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Squat Jump Exercise Increased Spike Jump and Block Jump Reach of Junior Volleyball Athletes

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Abstract

Spike jump and block jump were characteristic movements of volleyball. These movement were determined by explosive power of leg, strength of musculoskeletal, length of lower limb and length of arm. Explosive power could be enhanced by plyometric exercise, like squat jump. The aims of study to analyse the role of squat jump exercise program on spike jump reach and block jump reach of junior volleyball athletes. Twenty-three junior athletes (male 11 and female 12) participated in pre and post-test experiment study. The squat jump exercise program was conducted three time a week, for along 7 weeks. The squat jump exercise involved squat jump, squat jump with box, forearm passing while squat jump and squat jump with running take off. The data were analysed by paired t-test to compare pre and post-test. The experiment resulted increasing of spike jump both men ($p<0.001$) and women ($p<0.001$). Increasing of block jump in men ($p<0.001$) and women ($p=009$). We concluded that squat jump exercise regularly effective to increase the spike jump and block jump reach junior volleyball athletes.

Keywords: block_jump, squat_jump, spike_jump, volleyball

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1. Introduction

Spike and block were characteristic movements of volleyball games. These are fundamental skill must be expertise by volleyball player. On average, each of the players studied executed nearly 45 jumps and subsequent landings for the two games [1]. Spike jump is significantly related to general jumping ability [2]. Jumping ability are frequently used to assess lower limb explosive strength. Explosive power determined the successfully of jumping ability. Explosive power of leg muscle was important factors that affected the accuracy of spike in volleyball [3]. Similar with spike jump, block jump was done without initial step. Both spike jump and block needed explosive power of leg to do successfully.

Plyometric training program could potentially improve player's movement and performance and lower the athlete's risk for injury [4]. Plyometric training, i,e squat jump,

increasing explosive power of volleyball athletes [5, 6]. Squat jump exercises will be effective for increasing strength of leg muscle. Repetitive training, programming, and referring to the principle of practice is an effort to achieve a predetermined goal of champion. The aim of research was exam the effectiveness of squat jump exercise program to increase spike and block jump reach.

2. Material and Method

2.1. Experimental design

The pre-test and post-test experiment study conducted to exam the effectiveness squat jump exercise program on spike jump reach and block jump reach. The dependent variables were the high of spike jump reach and block jump reach, was measured in first and 7^{th} week.

2.2. Subject

A total twenty-three junior athletes contributed in this study, consist of men athletes (11) and women athletes (12). The participants were the member of Kaliangkrik 2 Junior High School, Magelang. They were 13 -15 years old. All participant signed the agreement before joined the research.

2.3. Squat jump exercise program

Squat jump exercise program was conducted for 7 weeks, three time a week. The program consists of vary squat jump, related with volleyball characteristic. All participant began and ended in the same time.

3. Result

The squat jump exercise program for about 7 weeks resulted the increasing of spike jump reach both men ($p<0.001$) and women ($p<001$). The increasing of block jump reach was significant in men ($p<001$) and women ($p=009$). The completed results were presented in Table 2 and Table 3.

Table 1: Squat Jump exercise program.

Week	Program	Frequency per week	Number of Set	Repetition	Recovery
1st	Pre Test		-	-	-
2nd	Squat Jump	3	3	7	2 min
			3	7	2 min
			3	8	2 mni
3rd	Squat Jump with box	3	3	7	2 min
			3	7	2 min
			3	8	2 min
4th	Multiple squat jump	3	3	7	2 min
			3	7	2 min
			3	8	2 min
5th	Forearm passing while squat jump	3	3	8	2 min
			3	8	2 min
			3	8	2 min
6th	Squat Jump with running take off	3	3	8	2 min
			3	9	2 min
			3	9	2 min
7th	Post test		-	-	-

Table 2: The average of Spike Jump reach before and after squat jump exercise program.

	Men Athletes (n=11)		Women athletes (n=12)	
	Pre test	Post test	Pre test	Post test
Maximum value (cm)	278	282	244	254
Minimum value (cm)	245	254	207	211
Average (cm)	259.5±9.45	266.3±8.33	228.7 ±13.25	235.2±13.92

Table 3: The average of Block Jump reach before and after squat jump exercise program.

	Men Athletes (n=11)		Women athletes (n=12)	
	Pre-test	Post test	Pre-test	Post test
Maximum value (cm)	270	282	246	250
Minimum value (cm)	238	253	202	205
Average (cm)	252.5±9.70	257±9.20	225.9±14.20	231.4±15.66

4. Discussion

Volleyball games are won by teams that reach score first Attacking and defending is a strategy for winning volleyball game. Spike jump is a very important movement in building an attack, while a block jump serves to defense an opponent's attack. Both spike and block require a strong explosive leg muscle power. Anthropometric factor

such as body height and body mass index have a relationship with the value of spike jump [7]. The spike jump reach and block jump reach are also affected by the length of the arm and the length of the leg [8].

Spike is the finishing touch to the team's play. Spike resulted high velocity and swoop ball. The high velocity of ball given a difficulty to opposite team to receive. Most point of games were obtained from spike attack. A volleyball player, especially spiker really determined successfully the team to winning game. Spike not only influenced by anthropometric factor like body height, but also influenced by motoric skill factor like jump ability, speed, strength of arm. Angle of right knee joint and right elbow were significantly influence the backcourt spike [9]. Power spike and off speed spike techniques were influenced of wrist, elbow, and shoulder and body inclination angles in hitting phase [10]. The ability to produce high force and tolerate high tendon tension in rapid stretch shortening cycle movements is very important to jump performance in volleyball [7]

Squat jump was a plyometric exercise enhanced explosive power of leg muscle. Many studies showed the effectiveness of squat jump exercise, not only enhanced explosive power but also increased the speed of jump [11, 12]. Regularly training needed to obtain the satisfied performance.

The main findings of this study were that 7 weeks of jump squat training led to simultaneous improvements of spike jump reach and block jump reach of junior volleyball player. The squat jump exercise program may applicate to increase volleyball player performance to achieve excellent team. These exercise program smart to applicate on young volleyball athletes.

5. Conclusion

Squat jump exercise was a program to enhance volleyball athlete's performance. Seven weeks program of squat jump exercise were conducted to junior athletes. We concluded that squat jump exercise regularly effective to increasing the spike jump and block jump reach junior volleyball athletes. This program may effective to enhance volleyball performance.

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