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# Increasing of young Greco-Roman wrestlers technical activity level by means of developing coordination and body balance maintaining

**Authors' Contribution:**
A Study Design
B Data Collection
C Statistical Analysis
D Manuscript Preparation
E Funds Collection

**Aleksander Yurievich Osipov** [1,2ABCDE], **Roman Sergeevich Nagovitsyn** [3ABCDE], **Sergii Sidorovich Iermakov** [4CDE], **Władysław Jagiełło** [4CDE]

[1] Department of Physical Culture, Siberian Federal University, Krasnoyarsk, Russia
[2] Department of Physical Culture, Professor V.F. Voyno-Yasenetsky Krasnoyarsk State Medical University, Krasnoyarsk, Russia
[3] Department of Physical Culture and Safety Life, Glazov State Pedagogical Institute named after V.G. Korolenko, Glazov, Russia
[4] Department of Sport, Gdansk University of Physical Education and Sports, Gdansk, Poland

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## Abstract

**Background and Study Aim:** Experts point to a lack of coordination abilities development at young Greco-Roman athletes in practice of pre-competitive training is revealed. The aim of the study – knowledge about to increase of young Greco-Roman wrestlers technical activity level in competitive matches by means of developing coordination and athletes body balance maintaining.

**Material and Methods:** Two groups of young (13-14 years old) athletes (total 27: G-1, n = 13; G-2, n = 14) practiced Greco-Roman wrestling for more than three years. The athletes G-2 performed special exercises to develop coordination and maintain a steady body balance in the second stage of the study. The all athletes have at least one year of competitive experience. The research period was 2 years.

**Results:** Expert analysis of competitive matches of all athletes at the first stage of the study showed a significant ($p<0.05$) superiority of athletes G-1 of some technical activity indicators over athletes G-2. Analysis of competitive matches revealed a significant ($p<0.05$) advantage of athletes G-2 of some technical activity indicators (wrestling in standing position, positive balance between won and lost technical scores in the match) over athletes G-1 in the second stage of the study.

**Conclusions:** The use of the necessary amount of motor exercises for the coordination abilities development and maintaining a stable balance, contributes to increase of young Greco-Roman wrestlers special technical activity indicators in competitive matches.

**Keywords:** competitive matches • pre-competitive period • technical scores • training sessions



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**Author's address:** Władysław Jagiełło, Department of Sport, Faculty of Physical Culture, University of Physical Education and Sports, K. Gorskiego Str. 1, 80-336 Gdansk, Poland; e-mail: wjagiello1@wp.pl

**Wrestling** – *noun* a sport in which two contestants fight by gripping each other using special holds, each trying to force the other's shoulders onto a mat [41].

**Wrestling** – Olympic sport which involves a direct combat between two competitors.

**Score** – *noun* **1.** the total number of points gained by a player or team at the end of or during a match or game. **2.** a record of the number of points gained by a player or team in a match or game [41].

**Strength** – *noun* the fact of being strong [41].

**Strength training** – *noun* training that aims to build muscle strength, usually resistance training [41].

**Technique** – *noun* a way of performing an action [41].

**Competitive** – *adjective* **1**. involving competition. **2.** tending to want to do something better than others or achieve more than others [41].

**Balance –** *noun* **1.** the act of staying upright and in a controlled position, not stumbling or falling **2.** a state of emotional and mental stability in which somebody is calm and able to make rational decisions and judgments [41].

**Coordination** – *noun* the ability to use two or more parts of the body at the same time to carry out a movement or task [41].

**Training session** – *noun* a period of time during which an athlete trains, either alone, with a trainer or with their team [41].

