

***Particularities of explosive strength training in the special stage of junior taekwondo players***  
***Particularidades del entrenamiento de la fuerza explosiva en la etapa especial de los taekwondistas juveniles***

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**Reception date:** January 14, 2023

**Acceptance date:** February 14, 2023

**ABSTRACT**

Explosive strength training is currently considered an essential element in the planning of training in the sport of Taekwondo, in which it is intended to achieve an acceleration of the strike with jumps, turns and therefore the movements of the taekwondo player. The investigation had as a sample the team of the youth category of the province of Holguín. The concepts, investigations, evaluations and actions of the coach were taken into account, as well as the methodological requirements of the capacity treatment through the exercises with weights and jumps planned in the special preparation stage according to the power zone. In the present work a theoretical review of the main systems applied for the methodology of explosive force training in the special preparation stage in Taekwondo is proposed.

**Keywords**

Taekwondo; Explosive force; Special stage; Youth.

**RESUMEN**

El entrenamiento de la fuerza explosiva se considera como un elemento esencial en la planificación del entrenamiento en el deporte de Taekwondo, en la que se pretende alcanzar una aceleración del golpeo con saltos, giros y los desplazamientos del taekwondista. La investigación tuvo como muestra el equipo de la categoría juvenil de la provincia de Holguín. Se tuvo presente los conceptos, investigaciones, valoraciones y acciones del entrenador, y los requerimientos metodológicos del tratamiento de la capacidad a través de los ejercicios con pesas y saltos planificados en la etapa de preparación especial según zona de potencia. En la investigación se plantea una revisión teórica de los principales sistemas aplicados para la metodología del entrenamiento de la fuerza explosiva en la etapa de preparación especial.

**Palabras clave**

Taekwondo; Fuerza explosiva; Etapa especial; Juveniles.

## **INTRODUCTION**

In recent years, explosive strength training has acquired an essential role in planning training in Taekwondo, since it positively influences the improvement of other qualities and, therefore, a higher performance of taekwondo players. There are recent studies (Brito et al., 2014; De Hoyo et al., 2015a; Jensen et al., 2014; Meylanet al., 2009; Owen et al., 2015) which show that with strength training adequate explosive, there is a greater response to the physiological demands that Taekwondo requires. Muscle contraction occurs because each muscle has a certain number of motor units that are controlled by the corresponding nerve endings, in such a way that when a signal from the brain is sent to the muscle fibers, they contract and subsequently relax (Bosco, 2000). However, explosive muscular strength is a complex concept, which involves a wide variety of definitions and its exercise is present in a wide range of training programs.

When the explosive force capacity appears in the development of research as a fundamental problem, an exhaustive analysis is necessary on the elements that identify it, its different manifestations and characteristics to be taken into account during the work aimed at its development. This ability plays a very important role in the athlete's preparation process, being a determining factor of competitive success, however, his training requires a high degree of methodological analysis for its correct direction, since, if properly oriented, it can be one of the noblest jobs for the taekwondo player, providing extraordinarily good results, but at the same time it can become the most dangerous practice if you do not have the proper knowledge and preparation.

Currently, the development of explosive strength capacity is practically inseparable from any sports training process, to such an extent that science tries more and more to see the influence of this physical capacity in relation to the competitive elements of each sport, making the taekwondo performance during the most effective competitive activity.

For Newton and Kraemer (1994) the explosive manifestation of force is responsible for the execution of certain activities that require a sequence of movements aimed at producing a high output speed in a movement or in impact with a body. According to Izquierdo and Aguado et al (1997) and Bosco (2000), this type of manifestation is conditioned by a series of neuromuscular and technical coordination factors:

- Frequency of nerve impulses that reach the muscles from the brain.
- Number of muscle fibers to which the impulses arrive.
- Influence of biofeedback provided by proprioceptors or neuromuscular spindles, Golgi tendon corpuscles and joint receptors.

