THE ROLE OF FUNCTIONAL DYNAMIC STRETCHING TRAINING IN DANCE SPORTS

O PAPEL DO TREINO FUNCIONAL DE ALONGAMENTO DINÂMICO NA DANÇA ESPORTIVA

EL PAPEL DEL ENTRENAMIENTO FUNCIONAL DE ESTIRAMIENTO DINÁMICO EN EL BAILE DEPORTIVO

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ABSTRACT

Introduction: Dynamic stretching is a particular form of training. Currently, there is little research in academia about dynamic stretching in sports dancing. Objective: Explore the role of functional dynamic stretching training in dance sports. Methods: 60 sports dancers with a history of ankle injuries were randomly divided into a control and experimental group. All performed a training protocol twice a week, lasting 45 minutes, for eight weeks. A functional dynamic stretching training session was added to the control group. The effects were evaluated by the Cumberland scale, bilateral stability comparison, and balance control by the Perkin system. Data were statistically treated for analysis. Results: There was no significant difference between the scores of healthy ankle joints and injured ankle joints in the two groups (P>0.05). After eight weeks of functional dynamic stretching training, there was a significant difference between the experimental and control groups on injured ankle joints (P<0.05). Conclusion: Dynamic stretching training can effectively improve ankle joint stability in sports dancers. Concomitantly, this method effectively prevents injuries to the athlete's ankle joint. ***Evidence level II; Therapeutic Studies - Investigating the results.***

Keywords: Plyometric Exercise; Sports; Dance Therapy; Athletes.

RESUMO

Introdução: O alongamento dinâmico é uma forma especial de treinamento. Atualmente, existem poucas pesquisas no meio acadêmico sobre alongamento dinâmico na dança esportiva. Objetivo: Explorar o papel do treino funcional de alongamento dinâmico na dança esportiva. Métodos: 60 bailarinos esportivos com histórico de lesões no tornozelo foram divididos aleatoriamente em grupo controle e experimental. Todos realizaram um protocolo de treinamento duas vezes por semana, com duração de 45 minutos, por 8 semanas. Ao grupo controle foi adicionado um treino de alongamento dinâmico funcional. Os efeitos foram avaliados pela escala de Cumberland, comparação de estabilidade bilateral e controle de equilíbrio pelo sistema de Perkin. Os dados foram tratados estatisticamente para análise. Resultados: Antes do experimento, não houve diferença significativa entre os escores das articulações do tornozelo saudáveis e das articulações do tornozelo lesionadas nos dois grupos (P>0,05). Após 8 semanas de treinamento funcional de alongamento dinâmico, houve diferença significativa entre o grupo experimental e o grupo controle nas articulações do tornozelo lesionadas (P<0,05). Conclusão: O treinamento de alongamento dinâmico pode efetivamente melhorar a estabilidade da articulação do tornozelo nos bailarinos esportivos. Concomitantemente, esse método previne efetivamente a ocorrência de lesões na articulação do tornozelo do atleta. ***Nível de evidência II; Estudos terapêuticos - Investigação de resultados.***

Descritores: *Exercício Pliométrico; Esportes; Terapia através da Dança; Atletas.*

RESUMEN

Introducción: El estiramiento dinámico es una forma especial de entrenamiento. Actualmente, existen pocas investigaciones en el ámbito académico sobre los estiramientos dinámicos en el baile deportivo. Objetivo: Explorar el papel del entrenamiento funcional de estiramiento dinámico en el baile deportivo. Métodos: 60 bailarines deportivos con antecedentes de lesiones de tobillo fueron divididos aleatoriamente en un grupo de control y otro experimental. Todos realizaron un protocolo de entrenamiento dos veces por semana, de 45 minutos, durante 8 semanas. Al grupo de control se le añadió un entrenamiento de estiramiento dinámico funcional. Los efectos fueron evaluados por la escala Cumberland, la comparación de la estabilidad bilateral y el control del equilibrio por el sistema Perkin. Los datos fueron tratados estadísticamente para su análisis. Resultados: Antes del experimento, no había diferencias significativas entre las puntuaciones de las articulaciones del tobillo sano y las articulaciones del tobillo lesionado en los dos grupos (P>0,05). Después de 8 semanas de entrenamiento funcional de estiramiento dinámico, hubo una diferencia significativa entre el grupo experimental y el grupo de control en las articulaciones del tobillo lesionadas (P<0,05). Conclusión: El entrenamiento de estiramiento dinámico puede mejorar eficazmente la estabilidad de la articulación del tobillo en los bailarines deportivos. Al mismo tiempo, este método previene eficazmente la aparición de lesiones en la articulación del tobillo del deportista. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Ejercicio Pliométrico; Deportes; Terapia a través de la Danza; Atletas.*

