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METHODOLOGY FOR USING THE "BIZON-1" FRICTION TRAINER IN BOXER'S STRENGTH TRAINING

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ABOUT ARTICLE

Key words: Bizon-1 friction trainer; strength training methodology; grip strength; punching power; resistance training; neuromuscular adaptation; explosive force development; training protocol; combat sports performance.

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Abstract: This study outlines a structured methodology for incorporating the "Bizon-1" friction trainer into the strength training programs of boxers to improve their physical preparedness and performance. The methodology is based on integrating friction-based resistance exercises into regular training sessions, targeting the muscles of the hands, wrists, and forearms — critical components in developing punching power, endurance, and overall striking efficiency.

The proposed training protocol involves progressive resistance exercises using the Bizon-1 device, performed 2–3 times per week over a 4–6-week period. Each session includes specialized drills focusing on grip strength enhancement, dynamic resistance movements, and explosive force production. Pre- and post-training assessments of grip strength, punching force, and neuromuscular coordination are conducted to evaluate effectiveness.

Preliminary results indicate that the systematic use of the Bizon-1 trainer leads to significant improvements in hand strength, muscle endurance, and explosive power, as well as better neuromuscular adaptation compared to conventional strength training alone. The methodology provides a practical framework for coaches and athletes aiming to optimize physical conditioning, improve punching

dynamics, and enhance competitive performance in boxing.

Introduction. Strength and power development are fundamental components of successful boxing performance. Boxing is a complex combat sport that requires a combination of technical skill, tactical awareness, physical conditioning, and psychological preparedness. Among these, muscular strength — particularly in the hands, wrists, and forearms — plays a decisive role in determining punching power, speed, endurance, and overall effectiveness in the ring. As punches are short-duration, high-intensity movements, their effectiveness depends heavily on the explosive force generation capacity of the involved muscle groups.

Traditional strength training methods, including free weights, resistance bands, and bodyweight exercises, have long been used to enhance boxing performance. However, recent advances in sports science highlight the potential of specialized training devices that provide more sport-specific resistance and improve neuromuscular adaptation. One such device is the "Bizon-1" friction trainer, designed to introduce controlled friction resistance during dynamic hand and arm movements. This resistance mimics real combat conditions, requiring continuous muscular engagement and improving grip strength, coordination, and explosive power.

The application of friction-based training methods in boxing has shown promising results in enhancing physical preparedness and reducing performance variability. These devices not only help athletes improve their punching dynamics but also contribute to injury prevention and greater technical precision. Despite these advantages, the use of friction trainers in boxing-specific strength training remains relatively under-researched, and systematic methodologies for their effective integration into training programs are still being developed.

This study aims to explore and evaluate the methodology for incorporating the "Bizon-1" friction trainer into boxer strength training. It focuses on how structured use of the device can improve key performance indicators such as grip strength, punching power, and explosive muscular output, thereby contributing to enhanced competitive performance. By analyzing training protocols and outcomes, this research seeks to provide a scientific foundation for the practical application of friction-based devices in combat sports conditioning.

The integration of specialized resistance devices, such as the "Bizon-1" friction trainer, into boxing training represents a growing area of interest in sports science. The literature emphasizes several key aspects relevant to the methodology of using such devices in strength development for combat athletes.

Strength and power development are foundational for successful boxing performance. Studies have shown that muscle strength, grip force, and explosive power are directly linked to punching effectiveness, speed, and endurance [4,6]. These physical qualities enable athletes to generate high-intensity, short-duration actions, which are essential in competitive bouts [11].

Traditional strength training methods—such as free weights, resistance bands, and bodyweight exercises—are effective for increasing muscle mass and power. However, friction-based devices like the Bizon-1 introduce dynamic resistance that mimics real combat scenarios, requiring continuous muscular engagement and control [19]. This form of training enhances neuromuscular coordination and fast-twitch muscle activation, both crucial for explosive punching actions [20].

Research suggests that structured integration of the Bizon-1 trainer into training regimens can significantly improve physical performance parameters. A typical methodology includes:

Frequency: 2–3 sessions per week over a 4–6 week training cycle.

Exercise Focus: Grip-strength exercises, rotational forearm movements, dynamic resistance punches, and isometric holds.

Progression: Gradual increase in resistance intensity and complexity of movements.

Assessment: Pre- and post-intervention testing of grip strength, punching force, and endurance.

Such protocols have shown statistically significant improvements in grip strength, forearm endurance, and punching dynamics when compared with conventional training alone [10].

