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Improvement of technique of a jerk of the qualified sportswomen in weightlifting

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Purpose: *the improvement of technical preparedness of the qualified female weight-lifters taking into account the group model characteristics of technique of a jerk.*

Material & Methods: *analysis and synthesis of data of scientific and methodical literature, pedagogical experiment, method of mathematical statistics.*

Results: *the revealed shortcomings of technique of the execution of a jerk of the qualified female weight-lifters were, considering the group model characteristics of technique of a jerk of the first group of weight categories. Complexes of compensatory exercises were offered for the purpose of correction.*

Conclusions: *the performance of complexes of the compensatory exercises, which are directed to the improvement of competitive exercise of a jerk of bar, allowed to increase the number of successfully executed raising of bar, for 10,3–19,8%, according to initial indicators of number of rises, and also to receive positive shifts in motive structure of a jerk of bar.*

Keywords: *technical preparedness, weightlifting, modeling, jerk, female weight-lifter.*

Introduction

The system of motor actions of the sportsman, which is directed to the achievement of sports result, is treated as technique and it differs in the specialization characteristic for the sake of appearances of sport [10; 19]. Shortcomings, which arise during studying of technique of competitive exercises, do not allow realizing fully individual opportunities of the sportsman during the competitive activity [3; 4].

Recently modeling of biomechanical parameters of technique of the best athletes of the world taking into account typological features of their organism received the wide use in connection with emergence of the latest computer technologies in elite sport. This problem was investigated by experts in track and field athletics, swimming, oar-sport, sports games [2–4; 6; 10]. Such researches were also conducted in weightlifting [1; 5; 7; 8; 9; 11].

Weightlifting belongs to sports with the maximum manifestation of power qualities, and was considered as especially man's sport recently. But women also debuted in 2000 at the Olympic Games in Sydney in this sport. The modern system of preparation of female weight-lifters provides the constant improvement of the technical skill, which is directed to the realization of effective technical-tactical actions in the conditions of competitive activity.

The number of works is devoted to the question of assessment of technique in weightlifting [1; 5; 7; 8; 11; 13]. At the same time we established that the vast majority of scientific works study the question of improvement of method of execution of heavy athletics exercises of sportsmen.

It is revealed that authors studied the first competitive exercise – jerk in researches on problems of female weightlifting [8]. Some scientists, in view of viability of phase structure of method of execution, studied the technique of jerk and the first technique of jerk-lifting on breast [1].

We consider, the question of technical preparedness of women in weightlifting remains still insufficiently studied, namely we didn't find researches, which would concern studying of technical preparedness of women in bar jerk, depending on conditions of violations of structural components of technique.

Communication of the research with scientific programs, plans, subjects

The research was conducted according to the plan RW DSIPCS in the branch of physical culture and sport for 2011–2015 of the Ministry of education and science of Ukraine on the subject 2.6: "Theoretic-methodical principles of improvement of the training process and competitive activity in the structure of long-term training of sportsmen", the number of state registration is 0111U001168 and for 2016–2020 on the subject: "Theoretic-methodical principles of improvement of the training process and competitive activity in the structure of long-term training of sportsmen", the number of state registration is 0116U003007.

The purpose of the research:

to define the efficiency of practical use of the group model characteristics of technique of jerk of the qualified female weight-lifters in the educational-training process.

Material and Methods of the research

The consecutive pedagogical experiment, in which participated 9 qualified female weight-lifters of the age from 17 to 19 years, I group of weight categories was made (weight categories to 48 kg, to 53 kg, to 58 kg).

Research methods: analysis and synthesis of data of scientifically-methodical literature, pedagogical experiment, method of mathematical statistics.

Results of the research and their discussion

The analysis of competitive activity of the qualified sportswomen at the international and All-Ukrainian competitions of 2013–2015 shows that over 45,0% of competitive attempts in jerk, which executed female weight-lifter with a bar of the sub-maximum and maximum weight weren't completed because of the made different technical mistakes. The greatest number the made mistakes by sportswomen (from 33,0 to 47,0% of cases) concerns violations of kinematic structure of the movement of bar in lifting it from breast that indicates the relevance of definition of the reasons, which lead to it [12].

On the basis of the obtained data, we have offered the group model characteristics of technique of jerk by the biomechanical characteristics of structure of the movement of bar which influence the progress of realization of sports result (tab. 1).

