

Effects of Low Intensity Plyometric Training Combined with Aerobic Training on Explosive Power of School Kabaddi Players

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DOI: [10.36348/jaspe.2023.v06i11.001](https://doi.org/10.36348/jaspe.2023.v06i11.001)

| Received: 03.11.2023 | Accepted: 08.12.2023 | Published: 12.12.2023

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Abstract

The purpose of study was to find out the effects of low Intensity plyometric training combined with aerobic training on explosive power of school kabaddi players. To achieve the purpose of the study, thirty school kabaddi players in, Alagappa Fitness foundation, Karaikudi, Tamilnadu were selected as subject at random and their age group range between 13 to 15 years. The study was formulated as pre and posttest random group design, in which thirty subject were divided into three equal groups. The experimental group-1(n=10, LI-PT) underwent low intensity plyometric Training. The experimental group-2 (n=10, LI- PT-AT) underwent low intensity plyometric training combined with aerobic training and group 3 served as control group (n=10, CG) did not undergo any specific training. In this study, two training programme were adopted as independent variable, i.e., low intensity plyometric training, and low intensity plyometric training combined with aerobic training. The explosive power was selected as dependent variables, it was tested by vertical jump test. The selected two treatment groups were performed three days in a week for the period of eight weeks, as per the stipulated training program. The selected performance parameters were collected before and after the training period. The collected pre and post data was critically analyzed with apt statistical tool of analysis of co-variance, for observed the significant adjusted post-test mean difference of three groups with respect to each parameter. The scheffe's post hoc test was used to find out pair-wise comparisons between groups with respect to each parameter. To test the hypothesis 0.05 level of significant was fixed in this study. The results proved that the selected both training produce significant improvement on explosive power rather than the control group. However, plyometric training combined with aerobic training have produced greater improvement on explosive power than the plyometric training alone.

Keywords: Plyometric training, aerobic training, Explosive power, ANCOVA etc.

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INTRODUCTION

Now a day's fitness is considered as most important health indicators in childhood. The concept of physical fitness has since evolved to include morphological and metabolic components (Sutha, Maniazhagu, 2019). Different training methods have been commonly used to improve physical fitness and related standards of performance of athletes (Maniazhagu, 2010). Strength training is a long-term proposition. Athletes do not reach their highest level after four to six weeks from the beginning of the strength training program, but rather during the competitive phase, which is months away from the anatomical

adaptation phase (Sridhar, Maniazhagu, 2018). Plyometric training (PT) is one of popular methods of physical conditioning among individuals playing dynamic sports (Vaczi, J. Tollar, B. Meszler, I. Juhasz, and I. Karsai, 2013). It consists of an eccentric contraction of the musculotendinous muscle followed by an immediate concentric contraction of the same connective tissues and muscles, which often referred as stretch-shortening cycle (SSC) (G. Aloui *et al.*, 2021, Y. C. Wang and N. Zhang, 2016, P. Komi, 2003). There are many factors contributed to the popularity of PT, one of them is that plyometric training can be performed at any intensity levels, ranging from low-intensity exercise such

as double-leg hops to high intensity unilateral drills (Villareal, B. Requena, and R. U. Newton, 2010).

Aerobic exercise (also known as cardio) is physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Aerobic literally means “living in air”, and refers to the use of oxygen to adequately meet energy demands during exercise via aerobic metabolism. Generally, light-to-moderate intensity activities that are sufficiently supported by aerobic metabolism can be performed for extended periods of time. Team sport athletes require a high level of aerobic fitness in order to generate and maintain power output during repeated high-intensity efforts and to recover. Aerobic training works on developing the players’ aerobic capacity (Shreya Deshak, Swati D. Kajbaje, 2021).

METHODOLOGY

To achieve the purpose of the study, thirty school kabaddi players in, Alagappa Fitness foundation, Karaikudi, Tamilnadu were selected as subject at random and their age group range between 13 to 15 years. The study was formulated as pre and posttest random group design, in which thirty subject were divided into three equal groups. The experimental group-1 (n=10, LI-PT) underwent low intensity plyometric Training. The experimental group-2 (n=10, LI- PT-AT) underwent low intensity plyometric training combined with aerobic training and group 3 served as control group (n=10, CG) did not undergo any specific training. In this study, two training programme were adopted as independent variable, i.e., low intensity plyometric training, and low intensity plyometric training combined with aerobic training. The explosive power was selected as dependent variables, it was tested by vertical jump test. The selected two treatment groups were performed three days in a week for the period of eight weeks, as per the stipulated training program. The selected performance parameters were collected before and after the training period.

