

EFFECTS OF LOW INTENSITY PLYOMETRIC TRAINING COMBINED WITH AEROBIC TRAINING ON FLEXIBILITY

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ABSTRACT

The objective of the present study was to know the effects of low intensity plyometric training combined with aerobic training on flexibility. Thirty subjects were randomly assigned into three equal groups. They were assigned to experimental group-1, experimental group-2 and control group. The experimental group-1 (n=10, LI-PT) and group-2 (n=10, LI-PT-AT) received low intensity plyometric training and low intensity plyometric training combined with aerobic training respectively for eight weeks, three times a week. Flexibility was measured by sit and reach test and performance of flexibility was recorded in centimetres. After 8 weeks, the low intensity plyometric training and low intensity plyometric training combined with aerobic training demonstrated significant improvement by 0.05% on flexibility rather than control group. The nature of flexibility highly developed in the influences of low intensity plyometric training and low intensity plyometric training combined with aerobic training than the control group.

Key Words: 1.Plyometric training, 2.Aerobic training, 3.Low intensity, 4. ANCOVA, 5. Flexibility

INTRODUCTION

Plyometric exercise is a popular form of training used to improve athletic performance. It involves a stretch of the muscle-tendon unit and immediately followed by a shortening of the muscle unit. This process of muscle lengthening followed by rapid shortening during the stretch-shortening cycle (SSC) is integral to plyometric exercise. The SSC process significantly enhances the ability of the muscle-tendon unit to produce maximal force in the shortest amount of time. These benefits have prompted the use of plyometric exercise as a bridge between pure strength and sport-related power and speed. Plyometric exercises have been described as activities that involve maximal effort, such as high intensity depth jumps. (Donald, Myer, 2013) Aerobic metabolism plays a vital role in human performance and is basic to all sports, if for no other reason than recovery. Metabolically, the Krebs cycle and electron transport chain are the main pathways in energy production. Aerobic metabolism produces far more ATP energy than anaerobic metabolism and uses fats, carbohydrates and proteins (Dudley, 1985).

The range of movement in a joint or sequence of joints is known as flexibility. For example, touching of fingers to toes while sitting or standing without bending knees. Strength alone will not assure success in any sport. It is usable strength that is the key, the strength which can be applied to the body to make it more laster, change speed, change the direction of body movement, put a greater speed into a cricket bat or racket head, or make the pull on an oar faster and longer. Hence, while strength is a dominant factor one must also call upon skill, mobility and speed a pupil will not be able to hold the tennis racket as instructed if he does not have sufficient strength. Moreover, lack of sufficient strength results in rapid muscular fatigue, which limits the amount of practice time available for learning skills (Mohammad Ashraf Khan, Sumia Ramzan, 2016).

Kabaddi is basically a combative sport, with seven players on each side; played for a period of 40 minutes with a 5 minutes break (20-5-20). The core idea of the game is to score points by raiding into the opponent's court and touching as many defense players as possible without getting caught on a single breath. One player chanting Kabaddi, Kabaddi, Kabaddi, charges into the opponent court and try to touch the opponent closest to him, while the seven opponents make manoeuvres to catch the attacker. In other words, the match of one against seven, known as the game of struggle (Sudhakara Babu Mande, 2016).

METHODOLOGY:

The study was formulated as pre and post test random group design, in which thirty school Kabaddi players between 13 to 15 years were selected as subjects from, Amritsar and Gurdaspur Districts of Punjab. During training, the experimental groups underwent their respective training as per schedule given below. Control group maintained normal activities.

Statistical Analysis:

The collected pre and post data was critically analyzed with apt statistical tool of analysis of co-variance (ANCOVA), for observed the significant adjusted post-test mean difference of three groups. The Scheffe's post hoc test was used to find out pair-wise comparisons between groups. To test the hypothesis 0.05 level of significant was fixed in this study.

Training Approaches

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

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

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

Low intensity Plyometric training

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

Aerobic training

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

TABLE-I
THE RESULTS OF ANALYSIS OF COVARIANCE ON FLEXIBILITY OF DIFFERENT GROUPS
(Scores in centimetres)

Test Conditions		G- 1 LI-PT	G- 2 LI-PT-AT	G- 3 CG	SV	SS	Df	MS	'F' Ratio
Pre test	Mean	15.1	15.02	15.2	Between	0.67	2	0.03	0.32
	S.D.	0.74	1.14	1.14	Within	28.1	27	1.04	
Post test	Mean	19.9	19.9	14.2	Between	216.6	2	108.3	99.46*
	S.D.	0.99	1.1	1.03	Within	29.4	27	1.089	
Adjusted post test	Mean	19.95	19.9	14.2	Between	219.6	2	109.8	265.87*
					Within	10.74	26	0.41	

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

Results of Flexibility

The pre test mean and standard deviation on flexibility scores G1, G2, and G3 were 15.1 ± 0.74 , 15.2 ± 1.14 and 15.2 ± 1.14 respectively. The obtained pre test F value of 0.32 was lesser than the required table F value 3.35. Hence the pre test means value of low intensity plyometric training, low intensity plyometric training combined with aerobic training and control group on flexibility 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 post test mean and standard deviation on flexibility of G1, G2 and G3 were 19.9 ± 0.99 , 19.9 ± 1.1 and 14.2 ± 1.03 respectively. The obtained post test F value of 99.46 was higher than the required table F value of 3.37. Hence the post test means value of low intensity plyometric training, low intensity plyometric training combined with aerobic training on flexibility 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 produced significant improvement rather than the control group of the sample populations.

