Development of technical and tactical actions of qualified athletes in mas-wrestling with use of technical tool

Dmitry Platonov1*, Ilia Cherkashin1,2,3, Egor Kudrin1, Kunne Timofeeva1

1 North-Eastern Federal University in Yakutsk, Russian Federation
2 Yakutsk State Agricultural Academy in Yakutsk, Russian Federation
3 Moscow State Academy of Physical Education, Malakhovka, Moscow region, Russian Federation

Abstract. Purpose: efficiency increase development of technical and tactical actions of qualified athletes in mas-wrestling on the basis of developed technique with use of technical tool and rational use of training means. Materials: 40 qualified athletes have taken part in research, specializing in mas-wrestling. Weight category of athletes is up to 70 kg. Sports qualification is I category. Age range of athletes was 18 – 20 years. Results: modification of “Pulley row” exercise machine which use allows to develop in parallel physical qualities, technical and tactical actions of athletes in mas-wrestling is carried out. The universality of exercise machine promotes holding educational and training occupations in small gyms and platforms. Differentiated criteria for evaluation of technical and tactical actions formation of athletes with use of modified “Pulley row” exercise machine are developed for qualified athletes in mas-wrestling in weight categories up to 70 kg. The technique of development of technical and tactical actions of qualified athletes in mas-wrestling is developed.

1 Introduction

The first mas-wrestling World Cup was held in November, 2014 in Yakutsk (The Sakha Republic, Russia). 186 athletes from 35 countries have taken part in it. Such number of participants has shown great popularity of this national sport not only among the population of Far North, but also in the world [11].

Mas-wrestling (pulling of a stick) is a national sport of the Sakha Republic (Yakutia) recognized in the Russian Federation and entered in 2003 into the All-Russian register of sports. International federation of mas-wrestling is formed in 2011, members are 33 countries. The essence of competitions consists that two athletes, sitting against each other and planting the feet against a special emphasis, have to pull out a stick from hands of an
opponent or draw him on its own side. Length of a stick corresponds to 50 cm, and diameter is 3.0 cm. Positions of hands during a stick grip at athletes are different, inside or outside closer to edges that is defined by a lot in the first fight, further grip changes. The fight begins on the judge’s signal. The athlete who has pulled out a stick or drawn the opponent on its own side is considered the winner. Fights are conducted prior to two victories. Competitions are held on a scaffold of 5x6 meters in size. The board of the emphasis fixed not movably has the sizes: length is 200 cm, height is 25 cm, thickness is 5 cm. Dynamic and fascinating type of single combat. Competitions are held among young men, girls, junior girls, junior boys, women and men [5, 6, 9].

Mas wrestling (earlier name was pulling of a stick) on the nature of motive activity of athletes is high-speed and power sport demanding instant considerable physical tension in a fight, technical and tactical readiness for overcoming the attacking actions of an opponent in a fight [6, 8]. There is a set of technical actions which are connected with realization of tactical option of conducting a competitive fight [12, 17].

Successful outcome of competitive fight in mas-wrestling more depends on development of technical and tactical actions which are shown from the moment of a stick capture. According to V.N. Platonov and V.B. Korenberg’s definition, the concept “action is a method or several methods used for the solution of a certain tactical task”, and “technical and tactical actions are actions which solve a tactical motive problem, the technical side is office” [10, 16]. Works are devoted to questions of theory and technique of sports training of athletes specializing in mas-wrestling [4, 12, 14]. However in these works the technology of development of technical and tactical actions of athletes isn’t reflected in mas-wrestling by application of training mesocycles, criteria for evaluation of technical and tactical actions with use of technical tool. Special researches and student teaching demonstrate that use of traditional techniques though contributes to the development of technical and tactical actions, but at the same time doesn’t allow to increase the level of development of power abilities [13]. This means that an exercise machine which will provide complex development of technical and tactical actions, high-speed and power, power abilities of athletes is necessary.

As a result of the analysis of scientific and methodical literature the weak study of a question concerning a periodization of athletes training in mas-wrestling, features of formation and development of technical and tactical actions of athletes with growth of sports skill is revealed. Only the historical aspect of mas-wrestling is widely presented in literature: formation and development of this national sport [8, 9, 17]. Personal qualities of athletes in mas-wrestling are described [1]. However materials concerning features of athletes readiness taking into account age, stage of long-term preparation, with use of technical means for development of technical and tactical actions of athletes in mas-wrestling are fragmentary presented that demanded further researches in this direction.