The consecutive pedagogical experiment, which duration was two mesocycles, is made for definition of efficiency of practical use of the group model characteristics: specially-preparatory and precompetitive, with conducting two control tests of sportswomen at the beginning and at the end of the experiment. The complex control of biomechanical characteristics of technique of jerk of bar was carried out by means of video filming and with use of the video computer program "Weightlifting analyzer 3.0" (production Germany).

The initial indicators of technique of each sportswoman in bar jerk, which was carried out by sportswomen in the "control" zone of intensity with encumbrance of 92-100% of maximum were defined at the beginning of specially-preparatory mesocycle of preparation. Shortcomings of technique of motor actions, indicators, which do not answer model characteristics, and also those, which were recorded during unsuccessful performance of attempt were found. But it was defined on what biomechanical structure of the movement of bar (kinematic or dynamic) these are not successfully performed motor actions influence. We offered compensatory exercises (tab. 2), which carried out sportswomen, depending on the made by them mistakes, during the studied period, two times for week during the training process in the lead-in, involving, shock, competitive microcycles, for the purpose of elimination of shortcomings of technique of jerk.

The creation of resistant interrelation and interdependence of structure of motor actions of sportswomen with bar and the level of development of their high-speed and power qualities was one of the important conditions in usage time of compensatory exercises for correction of technique of jerk of bar of female weight-lifters.

Compensatory exercises significantly influenced the technique of jerk during performance of such motor actions by female weight-lifters:

– starting position of the sportswoman;
– application of the maximum efforts in phase structure of the movement;
– dispensing of range of vertical movement of bar;
– dispensing of speed of bar in different phases of structure of the movement.

For example: sportswomen, who had technique shortcomings, which display violation of dynamic structure of the movement of bar before performance of each following lifting, had to apply more or less muscular efforts in two main phases of exercise – the previous crouch stand or phase of the reference.

Exercises, which promoted the reference of apparatus to the planned height, were used for correction of the movement of bar:

1) S. p. Bar on shoulders, deadlifting of different weight up by identical range (for 25, 50 or 75% to the movement);
2) S. p. Bar on shoulders, deadlifting of one weight up but by different range (for 25, 50 or 75% to the movement);
3) S. p. Bar on shoulders, deadlifting of different weight up (75, 85, 90 and 95% of maximum) for identical range;
4) S. p. Deadlifting of identical weight up by the defined previously ranges of movement (25, 50 or 75% of maximum);

The sportswoman also used methodical technique, which demanded switching off of the visual analyzer from bar range of movement by imposing of bandage on eyes of female weightlifter during correction of motor actions (kinematic and dynamic characteristics of technique of jerk). Activation of work of vestibular analyzer of the sportswoman, and also muscular and articulate feeling was result of it.

Therefore, the subsequent improvement of method of execution of jerk of bar at the qualified female weight-lifters was

Table 1

Average-group model characteristics of technique of jerk of bar at female weight-lifters of the first group of weight categories

Control indicator	$\bar{X}$	±S
Power of the movement of bar (m·v), kg·m·s^{-1}	1,76	0,01
Range of movement of bar in phase of the previous crouch stand (h*mm)*,%	12,2	0,14
Absolute height of movement of bar in phase of the reference($h_{max1)}$, sm	22,6	0,14
Relative height of movement of bar in phase of the reference ($h_{max2)}$, %	14,4	0,10
Maximum speed of movement of bar (v*pp*), m·s^{-1}	1,71	0,009
Maximum force of jerk of bar (F*pp*),%	183,2	0,86
The relations of range of movement of bar at the time of achievement of the maximum speed to the absolute height of its departure ($h_{Vmax.}/h_{max}$), %	63,1	1,24

Table 2

Program of compensatory exercises for correction of technique of jerk of bar

Mistake	Methods	Dosing		Instructional guidelines
		Number of lifting	Zone of intensity, %	
Curvature of trajectory of the movement in deadlifting from breast	S.p. Bar on breasts, performance of the previous crouch stand – pause – starting position	12–16	60–75	Control of the movement of trunk and apparatus precisely behind vertical
The insufficient force of the reference of bar up from breast	Bar jerk from starting position bar on shoulders behind the head	12–20	50–70	Crouch stand on average speed, phase of power – quickly
Finish pressing out of bar by one or two hands	Bar on breasts, jerk with medium crouch "Svung" press from breast + fixing above 4–5 s	12–16	40–50	Depth of medium crouch, as during performance of jerk
Lack of fixing after jerk	Squats with bar on breast	6–8	80–85	Concentration on change of operating mode of muscles of legs without pause
Impossibility to rise from the provision of crouch stand	Bar on breasts, performance of the previous crouch stand – pause – starting position	4–6	90–110	Rate of the movement – down slowly, up quickly, hands in one situation

