

Technical–tactical training methods applied in the training process of mixed martial arts fighters

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Abstract:

The present article addresses the problem of identifying the technical-tactical training means of mixed martial arts fighters (MMA) who are in the in-depth specialization and orientation stage towards high performance. The problem of the compatibility of the means taken from all fighting styles, with the physical effort and the technical structures in the training of athletes reaches the goal of achieving the biophysical factors that include the general physical development and the development of physical balance, the psycho-individual factors that aim at knowledge, skills and abilities in order to learn the technical - tactical elements and psychosocial factors that constitute interpersonal relationships, socio-affective relationships. Through these means, the balance of body segments is formed and developed. **Methods.** In order to carry out the research tasks, the following scientific methods were used: theoretical analysis and generalization of specialized literature data; evidence and control in sports training; pedagogical observation; tabular method; the pedagogical experiment; statistical-mathematical methods of processing and interpreting the recorded data. Since the research in question aims to increase the efficiency of the instructional-educational process within the training lesson of the fifth-year advanced training group in mixed martial arts, a pedagogical experiment was carried out at the "Stefan cel Mare" Police Academy regarding the level of training in a series of experimental tests, focused on technical-tactical training, as specified within the specialized federation. **Results.** Based on the study of the scientific literature, it was established that the implementation of technical-tactical means in training performance athletes has a decisive influence. The means of technical procedures selected from different types of fights contribute to the development of strength-speed skills that are important in the process of achieving performance results. Thus, through the methodology developed in order to implement the technical arsenal in the training of martial arts fighters, it demonstrated an indisputable efficiency materialized by improving strength-speed abilities and by training the skills of directing parameter principles specific to modern MMA fighting technique. Following the application of the experimental program in the formative experiment, it was clearly demonstrated that the experimental group registered a significant superiority from a static point of view in the final tests for all motor tests applied ($P < 0.001$). **Conclusions.** The paper demonstrated the need for technical-tactical training of MMA fighters in the in-depth specialization and orientation stage towards great performance through the means used in all fighting styles. More than that, there were significant divergences in the compartment related to the ratio between the strikes applied to different parts of the body in the technical-tactical training process.

Keywords: means of training, technical-tactical training, sports training process, performance, mixed martial arts.

Introduction

The progress of performance sports is conditioned by a large number of social, organizational, material, technical and methodical factors. In the field aiming at a new approach in the technical-tactical training of MMA fighters, which must contain basic elements of physical, technical, tactical and psychological training, systems and complexes of means, included in the structure of typical programs of training lessons that will be based on the knowledge of the individual characteristics and the specifics of the fighting athletes' skills manifestation, which will positively influence the level of multi-purpose training and implicitly their performances (Alzhanov, H. et al., 2021; Beranek, V. et al., 2020; Brechney, G. et al., 2021; Fernandes, J. et al., 2018; Yeger, J.M., Kruger, K., 2016).

According to the authors (Adam, M. et al., 2012; Chernozub, A. et al., 2019; Fernandes, J., et al., 2018; Epuran, M. et al., 2012; Grimalschi, T., 2022; Hartmann, H. et al., 2012; Issurin, V.B., 2017) knowing the content of technical-tactical training and the result of competitive activity allows us to determine the general strategy of training an athlete in a certain sport, the choice of training methods, the parameters of effort in sports training. Analyzing the sports results demonstrated by fighters in a competition, we can quickly and precisely find the reasons for the success or failure of athletes, therefore the issues of monitoring and evaluating competitive activity becoming a basic prerogative of coaches.

In terms of physical training, technical-tactical training, especially at the stage of advanced training in the fifth-year, must be a priority concern for all coaches in the field. It must be emphasized that strength, speed and resistance have a significant weight in the effectiveness of practicing MMA fights.

The development of the motor qualities characteristic of fighters is an important problem, their weight in achieving performance is not equal. Therefore, the development of the mentioned motor qualities ensures a high performance for the fighters. The increase in the efficiency of the training process, as well as the maximum use of the physical, technical, tactical and psychological potential of the team, implies the development of an instructional approach that ensures the continuity of the training and development of the team performance (Antonietto, N. et al., 2023; Camarco, N. et al., 2022; Folhes, O. et al., 2022; Gheorghiu, I. et al., 2019; Kirk, C. et al., 2021).

