RESPONSES OF TAI CHI IN UPPER LIMB SPORTS INJURIES REHABILITATION ON YOUNG PEOPLE

RESPOSTAS DO TAI CHI NA REABILITAÇÃO DE LESÕES ESPORTIVAS DOS MEMBROS SUPERIORES EM JOVENS

RESPUESTAS DEL TAI CHI EN LA REHABILITACIÓN DE LESIONES DEPORTIVAS DE LOS MIEMBROS SUPERIORES EN JÓVENES

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ABSTRACT

Introduction: Practicing sports can strengthen the body both physically and mentally. Although Tai Chi can help injured athletes to recover quickly and shorten the return to sports training and competition, there are still no detailed studies about its effectiveness in lower limb injuries in young people. Objective: Analyze the effects of Tai Chi in upper limb sports injuries rehabilitation on young people. Methods: 91 patients with sports injuries are selected and randomly divided into a control group (n=44) and an experimental group (n=47). The control group received regular exercises for rehabilitation, while the experimental group used Tai Chi exercises. Mathematical statistics are used to analyze the effects before and after the activities. Results: There are considerable statistical differences in the effects of exercise on the two groups of patients. Conclusion: Tai Chi exercise can help young people recover from upper limb sports injuries. ***Evidence level II; Therapeutic Studies - Investigating the results.***

Keywords: Tai Ji; Sports; Athletic Injuries; Adolescent.

RESUMO

Introdução: Praticar esportes pode fortalecer o corpo tanto física quanto mentalmente. Apesar do Tai Chi poder ajudar os atletas lesionados a se recuperarem rapidamente e abreviar o retorno ao treino esportivo e a competição ainda não há estudos detalhados sobre sua eficácia nas lesões de membros superiores em jovens. Objetivo: Analisar os efeitos na reabilitação esportiva de jovens lesionados nos membros superiores sob os fundamentos do Tai Chi. Métodos: Foram selecionados 91 pacientes com lesões esportivas que foram divididos aleatoriamente em grupo controle (n=44) e grupo experimental (n=47). O grupo controle recebeu exercícios regulares para reabilitação enquanto o grupo experimental utilizou exercícios de Tai Chi. Estatísticas matemáticas foram empregadas para analisar os efeitos antes e depois das atividades. Resultados: Existem diferenças estatísticas consideráveis nos efeitos do exercício nos dois grupos de pacientes. Conclusão: O exercício de Tai Chi pode auxiliar os jovens a recuperarem-se de lesões esportivas nos membros superiores. ***Nível de evidência II; Estudos terapêuticos - Investigação de resultados.***

Descritores: *Tai Chi; Esportes; Traumatismos em Atletas; Adolescente.*

RESUMEN

Introducción: La práctica del deporte puede fortalecer el cuerpo tanto física como mentalmente. Aunque el Tai Chi puede ayudar a los atletas lesionados a recuperarse rápidamente y a acortar la vuelta al entrenamiento y la competición deportiva, todavía no hay estudios detallados sobre su eficacia en las lesiones de las extremidades superiores en los jóvenes. Objetivo: Analizar los efectos en la rehabilitación deportiva de los jóvenes con lesiones en las extremidades superiores bajo los fundamentos del Tai Chi. Métodos: Se seleccionaron 91 pacientes con lesiones deportivas que se dividieron aleatoriamente en el grupo de control (n=44) y el grupo experimental (n=47). El grupo de control recibió ejercicios regulares de rehabilitación mientras que el grupo experimental utilizó ejercicios de Tai Chi. Se utilizaron estadísticas matemáticas para analizar los efectos antes y después de las actividades. Resultados: Existen considerables diferencias estadísticas en los efectos del ejercicio en los dos grupos de pacientes. Conclusión: El ejercicio de Tai Chi puede ayudar a los jóvenes a recuperarse de las lesiones deportivas de las extremidades superiores. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Tai Chi; Deportes; Traumatismos en Atletas; Adolescente.*

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INTRODUCTION

Conventional treatment of joint diseases in adolescents often fails to achieve a radical cure. This has caused a lot of inconvenience to the people in social work and life. It is the impact of physical health and the burden of mental health. This phenomenon has gradually become a common physiological impact public health problem for men and women.[1] At present, basketball, football, volleyball, and other sports have become common items for people to exercise. While improving people's physical fitness, this sport also brings certain sports injury risks. Severe sports injuries are usually accompanied by motor dysfunction.[2] This type of injury easily affects the insured's emotional state and quality of life. Therefore, it is necessary to analyze the rehabilitation of patients with sports injuries.

