IMPROVING EXPLOSIVE BODY CAPACITY IN FEMALE SHORT TRACK SPEED SKATERS

MELHORIA DA CAPACIDADE EXPLOSIVA CORPORAL EM PATINADORAS DE VELOCIDADE EM PISTA CURTA

MEJORA DE LA CAPACIDAD EXPLOSIVA CORPORAL EN PATINADORAS DE VELOCIDAD EN PISTA CORTA

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ABSTRACT

Introduction: The peculiar characteristics of short track speed skating should be integrated into the psychology of competitions; it is considered that elite athletes engaged in this particular sport should have a healthy psychic condition. Objective: Investigate the explosive power of female speed skaters in short track speed skating. Methods: 10 key athletes from the national short track speed skating team were selected, and explosive power was tested by T-test, hexagonal test, and pro sensitivity test. Data analysis was performed using an independent sample t-test, differences in the results of related test indicators between groups were analyzed, and repeated measures analysis of variance was used. Results: During the explosive kick phase, knee extension speed increased linearly from 210°/S to 600°/S, and hip extension speed increased linearly from 200°/S to 400°/S. Conclusion: The development of muscle group strength and explosive power during training often shows differences in the degree of contraction, which is related to the arrangement of training methods. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Skating; Exercise; Physical Education and Training.

RESUMO

Introdução: As características peculiares da patinação de velocidade em pista curta devem ser integradas na psicologia das competições; considera-se que os atletas de elite engajados nesta modalidade especial devem ter boa condição psíquica. Objetivo: Investigar o poder explosivo das patinadoras de patinação de velocidade em pista curta. Métodos: 10 atletas-chave da equipe nacional de patinação de velocidade em pista curta foram selecionadas, o poder explosivo foi testado por teste T, teste hexagonal e teste de sensibilidade pro. A análise dos dados foi realizada utilizando um teste t de amostra independente, as diferenças nos resultados dos indicadores de teste relacionados entre os grupos foram analisadas, e foi utilizada a análise de medidas repetidas de variação. Resultados: Durante a fase de pontapé explosivo, a velocidade da extensão do joelho aumentou linearmente de 210°/S para 600°/S, e a velocidade da extensão do quadril aumentou linearmente de 200°/S para 400°/S. Conclusão: O desenvolvimento da força do grupo muscular e do poder explosivo durante o treinamento muitas vezes apresenta diferenças no grau de contração, o que está relacionado com a disposição dos métodos de treinamento. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Patinação; Exercício; Educação Física e Treinamento.*

RESUMEN

Introducción: Las características peculiares del patinaje de velocidad en pista corta deben integrarse en la psicología de las competiciones; se considera que los atletas de élite que se dedican a esta modalidad especial deben tener una buena condición psíquica. Objetivo: Investigar la potencia explosiva de las patinadoras de velocidad en pista corta. Métodos: Se seleccionaron 10 atletas clave del equipo nacional de patinaje de velocidad en pista corta, se probó la potencia explosiva mediante la prueba T, la prueba hexagonal y la prueba de sensibilidad pro. El análisis de los datos se realizó mediante una prueba t de muestras independientes, se analizaron las diferencias en los resultados de los indicadores de las pruebas relacionadas entre los grupos y se utilizó el análisis de varianza de medidas repetidas. Resultados: Durante la fase de patada explosiva, la velocidad de extensión de la rodilla aumentó linealmente de 210°/S a 600°/S, y la velocidad de extensión de la cadera aumentó linealmente de 200°/S a 400°/S. Conclusión: El desarrollo de la fuerza y la potencia explosiva de los grupos musculares durante el entrenamiento suele mostrar diferencias en el grado de contracción, lo que está relacionado con la disposición de los métodos de entrenamiento. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: *Patinación; Ejercicio; Educación y Entrenamiento Físico.*

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INTRODUCTION

The main muscle groups in speed skating are the extensor muscles of the hip and knee joints, and their dynamic characteristics are very important to the pedaling effect.[1] In the past, people thought that muscle endurance and absolute strength were the determinants of the ice kick effect, so they attached great importance to the weight-bearing squat in training, train lower body strength. This training method can lead to muscle group contraction strength, which is only developed in the low-speed area, and the force development at high-speed contraction speed cannot be trained; Only later did it realize that the speed endurance of the muscle group is more important for the performance of the ice kick. Corresponding measures are also taken in training, emphasizing the explosive force of staring at the ice, pay attention to developing the force training of the lower body extensor group in high-speed contraction.[2] In the non-ice period training, pay attention to the arrangement of training contents such as middle distance running and skating, etc., as a result, the performance of speed skating has been improved accordingly. At present, the indirect method is generally used to test the explosive power of athletes; Establish a direct test and evaluation method for the explosive force of the lower limb extensor group of athletes, it is important to provide a basis for sports training. The author's purpose, the purpose is to establish a direct method to detect the explosive power of the extensor muscles of the lower limbs of speed skaters, and to study the relationship between the explosive power of the muscles and training.[3]

METHOD

Research object

10 key athletes of the national short track speed skating team.