## INTRODUCTION

Scientists believe that wrestling is the best way to develop the basic physical qualities of a person at a young age [1]. The young people who regularly engage in sports activities show higher indicators of strength, manoeuvrability, flexibility and endurance compared to peers who do not practice sports [2]. These factors contribute to the development of modern young people's interest in Greco-Roman wrestling. The experts note that modern sport wrestling is characterized by the establishment of physical dominance of one of the athletes and control of the opponent's actions in a competitive match [3]. To achieve sporting success, wrestlers need high indicators of muscle strength development [4] and special endurance [5, 6]. Today, many coaches estimate the probability of growth or decline of competitive results of athletes in Greco-Roman wrestling primarily by the characteristics of the level of physical fitness of wrestlers [7, 8]. The general trend for a significant increase in the physical fitness of athletes, starting from the moment of selection to the school of wrestling, was revealed in the training process of freestyle and Greco-Roman wrestlers [5], sambo [9] and judo [10-12]. Experts point out that today many coaches conduct the procedure of sports selection in Greco-Roman wrestling schools, taking into account the potential of physical and functional capabilities of young boys [13]. Special psychophysiological methods [14], functional tests and anthropometric measurements that allow fairly accurate assessment of the development potential of young athletes in relation to the indicators of physical fitness of elite wrestlers are used [15].

In addition to the problems of increasing the level of physical fitness of young athletes, there is a issue of poor quality of training of young wrestlers in tactical and technical actions. Experts note that there is a need for a deep tactical and technical analysis of the training process of young athletes for competitive wrestling [16]. Frequent changes in the rules of competition have led to a significant increase in the level of activity of athletes in competitive matches [17]. Increasing the level of competitive activity of athletes is inextricably linked with an increase in the total number of tactical and technical actions of wrestlers in matches [18]. However, experts point to a lack of quantity and quality of technical actions of athletes in competitive matches [19]. It is necessary to improve the training process of Greco-Roman wrestlers for competitive activities, taking into account the increase in the level of technical activity of athletes [20].

There are significant differences between winners and defeated wrestlers in the number and quality of technical actions in standing (vertical) and ground (horizontal) wrestling [21]. The various opinions on the organization of young wrestlers' pre-competitive training period are presents in the scientific literature. Experts suggest paying attention to the ability of young athletes to perform various techniques of wrestling at the beginning of the training process [22]. There are recommendations for the implementation of special programs that allow you to develop certain abilities of young men, at the beginning of their training in wrestling techniques. These programs will develop and improve the ability of young people to special movements in sport wrestling [23]. There is a data on the possibility of increasing the level of technical and tactical readiness of young Greco-Roman wrestlers by methods of assessing competitive activity [18]. Statistics indicate that young elite Greco-Roman athletes have an attacking efficiency: 1.32 scores per minute [16]. It is known that elite Greco-Roman wrestlers won most technical scores in the ground wrestling [24].

Most experts evaluate the quality of athletes' training and the possibility of achieving high competitive results according to physical fitness [25] and physiological profiles of wrestlers [26]. The physical fitness of athletes scientists include indicators of muscle strength [27], speed reaction [28], power and anaerobic capacity [6]. Scientists point out that change in competition rules (reduced match time and high activity requirements for athletes) require athletes to have a high level of power and performance with significant anaerobic effort [29]. Indicators of the development of coordination abilities and maintaining body balance are not a priority for coaches when training young athletes for competitive activities [13]. In the scientific reports, there is evidence that there is no significant effect of muscle fatigue on the indicators of static and dynamic balance of wrestlers [30]. There is also evidence that it is possible to increase body balance due to increased development of muscular strength of athletes, in particular leg strength [31]. Nowadays balance could be improved with specific strength training such

as blood flow restriction and plyometric training [32]. The size and weight of athletes, in particular shoulder girth and hip girth, have a significant impact on the ability to maintain a stable balance [33]. Perhaps this is why many coaches do not see the need for special training sessions to develop coordination abilities and maintain a stable balance of the athletes'. Coaches focused on the accelerated development of muscle strength indicators in athletes [4], power, performance [5] and speed of technical actions [34].

