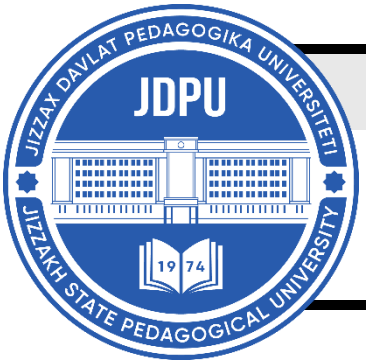

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CLASSIFICATION OF TRADITIONAL "THROWING" MOVEMENTS USED BY WRESTLERS BASED ON A BIOMECHANICAL APPROACH

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ABOUT ARTICLE

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Abstract: for the first time, a new standing phase based on morphobiomechanical aging was introduced into the “throwing” technical movements of wrestlers, which is widely used in the training process (1. Standing phase. 2. Holding phase. 3. The phase of unbalancing the body. 4. Drop phase. 5. Demolition phase) developed a classification scheme.

Relevance: In order to implement the tasks set forth in the Resolution of the President of the Republic of Uzbekistan No. PQ-4881 dated November 4, 2020 and other regulatory legal acts related to this area, a number of methods have been proposed to improve the technical and tactical training of young wrestlers in national wrestling styles, in particular, belt wrestling and wrestling. (Kerimov N.A., Yuldashev A.M., Isakov R.M., 2009, Mirzakulov Sh.A., Isakov R.M., 2009). When choosing methods of conducting wrestling training (I. Kh. Boymurodov, F.A. Kerimov, 2009, A. Beknazarova, Sh.S. Mirzanova, Ishmukhamedova TR, 2014) emphasized the importance of adequately selecting training methods and techniques, identifying individual competitive characteristics, and adhering to the principle of individualization through planning and control of the training process [1,2,3,4]. Therefore, at present, it is necessary to conduct scientific research on the assessment and analysis of morphological and physiological indicators in conjunction with the development of comprehensive special and general training criteria.

Purpose of the study: Classification of traditional “throwing” movements used by wrestlers based on a biomechanical approach.

Research methods: Anthropometry - biomechanical analysis of wrestlers’ “throwing” movements based on wrestlers’ body measurements.

Organization of the study: When performing the “unbalancing the body” phase, great importance is attached to the body type. Brachyomorph wrestlers are characterized by a more stable posture compared to dolichomorph wrestlers due to the low location of the UOM. In dolichomorphs, the location of the UOM is located much higher than the support area. In addition, coaches should take into account that during the grasping phase, a large load falls on the muscles of the palm, especially the area of the beginning of the palm, the wrist-palm joint. The length of the palm is of great importance, the longer the finger phalanges, the tighter and harder the grip will be.

Research results and discussion: We have developed an experimental program aimed at improving the individual technical and tactical training of wrestlers, taking into account the principle of individualization, the amount of training was calculated for each athlete, taking into account the somatotype of athletes, morphokinesiological parameters and indicators of physical performance abilities that affect the effectiveness of technical movements. The limits of the vertical perpendicular length from the center of gravity to the support surface when maintaining body balance were analyzed in different cases of the “bending over the chest” method. However, along with taking into account the characteristics of the body structure, it is advisable to analyze the external and internal forces acting on the body from a kinesiological point of view. From an anatomical and biomechanical point of view, the “throw” method when performing technical movements in a standing position can be divided into 5 phases:

1. Standing position phase. 2. Catching phase. 3. Phase of unbalancing the body. 4. The phase of execution of the technique (throw).

5. The phase of the takedown (see Table 1). It should be noted that for the first time we have singled out the “standing” phase, since it is this standing position that can be considered as a starting movement for a short transition to rapid movement. In martial arts sports, as well as in the national sport of wrestling, quick body movements or changes in situations when performing various technical and tactical movements begin with starting movements. Such a starting position contributes to the emergence of starting force with the first movement. This starting force provides the movements associated with the implementation of the catch. Secondly, the type of standing position is also important. In this case, the projection of the center of gravity shifts more to the superior side, which negatively affects the quality of balance

of the wrestler, who must have high indicators to maintain the position in rapidly changing situations during the competition. The fact is that athletes have increased tension in a number of muscles on the right (right-handed) and left (left-handed) sides, including the trapezius muscles located on the surface, as well as the quadratus lumborum muscles located higher and deeper, because the dominant hand controls the opponent's position during the catch and throw.