METHOD

General information

From May 2016 to September 2018, this article selected 91 patients with sports injuries from vocational and technical colleges as the research objects. We divided the volunteers into a control group (44 cases) and an experimental group (47 cases) based on the similarities and differences of the rehabilitation exercise methods. There were 33 males and 11 females in the control group.[3] The age is (23.1±4.5) years old. The age is (23.5±4.4) years old. The general information of the patients is not significantly different.

Method

Both groups of sports injury patients received conventional treatment. The control group received routine rehabilitation exercises. The experimental group received Tai Chi exercise. (1) Exercise content. The 47 cases of sports injury patients in this group used 24-style Tai Chi for rehabilitation exercises. Volunteers continued to carry out rehabilitation exercises following the movement procedures such as starting, dividing the mane of the left and right wild horses, flaring the wings of the white crane, cuddling the knees and stroking on the left and right, waving the pipa, and curling the humerus left and right. (2) Exercise plan. The exercise frequency and duration setting are set according to the recovery status of the activation function of the patient with a sports injury. It is advisable to take 1 time a day, 3 to 4 times a week in the initial stage. With the rehabilitation of sports injury patients, the daily exercise duration and exercise frequency are gradually increased. In the mid-stage, you can exercise at a frequency of 2 times a day and 5-7 days a week. In the later stage, the Tai Chi rehabilitation exercise program can be adjusted to 2 to 3 times a day, 7 days a week. (3) Rehabilitation exercise guidance. We correct the improper movements of the patients during the Tai Chi exercise for sports injury patients. We evaluate the patient's compliance with rehabilitation exercises. If it is found that patients with sports injuries have insufficient compliance, they will promptly explain the significance of sticking to Tai Chi exercises to the rehabilitation of injuries. If necessary, you can explain typical cases of good recovery after previous Tai Chi exercises. This improves the patient's exercise compliance level.

Observation indicators

We analyze changes in the patient's emotional state. Assess the patient's recovery of activity function.[4] We count patients' satisfaction with rehabilitation exercises.

Model simulation of the relationship between joint motion amplitude and sports injury

Abstract the motion data and treat it as a data information system.[5] The rough set attribute reduction method is expressed as follows:

$$S = (U, A, V, f) \quad (1)$$

The collection of motion data is U. The attribute set of motion data is A. The set of motion data attributes is $R = C \cup D$. Conditional attributes and decision attributes are represented by irrelevant attribute subsets C and D.[6] The value range of the attribute set is V. Information function f: $U \times R \rightarrow V$ represents the attribute value of any motion data in U.

For any attribute subset $B \subseteq R$, if the motion data $x_i, x_j \in U$, $\forall r \in B$. If and only if $f(x_i, r) = f(x_j, r)$, x_i and x_j are indistinguishable.[7] Abbreviated as $Ind(B)$. The indistinguishable relationship between x_i and x_j is equivalent.

Assumption 1: The attribute set is A. Property $a \in A$. Like $Ind(A - \{a\})$, then the attribute a is unnecessary in set A. Otherwise a is necessary in A. If any $a \in A$ is necessary in A, then A is independent. Otherwise, it can be said that A is dependent. If the attribute $Q \subseteq P$ exists and Q is independent and satisfies $Ind(Q) = Ind(P)$. Because SVM has a strong predictive level,[8] we use SVM to establish a model of the relationship between joint motion range and sports injury. SVM forms an optimal hyperplane when the training set is linearly separable:

$$(\omega \times \varphi(x)) + b = 0 \quad (2)$$

This optimal hyperplane must not only meet the following constraints:

$$y_i[\omega \times \varphi(x_i)) + b] \geq 1, i = 1, 2, \cdots, l \quad (3)$$

It is also necessary to obtain the minimum value of the following function:

$$\varphi(\omega) = \frac{1}{2}\|\omega\|^2 \quad (4)$$

The optimal hyperplane can be obtained by solving the optimization problem:

$$\sum_{SV} y_i a_i^0 k(x_i, x) + b_0 = 0 \quad (5)$$

That is, the support vector is SV. The Lagrange multiplier is a^0_i. The kernel function is $k(x_i, x)$.

Statistical methods

We use SPSS23.0 software for data statistics. P<0.05 indicates a significant difference.

RESULTS

Changes in an emotional state

There was no significant difference in depression and anxiety scores of patients with sports injuries before exercise.[9] After exercise, the bad mood of the patients with sports injuries has been improved. However, the scores of depressions (52.18±3.26) and anxiety (50.36±3.15) in the control group were still higher than those in the experimental group (P<0.05). (Table 1)

Recovery status of activity function

We use the simplified Fugl-Meyer motor function scoring method to evaluate the motor function of patients with sports injury.[10] There was no significant difference in the activity function scores of patients with sports injuries before exercise. After receiving rehabilitation exercises, the activity function of the two groups of patients improved. The scores of the control group after 3 months of exercise (93.62±2.59) and the scores of (95.38±1.69) after 6 months of exercise were lower than those of the experimental group (P<0.05). Table 2

Table 1. Changes in emotional state (points $x \pm s$).

