

## STUDYING AND BUILDING THE DEVELOPMENTAL STRENGTH EXERCISES SYSTEM BY PLYOMETRIC METHOD FOR PROFESSIONAL FEMALE VOLLEYBALL PLAYERS

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### ABSTRACT

*The study is the result of the selected exercises system by plyometric method. The researchers used to interview experts and scientists in this field to choose and apply an experiment. The result showed that the exercises system was highly effective in the development of strength training process for female students who major in volleyball at an Giang University in the first year of the first semester 2016-2017.*

**Keywords:** Strength exercises, plyometric method.

### 1. INTRODUCTION

Volleyball is one of the world's most popular sports and because of its enormous popularity many studies have been conducted in an attempt to understand the better program training required to develop total body performance by a volleyball player (Marques, van den Tillaar, Gabbett, Reis, & González-Badillo, 2009; Felicissimo, Dantas, Moura, & Moraes, 2012). Unfortunately, the scientific understanding of this issue remains unclear, with most young participants acquiring muscular performance through individual experience rather than research-based instructions (Zhu, Rink, Placek, Graber, Fox, Fisette, ..... & Raynes, 2011; Vassil & Bazanov, 2012). Indeed, volleyball is a sport that requires strength in upper and lower limbs (Forthomme, Croisier, Ciccarone, Crielaard, & Cloes, 2005; Marques, Tillaar, Vescovi, & Gonzalez-Badillo, 2008; Noyes, Barber-Westin, Smith, & Campbell, 2011). The development of muscle strength and specific technical skills are particularly important for young players and especially to female athletes (Marques *et al.*, 2008), as priority factors to achieve success (Morrow, 1979; Ciccarone, Croisier, Fontani, Martelli, Albert, Zhang, & Cloes, 2008; Malousaris, Bergeles, Barzouka, Bayios, Nassis, & Koskolou, 2008).

Today, in Vietnam and the world, the modern volleyball training is physical strength training, especially strength as one of the important factors has been emphasized by the coaches. It helps athletes get the best and the highest achievement. Currently, professional female volleyball players do not understand and use the power exercises in a scientific manner that makes them feel hard to practice strength of volleyball.

If players are well-equipped about foundation, in particular the specific strength of the sport and practice it in a scientific manner to improve result and advance technique. Thus,

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researchers carried out this study titled as “studying and building the developmental strength exercises by plyometric method for professional female volleyball students of physical education department at An Giang University”.

## **2. METHODS AND MATERIALS**

The research process used in this were analysis and synthesis materials, interview experts and coaches in the field of research, pedagogical testing, experimental pedagogy and statistical mathematical methods.

### ***2.1. Selection the developmental strength exercises by plyometric for professional female Volleyball students of physical education department at An Giang University***

To build the developmental strength exercises system by plyometric for professional female volleyball students of physical education department at An Giang University, we have consulted the materials of the experts in Bosch and Pittera (1982), Menerdez (1988), Bompa (2000), Nguyen (1998), Gonzales (2002), Bui (2004), Cortegaza (2011), the coaches of the strong volleyball teams: Binh Dien Long An, Phu Rieng Rubber, Sannest Khanh Hoa, Xuan Dung Nguyen, Nguyen Ngoc Tien, ... With 39 exercises to develop strength for feet and coaches and experts' interview result, we have selected 8 exercises with high approval rate ( $\geq 75\%$ ) including: running 30m/s, jumping two feet forward 60m/s, jumping 1'30s/l, jumping with feet 30s/l, knee jumping 30s/l, lift the weights stand up and sit down (kg/l), lift the weights jumping 15kg/l jump in place and the hurdle 60m/s. With 27 exercises for the hands, we have selected 10 exercises with a high approval rate ( $\geq 75\%$ ) including: training the forearm after the head (kg), lifting weights at chest (kg), lifting weights supine (kg/time), pushing weights supine (kg/time), pulling weights after hands (kg/time), lying on pushing (group/ time), lying on pushing (group/time), lying on pushing feet on chair (group/ time), pulling the back of the head with the right hand (30s/l), throwing the ball with two hands by one step ahead, standing at the place throwing basketball with one hand over the net.