Table 3

Changes biomechanical characteristics of technique of jerk of bar at female weight-lifters of the first group of weight categories

Control indicator	Value of indicators of technique					
	before the experiment		after the experiment		size of changes	
	$\bar{X}$	±S	$\bar{X}$	±S	t	p
Power of the movement of bar (m·v), kg·m·s^{-1}	1,66	0,02	1,78	0,02	t=4,3	(p<0,05)
Range of movement of bar in phase of the previous crouch stand h*mm)*,%	13,2	0,2	12,6	0,1	t=2,7	(p<0,05)
Absolute height of movement of bar in phase of the reference ($h_{max1)}$, sm	21,4	0,3	22,3	0,2	t=2,5	(p<0,05)
Relative height of movement of bar in phase of the reference ($h_{max2)}$, %	14,9	0,09	14,5	0,07	t=3,6	(p<0,05)
Maximum speed of movement of bar (v*pp*), m·s^{-1}	1,62	0,007	1,68	0,009	t=5,5	(p<0,05)
Maximum force of jerk of bar (F*pp*),%	174,3	1,1	178,8	1,0	t=3,0	(p<0,05)
The relations of range of movement of bar at the time of achievement of the maximum speed to the absolute height of its departure ($h_{Vmax.}/h_{max}$), %	67,3	1,2	63,4	1,3	t=2,2	(p<0,05)

carried out also due to the stabilization and automation of their motive skills with the simultaneous improvement muscular and articulate feeling.

Indicators of technical preparedness in bar jerk, which were recorded at sportswomen at the end of the pedagogical experiment, showed the positive improvement of the motor actions of the qualified female weight-lifters during the executed attempts, which were carried out in the "control" zone of intensity (tab. 3).

Biodynamic characteristics of technique of jerk of bar – the power of the movement (m·*v*) changed towards the improvement – for 7,2% (p<0,05), indicators of range of movement of bar in phase of the previous crouch stand were also optimized – the improvement made 4,5% (from 13,2% to 12,6%). Indicators of absolute and relative height of movement of bar also authentically improved – for 4,2 and 3,0% (p<0,05) respectively. The maximum speed of movement of bar also grew by 3,7% (p<0,05), as well as the maximum force of jerk of apparatus – for 2,6% (p<0,05). The last indicator of technique of jerk of bar also changed towards the improvement, it decreased – by 5,8% (p<0,05).

Therefore, the big half of control biomechanical indicators of technique of jerk were stabilized or improved by the results of influence of compensatory exercises on kinematic and dynamic structure of the movement of bar of the qualified sportswomen. It, on the first, allowed to optimize the range of vertical movement to apparatus of the qualified female weight-lifters, and secondly, to reduce time of switching of operating modes of muscles from appeasable to overcoming what indicators of the maximum force of jerk of bar testify to.

Conclusions

Biomechanical characteristics of technique of jerk of bar which were recorded at the beginning and at the end of the pedagogical experiment showed what the improvement of kinematic and biodynamic characteristics of the movement to

apparatus made 2,6–7,2% ($p<0,05$) from reference values at female weight-lifters of the first group of weight categories, the range of movement of bar in phase of the previous crouch stand was stabilized (11,8–12,6% in relation to body length).

The correction of technical mistakes of sportswomen in bar jerk, by means of group model characteristics of technique of jerk and compensatory exercises allowed to increase the number of successfully executed deadlifting for 19,8% according to initial indicators of quantity of lifting, and also to receive positive shifts in motive structure of jerk of bar.

All this allowed sportswomen to bring closer biomechanical characteristics of technique of jerk of bar to model sizes, and it promoted the increase in sports result during the test of sportswomen whereas to their mass-growth indicators significantly did not change.

Prospects of the subsequent researches will be directed to the search for methods and means of improvement of technical training of female weight-lifters both in snatch, and in jerk depending on qualification and weight categories.

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