

THE INFLUENCE OF STRENGTH TRAINING ON TAEKWONDO ATHLETES' REACTION SPEED



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A INFLUÊNCIA DO TREINAMENTO DE FORÇA NA VELOCIDADE DE REAÇÃO DOS ATLETAS DE TAEKWONDO

LA INFLUENCIA DEL ENTRENAMIENTO DE FUERZA EN LA VELOCIDAD DE REACCIÓN DE LOS ATLETAS DE TAEKWONDO

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ABSTRACT

Introduction: Taekwondo is a skill-oriented confrontational event. Athletes' physical fitness and flexible changes in skills and tactics have become the cornerstone of athletes' victory. **Objective:** The objective was to explore the influence of strength training on the reaction speed of boxing athletes. **Method:** 8 master-class Taekwondo athletes, 16 first-class Taekwondo athletes, and 30 second-class Taekwondo athletes from a particular province were selected as Group A, B, and C. The control groups were Group A1, B1, and C1. **Results:** Group B athletes showed significant changes in 15s front kick and 15s high leg lift. Group C athletes showed highly significant differences in rapid strength. After the traditional fast strength training in the control group, all the Group C1 had significant changes in the test. However, Group B1 athletes only had substantial changes in 15s down split and 15s front kick. There was no significant change in all indexes of Group A1 athletes before and after the experiment. **Conclusion:** The analysis of experimental data shows that core strength training significantly improves the reaction speed of Taekwondo athletes. **Level of evidence II; Therapeutic studies - investigation of treatment results.**

Keywords: Strength, Muscle; Martial Arts; Reaction Time.

RESUMO

Introdução: O Taekwondo é um evento de confronto orientado para a habilidade. A condição física dos atletas e as alterações na flexibilidade das habilidades e táticas tornam-se a pedra angular para a vitória dos atletas. **Objetivo:** O objetivo desse artigo foi explorar a influência do treinamento de força sobre a velocidade de reação dos atletas de taekwondo. **Método:** 8 atletas de Taekwondo de classe mestre, 16 atletas de Taekwondo de primeira classe e 30 atletas de Taekwondo de segunda classe de uma determinada província foram selecionados como grupos A, B e C. Os grupos de controle foram os grupos A1, B1 e C1. Foram consultados 12 especialistas sêniores da modalidade para auxiliarem na elaboração de um protocolo de treinamento rápido de força, embasado nos achados científicos e posto em prova durante 6 meses. As inferências estatísticas foram obtidas com o software SPSS19.0 para classificar, contar e analisar os dados obtidos no experimento. **Resultados:** Os atletas do Grupo B apresentaram mudanças significativas de chute frontal e na altura de elevação das pernas. Os atletas do Grupo C mostraram mudanças altamente significativas em força rápida. Após o tradicional treinamento de força rápida no grupo de controle, todos os atletas do Grupo C1 tiveram mudanças significativas no teste. Entretanto, os atletas do Grupo B1 tiveram mudanças significativas apenas nos chutes frontais para baixo e para cima. Não houve mudanças significativas em todos os índices dos atletas do Grupo A1 antes e depois da experiência. **Conclusão:** A análise dos dados experimentais mostra que o treinamento de força central melhora significativamente a velocidade de reação dos atletas de Taekwondo. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Força Muscular; Artes Marciais; Tempo de Reação.

RESUMEN

Introducción: El taekwondo es un evento de confrontación orientado a la habilidad. La condición física de los atletas y los cambios flexibles en las habilidades y tácticas se han convertido en la piedra angular de la victoria de los atletas. **Objetivo:** El objetivo de este artículo era explorar la influencia del entrenamiento de fuerza en la velocidad de reacción de los atletas de taekwondo. **Método:** se seleccionaron 8 atletas de taekwondo de clase magistral, 16 atletas de taekwondo de primera clase y 30 atletas de taekwondo de segunda clase de una determinada provincia como grupos A, B y C. Los grupos de control fueron los grupos A1, B1 y C1. Se consultó a doce expertos de alto nivel en este deporte para que colaboraran en la elaboración de un protocolo de entrenamiento de fuerza rápida, basado en los hallazgos científicos y puesto a prueba durante 6 meses. Las inferencias estadísticas se obtuvieron utilizando el software SPSS19.0 para ordenar, contar y analizar los datos obtenidos en el experimento. **Resultados:** Los atletas del grupo B mostraron cambios significativos en la patada frontal y en la altura de elevación de las piernas. Los atletas del grupo C mostraron cambios muy significativos en la fuerza rápida. Después del entrenamiento de fuerza rápida tradicional en el grupo de control, todos los atletas del grupo C1 tuvieron cambios significativos en la prueba. Sin embargo, los atletas del Grupo B1 sólo presentaron cambios significativos en las patadas frontales hacia abajo



y hacia arriba. No hubo cambios significativos en todos los índices de los atletas del Grupo A1 antes y después del experimento. Conclusión: El análisis de los datos experimentales muestra que el entrenamiento de la fuerza central mejora significativamente la velocidad de reacción de los atletas de taekwondo. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Fuerza Muscular; Artes Marciales; Tiempo de Reacción.

