

Original Article

Direction of knowledge formation in the field of power training of athletes specialized in sports wrestling

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Abstract

Purpose. In the present article there is discussed the direction of the formation of the main knowledge about the strength training of the athletes, specialized in different types of sports wrestling.

Material. We have studied the accessible, fundamental informational materials of a number of leading scientists on the physiological mechanisms of controlling motor actions in various types of sports wrestling from the standpoint of the rational use of athletic strengths in relation to the diversity of their motor activity, which ensures the effectiveness of the emulative wrestling

Results. This knowledge opens mainly physiological mechanisms of the intermuscular and intramuscular coordination during the intensive power of the motor sport actions and also the muscle reactivity and their neuroregulation.

Conclusions. At the same time, this knowledge doesn't reflect directional influence on the processes and phenomena, that stay at the basis of the manifestations and development of various types of power in relation to the variety of motor activity, ensuring the effectiveness of emulative wrestling.

Keywords: wrestling; power training; technical skill; physiological mechanisms; neuro-regulation mechanisms.

Introduction

An analysis of the special literature, which reflects the methodology of strength training of athletes specialized in wrestling, reflects the historically established orientation towards the manifestation of maximum and explosive strength, strength endurance in relation to such motor actions as pulling up on the crossbar, bending and unbending the arms in a lying position, bench press, barbell jerk, squat with a barbell, throws of a stuffed ball, high and long jump, rope climbing, etc. (Bojchenko & Belyh, 2003; Prohorova & Semenov, 2005; Vel'gishev, 2009). For the development of strength endurance there are recommended in the literature dummy throws (Bojko, & Dan'ko, 2004; Kajda, et al., 2012), keeping the angle between the shoulder and forearm in the position of the hang on the bar, lifting the torso lying on your back, lifting the straightened legs from the hang on the gymnastic wall (Latyshev, 2013; Manolachi & Chebanu, 2000; Standart, 2013; and others). All these motor actions, requiring the manifestation of power qualities, are associated with various components of general, auxiliary or special power readiness, but do not reflect the directed influence on the processes and phenomena that underlie the manifestation and development of various types of force in relation to the variety of motor activity, ensuring competitive efficiency struggle. That is why, the study of this issue even at a theoretical level, in our opinion, is an urgent task.

Moreover, in our vision, the general didactic and special principles of improving the strength of the wrestlers from different trials are insufficiently disclosed, the research and the achievement of which reflects a rather limited approach regarding the fundamentals of rational construction of sports training, the lack of adequate support on a volume vast knowledge of empirical knowledge in both the theory and methodology of sports training, as well as a number of related disciplines (anatomy, biomechanics, biochemistry, physiology, sports medicine and others) and scientific approaches (systemic approach, adaptation theory, motion control theory, the theory of functional systems and others), elaborated in the form of specific laws and principles. At the basis of the rational process of sports training, including the theoretical and methodological principles of strength training, the progressive experience of sports practices and general teaching principles - that of availability, awareness, activity, clarity, systematic, sequence, resistance (Ivanov, et al., 2004; Ivanov-Katanskij, 1997; Karamov, 2009).

Goal. To study the directions of development of knowledge on the physiological mechanisms of controlling motor actions in various types of sports wrestling from the standpoint of the rational use of power qualities of athletes.

Tasks. To analyze available specialized sources for various types of martial arts in the field of physiology of muscular activity of wrestlers with their active motor-technical actions.

Determine the most significant literary sources in which, in an accessible form are shown methods for the rational development of the power abilities of wrestlers of various styles in relation to the diversity of their physical activity, which would ensure the effectiveness of emulative wrestling.

Material and methods

We have studied the accessible, fundamental informational materials of a number of leading scientists on the physiological mechanisms of controlling motor actions in various types of sports wrestling from the standpoint of the rational use of athletic strengths in relation to the diversity of their motor activity, which ensures the effectiveness of the emulative wrestling.

