The Effect of Sport-specific Training on Body Composition and Isokinetic Muscular Strength in Handball Players

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Abstract

Research to enhance performance in sports typically focuses on physical conditioning, skill development, and mental strength based on the physical requirements suitable for the specific sport. **PURPOSE:** The purpose of this study is to investigate the effect of sports-specific training on body composition and isometric strength, in handball players and to provide effective and efficient exercise methods for physical strength and muscle strength to athletes **METHODS**: 17 handball players are recruited and randomly assigned to either exercise group (n=9) or control group (n=8). The handball players in the exercise group had completed sports-specific training (three times / week and 70 minutes / session) for 8 weeks, while handball players in the control group conducted only basic physical training during the research period. All variables were analyzed by two-way repeated measures ANOVA with contrast testing. Alpha was set at 0.05. **RESULTS**: As for the body composition change of the exercise group, the muscle mass (p=.020) showed a statistically significant increase. Right knee extensor strength 60°/sec (p=.010), the right flexor muscle strength 60°/sec (p=.002) and the left flexor muscle strength 60°/sec (p=.011) showed a statistically significant increase. **CONCLUSIONS:** The application of Sport-specific training to handball players can affect handball players' strength of knee joint and muscle function positively. **PRACTICAL APPLICATIONS:** The application of Sport-specific training to handball players is able to improve body composition and knee joint strength, so it may prevent an injury and enhance physical functions.

Introduction & Purpose

Handball is a sport that requires a variety of physical attributes such as cardiovascular endurance, muscular endurance, explosive power, speed, and coordination. From a performance perspective, it is characterized by the complex execution of various high-intensity movements, including running, jumping, accelerating, decelerating, and changing directions. Specifically, explosive power and strength are emphasized in actions such as shooting and jumping, and these factors are reported to significantly impact the performance of elite athletes. Therefore, it is important to select an appropriate exercise routine for handball players. In high-intensity sports like handball, strategic training aimed at improving both fitness and skills is necessary. Recently, the importance of sport-specific training methods has been emphasized over traditional, general training approaches.

However, research on training that reflects the sport-specific needs of handball players is limited. Therefore, this study aims to investigate the effects of an 8-week sport-specific training program on the body composition and muscle function of handball players.

Methods

Physical characteristics of subjects

	Age (years)	Height (cm)	Weight (kg)	Muscle mass (kg)	Body fat (%)	BMI (kg/m2)
Exercise group (n=9)	24.22±4.08	171.06±6.33	71.79±12.83	28.89±4.13	26.93±6.11	24.50±3.82
Control group (n= 8)	25.62±2.72	171.33±6.25	71.50±5.93	28.91±3.53	24.25±4.31	24.39±2.12

Research design

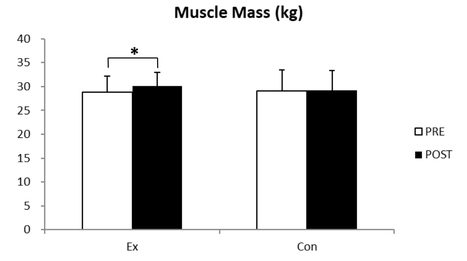
This study is a controlled pretest-posttest experimental design conducted to investigate the effects of an 8-week sport-specific training intervention on body composition and isokinetic muscle function in handball players. The dependent variables are body composition and isokinetic muscle strength (flexor and extensor strength of the knee joint).

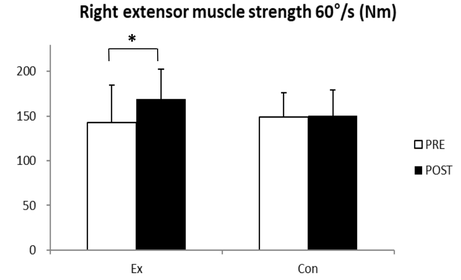
Sport-specific training program

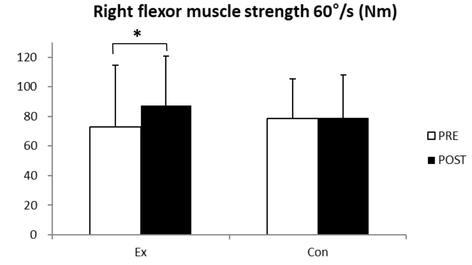
RPE: Rating of Perceived Exertion

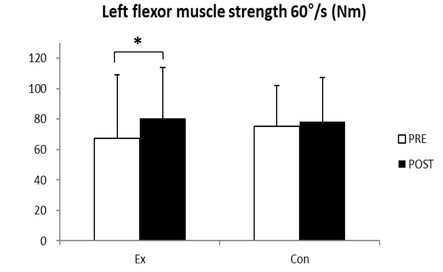
Program	Type	Posture	Reps	Set	RPE	Time	Purpose
Warm up	Stretching	·	·	·	7-9	10 mins	Warm up
Main exercise	Combo drill	Activity	2	4-8	16-18	50 mins	Agility, Strength, Endurance, Coordination
	Rotational lift to press	Standing	10-15	4-8	16-18		
	Hamstring hill walking	Prone	10-15	4-8	16-18		
	Medicine ball squat	Standing	10-15	4-8	16-18		
	Power vertex core rotation	Sitting	10-15	4-8	16-18		
	One leg jump lunge	Activity	10-15	4-8	16-18		
	Treadmill	Running	14RPM	4-8	16-18		
Warm down	Stretching	·	·	·	7-9	10 mins	Warm Down

Results









Conclusion & PRACTICAL APPLICATIONS

- **According to the changes in body composition and muscle function following sports-specific training, a statistically significant increase was observed in muscle mass (p=.020).**
- **Regarding the changes in isokinetic muscle function following sports-specific training, a statistically significant increase was observed in right knee extensor strength at 60°/sec (p=.010).**
- **Statistically significant increases were observed in right knee flexor strength at 60°/sec (p=.002) and left knee flexor strength at 60°/sec (p=.011).**
- **The application of Sport-specific training to handball players is able to improve body composition and knee joint strength, so it may prevent an injury and enhance physical functions.**

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