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INTRODUCTION

Sports dance is a new sport. In recent years, sports dance has developed rapidly in China. Chinese sports dancers have complex movements and superb skills. The increasing exercise intensity and exercise load have gradually increased the physical injuries of the players.[1] The athletes repeatedly performed technical movements such as flexion and extension, support, rotation, control, and landing buffer when the athletes showed their combinations. This forces the ankle joint to withstand high-intensity loads while completing high--quality technical movements. The strength of the ankle joint directly affects the performance of sports dancers. After applying training interventions to the experimental subjects, the author analyzes and investigates students with ankle joint injuries as the research object.[2] At the same time, we used the knowledge we learned to analyze and summarize a set of available dynamic stretching training methods to enhance the stability of the ankle joint.

METHOD

Research object

We select 60 sports dancers who have suffered ankle injuries. The suspension training method trained experimental subjects with ankle joint injuries. We randomly divided 60 subjects into a control group and an experimental group with 30 people each.[3] The experimental group used functional dynamic stretching training for intervention. The control group did not use functional dynamic stretching training for intervention. Observe the effect of functional dynamic stretching training on the distal end of the ankle joint through 8 weeks of training.

Research methods

Sixty students in the experimental group who had ankle joint instability and dance sports were given functional dynamic stretching training for 8 weeks. Train 2 times a week for 45 minutes each time. The experimental group used functional dynamic stretching training intervention, and the control group did not implement practical stretching training intervention.[4] We observe the effect of functional dynamic stretching training on the distal end of the ankle joint. Since the ankle joint of the human body needs a stage of treatment from injury to rehabilitation. In the control group, the ankle sprains of athletes who did not intervene were repaired by their physiological mechanisms. The experimental group carried out the intervention of functional dynamic stretching training. This can better compare the changes in the ankle function of the two groups of athletes.

Cumberland Ankle Instability Score Test

After the training, the Cumberland Ankle Joint Instability Scale was used to score 60 subjects before and after the experiment. At the same time, the stability scores of the healthy side and the affected side of the experimental group and the control group were compared and analyzed.[5] The score ranges from 0 to 30 points. A score of >28 means that the subject has not suffered a sprain, and there is no instability of the pedal joint. And <23 indicates that the subject's stepped joints are unstable. The lower the score, the worse the stability of the pedal joint.

Balance control ability test

Before and after training, test subjects' body balances control ability. Test the overall dynamic stability index through the Perkin test system.[6] The lower the index, the tester has good dynamic balance control ability. In this test, a single foot test was performed on the subject's affected and healthy side of the subject. We will compare and analyze the tested data.

Motion model of dynamic sequence synthesis

This article assumes that the motion primitives satisfy the first-order Markov distribution. A transition matrix can represent it.

$$M_{ij} = P(l_k = j \mid l_{k-1} = i) \tag{1}$$

Given an observation sequence $Y_1{:}7 = \{Y_1, Y_2, \cdots, Y_T\}$, the sequence length is. We can use the general criterion in statistical learning-the maximum likelihood criterion to learn the parameter $\{\Theta, \mu\}$ of the motion texture model:

$$\{\Theta, \mu\} = \arg\max_{\{\Theta,\mu\}} P(Y_{1:T} \mid \Theta, \mu) \tag{2}$$

By introducing the dividing point H and the segment label L, the right side of the above formula can be expanded as follows:

$$P(Y_{1:T} \mid \Theta, \mu) = \sum_{L,H} P(Y_{1:T} \mid \Theta, \mu, L, H) = \sum_{L,H} \left[\prod_{j=1}^{N_s} P(Y_{h_j:h_{j+1}-1} \mid \theta_{l_j}) M_{l_{j-1}l_j} \right] \tag{3}$$

The first term on the right side of equation (3) represents the likelihood function of a selected motion primitive for a given observation sequence. The second term represents the transition probability between two adjacent motion primitives. The sum symbol means to evaluate all possible occurrences of L, H.

Mathematical Statistics

The experimental data obtained are statistically processed using SPSS19.0 software.

RESULTS

Sixty subjects with ankle instability underwent the Cumberland Ankle Instability Score.[7] The article uses an independent sample T-test to compare and analyze the stable value scores of the experimental group and the control group, and the affected side (Table 1).