In scientific and methodical works data on athletes technique of various qualification in mas-wrestling are fragmentary submitted [11, 12, 7, 18, 10, 20].

The purpose of the work is increase in efficiency of development of technical and tactical actions of qualified athletes in mas-wrestling on the basis of developed technique with use of technical tool and rational use of training means.

2 Materials and methods

Participants. 40 qualified athletes have taken part in research, specializing in mas-wrestling. Weight category of athletes is up to 70 kg. Sports qualification is I category. Age range of athletes was 18 – 20 years. The written consent to participation in researches has been received from athletes.

Organization of research. The research was conducted on the basis of the North-Eastern
Federal University of M.K. Ammosov, Yakutsk. The research took place in three stages. At
the first stage the analysis of scientific and methodical literature on formation and
development questions of technical and tactical actions of athletes in mas-wrestling, use of
technical means in sport was carried out. Questioning of 24 leading trainers of Russia and
the Sakha Republic (Yakutia) having experience with qualified athletes in mas-wrestling is
carried out. The question directed to determination of structure of a year cycle of athletes
training at this stage of long-term preparation in the form of questioning of trainers was
studied. Diaries of 34 athletes of high qualification (MS) are analysed.

At the second stage work on modification of “Pulley row” exercise machine is carried
out. For development of criteria for evaluation of technical and tactical forced actions of
qualified athletes in mas-wrestling have made a search experiment. Test of technical and
tactical actions of athletes with use of modified “Pulley row” exercise machine passed
during it. Athletes consistently carried out exercises on exercise machine, the weight of
burdening was defined in % of maximum row. Following technical and tactical operations
were performed: “bent in stand” (70%), “Ushnitsky” (30%), “reverse bent” (30%),
“stepping” (70%) and “walking on basic board” (50%). Time of performance of each
exercise is 10 seconds.

On the basis of received results of technical and tactical actions testing of athletes the
data array has been received. After carrying out the mathematics and statistic analysis of
received results of researches rating scales of technical and tactical actions formation have
been developed [19]. Criteria calculated taking into account sports qualification and weight
category of athletes on a basis of sigmoid scales where 1 point is low, 2 points are below an
average, 3 points are average, 4 points are above an average, 5 points are high. Also the
technique of technical and tactical actions development of qualified athletes in mas-
wrestling at training stage including an algorithm of modified “Pulley row” use exercise
machine, a basic mesocycle of preparatory period of a year cycle, tests and criteria for
evaluation of technical and tactical actions formation of athletes has been developed.

At the third stage pedagogical experiment for assessment of developed technique
efficiency of technical and tactical actions development of qualified athletes in mas-
wrestling is made. 40 athletes specializing in mas-wrestling have taken part in it. They have
made control and experimental groups 20 people in everyone. When forming groups the
criterion of uniformity according to anthropometrical data, age, sports experience,
indicators of hand dynamometry of athletes was considered. The value of coefficient of
variation doesn’t exceed 10% that demonstrates uniformity according to anthropometrical
data, age, hand dynamometry of right and left hands of examined

During the experiment pedagogical testing, definition of indicators of functional state,
analysis of competitive activity of athletes was held. The complex of tests for determination
of physical fitness included the following exercises: a long jump from the place (m), row on
exercise machine in a sitting position (kg), row on exercise machine in a sitting position
(kg), squat with a bar (kg), press of a bar lying (kg). Coefficient of relative force of top
extremities was calculated after obtaining result in a press of a bar lying. Coefficient of
relative force of top extremities was calculated by formula: indicator of a press of a bar
lying (kg)/m (kg) where m is a body weight of athlete. For assessment of technical and
tactical actions development testing with use of “Pulley row” exercise machine was held.
Athletes carried out consistently such exercises “bent in stand” (size of burdening is 70% from
maximum, performance time is 10 s), “Ushnitsky” (30%, 10 s), “reverse bent” (30%,
10 s), “stepping” (70%, 10 s), “walking” on emphasis board (50%)

Diagnostic automated “Cardio+” complex was applied to definition of indicators of
functional condition of athletes [3, 6]. Indicators of heart rhythm regulation including
analysis of variability of heart rhythm (mathematical, spectral), determination of vegetative
balance, index of regulatory systems tension, functional state according to Bayevsky R. M.,
etc., condition of myocardium on the basis of full amplitude-time parameters of electrocardiography, analysis of violations of heart rhythm, psychoemotional state on indicators of emotional state index, degree of mental tension are revealed.