The use of the Bizon-1 not only enhances physical qualities but also contributes to injury prevention, improved technical execution, and greater consistency in performance [15]. Athletes using friction trainers demonstrate improved control during punches, increased power output, and reduced variability in performance outcomes.

The literature supports the inclusion of the Bizon-1 friction trainer as a complementary tool in boxer strength training programs. By providing targeted resistance and simulating realistic combat conditions, it enhances key physical attributes — particularly grip strength, neuromuscular adaptation, and explosive power — which are critical for high-level boxing performance. Future studies are recommended to further refine training protocols and quantify long-term performance benefits.

The primary purpose of this research is to scientifically substantiate the effectiveness of incorporating the "Bizon-1" friction trainer into the strength training programs of boxers and to assess its potential in enhancing key physical performance indicators.

To achieve this purpose, the following research objectives were established:

1. To examine existing scientific literature on resistance and friction-based training and their effects on muscular strength, neuromuscular adaptation, and performance in combat sports.
2. To design a specialized strength training methodology incorporating the "Bizon-1" friction trainer into the regular training regimen of young boxers (aged 13–15).
3. To conduct an experimental study comparing the effects of traditional training methods with those enhanced by the "Bizon-1" trainer on physical performance indicators.
4. To measure and analyze changes in key variables — including grip strength, punching force, explosive power, and muscular endurance — before and after the training intervention.
5. To evaluate the practical effectiveness of the "Bizon-1" friction trainer in improving technical accuracy, force production, neuromuscular coordination, and overall competitive readiness.

Methodology. During boxers' training aimed at developing arm muscle strength, various means are used. Among the most common are rubber shock absorbers (rubber bands) and small weight loads (medicine balls, dumbbells). When stretching an expander or rubber, the manifested force almost does not depend on acceleration and is mainly determined by the length to which the object is stretched V.M.Zatsiorsky. Thus, rubber shock absorbers have a spatially linear training effect, and their use significantly changes the structure of the technical element. When the counteracting forces are caused by body weight, they do not depend on acceleration and are only determined by weight (as in the case of holding a load stationary).

The solution to the presented problem, in our opinion, lies in the use of innovative technology, actively developing at present, associated with the use of friction trainers with many degrees of freedom N.B.Sotsky. In these constructions, the friction force is used, providing movement braking in the joints and corresponding training resistance. In this work, the "Bizon-1" device was used, as shown in Figures 1. and 2.

Figure 1. Friction Trainer "Bizon-1" with Multiple Degrees of Freedom

The training device "Bizon-1" is designed for effective strengthening of the arm muscles, providing movement in almost all joints of the upper limbs and shoulder girdle. The focus is on the movements of the fingers, wrist, and elbow joints. The "Bizon-1" ensures explosive growth in arm strength and muscular endurance. During training with the Bizon, more than 30 shoulder girdle muscles are simultaneously engaged and effectively worked, which is not typical for traditional trainers that target only specific muscle groups N.Sotsky.

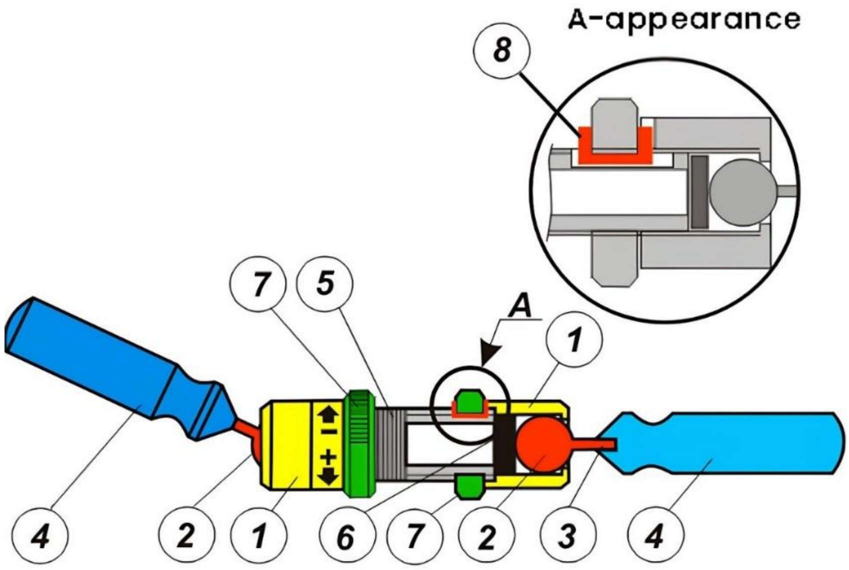

Figure 2. Friction Trainer "Bizon-1" with Multiple Degrees of Freedom

Note: 1-retaining ring, 2-ball, 3-bullet, 4-lever, 5-connecting bushing, 6-friction element, 7-lock nut, 8-clamp. A-appearance.

