

EFFECTS OF COMPOUND TRAINING ON MOTRICITY AMONG BASKETBALL PLAYERS



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EFEITOS DE TREINAMENTO COMPOSTO SOBRE A MOTRICIDADE ENTRE JOGADORES DE BASQUETE

EFFECTOS DEL ENTRENAMIENTO COMPUESTO EN LA MOTRICIDAD DE JUGADORES DE BALONCESTO

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ABSTRACT

Introduction: In kinematics, one can measure the strength of movement ability by the time it takes to move a certain distance and the speed of movement of a person by the speed of displacement. **Objective:** To study the effect of compound training on the mobility of basketball players. **Methods:** A comparative experimental study was carried out on the sensitivity of basketball players, lasting 8 weeks. There were 30 basketball-playing volunteers randomly divided into two groups, while the control group performed routine activities. The control group implemented a training protocol composed of a ladder and ropes allied to conventional training. **Results:** After the experiment, the technical level of motricity in the control group and the experimental group showed differences over the result before the experiment ($P < 0.05$), and the experimental group showed a very significant difference ($P < 0.01$), improving their performance after the experiment. There are significant differences in the effects of different sensitivity training methods, the experimental group using rope ladder training methods greatly improved their foot agility and motor skill. **Conclusion:** Composite training involving a ladder and rope has a superior effect on the development of motor skill, ability, and foot agility in basketball players. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Basketball; Physical Education and Training; Foot.

RESUMO

Introdução: Na cinemática, pode-se medir a força de capacidade de movimentação pelo tempo que se leva para mover a uma certa distância e a velocidade de movimentação de uma pessoa pela velocidade de deslocamento. **Objetivo:** Estudar o efeito do treinamento composto sobre a mobilidade dos jogadores de basquetebol. **Métodos:** Efetuou-se um estudo experimental comparativo sobre a sensibilidade de jogadores de basquetebol com duração de 8 semanas. Foram 30 voluntários praticantes de basquete divididos aleatoriamente em dois grupos, enquanto o controle realizava as atividades rotineiras, ao grupo controle foi implementado um protocolo de treinamento composto por escada e cordas aliado ao treino convencional. **Resultados:** Após o experimento, o nível técnico da motricidade no grupo controle e no grupo experimental apresentou diferenças sobre o resultado prévio ao experimento ($P < 0,05$), o grupo experimental mostrou uma diferença muito significativa ($P < 0,01$), melhorando sua performance após o experimento. Há diferenças significativas nos efeitos dos diferentes métodos de treinamento de sensibilidade, o grupo experimental usando métodos de treinamento com escada de corda melhorou muito a agilidade dos pés e a sua habilidade motora. **Conclusão:** O treinamento composto envolvendo escada e corda tem um efeito superior no desenvolvimento da motricidade, habilidade e agilidade nos pés dos jogadores de basquete. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Basquetebol; Educação Física e Treinamento; Pé.

RESUMEN

Introducción: En cinemática, se puede medir la fuerza de la capacidad de movimiento por el tiempo que se tarda en desplazarse una determinada distancia y la velocidad de movimiento de una persona por la velocidad de desplazamiento. **Objetivo:** Estudiar el efecto del entrenamiento compuesto sobre la movilidad de los jugadores de baloncesto. **Métodos:** Se realizó un estudio experimental comparativo sobre la sensibilidad de los jugadores de baloncesto con una duración de 8 semanas. Fueron 30 voluntarios jugadores de baloncesto divididos aleatoriamente en dos grupos, mientras que el de control realizó actividades rutinarias, al grupo de control se le aplicó un protocolo de entrenamiento compuesto por escalera y cuerdas aliadas al entrenamiento convencional. **Resultados:** Después del experimento, el nivel técnico de motricidad en el grupo de control y en el grupo experimental mostró diferencias respecto al resultado anterior al experimento ($P < 0,05$), el grupo experimental mostró una diferencia muy significativa ($P < 0,01$), mejorando su rendimiento después del experimento. Existen diferencias significativas en los efectos de los distintos métodos de entrenamiento de la sensibilidad, el grupo experimental que utilizó métodos de entrenamiento de la escalera de cuerda mejoró enormemente su agilidad del pie y su habilidad motriz. **Conclusión:** El entrenamiento compuesto con escalera y cuerda tiene un efecto superior en el desarrollo de la motricidad, la habilidad y la agilidad del pie en los jugadores de baloncesto. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptorios: Baloncesto; Educación y Entrenamiento Físico; Pie.



