

INFLUENCE OF UPPER BODY STRETCHING EXERCISES ON SHOT PUT



ORIGINAL ARTICLE
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INFLUÊNCIA DOS EXERCÍCIOS DE ALONGAMENTO DA PARTE SUPERIOR DO CORPO NO ARREMESSO DE PESO

INFLUENCIA DE LOS EJERCICIOS DE ESTIRAMIENTO DE LA PARTE SUPERIOR DEL CUERPO EN EL LANZAMIENTO DE PESO

Yusong Teng¹
(Physical Education Professional)
Anyu Chen¹
(Physical Education Professional)
Zhaoyu Xie¹
(Physical Education Professional)
Jiahe Zhang¹
(Physical Education Professional)
Wei Liu¹
(Physical Education Professional)

1. Liaoning Normal University,
Dalian, China.

Correspondence:

Wei Liu
Dalian, China. 116029.
lwslw188@163.com

ABSTRACT

Introduction: The technique in the shot put and the ability in the throwing stage are two important factors that determine the ability of athletes. Qualified experts and coaches attach great importance to training and research on the ability of the throwing stage and the ability to throw. **Objective:** Compare gravity load training and single incremental load training through practical means, analyzing the impacts on throwing ability in athletes. **Methods:** The self-assessment method was used to conduct the comparative experiment on different forms of strength training in 20 college students. The experimental scheme adopts the single incremental load strength training, and the control scheme adopts the traditional barbell training. **Results:** After the experiment, the hand angle of group I was significantly higher than that of group II ($P < 0.05$); after the experiment, the shoulder angle of group I was significantly higher than that of group II ($P < 0.05$); after the experiment, the performance of the seated shot placed in group I was significantly higher than that of group II ($P < 0.05$), and there was no significant difference in the standing performance ($P > 0.05$). **Conclusion:** Single incremental load training can significantly improve the throwing ability of shot put athletes. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Upper limb; Intensive; Exercises.

RESUMO

Introdução: A técnica no arremesso de peso e a habilidade na etapa de arremessar são dois fatores importantes que determinam a habilidade dos atletas. Especialistas e treinadores qualificados atribuem grande importância ao treinamento e pesquisa sobre a habilidade da fase de arremesso e a capacidade de arremessar. **Objetivo:** Comparar o treinamento com carga gravitacional e o treinamento com carga incremental única através de meios experimentais, analisando os impactos na habilidade de arremesso nos atletas. **Métodos:** O método de auto-avaliação foi usado para realizar o experimento comparativo de diferentes formas de treinamento de força em 20 estudantes universitários. O esquema experimental adota o treinamento único de força de carga incremental, e o esquema de controle adota o treinamento tradicional de barra. **Resultados:** Após o experimento, o ângulo da mão do grupo I foi significativamente maior do que o do grupo II ($P < 0,05$); após o experimento, o ângulo do ombro do grupo I foi significativamente maior do que o do grupo II ($P < 0,05$); após o experimento, o desempenho do tiro sentado colocado no grupo I foi significativamente maior do que o do grupo II ($P < 0,05$), e não houve diferença significativa no desempenho em pé ($P > 0,05$). **Conclusão:** O treinamento com carga incremental única pode melhorar significativamente a capacidade de arremesso dos atletas de arremesso de peso. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Membro superior; Intensivo; Exercícios.

RESUMEN

Introducción: La técnica en el lanzamiento de peso y la habilidad en la fase de lanzamiento son dos factores importantes que determinan la habilidad de los atletas. Los especialistas y entrenadores cualificados atribuyen gran importancia a la formación y a la investigación sobre la habilidad de la fase de lanzamiento y la habilidad de lanzamiento. **Objetivo:** Comparar el entrenamiento con carga gravitacional y el entrenamiento con carga incremental única a través de medios experimentales, analizando los impactos en la capacidad de lanzamiento en los atletas. **Métodos:** Se utilizó el método de autoevaluación para realizar el experimento comparativo de diferentes formas de entrenamiento de fuerza en 20 estudiantes universitarios. El esquema experimental adopta el entrenamiento de fuerza con una sola carga incremental, y el esquema de control adopta el entrenamiento tradicional con barra. **Resultados:** Después del experimento, el ángulo de la mano del grupo I fue significativamente mayor que el del grupo II ($P < 0,05$); después del experimento, el ángulo del hombro del grupo I fue significativamente mayor que el del grupo II ($P < 0,05$); después del experimento, el rendimiento del lanzamiento de peso sentado del grupo I fue significativamente mayor que el del grupo II ($P < 0,05$), y no hubo diferencias significativas en el rendimiento de pie ($P > 0,05$). **Conclusión:** El entrenamiento con una sola carga incremental puede mejorar significativamente la capacidad de lanzamiento de los atletas de lanzamiento de peso. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: Miembro superior; Intensivo; Ejercicios.