The adjusted post test means on flexibility scores of G1, G2 and G3 were 19.95, 19.9 and 14.2 respectively. The obtained adjusted post test F value of 265.87 was higher than the required table F value of 3.35. Hence the adjusted post test means value of low intensity plyometric training ,low intensity plyometric training combined with aerobic training on flexibility 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 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 FLEXIBILITY AMONG THREE GROUPS
(Scores in centimetres)

G-1 LI-PT	G- 2 LI-PT-AT	G- 3 C G	Mean Differences	Confidence Interval Value
19.95	19.9		0.81	0.91
19.95		14.2	5.78*	0.91
	19.9	14.2	5.7*	0.91

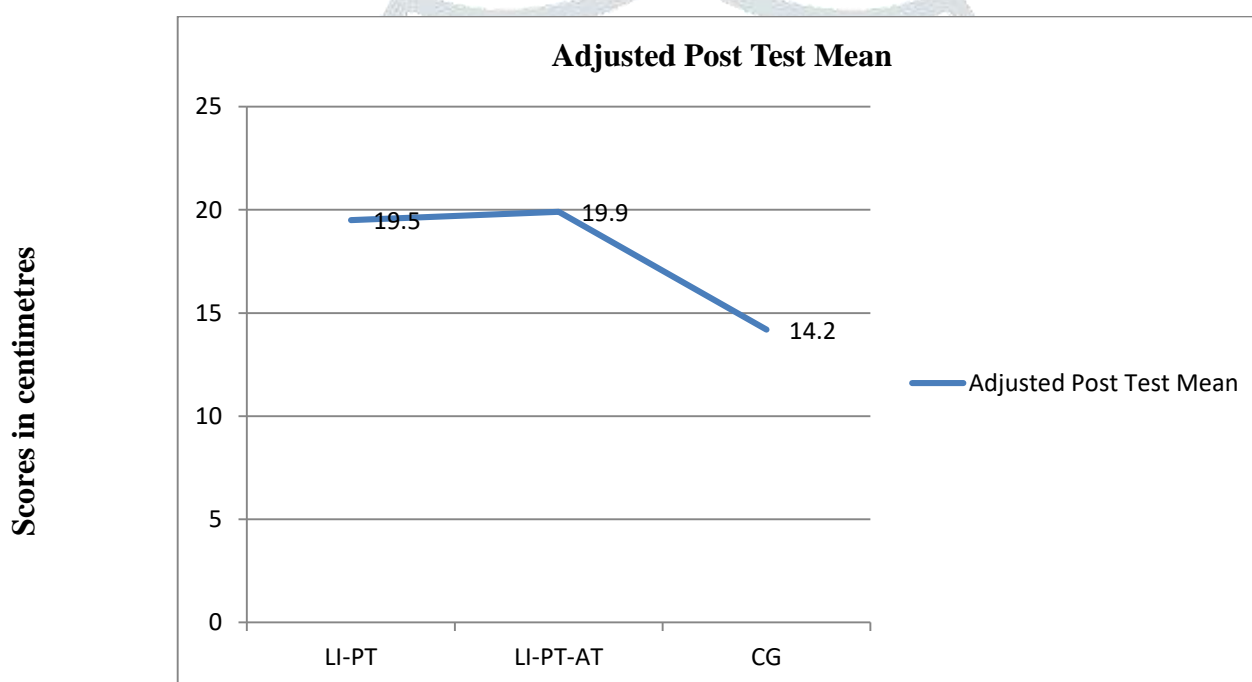
* Significant at .05 level of confidence.

Result of Scheffi's post hoc test on Flexibility

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 flexibility. The paired wise comparisons results as follows. **First comparison: Group 1 and 2:** The pair wise mean difference of group 1 and group 2 values 0.81 was lesser than the confidential interval value 0.91. Hence the first comparison was insignificant. The results of this comparison clearly proved that both training have produced similar effects on flexibility. **Second comparison: Group 1 and 3:** The pair wise mean difference of group 1 and group 3 values 5.78 was higher than the confidential interval value of 0.91. Hence the second comparison was significant. The results of this comparison clearly proved that low intensity plyometric training, have produced greater improvements on flexibility than the control group. **Third comparison: Group 2 and 3:** The pair wise mean difference of group 2 and group 3 values 5.7 was higher than the confidential interval value of 0.91. 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 flexibility than the control group.

The adjusted post test mean deference of experimental and control group value graphically represented in the figure1.

FIGURE1



Discussion on Findings

The results of the present study were demonstrated positive effect on the flexibility. This results of the present study in line with the following studies. The findings of the study in plyometric training effect on flexibility in female pubertal gymnasts demonstrated that the plyometrics training is an effective training approach in improving flexibility in particular, and thus in prevention of musculoskeletal injuries in female (Ritesh Gaigole, Shubhangi and P.Patil 2016). The study, effect of plyometric exercises on flexibility of Kho-Kho players, also shown that there was significant effect on flexibility of Kho-Kho players through the plyometric training after four weeks training programme. (Mohammad Ashraf Khan, Sumia Ramzan, 2016). A study the effect of core and plyometric exercises on soccer players exposed that 8-week core exercises implemented on soccer players have been more effective in flexibility due to the plyometric exercises. (Yakup Akif Afyon, 2014). The results of the effect of plyometric training on specific physical abilities in long jump athlete showed the benefits of plyometric training can have on flexibility (Mohamed Abd El-Mawgoud Elsayed. 2012). In another study, the effects of circuit training and plyometric training on selected physical fitness variables (speed, flexibility, muscular strength and muscular endurance) of the male schoolchildren's revealed that after eight weeks of training, flexibility no significant proved of between experimental groups(Mahesh Yadav, 2017).

CONCLUSION

The nature of flexibility highly improved in the influences of 8 weeks low intensity plyometric training and low intensity plyometric training combined with aerobic training than the control group.

Further the study proved that the nature of flexibility similar in both experimental groups.

The control group did not show any significant difference on flexibility.

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