

SYSTEMATIC PHYSICAL TRAINING IN FIGURE SKATING ATHLETES



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TREINAMENTO FÍSICO SISTEMÁTICO EM ATLETAS DE PATINAÇÃO

ENTRENAMIENTO FÍSICO SISTEMÁTICO EN ATLETAS DE PATINAJE

Tao Wang¹ 
(Physical Education Professional)

1. Beijing Information Technology University, Department of Sports, Beijing, China.

Correspondence:

Tao Wang
Beijing, China. 102200.
20151953@bistu.edu.cn

ABSTRACT

Introduction: Youngsters are an important source of reserve strength among short-speed skaters, so it is necessary to perform special strength training for young lower limb muscles while improving athletes' endurance and physical function. **Objective:** Study the systematic development of physical training of speed skating athletes. **Methods:** The author uses the method of experimentation and mathematical statistics, the first level male athletes were selected as experimental objects, and the double-blind test method was used to conduct a comparative study through experiments. **Results:** Statistically, the T-test considerations of the control and experimental groups in the unipodal take-off stand and bilateral sliding jump tests showed statistical differences ($P>0.05$). The comparison of the experimental group pre and post-intervention indicates that the experimental group's performance in this test item increased significantly after training ($P<0.05$). **Conclusion:** The adaptation of the entry-level trainers to the scientific training concept played an auxiliary role in the results by increasing the emphasis on small muscle group training. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Resistance Training; Athletes; Skating.

RESUMO

Introdução: Os jovens são uma importante fonte de força de reserva entre os patinadores de velocidade curta, portanto é necessário realizar um treinamento de força especial para os jovens músculos dos membros inferiores, melhorando ao mesmo tempo a resistência e a função física dos atletas. **Objetivo:** Estudar o desenvolvimento sistemático do treinamento físico dos atletas de patinação de velocidade. **Métodos:** O autor utiliza o método de experimentação e estatística matemática, foram selecionados como objetos experimentais os atletas do primeiro nível masculino, e o método de teste duplo-cego foi utilizado para conduzir um estudo comparativo através de experimentos. **Resultados:** Estatisticamente, as considerações do teste T do grupo de controle e do grupo experimental no suporte de decolagem unipodal e teste bilateral de salto deslizante apresentaram diferença estatística ($P>0,05$). A comparação do grupo experimental pré e pós intervenção indica que o desempenho do grupo experimental neste item de teste aumentou significativamente após o treinamento ($P<0,05$). **Conclusão:** A adaptação dos treinadores de nível básico para o conceito de treinamento científico desempenhou um papel auxiliar nos resultados, aumentando a ênfase no treinamento dos pequenos grupos musculares. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Treinamento de Força; Atletas; Patinação.

RESUMEN

Introducción: Los jóvenes son una importante fuente de reserva de fuerza entre los patinadores de velocidad corta, por lo que es necesario realizar un entrenamiento de fuerza especial para los músculos de las extremidades inferiores de los jóvenes, mejorando al mismo tiempo la resistencia y la función física de los atletas. **Objetivo:** Estudiar el desarrollo sistemático de la preparación física de los atletas de patinaje de velocidad. **Métodos:** El autor utiliza el método de la experimentación y la estadística matemática, se seleccionaron atletas masculinos de primer nivel como objetos experimentales, y se utilizó el método de prueba de doble ciego para realizar un estudio comparativo a través de experimentos. **Resultados:** Estadísticamente, las consideraciones de la prueba T del grupo de control y del grupo experimental en la prueba de despegue unipodal y de salto deslizante bilateral mostraron diferencias estadísticas ($P>0,05$). La comparación del grupo experimental antes y después de la intervención indica que el rendimiento del grupo experimental en este ítem de la prueba aumentó significativamente después del entrenamiento ($P<0,05$). **Conclusión:** La adaptación de los entrenadores de nivel inicial al concepto de entrenamiento científico desempeñó un papel auxiliar en los resultados al aumentar el énfasis en el entrenamiento de los grupos musculares pequeños. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Entrenamiento de Fuerza; Atletas; Patinación.