There is a lack of information about the need to develop coordination abilities and the ability to maintain a stable balance in young athletes who practice martial arts [35]. It is known that indicators of development of coordination abilities and balance occupy an important place in the formation of high performance in sports [36]. Experts pay special attention to the need to develop coordination motor abilities of young athletes practicing Greco-Roman wrestling. The total amount coordination training sessions must account for about 23% of the total training loads [37]. Significant correlations were found between indicators of development of coordination abilities and technical skills of Greco-Roman athletes [38]. Unfortunately, the analysis of training and competitive activity of young wrestlers revealed a lack of special training to develop coordination and maintain a stable balance of young athletes, as in Greco-Roman wrestling [13], and in other types of martial arts [39, 40].

The review of the presented scientific data determined the main aim of the study – knowledge about to increase of young Greco-Roman wrestlers technical activity level in competitive matches knowledge about increase of young Greco-Roman wrestlers technical activity level in competitive matches by means of developing coordination and athletes body balance maintaining.

## MATERIAL AND METHODS

### Participants

Young (13-14 years old) boys, practicing Greco-Roman wrestling for at least three years. The all athletes (n = 27) had experience of competitive activity not less than one year. The division into groups G-1 (n = 13) and G-2 (n = 14) is based on expert assessments of the first stage of the study. The young athletes competed in weight categories: up to 57 kg and up to 62 kg. The all boys and their parents gave their consent to participate in the study.

This study was approved by the local ethics Committee of the Institute of physical culture, sports and tourism, Siberian Federal University.

### Study design

The main bases of the study are sport wrestling schools located in two regions of the Russian Federation: Krasnoyarsk Region and Udmurt Republic. The research period was about 2 years (2018-2019).

The first stage of the study (2018) was an analysis of athletes' competitive matches. The task of the analysis is to determine of athletes individual technical activity in competitive matches. Were presented for the analysis 416 competitive matches of study participants. The analysis was carried out by invited experts-honoured wrestling coaches and athletes of high level of competitive achievements (12 experts in total). Experts evaluated the following of athletes technical activity (TA) indicators: correlation between won and lost competitive matches (TA-1); the ratio between of total won technical scores number and won a number of technical scores in wrestling in standing (vertical) position (TA-2); the ratio between of won total scores number and the number of technical scores won in the ground (horizontal) wrestling (TA-3); the ratio between the amount of won and lost technical scores athletes in competitive match (TA-4). Experts separately assessed of athletes efficiency level in attacking actions (TA-5, technical scores number won per minute of a competitive match).

Should remember: higher TA-1, TA-4 and TA-5 values and lower TA-2 and TA-3 values indicate of athletes' higher technical activity indicator.

All athletes conducted 292 training sessions in the second stage of the study. Total training amount: 174 training sessions (pre-competition period); 68 training sessions (physical fitness); 32 sparring sessions (wrestling days) and 18 training sessions (special competition training). Each training session time duration 80-90 minutes.

For athletes G-2 training sessions included methods of purposeful development of coordination abilities and body balance preservation in dynamic conditions in pre-competitive period. The basis of these

methods was to use certain sets of exercises that allow wrestlers to maintain a stable balance in the dynamics of a competitive match. The exercises selection is made taking into account the recommendations of experts on the formation of the ability to maintain a stable balance in young wrestlers. The following exercises were used in the study: speed pushing out of the wrestling mat; pushing out of a certain zone; attempts to simultaneously throw by two wrestlers in a tight strength grip; pushes in a position of unstable balance; turns and rotations in a limited space and other training tasks. The athletes G-2 performed these motor tasks at each training session, in the amount of at least 25-30% of the total training time. The athletes G-2 performed some motor exercises in physical fatigue conditions at the end of training. This allowed us to simulate the situation of competitive matches. During the second stage of the study, there were 174 similar training sessions (pre-competitive period).

The athletes G-1 did not use these techniques in pre-competitive period. During the second stage of the study, experts evaluated 423 competitive matches of all athletes (G-1 and G-2). The main indicators of wrestlers' technical activity level (TA-1; TA-2; TA-3; TA-4; TA-5) were determined.

### Statistical analysis

Statistical analysis of the study data was performed using SPSS20. The validity of the study results was determined using the Mann–Whitney U–test.