INTRODUCTION

In kinematics, people measure the strength of their moving ability by the length of time it takes to move a certain distance, or measure the speed of a person's movement by moving speed. The level of speed quality of an athlete is restricted and influenced by the percentage of fast twitch fibers in the muscle tissue.¹ The selection of relevant volleyball training movements or the formulation of volleyball training plans should start with the project itself, when organizing athletes to carry out relevant special training, they should pay more attention to pertinence in a step-by-step process, improve the state of muscle function, and thus improve their movement level.

Li H believes that compound training should be applied to athletes with higher levels, and after lower body explosive training through compound training, an athlete's recovery time is ideally within 48 to 96 hours, which reduces the risks associated with compound training.² Rader E P et al. conducted compound training for 9 weeks on 20 athletes with more than one year of weight-bearing resistance training experience, and the results showed that the improvement of the run-up, take-off, the training group's coordination performance was better than that of the control group, but not the group's performance improvement.³ Chesler K C et al applied compound training to 22 youth football players.⁴ The results showed that the implementation of compound training in youth football players not only compensated for the reduction in strength and explosiveness during the off-season, but some players even improved some sports performance. Burke A. in order to compare the effect of traditional compound training and new compound training on the explosive power of men's volleyball players, after 8 weeks of intervention, it was found that there was no significant difference between the three groups in the effect of the maximum bending moment of both knees.⁵ Wang D conducted 11-week single-leg and double-leg compound training on 18 track and field students from Beijing Sports University, the experimental results were as follows: The single-leg and double-leg compound training is more effective than traditional resistance training in improving various lower body explosive power indicators, whether it is single-leg or double-leg compound training, the effect of improving the explosive power of the lower body is more significant than that of traditional resistance training.⁶

METHOD

Research object

The research object is the effect of 8-week rope-ladder compound training on basketball players' foot movement ability and basketball foot movement sensitivity. The experimental subjects were 30 third-level men's basketball players of the school basketball team.

RESEARCH METHODS

Documentation Law

According to research needs, check basketball monographs, and collect journals, dissertations and other literature on basketball agility training and basketball foot mobility evaluation in CNKI and EB-SO sports database.⁷

Experimental method

Sensitivity training experiments were conducted on basketball players, and rope ladder training methods and conventional foot movement training methods were selected as the sensitivity training methods for basketball players, the training experiment lasted for 8 weeks, in order to improve the agility and foot movement ability of athletes.

Mathematical statistics

SPSS19.0 software tau siv rau kev txheeb xyuas cov ntaub ntawv kev sim, thiab qhov cuam tshuam tsis zoo ua ntej thiab tom qab kev cob qhia kev sim tau muab piv thiab T-test tau ua los ntuas seb puas muaj qhov sib txawv tseem ceeb ua ntej thiab tom qab kev sim. kawm kev sim.⁸

Experimental Design

Experimental purpose

In order to verify the actual effect of rope ladder training methods and conventional foot movement training methods on improving the sensitivity of basketball players, an 8-week sensitivity training experiment was conducted on basketball players, try to prove the effectiveness and feasibility of rope ladder training methods and conventional foot movement training methods, in order to improve the scientific level of basketball agility training.⁹

Experimental grouping

The subjects of the experiment were 30 male athletes of the school basketball team. Subjects were divided into experimental and control groups. From Table 1, we can see that the grouping of the experimental subjects is reasonable ($P>0.05$), and the differences in the basic conditions of the two groups of experimental subjects are not obvious. There was little difference between the experimental group and the control group.

Ethical Compliance

Research experiments conducted in this article with animals or humans were approved by the Ethical Committee and responsible authorities of Communication University of Zhejiang and China Women's University following all guidelines, regulations, legal, and ethical standards as required for humans or animals.

