

A comparative analysis of the competitive fights of fighters in mixed martial arts

HANAT HUDAIBERGENOVICH ALZHANOV¹, DENIS ALEKSANDROVICH IVANOV², TALGAT ABAEVICH SAGIEV³, EDUARD VLADIMIROVICH KLADOV⁴, NATALIA VASILYEVNA MATYUNINA⁵

^{1,3}, Omsk State Technical University, Omsk, RUSSIA

²Siberian State Automobile and Highway University, Omsk, RUSSIA

⁴Omsk State Transport University, Omsk, RUSSIA

⁵Omsk State Pedagogical University, Omsk, RUSSIA

Published online: December 30, 2021

(Accepted for publication December 15, 2021)

DOI:10.7752/jpes.2021.06461

Abstract:

The authors have conducted research aimed at determining the most effective and significant techniques and tactics during athletic competitions. The results of summarized and analyzed research material on competitive mixed martial arts provide information as to what techniques and tactics can allow one to reach advantages in the evaluated techniques (combinations of techniques) and to achieve superior results in terms of activity and domination in the active position, which are essential for judges making a decision according to the results of the bout. The article presents a comparative analysis of competitive fights in mixed martial arts of MMA fighters of young and adult men. The most frequent techniques and tactics in MMA fights assessed by us are the transfers or throws of the opponent from the "stance" position to the "ground" position, in the result of which the attacking athlete took a dominating position and continued the attack in 26 % - for young men, and in 32 % - for adult men. 35% and 25% of athletes, respectively, used an accentuated hand strike in the standing position. We registered a range of the simplest striking techniques used by young male fighters in the majority of competitions as the main way of achieving the techniques being assessed. According to the pedagogical observation of the MMA competitions, interviews and talks with the specialists in this kind of sport, the basic type of martial arts chosen by the fighters has a great influence on their fighting style and the use of techniques/tactics in MMA competitions, which is confirmed by the results of the research. The analysis of MMA competitions shows the predisposition of some fighters to striking martial arts - 19% or to wrestling - 47%, also there are universal fighters - 34%. This is natural, as various athletes use different methods to achieve victory: some use mainly striking techniques, others use mainly technical fighting techniques, and universal fighters use both striking and wrestling techniques and their combinations successfully. Fighters, who have skills of "basic" martial arts, achieve advantages in a competitive fight due to the techniques and tactics of their kind of martial arts, gradually adapting to the conditions and rules of mixed martial arts.

Keywords: Mixed Martial Arts (MMA), competitive duel, technical and tactical actions, dominant position

Introduction.

Competitive bouts in mixed martial arts MMA use the arsenal of most famous martial arts techniques, such as punches, kicks, throws, falls, submission and chokehold, both standing and on the ground, etc. (Korotkikh, 2015; Mixed martial arts unified rules for amateur competition IMMAF 2017).

Initially, the first mixed martial arts (MMA) competitions (modern mixed martial arts (MMA)) were held to determine the strongest style and type of martial arts. Participants in such competitions were athletes from various types of martial arts, both striking and wrestling. During the formative period of MMA, fighters used an arsenal of their martial arts, mostly at that time predominantly coming from wrestling schools, as punching athletes did not know how to defend against throwing, chokehold and submission (Konoplev, 2019; Sorokanyuk, 2018).

At first glance, it may seem that the technique of mixed martial arts MMA is mechanically composed of the techniques of various types of martial arts. Nevertheless, the analysis of competitive bouts shows that the technique and its characteristics have undergone significant changes, adapting to the new competitive conditions, to achieve victory it is not enough to master flawlessly the technique of a particular type of martial arts. The evolution of martial arts technique took place and is still going on. Thanks to the synthesis of some techniques, it changed its qualitative sides and, in some cases, - its effectiveness. For example, the probability of oncoming blows of the opponent has changed the technique of throwing and preparatory actions to them, and also made adjustments to the stance and movements of fighters. How skillfully each athlete can use this in a confrontation

largely determines the outcome of the fight (Chernozub et al, 2018; Ilnytsky et al, 2018; James et al, 2016; James et al, 2017; Korotkikh, 2015; Mordvintsev, 2016).