Experimental Group I: Low intensity plyometric training (LI-PT)

	Weeks	Repetition	Set	Recovery in between exercise	Recovery in between sets
1.Squad jump	1-2 Weeks	Each 6	2	1 minute	3 minutes
2.Vertical jump	3-4 Weeks	Each 8	2	1 minute	3 minutes
3.Standing broad jump	5-6 Weeks	Each 10	2	1 minute	3 minutes
4.Standing triple jump	7-8 weeks	Each 12	2	1 minute	3 minutes
5.Bike jump					

Experimental Group II: Low intensity Plyometric training combined with aerobic training (LI-PT-AT)

Experimental Group II (LI-PT-AT) performed low intensity plyometric training same as group I. after

completion of low intensity plyometric training they performed aerobic training in the following manner.

Aerobic training						
	Weeks	Repetition	Set	Recovery in between exercise	Recovery in between sets	
1 minute jog and 1 minute walk	1-2 Weeks	5	2	2	3 minutes	
1.5 minute jog and 1.5 minute walk	3-4 Weeks	5	2	2	3 minutes	
2 minute jog and 2 minute walk	5-6 Weeks	5	2	2	3 minutes	
2. 5 minutes jog and 2.5 minutes walk	7-8 weeks	5	2	2	3 minutes	

Table I: The Results of Analysis of Covariance on Explosive Power of Different Groups (Scores in Centimeters)

Test Conditions		G- 1 LI-PT	G- 2 LI-PTAT	G- 3 CG	SV	SS	Df	MS	‘F’ Ratio
Pre test	Mean	24.3	24.1	23.9	B	0.8	2	0.4	0.216
	S.D.	2.06	0.74	0.88	W	49.9	27	1.848	
Post test	Mean	26.2	27.4	22.8	B	0113.8	2	56.93	36.95*
	S.D.	1.87	0.69	0.79	W	41.6	27	1.54	
Adjusted post test	Mean	26.03	27.4	22.96	B	102.5	2	51.26	161.76*
					W	8.24	26	0.317	

* Significant at .05 level of confidence. The required table’s value for test the significance was 3.35 and 3.37, with the DF of 2 and 27, 2 and 26.

RESULTS OF EXPLOSIVE POWER

The pretest mean and standard deviation on explosive power scores of G1, G2, and G3 were 24.3 ± 2.06 , 24.1 ± 0.74 and 23.9 ± 0.88 respectively. The obtained pretest F value of 0.216 was lesser than the required table F value 3.35. Hence the pretest mean value of low intensity plyometric training, low intensity plyometric training combined with aerobic training and control group on explosive power before start of the respective treatments were found to be insignificant at 0.05 level of confidence for the degrees of freedom 2 and 27. Thus this analysis confirmed that the random assignment of subjects into three groups were successful.

The posttest mean and standard deviation on explosive power of G1, G2 and G3 were 26.2 ± 1.87 , 27.4 ± 0.69 and 22.8 ± 0.79 respectively. The obtained posttest F value of 36.95 was higher than the required table F value of 3.37. Hence the posttest means value of low intensity plyometric training, low intensity plyometric training combined with aerobic training on explosive power were found to be significant at 0.05 level of confidence for the degrees of freedom 2 and 27.

The results proved that the selected two training interventions namely low intensity plyometric training, low intensity plyometric training combined with aerobic training was produced significant improvement rather than the control group of the sample populations.

The adjusted posttest means on explosive power scores of G1, G2 and G3 were 26.03, 27.4 and 22.96 respectively. The obtained adjusted posttest F value of 161.76 was higher than the required table F value of 3.35. Hence the adjusted posttest means value of low intensity plyometric training, low intensity plyometric training combined with aerobic training on explosive power were found to be significant at 0.05 level of confidence for the degrees of freedom 2 and 26. The results confirm that the selected two training interventions namely low intensity plyometric training, low intensity plyometric training combined with aerobic training on explosive power were produced significant difference among the groups.

In order to find out the superiority effects among the treatment and control groups the Scheffe's post hoc test were administered. The outcomes of the same are presented in the Table I (a).

Table - I (a): Scheffe's Post Hoc Test Mean Differences on Explosive Power Among Three Groups (Scores in Centimeters)

G-1 LI-PT	G- 2 LI-PT-AT	G- 3 C G	Mean Differences	Confidence Interval Value
26.03	27.4		1.36*	0.8
26.03		22.96	3.07*	0.8
	27.4	22.96	4.43*	0.8

* Significant at .05 level of confidence.

