The role of balance stability in ensuring the accuracy and consistency of leg kicks in kickboxing

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Abstract

Purpose: Analysis of the stability of maintaining balance in ensuring the accuracy and stability of leg strikes in kickboxing.

Methods: analysis of scientific and methodological literature on the topic; pedagogical observation, pedagogical testing, methods of mathematical and statistical analysis.

Results: To the 9th question "Is the accuracy of hitting with the right and left leg taught in a symmetrical order?" 5 respondents (26.3%) answered "yes," 14 respondents (73.7%) answered "no." To the question "Is the shot with a jump, rotation to the left and right formed separately?," 3 respondents answered "yes" (15.8%), 16 respondents answered "no" (84.2%). In this regard, it is important to emphasize that from the initial stage of the long-term training process to the stage of improving higher sports mastery, practicing strikes with both the right and left foot, teaching them to execute them with equal skill, turning to the left and right sides, along with further expanding the scope of attacking technique and tactics, also increases the effectiveness of the fight.

Conlcusion: In kickboxing, the greater the reserve for rotating the body in different directions in different positions and modes, the greater the stability of maintaining balance and, in turn, the higher the accuracy of punches.

Keywords: kickboxing, punch accuracy, balance, vestibular analyzer, circular movements.

Introduction

The results of visual observation of traditional training sessions with different age groups in kickboxing clubs showed that although the age and stage of training of kickboxers are relatively the same, the volume and intensity of training, as well as the exercises used for the development of physical qualities or the formation of technical and tactical skills, differ significantly from each other. The exercises used in teaching the types of leg strikes are mainly aimed at the leading leg (i.e., the strong leg), from a standing position or during movement, from a supporting position, and from a jumping turn-turn.

Although the volume, number of repetitions, and series of exercises improving strikes were controlled, it was noted that their effectiveness or accuracy was not officially and objectively assessed. Emphasis is not placed on the symmetrical development of hitting techniques with the corresponding leg, turning or rotating to the left and right. Moreover, it was revealed that attention is not paid to the separate development of the ability to maintain balance, which creates the basis for stabilizing the accuracy of strikes under the influence of various loads.

Results and discussion

In order to formally and objectively study these problems, we conducted pedagogical observation of qualified kickboxers and an express survey of kickboxing coaches. Pedagogical observation was conducted in the first 2 months of the 2022-2023 academic year, in which 24 training processes were analyzed. From the recorded results, it became known that during the conducted training sessions, the number of leg strikes was 348, or an average of 43.5 such strikes were practiced in each training session (Table 1).

In particular, the volume of kicks from a standing position or during movement with the left foot was 70.9 times or an average of 8.9 times per training session, with the right foot - 128.7 times or an average of 16.1 times. During all training sessions, it was 199.6 times or an average of 24.9 times. The total number of punching exercises performed with the left leg while jumping was equal to 51.2 times, or an average of 5.4 times per training session. With the right leg, a total of 97.2 times or an average of 12.1 times were recorded. In total, for all classes it was 148.4 times or an average of 18.6 times.

It is noteworthy that the number of exercises by type of leg strikes differed sharply from each other. For example, the front kick from the supporting position was 9.7 times on the left foot, 18.5 times on the right foot, a total of 28.2 times. Or the average number of front-kick kicks performed with the right leg in a jump was 8.9 times, and the total number of kicks with the left and right leg was 13.6 times. For example, the front kick from the supporting position was 9.7 times on the left foot, 18.5 times on the right foot, a total of 28.2 times. Or the average number of front-kick shots performed with the right leg in a jump was 8.9

times, and the total number of shots with the left and right leg was 13.6 times.

The total number of leg strikes from all positions during the training sessions was 41.8 times. Subsequent types of strikes, respectively: in the side kick support position with the left foot - 12.6; with the right foot - 21.8; total - 34.4; jumping with the left foot - 11.8; with the right foot - 17.6; total - 28.4; in all classes with the right and left foot - 63.8. Roundhouse-kick - 13.2; 25.3; 38.5; 6.5; 10.9; 17.4; 55.9. Huk-kick - 5.1; 8.5; 13.6; 7.2; 13.8; 21.0; 34.6. Beck-kick - 7.9; 13.6; 21.5; 5.6; 9.3; 14.9; 36.4. Ex-kick - 6.6; 10.7; 17.3; 3.5; 6.8; 10.3; 27.6. Jumping Kick - 11.3; 17.9; 24.2; 4.7; 15.6; 20.3; 49.5. Tornado-kick - 4.5; 12.4; 16.9; 7.2; 14.3; 21.5; 38.4.

Comparative analysis of these indicators shows that, firstly, in these classes, emphasis is placed on practicing all types of leg strikes on the right leg. Secondly, all types of strikes are practiced twice as rarely with the left foot. Thirdly, turning-rotation movements are used only in the convenient direction when striking with a turn (90o or 180o) or a 360o turn, both standing in place in a supporting position and while jumping during movement. In other words, right-handed kickboxers turn to the left, while left-handed kickboxers turn to the opposite side.