If we take into account the variety of conditions to the manifestations of motor actions of "MMA" martial artists and permissions regarding the use of the arsenal of actions, we should note the small discreteness (discontinuity) in contrast to "classical" martial arts (the duration of confrontation in MMA parterre position is not limited with active work of one or both athletes), and so powerful impact on the body that it places high demands on the level of functional reserves of the body (Ashkinazi et al, 2016; Chernozub et al, 2019; Korobeynikov et al, 2020; Mordvintsev & Kleschev, 2017).

In all cases, effective performance in mixed martial arts competitions requires the athlete to have a high level of motor coordination, psychophysical qualities and functional capabilities. Such a complex combination of qualities will allow the athlete to have a range of effective techniques, which he could use at any moment of the competition, in various situations – both in a standing position using striking or throwing techniques, or in a parterre position. (Ivanov & Alzhanov, 2021; Prystupa et al, 2019).

This causes the search for effective methods of training and formation of technical and tactical arsenal in mixed martial arts through the analysis of competitive activity, as the problems of sport training of martial artists of different ages and qualifications are identified, implemented by coaches and athletes themselves only in competitive conditions.

Materials and Methods.

The following methods of research were used in the study: analysis of scientific and methodical literature, interview, conversation, pedagogical observations, mathematical and statistical methods.

At the championship among young men of 16-17 years old and the 2021 championship of the Siberian Federal District in MMA mixed martial arts there were recorded and analyzed 150 bouts, according to the results of which the percentage of significant (estimated) technical-tactical actions during competitive bouts was defined. For an objective definition of differences in the composition and structure of technical-tactical actions in bouts of fighters of different qualification and ages, a comparison of technical actions performed by athletes in bouts was carried out.

Results and discussion.

Difficulties faced by coaches in mixed martial arts are the choice of means of technical and tactical training, what to give priority to while studying and improving the technical arsenal, as it is diverse in mixed martial arts, different in terms of coordination complexity and modes of muscle effort to actions, which are the basis of the "mixed" confrontations (punches, throws, wrestling on the ground and their combinations, etc). Coaches have to and must constantly search, check and improve the methods of forming and improving the technical arsenal of their students, which consists of the arsenal of different types of martial arts in a single trainingsystem for mixed martial arts. So, for example, some recommend to teach athletes to master and improve striking and wrestling technique simultaneously, in one session; others - by alternating the training material through the session. Others - first, teach either striking or wrestling technique, and as they mastered them, move on to the next section. Adherents of this direction are mostly "descendants" from classical martial arts: from boxing, one of the styles of wrestling (Ashkinazi & Bavykin, 2014; Mordvintsev & Kleschev, 2017; Varenikov et al, 2019). Among the multitude of issues, the formation of an effective technical arsenal of competitive fighting in mixed martial arts bouts is constantly the most relevant and difficult to solve. Their solution is associated with the assessment, improvement of the conditions in which the motor activity takes place (Ivanov et al, 2020; Mordvintsev & Kleschev, 2017; Konoplev, 2019; Šiška, Ľ et al, 2016).

So, the analysis of the results of competitions in the period of 2020-2021 in MMA shows the tendency of some fighters to either perform punching or wrestling techniques, also there are universal fighters. It is natural, as some fighters successfully achieve the victory using mainly the striking technique, others - use mainly technical fighting techniques (throwing technique), and others - are universal fighters who successfully use both striking and wrestling techniques and their combinations (Fig.1).

