Peculiarities of manifestation of peak special strength in beginner armwrestlers of various weight categories

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Abstract

Objective of the study was to identify differences between the peak special strength rates in beginner armwrestlers of various weight categories.

Methods and structure of the study. Sampled for the study were 24 athletes aged 18-25 years, with up to one year into armwrestling sport and having no sports title. All subjects were divided into three groups depending on their body weight: Group A (n=8) – 53-65 kg – light weight category, Group B (n=8) – 78-85 kg – middle weight category, Group C (n=8) – 105 kg and over – heavy weight category.

The subjects' special strength abilities were assessed using a tensodynamometry method [4, 6]. After the warm-up, the subjects were given two attempts for every test, where only the best attempt was recorded.

Results and conclusions. The comparison of the test rates of armwrestlers of the middle and heavy weight categories showed that the greatest difference between the mean strength values, above 100%, was found in the forearm pronators, above 90% - in the forearm supinators (p<0.01), above 38% – in the shoulder extensors (p<0.01); the smallest - in the finger flexors (5.1%), supine forearm flexors (16.6%), and hand flexors (17.6%). There were no statistically significant differences between the beginner armwrestlers of the middle and heavy weight categories in the following tests: supine forearm flexion and finger flexion. The findings indicate that the difference in the special strength fitness rates in beginner armwrestlers of various weight categories is less significant than that of qualified athletes.

Keywords: armwrestling, special strength fitness, peak strength, weight categories, tensodynamometry.

Background. In many sports, including armwrestling, the improvement of athletic performance largely depends on the special fitness level of athletes. In terms of the direction in the development of motor skills, armwrestling refers to speed-strength sports. Special aspects of competitive activity in armwrestling include increased demands on the level of development of the arm muscles, forearm and hand in particular [2, 8]. The main motor task for an armwrestler is to develop the maximum capacity of the competitive movement, that is, to develop maximal strength in the shortest time [7].

Researchers note that there is no statistically significant difference between the maximal strength rates measured in a static mode and the maximum weight that can be lifted with the same movement [3].

When characterizing maximal strength, specialists identify peak strength as the highest level of strength displayed at a specific point in the motion range [5, 9].

There is a view that in people of the same training level, maximal strength increases with the body weight gain [1]; however, the body mass of an armwrestler is not a leading indicator of the effectiveness of competitive activity in the given sport [6].

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65 kg – light weight category, Group B (n=8) – 78-85 kg – middle weight category, Group C (n=8) – 105 kg and over – heavy weight category.

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For this study purposes, we have developed a comprehensive computer-controlled methodology for measuring strength indices in armwrestling (see Figure).
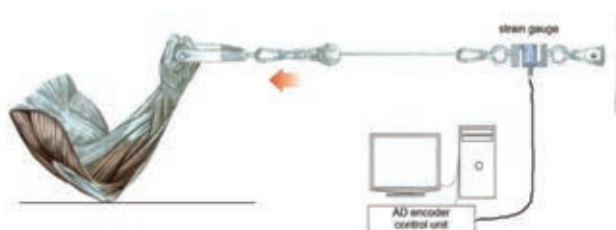
Special strength abilities measuring system scheme

The measuring system consists of the following elements: force sensory system; professional arm wrestling table; tensoresistive pressure sensor; analog-to-digital (AD) encoder; personal computer.

The study was conducted on the basis of the armwrestling section of the Bauman Moscow State Technical University.

Results and discussion. Given in Table 1 are the comparative characteristics of the peak special strength rates in the beginner armwrestlers of the middle and heavy categories. These data confirm that there are no significant differences between the following indicators: supine forearm flexion and finger flexion.

The greatest difference between the mean strength values, above 100%, was found in the forearm pronators, above 90% - in the forearm supinators (p<0.01), above 38% – in the shoulder extensors (p<0.01); the smallest - in the finger flexors (5.1%), supine forearm flexors (16.6%), and hand flexors (17.6%). There were no statistically significant differences between the beginner armwrestlers of the middle and heavy weight categories in the following tests: supine forearm flexion and finger flexion.