INTRODUCTION

As a competitive sport, shot put has a history of more than 100 years. The change of shot put technology runs through its historical development. On the whole, shot put technology has experienced several stages: initial technical pad step shot, half back sliding step shot, back sliding step shot, back sliding step shot and rotary shot put.¹ From the initial American athlete Ross's achievement of 15.54 meters in lateral sliding shot put to the holder of the modern shot put world record, American Barnes achieved an excellent achievement of 23.12 meters by using the rotary throw technology. The shot put technology has experienced the development trend of single polarization before the 1970s to the development trend of multi polarization after the 1970s. The reason is that the academic and training circles have played a vital role in improving the understanding of shot put technology.² At present, all scholars and coaches agree that the final effort plays an important role in improving the performance of shot put, and more and more recognize that "surpassing equipment" is one of the most important technologies in throwing events.³ We usually divide the final exertion stage into two different action structure processes: from the support stage of both feet to the moment of "full bow" and from "full bow" to the release of shot put, that is, the preparation and acceleration of the final exertion of shot put.

METHOD

Subjects

The research object of this experiment is 50 male college students in ordinary universities. The students have good physical function and no disease. They did not carry out heavy load and high-intensity physical exercise the day before the experiment.⁴ The experiment was carried out by self-comparison. The basic information of students is shown in Table 1.

Research methods

Documentation method

Through the use of manual access and Internet access in the university database and electronic reading room, I consulted the relevant Chinese and foreign periodicals, as well as the sports textbooks and reference books in the Haida library.⁵ Through careful analysis and research, this paper aims to understand the current situation and development trend of shot put strength and technical training at home and abroad, and provide strong theoretical support for this study.

Mathematical statistics

SPSS 170 statistical software was used to process the data before and after the experiment of scheme 1 and scheme 2.

Experimental method

This experiment is the real-time effect of intensive exercise at the end of upper limb extension on shot put skill and throwing ability. The experiment adopts self comparison. The experimental content is divided into two parts. The first part of the experimental content (scheme 1) is the intensive exercise at the end of upper limb extension, and the second part is the barbell bench press exercise (scheme 2).⁶ The specific experimental steps are as follows:

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- a. Before the practice, all subjects put the shot on the chair and stand against the wall. The whole test process was recorded by high-speed camera, and the subjects' shot putting results were recorded.

Table 1. Basic information of students.

N	Age	Height	Weight
50	19.6±3.8	175.4±5.4	72.8±5.1

b. First, carry out scheme 1, that is, intensive exercise at the end of upper limb extension. This training method is characterized by using high elastic rubber belt as incremental load for training. During practice, one end of the elastic belt is fixed at the lower part of the slope, and the athlete holds the other end of the high elastic rubber belt and pulls it forward and upward. As the tape is elongated, the load gradually increases until the athlete fully stretches his shoulder, the athlete's upper limbs stand still, and fully experience the stimulation of large load and the feeling of fully extending his shoulder. The load when the high elastic rubber belt is stretched is 200N measured by the tension meter. The experiment is carried out for 6 times in each group, with a total of 5 groups. After completion, the subjects immediately push the solid ball in place.⁷

The results of the two groups of athletes were tested by sitting and standing on the chair and leaning against the wall. The effects of intensive exercises at the end of upper limb extension on shot putting ability and shooting skills were observed. At the same time, the whole process was recorded by high-speed camera.

c. Then carry out scheme 2, namely barbell bench press training. The subjects carried out the barbell bench press. The barbell load of bench press was 30kg. Each group did 5 bench presses, a total of 4 groups. After completion, the subjects immediately carried out the solid ball in-situ push.