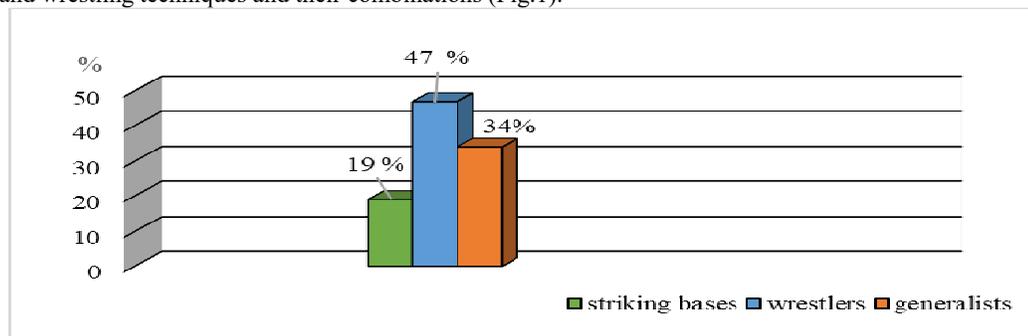


Fig. 1 Percentage ratio of achievement of victories by styles of confrontation in mixed martial arts "MMA" byresults of competitions of the championship and championship of the Siberian federal district 2021

In competitive fights in mixed martial arts combinations of punches and kicks are used, both in a standing and lying position. In the standing position, mainly hand blows (clenched fist) from the arsenal of boxing and others are used (straight, side, underneath and their combinations), elbow blows (the arsenal of Thai boxing) are used in a clinch or when coming out of it, roundhouse punches (or "backfist"), it is also possible to observe a blow with the shoulder.

Kicking technique is used also in a standing and lying position, the allowed part of the application is the body, head (only in a standing position), legs. That is why in order to kick to the body (to the upper part of the body) or to kick to the head a fighter must have good stretching and quickness of execution, otherwise the rival may grab his leg and counterattack. Striking techniques in the "lying position" are characterized by the predominant use of lateral, direct punches, elbow blows, punches with the hands from below and kicks with the knees (Šiška, L. et al, 2020; Viktorov et al, 2019; Zadorozhna et al, 2019).

Wrestling techniques are used in combination with striking techniques in close proximity or in attacking actions throws in the standing position, among the widespread technical and tactical actions: knocking down with the double leg takedown, grips, foot sweeps, grabs, etc. Fighting techniques used lying down are choking, submission, holding in order to control and get dominant position to inflict blows with hands and legs. Therefore, for a successful performance in competitive bouts in mixed martial arts "MMA", fighters must possess a huge arsenal of wrestling techniques and combine such qualities as the rapid reaction of a striker, the explosive power of a freestyle wrestler, the vulnerability and plasticity of a grappler lying down, etc (Kirk, 2018).

Despite the fact that many fighters tend to become universal and train all aspects of technical and tactical arsenal of mixed martial arts MMA, the survey and interviews with experts of this sport show that the basic kind of martial arts has a huge impact on their fighting style and application of technical and tactical moves in competitive bouts in MMA. As a rule, athletes with wrestling background have good stamina and physical strength and many of them, when starting mixed martial arts, in addition to good wrestling successfully demonstrate their techniques of striking. Representatives of shock martial arts well demonstrate techniques in a standing position and have high rates of rapid motor reaction to the actions of the opponent. As practice shows, the influence of the basic martial arts has a great importance not only on the amateur MMA level, but also on the professional one. This is evidenced by the data (Konoplev, 2019), for example, UFC (Ultimate Fighting Championship) champions and top 5 fighters of the UFC rating, as the largest and most popular in the world of mixed martial arts, are representatives of various basic martial arts, like wrestling, boxing or kickboxing, etc. Therefore, according to experts (Korotkikh, 2015; Mordvintsev, 2021; Vaganova et al, 2016;) it is necessary to universalize MMA fighters on the basis of basic martial arts, i.e. the basic martial arts should be laid in the basis of training at least to the level of the CMS (Candidate Master of Sports), subsequently being adapted to the conditions of mixed martial arts duels.