## RESULTS

Expert analysis allowed to identify two groups of athletes. The athletes G-1 (n =13) showed significantly ($p<0.05$) higher TA indicators in the ratio between won and lost technical scores and positive balance between won and lost matches. The athletes G-2 (n=14) were characterized by higher performance in ground wrestling. All athletes scored more technical scores in wrestling in standing position. The expert analysis revealed that most of the won technical scores in wrestling in standing position athletes gain by pushing the opponent outside the wrestling mat. The other techniques number in wrestling in standing position is small and is mainly associated with the throw of the opponent to the mat due to speed and power efforts. A significant number of pushes and dumping of the opponent on a mat at young athletes in competitive wrestling is revealed.

The first stage of the study (2018) showed a significant ($p<0.05$) advantage of athletes G-1 in the data: TA-1 and TA-4. These results indicate a higher percentage of won matches and ratio between of won and lost technical scores total amount for athletes G-1. There were no significant differences between athletes in wrestling in standing position (TA-2). Reliable ($p<0.05$) advantage of athletes G-2 in ground wrestling (TA-3) was revealed. There were no significant differences in TA-5 data of both group athletes (Table 1).

The each of athletes' technical performance was evaluated on average for 15.41 ±0.46 matches. It was found that the average number of matches won by athletes G-1 is 8.72 ±0.33. The athletes G-2 won 6.92 ±0.35 matches on average. The total number of technical scores won, on average per match, is 7.48 ±0.21 for athletes G-1 and 6.91 ±0.37 for athletes G-2. The scores number won in wrestling in standing position is 4.11±0.15 for athletes G-1 and 3.58 ±0.25 for athletes G-2. The scores number won in a ground wrestling is on average for athletes G-1: 3.07 ± 0.06, for athletes G-2: 3.33 ±0.12. The average scores number lost per match is 5.86 ±0.14 for athletes G-1 and 6.76 ±0.09 for athletes G-2.

**Table 1.** The athletes' technical performance in competitive matches (2018-2019)

| TA indicators | 2018 | | 2019 | |
|---|---|---|---|---|
| | G-1 (n = 13) | G-2 (n = 14) | G-1 (n = 13) | G-2 (n = 14) |
| TA-1 | **1.30 ±0.14*** | 0.82 ±0.17 | 1.69 ±0.41 | 1.72 ±0.22 |
| TA-2 | 1.82 ±0.10 | 1.93 ±0.02 | **2.02 ±0.07*** | 1.68 ±0.14 |
| TA-3 | **2.44 ±0.05*** | 2.08 ±0.07 | 1.98 ±0.26 | **2.47 ±0.17*** |
| TA-4 | **1.28 ±0.15*** | 1.02 ±0.12 | 1.05 ±0.12 | **1.27 ±0.18*** |
| TA-5 | 1.25 ±0.07 | 1.15 ±0.17 | 1.33 ±0.16 | 1.46 ±0.13 |

*$p<0.05$ significance level

The second stage of the study (2019) showed a significant ($p<0.05$) advantage of athletes G-2 in TA-2 and TA-4 indicators. The athletes G-2 significantly increased the percentage of successful technical actions and scores number won in wrestling in standing position. Reliable ($p<0.05$) superiority of athletes G-1 in ground wrestling (TA-3) was revealed. Athletes' indicators: TA-1 and TA-5 in both groups did not have significant differences.

TA indicators of each athlete were evaluated on average for 15.68 ±0.34 matches. The number of competitive matches won for athletes G-1: 9.86 ±0.45, for athletes G-2: 9.92 ±0.36. The total scores number won on average for a competitive match is 7.99 ±0.23 for athletes G-1 and 8.75 ±0.19 for athletes G-2. The won of technical scores number in wrestling in standing position in competitive match averages 3.96 ±0.08 for athletes G-1 and 5.21 ±0.12 for athletes G-2. The won technical scores number in the ground wrestling is on average in athletes G-1: 4.03 ±0.15, in athletes G-2: 3.54 ±0.07. The lost scores number in the match is on average for athletes G-1: 7.63 ±0.29, for athletes (G-2: 6.88 ±0.24.

