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Dependence of sports results on data of physical development, morphofunctional and special power preparedness of weight-lifters at the stage of initial preparation

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Purpose: *the establishment of nature of the interrelation between sports results of weight-lifters and level of their special physical and morphofunctional preparedness.*

Material & Methods: *48 sportsmen of group of initial preparation of the first year of training were involved to the experiment. The research was conducted on the basis of the chair of weightlifting and boxing of Kharkov state academy of physical culture and CYSS "HTZ".*

Results: *the correlation between indicators of morphofunctional, high-speed and power and special (competitive) preparedness of weight-lifters is revealed at the stage of initial preparation. The conducted research shows that the result of competitive exercises of the sportsmen, specializing in weightlifting at the stage of initial preparation, depends on power and high-speed and power preparedness.*

Conclusions: *it is established that the correlation between results of competitive exercises and jumps uphill from the place, in length from the place, run on 30 m can demonstrate the interrelation of power and high-speed and power preparedness of the sportsmen, specializing in weightlifting at the stage of initial preparation.*

Keywords: *sports result, morphofunctional preparedness, initial preparation, competitive exercises, high-speed and power preparedness.*

Introduction

Studying of dependence of results of competitive exercises on the level of morphofunctional and special physical preparedness of weight-lifters is the important condition of creation of the program of effective training of sportsmen at the initial stage. Number of researches is devoted to the identification of interrelations between indicators of physical development, preparedness of sportsmen, and sports result in different strength sports. V. M. Platonov, A. N. Vorobyov, I. T. Lisakovsky, V. G. Oleshko investigated the correlation dependence between morphological features, high-speed and power qualities and sports-technical indicators in different strength sports, in particular, in weightlifting [8; 1; 6]. Results of researches showed that jump height up from the place increased moderately increases in sports skill and had average reliable communication with length of body and legs, press, burst, jerk and squat with bar on breast and shoulders. Authors recommend outleap from the place as the test at selection for weightlifting trainings on the basis of the obtained data. The reliable correlation of biomechanical parameters of the movement of apparatus with the level of development of motor abilities, power and high-speed and power parameters at rise of weights with indicator of high-speed and power qualities in weight-lifters of high qualification when performing classical exercises is found in the researches of O. Dovgich, V. Yu. Dzhim, R. A. Roman [3; 4; 11]. L. S. Dvorkin, V. A. Romanenko established the existence of interrelations between exercises of weightlifting and means of overall physical fitness [2; 11]. The author recommends to use exercises "bendings of hands in emphasis, lying" and "trunk raising from situation, lying on back" as auxiliary for the increase in level of force in exercises of weight-lifters. The research of dependence of sports result on data of physical development, functional condition of cardiovascular and respiratory systems of organism and special power preparedness of weight-lifters at the stage of initial preparation is conducted in this work.

Communication of the research with scientific programs, plans, subjects

The scientific research is executed on the subject of the Built plan of the research work in the sphere of physical culture and sport for 2011–2015 3.7 "Methodological and organizationally-methodical bases of determination of individual norm of physical condition of the person" (number of the state registration is 0111U000192).

The purpose of the research:

the establishment of nature of interrelation the between sports result of young weight-lifters and level of their special physical and morphofunctional preparedness.

Material and Methods of the research

The experimental research of nature of the interrelation between sports result, data of physical development, functional condition of organism of weight-lifters is carried out on the basis of the chair of weightlifting and boxing of Kharkiv state

academy of physical culture and CYSS "HTZ". 48 sportsmen of the group of initial preparation of the first year of study were involved to the experiment. The program of researches included the complex of methods of the research according to the methodological approach in solution and the put tasks: analysis of scientifically-methodical literature, method of anthropometry and research of condition of cardiovascular system, pedagogical experiment and methods of mathematical statistics.

Results of the research and their discussion

Data of physical development, functional condition of cardiovascular and respiratory systems of organism, special and power preparedness of weight-lifters, in the stated experiment are provided in the table. The analysis of sizes of massogrowth indicators, sizes of grasp and length of different links of body of sportsmen confirms the relative uniformity of the vast majority of the studied indicators in the group. Changeability of variation row for the sizes of length of body of weight-lifters was insignificant.

The variation coefficient on indicator of length of body equaled 3,89%, body length, sitting – 4,02%, the lower extremity – 4,15%, upper extremity – 4,5%, width of shoulders – 6,04%, cross diameter of thorax – 8,36%. The extent of value to coefficient of variation were higher for the grasp sizes. So, the variation on thorax grasp indicators at rest made 4,58% to thorax grasp (exhalation) – 4,95%, to thorax grasp (breath) of 4,59%, shoulder – 6,19%, hip – 7,29%. It is noted the highest coefficient of variation for indicator of body weight of sportsmen – 8,48%.

