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# Proceedings of the 1<sup>st</sup> International Summit Conference on Exercise Science, Sports Management, Outdoor Recreation, and Physical Education, ExSPORT 2024, 28<sup>th</sup> - 29<sup>th</sup> August, Malaysia

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## Acute Effects of Barbell Hip Thrust on Speed and Power Among Volleyball Athletes



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**Abstract** | This study investigates the acute effects of barbell hip thrust (BHT) on speed and power among volleyball athletes. Twenty-four volleyball players ( $N=24$ ) were selected to become the subjects of this study. Subjects were divided into two groups: the experimental group (EG) and the control group (CG). Forty-meter (40-m) sprint test and vertical jump test were used to measure speed and power. The study involved the EG doing BHT exercises, and the CG performed regular training. The EG did 3 sets of 5 repetitions using 80% of their one-repetition maximum (1RM) for BHT, with a 3-minute rest between sets. The post-test was conducted 14 minutes after the intervention. Similar procedures were carried out for speed and power variables on different occasions. The results revealed a significant improvement in speed  $\{t(22) = 2.18, p = 0.041, p < 0.05\}$  and power  $\{t(22) = 2.23, p = 0.037, p < 0.05\}$  for the experimental group (EG) compared to the control group (CG). Specifically, the EG demonstrated a speed of  $0.40 \pm 0.11$  sec, whereas the CG showed a speed of  $0.30 \pm 0.11$  sec. Regarding power, the EG scored much higher, with  $2.75 \pm 0.67$  cm, compared to the CG's  $2.22 \pm 0.49$  cm. These findings showed that the acute implementation of BHT can enhance speed and power in volleyball athletes and provide a valuable tool for volleyball training programs focusing on improving explosive performance.

**Keywords:** *Barbell hip thrust, speed, power, volleyball, PAP.*

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## I. INTRODUCTION

Volleyball is among the world's most popular team sports, distinguished by explosive movement patterns and flexible positioning. The outcome of a volleyball game is determined by the best mix of motor and technical-tactical elements [1]. To compete at a high level, volleyball players must acquire and maintain a variety of physical fitness attributes. The primary goal of volleyball training is to improve vertical jump height and jump speed [8]. Jumping along with the appropriate strategies influences the efficacy of attacking, serving, or blocking [2]. Strength training is one of the methods to increase physical performance and reduce the risk of injuries in sports. One of the methods, post-activation potentiation or, in short, PAP, is a physiological or neuromuscular phenomenon characterized by an immediate increase in muscular performance and muscle activation, culminating in voluntary force augmentation measured several minutes after high-intensity muscle contractions [3]. The implementation of PAP aims to increase muscular strength and power in response to a conditioning activity, such as heavy-loaded (80-90% 1-RM) resistance exercises with free weights or variable resistance training [4]. Exercises like the barbell hip thrust may be used to maximize the phenomenon of PAP, which can improve speed and explosive power in volleyball [5].

## II. METHODS

A purposive sampling technique and pre-test and post-test quasi-experimental design were used for this study. This study investigates the acute effects of barbell hip thrust (BHT) on speed and power among volleyball athletes. Twenty-four volleyball players ( $N = 24$ ) were selected to become the subjects of this study. Subjects were divided into the experimental group (EG) and the control group (CG). Forty-meter (40-m) sprint and vertical jump tests were used to measure speed and power. The study involved the EG doing BHT exercises, and the CG performed regular training. The EG did 3 sets of 5 repetitions using 80% of their one-repetition maximum (1RM) for BHT, with a 3-minute rest between sets. The post-test was conducted 14 minutes after the intervention. Similar procedures were carried out for speed and power variables on different occasions. A standard score sheet was used to record the data, and the score differences for speed and power between the two groups were compared to determine any significant differences.

## III. RESULTS AND DISCUSSION

The Independent Samples T-Test test was used to compare the differences between the two groups. This study aimed to find significant differences in speed and power between EG and CG. The significance level of 0.05 was used to determine significance. If the  $p$ -value was 0.05 or less, it indicated a significant difference, so we rejected the null hypothesis. If the  $p$ -value was greater than 0.05, we accepted the null hypothesis, meaning there was no significant difference.

TABLE 1  
FORTY-METER SPRINT TEST BETWEEN EXPERIMENTAL AND CONTROL GROUP

	Group	N	Mean (SD)	t	df	p-value
Forty Meter Sprint	Experimental	12	0.40 (0.11)	2.18	22	0.041
	Control	12	0.30 (0.11)			

TABLE 2  
VERTICAL JUMP TEST BETWEEN EXPERIMENTAL AND CONTROL GROUP

	Group	N	Mean (SD)	t	df	p-value
Vertical Jump Test	Experimental	12	2.75 (0.67)	2.23	22	0.037
	Control	12	2.22 (0.49)			

The results revealed a significant improvement in  $t(22) = 2.18, p = 0.041, p < 0.05$  in speed and  $t(22) = 2.23, p = 0.037, p < 0.05$  for power for the experimental group (EG) compared to the control group (CG). Specifically, the EG demonstrated a difference in speed time reduction of  $0.40 \pm 0.11$  sec, whereas the CG showed a speed of  $0.30 \pm 0.11$  sec. Regarding power, the EG scored much higher,  $2.75 \pm 0.67$  cm, compared to the CG's  $2.22 \pm 0.49$  cm. These findings showed that the acute implementation of BHT can enhance speed and power in volleyball athletes and provide a valuable tool for volleyball training programs focusing on improving explosive performance [1].

In this research, post-activation potentiation (PAP) induced by barbell hip thrust (BHT) gives the improvement of speed and sprint performance in volleyball athletes [9]. The BHT is said to have the potential to enhance speed performance as well because the exercise incorporates the hip extensors to increase horizontal force production [6]. The horizontal force is very prominent when lateral movements in volleyball games because it shortens the time the player moves across the volleyball court. The BHT also improves explosive power through vertical jump [7]. The positive performance of the vertical jump requires a few factors that can be highlighted. The factors are the initial exit velocity, explosive force, mechanical power of the lower limb, and the speed of leaving the ground, thus leading to a greater height during the jump motion [5].

#### IV. CONCLUSIONS

In conclusion, this study examined the acute effect of barbell hip thrust (BHT) exercise on speed and power among volleyball athletes. There was a significant effect on the speed and power performance of BHT exercise among the volleyball athletes in UiTM Seremban. Implementing PAP effects induced by strength training, such as barbell hip thrust, has been proven to improve speed and power among volleyball athletes. The BHT is good training to improve skills performance such as jumping ability and sprinting speed in sports that require a lot of jumping and short sprinting, such as volleyball, badminton, and basketball [7]. An athlete's ability to run, jump, or change direction can affect their performance during a game and the outcomes of the matches. Different kinds of training programs or using different volumes and intensities of training can be used to improve other physical fitness skills [10]. The BHT exercise has proven to have positive effects and improve speed and power among volleyball athletes by implementing

PAP effects. The study's findings can prove and be very helpful to coaches and trainers in creating efficient warm-up plans and conditioning methods for volleyball athletes, to enhance explosive power and speed movement and improve match performance.

**ACKNOWLEDGMENTS** The physical performances through tactical and technical is very important in volleyball. This study is important because it helps coaches and athletes improve their performance. Coaches can use this information to better player development, strategies, and coaching for the volleyball team. Athletes can gain insights, criteria, and motivation to enhance their skills and compete at high levels. This will also help to understand teamwork and overall performance in volleyball.

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