INTRODUCTION

The birthplace of Taekwondo is the Korean Peninsula, it is a combination of Korean traditional martial arts and Japanese karate, south Korean general Choi Ran-hee officially named the sport "Taekwondo" in 1955, and quickly gained popularity in famous international events such as the World Championships, Asian Games and University Games.¹ The original taekwondo appeared in the Olympic Games as a performance event, in 2000, it was listed as an official event of the Olympic Games.² Since its development, Taekwondo has become a fashionable sport among young people and teenagers, relevant statistics show that there are about 80 million people in the world doing taekwondo training, the performance and competitive nature of Taekwondo determines that it can be widely promoted in the world so quickly.³ In summary, this research integrates core strength training into rapid strength training based on the technical and tactical characteristics of Taekwondo, selection of Taekwondo fast strength indicators, supplemented by experiments to verify the effectiveness of core strength training for rapid strength development, it is designed to provide reference for taekwondo coaches and athletes' strength training.⁴

METHOD

Research objects

Select 8 elite Taekwondo athletes from a certain province (numbered group A), 16 first-level athletes (all have participated in taekwondo competitions at or above provincial level games) (numbered group B), there are 30 second-level taekwondo athletes (numbered group C), the samples of the above three groups are all males as the experimental group (Figure 1), in addition, the same exercise level, weight level, number of people, and gender numbers are selected as the control group, respectively, as the A1 group, B1 group and C1 group, two groups of athletes as the research object of this subject, the experimental group and the control group were tested on three levels of related physical fitness, after statistical analysis, there was no significant difference.

Research methods

(1) Literature data method

Collect and organize relevant data and information as the theoretical support of this research.

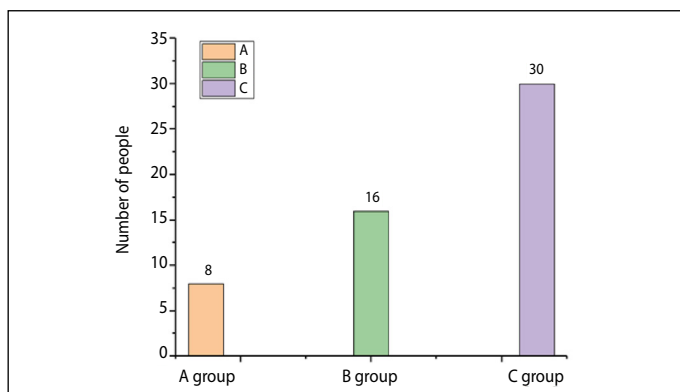


Figure 1. Taekwondo master athletes.

(2) Expert survey method

According to the needs of this research, formulate fast taekwondo strength training methods and methods, Taekwondo core strength training and test related methods and indicators and other related questionnaires, select 12 experts with senior titles, senior coach titles and above, the content of the questionnaire was investigated and 12 valid questionnaires were obtained.

(3) Experimental method

Obtain Taekwondo core strength training programs, methods, and methods through expert surveys, methods and methods, methods and evaluation indicators of rapid strength training, conduct a 6-month experiment on the research subjects, verify the effect of Taekwondo core strength training on athletes' rapid strength improvement.

(4) Mathematical Statistics

Use SPSS19.0 statistical software to sort, count and analyze the data obtained in the experiment.

RESULTS

Selection of Taekwondo Fast Strength Training Indexes and Training Methods, Means, and Load Research

On the basis of extensive review of relevant literature and expert consultation, a total of 4 Taekwondo fast strength training indicators have been drawn up, as shown in Table 1.

The training method is that the coaches carry out training work, complete training tasks, application tools to improve athletes' competitive ability. The training method is divided into grades, it is constantly evolving, on a certain objective basis, different levels of training methods decisively produce different levels of exercise levels. It can be seen that the training method plays an important role in the training process. The training method is the concrete and practical of the training method, the executor of the training method, and the concrete manifestation of the training method. Training load is a "scale" in the training process of athletes, and it is the quantification process of training content.⁵ After three rounds of questionnaires were issued and collected using the delphi method, obtain relevant information on the methods, means, and load of Taekwondo special strength training (Table 2). Openness is the most important manifestation of the skill characteristics of Taekwondo, the action frequency is based on a single or less than three consecutive actions, movement performance is fast, accelerating and not decelerating before hitting the target. Practice has proved that, the load intensity of about 30% of the maximum load to develop explosive force is not enough. Combining with the competition characteristics of this event, athletes' speed and strength training, exercise load intensity

Table 1. Taekwondo fast strength quality indicators.

Serial number	Index	Index category
1	15s original underground split	Fast power
2	15s front cross kick with weight	
3	15s cross kick	
4	15s weight-bearing high leg lift	

Table 2. Taekwondo fast strength training methods, methods, load table.