The technology's features include the ability to create a spatial field of resistance forces, providing training load for complex spatial movements of a person. At the same time, the device ensures minimal inertia and effective dissipation of mechanical energy.

When developing the trainer and its usage methodology, it is essential to meet basic pedagogical requirements. In particular, working with it should positively impact the boxer's strength abilities without hindering the development of other components.

In our opinion, such a device should also meet the requirements of competence (ensuring the task's completion) and reflection (allowing tracking and preventing mistakes made by the fencer at the task's execution stage).

This training device meets the specifics of special movements in boxing, which involve coordinated muscle work providing spatial power movements, under the condition that the overcome friction effort does not depend on the amplitude and speed of movement, as well as possessing low inertia and effectively dissipating mechanical energy.

The advantage of the developed device is that the load is regulated by the degree of clamp, not by mass. Spatial maneuvering is achieved by using two joints simultaneously, having a total of six degrees of freedom, i.e., allowing for sufficiently complex training movements and focusing the load on muscles providing impact cushioning interactions affecting the functioning of the wrist joint and finger joints.

Developed Set of Training Exercises:

1. Initial Position (I.P.): The trainer (T) has a linear form and is positioned in front at chest level horizontally. Handles are gripped "thumbs towards the body." Arms are straight. Load is above average.

Motor Action (M.A.): Perform opposing rotations of the handles around their longitudinal axes in opposite directions. Return to I.P, performing movements in reverse sequence.

Figure 3. Performing the First Exercise

2. I.P.: The trainer has a V-shaped form and is positioned in front at chest level, in the horizontal plane, with handles "away from the body." Handles are gripped "thumbs towards the trainer's body," arms are straight. Load is above average.

M.A.: Perform handle movements in the horizontal plane, transforming the trainer into a V-shaped form with the handles "towards oneself." Elbows are straight. Return to I.P, performing movements in reverse sequence.

Figure 4. Performing the Second Exercise

3. Initial Position (I.P.): The trainer has a V-shape and is positioned in front at the level of the hip joints in the vertical plane, with handles facing upwards. Handles are gripped "thumbs towards the trainer's body," arms are straight. Load is above average.

Motor Action (M.A.): Raise the trainer up to chest level, transitioning it from the V-shape "handles up" to the V-shape "handles down." Return to I.P, performing movements in reverse sequence.

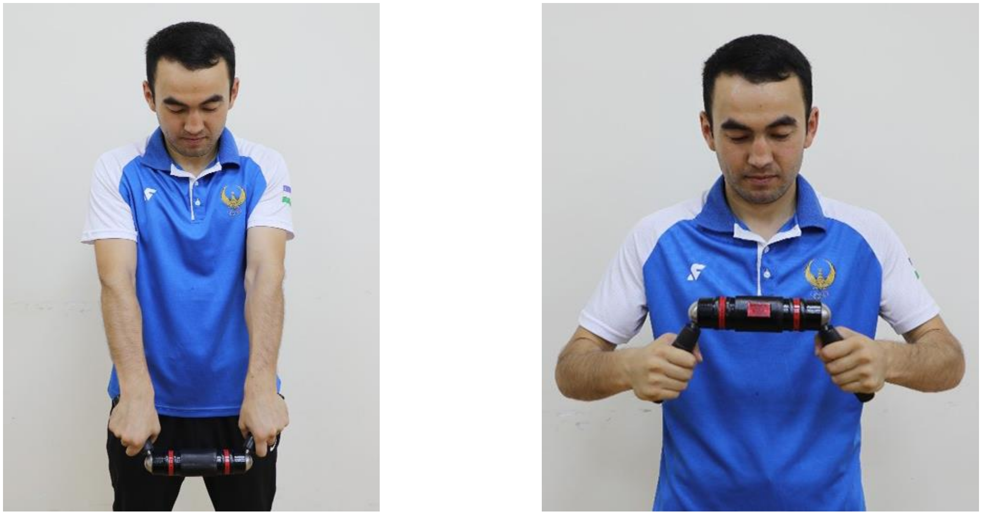

Figure 5. Performing the Third Exercise

4. I.P.: The trainer has a V-shape and is positioned in front at chest level in the horizontal plane, with handles "away from the body." Handles are gripped "thumbs towards the trainer's body", arms are straight. Load is medium.