In mixed martial arts, as a result of pedagogical observations and video analysis, the arsenal of throws has a significant difference from the technique of throws in wrestling, as the wrestling conditions are combined with various striking techniques. Evaluation of technical and tactical actions by the MMA rules also differs from many classical types of martial arts, especially wrestling, since there is an evaluation for every performed technical action and the winner is the one who gains the biggest number of points, or in case of equality certain criteria are taken into account according to their competition rules. And by the MMA rules the calculation of points goes for each separate round, where the fighter who won the round - receives 10 points, the loser can receive from 6 to 9 points for a round, depending on degree of displaying and carrying out of technical arsenal during a fight, and system of estimations includes not only for the certain technical action as the accented blow of hand, leg, knee in the allowed to attack zone of the opponent, which has led to his shock, but also the obligatory content of combination for any takedown or throw of the opponent. To win on points a fighter must ensure "positional security", expressed in tactical superiority and technical advantage during the whole fight and respectively in every round. And this can be achieved by constantly striving for an active and dominant position (Merkulov & Alzhanov, 2020), i.e. the most favorable situation in relation to the opponent, as evidenced by a comparative analysis of competitive MMA fights. At the championship among young men of 16-17 years old and the championship of the Siberian federal district in mixed martial arts (MMA) the video recordings and analysis of 150 duels were made. According to the results of it the percentage of significant technical and tactical actions during competitive duels (Table 1) was revealed.

As the analysis of the data given in the table 1 shows, the most used evaluated technical and tactical action in MMA bouts for junior male and male fighters are: any takedown or throw of the opponent from the "standing" position to the "ground" position, as a result of which the attacker took the dominant position and continued the attack, 26% and 32% respectively of the evaluated technical actions on the judges' notes, and also in the standing are accentuated hand punches (clenched fist) into the opponent's allowed to attack zone, leading to his shock in the "standing" position - 35% and 25%, the arsenal of simple striking techniques, which in most bouts was the main way in achieving evaluated techniques in junior male fighters, was registered. Preferences of young contestants to the listed types of technical arsenal are obvious and explained by the relative simplicity of its variants in execution and, consequently, easier in mastering in comparison with coordination-complicated

techniques from the wrestling technique, complex kicks (with turns, on high levels of kick places, etc.) were not observed in the bouts.

Table 1

Indicators of evaluation of technical and tactical actions in MMA mixed martial arts bouts based on the results of the Siberian Federal District Championship and Championship competitions

| Evaluation indicators of technical and tactical actions in mixed martial arts "MMA" duels | Contestants | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------|
| | Junior fighters (75 fights) | Male Fighters (75 fights) |
| Early Victory ¹ | | |
| Technical knockout (knockout) | 2 | 1 |
| Chokehold | 4 | 8 |
| Submission | 3 | 7 |
| Technical victory (withdrawal by doctor) | 1 | 1 |
| Disqualification, etc. | 0 | 0 |
| Quality of victory on points (evaluated technical and tactical actions in percentage %) ² | | |
| Punch with hand (clenched fist) in "standing" position | 35 | 25 |
| Kicks to the head, body, legs and arms of an opponent who is in the "standing" position | 8 | 6 |
| Knee blows to the body, legs and arms of an opponent in the "standing" position | 9 | 7 |
| Clenched fist punches in the "ground" position | 15 | 21 |
| Knee blows to the body, legs and arms of the opponent in the "ground" position | 7 | 9 |
| Any takedown or throw of an opponent from the "standing" position to the "ground" position, as a result of which the attacking athlete has taken a dominant position and continued the attack | 26 | 32 |

1. The number of fights that ended with an early victory¹
2. Accentuated blow with hand, foot, knee in the opponent's zone allowed for attack, which led to his shock in the "stance" and "parterre"².

