EFFECTS OF ABDOMINAL CORE STRENGTHENING ON FLEXIBILITY IN TAE KWON DO ATHLETES

EFEITOS DO FORTALECIMENTO DO CENTRO ABDOMINAL SOBRE A FLEXIBILIDADE DOS ATLETAS DE TAE KWON DO

EFECTOS DEL FORTALECIMIENTO DEL NÚCLEO ABDOMINAL EN LA FLEXIBILIDAD DE LOS ATLETAS DE TAE KWON DO

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ABSTRACT

Introduction: In competitive sports like Tae Kwon Do, the body remains in constant disequilibrium and displacement. In this state, the limbs generate and transmit energy through the muscles of the abdominal core, which is the main link in the human kinetic energy chain. Objective: Explore the effect of abdominal core strength on improving flexibility in taekwondo athletes. Methods: Thirty male athletes were selected, with a minimum sport time limit of 4 years, and a mean age of 21±1 years. They were randomly divided into three groups, A, B and C, with 10 people in each group. Group A participated in stable abdominal core strength training, 1 hour daily, 3 times a week, for a total of 12 weeks. Results: Intra-group comparisons: There were extremely significant differences between groups A, B and C; extremely significant differences were found between the first and second and third times in group A; when compared, the first, second and third times in group B also showed modifications. Conclusion: Stable and unstable core strength training can improve flexibility; after training, flexibility gains from unstable abdominal core strength training are more lasting. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Abdominal Core; Tae Kwon Do; Resistance Training; Range of Motion, Articular.

RESUMO

Introdução: Em esportes competitivos como o Tae Kwon Do, o corpo permanece em constante desequilíbrio e deslocamento. Neste estado, os membros geram e transmitem energia através dos músculos do centro abdominal, que é o elo principal da cadeia de energia cinética humana. Objetivo: Explorar o efeito da força do centro abdominal na melhoria da flexibilidade dos atletas de taekwondo. Métodos: Foram selecionados 30 atletas masculinos, com limite de tempo esportivo mínimo de 4 anos, e idade média de 21±1 anos. Foram divididos aleatoriamente em três grupos, A, B e C, com 10 pessoas em cada grupo. O grupo A participou do treinamento estável da força do centro abdominal, 1 hora diária, 3 vezes por semana, por um total de 12 semanas. Resultados: Comparações intra-grupo: Houve diferenças extremamente significativas entre os grupos A, B e C; foram encontradas diferenças extremamente significativas entre a primeira e segunda e terceira vez no grupo A; quando comparados, a primeira, segunda e terceira vezes do grupo B também apresentaram modificações. Conclusão: O treinamento estável e instável da força do centro abdominal pode melhorar a flexibilidade; após o treinamento, os ganhos de flexibilidade do treinamento instável da força do centro abdominal são mais duradouros. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

***Descritores*:** *Núcleo Abdominal; Tae Kwon Do; Treinamento de Força; Amplitude de Movimento Articular.*

RESUMEN

Introducción: En los deportes de competición como el Tae Kwon Do, el cuerpo permanece en constante desequilibrio y desplazamiento. En este estado, las extremidades generan y transmiten energía a través de los músculos del núcleo abdominal, que es el principal eslabón de la cadena de energía cinética humana. Objetivo: Explorar el efecto de la fuerza del núcleo abdominal en la mejora de la flexibilidad en atletas de taekwondo. Métodos: Se seleccionaron 30 atletas masculinos, con un tiempo mínimo de práctica deportiva de 4 años, y una edad media de 21±1 años. Se dividieron aleatoriamente en tres grupos, A, B y C, con 10 personas en cada grupo. El grupo A participó en un entrenamiento de fuerza abdominal estable, 1 hora diaria, 3 veces por semana, durante un total de 12 semanas. Resultados: Comparaciones intragrupo: Hubo diferencias extremadamente significativas entre los grupos A, B y C; se encontraron diferencias extremadamente significativas entre el primer y el segundo y tercer tiempo del grupo A; cuando se compararon, el primer, el segundo y el tercer tiempo del grupo B también mostraron modificaciones. Conclusión: El entrenamiento de la fuerza del núcleo estable e inestable puede mejorar la flexibilidad; después del entrenamiento, las ganancias de flexibilidad del entrenamiento de la fuerza del núcleo abdominal inestable son más duraderas. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

***Descriptores*:** *Núcleo Abdominal; Tae Kwon Do; Entrenamiento de Fuerza; Rango del Movimiento Articular.*

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INTRODUCTION

In many competitive sports, the body will be in an unbalanced state of displacement, the human body in this state, the limbs generate and transmit power through the muscles of the core, which is the middle link of the human power chain, if there is a strong core strength, the balance ability and stability of the body can also be developed.[1] And many athletes attach great importance to the training of core strength, so far, the core area is defined as: The area below the shoulder joint and above the hip joint includes the deep muscles that attach to the spine, hips, around the pelvis and the back, abdomen, and the system of muscles, tendons, and ligaments that make up around the pelvis. Stability is the key and difficult point in taekwondo, and flexibility is also the top priority, with the gradual increase in the level of taekwondo competition, the difficulty movements are constantly updated, which puts forward higher requirements for taekwondo athletes, and it is more difficult to complete the stability and flexibility of the movements. On the basis of reading a lot of previous literature, the author discusses the influence of the flexibility of taekwondo athletes through core strength training, provide some theoretical basis for the training of coaches and athletes.[2]