Given in Table 1 are the comparative characteristics of the peak special strength rates in the beginner armwrestlers of the light and middle categories.

There were significant differences in terms of all peak strength indicators, except for hand abduction, forearm supination, and shoulder extension. The most significant differences were found in the following tests: hand flexion, neutral-point forearm flexion, and supine forearm flexion (p<0.01).

The earlier studies of special strength fitness of armwrestlers of the middle and heavy weight categories with the 1st senior category (CMS) and titles of MS and WCMS revealed significant differences in terms of all test rates [6]. This leads to the conclusion that the difference in the peak special strength rates in beginner armwrestlers of various weight categories is less significant than that of qualified athletes.

Conclusion. The control test rates in the beginner armwrestlers (up to one year of sports experi-

Table 1. *Comparative characteristics of peak special strength rates in beginner armwrestlers of middle and heavy categories*

Control test	Group B 78-85 kg, M±m	Group C 105+ kg, M±m	Difference, kg	Difference, %	t	p
SP	26.60±1.30	34.01±1.81	7.41	27.7	3.33	<0.01
HF	44.45±2.04	52.28±2.40	7.83	17.6	2.49	<0.05
HA	17.44±0.82	23.76±2.03	6.32	36.2	2.89	<0.05
FS	23.71±2.01	45.26±5.04	21.55	90.9	3.97	<0.01
NFF	31.15±0.83	37.75±2.43	6.6	21.2	2.57	<0.05
SE	65.78±2.09	91.01±4.76	25.23	38.4	4.85	<0.01
SFF	31.18±0.60	36.34±4.43	5.16	16.6	1.15	>0.05
FP	26.09±1.76	53.82±6.44	27.73	106.3	4.15	<0.01
FF	63.96±2.59	67.21±5.32	3.25	5.1	0.55	>0.05

Legend. SP – shoulder pronation, HF – hand flexion, HA – hand abduction, FS – forearm supination, NFF – neutral-point forearm flexion, SE – shoulder extension, SFF – supine forearm flexion, FP – forearm pronation, FF – finger flexion.

Table 2. *Comparative characteristics of peak special strength rates in beginner armwrestlers of light and middle categories*

Control test	Group A 55-65 kg, M±m	Group B 78-85 kg, M±m	Difference, kg	Difference, %	T	p
SP	22.19±1.21	26.60±1.30	4.41	19.87	2.48	<0.05
HF	35.11±1.78	44.45±2.04	9.34	26.60	3.45	<0.01
HA	15.34±0.89	17.44±0.82	2.1	13.69	1.74	>0.05
FS	20.21±1.86	23.71±2.01	3.5	17.32	1.28	>0.05
NFF	24.02±1.61	31.15±0.83	7.13	29.68	3.94	<0.01
SE	59.37±2.88	65.78±2.09	6.41	10.80	1.8	>0.05
SFF	26.68±1.30	31.18±0.60	4.5	16.87	3.14	<0.01
FP	20.40±1.31	26.09±1.76	5.69	27.89	2.59	<0.05
FF	55.65±2.32	63.96±2.59	8.31	14.93	2.39	<0.05

ence) confirm that there were significant changes between the athletes of the middle and heavy weight categories in 7 out of 9 special control tests: shoulder pronation, hand flexion, hand abduction, forearm supination, neutral-point forearm flexion, shoulder extension, forearm pronation. There were no statistically significant differences between the following indicators: supine forearm flexion and finger flexion.

The most significant differences between VC and VC are found in «Hand Flexing», «Forearm Flexion in Neutral Position» and «Forearm Flexion in SMP» (p<0.01). The most significant differences between the beginner armwrestlers of the light and middle weight categories were found in the following tests: hand flexion, neutral-point forearm flexion and supine forearm flexion (p<0.01).

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