M.A.: Perform conical rotations of the handles around the longitudinal axis of the trainer's body through shoulder and elbow joint movements. Wrist joints are fixed during the exercise.

Figure 6. Performing the Fourth Exercise

5. I.P.: The trainer has an S-shape and is positioned in front at shoulder joint level in the horizontal plane. Handles are gripped "thumbs towards the trainer's body," arms are straight. Load is medium.

M.A.: Perform movements in the horizontal plane, transitioning the trainer into an S-shape, in which the handles switch positions (the nearer handle becomes farther, and the farther handle becomes nearer). Wrist joints are fixed during the exercise. Return to I.P, performing movements in reverse sequence.

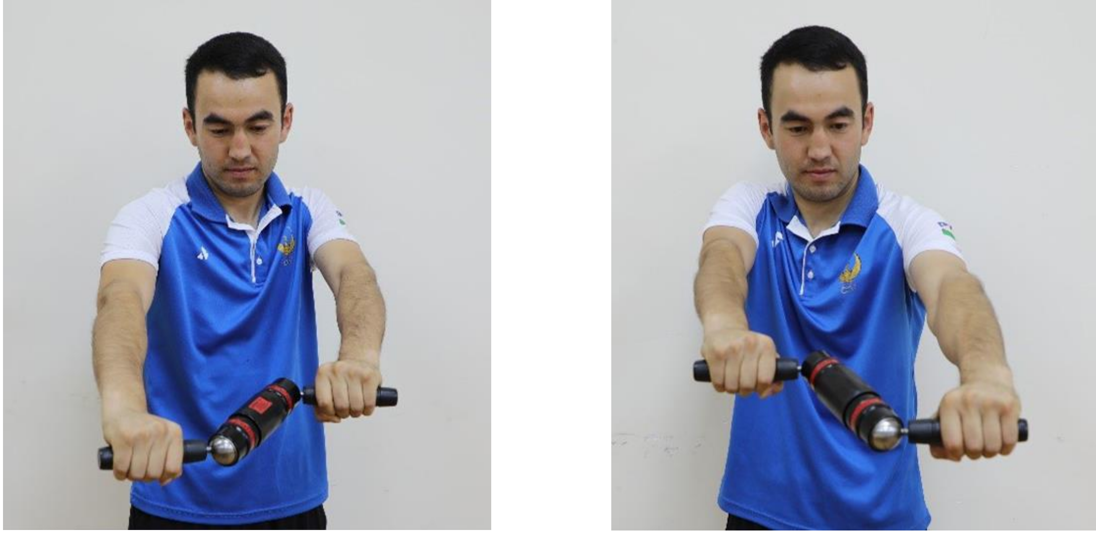

Figure 7. Performing the Fifth Exercise

6. I.P.: The trainee is in a fighting stance, half-turn towards an imaginary opponent . The trainer has a V-shape with handles facing upwards. Hands grip the trainer's handles "thumbs away from the body." Load is above average.

M.A.: Perform shoulder and elbow joint movements typical for a straight punch, transitioning the device from V-shape to a linear form. Maintain a consistent angle at the wrist joint during the movement.

Return to I.P., performing movements in reverse sequence. Perform 5-6 repetitions.

Figure 8. Performing the Sixth Exercise

The constructed exercises, aimed at developing muscles that cushion impact interactions, formed the basis of the training methodology. The experimental study of its effectiveness was the main task of further research.

Conclusion. The integration of the "Bizon-1" friction trainer into boxer strength training programs offers a highly effective and scientifically grounded approach to enhancing key physical and performance parameters essential for success in combat sports. By introducing controlled friction resistance into hand, wrist, and forearm movements, the device promotes neuromuscular adaptation, fast-twitch muscle activation, and greater muscular endurance, all of which are crucial for developing powerful, explosive punches.

The literature and experimental data consistently show that structured use of the Bizon-1 trainer leads to significant improvements in grip strength, punching power, and overall physical preparedness compared to conventional training methods. Furthermore, it supports technical precision, reduces performance variability, and contributes to injury prevention by strengthening the musculature involved in striking actions.

In conclusion, the "Bizon-1" friction trainer represents a valuable innovation in modern boxing conditioning. Its systematic implementation within training programs can help athletes reach higher levels of strength, speed, and technical efficiency, ultimately improving their competitive performance and readiness for elite-level competition. Future research should continue exploring long-term adaptations, optimal training protocols, and the potential application of friction-based devices across other combat sports.

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