METHOD

Experimental subjects

30 athletes were selected as experimental objects, numbered randomly, and the random numbers were sorted from small to large, and the first 20 athletes were designated as group A, and so on for every 20 people. They were divided into three groups, A, B, and C, group A was the stable group, group B was the unstable group, and group C was the control group, the groupings were as follows.[3] (Table 1)

Experimental method

The training process follows some of the basic principles of strength training (such as the principle of overloading, the principle of exercise sequence) and the design of training movements such as muscle balance. In addition to participating in the regular practical skills classes in groups A, B, and C, groups A and B have to participate in 12 weeks, 3 times a week, each 60-minute core area strength training, group A stabilized core area strength training, group B used equipment for strength training in the unstable core area.[4] (1) Training equipment. In the experiment, Swiss balls, yoga mats, medicine balls, and Norway REDCORD red rope hangers were used as training equipment. (2) Training time. 2, 3, and 5 times a week for core strength training for 60 minutes for 8 weeks, totaling 24 times. Group C only participated in practical technical classes and extracurricular exercises. (3) Training content. According to the characteristics of muscle distribution in the core area of the human body, the training should be based on the principles of overload, exercise sequence, etc, muscles in all parts can be taken into account, and the two groups A and B should be the same as possible in terms of the form, quantity, load and technical requirements of the movements.[5] (4) Test equipment. The test instrument is a sitting body flexion tester (TCZS-3 type). (5) Test content. Groups A, B, and C were tested 5 times in total. They are: ①Initial test (1 test after subject selection); ②Post-training test (1 test after 1-4 weeks of training, 1 test after 5-8 weeks of training); ③ Test after training suspension (one test each after the first month and the second month after the training suspension). For the convenience of comparison, the two phases of the training intervention in this experiment and the two tests after the training suspension were conducted in units of 1 month. (6) Evaluation criteria. Sitting forward flexion is a test item used to reflect the flexibility of the human body, mainly reflecting the flexibility of the back of the human body (back flexibility: The test of sitting forward flexion mainly reflects the flexibility of the dorsal structure of the core area, such as the extensibility of the erector spinae, gluteus maximus, hamstrings, etc., and the extensibility of the ligaments or joint capsules in the spine, pelvis, hip joint, etc.). The evaluation standard is the scoring standard of sitting forward flexion for the single index of the National Student Physical Health Test. (7) Data processing. First, calculate the average value of each test result of each group of A, B, and C groups, and then calculate the difference between the two adjacent average values to obtain the 4-time change value of each group. Finally, using spss22.0 software, the results of 5 tests and 4 changes in each of the three groups of A, B, and C were input, and one-way ANOVA and paired samples T test were used to compare and analyze the data.[6]

Table 1. List of basic information of experimental subjects.

Group	number of people	age	height (cm)	weight (kg)
Group A	10	21	175.03±2.74	64.88±5.74
Group B	10	21	172.45±3.64	65.48±5.36
Group C	10	21	174.27±2.69	67.18±4.14

RESULTS

Using spss22.0 software, compare the data of five test groups in each group, and compare the data within and between groups to obtain: ①The results of the 2nd to 5th test in group A were significantly different from the 1st test; ②The 2nd to 5th test results of group B were significantly different from the first test; ③There was no significant difference between the test results of the two groups of B; (Figure 1).

(2)Comparison of changes in flexibility grades among the three groups: ①The 1st, 3rd, and 5th tests of group A showed that the proportions of different levels changed, among which the outstanding percentage changed most significantly, after the training was stopped, the flexibility decreased, but it was still better than before the training (Figure 1-3); ②The 1st, 3rd, and 5th tests of group B found that the number of outstanding people after training almost reached 100%, after the training was stopped, the decrease in flexibility was small.[7] (Figure. 2)

(3) Comparison of flexibility changes between groups: Using spss22.0 software, the change of two adjacent tests in each group (that is, the result of the latter test minus the result of the previous test to obtain the change of 1, and so on, to obtain the change of 2, 3, and 4) One-way ANOVA was performed and the results showed: Changes 1, 2, 3, groups A, B and C have extremely significant differences; Change 4 has no significant difference. (Figure 3)

DISCUSSION

(1) Intra-group comparative analysis of the three groups of test results. To sum up, the values of sitting body forward flexion in both groups A and B showed an upward trend, the level changes corresponding to the

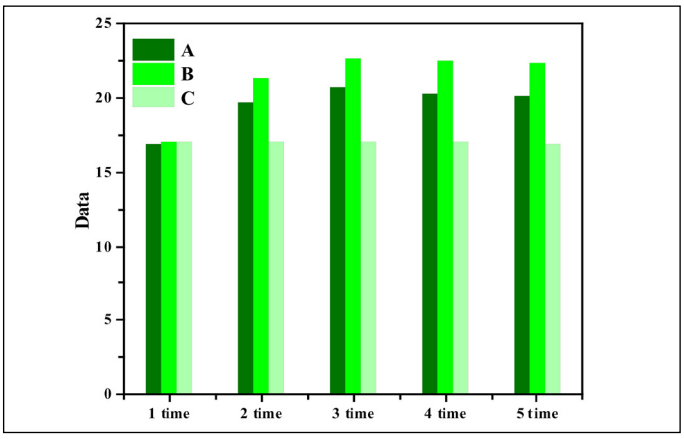

Figure 1. Comparison of the three groups of test results.