The results of the two groups of athletes were tested by sitting on the chair and standing against the wall. At the same time, the whole process was recorded by high-speed camera.

The interval between the two experiments was four days, during which the subjects did not do strenuous exercise, so as to ensure complete rest.

Steps a,b and c are a complete training process. This experiment is a short-term intensive training. Therefore, in order to prove that the data generated in the experiment are not accidental, the repeatability test of the results is carried out. After the two-part experiment, repeat the above experiment again at an interval of one week to determine the repeatability and reliability of the experimental results.

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

RESULTS

Release angle

As can be seen from Figure 1, the results of scheme I and scheme II after the experiment are compared. The hand angle of scheme I after the experiment is 36.90 °, and that of scheme II after the experiment is 31.20 °. Through the t-test of two independent samples, P < 0.05, it shows that there is a significant difference between the release angle after the experiment of scheme 1 and the release angle after the experiment of scheme 2, which shows that the release technology

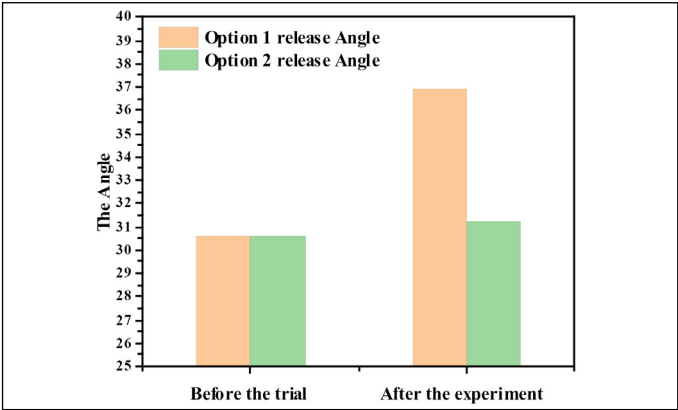


Figure 1. Shot Angle of shot putting before and after the two experimental schemes.

after the experiment of scheme 1 is significantly better than the result after the experiment of scheme 2, and the training method of one-time incremental load has a better effect on the learning of throwing technology.⁸

As can be seen from Figure 1, the results of scheme I and scheme II after the experiment are compared. The hand angle of scheme I after the experiment is 36.90°, and that of scheme II after the experiment is 31.20°. Through the t-test of two independent samples, $P < 0.05$, it shows that there is a significant difference between the release angle after the experiment of scheme 1 and the release angle after the experiment of scheme 2, which shows that the release technology after the experiment of scheme 1 is significantly better than the result after the experiment of scheme 2, and the training method of one-time incremental load has a better effect on the learning of throwing technology.⁸

Shoulder angle

According to the comparison between scheme I and scheme II after the experiment, it can be seen from Figure 2 that the shoulder angle after scheme I training is 141.40°, and that after scheme II training is 132.20°, after statistical analysis, $P < 0.05$. The difference between scheme 1 and scheme 2 after the experiment is very significant, which shows that scheme 1 is better than scheme 2 using gravity load exercise method in improving the level of shoulder angle and promoting the improvement of shoulder extension ability.

Shot put performance

It can be seen from Figure 3 that the difference between the results of scheme I and scheme II is very obvious. The independent sample t-test shows that there is a significant difference between the throwing results of scheme I and scheme II after the experiment. The experiment shows that the one-time incremental load training method adopted

in scheme I is better than the gravity load training method adopted in scheme II in improving the performance of shot put.

It can be seen from Figure 4 that there is no significant difference in the results of standing leaning against the wall throwing after training in scheme I and scheme II. Independent sample t-test, $P > 0.05$.

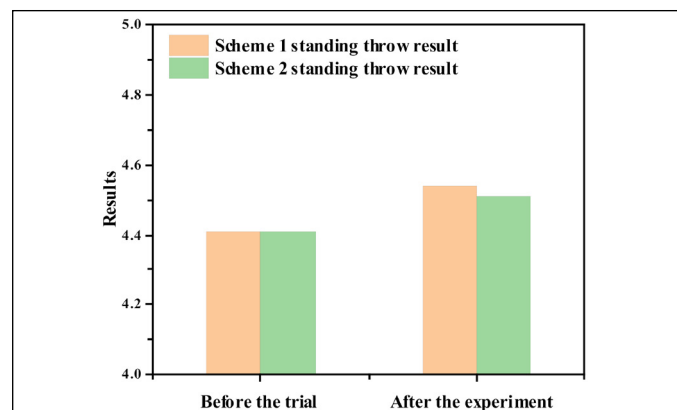


Figure 4. Results of standing shot put before and after the two experimental schemes.