### ***2.2 Build the strength exercises system by plyometric for professional female volleyball students***

From the results of the initial examination and the results of the questionnaire, we constructed an exercise system by plyometric and conducted experiments for professional female volleyball students of physical education department at An Giang University to improve the characteristic strength of volleyball for the experimental group and assess the effectiveness. In order to be highly effective in training we used the principles and methods of training sports in the experimental process and the experimental time was 12 weeks from September 2016 to December 2016. The training program is required for 2 groups, so the time for experimenting and practicing is a week three session. Total time is 120 hours for both experimental and control groups. Control group: Group A (37 females) practiced normal strength training for professional female volleyball students at An Giang University. Experimental group: Group B (35 females) practiced the elective strength exercises for interview.

### ***2.3 Evaluate the effectiveness of strength training program for professional female volleyball students at An Giang University through 12 weeks by plyometric method.***

After 12 weeks applying for strength training by plyometric method, we conducted a post-experimental evaluation of the two groups and considered more objective assessment than the results and comparative achievement through 4 test: high jump with momentum (cm); High jump

no momentum (cm); long jump (cm); Throw a ball (1kg) with two hands (m) of two groups professional female volleyball students at An Giang University after the experiment through T-student index.

### 3. RESULTS AND DISCUSSION

**Table 1: Test results of the two groups before and after the experiment**

Order	Test	Experimental group		Control group		t	p
		n=35		n=37			
Before the experiment		$\bar{X}$	$\sigma$	$\bar{X}$	$\sigma$		
1	High jump with momentum (cm)	63.23	4.32	63.19	4.98	0.48	> 0.05
2	High jump no momentum (cm)	60.18	4.88	61.02	5.14	0.19	> 0.05
3	Long jump (cm)	192	14.47	194	14.20	0.75	> 0.05
4	Throw a ball (1kg) with two hands (m)	9.18	0.95	9.17	0.85	0.42	> 0.05
After the experiment							
1	High jump with momentum (cm)	74.12	4.92	65.07	5.78	3.48	<0.001
2	High jump no momentum (cm)	69.98	4.12	62.87	6.02	2.71	<0.01
3	Long jump (cm)	243	15.12	202	14.63	2.82	<0.01
4	Throw a ball (1kg) with two hands (m)	11.89	1.27	9.79	1.09	3.75	<0.001

**Table 2: The growth of experimental and control group before and after experiment**

Order	Test	Experimental group			W	Control group		W
		Before the experiment	After the experiment			Before the experiment	After the experiment	
1	High jump with momentum (cm)	63.23	74.12	14.69	63.19	65.07	2.89	
2	High jump no momentum (cm)	60.18	69.98	14.00	61.02	62.87	2.94	
3	Long jump (cm)	192	243	20.99	194	202	3.96	
4	Throw a ball (1kg) with two hands (m)	9.18	11.89	22.79	9.17	9.79	6.33	
$\bar{X}_W$				18.12%			4.03%	

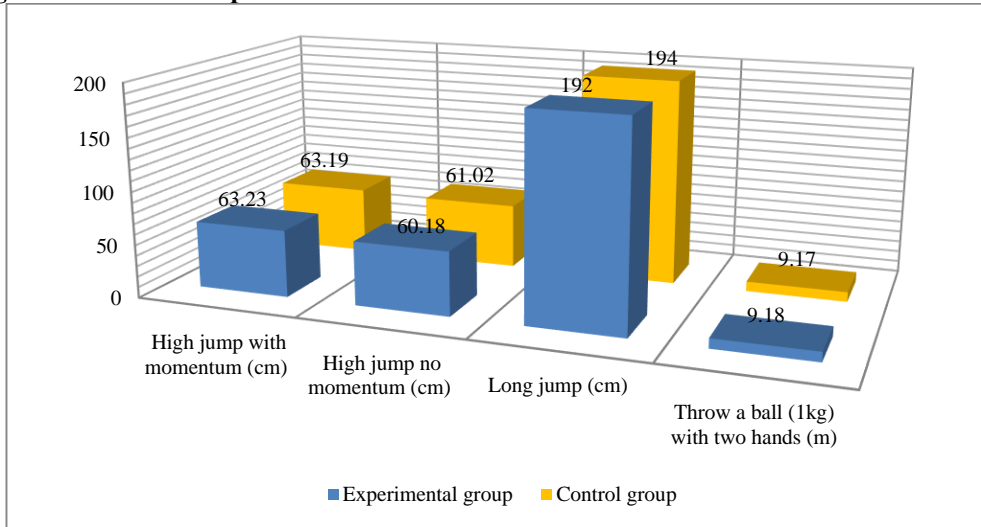
Table 1 showed that high jump with momentum test (cm): Experimental Group  $\bar{X} = 74.12 \pm 4.92$ ; The control group  $\bar{X} = 65.07 \pm 5.78$ , the average result of the experimental group and the control group after the experiment changed with  $t = 3.48 > t_{0.05} (t_{0.05} = 1.96)$ ,  $p < 0.001$  the difference between 2 average values is statistically significant.

