



## EFFECT OF CIRCUIT AND PLYOMETRIC TRAINING ON SELECTED PERFORMANCE RELATED VARIABLES OF UNIVERSITY LEVEL WOMEN KHO-KHO PLAYERS

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### Abstract

The study was designed to investigate “The Comparative Effect of Two Resistance Training Menu on Selected Performance Related Variables of University Level Women Kho-Kho Players. To achieve these purpose forty five University level women Kho-Kho players were selected from Department of Physical Education and Sports, Pondicherry University, Bharathidasan Women’s college, Pondicherry and Mary Matha Arts and Science College Mananthavady and having three years of training age. Their age group ranged from 17 to 22 years, they were - divided in to experiment group 1 (n=15) Plyometric training group (PTG), Experiment group 2 (n=15) Circuit training group (CTG), and Control group (n=15) (CG). The experimental group was given six weeks (three times /week) of resistance training programme prepared by the investigator. The experiment group 1 underwent plyometric training, experiment group 2 underwent circuit training and control group was not given any specific training. The following performance related variables were chosen namely, speed, endurance, agility, leg endurance and explosive power for the study. They also assessed Kho-Kho playing ability before and after the training period of six weeks. Significant differences present among three groups of the dependent variables were analyzed by studying ANACOVA. The study revealed that the performance related variables of University level women Kho-Kho players were significantly improved through plyometric training.

**Keywords:** Plyometric Training, Circuit Training, Playing Ability, Kho-Kho.

### Introduction

Resistance training is an exercise that exerts the muscle and makes them to contract against an external resistance, with the main goals to increase the strength, tone, mass and /or endurance. The external resistance can be dumbbell, rubber, exercise tubing, free weights or any object that causes the muscle strain (Thakur V, 2010).

Plyometrics (also known as “plyos”) is a special kind of exercise that produces fast, quickness, powerful movements. The generally stimulates the nervous system, which improves sports performance (Sharma A, 1999). Plyometric movement, in which a muscle is loaded and then contracted in rapid sequence, these exercise stimulates the muscles and tissues surrounding it to jump higher run faster, throw farther depending on the desired training goal. This is a very effective procedure for improving strength endurance (Verma, A et al, 2011). A circuit of 6-10 exercises is arranged in such a way that different muscle group are exercised at different station. The performer moves from one station to another undertakes load and recovery in the following two ways 30 second exercise and 30 second rest in between two stations, 20 second exercise and 40 second rest between two section (Caudhuri, Net al, 1987), (Gole. Y. A, 1978) and (Rao. C. V, 1971).

### Methodology

Forty Five (n=45) women Kho-Kho players were selected for the study, having three years of training age were divided in to experiment group 1 (PTG, n=15), Experiment group 2 (CTG, n=15) and Control group (CG, n=15). All group were tested for the pre-test through selected performance related variables i.e. speed, endurance, agility, leg endurance and explosive power. The experimental group were given six weeks (three days in a week) training programme.

Training program include plyometrics like Standing broad jump, Hopes, Half Squat jump, Vertical jump, Standing long jump etc. and circuit training which includes Bench press, overhead throw, Pushups etc. The load, intensity and volume of these exercises were 1st and 2nd week 60%, 3rd and 4th week 70-80%, 5th and 6th week 80-90%. After six weeks all groups were tested for same components of physical fitness with same test battery. They also assessed with Kho-Kho playing ability before and after experiment. In order to assess the Kho-Kho playing ability of the subjects, rating was done with the help of three well experienced and efficient Kho-Kho coaches (Kumar, Set al, 2011). For the rating, the investigator has identified most important Kho-Kho skills and abilities of defensive and offensive tactics. Separate rating chart was given for each judge for each player for rating. Each judge evaluates the player’s ability with the help of the rating chart for the maximum of 100 marks. Each player was evaluated by three judges separately and the average score of the rating was treated as playing ability of the Kho-Kho players. (Reddy. B. R, 1974). Analysis of co variance was used in this study. The study shows that the performance related variables were significantly improve due to the influence of the above site training programme.