Statistical analysis. Processing of experimental material was carried out by means of integrated statistical and graphic packages – IBM SPSS Statistics-22, Excel by means of which average values determined, standard deviation, variation coefficient, assessment of reliability of distinctions with use of Student’s t-test [15]. Rating scales for determination of level of formation levels of technical and tactical actions of athletes in mas-wrestling calculated on basis of sigmoid scales [19]. While calculating two sizes – average value and standard deviation were considered.

3 Results

We have carried out modification of “Pulley row” exercise machine use of which after transformation contributed to development of technical, tactical and physical fitness of athletes in mas-wrestling. It differs from traditional power simulator in fact that for imitation of fight on mas-wrestling the body is supplied with an emphasis board for legs, and device for hand capture is connected by means of flexible communication with a set of counterbalances through the system of blocks on a vertical rack of the core the lower blocks of which are made rotary, at the same time the external rotary block in addition has a possibility of movement on horizontal guides parallelly to emphasis board. Besides, for fight imitation on mas-wrestling flexible communication of device for creation of dynamic resistance contains the springing element between the system of blocks and a set of counterbalances.

Corresponding criteria have been developed for informative assessment of technical and tactical actions formation of athletes with use of modified “Pulley row” exercise machine (table 1).

**Table 1. Ranges of formation levels of technical and tactical actions of qualified athletes in mas-wrestling with use of modified “Pulley row” exercise machine (men, up to 70 kg)**

<table>
<thead>
<tr>
<th>Actions</th>
<th>Levels</th>
<th>Quantity of performed actions for 10 s</th>
</tr>
</thead>
<tbody>
<tr>
<td>“bent in stand”</td>
<td>low, below average</td>
<td>3 &lt; x_i ≤ 5</td>
</tr>
<tr>
<td>“reverse bent”</td>
<td>x_i ≤ 7</td>
<td>7 &lt; x_i ≤ 9</td>
</tr>
<tr>
<td>“ushnitsky”</td>
<td>x_i ≤ 6</td>
<td>6 &lt; x_i ≤ 9</td>
</tr>
<tr>
<td>“stepping”</td>
<td>x_i ≤ 11</td>
<td>11 &lt; x_i ≤ 13</td>
</tr>
<tr>
<td>“walking”</td>
<td>x_i ≤ 3</td>
<td>3 &lt; x_i ≤ 5</td>
</tr>
</tbody>
</table>

**Note:** x_i is result of athlete shown during testing of technical and tactical actions with use of exercise machine.

As a result of conducted researches development technique of technical and tactical actions with use of modified “Pulley row” exercise machine including three components is developed. The first component is an algorithm of performance of technical and tactical actions on modified “Pulley row” exercise machine in which the detailed description of performance of technical and tactical actions by athlete with movement and without movement on a support board is submitted. Recommendations about consecutive development of these actions with representation of tasks, means, organizational and methodical instructions are developed.

Second component of technique is basic mesocycle of preparatory period of a year
cycle. Third component – estimation of formation levels of technical and tactical actions of qualified athletes in mas-wrestling with use of modified “Pulley row” exercise machine.

Before pedagogical experiment organized for assessment efficiency of developed technique of technical and tactical actions development of athletes in mas-wrestling with use of modified “Pulley row” exercise machine average values of results of pedagogical testing which don’t differ among themselves that indicates uniformity of two selectively created groups have been revealed (table 2).

As a result of results analysis received during the pedagogical testing directed to identification of motive qualities development have defined that in experimental group 6 of 8 indicators of testing has statistically authentically changed after carrying out an experimental mesocycle (p˂0,05), and in control group only the tendency to improvement of result is observed, but reliable differences aren’t revealed (p˃0,05) (table 2).