Research time: From September 2018 to February 2020, the total duration is about 17 months.[4] Due to the psychological research work, it is required to maintain a reasonable psychological distance between researchers and athletes, in order to ensure the credibility and effectiveness of each implementation. Therefore, in addition to carrying out on-site tracking and research on important competitions held in China, we also implement indirect monitoring of foreign competitions we participate in, for the period from the Winter Olympics qualifiers to the pre-competition of the Winter Olympics, except for the implementation of the key guarantee of unlimited time, the rest of the time is basically in the form of a special psychological training session once a week.

Experimental method

After the research of the special content and the observation and analysis of the competition, we have demonstrated that, this paper proposes a content system of psychological ability training to enhance the psychological stability of Chinese short track speed skaters participating in the Winter Olympics. The main content of the system is to enhance the psychological stability of athletes through the cultivation of special psychological ability.[5] Because only the athletes improve their special psychological ability, can they truly cope with the complex stress changes in the Olympic Games, and finally implement and reflect the enhancement of the psychological stability of the competition. In addition, the diagnosis of basic psychological characteristics and the establishment of personal psychological files, it is the reference basis for carrying out the subject research, In this regard, we have conducted a relatively comprehensive psychological diagnosis test for all the athletes of the short track speed skating team, on the basis of diagnostic tests, actual training and competition observation, a personal psychological file was established, and the relevant test results were given timely feedback to managers such as coaches and team leaders.[6]

Data Analysis

The author used SPSS 22.0 to analyze the indicators measured before and after the intervention of the research subjects, and used the independent sample T test, the pre-test differences of related test indicators between groups were analyzed, using repeated measures analysis of variance and paired samples T test, the differences between the relevant test indicators in the group before and after the experiment were analyzed, all data were expressed as mean±standard deviation (x+SD), and the final result was expressed as $P<0.05$, which was statistically significant.[7]

There is no need for a code of ethics for this type of study.

RESULTS

As shown in Table 1, in the pre-test, the two groups with exercise level and no exercise level were grouped according to height, weight, 1RM squat, etc., shows that there is no significant difference between the experimental group and the control group in terms of height, weight, years of training, and 1RM squat-related indicators.

Table 2 shows that there is no significant difference in height, weight, years of training, and 1RM squat-related indicators between the experimental group and the control group of athletes without sports grades. Therefore, there is no significant difference between the groups with and without the exercise level, and it will not affect the intervention results.[8]

As shown in Table 3, the CMJ value of the experimental group was 45.63±4.0; The SJ value was 44.70±5.4; the CMJ value of the control group was 46.97±3.9; the SJ value was 45.93±4.3. The P values of CMJ and SJ were respectively obtained as $P=0.796>0.05$ for the experimental group and the control group with exercise level after independent sample T test; $P=0.405>0.05$; P values are all greater than 0.05, it shows that: Before the experiment, there is no significant difference in the explosive power of lower limbs between the experimental group and the control group with exercise level, and the samples are statistically significant. The experimental subjects of the two groups have the experimental intervention conditions, which will not affect the experimental results, and can carry out group intervention reinforcement training.

Through the results of the pre-experiment test, we conducted plyometric training for the experimental group and the control group with exercise levels. After the experimental intervention, four sensitive

Table 1. Pre-test data of the experimental group and the control group with exercise levels.

	test group	control group
	mean ± standard deviation	mean ± standard deviation
height	176. 2±8.04	177.8±10.1
weight	67±5.48	65.1±7. 05
1RM Squat	105.3±13.31	106. 32±11. 56
training years	5.6±1.30	5. 7±1.21

Table 2. The pre-test data of the control group in the experimental group without exercise level (M±SD).

	test group	control group
	mean±standard deviation	mean ± standard deviation
height	175. 2±8.21	175.2±7.82
weight	57±8.40	58±4.51
1RM Squat	89±18.3	90.4±15.79
training years	4.3±0.4	4.5±0.5

Table 3. Comparison of lower extremity explosive power in the experimental group with exercise level and the control group before the test (MS±SD).

test name	test group	control group	T	P
CMJ	45. .63+4.0	46.97±3.9	-0.264	0.896
SJ	44.70±5.4	45.93±4.3	-0.780	0.415

quality-related tests were performed on the two groups for post-test, the results were compared and analyzed, as shown in Figure 1, through repeated measures analysis of variance, there were relative differences between the experimental group and the control group before and after the experiment.