One more distinctive feature in the competitive MMA fights is that the male fighters after the attacking actions when performing takedown, not only occupy the dominant position, but also control and apply accentuated (evaluated) punches for a long time, which is an effective way to achieve evaluated technical actions - 21 % for male fighters. From other distinctive features of the compared contestants is that junior males in their fights used chokeholds less often (4 chokeholds for junior males, and 8 early victories in fights for adult male fighters by the given technique), especially after the counteractions at unsuccessful attempts of the rival to perform technical actions of knocking down with the double leg takedown. In most cases, making unsuccessful attempts to perform attacking actions, the opponents are caught in the "guillotine" or when coming out from underneath they give up their position from the back, which are favorable conditions for chokeholds. This is natural and can be explained by the fact that young fighters do not yet have enough skills to defend themselves against chokeholds and their details. An analysis of the composition of technical actions performed by junior fighters on the ground indicates the low efficiency of the arsenal of attacking actions. Young athletes do not know perfectly complex wrestling techniques on the ground, such as transitions to chokeholds and submissions, which bring a clean victory.

When comparing the discussed data with the arsenal of technical and tactical actions, performed by the fighters of the high class, we should note that the junior participants more often use ineffective holds in the standing position, and the experienced sportsmen are more active in the ground and lying position, when their attacks are connected with relatively small opportunities (except the submissions and chokeholds) to dominate in the fight.

Other differences in the composition of technical actions performed by fighters at different levels of competitions are the more frequent performance by male fighters of multicomination transitions and knockdowns with the continuation of the attack with punches or chokeholds and submissions. Male fighters, after knocking down the opponent, pause in action without pursuit in the lying position, acting very monotonously and using the same method of attack when repeating similar situations.

The presence of the mentioned differences in the content and structure of the technical-tactical actions of the fighters of different qualification and age is the evidence of the essential problems in the technical-tactical training of the MMA fighters by the purposeful selection of the means of training, starting from the stage of the primary training, because the majority of them (junior male fighters) start mastering the technical-tactical moves

of the mixed martial arts from the basics without any experience of wrestling in a separate kind of martial arts, which constitutes the arsenal of mixed martial arts, since the universalization of MMA fighters starts. Male fighters mostly have a basic experience in a separate kind of martial arts making up the arsenal of mixed martial arts (e.g., punching or wrestling), gradually adapting to the conditions and rules of mixed martial arts. The basic kind (of martial arts) promotes a faster extrapolation in mastering the technical and tactical techniques of the mixed martial arts MMA arsenal, especially the different types and styles of wrestling.

At the same time, it is natural that young martial artists are considerably inferior to high-class athletes in tactical skill, prudence and caution. High activity in competitive fights is always commendable and should be encouraged by coaches. However, insufficient technical mastery of the mixed martial arts arsenal leads to a large number of unrealized successful attack attempts, which significantly reduces the reliability and effectiveness of technical and tactical actions.

Conclusion

Thus, a comparative analysis of competitive fights, experts' opinions on the results of conversations and analysis of scientific and methodological literature prove that the efficiency of mastering and perfecting such a huge technical and tactical arsenal, in most cases, is based on the "basic" martial art. Contestants, who know the "basic" martial arts, reach advantages by technical and tactical actions of their kind of martial arts, thus completing the disadvantages of other aspects of the arsenal and dictating their own style of wrestling. The UFC champions Khabib Nurmagomedov, Petr Yan and others are the brightest representatives of the "basic" martial arts in MMA fights of highly qualified fighters.