INTRODUCTION

Young men are an important reserve force among short-track speed skaters, since the competition is an elimination system, it is necessary to carry out special strength training for the small muscles of the lower limbs, while improving the endurance and physical function of athletes, it can exert explosive power in the shortest time, and promote the proportional coordination between the strength of large and small muscle groups, so as to achieve the best sports effect.¹ Therefore, coaches are required to design scientific training methods in training, ensure the training time, gradually increase the difficulty, and ensure that athletes can achieve excellent competition results.²

At present, most of the researches focus on discovering the importance of special lower extremity small muscle group strength in various competitive events, in addition to having special strength that is superior to others, elite athletes also have higher and higher requirements for the strength of the body's small muscle groups and deep muscle groups, this is often the key to determining the outcome of the competition, therefore, according to different training tasks and goals, the strength training of small muscle groups can be carried out in different ways.³ However, domestic scholars and coaches are also actively changing training concepts. Contreras-Muoz P pointed out in "On the Training of Small Muscle Groups for Speed Skaters": Due to the characteristics of speed skating, squatting poses high demands on the small muscle group abilities of speed skaters. The development of the strength of small muscle groups is different from that of large muscle groups, and it is not easy to retrain after the sensitive period of human strength development.⁴ Starting from the research on the special strength quality of short track speed skating, the author uses the evaluation of the indicators and the weights of the indicators to establish a framework for the training of the strength and quality of the special lower extremity small muscle groups. For evaluate the specific lower body strength of the young men's short track speed skaters in Heilongjiang Province on land single event and on ice multiple indicators. Help improve athletes' physical form, master and improve special techniques and tactics, complete heavy-duty training and intense competition, and prolong sports life. Therefore, the correct and true understanding of the training of small muscle groups in the lower body, it has certain practical significance for improving the training level of young men's short track speed skaters.⁵

METHOD

Research object

Special strength training for the small muscle groups of the lower limbs of young short track speed skaters.

Research methods

Documentation method

According to the needs of this experimental research, refer to relevant articles and teaching materials on speed skating strength training and other aspects. The author collected and organized more than 100 literatures related to strength training at the Normal University Library, the Materials Room of the Physical Education College of the Normal University, the Full-text Database of Chinese Academic Journals, and CNKI, and conducted detailed study and analysis.⁶

Experimental Method

The author selected the first-level young men's athletes in the region (a total of 30 people and divided them into two groups on average, 15 athletes in each group, and 20 people in a certain region were divided into two test groups of 10 people each. 10 people in Qiqihar area were divided into two test groups (5 people in each group) as the experimental objects, through experimental comparison research. The number of people in the two groups, the number of training hours (the average

ice period from October to February of the following year, the number of small muscle group training times as the unit, the number of training times 70 ± 2 times, each training time is $30 \text{min} \pm 5 \text{min}$), venue equipment, single training time, etc. remain the same, using a double-blind experimental test method, the athletes in the experimental group were trained in the training plan for the lower extremity major muscle group formulated by the coach, reduce the training content of large muscle groups ($30 \text{min} \pm 5 \text{min}$), and intervene in the strength training plan for lower extremity small muscle group ($30 \text{min} \pm 5 \text{min}$), the training plans for small muscle groups are selected from the training modes formulated in this article, and the author formulates them uniformly.

Mathematical Statistics

The real results obtained by the measurement, the pre-test and post-test results of the experimental group, and the pre-test and post-test results of the control group are compared "horizontally and vertically", and the same treatment is carried out by means of T test, etc., finally, use each test data to list the average of the normal distribution, and use it to tick off the linear indicator graph, which can more critically show the integration of the data and the graph list, and the experimental results can be expressed more clearly.^{7,8}

Ethical Compliance

Research experiments conducted in this article with animals or humans were approved by the Ethical Committee and responsible authorities of Beijing Information Technology University following all guidelines, regulations, legal, and ethical standards as required for humans or animals.

RESULTS

Changes in motor skills of subjects before and after exercise intervention

Figures 1 to 2 are the distribution of the histograms attached to the corresponding digital tables, the test items were pre-tested and post-tested before and after training in the experimental group and the control group, respectively, the horizontal and vertical comparisons are carried out, and the author uses histograms to show the distribution of high points and particle points, so that the test results are not only obvious in data, T value report, and statistics, there is also a more intuitive expression in the image dispersion and imaging after data processing.