Results and discussion

It is well known that the level of development and manifestation of strength is determined by many factors of anatomical, morphological, biomechanical, physiological, psychological nature, the consideration of which is fundamentally important both when working on the development of power qualities, and for developing the ability to implement them in competitive activity. A large number of studies have been performed that demonstrate the need of taking into account when studying and improving the fighting technique, the style of conducting fights, the specifics of the manifestation of power, speed and coordination capabilities, the body structure of athletes - growth, length of limbs, body weight (Manolachi, 1989; Ratamess, 2012; Gorgolewski, et al., 2016; Nagovitsyn, et al., 2017). The structure of various techniques and motor actions has been subjected to no less comprehensive study, providing the most advantageous movements from the standpoint of biomechanics, their effectiveness due to the optimal combination of dynamic, temporal and spatial characteristics (Arakchiyski & Stanchev, 2016; Janget al., 2009; Komi, Ishikawa & Salmi, 2009; Manolachi, 2003).

The physiological laws of controlling motor actions in the fight against the positions of rational use of the power qualities of athletes have been studied to a much lesser extent. There is a clear underestimation of the neuroregulatory mechanisms for the development of various power qualities, their relationship with the core elements of techniques and motor actions. In the vast majority of textbooks and teaching aids intended for trainers in Greco-Roman wrestling, freestyle wrestling, judo, sambo, not to mention the many less common and popular types, this is the most important aspect of an athlete's physical fitness, its connection with the structure of competitive activity, elements of technical skills are left without due attention. Well-known experts pay attention to this (Ivanov-Katanskij, 1997; Kupcov, 1978), which rightly note the need for the development of power qualities in unity with speed abilities and consider in the form of an independent section the training of wrestlers - speed and strength training, providing high power of sports work (Manolachi, 2015). At the same time, it is necessary to strive to develop those speed abilities that are based on the following mechanisms: improving intermuscular coordination as an important factor in increasing the power of motor actions; improvement of intramuscular coordination - the ability to activate a large number of motor units of muscles and synchronize their activity; increase in muscle reactivity, determined by its structure and characteristics of neuro-regulation. Moreover, to increase speed-power capabilities, there are recommended exercises with high weights in terms of spatial and temporal characteristics similar to the main techniques. These exercises should be organically combined with general training, performed with large weights, allowing performing 8-12 repetitions in the set (Vasil'kov & Sidorov, 2009; Karamov, 2009; Kupcov, 1978).

Considering the problem of special strength training, authors (Vasil'kov & Sidorov, 2009; Ivanov-Katanskij, 1997; Kupcov, 1978) recommend classifying training methods according to a specific type of strength: methods with a primary focus on the development of explosive power and reactivity; methods with a primary focus on the development of the power component of movements; methods with a primary focus on the development of the speed-power component of movements; methods with a primary focus on the development of power endurance.

At the same time, the implementation of any technique or motor action in wrestling requires the manifestation of the athlete's ability to control the manifestation of various types of strength - speed (starting and explosive), maximum, static and dynamic, strength endurance, as well as manifestations of strength in various modes of muscle activity - concentric, eccentric, plyometric, ballistic, isometric (Vasil'kov & Sidorov, 2009). The manifestation of various types of strength in various modes of muscle activity in organic connection with the sports technique, coordination abilities, the capabilities of energy supply systems is an extremely complex and constantly changing process of interaction of many characteristics that reflect the manifestation of power qualities and their interaction with other components of fitness, that ensure achievement of the desired result (Kibler et al., 2006; Barr & Lewindon, 2014).

It is especially necessary to emphasize the need for an organic relationship between technical skill and strength preparedness, which are fragmentary shown in the I. A. Morgunov's work (1979) with coauthors. So, in studies conducted with the participation of 176 high-class wrestlers, a relationship was found between the performance of the main techniques and the level of absolute and relative strength of the corresponding muscles and muscle groups [Ivanov, et al., 2004; Kupcov, 1978]. For example, it was found that when performing a dive

arm-to-arm transfer with a torso grasp, the strength capabilities of the shoulder flexors and hip extensors are of the greatest importance. A roll over with a grip on the neck and thigh on the side requires a high level of strength of the flexors of the forearm, lower leg, muscles, extensors of the foot. A jerk overturn with a grab on the neck and shoulder from above requires the development of the strength of the flexors of the body, and then the extensors of the lower leg. As the authors note, the strength of the muscles that provide plantar flexion of the foot is important for the effective execution of throws by cutting inside and out. They also note that the use of physical qualities in a fight is largely associated with the musculoskeletal sensitivity of athletes, which allows the athlete to clearly and timely respond to any unexpected situation (Karamov, 2009).