Fourthly, when teaching or improving types of strikes, emphasis is placed on the coordination of the number of repetitions of exercises, their coordination and technique, or on correcting technical errors, but priority is not given to training their accuracy and stability. It is important to emphasize that during all the analyzed training sessions, exercises aimed at forming balance stability, which create the basis for stabilizing the coordination of strikes and their accuracy, were practically not used. However, from a number of scientific sources, it is known that if the functional capabilities of the vestibular analyzer are not sufficiently developed in an athlete, and especially in a kickboxer, then under the influence of such motor loads as sharp turns, bends, and straightenings performed during training, especially during competitive fights, signs of swaying arise.

It should also be noted that during the studied training sessions, the volume of exercises used for teaching and improving types of leg strikes, the number of their repetitions, differed significantly from the corresponding types of strikes used in rounds of official competitive fights. For example, in the final bouts of the Russian Championship held in November 2024, the types of kicks performed with the foot were recorded with the following indicators:

- 1st pair. Round 1 - roundhouse-kick - 1; bok-kick - 0; front-kick - 3; iks-kick - 0; low-

Table 1. Results of studying the experience of improving striking techniques from a supporting position and during a jump turn in traditional training sessions with qualified kickboxers - 24 sessions (average indicators)

Exercise	Volume $\bar{x}$	In supporting position		Total	Jumping		Total
		left leg	right leg		left leg	right leg	
1. Front-kick	*41,8*	*9,7*	*18,5*	*28,2*	*4,7*	*8,9*	*13,6*
2. Sayd-kick	*63,8*	*12,6*	*21,8*	*34,4*	*11,8*	*17,6*	*29,4*
3. Round-kick	*55,9*	*13,2*	*25,3*	*38,5*	*6,5*	*10,9*	*17,4*
4. Hay-kick	*34,6*	*5,1*	*8,5*	*13,6*	*7,8*	*13,8*	*21,0*
5. Bak-kick	*36,4*	*7,9*	*13,6*	*21,5*	*5,6*	*9,3*	*14,9*
6. Iks-kick	*27,6*	*6,6*	*10,7*	*17,3*	*3,5*	*6,8*	*10,3*
7. Jamping-kick	*49,5*	*11,3*	*17,9*	*29,2*	*4,7*	*15,6*	*20,3*
8. Tornado-kick	*38,4*	*4,5*	*12,4*	*16,9*	*7,2*	*14,3*	*21,5*
Total	*348,0*	*70,9*	*128,7*	*199,6*	*51,2*	*97,2*	*148,4*
$\bar{x}$ - average	*43,5*	*8,9*	*16,1*	*24,9*	*6,4*	*12,1*	*18,6*

Fig 2. Experience in forming the accuracy of leg strikes in kickboxing and the stability of maintaining balance that stabilizes it Results of the express survey on the topic "From the eyes of coaches" - n=19

N	Questions	Answers			
		YES		NO	
		quantity	%	quantity	%
1.	*Is static balance regularly practiced in training?*	*6*	*31,6*	*13*	*68,4*
2.	*Is dynamic balance regularly practiced during training?*	*5*	*26,3*	*14*	*73,7*
3.	*Is the accuracy of strikes based on the stability of balance?*	*12*	*63,1*	*7*	*36,9*
4.	*Is the ability to distinguish time intervals, which is important in the formation of punch accuracy, trained?*	*4*	*21,1*	*15*	*78,9*
5.	*is the function of the vestibular analyzer trained separately?*	*6*	*31,6*	*13*	*68,4*
6.	*Is the accuracy of strikes trained under the influence of sharp rotational loads?*	*5*	*26,3*	*14*	*73,7*
7.	*Is the accuracy of strikes trained under the influence of ultra-intensive anaerobic loads?*	*8*	*42,1*	*11*	*57,9*
8.	*Does the accuracy of strikes depend on coordination endurance?*	*7*	*36,9*	*12*	*631*
9.	*Is the accuracy of striking with the right and left leg taught in a symmetrical order?*	*5*	*26,3*	*14*	*73,7*
10.	*Are the jumping left and right turns and strikes formed separately?*	*3*	*15,8*	*16*	*84,2*

kick - 21; jumping-kick - 0; midel-kick - 9; knee-kick - 1; futswips - 0. 2nd round - respectively - 2; 0; 1; 0; 17; 0; 6; 2; 0. 3rd round - 1; 0; 0; 0; 14; 0; 5; 5; 0.

- 2nd pair. 1st round - 3; 0; 1; 0; 24; 0; 4; 11; 0. 2nd round - 4; 0; 1; 2; 22; 0; 5; 7; 0. 3rd round - 2; 1; 2; 0; 17; 1; 2; 13; 0.

