EFFECT OF STRENGTH TRAINING ON NECK INJURIES PREVENTION IN MARTIAL ARTS ATHLETES

EFEITO DO TREINAMENTO DE FORÇA SOBRE A PREVENÇÃO DE LESÕES NO PESCOÇO EM ATLETAS DE ARTES MARCIAIS

EFECTO DEL ENTRENAMIENTO DE FUERZA EN LA PREVENCIÓN DE LESIONES EN EL CUELLO EN ATLETAS DE ARTES MARCIALES

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ABSTRACT

Introduction: As competitive martial arts develop rapidly, technical difficulty and training intensity continues increasing, neck injuries in athletes have also increased proportionally, attracting the attention of researchers. Localized strength training is used for rehabilitation, but there is no research related to prevention in athletes. Objective: Explore the neck strength training effect on neck injury prevention in martial arts athletes. Methods: 68 (34 male) volunteers attended the experiment randomly divided into control and experimental groups. Traditional training activities were practiced in the control group, while a strength training protocol was added in the experimental group. Indices of change in pain, motor quality, and neck disability index were compared. Results: After the test, the number of neck injuries in the control group was 23, compared to five in the experimental group; there is a significant difference. There was a significant reduction of injuries in the experimental group (P=0.05); one year later, the VAS score of the experimental group remained significantly lower than the same pre-experiment or control group. The neck dysfunction score of the experimental group was still significantly lower than the pre-experimental and control group; there was no statistically significant difference between the control group and the experimental group before the experiment. Conclusion: The adequate periodic neck strength training formulation has a significant preventive effect on neck injuries in martial arts athletes. ***Evidence Level II; Therapeutic Studies - Investigating the result.***

Keywords: Endurance Training; Martial Arts; Neck Injuries.

RESUMO

Introdução: Com o rápido desenvolvimento das artes marciais competitivas, a dificuldade técnica e a intensidade do treinamento continuam a aumentar, as lesões no pescoço dos atletas também têm aumentado proporcionalmente, atraindo a atenção dos pesquisadores. Treinamentos de força localizados são utilizados para reabilitação, porém não há pesquisas relacionadas à prevenção nos esportistas. Objetivo: Explorar o efeito do treinamento de força no pescoço na prevenção de lesões no pescoço de atletas de artes marciais. Métodos: 68 (34 homens) voluntários, divididos aleatoriamente em grupo controle e experimental, participaram do experimento. Enquanto o grupo controle praticava as atividades tradicionais de treinamento, no grupo controle foi adicionado um protocolo de treinamento de força. Foram comparados os índices de variação na dor e na qualidade motora. O índice de incapacidade do pescoço também foi comparado. Resultados: Após o teste, o número de lesões no pescoço no grupo controle foi de 23, comparado com os cinco do grupo experimental; há uma diferença significativa. Houve redução significativa das lesões no grupo experimental(P=0,05); um ano depois, o escore VAS do grupo experimental continuou significativamente menor que o mesmo grupo pré-experimento ou controle. O escore do de disfunção do pescoço do grupo experimental ainda foi significativamente menor que o grupo pré-experimental e controle; não houve diferença estatisticamente significativa entre o grupo controle e o grupo experimental antes do experimento. Conclusão: A formulação do treinamento periódico adequado de força no pescoço tem um efeito preventivo significativo sobre lesões no pescoço em atletas de artes marciais. ***Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.***

Descritores: *Treinamento de Resistência; Artes Marciais; Lesões do Pescoço.*

RESUMEN

Introducción: Con el rápido desarrollo de las artes marciales de competición, la dificultad técnica y la intensidad del entrenamiento siguen aumentando, las lesiones cervicales en los atletas también han aumentado proporcionalmente, lo que ha atraído la atención de los investigadores. El entrenamiento de fuerza localizado se utiliza para la rehabilitación, pero no hay investigaciones relacionadas con la prevención en los deportistas. Objetivo: Explorar el efecto del entrenamiento de la fuerza del cuello en la prevención de lesiones del cuello en atletas de artes marciales. Métodos: Participaron en el experimento 68 voluntarios (34 hombres), divididos aleatoriamente en el grupo de control y en el experimental. Mientras que el grupo de control practicó actividades de entrenamiento tradicionales, en el grupo de control se añadió un protocolo de entrenamiento de fuerza. Se compararon los índices de variación del dolor y de calidad motriz. También se comparó el índice de discapacidad del cuello. Resultados: Después de la

prueba, el número de lesiones en el cuello en el grupo de control fue de 23 en comparación con cinco en el grupo experimental; hay una diferencia significativa. Hubo una reducción significativa de las lesiones en el grupo experimental (P=0,05); un año después, la puntuación VAS del grupo experimental seguía siendo significativamente inferior a la del mismo grupo antes del experimento o del grupo de control. La puntuación de la disfunción del cuello del grupo experimental seguía siendo significativamente más baja que la del grupo preexperimental y la del grupo de control; no había diferencias estadísticamente significativas entre el grupo de control y el grupo experimental antes del experimento. Conclusión: La formulación de un entrenamiento periódico adecuado de la fuerza del cuello tiene un efecto preventivo significativo sobre las lesiones del cuello en los atletas de artes marciales. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Entrenamiento de Resistencia; Artes Marciales; Traumatismos del Cuello.*

