FUNCTIONAL EXERCISE EVALUATION ON ATHLETES' CERVICALGIA MANAGEMENT

AVALIAÇÃO DO EXERCÍCIO FUNCIONAL NO TRATAMENTO DE CERVICALGIA EM ESPORTISTAS

EVALUACIÓN DEL EJERCICIO FUNCIONAL EN EL TRATAMIENTO DE LA CERVICALGIA EN DEPORTISTAS

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ABSTRACT

Introduction: Cervicalgia generally refers to the pain syndrome caused by the cervical spine, joints, muscles, ligaments, fascia, soft tissues around the shoulder joint, and visceral diseases. Evidence suggests that resistance exercises are beneficial in solving this dysfunction in various groups, but there is no consensus in athletes. Objective: This paper examines functional exercises' effect on athletes' cervicalgia. Methods: Using mathematical statistics, the article randomizes equally the intensity of cervicalgia in the control and experimental groups, involving 60 individuals aged 18 to 20 years (31 males). While the control group received conventional rehabilitation treatment, the experimental group had a functional exercise training protocol three times a week, of 10 weeks. The pain was assessed by visual analog scale and self-assessment of functional limitation. Results: Differences in shoulder and neck pain were found between the two groups of volunteers before and after the training rehabilitation. A complete improvement was seen in 15 subjects in the experimental group versus 8 in the control group (P<0.05). Conclusion: Functional exercise effectively treats cervicalgia in athletes. ***Evidence Level II; Therapeutic Studies - Investigating the result.***

Keywords: Athletic Injury; Sports; Exercise; Endurance Training.

RESUMO

Introdução: A cervicalgia geralmente refere-se à síndrome de dor causada pela coluna cervical, articulações, músculos, ligamentos, fáscia, tecidos moles ao redor da articulação do ombro e doenças viscerais. Há evidências de que exercícios de resistência são benéficos para a resolução dessa disfunção em vários grupos, mas não há consenso da eficácia dos exercícios de resistência no combate à cervicalgia em esportistas. Objetivo: Este artigo analisa o efeito dos exercícios funcionais na cervicalgia em esportistas. Métodos: O artigo usa estatísticas matemáticas para controle randomizado equalitário na intensidade da cervicalgia nos grupos controle e experimental, envolvendo 60 indivíduos com idade entre 18 a 20 anos (31 homens). Enquanto o grupo controle passa por um tratamento de reabilitação convencional, o grupo experimental passa por um protocolo de treinamento em exercícios funcionais, na frequência de 3 vezes semanais por 2 meses e meio. A dor foi avaliada pela escala visual analógica e auto-avaliação de limitação funcional. Resultados: Houve diferenças nas dores no ombro e pescoço entre os dois grupos de voluntários, antes e depois do treinamento de reabilitação. Houve melhora completa do quadro em 15 indivíduos no grupo experimental contra 8 no grupo controle (P<0,05). Conclusão: O exercício funcional trata efetivamente cervicalgia nos esportistas. ***Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.***

Descritores: *Lesões em Atletas; Esportes; Exercício Físico; Treino Aeróbico.*

RESUMEN

Introducción: La cervicalgia se refiere generalmente al síndrome de dolor causado por la columna cervical, las articulaciones, los músculos, los ligamentos, la fascia, los tejidos blandos alrededor de la articulación del hombro y los trastornos viscerales. Existen pruebas de que los ejercicios de resistencia son beneficiosos para la resolución de esta disfunción en varios grupos, pero no hay consenso sobre la eficacia de los ejercicios de resistencia para combatir la cervicalgia en los deportistas. Objetivo: Este artículo analiza el efecto de los ejercicios funcionales sobre la cervicalgia en los deportistas. Métodos: El artículo utiliza estadísticas matemáticas para el control aleatorio de la intensidad del dolor de cuello en los grupos de control y experimental, en el que participaron 60 individuos de entre 18 y 20 años (31 hombres). Mientras que el grupo de control se somete a un tratamiento de rehabilitación convencional, el grupo experimental se somete a un protocolo de entrenamiento de ejercicios funcionales, con una frecuencia de 3 veces por semana durante 2 meses y medio. El dolor se evaluó mediante una escala analógica visual y la autoevaluación de la limitación funcional. Resultados: Hubo diferencias en el dolor de hombro y cuello entre los dos grupos de voluntarios antes y después del entrenamiento de rehabilitación. Hubo una mejora completa en 15 individuos del grupo experimental frente a 8 del grupo de control (P<0,05). Conclusión: El ejercicio funcional trata eficazmente la cervicalgia en los deportistas. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Lesiones en Atletas; Ejercicio Físico; Entrenamiento de Resistencia.*