Thus, the process of sports training in mixed martial arts must be approached primarily from the perspective of its stage, dynamic and multifaceted/complex character (Kerksick, C.M. et al., 2018; Klimov, K.V., 2007; Liu, Y. et al., 2022; Markov, K.K., 2019).

In order to argue for a method of streamlining the technical-tactical training of MMA fighters in the in-depth specialization and orientation stage towards high performance, it was decided to organize and conduct a pedagogical experiment with the duration of an annual cycle. The research was of a longitudinal type, aiming at the evolution of the athletes who trained during this period, using a well-determined didactic strategy to develop the components of the technical-tactical training of MMA fighters.

The purpose of the work consists in identifying effective means of technical-tactical training of MMA fighters who are, according to their age, in the in-depth specialization and orientation stage towards high performance.

Material and methods

The pedagogical experiment was carried out during the sports training lessons of the MMA fighters from the club "Stefan cel Mare" Police Academy. The experimental sample consisted of: the experimental group (n=14) and the control group (n=14) in total 28 MMA fighters in the in-depth specialization and orientation stage towards high performance.

The members of the experimental group are the members of the national team, with an experience in national competitions of 9-10 years and especially with a number of at least 10-14 international competitions, including at least 2-3 participations in the European and World Championships. Across the training level, the 18-23-year-old fighters were selected according to the level of technical, tactical and specific high-level physical training, as well as according to the results demonstrated in several national and international competitions. The didactic strategy was based on biomechanical and methodological principles from the specialized literature. Only the conclusions drawn from the survey carried out in the preliminary research were taken into consideration.

On the basis of establishing the methodology for the development of the technical-tactical components was several principles and methodical requirements. The most important of these were the following:

- Integration of specific strength training into the concept of optimization/efficiency of the training of MMA fighters in the in-depth specialization and orientation stage towards high performance;
- Elaboration of the technical-tactical training methodology, integrated in the annual training plan, subordinated to the performance and instructional objectives of the athletes;
- Selection of education means /reaction speed development, setting the volume and intensity of work, depending on the proposed objectives;
- Operationalization of training during different training periods.

The methodology of education/development of reaction speed had well-defined objectives and proposed the experimentation of a coherent didactic strategy in which the methods, means and forms of activity organization were judiciously selected and used.

Means used for the development of psychomotor qualities

In the selection of the means, the use of exercises that require the respective kinematic chains and their use in kinematic structures similar to the fights in the competition was taken into account.

It is recommended that these exercises be done both for the formation of movement control and organization skills, and at the beginning of each psychomotor education activity, in order to prepare and mobilize the body for physical and mental effort.

In turn, the technical procedures and terminology of the kicking technique applied with different parts of the body in MMA fight, were divided into three basic categories (Figure 1.):

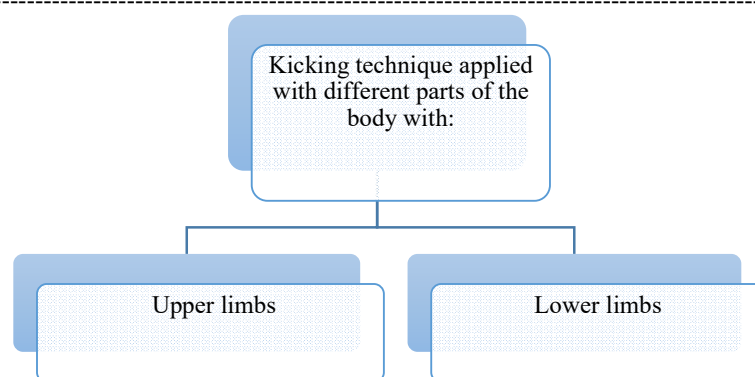


Fig. 1. Classification of kicking technique with different body parts in MMA

It will be noted that some exercises are recommended to be used at the basic stage of the training lesson. The uncompleted or partially completed item turns into an educational objective that is included in the individual technical-tactical education/training program.

