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Halashko Maksym Mykolayovych

STUDY OF THE PECULIARITIES OF THE PHYSICAL STRUCTURE OF ARM SPORTS ATHLETES OF DIFFERENT SKILL LEVELS

Kharkiv National Medical University
Department of Physical Education and Health
mm.halashko@knmu.edu.ua

Actuality of theme. The general deterioration of the health of the population, primarily of children, adolescents and young people, is one of the characteristic features of the present time [1]. Among other things, it is characterized by a decrease in physical fitness, lagging indicators of physical development. Physical education and sports are one of the most important means of preserving and strengthening health, however, the available information indicates that at this time their popularity is gradually decreasing [2]. The current situation requires the wide implementation and development of the "Sports for all" direction, in connection with which the involvement of broad layers of young people in activities, the promotion of certain sports, especially those that have a pronounced strength orientation and are popular, become important among the rising generation. Among the promising types in this regard is arm sports [3].

Armsport or arm wrestling is quite popular in the world and occupies a special place in this group. On the one hand, this is a typical representative of martial arts, which determines the requirements for willpower and psychological training of athletes. On the other hand, the strength nature of this type does not cause doubts, which allows us to talk about the need for strength training, especially speed-strength training.

This determines the need for scientific substantiation of approaches to preliminary selection in this sport, which will make it possible to predict the success of the training process. Considering the strength nature of this sport, it is natural to assess the anthropometric characteristics of athletes, which was the purpose of the work.

Materials and methods. 98 people engaged in arm sports participated in the study, divided into three groups: 1st group – 53 people, amateur gymnasts, average age (30.59±1.19) years; 2nd group – 37 athletes of mass ranks (up to and including candidates for master of sports), average age (18.94±0.57) years; Group 3 – 8 athletes of the highest skill level (masters of sports and masters of sports of the international class), average age (29.25±1.51) years.

The obtained research results are shown in Table 1, and confirm the high level of physical fitness of the athletes of the 3rd

group compared to the others, which is illustrated by the higher values of hand dynamometry of both hands.

Table 1.

The results of research on the physical structure of arm wrestlers.

Characteristic	1 group	2nd group	3 group
The length of the right shoulder, cm	36,20±0,45	34,71±0,76	35,75±0,70
The length of the left shoulder, cm	35,76±0,49	34,44±0,72	35,70±0,72
The length of the right forearm, cm	27,54±0,25	28,28±0,79	29,13±0,51[1]
The length of the left forearm, cm	27,48±0,29	28,12±0,79	29,31±0,44[1]
The width of the right hand, cm	9,26±0,10	9,21±0,14	9,81±0,16[1]
The length of the right hand, cm	18,65±0,16	18,94±0,24	19,81±0,30[1,2]

The thickness of the hand, right, cm	2,63±0,09	2,15±0,07	2,63±0,10[2]
The width of the left hand, cm	9,26±0,10	9,15±0,11	9,69±0,13[1,2]
The length of the left hand, cm	18,92±0,12	18,88±0,21	20,06±0,36[2]
The thickness of the hand, left, cm	2,59±0,05	2,15±0,07	2,46±0,09[2]
Circumference of the right biceps, see	38,89±1,31	35,53±0,95[1]	41,69±1,28[2]
Circumference of the left biceps, see	38,06±1,34	34,12±1,17[1]	41,19±1,53[2]
Circumference of the right forearm, see	33,94±1,11	32,26±0,91	37,88±0,88[1,2]
Circumference of the left forearm, see	33,00±0,96	31,79±0,89	36,50±1,12[1,2]
Shoulder width, cm	43,19±0,42	39,79±0,551	43,31±1,222

Hand dynamometry of the right, kg	58,74±2,15	57,71±2,55	80,50±4,501,2
Left hand dynamometry, kg	56,56±2,00	52,47±2,45	72,88±3,711,2
"Relay test", see	14,87±1,23	8,30±1,091	7,88±2,221

Note. The index means with which group the difference is probable ($p<0.05$)

The results of the "relay test" confirm a higher speed of reaction in athletes compared to persons engaged in arm sports at the amateur level, and they are significantly better than age norms according to the CONTREX system [4]. The absence of a probable difference between groups 2 and 3 also illustrates the importance of high reaction speed in athletes and allows this test to be considered a selection criterion.

The obtained results can be considered an affirmation of the importance of arm muscle development for arm sports. Athletes of group 3 probably had a longer forearm than in group 1, more significant parameters of the hand and a larger circumference of the forearm. Compared with group 2, they found an increase in all sizes of the hand, the contours of the right and left biceps and

forearms. At the same time, the athletes of the 2nd group lagged behind the 1st group only in terms of the circumference of the biceps. This situation reflects higher athletic training of athletes

3 groups, due to the high level of skill and less training experience of the athletes of the 2nd group. The given results allow us to assume the presence of certain advantages in this type of sport in people who have a long forearm, length and width of the hand.

The specifics of arm wrestling as a sport imply specialized requirements for the development of the arms, especially the muscles of the forearm and hand [3]. Body proportions of athletes are also important from the point of view of the biomechanics of muscle work. Taking into account a number of features, the comparison of actual anthropometric indicators is insufficiently illustrative, as it does not reflect the relationships between various criteria and features of specialization in arm sports.

