

Isometric exercises for the development of leg strength in school taekwondo athletes ***Ejercicios isométricos para el desarrollo de la fuerza de piernas en taekwondistas escolares***

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ABSTRACT

It is the result of a diagnostic study of isometric strength, applied to taekwondo athletes from the Eide “Pedro Díaz Coello” school category. The athlete's integral preparation program and current methodological documents were reviewed, verifying little explanation in the methodological guidelines for the development of isometric strength. Methods of scientific knowledge are used, such as analytical-synthetic, historical-logical, survey, measurement, interview and statistical methods. The contributions obtained in this research are aimed at the development of isometric strength in Taekwondo. The form of evaluation of the result is established and the growth times of the isometric force are shown.

Keywords

Isometric Strength; Taekwondo; Set of exercises.

RESUMEN

Es el resultado de un estudio diagnóstico de la fuerza isométrica, aplicado a taekwondistas de la categoría escolar de la Eide “Pedro Díaz Coello”. Fue revisado el programa de preparación integral del deportista y documentos metodológicos de actualidad, comprobándose poca explicación en las orientaciones metodológicas para el desarrollo de la fuerza isométrica. Se emplean métodos del conocimiento científico, como analítico-sintético, histórico-lógico, encuesta, medición, entrevista y los métodos estadísticos. Los aportes obtenidos en esta investigación están encaminada al desarrollo de la fuerza isométrica en el Taekwondo. Se establece la forma de evaluación del resultado y se muestran los tiempos de crecimiento de la fuerza isométrica

Palabras clave

Fuerza isométrica; Taekwondo; Conjunto de ejercicios.

INTRODUCTION

Physical Culture, as an integral part of the multilateral and harmonious formation of the personality, constitutes a pedagogical process aimed at the development of the capacities, of the physical performance of the individual, on the basis of the morphological and functional improvement of his organism, the formation and the improvement of their motor skills, the acquisition of knowledge and the development of convictions, in such a way that they are in a position to fulfill the tasks that society indicates to them, from the labor, military and social point of view.

Volkov, V. M. and Filin, V. P. (1989), when referring to the methodological scientific foundation of children's - youth sports, explained since 1977 that before science, tasks of greater responsibility regarding the sports preparation of children and adolescents are raised and highlights the importance of the correct education of the motor skills of young people. This guarantees that the necessary organic structure is used, which allows multilateral work to be carried out in better conditions and which optimally responds to the demands of children's ages.

Various authors explain that practice shows that often the most capable at first glance do not later justify the hopes placed in them and, on the contrary, children with a medium level of development, and even low, after a few years, surpass them. Siris, P.Z; Gaidarska, P.M; Rachev, K.I. (1988). In his work, he explains that this consists in the fact that the control exercises with which an attempt is made to determine the level of development of physical abilities are not sufficiently safe. For reasons like this, various investigations have been carried out in Cuba for several years, aimed at studying the behavior of muscular strength in trained Cuban schoolchildren, however, very little has been done in depth on isometric strength in this category in sport. of Taekwondo in the EIDE "Pedro Díaz Coello" of the Holguín province.

Methods.

To corroborate the set of proposed exercises, a sample of 10 taekwondo athletes was used, specifically from the school team of the 15-16 years' category of the Eide "Pedro Díaz Coello" from the province of Holguín, male with an average age of 15 years. and sports experience in 4.8 years.

A survey of specialists was carried out to see if it was necessary to develop a set of exercises to evaluate isometric strength for the development of leg strength in school taekwondo players and the other for their assessment of the efficiency of the test in terms of objectives, means, indicators and evaluations used.

Measurement: It allowed us to know the behavior of the special resistance during training through the application of the test and its operation, controlling the Heart Rate (HR), as well as statistically analyzing its results.

Observation: It was developed systematically by the researcher, in each class and training, with the selected sample, collecting the data in an observation guide.

RESULTS

Description of the test applied to school taekwondo players with the leg dynamometer.

In order to obtain a more reliable and reproducible measurement, timely attention must be paid to all the variables that may alter the validity of the results obtained, and especially those inherent to the design of the study protocol itself and to the development of the test, estimation of strength average values.

A cross-sectional study was carried out in which the isometric activity was determined by the dynamometer in 10 taekwondo athletes of the 15-16-year-old school category of the Eide "Pedro Díaz Coello" in the province of Holguín, representatives of different weight divisions, selected. These athletes were between 15 and 16 years old and were beginning the special physical preparation of the macrocycle.

The measurements were carried out in the test laboratory of the AFITCOMB Study Center based in the Faculty of Physical Culture, in the morning, after a day of rest and as the first physical activity of the microcycle. 2 variables of maximum force and 2 of resistance to force were selected.

Methodology in the application of the tests.