## DISCUSSION

At the discussion beginning, we should highlight some limitations of our study related of total participants' number. It was not easy to find young Greco-Roman wrestlers who were similar in age, wrestling experience and weight categories. It should be noted of many coaches resistance to our proposals to change the plan for the pre-competition training of young wrestlers. Most coaches require of wrestlers a high level of speed, power [29] and anaerobic capacity [6] in competitive matches. The requirements for coordination and sustainable body balance maintaining are not priority [13]. Experts point out that most technical scores Greco-Roman wrestlers win in ground wrestling [24]. For successful ground wrestling athletes need high power performance. Our studies have shown that young wrestlers (13-14 years old) in competitive matches prefer wrestling in standing position. Athletes of both groups had a greater won technical scores number in wrestling in standing position (on average per match) in the second stage of the study. For a successful wrestling in standing position, young athletes need of coordination and a stable body balance high level [38].

Polish specialists presented data on the amount of coordination trainings in the practice of training young Greco-Roman wrestlers for competitive activities. In the period of pre-competitive training of athletes, coordination trainings account for about 23% of the total training loads [36]. In our research, the amount of special exercises to develop coordination and maintain a stable body balance was at least 25-30% of the total training time. Studies show that athletes G-2 practiced such training sessions have significantly ($p<0.05$) higher TA indicators (wrestling in standing position, difference won and lost technical scores in the match). In our opinion, the minimum amount of such trainings in the practice of training young wrestlers should be at least 25% of the total training loads.

Russian scientists presented scientific data on the possibility of increasing TA level of young Greco-Roman wrestlers by assessing of athletes competitive performance level (the percentage of won competitive matches and the percentage of successful technical actions). The young wrestlers who have high scores (more than 65%) of winning matches and holding successful receptions can participate in higher-level competitions. At the same time, the age and duration of the practice of wrestling does not matter. However, the practice of using this method indicates a significant percentage (more than half) of young wrestlers who do not meet these criteria during the first 3-4 years of training [18]. All participants at best won about 55% competitive matches on the first stage of our study. The athletes G-2 were significantly inferior to athletes G-1 in terms of winning competitive matches and winning technical scores. The use of techniques for developing coordination abilities and maintaining a stable body balance allowed athletes G-2 to surpass athletes G-1 in terms of winning technical scores on average for one year. The athletes of both groups had about 63% won competitive matches at the study end.

Croatian experts note that the young athletes of their national team carry out a greater percentage of successful technical actions in the center of the mat. The young Croatian wrestlers have a high (1.32 scores per minute) attacking efficiency [16]. Athletes G-2 on average showed higher attacking efficiency results (1.46 points per minute) and implemented attacking actions in the moving to the all zone of mat in our research. There is evidence that most of the

technical scores Greco-Roman wrestlers win in the ground wrestling [24]. A significant increase of won technical scores number by athletes G-2 in wrestling in standing position was revealed in the second stage of the study. It can be assumed that the increase of athletes G-2 technical actions effectiveness in wrestling in standing position contributes to the use of methods of purposeful development of coordination abilities and maintaining a stable dynamic balance of athletes.

## CONCLUSIONS

Today, experts determinate the possibility of achieving sports results in Greco-Roman wrestling of potential physical fitness profile of athletes. The training process in Greco-Roman wrestling is aimed at achieving a significant superiority of wrestlers in muscle strength, speed and performance over opponents. Coaches do not pay enough attention to the development of coordination abilities of young wrestlers, mistakenly underestimating the impact of coordination and the ability to maintain body balance on the competitive result. Our study have shown a significant ($p<0.05$) superiority of athletes TA indicators (TA-2; TA-4) who used the coordination and stable balance training sessions, over other athletes. The coordination and stable balance motor exercises should be used in most training sessions. The total amount of coordination and stable balance training sessions is at least 25-30% of the total training load of young Greco-Roman athletes in the pre-competition period.

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