It should also be noted that in the literary sources there is no manifestation of maximum strength when performing most motor actions in the struggle. In their opinion, the explosive force and power of work, realized by close interaction of different muscles, effective intramuscular and intermuscular coordination with the fastest possible involvement of a large volume of motor units of muscles, are of decisive importance. At the same time, our opinion is confirmed by the opinion of individual authors that the means of strength training should meet the competitive requirements for a number of important indicators: muscle groups involved in the work, the amplitude and direction of movement, the magnitude of the effort and time of their development, speed of the movement (Latyshev, Korobeynikov & Korobeinikova, 2014; Manolachi, 1991; Tropin, Korobeynikov, Korobeynikova, Shatskikh, 2018).

In this regard, the experience of Japanese experts is interesting, which recommend that all speed-strength training to be carried out on the carpet using various kinds of techniques and special exercises with a pronounced strength component. At the same time, special attention is paid to the value of resistance and the implementation of exercises at high speed. Small resistances are used to develop speed qualities, and large ones are used for strength abilities (Kupcov, 1978). A large role for effective speed-strength training is played by the selection of sparring partners. For the development of maximum strength, one should work with heavier and more qualified partners, and for the development of speed force - with light and less qualified partners.

We also believe that the impact of confounding factors on the athlete's body, all kinds of disturbing influences, introducing variety and unexpected situations into the training process, is of great importance for the development of power qualities, with regard to the diverse and changing conditions of competitive activity. As it is well known, these factors can be exogenous and endogenous (Ivanov, et al., 2004). Exogenous, external factors should include the opponent's manner of action, his strengths, unexpected technical and tactical decisions, refereeing peculiarities, competition responsibility, etc. To endogenous (internal) - psycho-emotional state, level of performance, development of fatigue, pain, etc.

Therefore, the process of the development of motor abilities should be considered by the authors comprehensively, affecting not only the basic physiological processes, but also in combination with the motor-technical actions in competitive activity, and it should also include the implementation of a methodology that is not only the most effective from the standpoint of the type of power manifestation, but also provides the manifestation of the diversity of this quality in the changing conditions of a sports match, including being under the influence of knocking factors.

Moreover, the didactic principles (general and special ones) regarding the training of strength skills of athletes of different fighting styles are not studied, and this situation is a natural consequence of the desire in the preparation process to be based on traditions, formed on an extremely diverse and generally successful practice, neglecting the basic provisions of the general theory of training of athletes, the necessity of continuous improvement of knowledge by combining the achievements of the practice with the development of the general theory of training of athletes, the achievement of related scientific disciplines.

At the same time, the use of the principles of each level (general didactic, general special, especially for fighting styles) or the different principles regarding one of the levels cannot be distinguished by strict selectivity and the independence of their reflection in the training process. The particular background components of the sports training system often suggest the achievement of the characteristic provisions for different principles, ensuring the complexity of the exposure on the body of those who train. The tendency to highlight completely independent principles, which are mutually exclusive, in a process as complex and multifactorial as the sports training of wrestlers in general or in the multitude of particular processes related to the formation of various aspects of sportsmanship, the development of some or other motor qualities, components of the competitive activities and others, suffer from artificiality and unilaterality (Matveev, 1999; Gaverdovskij, 2007; Marjolein B. A. van Asselt & Ellen Vos (2008).

Conclusions

The physiological foundations of the power development of wrestlers of various styles and the management of motor actions in the fight against the positions of rational use of the power qualities of athletes have not been sufficiently studied and published.

There is a clear underestimation of the neuroregulatory mechanisms for the development of various power qualities, their relationship with the core elements of techniques and motor actions.

The process of developing the motor qualities of wrestlers, the ability to implement them in competitive activity, should provide the implementation of a methodology that is not only the most effective from the

standpoint of the development of a particular physical quality, but also ensures their manifestation in the changing conditions of a sports match, including under the influence of knocking down competitive factors and surrounding reality.

A harmonious combination of internal and external factors in the design and implementation of a sports match is a rational basis for successful technical and tactical techniques of power orientation for wrestlers of various styles.