DISCUSSION

In the process of systematically cultivating athletes' mental ability, we pay great attention to the mental fatigue state of athletes' training and competitions, because, ignoring the training and training process of people's mental fatigue state is definitely an inefficient training process. In terms of comprehensive psychological fatigue monitoring and recovery, we explained to athletes the characteristics of high concentration and rapid response in short track speed skating, it not only causes the athletes to produce physical energy consumption, but also a large amount of psychological energy consumption. Therefore, evaluating and promoting mental fatigue recovery is also a very important aspect. According to different training stages, we implemented the systematic monitoring of multi-index parameters. The basic indicators we use are flash fusion value, strength feeling, reaction time, TCM pulse image and tongue coating, self-spiritual feeling and physical strength feeling, etc., weekly changes in these indicators are used to monitor the overall mental and physical fatigue of athletes.[9] We also use the POMS table (ProfileofMoodStates) to monitor and evaluate the main dimensions of the athletes' mental fatigue state, and the monitoring results have a certain correspondence with the training and competition state reflections. In addition, we also use the "Meridian Function Status Diagram" to diagnose and evaluate the athletes' comprehensive function status in stages. When there are obvious symptoms and problems, timely feedback to the coaches and relevant athletes. On the basis of, we also chose to implement the methods related to mental fatigue recovery, such as functional music method, progressive psychological relaxation method, foot specific reflex area massage method, head and neck specific acupoint massage method. For these methods, we use a combination of repeated strengthening and imitation exercises, and produce functional music tapes and progressive psychological relaxation tapes for athletes, as well as massage acupoint maps and professional massage sticks. Through systematic study and application, athletes report good results.

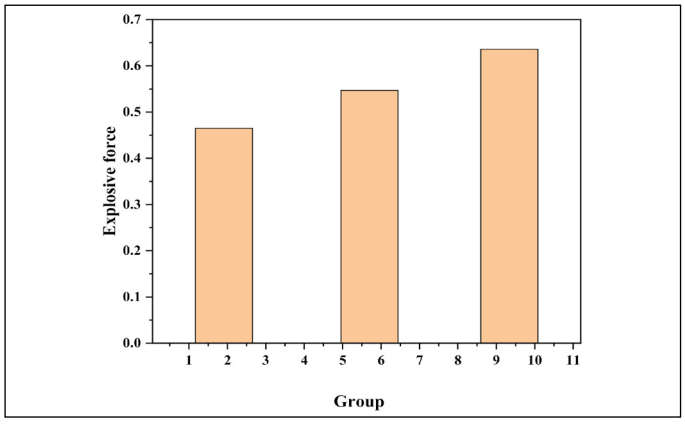

Figure 1. Comparative analysis of sensitivity quality test in the experimental group with exercise level after the experiment.

In order to minimize the unfavorable situation of the athletes involved, it is very necessary to give the athletes external psychological adjustment on the spot. Under the premise of not being able to accompany the team to assist on the spot, after repeated research, we designed and produced a set of multimedia software intended to replace the guidance of on-site psychological experts, installed in an Apple-branded multimedia laptop, let athletes take the application to the Olympics in Japan. The software is divided into two parts: pre-match psychological purification and pre-match psychological adjustment. The function of the psychological purification part is to filter the negative thoughts of athletes, clarify the key link of psychological preparation for the competition, and correct the cognitive processing direction of the competition. It includes 6 major elements of psychological purification, guidance on the best psychological purification procedures, and enhanced tips for the best "spiritual energy--anger, murderous, and domineering" in the competition.[10] The pre-match psychological adjustment part is a guide library for individual targeted psychological adjustment. Each participating athlete can enter his own library, which includes his own best competition experience, special competition tips, self-motivation words, psychological expert guidance words and so on. Athletes can check according to their needs at any time during the competition stage, get adjustments and tips. These measures have played a positive role during the Olympic Games, and all athletes have benefited from them to varying degrees, fully realizing the role and value that laptops can play.

CONCLUSION

Through systematic psychological ability training, it is proved that the competitive psychological stability of short track speed skaters can be cultivated and improved. The author proposes, and has been tested, the content system of psychological ability training to enhance the psychological stability of short track speed skaters participating in the Winter Olympics competition, it has certain feasibility, rationality and reference.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. XG: writing and performing surgeries; JL: data analysis and performing surgeries; YL: article review and intellectual concept of the article.

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