Before the experiment, there was no significant difference in the scores of the uninfected and affected ankle joints between the two groups. This shows that the experimental subjects are basically at the same level (P>0.05). After 8 weeks of functional dynamic stretching training, there are significant differences between the affected side of the experimental group and the control group.[8] The score measured by Cumberland shows that the affected side of the experimental group before the experiment is 17.22±1.24, and the affected side after the experiment is 23.62±1.12. It can be seen that the stability of the affected ankle joint in the experimental group has been significantly improved after 8 weeks of training. There is a very significant difference (P<0.01). In the control group, the affected side was 16.22±1.47 before the experiment, and the affected side was 18.33±1.28 after the experiment. Although there is a certain change in the score, it is found that the score is not high compared to the experimental group (P<0.05). This shows that the stability of the ankle joint is still poor. (Table 2)

Table 1. Ankle stability score.

Group	N	Cumberland Ankle Instability Score			
		Before the experiment		After the experiment	
		Healthy side	Affected side	Healthy side	Affected side
Test group	30	24.62±2.26	17.22±1.24	26.41±1.16	23.62±1.12
Control group	30	24.12±2.23	16.22±1.47	24.62±1.66	18.33±1.28

Table 2. Ankle stability score.

Stability Index	N	Dynamic equilibrium stability index			
		Control group		Test group	
		Healthy side	Affected side	Healthy side	Affected side
Before the experiment	30	3.52±0.03	2.80±0.57	3.28±0.85	5.02±0.50
After the experiment	30	3.20±0.20	2.52±0.50	2.73±0.53	3.02±0.82

DISCUSSION

The suspension training method adopted by the experimental group was used for functional dynamic stretching training. Suspension training is training in an unstable training environment.[9] This forces the whole-body function organization to participate in the functional training of the whole body. The suspension training method for functional dynamic stretching training trains the large and small muscle groups of the body's trunk, spine, pelvis, and core area. This provides a good power platform for the body's limb movements. At the same time, the training has played a good role in converting the upper and lower body strength. During training, the suspended lower limbs and the upper limbs supported on the ground are the fulcrum points of the body. The whole person is trained in an unstable situation. A high degree of self-control makes the patient's core strength, ankle joints, and body muscles participate in the training and strengthens cooperation.[10] The patient is training in an unstable space. This training method strengthens the functional dynamic stretching training and strengthens the coordination between the ankle joint and the small muscle groups of the whole body. This fundamentally improves the stability of the whole body. The stability of the affected side of the ankle joint is also improved.

The suspension training method provides an unstable platform for functional dynamic stretching training. While training large muscle groups, small muscle groups are trained simultaneously, which strengthens the coordination ability of small muscle groups around the spine. This indirectly enhances the cushioning ability of the ankle joint of the trunk that controls the landing of the lower limbs of the body.[11] At the same time, the pressure on the ankle joints of the lower limbs is reduced. This improves the players' ability to control unstable states and enhances their balance. This method allows the players to control their bodies always to maintain the correct posture when completing the combination.

After investigation, it was found that ankle joint injuries are the most common among sports dance injuries. Fractures caused by injuries are less likely. Training often brings more serious ligament strains, muscle strains, and nerve tissue damage. These injuries can cause a decrease in the stability of the ankle joint and are accompanied by chronic sprains. Functional dynamic stretching training is the basic guarantee for improving one's cluster strength. The improvement of the abdominal and back muscles can effectively control the trunk, spine, and pelvis movement. This strengthens the stability of the trunk, spine, and pelvis. The physiological function of muscles replacing the core area can stimulate more trunk strength training that is easily overlooked. The suspension training method is an unsteady training method used. This method can better train small muscle groups to improve core strength.[12] This also ensures that the body can still be correctly positioned when exerting its maximum force. This enhances the stability of the ankle joint. Through correlation distraction, it is concluded that functional dynamic stretching training is related to the body's dynamic balance ability. There is a correlation between the ankle joint stability score and the body's dynamic balance ability. Poor body balance control ability leads to a relatively higher chance of repeated stepping joint injuries. Strengthening functional dynamic stretching training is a reliable and effective means of effectively preventing ankle joint injuries and improving ankle joint stability.

CONCLUSION

The athletes with ankle joint injuries have improved their balance ability after functional dynamic stretching training. At the same time, the stability of the player's ankle joint is improved. Functional dynamic stretching training strongly enhances the mobility of the trunk and improves the quality of the muscles and the ability to adjust the system. Functional dynamic stretching training effectively enhances the stability of the ankle joint. At the same time, this method effectively prevents ankle joint injuries. Suspension training can improve the ability training of small muscle groups more than traditional training methods. This training method has a positive effect on enhancing muscle groups' strength and stabilizing the ankle joint's balance.

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