### Table 2. Changes of physical fitness indicators of qualified athletes in mas-wrestling

<table>
<thead>
<tr>
<th>Test</th>
<th>Result in testing, $X^- \pm S$</th>
<th>Experimental group (n= 20)</th>
<th>Control group (n= 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand dynamometry of right (kg)</td>
<td>Before beginning of mesocycle</td>
<td>49±3,64</td>
<td>49±5,50</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>53±4,07*</td>
<td>49±5,63</td>
</tr>
<tr>
<td>Hand dynamometry of left (kg)</td>
<td>Before beginning of mesocycle</td>
<td>47±5,27</td>
<td>46±3,72</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>49±4,22</td>
<td>47±4,76</td>
</tr>
<tr>
<td>Deadlift dynamometry (kg)</td>
<td>Before beginning of mesocycle</td>
<td>144±7,26</td>
<td>145±8,24</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>162±8,12*</td>
<td>149±7,68</td>
</tr>
<tr>
<td>“Pulley row” (kg)</td>
<td>Before beginning of mesocycle</td>
<td>169±9,32</td>
<td>167±6,88</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>191±10,01*</td>
<td>174±9,12</td>
</tr>
<tr>
<td>Benchpress (kg)</td>
<td>Before beginning of mesocycle</td>
<td>60±6,32</td>
<td>60±5,23</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>73±6,21*</td>
<td>62±9,22</td>
</tr>
<tr>
<td>Front squat (kg)</td>
<td>Before beginning of mesocycle</td>
<td>100±9,16</td>
<td>98±10,35</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>120±9,87*</td>
<td>102±6,71</td>
</tr>
<tr>
<td>Pull-ups (quantity times)</td>
<td>Before beginning of mesocycle</td>
<td>12±2,9</td>
<td>12±2,80</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>17±3,07*</td>
<td>12±3,16</td>
</tr>
<tr>
<td>Coefficient of relative force of top extremities (o.e.)</td>
<td>Before beginning of mesocycle</td>
<td>0,85±0,18</td>
<td>0,85±0,10</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>1,04±0,22*</td>
<td>0,88±0,17</td>
</tr>
<tr>
<td>Standing long-jump (m)</td>
<td>Before beginning of mesocycle</td>
<td>2,38±0,12</td>
<td>2,38±0,14</td>
</tr>
<tr>
<td></td>
<td>After termination of mesocycle</td>
<td>2,51±0,13</td>
<td>2,45±0,14</td>
</tr>
</tbody>
</table>

**Note:** * – p<0,05 relatively corresponding value before pedagogical experiment in groups

Results of testing demonstrate that athletes of experimental group have had a considerable gain of indicators of force and power endurance that was shown in increase of right hand force and forearm, muscles of trunk extensors, hands and legs.

## 4 Conclusions

The technique of development of technical and tactical actions of qualified athletes in mas-wrestling at a training stage is developed. The technique includes an algorithm of use of modified “Pulley row” exercise machine, developed basic mesocycle of preparatory period of the year cycle consisting of 9 microcycles of different orientation (one is
involving, six percussions and two recovery), tests and criteria for evaluation of formation of technical and tactical actions of athletes.

Efficiency of developed technique of technical and tactical actions development of qualified athletes in mas-wrestling at training stage was confirmed during pilot studies during which definition of indicators of physical fitness, assessment of functional state, formation of technical and tactical actions and competitive activity was carried out. At athletes of experimental group, unlike control group, at the end of experiment high rates of physical fitness statistically authentically different from basic data in six pedagogical tests were observed ($p<0.05$). Upon termination of experiment 91% and 9% of athletes with high and above average level of functional state respectively are revealed. Level of technical and tactical actions at athletes of experimental group has also positively changed at 64% average level, and at 36% – above average is revealed.

Competitive practice was also more successful at athletes of experimental group. Throughout 5 competitions of republican and All-Russian level athletes of experimental group have won four bronze medals, have taken four fourth places. In control group at the same competitions the highest achievement are the two fifth places.

References

15. S.V. Nachinskaya, Sportivnaya metrologiya (2012)
19. V.M. Zatsiorsky, Fundamentals of sports metrology (1979)