Table 1 is in the statistical sense, more specifically, the T-test reflection of the control group and the experimental group in the sitting horizontal pulling training bar test, it can be found that there is no significant difference between the control group before and after $P=0.8068P>0.05$, the comparison of the experimental group before and after $P=0.0171P<0.05$, indicating that the experimental group's performance in this item has increased significantly after training.

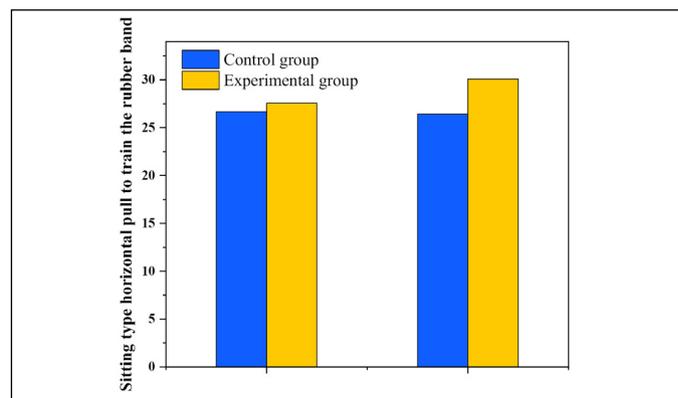


Figure 1. Histogram of comparison of rubber bands in seated horizontal pulling training on land.

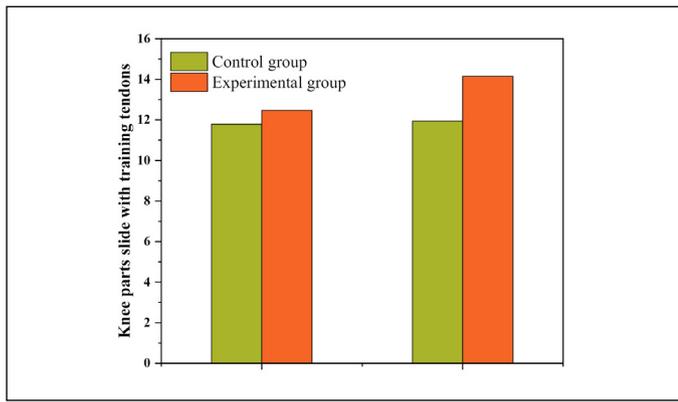


Figure 2. Histogram of the sliding imitation of the knee attached to the training bar on the land part.

Table 1. T-test comparison of the horizontal and vertical normal values of the front and rear sides of the experimental group and the control group.

	Normally distributed values (before/after)	t value
Comparison of the front and back of the control group	27±4/28±6	P=0.807 p>0.05
The comparison of the front and back of the experimental group	25±7/29±4	P=0.017 p<0.05
Comparison of the back side of the control group and the experimental group	28±6/29±4	P=0.707 p>0.05

Table 2, in a statistical sense, more specifically describes the T-test reflections of the control group and the experimental group on the single-leg take-off support followed by the bilateral sliding jump test, it can be found that there is no significant difference between $P=0.3511$ $P>0.05$ before and after the control group, and $P=0.0061$ $P<0.05$ before and after the experimental group, indicating that the performance of the experimental group after training has increased significantly in this test item, finally, the comparison between the back of the control group and the back of the experimental group $P=0.01376$ $P<0.05$ also shows that through the training of the small muscles of the lower limbs, the performance of the experimental group has a significant increase in comparison with the performance of the control group after training.

DISCUSSION

In the process of youth short track speed skating training, we have certain research and countermeasures for special muscle group strength training, which is worthy of recognition in terms of general training concepts and teaching technical skills, however, under the general trend of the rapid development of short track speed skating, the training methods and means

Table 2. T-test comparison of the horizontal and vertical normal values of the front and rear sides of the experimental group and the control group.