In order to confirm the previously made assumptions, the method of "indexes" was applied, which allows you to evaluate the features of the physique with the help of the ratio of various anthropometric indicators expressed by mathematical formulas [5]. The work uses indices that reflect the development of

specialized qualities important in this sport. They are the hand dynamometry index (ICD = (hand dynamometry / body weight)

*100%), arm index (IR = forearm length / shoulder length), arm circumference index (IR = forearm circumference / shoulder circumference). In addition, we proposed an indicator called the palm index (ID = palm length

* width of the palm * thickness of the palm * 10 / 100%), which allows you to assess the relationship between its dimensions, which is important for assessing the athlete's functional capabilities. The obtained results are shown in Table 2.

Table 2

Indexes illustrating anatomical and physiological features of arm sports athletes.

Indicator	1 group	2nd group	3 group
ICD of the right hand	70,43 ±1,71	83,62± 2,86[1]	86,53± 4,91[1]
ICD of the left hand	67,67 ±1,60	75,89 ±2,60[1]	78,30 ±3,51[1]
IR of the right	0,76 ±0,01	0,93 ±0,01[1]	0,82 ±0,02[1]
IR of the left	0,77 ±0,01	0,94 ±0,01[1]	0,82 ±0,01[1]
ID of the right	47,14± 2,51	38,78 ±1,81[1]	51,25± 3,01[2]

ID of the left	46,03 ±1,88	37,38 ±1,78[1]	48,11 ±2,69[2]
IOR of the right	0,87 ±0,01	0,93 ±0,01[1]	0,91 ±0,01[1]
IOR of the left	0,87 ±0,01	0,94 ±0,01[1]	0,89 ±0,02[2]

Note. The index means with which group the difference is probable ($p<0.05$)

During the analysis, it was found that groups 2 and 3 have probably higher indicators of ICD compared to 1. It is believed that in harmoniously developed men this indicator should be 50-70%, which is confirmed by the results of group 1. The increase in ICD reflects a higher level of sports training of athletes of groups 2 and 3 compared to physical athletes. The absence of probable differences between groups 2 and 3 illustrates the same orientation of the training process, a high degree of hand muscle development in athletes of this sport, regardless of skill level.

Taking into account the peculiarities of arm wrestling as a sport that requires good development of the upper limbs, the assessment of the ratio of the length of the shoulder to the forearm is of particular importance. According to the proportions of a harmoniously developed person, this indicator should be ¾, and, as evidenced by the information given in Table 2, the results of Group 1 are close to this value. In the groups of athletes, this

index is probably higher compared to the group of physical athletes, which, in our opinion, is fundamental. Thus, with a longer lever and the same effort, the muscle performs more work. That is, a wrestler who has a longer forearm is in a more advantageous position, it is more convenient and easier for him to fight. The results of athletes of groups 2 and 3 clearly confirm this position. Thus, the optimality of selection in arm sports is asserted, since the length of the forearm as the main lever is of significant importance in it.

In addition to the ratio of levers, which is determined by the development of the elongated dimensions of the upper limb, success in arm sports is also determined by the development of the muscles of the hands, which can be described by the ratio of the contours of the forearm and shoulder.

It is believed that a high and harmonious physical development of a person is characterized by a ratio equal to 0.833. In all studied groups, this index was higher, which once again confirms the high physical fitness of the subjects, but in both sports groups, this index was probably higher than in physical athletes. That is, arm wrestlers have a higher development of the muscles of the upper limbs, and due to the increase in the muscles of the forearm, which is also important for performance in this

sport and illustrates the training focus in this sport. In addition, the largest absolute values of this index are found in the youngest athletes, which reflects a relative increase in forearm muscle strength in them.

The palm index is introduced for the possibility of predicting success in arm sports. In group 3, it was probably higher than in group 1, and in group 2, on the contrary, it was lower compared to athletes. This can be explained by the fact that arm wrestlers of higher achievements have a longer and wider palm, which makes it possible to provide a stronger grip and lengthen the lever. As for the thickness of the palm, this criterion mainly reflects muscle development and the possibility of specialized training influencing it.

Conclusions. Thus, the conducted studies allow us to state that the features of the physical structure are of significant importance for effectiveness in arm sports. The obtained data allow us to talk about the existence of a direct connection between the level of physical fitness and performance. The most important thing is the assessment of the reaction speed, as well as the development of the upper limbs, and in its assessment, the index method can be used, which allows you to assess the ratio of several indicators. The obtained results indicate that some indices

can be used as criteria for the selection and prediction of performance in athletes. Moreover, specialized indexes illustrate the anatomical and physiological features of the development of persons engaged in arm sports, and allow selecting the most promising for this type of sport. With high probability, it is possible to state that persons with relatively long shoulders and forearms, sufficiently developed (in all dimensions) hands, those with high reaction speed, and also high development of forearm muscles are suitable for arm sports. In the process of working with athletes, it makes sense to carry out the selection mainly according to uncontrollable criteria that reflect innate features, and to evaluate the results of training with the help of indices of another group. This distribution makes it possible not only to carry out a qualified selection for classes, but also to control the direction and effectiveness of training, which also predicts success in competitions.

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Гончаров Олексій Геннадійович

ОЦІНКА ЕФЕКТИВНОСТІ ФІЗИЧНОЇ ТЕРАПІЇ ПРИ ХРОНІЧНОМУ НЕСПЕЦИФІЧНОМУ БОЛЮ В СПИНІ

Харківська державна академія фізичної культури
кандидат наук з фізичного виховання і спорту
доцент кафедри фізкультурно-спортивної реабілітації
aionaskr89@ukr.net

Постановка проблеми. Проаналізувавши літературні джерела можна зробити висновки, що в Україні хронічні захворювання опорно-рухової системи є однією з найбільш частих проблем, які вимагають безперервної багаторічної