**Results and Discussions**

Table 1 state that there is a statistically significant difference on all the fitness components (Speed =33.03, Endurance =7.67, Agility =21.53, Leg Endurance = 14.37 and Explosive Power = 12.69) confined to this study, as they obtained 'F' ratio was found to be greater than the required value at 0.05 level of confidence. Since, significant difference exists, the post hoc test was applied to find out the paired mean difference among experimental groups and control group on each of the fitness components selected in the study, and it is given in table 3.

**Table I- Analysis of co variance of experimental groups and Control group**

Variables	Sources of variations	d.f.	SS <sub>x</sub>	SS <sub>y</sub>	SS <sub>xy</sub>	SS <sub>yx</sub>	MSS <sub>yx</sub>	F value
Speed	Between	2.00	753.08	25.48	12.11	8.05	4.03	33.03*
	Within	41.00	765.60	5.01	2.67	5.00	0.12	
Endurance	Between	2.00	502.69	13.64	9.01	3.18	1.59	7.67*
	Within	41.00	515.68	8.48	5.81	8.41	0.21	
Agility	Between	2.00	1652.85	2.98	0.58	2.85	1.42	21.53*
	Within	41.00	1657.38	2.71	0.18	2.71	0.07	
Leg Endurance	Between	2.00	15021.63	1007.52	251.83	574.29	288.14	14.37*
	Within	41.00	15317.54	953.17	106.55	952.35	24.23	
Explosive Power	Between	2.00	1.63	0.04	0.03	0.03	0.01	12.69*
	Within	41.00	1.67	0.04	0.00	0.04	0.00	

\*P< 0.05

**Table II- Post -hoc analysis between groups**

Variables	Control	Plyometric	Circuit	M.D.	CD at 5% level
Speed	7.94		6.54	1.41*	0.26
	7.94	6.14		1.81*	
		6.14	6.54	0.39*	
Endurance	5.44		5.64	1.21*	0.34*
	5.44	6.99		1.55*	
		6.99	5.64	1.35*	
Agility	10.26		10.01	0.25*	0.19*
	10.26	9.64		0.63*	
		9.64	10.01	0.37*	
Leg Endurance	27.94		34.20	6.26*	5.63*
	27.94	40.12		12.18*	
		40.12	34.20	5.92*	
Explosive Power	0.36		0.40	0.04*	0.02*
	0.36	0.54		0.18*	
		0.54	0.40	0.14*	

\*P< 0.05



The analysis of data of the study revealed the following findings. The selected performance related variables namely speed, endurance, agility, leg endurance and explosive power had significantly improved after the training period of eight weeks. The improvement in explosive power and leg endurance are in agreement with the study conducted by Nimphiuset.al.,Vladanmilic et al., Amusa, Choudhary et.al., Granados et al., Blackeyl et.al., and Hombergen et.al. The basic nature of the training given to the subjects involved plyometric and circuit training. Tudor Bompa in his book "periodization in sports" has mentioned both plyometric and circuit training as a means of strength development. Moreover depth jumping is one of these specific methods to improve explosive strength.

The improvement in Agility and Speed can be attributed to the nature of the game Kho-Kho. This requires quick movements with unpredictable change of directions within a limited space. This findings is in consonance with the finding of Faigenbaumet.al. Granados et.al., Bellar and Tomescu, Hombergen et.al., Dellavalle and Hass. The subjects selected for the study were seasoned Kho-Kho players and therefore had already developed the basic fitness level. This would have helped them to endure the intensity of the training given for six weeks as a part of the study.

### Conclusion

On the basis of the findings of the study, the following conclusions were drawn:

Six weeks of Plyometric and Circuit training programme improved the following performance related variables of University level women Kho-Kho players.

1. Speed
2. Endurance
3. Agility
4. Leg Endurance
5. Explosive Power

After Six weeks training Plyometric group brought better changes in all the selected variables when compared to Circuit training group of University level women Kho-Kho players.

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