RESULTS

During the training experiment, the experimental group and the control group were tested for the sensitivity of foot movements and the technical ability test of the combination of offensive and defensive foot movements, evaluate the development level of athlete's foot movement agility and foot movement ability, at the same time, the practical effects of the rope ladder training method and the conventional foot movement training method on the athlete's foot movement sensitivity and foot movement technical ability during the training experiment were tested.

Comparative analysis of the sensitivity of basketball players' footwork during the experiment

During the training experiment, the Illinois test, the Pro test, the T test, the dribbling around the bar test, and the Z test were selected to evaluate the development level of the agility of the athlete's foot movements.

The Illinois Motor Agility Test assesses technique and speed used in straight line sprints and changes of direction, test for sports such as basketball that change direction when moving in a straight line, helps to assess an athlete's ability to stop and change direction. The Pro test assesses an athlete's technique, leg strength, and explosiveness in making multiple changes of direction. The T-word test tests an athlete's ability to adjust pace when accelerating and decelerating, change direction, and control the body when moving forward, backward, and horizontally. The dribbling around the bar test evaluates the athlete's ability to suddenly stop and change direction, as well as the coordination ability of hands and feet, and the ability to quickly switch between agile movements and movements.¹⁰ The zigzag test assesses an athlete's leaning ability and body posture, sprint speed in a straight line, the ability to adjust the pace during acceleration and deceleration, and the ability to choose an appropriate deceleration distance when changing direction, examine the athlete's ability to use sensitive skills throughout the process.

Table 1. Comparison table of basic conditions between the experimental group and the control group (n=30).

	Age (y)	Height (cm)	Weight (kg)	Training years (y)	BMI (kg/m ²)
Control group	20.3±1.1	186.9±4.1	81.1±2.3	6.7±2.3	23.2±2.1
Test group	19.7±1.6	187.6±3.8	80.8±2.6	6.9±2.6	23.1±1.9

As shown in Table 2, before the experiment, the experimental groups were divided into the experimental group and the control group, and it can be seen from the table above that the integration of the experimental groups is reasonable ($P>0.05$), and there is no significant difference in the understanding of the two groups of subjects. There was little difference between the experimental and control groups.

Table 3 shows that, after the experiment, the Illinois test index, Pro test index, The T-test index and Z-test index of the experimental group were significantly different from the control group ($P<0.01$), and the parameters of the drip and coil test were significantly different ($P<0.05$).

Comparative analysis of the results of the technical ability test of foot movement

Figure 1 shows that after the test, the process of mobile connection between the control group and the test group has improved significantly compared to before the test, the control group has seen significant difference ($P<0.05$), the test group was found to be significantly different. The difference is significant ($P<0.01$), and the test group compared to the test before the test. It shows that the traditional foot movement training method has certain effectiveness, and the rope ladder training effect is more significant.

DISCUSSION

Compared with the control group, the ease of foot movement and the ability of foot movement in the experimental group were better. The experimental group's ability to change direction, move forward, backward and horizontally, as well as self-control and coordination of hands and feet were improved; The experimental group's defensive ability, breakthrough ability, ability to grab a favorable position, rush to rebound, and ability to get rid of opponents have all been greatly improved. Rope ladder training plays an important role in improving coordination, agility and speed ability, and can improve athletes' ability to switch movements, direction and movement, it can promote the development of athletes' ability to move quickly, improve body control and kinesthetic awareness, and improve basic sports skills. The ladder operation can improve the ease of operation in basketball, and the improvement of the foot will help improve the ability of the foot.

CONCLUSION

When comparing the groups before and after during the experimental training, the experimental group showed significant differences in five measures of foot movement, while the control group showed the same

Table 2. Sensitivity index of foot movement of two groups of athletes before the experiment (S, n=30).

	Illinois test	Pro test	T-word test	Dribble round test	Z test
Control group	16.37±0.42	5.31±0.56	9.21±0.64	11.87±0.68	7.76±0.47
Test group	16.38±0.39	5.34±0.44	9.19±0.59	11.88±0.71	7.74±0.54

Note: Compared with the control group, * means $P<0.05$, ** means $P<0.01$.