Analyzing the standing position, we paid special attention to the problem of maintaining a stable body position in various situations that occur rapidly during the competition. In our research, there was also a task to determine the range of displacement of the total center of gravity to the extreme limit, that is, until the loss of the state of balance. Therefore, we divided 30 wrestlers according to body length: short wrestlers with a height of 160-169 cm, medium-sized wrestlers with a height of 170-179 cm, and tall wrestlers over 180 cm. The vertical length of the UOM, which falls when standing, is calculated when bending to the left, right, and forward at maximum. The turns in the sagittal direction were measured from the coccyx to the anterior edge of the iliac crest on both the right and left sides until the end, that is, until the moment when a fall is possible. In some of the 30 examined wrestlers, regardless of body length, different indicators were determined, that is, during the experiment, asymmetry in the length of the muscles that make up the lower half of the back was detected. 5 athletes had a small asymmetry, and 6 athletes had a large asymmetry. Thus, muscle-tonic asymmetries were detected in the wrestlers, which were expressed in a large muscle tone on one side of the body (chest).

In situations where measures aimed at relaxation are not taken for a long time under extremely high loads, a shortening of the length of this muscle is observed and pathological tone is formed. This condition is observed with a shift of the shoulder girdle up and forward, and the shoulder blade falls on the side that is leading in that direction.

Table 1

Classification scheme of the technical movement "Throw" based on morphobiomechanical aging

Phases of the method	Biomechanical analysis of the implementation of the method	(UOM) position change
	In the final stage of the standing phase, the muscles of the arms, legs and body are tense, but not too much, as they are preparing for the next phase of the throw - the catch. Before performing the "catch" phase, the wrestler's body comes forward.	In this case, the body (UOM) also moves forward and reaches the front edge of the support area.
First phase	The opponent's body forms a single interconnected biomechanical system to ensure the grasping phase. In	Changes in the location of the total

	this movement, a change in body position occurs and a connection is formed between the opponents. The implementation of the grasping phase is carried out either with one hand, or with both hands, or by grabbing the belt. The time at which the grasp begins and ends is recorded. During the grasping, the main load falls on the muscles that rotate the fingers and palm of the hand, which are in a tense and contracted state. In the wrist-hand joint, the muscles that flex and flex the palm and fingers work, and the movement of the palm forward and backward is carried out due to the contraction of the muscles that bring the palm closer and further apart. In this case, the palm itself is in a flexed position, and the muscles that flex it are maximally stretched, which provides an increase in the gripping force from this place (hand, arms, waist, neck). The most "responsible" part of the palm is the forearm and the base of the palmar bone. The length of the palm is of great importance, in particular, the longer the length of the phalanges of the fingers, the tighter and firmer the grip will be. However, a large load falls on the muscles of the shoulder girdle and forearm, which provide rotation of the hand to the right or left. These are the pectoralis minor, the pectoralis major, the lower part of the trapezius muscle, the lower teeth of the serratus anterior. In addition, when controlling the opponent by grabbing him by the collar of his clothes, the athlete tries to reduce the distance between himself and the opponent, as a result of which the pectoralis major and minor, the pectoralis major muscle are extremely tense. This leads to a downward displacement of the shoulder blade. This condition is observed when the rhomboids major and minor, the middle and lower bundles of the trapezius muscle are weak. Weakness can occur due to high demands on the muscles of the back and prolonged tension. Also, with unilateral physical exertion (either left or right), the tension in the quadratus muscle increases on the corresponding side, which is reflected in the shortening of this muscle. During the grip, due to the increase in the tone of the pectoralis major and minor muscles, an increase in thoracic kyphosis occurs, as well as a flattening of the lumbar lordosis..	center of gravity (CCG) during the catch phase During physical exertion, active support of the leg may decrease and passive support may increase - the athlete only puts his foot forward and uses it as a support, and the weight force is transferred to the forward leg. The muscles that lower the arm girdle prevent the body from falling relative to the arm girdle under the influence of gravity.
	The type of body structure plays an important role in the execution of this phase. This phase begins after the capture. It can be divided into two sub-phases: the first sub-phase is aimed at changing the location of the total center of gravity of the opponent's body. This is achieved by changing the location of the body parts of the opponents relative to each other. The work of the leg muscles is aimed at maintaining a static position, that is, maintaining body balance, so the hip flexors shorten and	The third phase is observed when the attacking wrestler's center of gravity shifts to the optimal position for the execution of the technique. Brachiomorph