The section of the kicking technique with the upper limbs in MMA were also divided into four sub-sections types of strikes depending on the method of application: strikes applied with the palm of the hand (punch, with the palm, with the fist joint), with the forearm, with the wrist, with the shoulder, shown in Table 1.

Table 1. Means whose objective is to educate (consolidate) the organization and motor coordination of strikes applied with the upper limbs according to the contact area of the articulating surface and kicking direction

Way of application	Depending on the contact area of the articulating surface	Depending on the kicking direction
With the fist	Punch with the front of the fist	Direct, down, up, side punch
	Punch with the outer part of the fist	Direct, down, up, side punch
	Punch with the upper part of the fist	Down, up, circular punch
	Punch with the lower part of the fist	Up down, down up, side punch
With the palm	Kicking with the center of the palm	Direct, down up, up down, circular kicking
With the fist joint	Upper part punch of the fist joint	Side, round forward kicking
	Strike with the outer edge of the fist joint	Forward round strike, from down to up
With the hand joint	Strike with the upper part of the hand joint	Direct, down, up, side strike
	Strike with the front of the hand joint	Up-forward, inside-out kicking
	Strike with the upper back of the hand joint	Up-back kick, from outside to inside
With the forearm	Up-Forearm strike	Up, down-up kicks
	Front Forearm strike	Down-up, circular-forward kicks
	Forearm back strike	Up, back-up, side kicks
With the elbow	Front elbow strike	Forward, round-forward kicks
	Back elbow strike	Back, round-back kicks

Depending on the contact area of the articulating surface and the kicking direction, the kicking technique applied with the upper limbs were also divided into the compartments of strikes according to the method of application: strikes applied with the palm of the hand, with shin and knees in Table 2.

Table 2. Means whose objective is to educate (consolidate) the organization and motor coordination of strikes applied with the lower limbs depending on the contact area of the articulating surface and the kicking direction

Way of application	Depending on the kicking direction	Depending on the contact area of the articulating surface
With the foot	Forward kicks	Forefoot strikes
		Heel strikes
	Side kicks	Outer-foot strikes
	Back kicks	Heel strikes
	Round kicks with the forward leg	Forefoot strikes
	Round back kicks	Forefoot strikes
	Outer half- round kick	Outer -foot strikes
	Inside half- round kick	
With the shin	Forward shin kick	Front shin kicks
	Round forward shin kick	Front shin kicks
	Outer half- round kick	Back shin kicks
	Inner half- round kick	Inner shin kicks
With the knee	Forward knee strike	Knee articulating kicks
	Forward knee round kick	The lower hip articulating
	Outer half- round kick with the knee	The outer knee articulating
	Inner half-round kick with the knee	Half-round with the knee inside

There were used following means in the section: kicks applied with the MMA hip articulating, depending on the method of application, the contact area of the articulating surface and the direction of the strikes, (Figure 2).

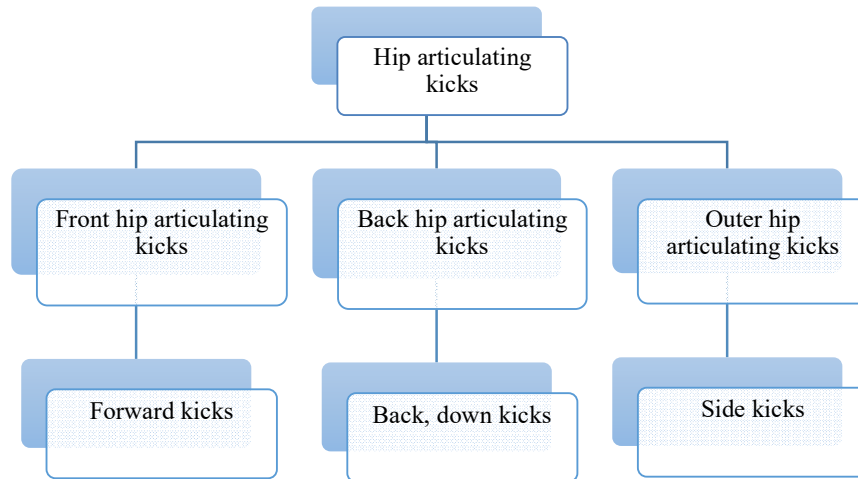


Fig. 2. The model applied of means with the hip articulating in MMA

The specificity of technical training in MMA lies in the fact that the competition rules for various types of complex martial arts allow the use of a wide arsenal of technical actions that have been classified according to the part of the body through which the technical procedures were performed in Figure 3.