The use of different characteristics of fighters' technical and tactical actions concretizes and clarifies the conditions of the fight, which allows us to get a more complete picture of the athlete's actions in the fight. The analysis of competitive bouts shows that the most significant and effective in the evaluation of technical actions is the winning of active positions in the course of a confrontation, which is possible when performing any takedown or throw of an opponent from the "standing" position to the "ground" position, as a result of which the attacking athlete takes a dominant position and continues the attack with control on the ground with finishing with hand punches. Proceeding from this, as the technical and tactical actions are mastered and perfected, it is necessary to improve the technical and tactical skills in situational-episodic conditions, simulating the main positions encountered in MMA fights, for example, training tasks from the positions: "Guard", "Half-Gard", "Mount", etc. The use in training sessions of such initial positions, which create and simulate bout episodes for a successful tactical decision and technical execution will contribute to the effective application of the technical and tactical arsenal of mixed martial arts "MMA" in competitive bouts. Every year mixed martial arts MMA is becoming one of the most popular sports; more and more athletes come from various types and styles of contact martial arts, to perform at the amateur and professional level, which increases the competition in this sport. This situation contributes to the search and improvement of effective methods of building up the educational and training process in mixed martial arts MMA, which is urgent and requires its solution.

References

- Ashkinazi, S. M., & Bavykin, E.A. (2014) Improvement of the system of special physical training of sportsmen of complex (mixed) single combats. *Theory and Practice of Physical Culture*. (6). 28.
- Ashkinazi S.M., Zhang X., Bavykin E.A., & Klimov K.V. (2016). Influence of interval training modes on the development of special physical qualities of mixed martial arts athletes *Archives of Budo Science of Martial Arts and Extreme Sports*. 131-138.
- Chernozub, A., Korobeynikov, G., Mytskan, B., Korobeinikova, L., & Cynarski, W. (2018). Modelling Mixed Martial Arts Power Training Needs Depending on the Predominance of the Strike or Wrestling Fighting Style, *Ido movement for culture. Journal of Martial Arts Anthropology*, 18(3), 28-36. doi: 10.14589/ido.18.3.5.
- Chernozub, A., Danylchenko, S., Imas, Y., Cynarski, W.J., & Gorashchenko, A. (2019). Peculiarities of correcting load parameters in power training of mixed martial arts athletes. *Journal of Physical Education and Sport* 19 (70), 481-488. doi:10.7752/jpes.2019.s2070
- Ilnytskyi I., Okopnyy A., Palatnyy A., Pityn M., Kyselytsia O. & Zoriy Y. (2018). Use of boxing to improve the physical education content in lyceums with intensive military and physical training. *Journal of Physical Education and Sport (JPES)*, 18 (1), 262-9. doi:10.7752/jpes.2018.01035
- Ivanov, D.A. & Alzhanov, H.H. (2021). The method of teaching martial arts by building confrontation, taking into account the tactical purpose of individual situations of the fight. *Physical education and sports in the education system: current state and prospects. Materials of the International Scientific and Practical Conference*. Omsk, 155-161.
- Ivanov, D.A., Alzhanov, H.H., Kuritsyna A.E. (2021). Analysis of the motor composition and structure of the fight from the position of the systemic-structural approach. *Physical culture and health*. No. 1 (73). 116-117

