EFFECTS OF VARIABLE EXERCISE ON STRENGTH TRAINING IN THROWING ATHLETES

EFEITOS DO EXERCÍCIO VARIÁVEL NO TREINAMENTO DE FORÇA EM PRATICANTES DE ARREMESSO

EFECTOS DEL EJERCICIO VARIABLE EN EL ENTRENAMIENTO DE FUERZA EN PRACTICANTES DE LANZAMIENTO

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ABSTRACT

Introduction: Throwing is a physical phenomenon with its base resistance and speed, demanding the high explosive force of its practitioners. Objective: Observe the implications of exercise with speed and variable load on the explosive strength training of throwing practitioners. Methods: The author uses scientific literature to execute an experiment on throwing techniques, dividing 24 athletes randomly into control and experimental groups. Variations of discus weight and throwing distances were applied in the groups. The results were compared in SPSS and Excel to perform the corresponding statistical processing. Results: The athletes showed throwing performance with an increasing trend, but not evident enough among the control group. The increase in the experimental group was evident compared to the performance before the experiment. Conclusion: Training with variable speed and variable load exercises positively affects strength training in throwing events. It is recommended to perform variable speed and variable load exercises for athletes in throwing practitioners. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Physical Education and Training; Exercise Program, Weight-Bearing; Track and Field.

RESUMO

Introdução: O arremesso é um fenômeno físico que tem como base a resistência e a velocidade, exigindo elevada força explosiva corporal de seus praticantes. Objetivo: Observar as implicações do exercício com velocidade e carga variável no treinamento de força explosiva dos praticantes de arremesso. Métodos: O autor utiliza embasamento na literatura científica para executar um experimento de técnicas de arremesso esportivo, dividindo 24 atletas aleatoriamente em grupos controle e experimental. Variações de peso dos discos e distâncias de lançamento foram aplicadas nos grupos e a comparação dos resultados foi executada no software SPSS e Excel para realizar o processamento estatístico correspondente. Resultados: Os atletas apresentaram desempenho de lançamento com uma tendência crescente, mas não suficiente evidente entre o grupo controle. Comparado ao desempenho prévio do experimento, o aumento do grupo experimental foi evidenciado. Conclusão: O treinamento com exercícios de velocidade variável e carga variável tem um efeito positivo no treinamento de força em eventos de arremesso, é recomendado realizar exercícios de velocidade variável e carga variável para atletas em praticantes de arremesso. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

***Descritores*:** *Educação Física e Treinamento; Programa de Fortalecimento por Carga de Peso; Atletismo.*

RESUMEN

Introducción: El lanzamiento es un fenómeno físico que tiene como base la resistencia y la velocidad, exigiendo una alta fuerza corporal explosiva de sus practicantes. Objetivo: Observar las implicaciones del ejercicio con velocidad y carga variable en el entrenamiento de la fuerza explosiva de los lanzadores. Métodos: El autor utiliza la literatura científica para ejecutar un experimento de técnicas de lanzamiento, dividiendo a 24 atletas al azar en grupos de control y experimental. Se aplicaron variaciones de peso de los discos y distancias de lanzamiento en los grupos y la comparación de los resultados se ejecutó en el software SPSS y Excel para realizar el correspondiente tratamiento estadístico. Resultados: Los atletas mostraron un rendimiento de lanzamiento con una tendencia al alza, pero no es suficientemente evidente entre el grupo de control. En comparación con el rendimiento anterior al experimento, se evidenció el aumento en el grupo experimental. Conclusión: El entrenamiento con ejercicios de velocidad variable y carga variable tiene un efecto positivo en el entrenamiento de la fuerza en las pruebas de lanzamiento, se recomienda la realización de ejercicios de velocidad variable y carga variable para los atletas en las prácticas de lanzamiento. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

***Descriptores*:** *Educación y Entrenamiento Físico; Programa de Fortalecimiento Levantando Peso; Atletismo.*

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INTRODUCTION

The throwing event is a physical-dominant speed-strength event with strength as the foundation and speed as the core. Throwers can effectively improve their ability to maintain body balance through systematic core strength training, and the ability to control their own actions.[1] The strength of core strength directly affects the body posture, limb coordination and stable performance of technical movements during the completion of technical movements, and is also one of the important factors affecting sports performance.[2] From the technical action characteristics of throwing events, the role of core strength in throwing events and the specific core strength training methods and means of throwing athletes, and based on core strength training theory and elements of core strength training, the analysis and research are closely combined with the throwing technology itself.[3]