For the development of maximum strength of wrestlers, one should work with heavier and more qualified partners, and for the development of speed strength - with light and less skilled.

In our vision, a vertical can be and should be created, including the general didactic principles, as the foundation of the special principles, which reveals the possibilities of athletes in relation to high performance sports and those specific of concrete wrestling styles, principles, that allow the placement of the most significant accents for the concrete fighting styles.

Reference

- Arakchiyski, Z. & Stanchev, N. (2016). Biomechanical model of wrestling bridge. *Activities in Physical Education and Sport*, 6(1), pp. 86-89
- Barr, A., Lewindon, D., 2014. *High Performance Training for Sports*. 1st ed. Champaign: Human Kinetics.
- Bojchenko, N.V. (2010). Metodicheskie osobennosti sovershenstvovaniya tehnikotakticheskogo masterstva edinoborcev pri pomoshhi tehnikeskikh sredstv [Methodological features of improving the technical-tactical skills of martial artists using technical means]. *Physical education of students*, 1, pp. 7-10.
- Currie, M. & Steedman, I. (1990). Wrestling with time. Problems in economic theory. Manchester University Press,
- Galkovskij, N.M, Katulin, A.Z. (1968). *Sportivnaja bor'ba (klassicheskaja, vol'naja, sambo)* [Sports wrestling (Greco-Roman, free-style, sambo)]. Moskva, FiS.
- Gavardovskij Ju.K. (2007). Obuchenie sportivnym uprazhnenijam: Biomehanika. Metodologija. Didaktika (Training in sports exercises: Biomechanics. Methodology. Didactics). Moskva: FiS, 911 p.
- Ivanov I.I, Kuznecov A.S, Samurgashev R.V, & Shulika Ju.A. (2004). *Bor'ba greko-rimskaja* [GrecoRoman wrestling]. Rostov-na-Donu, Feniks, 800 p.
- Ivanov-Katanskij, A. B. (1997). *Vysshaja tehnika karatje* [Karate highest technique]. Moskva, Sport, 528 p.
- Jang, T-R., Chang, C-F., Chen, S-C., Fu, Y-C., & Lu, T-W. (2009). Biomechanics and potential injury mechanisms of wrestling. *Biomedical Engineering: Applications, Basis and Communications*, 21(3), pp. 215-222.
- Kaida, L.I. & Sharukhin, A. P. (2012). The responsibility formation of the cadets of the institutes of the Russian Interior Ministry Forces. The problems of the essence's definition and the substantiation of the system of upbringing of future officers' responsibility are considered in the article. *Pedagogy, Vestnik Sank-Petersburg university of Russian Interior Ministry Forces*, 3(55), pp. 134-138.
- Karamov, S. K. (2009). *Korejskij rukopashnyj boj* [Korean hand-to-hand combat]. Moskva, Sovremennaja shkola, 336 p.
- Kibler, W.B., Press, J., & Sciascia, A. (2006). The Role of Core Stability in Athletic Function. *Sports Medicine*, 36 (3): 189-198
- Komi, P.V., Ishikawa, M., & Salmi, J. (2009). IAAF Sprint Start Research Project: Is the 100 ms limit still valid? *New Studies in Athletics*, 1, pp. 37-47.
- Kupcov, A. P. (1978). Osnovy metodiki trenirovki borca. Sportivnaja bor'ba [Bases of the methods of wrestler training. Sports wrestling]. Moskva, Fizkul'tura i sport, p. 323-327.
- Latyshev, S. V. (2013). Sistemaindividualizacii podgotovki v vol'noj bor'be [The system of individualization of training in freestyle wrestling]: monograph. Doneck: DonNUJeT
- Latyshev, S., Korobeynikov G., & Korobeinikova, L. (2014). Individualization of Training in Wrestlers. *International Journal of Wrestling Science*, 4 (2), pp. 24-32
- Maljarenko, A. T., & Tkachenko, A. N. (2007). *Prognozirovanie uspešnosti sportivnoj podgotovki junyh dzjudoistov (9-11) let na osnove rezul'tatov testirovanija dvigatel'nyh sposobnostej* [Prediction of the success of sports training of young judokas (9-11) years based on the results of testing motor abilities]. In: Materials of the scientific conference of the Kharkov Academy of Physical Culture. Kharkov: HAFK, p. 95-99.
- Manolachi V. G. (1989). Obosnovanie programmy testov dlja kontrolja za podgotovkoj kvalificirovannyh dzjudoistok [Justification of the test program for monitoring the training of qualified judokas]. In: *Collection of scientific papers "Medical and pedagogical aspects of the training of young athletes."* Smolensk: SSU, p.109-111.
- Manolachi, V. G. (1991). *Pedagogicheskij kontrol' za fizicheskoi i tehniko-takticheskoi podgotovlennost'ju dzjudoistok* [Pedagogical control of the physical and technical-tactical preparedness of judokas]. Methodical manual. Chisinau: Stiinta, 36 p.
- Manolachi, V. G, & Chebanu, A. (2000). *Postroenie i realizacija godichnogo cikla podgotovki borcov-junoshej na osnove optimal'nogo vybora trenirovochnykh vozdejstvij* [The construction and implementation of the