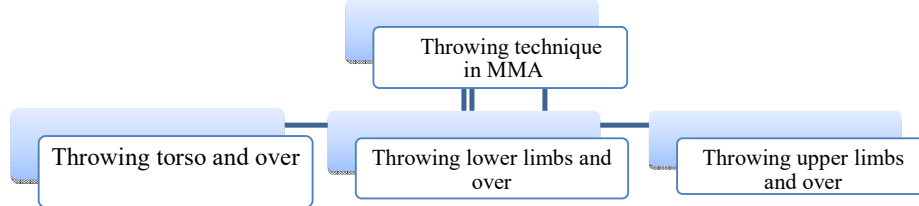


Fig. 3. The model applied of technical means of throwing in MMA

Next, we are going to present the technique of fighting on the ground, which was divided into technical overturn actions, technical dislocation procedures, technical strangulation procedures and ground blocking from various positions in Figure 4:

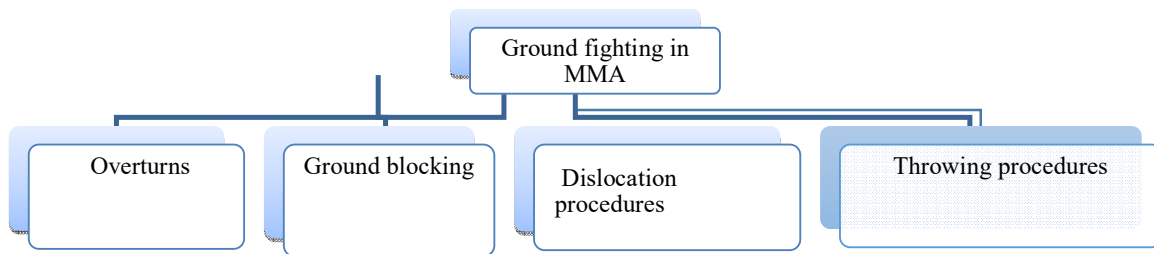


Fig. 4. The model applied of ground fighting technique means in MMA

We mention here that, depending on the particularities of each athlete, from the point of the technical-tactical training level view, the program has been individualized in terms of the number of exercise repetitions.

Results

For an objective statistical analysis of the differences recorded between the initial and final tests, the level of their mathematical significance was calculated for the evaluation samples, by applying the "t" - Student criterion. The determined values and significance threshold for each independent and dependent variable are shown in Table 3.

Table 3. Annual dynamics of the technical-tactical training indices of fighters from the control (n=14) and experimental (n=14) groups