The characteristics and advantages of variable-speed variable-load muscle strength training are strong contraction training throughout the range of motion of the joint, which has the same characteristics as isokinetic contraction training. In addition, variable-speed and variable-load muscle strength training, even if the muscle fatigue caused by lactic acid production reduces the muscle strength and movement speed that the trainee can exert, the training load and training speed can also be adjusted accordingly, so as long as the trainer continues to train, the most suitable training conditions can always be maintained.[4] Variable speed variable load muscle strength training is both "variable speed", at the same time, it is also a "variable load" training, variable-speed variable load muscle strength training will not impose any restrictions on the patient, instead, it reproduces a more natural movement environment for patients, and provides continuous strong contraction and high-frequency training conditions within the entire range of joint movement.[5] It is both safe and effective; a strength training system that enhances both "muscle strength" and "muscular endurance". The advantages of isokinetic training: The movement speed is relatively stable, and there is no accelerated movement; Every point in the range of motion of the joint can provide the appropriate resistance to the muscles, so that the muscles can maintain the proper tension and contraction force; Maintain the balance of tension and contraction force, so that the muscle can be fully contracted, and the muscle strength can be better enhanced.[6] Isokinetic training can provide a kind of compliant resistance according to muscle strength, muscle length change, moment arm length, pain and fatigue, etc., so that muscles always bear the maximum resistance in the entire range of activities, and generate maximum muscle strength, thereby improving. training efficiency.[7] Disadvantages of isokinetic training: It must use more expensive isokinetic equipment, which is not suitable for popularization; It takes a lot of time to train; The therapist needs to spend a certain amount of time on the training of the use of the equipment.[8]

VVR is variable speed and variable load, this system is a knee joint measurement and training system with the functions of measurement, training and evaluation of muscle strength and muscle endurance. The structural features of this instrument are the rotation resistance and training speed of the support, which will change according to the magnitude of the force acting on the support.[9] Variable-speed variable-load muscle strength training is not only "variable speed", but also "variable load" training, the author studies the effect of variable-speed variable-load exercise training on the strength training of throwing events through variable-speed variable-load muscle strength training.

METHOD

Documentation method

Through CNKI, I checked the world records of the world men's and women's discus in recent years, at the same time, the best results of the men's and women's year in my country were checked, and consulted relevant journals, newspapers, textbooks, Baidu Encyclopedia and excellent master's thesis, etc., these theories and literatures related to the training mode of throwing technique of discus athletes are analyzed. Understand the relevant knowledge and current situation.

Experimental method

Through the comparison of experiments, the understanding of sports throwing technology, and the application and realization of the comparative research on the existing technical problems and the status quo, so as to reduce the training error and scientifically guide the training.

Mathematical Statistics

For the relevant data obtained from the experiment, use Excel software to carry out corresponding statistical processing, and be used for the analysis and demonstration of this research after being reviewed by experts, so as to provide a theoretical basis for the writing of the paper.[10]

Experimental subjects

Subjects: 12 male discus athletes and 12 female discus athletes. Status of athletes: 4 men's discus athletes with a performance of about 25 meters, 4 men's discus athletes with a performance of about 34 meters, and 4 men's discus athletes with a performance of about 45 meters. There are 4 women discus athletes with a score of about 27 meters, 4 women discus athletes with a score of about 35 meters, and 4 women discus athletes with a score of about 47 meters.

Ethical Compliance

Research experiments conducted in this article with animals or humans were approved by the Ethical Committee and responsible authorities of Department of Sports, Zhengzhou Preschool Education College following all guidelines, regulations, legal, and ethical standards as required for humans or animals.

RESULTS

Comparing the scores of the control group (group A) and the experimental group (group B) after the experiment, using SPSS software to construct the graphs in Figure 1 and Figure 2.

12 athletes in the control group (group A) and 12 athletes in the experimental group (group B), the sports performance after different trainings was compared, and the throwing performance of the control group (group A) before and after training was compared, there is an upward trend but not obvious. The final results measured before and after the experiment in the experimental group (group B) using auxiliary training showed that, there is an obvious upward trend, and the scores before the experiment have risen significantly. Under the condition that the throwing performance of the control group (group A) was much higher than that of the experimental group (group B) before the experiment, different training methods were