- annual cycle of fighters, youth training based on the optimal choice of training effects]. Methodical manual. Chisinau: Stiinta. 43 p.
- Manolachi, V. G. (2003). *Sportivnaja bor'ba – teorija i metodika* [Wrestling - Theory and Methodology]. Chisinau: Tipografiacentrala, 400 p.
- Manolachi, V.. (2012). *Dzjudo kak «mjagkij put'» k samosovershenstvovaniju i sportivnym vysotam* [Judo as a “soft path” to self-improvement and athletic heights]. Monografie. Chisinau: USEFS, 116 p.
- Manolachi, V. (2015). Experimental argumentation of development of force and force-velocity abilities of judo players in the context of coaching process. *Journal of Physical Education and Sport*, 15(3), pp. 582 – 584.
- Marjolein B. A. van Asselt & Ellen Vos (2008). Wrestling with uncertain risks: EU regulation of GMOs and the uncertainty paradox, *Journal of Risk Research*, 11(1-2), pp. 281-300.
- Masser, D. & Tomas A. Ljeng, T. A. (2005). *Dzjudzjucu. Tehnika i taktika* [Jujutsu. Technique and tactics]. Moskva: Jeksmo, 201p.
- Matveev, L.P. (1999). *Osnovy obshhej teorii sporta i sistemy obshhej podgotovki sportsmenov* (Fundamentals of the general theory of sports and the system of general training of athletes). Kiev: Olimpijskaja literatura, 320 p
- Nagovitsyn, R., Volkov, P., Miroshnichenko, A., Tutolmin, A., & Senator, S. (2017). The influence of special graduated weight load in Greco-Roman wrestling on the growth of students' sports results. *Physical education of students*, 21(6):294-01.
- Novikov, A.D. (2012). *Osnovy sportivnogo masterstva* [Fundamentals of sportsmanship]. Monograph. Edit.II., pererab. i dop. Moskva, Sovetskij sport, 256 p.
- Ratamess, NA., Chiarello, CM., Sacco, AJ., Hoffman, JR., Faigenbaum, AD., Ross, RE., & Kang, J. (2012). The effects of rest interval length on acute bench press performance: the influence of gender and muscle strength. *Journal of Strength and Conditioning Research*, 26(7)/1817–1826.
- Gorgolewski, K., Auer, T., Calhoun, V. et al. (2016). The brain imaging data structure, a format for organizing and describing outputs of neuroimaging experiments. *Scientific Data* 3, 160044, doi:10.1038/sdata.2016.44
- Semenov, A.G., & Prohorova, M. V. (2005). *Greko-rimskaja bor'ba* [Greco-Roman wrestling]: book. Moskva: Terra-sport
- Tropin, Y., Korobeynikov, G., Korobeynikova, L., Shatskikh, V. (2018) The impact of rule changes on the competitive activity indices in Greco-Roman wrestling. *Science in Olympic Sport*, 58-64
- Vasil'kov, P.S. & Sidorov, V.M. (2009). Vlijanie silovyh sposobnostej borcov na sportivnyj rezul'tat [Influence of wrestler strength abilities on sports result]. In: Improving the training system of highly qualified athletes and reserve in martial arts. *International scientific and practical conference*. 2009, april 28-29, Minsk, BSUFK, vol 4, p. 15–7.