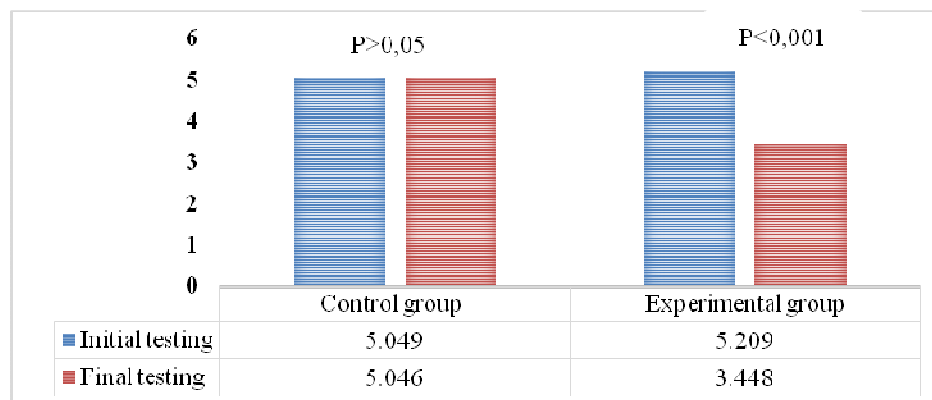
No. ct.	Parameters tested	Group	Statistical data		t	P
			Initial testing	Final testing		
			$\bar{X} \pm m$	$\bar{X} \pm m$		
1	Number of arm strikes on the punch bag 8 sec (no./rep.)	C	31,071 $\pm$ 0,588	32,214 $\pm$ 0,447	2,320	<0,05
		E	31,286 $\pm$ 0,667	34,429 $\pm$ 0,510	5,619	<0,001
		t	0,241	3,264	-	-
		P	>0,05	<0,01	-	-
2	Two direct leg kicks, side half-round and down-up half-round (sec)	C	5,049 $\pm$ 0,325	5,046 $\pm$ 0,266	2,521	<0,05
		E	5,209 $\pm$ 0,351	3,448 $\pm$ 0,314	5,715	<0,001
		t	0,336	5,584	-	-
		P	>0,05	<0,001	-	-
3	Procedures of knocking down to the ground through different difficulties 30 sec (no./rep.)	C	8,714 $\pm$ 0,412	9,786 $\pm$ 0,334	3,058	<0,01
		E	8,643 $\pm$ 0,440	10,857 $\pm$ 0,417	5,602	<0,001
		t	0,119	2,003	-	-
		P	>0,05	>0,05	-	-
4	From the fighting position on the ground performing dislocation and strangulation procedures 20 sec (no./rep.)	C	10,071 $\pm$ 0,497	10,857 $\pm$ 0,467	1,767	>0,05
		E	10,286 $\pm$ 0,474	12,429 $\pm$ 0,441	5,074	<0,001
		t	0,312	2,633	-	-
		P	>0,05	<0,01	-	-
5	Arm strikes on the punch bag 30 sec (no./rep.)	C	49,857 $\pm$ 0,533	50,929 $\pm$ 0,399	2,406	<0,05
		E	49,643 $\pm$ 0,570	52,643 $\pm$ 0,357	6,422	<0,01
		t	0,274	3,203	-	-
		P	>0,05	>0,01	-	-
6	Two direct leg kicks, two down-up side half-rounds and two half-rounds 30 sec	C	5,929 $\pm$ 0,322	6,714 $\pm$ 0,266	2,852	<0,05
		E	6,000 $\pm$ 0,331	7,857 $\pm$ 0,275	6,549	<0,001
		t	0,154	2,991	-	-
		P	>0,05	<0,01	-	-
7	Procedures of knocking down to the ground through different technical-tactical difficulties 30 sec	C	8,143 $\pm$ 0,376	9,286 $\pm$ 0,322	3,518	<0,01
		E	8,357 $\pm$ 0,387	10,500 $\pm$ 0,310	6,534	<0,001
		t	0,397	2,560	-	-
		P	>0,05	<0,05	-	-

Note: (n=28); f = 27 (n=14); f = 12
 C - control group; E-experimental group $P = 0,05; 0,01; 0,001$ $P = 0,05; 0,01; 0,001$
 n = 28; f = 27; r = 0,396 t = 2,056; 2,779; 3,707 t = 2,160; 3,012; 4,221

We notice that, for all the technical-tactical training evaluation samples, the differences for the experimental group are significant for the threshold of ($P < 0.01-0.001$).

This confirms the methodical orientation presented previously and provides us with strong arguments in promoting these means of training at this level, in order to develop the components of the technical-tactical training of MMA athletes in the in-depth specialization and orientation stage towards high performance.

The values recorded in the test two direct kicks, side half-round and down-up half-round (sec) can be seen a significant difference between the initial and final testing of the experimental group of 99.9%, as well as the final testing between the control group and experiment ($P < 0.001$), (Figure 5).

**Fig. 5.** Test results, two direct kicks, side half-round and down-up half-round (sec)

In the test „procedures of knocking down to the ground through different difficulties 30 sec (no./rep.)” a difference in experimental group average between initial and final testing of 2.214 ($P < 0.001$) can be seen.

The performances of MMA-style fighters in the test, „procedures of knocking down to the ground through different technical-tactical difficulties 30 sec.” highlights with the coefficient value of 3.4%, a high degree of homogeneity of the results obtained in this test, presented in Figure 6.