Special force	Index	Training method	Training methods	Load intensity	Load	Remark
Fast power	15s original underground split	Short-term repetitive training Transformation training method Circuit training	Multiple action structure	40%-60%	6-8 groups	The number of groups should not be too many, emphasize that each group does not reduce the speed, and gradually reduce the load before the competition
	15s front cross kick with weight					
	15s cross kick					
	15s weight-bearing high leg lift					

should be controlled at 40%-60%, as the load intensity increases, the load decreases. The load in each training session should not be too much, it is generally arranged in the first half of the training session where the athlete's nervous system has the highest excitement, according to different training content, free air strikes, moving targets, paired double guard training, etc. are set up to ensure the quality of each strike of the athletes, improve the athlete's reaction power and ensure the training effect.

Analysis and research of experimental results

After 6 months of experimentation, the exercise mobilization of the experimental group had significant changes in the rapid strength test, among them, the athletes of Group B kicked before 15s, the 15s high leg lift index showed a highly significant change, before the experiment, the athletes in group C (the second-level athlete group) showed highly significant changes in the rapid strength indicators. (Table 3) It can be concluded that core strength exercises are used as a supplement to traditional strength training, it has a significant effect on the rapid strength development of Taekwondo athletes. After the athletes in the control group undergo traditional rapid strength training, the athletes in group C1 (the second-level athlete group) experienced highly significant changes in the various index tests of fast strength, athletes in Group B1 split in 15s, significant changes occurred in the index of kicking before 15s, no other indicators have changed. The athletes in group A1 had no significant changes in the test of each index before and after the experiment. (Table 4)

DISCUSSION

The results shown in Tables 3, 4, and 5 can be traced back to the cause, the traditional rapid strength training system has a significant effect on the rapid strength development of Taekwondo reserve talents (level 2 athletes and below), intervene in core strength training for athletes in this training phase, there is no obvious manifestation in the rapid power improvement.⁶⁻⁸ The main reason is that athletes are in the initial stage of

Table 3. Analysis of rapid force changes before and after the experiment in the experimental group.

Fast strength indicator	Group	Before the experiment (times)	After the experiment (number of times)	t	p
Undercut	Group A	28±3.76	29±2.43	1.000	<0.05
	Group B	25±4.35	27±3.73	2.123	<0.05
	Group C	20±6.12	23±5.04	6.517	<0.01
Forward kick	Group A	32±4.28	33±4.20	0.246	<0.05
	Group B	30±6.77	33±5.83	2.121	<0.01
	Group C	26±6.32	29±5.66	3.737	<0.01
Cross kick	Group A	31±4.31	32±3.91	0.264	<0.05
	Group B	29±5.00	30±4.70	0.349	<0.05
	Group C	24±6.31	26±7.31	2.751	<0.01
High leg up	Group A	49±3.67	50±3.34	0.612	<0.05
	Group B	46±5.34	48±4.65	0.415	<0.01
	Group C	40±3.45	44±5.90	3.943	<0.01

Table 4. Analysis of rapid force changes before and after the experiment in the control group.

Fast strength indicator	Group	Before the experiment (times)	After the experiment (number of times)	t	p
Undercut	Group A1	28±3.85	28±4.76	3.346	>0.05
	Group B1	25±5.03	26±5.18	1.123	<0.05
	Group C1	20±5.67	23±6.00	2.457	<0.01
Forward kick	Group A1	32±4.13	32±5.02	0.212	>0.05
	Group B1	30±4.67	32±5.32	1.089	<0.01
	Group C1	26±6.25	29±4.87	3.004	<0.01
Cross kick	Group A1	31±4.01	31±4.31	1.342	>0.05
	Group B1	29±4.16	29±4.53	3.157	>0.05
	Group C1	24±6.18	26±5.67	0.231	<0.01
High leg up	Group A1	49±3.33	49±3.47	1.754	>0.05
	Group B1	46±4.12	46±4.65	0.543	>0.05
	Group C1	40±3.54	44±4.56	2.128	<0.01

training, and general physical fitness training is greater than specialized physical fitness training, and attach importance to the comprehensive and coordinated development of athletes' physical fitness, pay attention to the development of athletes' large muscle groups and superficial muscle groups, deep muscle group development exercise, less refined movement exercises, the training of athletes at this stage should focus on general physical fitness exercises, focusing on the overall improvement of athletes' physical fitness.⁹

As a supplement to traditional fast strength training and advanced training stage, after the intervention of core strength training for elite athletes (level one and above athletes), the rapid power has undergone a significant change. The main reason is that excellent athletes generally have to train for more than 5 years, at a high-level special training stage, after a long time of traditional physical fitness exercises, the athlete's body has gradually adapted to these training methods and methods, only by adopting innovative training techniques can the body's potential be awakened.¹⁰

CONCLUSION

In Taekwondo, a combination of strength, speed, endurance, agility, and flexibility is achieved, insufficiency in any of these abilities will become an influencing factor for Taekwondo athletes in the competition. therefore, we must follow a comprehensive and systematic training when performing core strength training, we must attach importance to every physical fitness. So that athletes can get a balanced development and improvement, in daily training, it must be closely integrated with the techniques and tactics of Taekwondo, do targeted training. Through the analysis and research of experimental data, it can be found that core strength training has significantly improved the reaction speed of Taekwondo athletes, and the athletes' physical fitness has been significantly improved.

All authors declare no potential conflict of interest related to this article

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