High jump no momentum test (cm): Experimental Group  $\bar{X} = 69.98 \pm 4.12$ ; The control group  $\bar{X} = 62.87 \pm 6.02$ , the average result of the experimental group and the control group after the experiment changed with  $t = 2.71 > t_{0.05} (t_{0.05} = 1.96)$ ,  $p < 0.01$  the difference between 2 average values is statistically significant. Long jump test (cm): experimental group  $\bar{X} = 243 \pm 15.12$ ; The control group  $\bar{X} = 202 \pm 14.63$ , the average result of the experimental group and the control group after the experiment changed with  $t = 2.82 > t_{0.05} (t_{0.05} = 1.96)$ ,  $p < 0.05$  the difference between the average values is statistically significant. Throw a ball (1kg) with two hands test (m): Experimental team  $\bar{X} = 11.89 \pm 1.27$ ; The control group  $\bar{X} = 9.79 \pm 1.09$ , the average result of the experimental group and the control group after the experiment changed with  $t = 3.75 > t_{0.05} (t_{0.05} = 1.96)$ ,  $p < 0.05$  the difference between 2 average values is statistically significant. The results showed that the experimental group and the control group were statistically significant difference especially experimental group ( $p < 0.05$ ).

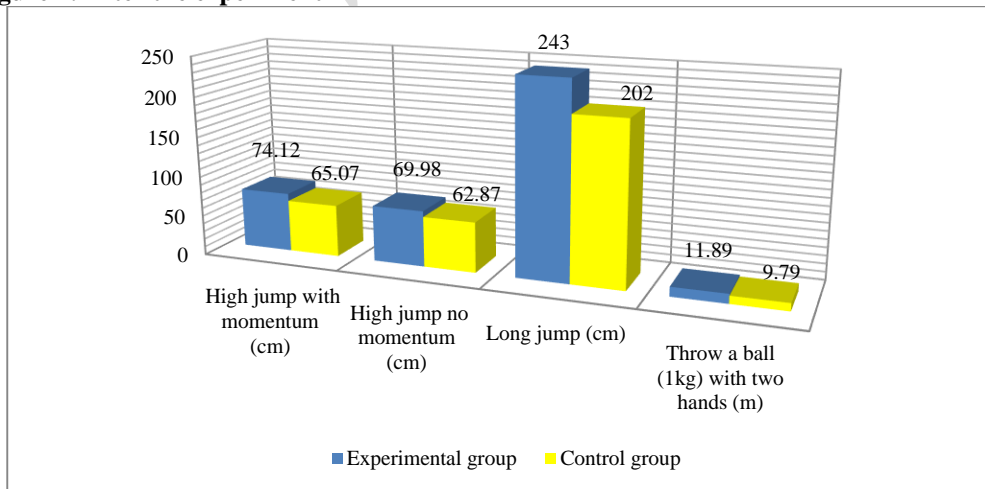
The experimental group had a good improvement in comparison to the control group that was tested by comparing the experimental results with the pre-experimental results (T bigger than T-table,) (Table 1). At the same time, it was also demonstrated by the growth according to Brody (W%) the post-experimental criteria with pre-experiment. The average growth of the control group was 4.03%, the average growth of the experimental group was 18.12%. It means the growth of the experimental group increased significantly in comparison to the control group (Table 2).

This showed that the developmental strength exercises had more positive effects than the developmental strength of students. Through results Table 1 & 2 and graphs 1 & 2 showed that all the tests of the experimental group (the selected exercises) were better than control group according to the old program. Thus, after 120 periods applying for strength exercises, the evaluation criteria of the experimental group have increased. This is showed in graphs 1 & 2.

**Figure 1: Before the experiment**



**Figure 2: After the experiment**



#### 4. CONCLUSION

Through the analysis, summary and interview of experts, the study has selected 10 developmental strength exercises at hands and 8 developmental strength exercises at feet.

The research results have established the strength exercises system by appropriation and science of plyometric method for professional female volleyball students of physical education department at an Giang University.

The strength exercises system by plyometric for professional female volleyball students of physical education department at an Giang University of experimental and control groups has a significant increase. Therefore, the growth of the experimental group increased an average 14.15% in comparison to 4.25% of the control group in four tests. This shows that the plyometric method is effective freshman's strength of physical education department at an Giang University.

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