Result of Scheffe's post hoc test on Explosive power

Table I (a) shows the paired mean differences of low intensity plyometric training, low intensity plyometric training combined with aerobic training and control group on explosive power. The pair wise comparison results as follows:

First comparison: Group 1 and 2: The pair wise mean difference of group 1 and group 2 values 1.36 was higher than the confidential value of 0.8. Hence the first comparison was significant. The results of this comparison clearly proved that both training have produced significantly different improvements on explosive power.

Second comparison: Group 1 and 3: The pair wise mean difference of group 1 and group 3 values 3.07 was higher than the confidential value of 0.8. Hence the

second comparison was significant. The results of this comparison clearly proved that low intensity plyometric training, have produced greater improvements on explosive power than the control group.

Third comparison: Group 2 and 3: The pair wise mean difference of group 2 and group 3 values 4.43 was higher than the confidential value of 0.8. Hence the third comparison was significant. The results of this comparison clearly proved that low intensity plyometric training combined with aerobic training have produced greater improvements on explosive power than the control group.

The adjusted post test mean deference of experimental and control group value graphically represented in the Figure 1.

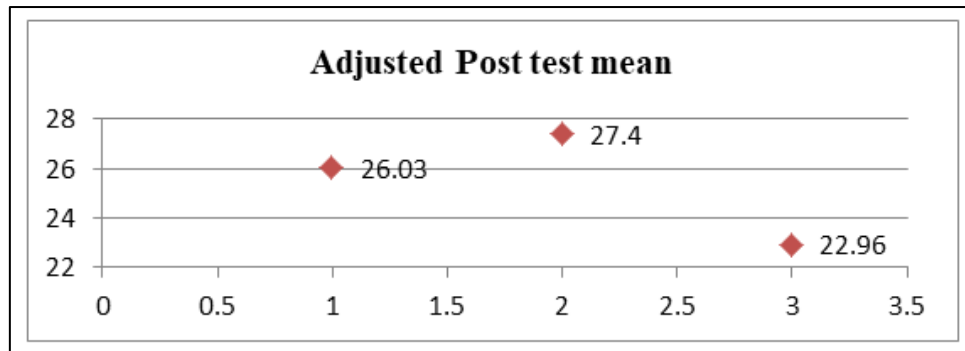


Figure 1: The Adjusted Post Test Mean Values of Experimental and Control Groups on Explosive Power (Scores in Centimeters)

DISCUSSION ON FINDINGS

The aim of the study was to compare the effects of low intensity plyometric training combined with aerobic training on explosive power of school kabaddi players. The findings of the study showed that the low intensity plyometric training combined with aerobic training produced similar effects on explosive power. The following earlier studies are in line with the present study findings. V. Senthil Kumar and Maniazhagu (2014) found that the twelve weeks of circuit resistance training improved the ability of motor fitness variables in college students. Chen, WH, Wu, HJ, Lo, SL, Chen, H, Yang, WW, Huang, CF, and Liu, C (2018) found that the battle rope training effectively improves the multiple physical fitness and shooting accuracy in basketball players. Muktamath, D Maniazhagu, Muktamatha, Basavaraj (2010) investigated a study on two modes of resistance training, they found that the after the 8 weeks of training intervention produced significant improvement on speed, leg explosive power, anaerobic power. Manal Azab (2019) investigated a study on battle rope exercises on power and leaping ability in rhythmic gymnastics. They found that the 10 weeks of battle rope training resulted to increase power and leaping ability for female college students. KS Sridhar and Maniazhagu (2018) investigated a study on explosive strength and strength endurance-based circuit training. They found that the explosive strength-based circuit training improved the nature of explosive power. Senthil kumar and Mohammed Abdul Kaddafi (2021) conducted a study to find the effects of low intensity circuit training and high intensity circuit training. They proved that the eight weeks of low intensity circuit and high intensity circuit produced significant improvement on explosive power. T. Santhos and Maniazhagu (2019) investigated a study on own body exercises combined with neuromuscular drills on explosive power. They found that the explosive power was improved in experimental groups. Souhail Hermassi, Kevin Laudner, Rene Schwesig (2020) found that the 12 week of circuit strength training is an effective method to improve the handball related skills. Sankaran and Maniazhagu (2018) investigated a study on effects of low intensity plyometric training combined with stretching exercises on explosive power. After the 12 weeks of training

interventions the explosive power was improved in low intensity plyometric training combined with static stretching.

CONCLUSION

After the 8 weeks of low intensity plyometric training and low intensity plyometric training combined with aerobic training have produced the increase in performance of explosive power in kabaddi players. However, low intensity plyometric training combined with aerobic training have produced greater effect on explosive power than the low intensity plyometric training.

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