- Predominant types of muscle fibers since there is a positive correlation between explosive strength and the percentage of fast fibers.
- Mass and molecular weight of the protein structure that constitutes the fiber.
- Training level of the muscle fiber from the neuromuscular and metabolic point of view.

Physiological conditions in which the muscle fiber is found before explosive force and the degree of muscle stretch prior to concentric contraction are developed.

Several authors agree that the factors that determine the manifestation of explosive force should include the level of maximum force, since having a good base of maximum force and maximum dynamic force is essential to develop high explosive force gradients. Manno, (1999), Bosco (2000) and Sedano (2009), among others.

Regarding this physical quality, García Manso et al. (1996), refer to two types of explosive force. They are namely:

Tonic explosive force: refers to rapidly developing forces against relatively high resistance, in which the athlete generates tensions that appear quickly and gradually increase to include movement.

Ballistic explosive force: refers to forces of rapid development, in which the resistance to be overcome is relatively small and the movement is of a ballistic type, that is, after a maximum tension has been developed (lower than that produced in tonic explosive actions), the tension begins to decrease even though the speed of movement continues to slowly increase.

## **METHODS**

To carry out this work, a simple random sample was chosen, for all the participants of the male youth taekwondo team of the EIDE "Pedro Díaz Coello" from the province of Holguín, which constitutes 100% of the current population. of this team, they have an average of 5 years in high sports performance. Methods of the theoretical level and the empirical level were used, such as the historical-logical, analysis-synthesis, induction-deduction and documentary review. The observation made to the trainings, there were no significant variations with respect to the volume, the sessions of these in the realization with the exercises with weights and jumps were reduced with emphasis on the muscles that intervene in the action of moving, jumping, turning and the jump power according to the technical element, these were in different intensity zones, the training was carried out through series, repetitions, and time.

## **DEVELOPMENT**

Particularities of explosive strength training in the special stage of youth taekwondo players.

The development of physical preparation in the special stage is valued by Romero and Becali (2014), who affirm that "the objective of this stage consists in the development of the special basic elements for the acquisition of sports form". (p. 35-36). These arguments constitute starting points in relation to the special preparation stage in Taekwondo where its characteristics are the following:

- 1.- Its duration is determined by the behavior in relation to the volume of the general and special preparation.
- 2- The orientation of the training is more specialized.
- 3- The physical preparation is aimed at the development of determining capacities closely linked to the demands of the sport.
- 4- There is a greater use of special means and methods to ensure the achievement of objectives of a special nature.
- 5-The general trend of the dynamics of the loads is towards the reduction or relative stabilization of the volume. The intensity increases considerably compared to the previous stage, therefore it is necessary to take these aspects into account for the development of physical preparation at this stage.

These criteria, in the author's opinion, allow us to assume what was stated by Hernández (1987a), for him it is an alternate aerobic-anaerobic sport, with brief phases where maximum actions are produced. According to the characteristics, level, rules and demands of each sport, jump ability manifests itself in different ways. The types of vertical jump vary according to the purpose of the athlete, sometimes they seek to reach the maximum distance in height, in length, many times in trajectory and angulation after some external or fixed element (ball, hoop, bow, rivals and teammates), and in some cases they are also influenced by other factors (time, speed and previous actions).

According to Aguirre (2007) "jumping is a motor skill that consists of a takeoff action from the ground from a powerful impulse provided by one or both legs". (p.1). Therefore, jumpability refers to a series of repeated maximum vertical jumps used by many sports, and in this case Taekwondo is one of them, where the ability to execute a technical gesture at maximum speed (jump up and/or or jump forward), with the performance of kicking techniques either frontal, lateral and in turns, determining aspects for sports performance.

In this regard, Esper (2000) recognizes that jumping is a critical skill in sports such as volleyball and basketball; in the specific case of Taekwondo, power in the legs is essential, because many jumps, turns and movements are performed during the course of the game. of the competition. Due to the characteristics of this sport, taekwondo players must be prepared to face this physical demand.