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INTRODUCTION

The training of Wushu Sanda is a multi-year and systematic process, sports injuries will directly or indirectly affect the normal study and life of athletes, severely restrict the systemicity and efficiency of training and the improvement and performance of athletes' technical level, at the same time, it also brings great pain to their physiology and psychology.[1] Even if Wushu Sanda athletes insist on training with injuries, due to injuries and illnesses, it is difficult for athletes to improve their technical skills, so as to influence them to enter the ranks of Wuying athletes, make their development space shrink.[2] This will not only cause a waste of talents to the country, at the same time, it will also affect the improvement of the overall level of China's Wushu Sanda. The Wushu Sanda movement continues to develop in a more intense and exciting direction, this puts forward higher requirements on the physical and psychological qualities of athletes, this also indirectly increased the incidence of sports injuries.[3] In order to avoid sports injuries of Wushu Sanda athletes, during the training period, it is very important for athletes to have scientific training concepts and improve their awareness of preventing accidental injuries. In response to this research question, scholars such as Privett B J and others compared the neck strength of excellent classical wrestlers and freestyle wrestlers. The ratio of cervical spine extension and flexion strength to body weight of two types of wrestlers and non-athletes was compared. They found that the strength of the cervical spine of these two wrestlers was significantly higher than that of non-athletes, so the stability of the cervical spine was better. It is also believed that this relationship is likely to be related to training and skills related to wrestling over the years.[4]

METHOD

Experimental subjects

There are 34 male athletes in the martial arts team of Province A, 34 female athletes, the average age is 19.63 years old, the average training period is 7.95 years of which, 50 Wuying athletes (25 males and 25 females); 10 first-level athletes, 8 females; 8 female second-level athletes.

Experimental method Randomly divide it into experimental group and control group, there are 34 people in the experimental group and 34 people in the control group, periodic training of neck strength was performed on the experimental group, the control group lived as normal. Select related neck injuries for comparison. (Table 1)

Table 1. Basic information of athletes.

Group	Number of cases	Man	Women	Wuying class	Level 1	Level 2
Test group	34	16	18	26	4	4
Control group	34	18	16	24	6	4

Observation indicators and evaluation methods

Arrange standardized training experimenters to conduct functional evaluation, mainly observe the scores of VAS and NDI before and after the experiment and follow-up. The scoring standards are as follows: Visual analogue scale (visualana-logue scale, VAS): Use 11 numbers from 0 to 10 to indicate the degree of pain, 0 points, no pain; Less than 3 points, slight pain, tolerable; 4-6 points, the patient has pain and affects sleep, which can still be tolerated; 7-10 points, the patient has gradually intense pain, the pain is unbearable and affects appetite and sleep. Neck disability in-dex (NDI): Divided into pain intensity, life situation, extract, reading, headache, 10 items such as concentration, work, driving, sleep, entertainment, etc.

RESULTS

Comparison of the number of neck injuries between the two groups of athletes before and after the experiment

As shown in Figure 1, the number of injured in the experimental group was 5 people, 4 of whom were slightly injured, 1 person suffered minor injuries. The number of injured in the control group was 23, of which 20 were slightly injured and 3 were moderately injured. There is a significant difference in the comparison. Athletes must pay attention to and strengthen neck muscle exercises in training, not only can it improve athletic performance, but it also has an effect on shaping body beauty. Therefore, in terms of strength training, the strength training of the neck muscles is quite important.[5]

Comparison of the VAS scores of the two groups of athletes

Before the experiment, there was no statistically significant difference in VAS scores between the two groups of patients; After the experiment,

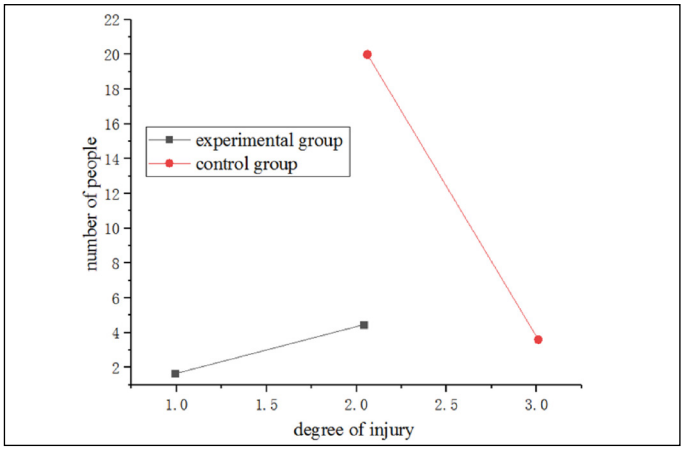

Figure 1. Comparison of the number of neck injuries between the two groups of athletes before and after the experiment.