Isometric leg strength (leg flexion):

- The purpose of the test is to measure the static strength of the lower limbs.
- The athlete starts standing.
- The athlete holds the center of the bar with the palms down at the level of the pubic bone.
- Then a strong fabric sash is placed that firmly joins both ends of the bar, passing around the lower part of the sacrum. This belt will prevent the bar from rolling during the test and prevent the athlete from engaging the extensor muscle groups of the spine.
- The athlete, with the head erect and back straight, flexes the knees at an angle of 120 degrees and adjusts the length of the chain (before connecting it is on the scale of the dynamometer), in such a way that the bar is in the crease that forms on the thigh and trunk.
- The athlete can connect the hands in the middle of the bar or at the ends of it.

- The subject is instructed to try to extend their knees, applying force continuously but vigorously. Upon completion of the test, the athlete's knees should be fully extended to ensure maximum effort has been exerted.
- The procedure is repeated two more times (resting 30 seconds between each trial and record the highest value of the three trials).
- It was used: Japanese digital dynamometer brand baseline model 12-0286.

No.	Nombre	Edad	División de peso	FP (Kg)	Valor1	FP (Kg)	Valor2	FM, Brito (1994)
1	Michel Verdecia	13	40	92,0	Regular	120	Regular	Debajo de la media
2	Ronaldo Romero	14	42	200,0	Bueno	220,8	Bueno	Sobre la media
3	Eugenio Ruiz E.	13	44	160,0	Malo	166,6	Regular	Debajo de la media
4	Julio Crespo H	14	54	242,0	Bueno	273,9	Bueno	Sobre la media
5	Norberto Noa	13	54	162,0	Regular	183,6	Bueno	Sobre la media
6	Cristian Reyes	13	58	171,0	Regular	187	Bueno	Sobre la media
7	Josue Vargas R.	14	62	174,0	Regular	189	Regular	Debajo de la media
8	Marcos Zapata P.	15	66	225,0	Bueno	230,5	Bueno	Sobre la media
9	Arleys Espinosa	15	76	215,0	Bueno	222	Bueno	Sobre la media
10	Idael Alvares P.	14	76	220,0	Bueno	226	Bueno	Sobre la media

Table # 1 According to García Manso (2002) and Brito (1994) carried out with the dynamometer of the AFIT/COMB study center. glossary.: FP (kg) leg strength.

Leg flexion strength was measured, with the elbow flexed to 90 degrees, using the equipment's handheld transducer. In all cases, the dynamometers were properly calibrated, three repetitions of each modality were performed, and the highest value was taken to evaluate the maximum force.

For the measurement of the resistance to force, the taekwondo athletes were asked to maintain the tension or pressure with the indicator of the instrument marking the value that represented 50% of the maximum value reached in each of the force measurements performed in that joint. All measurements were made by the same professional, experienced in this type of work.

The data processing consisted of descriptive statistics and the application of the range test of data by García Manso, (2002) to determine the level of significance of the differences observed between the measurements of the legs.

This, as seen by the authors of this work, where it is stated that it is an element that corroborates the importance of this motor quality for the sporting result of highly qualified taekwondo players.

The kick carried out with the maintenance of the leg without lowering it to the head is decisive for the effectiveness of the attack and counterattack actions in combat, where the marking of several points is made to limit the effectiveness of the defensive action in most of the cases, so the possibility of

displaying high levels of static force in this muscle group is a favorable element to exercise adequate control of the opponent, which must be reinforced throughout the sporting life.

It is of vital importance for the execution of the Freestyle Poomsaes, due to the characteristics of the kick in the realization of the different technical executions without lowering it, directing the hit to the Olgun and Monton area (Upper and Center) of the opponent's body.

Isometric strength is a determining capacity in our sport since it is the object of evaluation of the pedagogical objectives and the competition when performing the kap (kicking up and down) for the effectiveness of offensive and defensive actions in combat, for Therefore, the kick carried out with the maintenance of the leg without lowering it to the head is decisive for the effectiveness of the attack and counterattack actions in combat, where the marking of several points is carried out and for limiting the effectiveness of the defensive action in the In most cases, therefore, the possibility of deploying high levels of static force in this muscle group is a favorable element to exercise adequate control of the opponent, which must be reinforced throughout the sporting life.

With the introduction of the test to assess grip strength in isometric work. Therefore, until very recently, the parameter that has been used systematically to define isometric leg strength has been the determination of the Maximum Isometric Pressure Force (M.F.I) expressed in Kilograms or Pounds.

Results of the applied test.

Methodological indications.