The researcher mentions that in Taekwondo the vertical jump is a very important element since it depends, basically, on the opportunities to obtain or maintain the score during the fight since the technical elements with kicks and turns either to the back or to the face are with the highest score in combat due to the competitive demands of the regulations and the spectacularity of the techniques. In addition, in the statistics of Taekwondo bouts, the percentages of jumping actions with twists in attacks and defenses have a lot of relevance in the outcome of a bout, hence the importance of strengthening the jump to maximize results.

Bolognese (2000), when referring to explosive muscular strength, emphasized: "...explosive gestures are those that are executed in an application time of less than 350 milliseconds." (p. 78). For this reason, explosive muscular strength must be worked on in reactive, ballistic movements with maximum contraction velocity. In Taekwondo, explosive movements have expressions in jumps, thrusts, turns or displacement, when executing the leg technique. These criteria are assumed as a guide in muscle strength training, based on the general guidelines offered by this author; but they are still insufficient for their treatment in Taekwondo, considering the weight divisions of taekwondo players.

No less important is the rapid muscular strength in the constant action of taekwondo players in the face of different changing combat situations. Román (2012) defines rapid muscle strength as:

"The individual's ability to overcome resistance through a high speed of contraction, this force depends on the maximum force, the speed of contraction of the musculature (type of fiber), intramuscular coordination, adequate participation of the different muscles that are involved. in the exercise". (p.97)

A controversial aspect in the preparation of muscular strength in Taekwondo is the training of maximum muscular strength. Román (2010) considers that it is the greatest muscular force that an individual can develop with a voluntary contraction of the muscles, and it is necessary for sports that must overcome considerable external resistance. For this reason, the training of this ability is questionable. This develops to the extent that the different manifestations of muscular strength are trained, and when sub-maximal weights are applied to achieve synchronization, inter and intramuscular coordination, and recruitment of muscle fibers. In short, maximum muscle strength is developed, but not trained.

On the other hand, authors such as Hanz (1990), Cometti (2002), Charchabal (2005), Ebben (2005), Font (2008) and Fabra (2012) consider that exercises with weights, performed over 85 percent of the maximum result in those sports where the resistance to be overcome is not limited, they cause a positive

effect on inter and intramuscular coordination, synchronization and recruitment of fast and ultra-fast muscle fibers, present in the different actions.

The author of the present investigation agrees with the criteria expressed by these researchers regarding the training of maximum muscular strength. This makes it possible to corroborate the dependence of the increase in this manifestation of strength from the improvement of explosive, fast muscle strength and resistance to muscle strength, using weights in the work with taekwondo athletes.

Muscle strength training with weights provides additional benefits by accurately quantifying volume and intensity. It is also notorious for its prolixity to provide various exercises according to the different positions, for the strengthening of the trunk and extremities in the general and special preparation of muscular strength, from its execution in certain positions, with various weights, in dissimilar regimens. work and at changing speeds.

The execution of exercises with weights is related to the basic laws of muscle strength training. In this sense, Bompa (2005) proposed: "...train the movements, not the isolated muscles." (p. 105). This idea offers the possibility of training special muscular strength by applying exercises combined with weights, similar to the dynamic structure of the movement in the different actions of taekwondo players within the competition.

The use of this procedure allowed Cortegaza and Luong (2011) to consider that, as a basic premise in the general and special preparation of muscular strength, work must be done to convert or transform the acquired general muscular strength into specific muscular strength; For this reason, they admit it as a characteristic feature of the athlete's preparation today, where a high percentage of special exercises prevails over general exercises.

Consequently, with the above, the exercises in the special preparation of muscular strength must have a marked similarity in the jumps, push turns and displacements. Each one of the taekwondo athletes have different functions in correspondence with the tactics used in the combat, which must visualize the opponent, if he is taller, faster, stronger. Sometimes, they present difficulties in certain actions in the attack or in the counterattack and this requires individual attention.