- James, L.P., Haff, G.G., Kelly, V.G., & Beckman, E.M. (2016). Towards a Determination of the Physiological Characteristics Distinguishing Successful Mixed Martial Arts Athletes: A Systematic Review of CombatSport Literature. *Sports Medicine*, 46(10), 1525-1551. doi: 10.1007/s40279-016-0493-1.
- James, L.P., Robertson, S., Haff, G.G., Beckman, E.M., & Kelly, V.G. (2017). Identifying the performance characteristics of a winning outcome in elite mixed martial arts competition: *Journal of Science and Medicine in Sport*, 20 (3), 296-301. doi: 10.1016/j.jsams.2016.08.001
- Kirk, C. (2018) Does anthropometry influence technical factors in competitive mixed martial arts? *Human Movement*, 19 (2), 46-59. doi: 10.5114/hm.2018.74059
- Konoplev V.V. (2019), "Methodological aspects of preparing an athlete for a professional duel MMA", *World of pedagogy and psychology*, 30(1), 100-107.
- Korobeynikov, G., Stavinskiy, Yu., Korobeynikova, L., Volsky, D., Semenenko, V., Zhirnov, O., Chernozub, A., & Nikonorov, D. (2020). Connection between sensory and motor components of the professional kickboxers' functional state. *Journal of Physical Education and Sport (JPES)*, 20(5), Art 368, 2701 - 2708, DOI:10.7752/jpes.2020.05368
- Korotkikh, I.A. (2015), "Adaptation of technical and tactical arsenals of combat martial arts fighters to the conditions of mixed martial arts (MMA)", *Materials of the scientific and initial-methodical conference of the teaching staff of the Kuban State University of Physical Culture, Sports and Tourism, Krasnodar*, (1),20-21.
- Merkulov, A. B., & Alzhanov, H.H. (2020). Situation-episodic approach to building the teaching and training process for wrestling "sambo" in the framework of physical education at the university. In the collection: *Physical education and sports in the education system: current state and prospects. Materials of the International Scientific and Practical Conference*, 51-57.
- Mixed martial arts unified rules for amateur competition IMMAF (2017) <https://immaf.org/wp-content/uploads/2020/02/IMMAF-Rules-Document-as-of-March-2017.pdf>
- Mordvintsev, D.N. (2016) Characteristics of competitive activity of athletes of mixed martial arts. *Modern scientific researches and innovations*. [Electronic resource]. URL: <http://web.snauka.ru/issues/016/07/68305>
- Mordvintsev, D.N., & Kleshev V.N. (2017) "Content-quantitative characteristics of the competitive activity of athletes - participants in the largest competitions in mixed martial arts (MMA)", *Bulletin of sports science*,(4), 13-15.
- Mordvintsev, D.D. (2021) Features of conducting duels in mixed martial arts. *The scientific heritage* (66) 34 37. doi: 10.24412/9215-0365-2021-66-4-34-37
- Prystupa E., Okopnyy A., Hutsul N., Khimenes Kh., Kotelnik A., Hryb I. & Pityn M. (2019). Development of special physical qualities skilled kickboxers various style of competitive activity. *Journal of Physical Education and Sport*, vol 19 (Supplement issue 2). 273–80, doi:10.7752/jpes.2019.s2041.
- Šiška, L., Broďani, J., Štefanovký, M., & Todorov, S. (2016). Basic reliability parameters of a boxing punch. *Journal of Physical Education and Sport (JPES)*, 16(1), 241-244.
- Šiška, L., Hubinák A., Krška P., & Broďani, J. (2020). Development of specific training load in boxing. *Journal of Physical Education and Sport (JPES)*, 20(5), Art 352, 2580 - 2585, 2020, DOI:10.7752/jpes.2020.05352
- Sorokanyuk O.V. (2018), "Analysis of technical actions and structural elements in the system of mixed martial arts", *Uchenye zapiski universiteta imeni P.F. Lesgafta*, 5(159), 275-277.
- Vaganova, V.A., Tedoradze, A.S., & Pyannikov V.S. (2016), "Classification of the technique of attacking operations of mixed martial arts (MMA)", *Theory and practice of physical culture*, (3), 49-51.
- Varenikov, N.A., Popova, I.E., Gubin, O.V., & Sandrakov, M.S. (2019) Training to technique and tactics of fighting in mixed martial combat MMA. *Uchenye zapiski universiteta imeni P.F. Lesgafta*, 11 (177), 6974.
- Viktorov, D., Leshukov V., Shakhovskiy A., & Bakushin, A. (2019). Improving training of boxers based on the assessment of stabilometric indicators. *Journal of Physical Education and Sport (JPES)*, 19(4), Art 386, 2539 - 2544, DOI:10.7752/jpes.2019.04386
- Zadorozhna, O., Okopnyy, A., Hutsul, N., Kotelnik, A., Grashchenkova Zh., Perederiy, A., Pityn, M., & Svistelnik, I. (2019). Improving kickboxers' special physical preparedness which accounts for their individual tactical style and technical skills. *Journal of Physical Education and Sport (JPES)*, 19(2), Art 170, 1173 - 1179, DOI:10.7752/jpes.2019.02170