DISCUSSION

Acharjya, D. P. believe that there are two reasons for the occurrence of sports migration. One is that different sports skills have similarities in the composition of skills and situations, and the other is that they have similarities in demand procedures.⁹ Dér proposed that the reason why general strength training can not promote skill transfer well is that the action structure and demand procedure of general strength training are not highly similar to special actions.¹⁰ According to the theory of exercise learning and control, the incremental load is adopted in scheme 1, and the load is increasing and is a large load. Through the continuous stimulation of the upper arm muscle group, the white muscle fiber dimension of the subjects' shoulder extensor muscle group, elbow extensor muscle group and wrist flexor muscle group can be mobilized. At the same time, the use of this high-intensity stimulation can increase the memory effect of upper limb muscle force feeling in the cerebral cortex, and make this memory effect consolidated and maintained in the cerebral cortex for a long time. Then, combined with the unarmed training, the memory effect can be transferred to the unarmed training, so as to ensure that the upper limb muscles actively stretch their shoulders, actively stretch their elbows and bend their wrists, so as to form the technology of large forward inclination of the body trunk and reasonable hand angle and shoulder angle level.

CONCLUSION

There is a phenomenon of insufficient muscle strength at the end of upper limb extension. The gravity load training method can not increase the load at the end of force, and can not solve the problem of insufficient force at the end of force; The one-time incremental load training method can solve the problem of insufficient load at the end of force, give high-intensity stimulation to the muscles at the end of force, mobilize fast muscle fibers, promote the effect of movement migration, increase the muscle level of upper limb at the end of force, and solve the problem of insufficient force at the end of upper limb. The use of gravity strength practice has no obvious effect on promoting the formation of scientific shoulder angle and hand angle; The use of one-time incremental load training for intensive training can form a reasonable shoulder angle and hand angle.

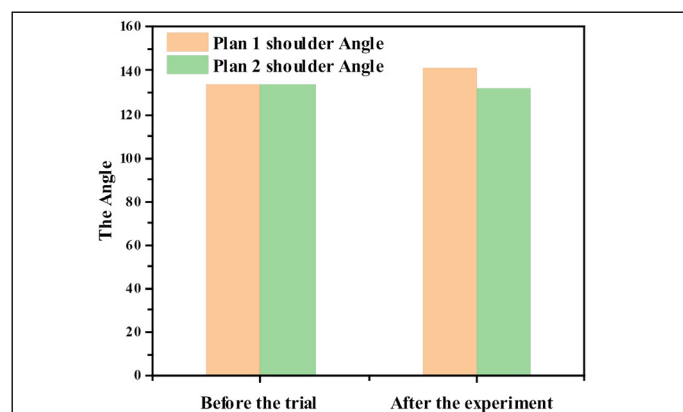


Figure 2. Included Angle between hind limbs and trunk before experiment of the two experimental schemes.

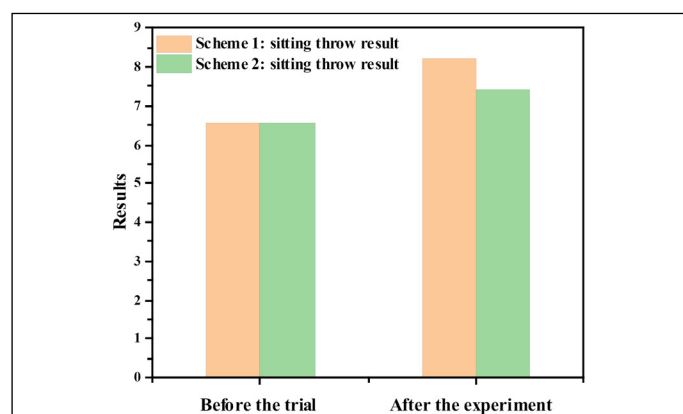


Figure 3. Results of sitting shot put before and after the two experimental schemes.

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

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