- The maximum tension time should last between 5-6 seconds. Total, time can be up to 10 seconds. The start and end of the contraction should be done gradually. Therefore, 2-3 seconds to progressively start the contraction, 5-6 seconds of maximum tension and 2-3 seconds to progressively return to rest again.
- The rest time between repetitions is 5-10 seconds.
- The total number of repetitions per exercise ranges from 5-6 times.
- Specialists suggest not exceeding 10 minutes of total training time. It is possible to train several times a day by splitting the program.
- There are two ways to work isometric strength: maximum tension method and method until total fatigue. The first is about voluntarily generating maximum muscle tension, for 5-6 seconds. The second method consists of holding a position of strength until the muscle is completely fatigued.
- Each training session can work 5-7 different muscle groups.

- It is possible to train isometric strength without using external loads or weights. Scholars compare this method with the movements that animals perform to maintain their optimal muscular state.

Apart from this instantaneous isometric effort test, the dynamometer allows other isometric grip studies to be carried out: the “maintained grip” for a certain time and the “rapid alternating grip” test.

In the "Maintained Grip" test, the subject is asked to exert the maximum force that he can in one of the positions of the dynamometer (usually in position II) and for a period of time at the discretion of the explorer (usually 10 seconds).

The dynamometer provides a Force-Time graph that shows the subject's ability to maintain the level of effort and resistance to fatigue.

The normal curve shows a rapid rising slope until reaching the maximum value of force and subsequently the falling slope that corresponds to the ability to maintain tension for a certain period of time is shown.

FP (kg) Leg Strength.

DISCUSION

In the consulted bibliography, there are few referential works that completely address the isometric force manifestation in Taekwondo.

Isometric exercises consist of contracting the muscles under tension without executing any type of movement, this is applicable to any exercise that can be performed with or without weights, or simply with one's own body weight according to Decimavilla, (2017). where adaptive changes occur in the muscle, such as increased strength and endurance, isometric contractions will be held for at least 6 seconds against resistance.

However, Stucky, Triana & Avella, (2015) state that they are exercises in which the muscle exerts force without making movements. Consequently, there is a contraction of the specific muscle without movement of the joint, that is, muscle shortening or lengthening, and we will work with the tension that is generated with the muscles in a static state, therefore, there is force and resistance in the movement. When tension originates in the muscle, the force of the contraction causes it to hold firm or with minimal movement, EIM can develop as a pushing or pulling action in various positions

Proposal for a set of physical exercises to develop isometric strength.

Methodological guidelines for the development of isometric strength in Taekwondo.

In the first stage (PFG).

Work on the railing with a specific technique (Bandal chagui, Yop chagui Doliot chagui, and Bituro chagui,) the exercises must be executed in both guards to work both feet and without support, then proceed to perform them in movement according to the preparation stage jump on the stairs.

1. Holding on to the rail, perform sustained kicking for 6 to 10 seconds in the different technical elements to work on the different muscle planes involved in kicking.
2. Carry out the route of number 8 and that of O with the techniques estimated by the coach.
3. From the combat position, perform sustained kicking for 6 to 10 seconds in the different technical elements to work on the different muscle planes involved in kicking IDEM to exercise no. 1
4. Kicking work in displacements with repetitions 2 or 3 techniques without lowering the knee.
5. Kick the kicker from the combat position by both guards 3Tand10 rep.
6. Start from the plank position, jog for 5 seconds, kick 2 Dolio chagui 2 tand, 8 rep.
7. From the combat position perform Bandal Squats. 3T 10R.
8. From the position of chuchum seogui, jump behind Dolio chagui. 2t8R.
9. From the squatting position, half turn I kick bandal-Dolio chagui. 2t 8R.

Exercises in the second stage (PFE).

In the stage the trainers work isometrics in pairs, you can perform different exercises starting from different positions:

Exercises aimed at the attack and counterattack by different guards using isometry as the main objective of the training.

Examples of exercises:

1. Work aimed at attacking with the front leg by closed guard and counterattack to the head area with (doliot - chagui) executing this technique 3 or 4 times without lowering the knee.
2. Carry out a direct attack by open guard and carry out (bandal-chagui) followed by (dolio - chagui) without lowering the knee.

Some of the most important exercises at this stage are carried out in combat schools that are very fundamental for the athlete since it gives them confidence and determination for combat. These training sessions must be carried out as realistically as possible so that the athlete executes and works on techniques in the head area without lowering the knee, thus gaining experience and creating his own mastery.

Methodological guidelines for the development of isometric strength in Taekwondo.

Observations: The development of flexibility capacity is of vital importance for the development of isometric strength, to be able to execute techniques with effectiveness and elegance.

Some of the most important exercises at this stage are carried out in combat schools that are very fundamental for the athlete since it gives them confidence and determination for combat. These training sessions must be carried out as realistically as possible so that the athlete executes and works on techniques in the head area without lowering the knee, thus gaining experience and creating his own mastery.