	Normally distributed values (before/after)	t value
Comparison of the front and back of the control group	7±2/7±1	P=0.351 p>0.05
The comparison of the front and back of the experimental group	6±3/9±2	P=0.006 p<0.05

of local grassroots sports teams need to be studied.⁹ In the daily training of the control group before and after the training of the land part of the test item, there is basically no training method involving the training of relevant muscle groups.¹⁰ After 70 ± 2 small muscle group training interventions, the experimental group's performance in the above land test items was significantly improved, this test training item is closely related to the general lower extremity small muscle group land training and the ice special lower extremity small muscle group training, which is very important for the improvement of the athletes' special ability. In the ice test part, the 10 laps on the ice, 11 seconds, 5 glides, and 20 laps are all tests for the quality of the skates after the athletes are fatigued, the test results reflect that under the condition of 70 ± 2 lower extremity small muscle group training sessions in the experimental group, both the special ability on the ice and the maintenance of the ice kick effect after fatigue were significantly improved.

CONCLUSION

The importance that each athlete attaches to each training session, that is, the training emotion and the corresponding training effect expressed in the training session are directly related to whether the training session can be fully implemented, through reasonable training plan adjustment and the coach's language intervention ability, athletes can actively participate in the training with their own subjective initiative, and the training mood can reach an unprecedented high. The test items reflect the ability of athletes to maintain technical skills when they are fatigued, although the training effect of the control group according to the traditional training method is also worthy of recognition, we will find that the post-training test results of the control group and the experimental group have been tested by T-test, there is a significant difference in the P value, this shows that through the training of special small muscle groups of the lower limbs, the special sports ability and performance of athletes have been improved, it is recommended to use more relevant small muscle group training methods and means to improve the sports ability of athletes.

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

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REFERENCES

- Jong E, Sanders K, Deist TM, van Elmpt W, Jochems A, van Timmeren JE, et al. Can radiomics help to predict skeletal muscle response to chemotherapy in stage IV non-small cell lung cancer?. *Eur J Cancer*. 2019;120:107-13.
- Wei F, Fukuchi M, Ito K, Sakata K, Asakura T, Date Y, et al. Large-Scale Evaluation of Major Soluble Macromolecular Components of Fish Muscle from a Conventional 1H-NMR Spectral Database. *Molecules*. 2020;25(8):1966.
- Murphy KT, Mckellar SR, Schoenfeld BJ, Henselmans M, Helms E, Aragon AA, et al. Infographic. The effect of protein supplementation on resistance training-induced gains in muscle mass and strength. *Br J Sports Med*. 2019;53(24):bjsports-2019-100990.
- Contreras-Muoz P, Torrella JR, Venegas V, Serres X, Vidal L, Vila I, et al. Muscle Precursor Cells Enhance Functional Muscle Recovery and Show Synergistic Effects With Postinjury Treadmill Exercise in a Muscle Injury Model in Rats. *Am J Sports Med*. 2021;49(4):1073-85.
- Dongen M, Smeulders D. Ice speed skating: Onset of lubrication by frictional heating. *EPL*. 2021;134(3):34005.
- Ichinose G, Miyagawa D, Ito J, Masuda N. Winning by hiding behind others: An analysis of speed skating data. *PLoS ONE*. 2020;15(8):e0237470.
- Nijenhuis B, van der Eb K, Tijssen M. Undiagnosed movement disorder in speed skating: a possible form of task specific dystonia. *ISBS Proceedings*. 2019;37(1):28.
- Chen J, Xu K, Ding X. Roller-Skating of Mammalian Quadrupedal Robot with Passive Wheels Inspired by Human. *IEEE ASME Trans Mechatron*. 2020;26(3):1624-34.
- Stagsted R, Ramari C, Skjerbaek AG, Thruce C, Dalgas U, Hvid LG. Lower extremity muscle power – A critical determinant of physical function in aging and multiple sclerosis. *Exp Gerontol*. 2021;150(14):111347.
- De Vroey H, Staes F, Vereecke E, Vanrenterghem J, Deklerck J, Van Damme G, et al. Lower extremity gait kinematics outcomes after knee replacement demonstrate arthroplasty-specific differences between unicompartmental and total knee arthroplasty: A pilot study. *Gait Posture*. 2019;73:299-304.