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INTRODUCTION

Neck and shoulder pain is probably one of the most common diseases among the students undergoing daily rehabilitation in our school. Neck and shoulder pain generally refers to the cervical spine, joints, muscles, ligaments, fascia, soft tissue lesions around the shoulder joint, and internal organs. Pain syndrome is caused by illness.[1] For a long time, the strength and flexibility of the neck and shoulder muscles have declined, and the protection of joints and bones has become worse and worse. There is a close connection between the cervical spine and the shoulder. People with a bad cervical spine generally have stiff and weak shoulders. So, to improve the cervical spine, problems can start from our shoulders. We can nourish our shoulders and necks by enhancing the strength of the shoulder trapezius and neck sternocleidomastoid muscles. Resistance exercise 2-3 days a week is beneficial to the health of the musculoskeletal system. The periodic review report points out the effectiveness of physical exercise in relieving neck and shoulder pain. Regular resistance exercises for a few minutes can increase muscle strength.[2] We explore the use of upper limb strength exercises to exercise the strength of the neck and shoulder muscles to provide a research basis.

METHOD

Research object

We select 60 students who are treated in the rehabilitation center of our school daily. The youngest is 18 years old, and the average age is 20 years old. There are 31 males and 29 females. They were randomly divided into observation and control groups, with 30 cases in each group.[3] There were no significant differences between the two groups in terms of age and medical conditions.

Research methods

Students in both groups were given some rehabilitation treatment for the neck and shoulders. That is a massage to relieve pain. The treatment time is weekly (1, 3, 5). The observation group and the control group had the same rehabilitation treatment methods. The observation group was undergoing routine rehabilitation treatment and then cooperated with the two groups of strength fitness exercises. Rehabilitation treatment is carried out in two stages.[4] The first 6 weeks of the first stage: the horizontal bar is suspended with a straight arm, and the pull-up belt assists the pull-up. Six weeks after the second stage: horizontal bar bend arm hanging, horizontal bar pull-up. The control group only received conventional rehabilitation treatment. Both groups of patients were treated for 2 and a half months to observe the efficacy.

Observation indicators

After treatment, you can try to lower your head to find your collarbone. Raise your head and chin to find the ceiling.[5] Then let your ears go to the shoulders. We observe whether volunteers can do it flexibly. If the volunteers can do it easily, then the cervical spine is healthy.

Bone joint sports injury characteristics affect simulation

δ represents the morphological characteristics of the bone and joint parts. $\varphi(g)$ represents the constant parameter relative to the osteotomy surface. We use the virtual Marker coordinates inside and outside the joint center to construct the size of the athlete's bone and joint anatomy. We use formula (1) to express

$$\bar{\omega}(\theta_3^{'}) = \frac{\varphi(g)\times\delta}{\Delta\omega(v)}\times(\zeta) \quad [U\times L] \tag{1}$$

ζ represents the quality of each anatomical part. $\omega(v)$ represents the measurement coefficient of left foot, left calf, left thigh, right foot, right calf, and right thigh. U represents the morphological characteristics of different anatomical parts. L represents the left and right bone joint angle variables. $o(i)$, $p(i)$ represents the conversion of the local coordinate system between the left and right calf and the left and right thigh. $f(m)$, $l(m)$ represents the change curve of the flexion and extension angle of the left and right bone joints.[6] Use formula (2) to model the joint skeleton of athletes under hurdle training.

$$A(\bar{\omega}) = \frac{[o(i)\times p(i)]\times[f(m)\times l(m)]}{\mu(\vartheta\times\upsilon)} \tag{2}$$

μ represents the change curve of the flexion and extension angle of the bone joints in each training stage. ϑ represents the maximum knee angle of the bone joint. υ represents the process of gradual increase in the angle of the bone and joint. $\partial(v)$ represents the minimum force load for continuous flexion of the bone joint. $\Phi(v)$ represents the maximum force load of continuous flexion of the bone joint. $\Gamma(p)$ represents the changes in flexion and extension of bones and joints under different training intensities. $\gamma(p)$ represents the changes in the internal and external rotation angles of the bone joints under different training intensities. Use formula (3) to give the athlete's bone joint force load change state under hurdle training

$$H[j] = \frac{[\partial(v)\times\Phi(v)]\times\gamma(j^{*}g)}{[\Gamma(p)\times\gamma(p)]}\times A(\bar{\omega})\times\bar{\omega}(\theta_3^{'}) \tag{3}$$

A represents the spatial position relationship of the bone joint movement. $(j^{*}g)$ represents the transfer law of the force state of the bone and joint.

Data statistical processing

The measured data was processed with SPSS16.0 statistical software. All statistical tests adopt a double test. P <0.05 indicates that the difference tested is statistically significant. P <0.01 has a significant difference.

RESULTS

omparison of the age and condition of the two groups of patients

Table 1 shows that the differences in age and condition of the two groups of patients are not statistically significant and comparable.