Group	n	Depression		Anxiety	
		Before exercise	After exercise	Before exercise	After exercise
Control group	44	56.19±4.72	52.18±3.26	53.84±4.29	50.36±3.15
test group	47	56.22±4.79	48.16±2.51	53.78±4.25	46.05±2.93
t	-	0.15	4.79	0.19	4.87
P	-	>0.05	<0.05	>0.05	<0.05

Satisfaction with rehabilitation exercise

The satisfaction of the control group with rehabilitation exercise was 81.82%, which was lower than that of the experimental group (P<0.05). (Table 3)

Table 2. Activity function recovery status (points $x \pm s$).

Group	N	Before exercise	After 3 months of exercise	After 6 months of exercise
Control group	44	91.27±3.19	93.62±2.59	95.38±1.69
test group	47	91.21±3.22	96.16±1.85	97.89±1.29
t	-	0.13	3.72	2.95
P	-	>0.05	<0.05	<0.05

Table 3. Satisfaction with rehabilitation exercise (n/%).

Group	N	Completely satisfied	Satisfied	Dissatisfied	Satisfaction
Control group	44	25(56.82)	11(25.00)	8(18.18)	36(81.82)
test group	47	32(68.09)	13(27.66)	2(4.26)	45(95.74)
X2	-	-			5.14
P	-	-			<0.05

DISCUSSION

With the continuous changes in people's health awareness and health concepts, their active participation in physical exercise has gradually expanded. Compared with walking, jogging, and other sports, more intense sports such as basketball and football are more likely to cause sports injuries.[11] For the injured, the formation of sports injury will affect their follow-up exercise plan and easily interfere with their activities and daily life. This brings a lot of inconvenience to patients.

Combined with previous injury management experience, it can be known that serious sports injuries usually take a long time.[12] Only in this way can normal activity functions be restored. But for the special group of sports preference or professional athletes, the interference of sports injury to their sports plan and daily life can easily lead to the formation of anxiety, depression, and other bad emotions. Negative emotions can affect the recovery speed of their activities and functions through physiological-psychological mechanisms. The above situation puts forward higher requirements for the rehabilitation exercise management of patients with sports injuries.

The Tai Chi movement belongs to Chinese intangible cultural heritage. This health-preserving boxing method integrates the essence of traditional Chinese medicine meridian theory and the theory of yin and yang and five elements.[13] Its rigid and flexible palm can produce good physical fitness and improve activity functions for exercisers. We use it for sports injury patients. The intensity of this exercise is low, and it is highly compatible with the rehabilitation needs of injured patients. Therefore, Tai Chi exercise is necessary to establish a rehabilitation exercise plan for sports injury patients.

Compared with conventional rehabilitation exercise methods, the advantages of Tai Chi exercise are embodied in the following points: (1) Reduce the risk of secondary injury of patients with sports injuries and promote their recovery. The peculiarities of the rehabilitation management of sports injury patients are as follows. The etiology of this patient group is relatively special. It is necessary to pay full attention to controlling the patient's exercise intensity and load when selecting rehabilitation exercise methods to restore their activity functions. This can avoid causing secondary sports injuries.[14] Tai Chi exercises are highly consistent with the above requirements. The rhythm of this health-preserving exercise is slow. It can relax the muscles, adjust breathing, and promote the rehabilitation of injured tissues with the help of Tai Chi based on ensuring the safety of patients' exercises. This can shorten the patient's recovery time. This study confirmed that the experimental group's 3 months of exercise (96.16±1.85) points and 6 months of exercise (97.89±1.29) points were higher than those of the control group (P<0.05).

(2) Pleasant body and mind. Sports injury patients need to continue thinking about the follow-up boxing movements when doing Tai Chi exercises. Sports injury patients can gradually get rid of worries and anxiety about activity function and self-care ability. This way, a state of unity of body and mind is reached. It can be considered that this rehabilitation exercise method can form a good body and mind pleasurable effect.

CONCLUSION

In the training process, Tai Chi can dredge the joints of the whole body and speed up blood training. It has a very good effect of promoting blood circulation and removing blood stasis. To sum up, it is suitable to promote Tai Chi in the exercise of sports injury patients. This can increase the patient's recovery speed.

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