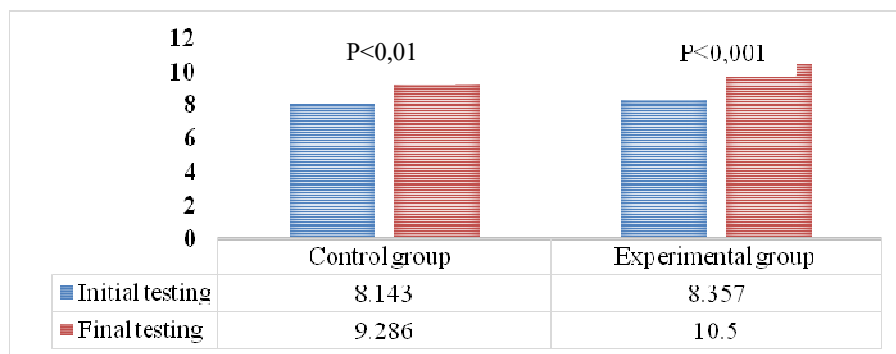


Fig. 6. Results of the test „Procedures of knocking down to the ground through different technical-tactical difficulties 30 sec”

Discussions

Statistical processing of information reduces and sometimes eliminates the subjectivity of the researcher, helping to increase scientific objectivity. A basic principle of the means used is to acquire a performing level of psychomotor skills before the in-depth specialization stage. This principle can be achieved if:

- the process of accelerating and increasing the efficiency of the use of means will be distributed in the stage of basic training in order to develop the progress of the training activity;
- multilateral and harmonious training is a condition of obtaining performances;
- the development of one quality reflects positively on the others, fully concentrated;
- the sports training process, the quality of which can be influenced by the coach's ability and experience to use concentrated and correct means taken from freestyle wrestling, Greco-Roman wrestling, boxing, judo, taekwondo and kickboxing;
- while increasing the sports performance, the number of traditional circulating means will also be reduced by perfecting the structure and content of the qualified training process, in terms of the rational distribution of the means specific to the technical-tactical training of the athletes.

The properties of the system of using the means in the training of fighters from the advanced group Vth year was based on the formative value in terms of multilateral and functional physical development, in the aspect of maintaining and strengthening the state of health, including the acquisition of basic and specific technical procedures. These desired principles reflect internal factors – biophysical and psycho-individual, external social and psychosocial factors. Internal factors are unknown in hereditary characters and in the activity of the major body functions (Krasnikov, A.A., 2005; Manolachi, V., et. al, 2022; Pavelka, et. al., 2020).

We believe that the notion of technique and tactics brings them closer to reality, they contribute to optimizing the effects of general and specific physical exercises, especially psychomotor skills. We note that in the current stage of basic training, the means taken from other sports have diversified and at the same time have become more complex, more compatible from the point of training effect view, thanks to new combinations of movements and the development of motor intelligence to perform high efforts in volume and intensity until approaching the biological, psychomotor and psychic limits.

Conclusions

1. The development/education of technical-tactical skills simultaneously with the improvement of the major functions of the body are essential aspects of the objectives of the training process that are the basis for achieving the highest possible level of the value of the fighters' performance indices.
2. Based on the results of the experiment, it can be mentioned that the optimization of motor qualities stimulates the development of technical training, necessary for martial arts fighters.
3. Implementation of specific psychomotor training by introducing exercise programs for the development of execution speed in fighters, we can mention that the control and experimental groups at the initial testing recorded the following indices: the control group 5.049 ± 0.325 , and the experimental group 5.209 ± 0.351 , the value t is 0.336 with $P > 0.05$, thus demonstrating that both groups were homogeneous and the differences insignificant. At the final testing we obtained the following indicators: the control group respectively 5.046 ± 0.266 , and the experimental group 3.448 ± 0.314 the value t constituting 5,584, and $P < 0.001$, which proves to us that following the use of the means specific to the Vth year advanced training stage and the fighting tests, the experimental group recorded significant values at the end of the experiment.

Conflicts of interest - If the authors have any conflicts of interest to declare.

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