Sportsmen of the studied group have average value of HR, apparently from the table, equaled 65,32 bpm^{-1}. Sizes of standard square deviation and coefficient of variation made 6,22 bpm^{-1} and 9,52%. It is established that APs of sportsmen of the studied group at rest was in optimum zone, average value made 121,25±1,64 mm of mercury. For APd average value in the group is brought closer to the lower limit limit of the aged norm – 80,35±1,98 mm of mercury. Results of the submaximum test of Valunda-Shestrand testify to the sufficient level of physical efficiency of sportsmen of the studied group. Sizes of average square deviation and coefficient of variation by the size PWC170 made 48,12 $kgm \cdot min^{-1}$ and 13,87%. Average PWC170 value equaled 1343,10±48,12 $kgm \cdot min^{-1}$ that exceeded the norms determined for healthy unexercised children. Average sizes of MOC made in absolute expression and calculation on kilogram of body weight respectively 3979,10±0,126,59 $ml \cdot min^{-1}$ and 59,80±2,95 $ml \cdot kg^{-1} \cdot min^{-1}$, 12-minute Cooper's test – 2448,34±75,98 m also characterized the sufficient level of aerobic endurance. Indicators of VCL of sportsmen made 3,90±0,16 l and were in norm limits for healthy children. Sizes of average square deviation and to variation coefficient by this indicator were equal 0,60 l and 15,38%. The vital index of weight-lifters at the stage of the stating experiment made 57,60±0,78 $ml \cdot kg^{-1}$. Such VI values answer the average level of physical health. Frequency of breath of sportsmen was in norm limits for healthy children and averaged 13,47±0,55 times the coefficient of variation made 15,96%. The considerable variability of results was observed on indicators of tests of Stange and Genchi. Average values of the noted indicators made 48,67±2,69 times and 30,17±2,30 times, variation coefficients – 21,30% and 29,50% respectively. Thus, physiologic state of cardiovascular and respiratory systems of organism of sportsmen of the studied group satisfactory, sizes of the studied indicators were in limits of norm and characterized the sufficient level of physical working capacity [6].

The average result in standing long-jump made 157,96±1,57 sm; the coefficient of variation equaled 6,91%. In jump on certain height the average result made 35,38±0,37 sm, variation coefficient, – 7,30%. Average results in exercises which characterize power abilities, namely pulling up and bending extension of hands in emphasis, lying, equaled 8,60±0,25 times and 32,46±0,58 times; coefficients of variation equaled 19,73% and 12,49% respectively. The insignificant variability of results was noted for indicators, which characterize the speed and dexterity. The variation coefficient by run indicator on 30 m was 5,19%; shuttle run – 3,34%. The insignificant variability of the following results was noted for indicators, which characterize endurance, variation coefficient on trunk raising indicators – 9,19%, respectively jumps on jump rope on 2 legs – 6,46%.

The correlation analysis is carried out for the establishment of dependence of sports result from morphofunctional of indicators and level of special physical preparedness of sportsmen. It is established that all indicators correlate among themselves, but the degree of these interrelations is different. The interrelation between result of classical burst of both length and body weight was found (r=0,70; r=0,85), grasps of hip (r=0,66), thorax, on breath, exhalation, breath holding (r=0,69; r=0,67;). The training of weight-lifters promotes the expansion of thorax, increase in volume of the muscles involved in work which is confirmed by correlation coefficients between the noted indicators. The interrelation of result of squat and grasp of hip can demonstrate that it is necessary to work on increase in mass of muscles of hip for the achievement of the best result in this exercise.

The interrelation that is revealed between classical burst and indicators of the maximum absorption of oxygen and PWC170 (r=0,45 and r=0,57), can explain with increase in indicators of aerobic endurance and level of physical operability of organism which happen in the course of sports preparation. The return interrelation between results in classical burst and run on is noted 30 (r=–0,63) which can be explained with the fact that when performing to classical burst and run on 30 m different types of muscular fibers are involved. Retractive fibers are attracted quickly in classical burst, in run – slowly retractive. As when performing competitive exercises quickly retractive muscular fibers are involved in weightlifting to work, their part in muscles of legs is increased and the sportsman cannot perform physical activity long time, as it appears in negative value of coefficient of correlation between these indicators.

The correlation between results in classical burst and long jumps and on certain height is found (r=0,43; r=0,67) which can demonstrate the interrelation of power and high-speed and power preparedness of weight-lifters at the stage of initial preparation.