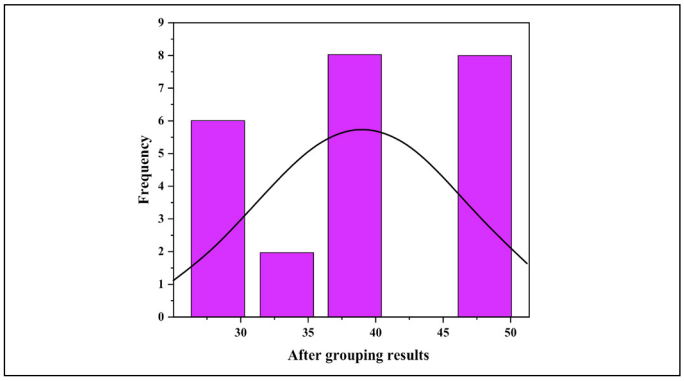

Figure 1. Histogram of the performance data of the two groups of AB athletes after grouping.

used, there are some changes in the performance of the discus throwing athletes in the two groups before the experiment, according to the statistical analysis of the SPSS data, it can be seen that, there is a clear upward trend in the performance of the athletes in the experimental group (group B), there is a significant difference in the paired sample data between the two groups, and compared with the control group (group A) after the experiment, the experimental group (group B) has obvious advantages, the specific values are shown in Table 1 and Table 2.

DISCUSSION

The core area of the human body reinforces the various technical movements of the body during exercise. The stronger the core strength and stability, the stronger the acceleration ability of the limbs. In throwing techniques, excellent results can only be achieved under the conditions of effective and coordinated force. Throwing events include slides and spins of shot put, discus and hammer; The straight-line acceleration of the javelin, the turning of the throwing step and the final force technology, the time required to complete the whole set of actions is extremely short, however, it puts forward extremely high requirements on the ability of the athletes to quickly coordinate the work of the muscles of the whole body, it is emphasized that the equipment is thrown at the fastest speed under the premise of actively coordinating and coordinating the muscles of the whole body. In the extremely short throwing process, athletes should reduce energy consumption and improve work efficiency. This requires the throwing athletes to have strong core strength to ensure the stability and balance of the body during the entire exercise process, and to better transmit power and exert overall force. Therefore, in the whole exercise process, the core strength plays a vital role in adjusting the posture, maintaining the balance and stability of the trunk and improving the speed of the shot.

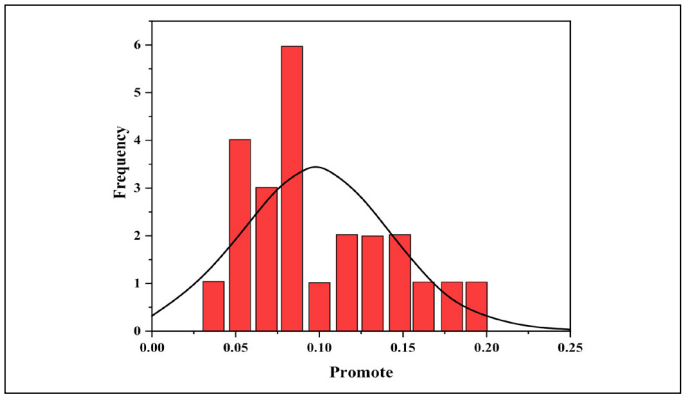

Figure 2. The histogram of the percentage data of the overall performance improvement of the athletes in the two groups of AB.

Table 1. Overall values.

Group	N	Mean	Std.Deviation	Std.Error Mean
Group A	12	0.0551	0.0178	0.0051
Group B	12	0.1244	0.0401	0.0116

CONCLUSION

The range of motion and acceleration ability of the athlete's final exertion have a certain influence on the final athletic performance. Throwing and twisting techniques should have a suitable speed rhythm to highlight the individuality of the technical movements. In the final exertion stage, the center of gravity of the athlete will have different ups and downs, but the degree of ups and downs is not very obvious, and it has little effect on sports performance. Theoretical in-depth understanding of core strength and the meaning of core strength training, a correct understanding of the definition of core strength and the methods and means of training, and correcting the position of core training in the overall training of the project, can effectively play the role of core strength training. Although there has been research on the performance improvement of core strength training in throwing athletes in recent years, there is still not enough research on the experimental application, this is also a problem facing scholars and coaches, and it is necessary to continuously explore and improve in future theory and practice for in-depth research.

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

Table 2. Independent sample T test of group AB.

F		Levene,s Test for Equality of Variances		t-test for Equality of Means						
		Sig.	t	df	Sig.(2-tailed	Mean Difference	Std. Error Difference	95%Confidence Interval of the Difference		
								Lower	Upper	
Promote	Equal	4.97	.03	-5.47	22	.000	-.06927	.01265	-.09550	-.04304
	Variances	4	6	6						
	Assumed									
	Equal			-5.47	15.1	.000	-.06927	.01265	-.09620	-.04233
	Variances			6	71					
	Not									
	Assumed									

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