- 3rd pair. 1st round - 1; 1; 0; 0; 17; 0; 3; 7; 1. 2nd round - 4; 0; 2; 0; 19; 1; 4; 6; 0. 3rd round - 2; 2; 2; 0; 13; 0; 1; 4; 0.

Among these hits, the 1st-4th did not bring a successful result, the 5th (low-kick) - a positive result, jumping-kick - negative, midel-kick - neutral, knee-kick - positive, futswips - negative.

As can be seen from the comparative analysis of the above-mentioned indicators, some types of foot strikes used for training and improvement in traditional classes were not used at all, while others were repeated extremely rarely (1-3 times). The most frequently executed types of punches were low-kick (13-24 repetitions) and knee-kick (4-13 repetitions), which were performed with a good result in each round.

Such problems or types of punches observed in traditional training sessions and official competitive fights were not used based on non-traditional tactical approaches, and the logical reasons for this were also confirmed by the results of a survey conducted with kickboxing coaches (Table 3.2).

The results presented in this table show that most coaches do not have a sufficient and complete understanding of the internal structural mechanisms that ensure the specific coordination, accuracy, and effectiveness of leg strikes, their components, and the execution mechanism. To the 1st question, entitled "Is the stability of maintaining static balance, which creates the basis for stabilizing the technique, coordination, and accuracy of strikes, regularly practiced," only 6 out of 19 respondent-trainers answered "yes" (31.6%), the remaining 13 trainers answered "no" (68.4%). To the question of whether the ability to maintain dynamic balance is regularly formed during training, 5 respondents answered "yes" (26.3%), and 14 respondents answered "no" (73.7%).

To the 3rd question, "Is the accuracy of strikes based on the stability of balance," the answer "yes" was 12 times (63.1%), and the answer "no" was 7 times (36.9%). Surprisingly, the majority of respondents know the priority

importance of the ability to maintain balance in ensuring the accuracy of strikes, but they do not pay attention to the regular formation of this ability in training.

It is known that the accurate and high-performance execution of punches largely depends on the kickboxer's time-range reaction. To the 4th question presented in this sense, 4 trainer-respondents answered "yes" (21.1%), and the remaining 15 respondents answered "no" (48.9).

In the 5th question, "Is vestibular analyzer function trained during training," the respondents answered as follows: "yes" - 6 (31.6%), "no" - 13 (68.4%). It should be recognized that in kickboxing fights, although most movements are associated with sharp turns and rotational elements, many punches performed by kickboxers are not executed with absolute accuracy.

The main reason for this is the weak development of the functional capabilities of the vestibular analyzer, which regulates the function of maintaining balance in them, as can be seen from the results of vestibulokinetic tests. The fact is that in this sport, impact loads associated with sharp rotational movements affect the receptors of the vestibular apparatus, leading to a state of body swaying, as a result of which the coordination of balance is disrupted, negatively affecting the accuracy and effectiveness of the strike. However, despite this, only 5 respondents (26.3%) answered "yes," and 14 respondents (73.7%) answered "no" to the 6th question "Is the accuracy of strikes trained under the influence of sharp rotational loads?."

It is known that in situational sports, including kickboxing, training sessions (groups of exercises) conducted at extremely variable and maximum speed, especially competitive matches, are carried out in an anaerobic mode. Such loads primarily affect respiratory function, accelerating the rhythm of breathing, but also increase the frequency of heart contractions and relaxations, resulting in O2 dependency in the body (hypoxia and hyperkopnia - increased CO2), accelerating body vibrations, which negatively affects both the coordination of strikes and their accuracy.

[Kleshev V.N., 2018, pp. 20-27; E.V. Kladov, 2011, pp. 16-23; E.V.Kladov, V.P.Shupgina, 2011 p 187-191] Nevertheless, only 8 respondents (42.1%) answered "yes" to the 7th question, which was presented in the sense that "Is the accuracy of strikes trained under the influence of ultra-intensive anaerobic loads?," and the remaining 11 respondents (57.9%) answered "no."

Neither in the theory of physical culture and sports nor in their practice does the concept of "coordination ability" exist, but most specialist scientists and coach-teachers conditionally use this concept when assessing the ability to maintain coordination abilities, such as simple and complex motor reactions, the speed of transition from one type of movement to another, the sense of movement rhythm, the ability to distinguish the limits of muscle tension or the amplitude of flexion-extension of joints, the ability to maintain balance for a long time, for example, in training or competitive cycles. Therefore, we decided to use this term in the questionnaire. In particular, when this question (question 8) was presented, 7 out of 19 respondents answered "yes" (36.9%), and 12 respondents answered "no" (63.1%).

Conclusion

Based on the results of pedagogical observations and surveys, it became known that in modern kickboxing, teaching and improving the techniques of striking with the right and left leg by jumping from a standing position and turning to the left and right during movement remains a problem. It is possible that in kickboxing matches, kicks performed in supporting positions and jumping in 900, 1800, 3600, or rotational positions form a balance function controlled by the vestibular analyzer to a certain extent, but such rotational movements cannot perfectly develop this ability.

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