	perform a strengthening function on the supporting leg. The calf muscles also work actively, in which the muscles located on the back of the calf, for example, the triceps, exert great force. If the foot loses contact with the support area, this turns into a free leg, its position creates an unstable equilibrium. The second phase is the time interval from the moment when the attacking wrestler, through his own efforts, brings the center of gravity of the attacked wrestler to an optimally convenient position for the throw. This movement can be performed in an instant, it is difficult to separate the two small phases shown here and it can be considered as a single movement. In some cases, the opponent may occupy such an awkward position that the general center of gravity can help create favorable conditions for the attacking wrestler to perform the throw. It is worth recognizing that the phase of unbalancing is a necessary part of the execution of the throw. This phase is also expressed in terms of time parameters, that is, it takes into account the start and end times of the phase.	wrestlers are distinguished by a higher level of stability than dolichomorphs, whose body center of gravity is located much higher than brachiomorphs in relation to the support area due to the low location of the body UOM.
“Standing” phase	This phase can be divided into two sub-phases: a) the phase of preparation for the throw; b) the phase of execution of the throw. In this phase, the attacking wrestler performs the necessary movements in order to prepare a more favorable position for throwing the opponent. This phase has different time intervals depending on the duration of the time parameters. The beginning of this phase corresponds to the end of the movement to throw the opponent's body off balance, and the final point in time corresponds to the movement to throw the opponent. In this phase, the technique, that is, the throw, is performed. The most commonly used throwing movement is the "overhead throw from behind". After knocking the opponent's body off balance, the sub-phases of lifting and grabbing the opponent from the mat are performed. In this sub-phase, the most active tension in the throwing movement is observed in a timely manner, that is, an attempt is made to "lift" oneself and the opponent, which is one of the most leading elements in the structure of wrestling movements. Another important moment is the backward movement of the arms and the straightening of the spine. In this case, it is necessary to bend the body forward, straighten the legs and precisely coordinate the movements of the hands. It is necessary to pull the opponent towards you, while ensuring a firm grip.	This situation is characterized by a type of unstable equilibrium state
	This phase is when the opponent falls to the mat. It can begin during the previous phase. Its start and end times are also recorded and can vary depending on the individual characteristics of the athlete.	A wrestler falls to the mat.

Conclusion: Instead of the traditional 4 phases in wrestling, 5 phases were distinguished, and the first phase, not the “catch” phase, as given in the literature, but the “standing” phase was distinguished. We evaluated this phase as a pre-starting position in which starting strength develops. An anatomical and biomechanical analysis of the “standing” position was carried out. In the national sport of wrestling, starting movements begin with rapid body movements or changing situations when performing various technical and tactical movements. Such a starting position with the first movement contributes to the emergence of starting strength. It was found that it provides the movements associated with the implementation of the subsequent phase of the tight “catch” technical movement. A morphobiomechanical analysis of each phase of throwing movements was carried out, in particular, the standing phase, the catching phase, the phase of unbalancing the body, the phase of performing the technique (throw) and the knockdown phase. For each phase, the leading and auxiliary muscles were separated, the location of the UOM (the total center of gravity of the body relative to the base area) was taken into account (the body's imbalance depends on it), the work of the joints of the limbs was analyzed. Technical errors that could be made by wrestlers when performing and mastering elements of throwing movements were identified and eliminated.

Since all competitions in the national sport of wrestling are held in a standing position, the presence of bilateral symmetry in the location of the muscles is of great importance, which affects the effectiveness of the performance of technical and tactical movements. When hypertonicity is detected in the wrestlers' body area and, as a result, a state of asymmetry appears, the quality of technical and tactical movements decreases, in particular, the amplitude of shoulder movements decreases, the opportunity to shift the opponent's body center of gravity disappears, the opportunity to perform the phase of disbalancing the opponent in phase 3 is lost.

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