Comparison of visual analog scoring method (VAS) and self-inspection evaluation method

Before treatment, the two groups of patients were evaluated by visual simulation evaluation and self-observation evaluation.[7] Evaluation results select two independent sample difference test items for the rank sum test. The statistical results are shown in Table 2. p1=0.936>0.05, P2=0.522>0.05. This shows no significant difference between the two groups of patients in evaluating their pain degree by the two methods, and they are comparable.

Table 1. Comparison of the age and condition of the two groups of patients.

Group	Number of cases	Male	Female	Age	Condition	p
Observation group	30	16	14	19.73±1.28	Neck and shoulder pain for more than half a year	P>0.05
Control group	30	15	15	19.87±1.30	Neck and shoulder pain for more than half a year	P>0.05

Table 3 shows that the straight arm suspension of 30 patients in the observation group increased from the limit of 9.6 seconds before the experiment to 19.7 after 6 weeks in the first stage. The pull-ups of the tension belts increased from 2.9 to 5.6 on average before the experiment. In the second phase, the observation group continued to massage and then cooperated with another group of strength fitness programs.[8] After the two-stage training, the patients' neck and shoulder muscle strength was significantly improved (P<0.01).

Comparison of curative effect between observation group and control group after treatment

It can be seen from Table 4 that after 12 weeks of treatment, the results of the self-examination of the efficacy and the VAS evaluation standard test showed that the two groups have the efficacy. However, the rank-sum test showed P<0.01 for the two sets of data.[9] It can be seen that the curative effect of the observation group is better than that of the control group, and the difference is highly significant. Similarly, the effective rate from Table 5 shows that the effective rate after treatment in the observation group reached 80%, and the effective rate in the control group reached 43%. From this we can think that the effect of the observation group after treatment is better than the control group.

Table 2. Comparison of visual stimulation (VAS) evaluation and self-observation evaluation before treatment between the two groups.

Group		Observation group	Control group
n		30	30
Visual simulation to evaluate the degree of pain	Mild	5	4
	Moderate	10	12
	Severe	15	
	P1	P1=0.936>0.05	14
Self-assessment of pain	can do	0	0
	Can do but pain	5	7
	can not do	25	23
	P2	P2=0.522>0.05	

Table 3. Comparison of the strength of the neck and shoulder muscles and ligaments.

Week farewell	1-6 weeks		7-12 weeks	
	Before training	After training	Before training	After training
Straight arm hang (seconds)	9.6'±2.98	19.7'±5.53		
Pull-ups with pull-ups (pcs)	2.9±0.74	5.6±1.25		
Bent arm hang (seconds)			27.5'±10.8	40.3'±15.5
Pull-ups (n)			1.4±0.84	3.3±1.64
p	P<0.01		P<0.01	

Table 4. Comparison of curative effect between two groups of patients before and after treatment.

Curative effect	Group		P
	Observation group	Control group	
A little uncomfortable	6	17	p=0.008<0.05
Get better	9	5	
get well	15	8	

Table 5. Comparison of the effective rate of the two groups of patients after treatment.

Group	Number of cases	Get well	Get better	Efficient	Efficient
Observation group	30	15	9	24	80%
Control group	30	8	5	13	43%

DISCUSSION

Neck and shoulder disease has spread rapidly in China and is becoming popular and younger. With the development of network technology, people's work and lifestyle have changed greatly, and the chance of neck bending has greatly increased.[10] The different muscle groups that dominate the various motion states of the cervical spine can cause muscle fiber damage and weakened muscle strength by maintaining the flexion posture for a long time under the influence of factors such as poor posture and mental tension. This directly leads to the destruction of the dynamic and static balance of the cervical spine and the reduction of mechanical properties, which intensifies the degeneration of the cervical spine. Some traditional Chinese medicine hot compresses, massage, massage, acupuncture, traction, etc., are often used in treatment. We provide traditional Chinese medicine and exercise therapy according to the changes in the neck and shoulder pain and the cause of the disease.[11] In a certain period, the effect of alleviating neck and shoulder pain is also obtained. The main effect of this treatment plus the limb strength exercise program is to relieve the tension and stiffness of the neck and shoulder muscles and ligaments, correct joints, peel adhesions, and clear stenosis. This can promote the reset to create good conditions.

The upper limb exercises of the horizontal bar should be carried out following the requirements and precautions when using different stages and different exercise methods.[12] In this way, the development of muscle and function is realized step by step. When practicing, you should feel the subjective fatigue completely disappear and be motivated and confident of performing well in practice again. When practicing, pay attention to exercise within the painless range and improve the enthusiasm of exercise. Always give verbal encouragement during exercise and show the effect of the exercise.

CONCLUSION

The observation and control groups have statistically significant differences in the indicators after treatment and before treatment in this group. It can be seen that the observation group and the control group have curative effects on the treatment of neck and shoulder pain. The difference between the observation group and the control group was statistically significant. This shows that the observation group is more effective in treating neck and shoulder pain after exercising with the upper limb strength of the horizontal bar.

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