Result of the analysis of the specialists.

At the end of the investigation, a group of aspects that are shown in the annexes were submitted to the specialists.

28 specialists were consulted, of them 2 PhDs in Physical Culture Sciences; Master 8 and 18 experienced teachers.

It presents the results, where their criteria were taken into account based on 5 parameters: very high, high, acceptable, low and very low; and on the aspects: scientific level, didactic approach, importance and possibilities of application.

The analysis of the results was carried out and it was evidenced in the first aspect the scientific level of the set of exercises is qualified as very high by 7 people out of 28, for 25.0%, 11 as high for 39.29 and 10 of acceptable, for 35.71%, representing 100% for these three parameters, which means its acceptance from the scientific point of view.

In the didactic approach, the 28 specialists consider it very high, high and acceptable, for 100%, representing the very positive aspect for the investigation.

In the aspect of importance, 19 evaluate it as very high, for 67.86%, 6 as high for 21.43%, and 3 as acceptable for 10.71%, which represents 100% of the total number of the respondents. The results achieved are significant for the researcher.

The possibilities of application were demonstrated, because 27 people out of 28 evaluated it as very high, high and acceptable, which represents 96.42%, demonstrating the value that the methodology for evaluating isometric strength with the use of the dynamometer represents for them. and the elaboration of the set of exercises for the grip in the Tashi waza for the development of the elaborated isometric force.

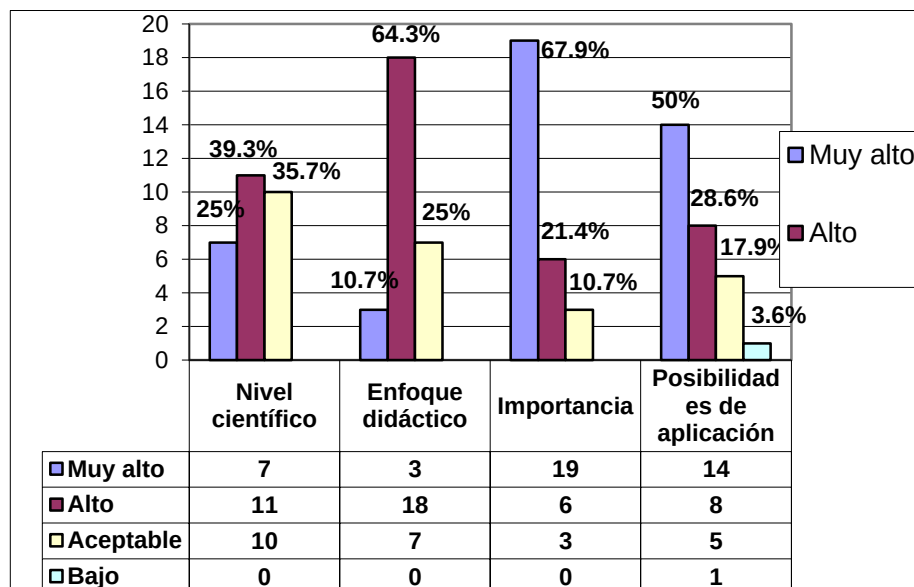


Table #2 Analysis of the specialists.

Taking into account the results achieved in the evaluation of the set of exercises used for the development of isometric strength for the grip, it is considered that it is possible to put it into practice. The 28 people surveyed evaluated the importance of the set of exercises for the development of isometric strength as very high, high, and acceptable. This analysis allows us to affirm that the subject is of great interest, and that it is possible to use it in the preparation of exercises. judokas of the other categories and sex.

As a final criterion, the specialists considered that this test or test could be included with the use of the dynamometer to evaluate and control the isometric force for the next school year where the behavior in stops and competitions is assessed in order to have a better control of the preparation of the judokas to carry out adaptations of the individual plans and that the test or test can be feasible by any sports technician.

From all the previous analysis it is inferred that the set of exercises for the development of isometric grip strength in the Tashi Waza proposed by the author of this research work is feasible to apply.

CONCLUSIONS

From the essential needs in the preparation of taekwondo players, the scientific and methodological elaboration of a set of isometric strength exercises became necessary, for which the deficit situation of leg strength in this sport discipline was taken as a starting point.

Reaching the following conclusions during the course of implementation:

1. The need for the application of the set of isometric strength exercises to improve the strength capacity of school taekwondo players together with the technical components and physical qualities was demonstrated.
2. With the use of isometric strength exercises, it will be possible to promote the development of strength in the legs, as well as complex qualities such as fast-strength, elastic, explosive and other basic ones in the athlete's physical preparation, scientifically proven during development. of the research report.
3. The set of isometric strength exercises was prepared, which will be available to any coach interested in its implementation.

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