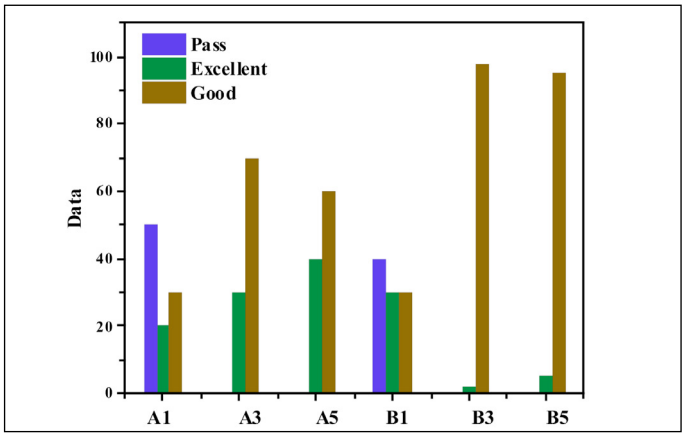

Figure 2. The change chart of training times and grades in groups A and B.

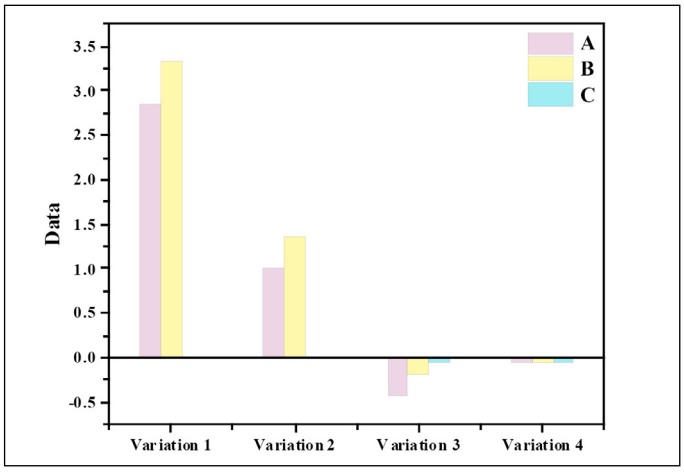

Figure 3. Comparison of flexibility changes between groups.

5 test sitting body forward flexion, the number of people who can reach the excellent level in the three groups is increasing. However, group C did not perform training to strengthen the core area, and the test results showed significant changes. The result shows: Both unstable and stable core strength training improve flexibility.[8] The sitting body forward flexion test mainly reflects the flexibility of the dorsal structure of the core area, this experiment can see that, through training to enhance the strength of the waist and abdomen, the flexibility of the back of the core area can be improved to a certain extent. Physiologically, it is believed that the core area is the "bridge" connecting the upper and lower body, where the muscles and fascia of the limbs and trunk "meet", according to the theory of the "three sub-lineage model" proposed by some studies, the muscles in the core area are coordinated and controlled by the passive sub-line, the active sub-line and the neural control sub-line. Based on the above viewpoints, it is believed that, Core area strength training, to some extent, may activate the connection between the muscles of the body, it may be that the deep fascia of the muscles makes their movement relationship more coordinated, changes have taken place in the transmission and establishment of nerve impulses.[9]

(2) Comparison and analysis of the results of test changes in groups A, B, and C. As can be seen from Figure 3, compared with the first three changes, there are extremely significant differences between groups A, B and C, indicating that strength training in the core area (regardless of stable and unstable) has a certain level of flexibility in subjects. promote. After the training was stopped, the downward trend of the dorsal flexibility of the members of group B was slower than that of group A, indicating that compared with the strength training in the unstable and stable core area, the effect of strength training in the unstable core area remains longer, and it is also reflected from the side that the strength training in the unstable core area is better.[10]

CONCLUSION

Through this experimental investigation, it was found that strength training in the core area has a promoting effect on the improvement of flexibility, in terms of effect, the two are relatively opposite, and the effect of strength training in the unstable core area is better than that of stable core strength training in terms of stamina. Therefore, the author suggests that in the process of core strength training, combined with flexibility development training, in daily training, you can design some movements that can not only improve the strength of the core area, but also develop flexibility, so that the strength and flexibility of the muscles develop together and complement each other.

The author declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author made significant contributions to this manuscript. Peipei Guo: writing; data analysis; article review and intellectual concept of the article.

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