Table 3. Sensitivity index of foot movement of two groups of athletes after the experiment (S, n=30).

	Illinois test	Pro test	T-word test	Dribble round test	Z test
Control group	16.21±0.34	5.20±0.53	9.11±0.47	11.59±0.53	7.61±0.58
Test group	15.678±0.31	4.86±0.51	8.73±0.32	11.34±0.52	7.27±0.47

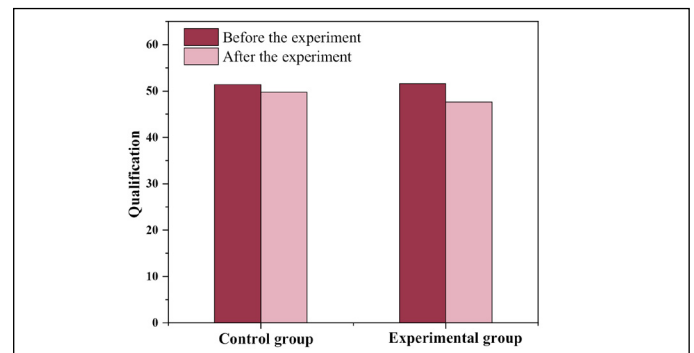


Figure 1. Technical indicators of the combination of offensive and defensive footwork movement before and after the experiment (S, n=30).

important difference in the loss and coil parameters. Before and after comparison between groups, the experimental group Illinois test, Pro test, T test and Z test index showed very significant differences compared with the control group, and the dribbling and rod test indexes showed significant differences. During the experiment, the athletes' ability to change direction, adjust their pace, control their bodies when moving forward, backward and horizontally, lean their bodies, in the experimental group, the coordination of the arms and legs was better compared to the control group, and the flexibility of the legs in the experimental group was significantly improved. The rope ladder training used in the experimental group was more effective than the conventional foot movement training used in the control group in improving the agility of foot movements.

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

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REFERENCES

- Liu C, Liu X. Employee Training System of Manufacturing Enterprises for Implementing Industry 4.0. *J Phys Conf Ser.* 2020;1648(4):042117.
- Li H, Li Q. End-to-End Training for Compound Expression Recognition. *Sensors.* 2020;20(17):4727.
- Rader EP, Ensey J, Naimo MA, Baker BA. Age-dependent Skeletal Muscle Outcomes Following Resistance-type Training Improve with Pit1 Mutation and Training Frequency Modulation: 3312 Board #133 May 29 1:30 PM - 3:00 PM. *Med Sci Sports Exerc.* 2020;52(Suppl 7):907.
- Chesler KC, Motz CT, Bales KL, Allen RA, Vo HK, Pardue MT. Voluntary oral dosing for precise experimental compound delivery in adult rats. *Lab Anim.* 2022;56(2):147-56.
- Burke A, Dillon S, O'Connor S, Whyte EF, Gore S, Moran KA. Risk Factors for Injuries in Runners: A Systematic Review of Foot Strike Technique and Its Classification at Impact. *Orthop J Sports Med.* 2021;9(9):738-55.
- Wang D, Shi JJ, Zhang L, Jia YW, Qiao HY, Liu H, et al. The Ilizarov technique in treating denervated ankle-foot deformities. *J Neurorestoratol.* 2021;9(4):255-68.
- Cai G, Wei L, Xiong J, Liu L, Wang D, Yang J. Functional Reconstruction of Hindfoot with Total Calcaneus and Talus Loss by Ilizarov Technique: A Case Report. *J Foot Ankle Surg.* 2020;59(1):142-8.
- Loquet M. Constitution d'un savoir technique: l'exemple du tour illusion en gymnastique rythmique. *Mov Sports Sci.* 2021;2009(68):9-25.
- Grieb EM, Whang G. Low Back Pain in A Basketball Player: 1238. *Med Sci Sports Exerc.* 2021;53(Suppl 8):405.
- Kolias P, Stavropoulos N, Papadopoulou A, Kostakidis T. Evaluating basketball player's rotation line-ups performance via statistical markov chain modelling. *Int J Sports Sci Coach.* 2022;17(1):178-88.