the VAS scores were significantly reduced, compared with the pre-experiment, the differences are statistically significant; The decrease in the experimental group was more obvious, and the difference was statistically significant compared with the control group; After 1 year, the VAS score of the experimental group was still significantly lower than that of the pre-experiment and the control group, there was no statistically significant difference between the control group and before the experiment. (Table 2)

Comparison of NDI scores between the two groups

Before the experiment, there was no statistically significant difference in NDI scores between the two groups of athletes; After the experiment, the NDI scores were significantly reduced, compared with the pre-experiment, the differences are statistically significant; The decrease in the experimental group was more obvious, and the difference was statistically significant compared with the control group; After 1 year, the NDI score of the experimental group was still significantly lower than that of the pre-experiment and the control group, there was no statistically significant difference between the control group and before the experiment. (Table 3)

Table 2. Comparison of the VAS scores of the two groups of athletes.

Group	N	Before the experiment	After the experiment	Follow up
Test group	34	5.76 ± 1.33	1.76 ± 1.13	1.86 ± 1.13
Control group	34	5.66 ± 1.35	4.0 ± 1.08	5.43 ± 1.31

Table 3. Comparison of NDI scores between the two groups of athletes.

Group	N	Before the experiment	After the experiment	Follow up
Test group	34	46.78 ± 4.0	20.08 ± 1.73	20.43 ± 1.48
Control group	34	46.66 ± 4.05	40.76 ± 2.15	44.63 ± 3.43

DISCUSSION

The spine is divided into five segments: Neck, chest, lumbar, sacrum and tail. In addition to supporting and protecting functions, there are also flexible exercise functions. Among them, the cervical spine segment has the largest range of motion, easily injured when subjected to external impact. The balance and stability of the human neck needs to be completed by the following two parts: The first is static balance, it is an endogenous stable organization, it includes the structure of the vertebral body, vertebral arch and its protrusions, intervertebral discs and connected ligaments; The second is the balance of power, which is an exogenous stable organization, mainly for the adjustment and control of neck muscles, it is the original power of spine movement. The neck must be kept in a dynamic balance between static and dynamic forces, any kind of balance disorder can break the stability of the neck. The degenerative changes of the muscles near the cervical spine and the long-term strain of nearby tissues are important causes of non-specific neck pain. Because of the degenerative changes of the stabilizing muscles in the front and rear of the neck, the muscle strength and muscle tone are weakened, can't effectively coordinate balance, broke the stability of the cervical spine; In addition, because the imbalance of the cervical spine affects the muscle tissue around the neck to produce radiation pain, in order to relieve pain, patients will reduce neck movement, decrease the mobility of neck flexion, extension, lateral bending, and left and right rotation, in severe cases, the muscle strength of the neck muscles that are out of balance will be weakened, muscle atrophy, accelerates the degenerative changes of neck muscles, especially the back extensor muscles of the neck. So in training, coaches and athletes, generally able to do strength training that pays attention to large muscle groups, for example: strength exercises for chest, back and abdominal muscle groups and upper and lower limb muscle groups.[6] Often overlook the role of small muscle groups to complete the action. However, the quality of the completed movement is related to the coordinated effort of the large and small muscle groups of the entire body. If an athlete can achieve a high level of skill in completing the required actions, then the difference is as small as a few tenths, often the small muscle groups do not work well, the neck muscles cannot make the head reach the ideal position. The strength of the neck is strong, it is not only conducive to the completion of the action, but also has its special significance in maintaining the balance of the body and protecting the body from injury. When the body loses balance during exercise, the neck muscles can protect the head, make the head adjust the position in time, and the balance organs can resume work as soon as possible, the body is protected from injury. Promoting cervical spine strength training has a good preventive effect on martial arts cervical spine injury.[7]

Adopt the correct periodic training method, the effect of splitting and training multiple times will be better, but coaches must carefully plan when they will conduct high-intensity training. Even if it is just a simple exercise, strength can lead to higher susceptibility to injury.[8] By incorporating all these principles into the cervical spine enhancement program, the most effective project can be developed to help the team improve the strength of the cervical spine and reduce possible damage. In all studies on cervical spine enhancement projects, one thing is consistent, that is, if you want to have the greatest effect, you must have specialized neck training.[9] The effect of coordination training on cervical spine strength is not as significant as that of special neck training. By focusing on specific movements of the neck, I hope to coordinate the adjustment of other stronger muscle tissues, this forces the neck musculature to really do the necessary work to increase strength. In the traditional culture of martial arts, martial arts as a sport is very different from most other sports. This means it requires a specific set of skills, therefore, a specific set of muscles is required to work together in a certain way. Martial arts relies heavily on the strength of the neck and the ability to fight against opponents, usually using neck and upper back musculature.[10]

CONCLUSION

It is proposed to study the influence of neck strength training on the neck injury of martial arts athletes, the results showed that, strengthening the strength of the deep neck flexors should be included in the weightlifting training of martial arts athletes, in order to further help the stability of the spine and possible injury prevention.

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

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