The interrelation with length and body weight (r=0,65; r=0,80), thorax grasps on breath, to exhalation (r=0,74; r=0,72), and also to pullings up in hang on cross-piece (r=0,40), to bendings extensions of hands, in emphasis, lying (r=0,51) is found for result in classical jerk. When performing classical jerk and exercises of bending extension of hands on bars are involved

Indicators of sizes of grasp and length, conditions of cardiovascular and respiratory systems, testings of special physical qualities and competitive exercises of weight-lifters of the studied group (n=48)

Indicators	$\bar{X}$±m	V,%
The sizes of grasp and length		
Body length, sm	143,73±0,81	3,89
Body weight, kg	40,92±0,50	8,48
Body length, sitting, sm	76,04±0,44	4,02
Length of the lower extremity, sm	67,69±0,41	4,15
Length of upper extremity, sm	61,40±0,39	4,35
Width of shoulders, sm,	41,75±0,36	6,04
Thorax grasp at rest, sm	73,10±0,48	4,58
Thorax grasp (exhalation), sm	70,50±0,50	4,95
Thorax grasp (breath), sm	75,92±0,50	4,59
Grasp of shoulder, sm,	24,20±0,22	6,19
Grasp of hip, sm	47,88±0,50	7,29
Cross diameter of thorax, sm	28,15±0,34	8,36
Condition of cardiovascular and respiratory systems		
HR at rest (bpm^{-1})	65,32±1,33	9,52
APs at rest (mm of mercury)	121,25±1,64	5,27
APd at rest (mm of mercury)	80,35±1,98	8,53
PWC170, $kgm \cdot min^{-1}$	1343,10±48,12	13,87
PWC/kg, $kgm \cdot min^{-1} \cdot kg^{-1}$	20,21±1,07	21,82
MOC, $ml \cdot min^{-1}$	3979,10±126,59	12,32
MOC/kg, $ml \cdot min^{-1} \cdot kg^{-1}$	59,80±2,95	19,12
Cooper's test, m	2448,34±75,98	11,74
Vital capacity of lungs, l	3,90±0,16	15,38
Vital index, $ml \cdot kg^{-1}$	57,60±0,78	5,32
Breath frequency, for 1 min	13,47±0,55	5,96
Breath holding on breath, s	48,67±2,69	21,30
Breath holding on exhalation, s	30,17±2,30	29,50
Indicators of testings of special physical qualities		
Run 30 m, s	6,19±0,05	5,19
Shuttle run of 3x10 m, s	8,60±0,04	3,34
Standing broad jump up, sm	35,38±0,37	7,30
Standing long-jump, sm	157,96±1,58	6,91
Trunk raisings, number of times on min	41,69±0,55	9,19
Bending and extension of hands in emphasis, times	32,46±0,58	12,49
Pulling up on horizontal bar, times	8,60±0,25	19,73
Jumps on jump rope on 2 legs, times	86,23±0,80	6,46
Indicators of competitive exercises		
Classical burst, kg	19,24±0,45	16,04
Classical jerk, kg	26,73±0,41	10,56
Sum of double-event, kg	45,97±0,76	11,42
Squats on shoulders, kg	43,65±0,72	11,45
Burst draft, kg	31,86±0,44	9,55
Jerk draft, kg	44,36±0,55	8,57

the same groups of muscles, in particular, deltoid, tricepses. The vast majority of sportsmen in weightlifting, when performing jerk, use the technique, at which exercise is performed with different receptions [7]. The muscle work, when using this method of execution of jerk, is brought very closer to muscle work in exercise of bending extension of hands in emphasis, lying, that is confirmed by the correlation interrelation between these exercises.

The correlation with thorax grasps on breath, exhalation is noted for result in burst draft (r=0,55; r=0,60). The interrelation between result of the noted exercise and PWC170 and MOC, vital capacity of lungs is found during power trainings (r=0,57; r=0,55; r=0,42 respectively). In our research the correlation between result of burst draft and long jump (r=0,52), which can demonstrate the interrelation of power and high-speed and power preparedness of sportsmen, who specialize in weightlifting, at the stage of initial preparation, is found.

It is established that the most significant morphological indicators for ensuring high sports result in competitive exercises weight-lifters have length of the lower extremities, upper extremities, grasps of breast, hip [4]. Results of the correlation analysis, which is carried out by us, confirm the data obtained in the research of Dvorkin (1992), to which it is shown that (from r=0,6 to r=0,9) the following indicators have high correlation interrelation with the level of achievements in competitive exercises of weight-lifters: with classical burst – length, body weight, grasp of breast, hip, length of the lower extremity, length of upper extremity. With classical jerk – body weight, grasp of shoulder, breast, length of upper extremity, length of the lower extremity, width of shoulders [5].

Conclusions

It is established that the most significant morphological indicators for ensuring high sports result in competitive exercises at weight-lifters are hip grasp, grasp of muscles of shoulder, breast grasps.

The found correlation between results of competitive exercises and standing broad jump up, standing long-jump, run on 30 m that can demonstrate the interrelation of power and high-speed and power preparedness of sportsmen who specialize in weightlifting at the stage of initial preparation.

The subsequent researches will be directed to the identification of structure of preparedness of weight-lifters at the stage of initial preparation.

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