Muscle strength training with weights in Taekwondo, taking individual elements into account, should facilitate the maintenance of optimal form during the competitive season. For this reason, a previous analysis of the competitive calendar is necessary to achieve the distribution of the work of the performance factors, depending on the rival and the expectations of success, being necessary to determine in advance how the muscular force will be periodized. When reflecting on the periodization

of muscular strength, Román (1994) expressed: "... each period according to its characteristics poses, before the preparation of strength, rigorous and determined tasks." (p.39)

In the same way, Bompa (2000) defined specific tasks for the training of muscular strength with weights, and translates it into periodization of that capacity, which is developed in the periods of sports training. This aspect is important, since the future increase in the muscular strength of taekwondo athletes requires a more differentiated approach in the training of this capacity.

This sport is characterized by the use of various combat techniques such as high and fast kicks, fists, displacements, blocks, among many more, all with an explosive nature (Bridge, Ferreira da Silva Santos, Chaabene, Pieter and Franchini, 2014). To win a match, the athlete must score points through kicks (torso and head) and punches (torso only) with enough force to produce a displacement of the body segment, or they can also win the match by knockout (World Taekwondo Federation, 2017a, 2017b).

Explosive strength can be defined as the rate of force production in one or several movements. Being understood as "the best relationship between the applied force and the time spent for it in the manifestation of maximum force against any resistance" (González-Badillo & Gorostiaga-Ayestarán, 2002). That is, the ability of an athlete to apply force quickly or the application of his maximum force in the shortest possible time (Cappa, 2000; Cardozo, Vera-Rivera, Conde-Cabezas, & Yáñez, 2017).

The author characterizes the explosive force in Taekwondo as a determining capacity, which is manifested through the use of the greatest amount of force in the shortest possible time, it is a specific function of the technical elements of kicks in combat such as the Tuit Chagui, Yop Chagui, Dui-fuirio Chagui, Bandal-Chagui, Dollyo-Chagui, Neryo Chagui and the call 360° Timio Dolio Chagui both attacking and counterattacking that determines the quality of the jump, spin and spin jump actions.

From this theoretical understanding, different researchers have compared different training methodologies and protocols used by Taekwondo coaches in physical conditioning programs with respect to this component, where the assignment of light weight loads but executed at maximum speed predominates, either in application exercises (plyometrics), or in sports gestures, mainly in the lower body (Jakubiak & Saunders, 2008; Kim, Stebbins, Chai, & Song, 2011) since contemporary taekwondo has been transforming, and this reason has given vital importance to the kicks to achieve victory.

This evolution in sport has led coaches to seek strategies to develop the maximum rate of force production per unit of time or "Rate of force development" (RFD) in athletes (Izquierdo, 2011), therefore, this search resulted in also in the use of tools that allow knowing the starting point of their

athletes, the effectiveness of the methodologies used, and the progress over time mainly in the lower limbs (MI).

The coach must know which evaluation or test instruments are not only the most used for this purpose, but also the most viable, and be aware of the values they show, in order to establish reference points in the preparation of their athletes, both at the national level (athletes who represent their state or department and compete in events at the national level) or at the international level (athletes who are part of the national teams and represent their country in international events such as World Cups, World Championships, Games Olympics, etc.).

## **CONCLUSIONS**

The theoretical exploration of the referents of explosive force training in Taekwondo, allowed us to verify that exercises with weights and jumps are fundamental ways for the work of the related muscle groups in this sport modality; likewise, as an essential quality, explosive strength requires work in various intensity zones given the particularities of this sport.

The diagnosis made showed that there are limitations on the part of the coaches on the training of muscular strength and the use of methods for its development; In addition, the comprehensive training program for the athlete presents limitations in the information about training for explosive strength in Taekwondo.

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