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Effect of plyometric training on take-off and touch-down of male hurdlers in 400 meters hurdle race

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Abstract
The present study was conducted to investigate the "Effect of plyometric training on take-off and touch-down of male hurdlers in 400 meters hurdle race". Fourteen male sports person between the age group of 25-28 were selected through purposive random sampling technique from Government degree college pattan, baramulla, Jammu and Kashmir. Experimental design was applied in which the subjects were tested twice i.e. pre-test and post –test was conducted and recorded. Subjects were divided into two groups i.e. Experimental and Control group. Training of plyometric training was imparted for twelve weeks followed by post test. Training program was not given to Control Group. Take-off distance, touch-down distance and take-off and touch-down timings were measured by measuring tape and stop watch. The results of the investigation showed insignificant difference in all variables except touch-down timings. Suggesting that plyometric training can be used as effective tool for the hurdlers. Level of significance was tested at 0.05 level.

Keywords: plyometric training, take-off, touch-down, hurdlers and 400mtrs race

Introduction

Speed and strength are integral components of fitness that can be found in varying degrees in all athletic movements. In scientific terms product or combination of speed and strength is power. For many years coaches and athletes have sought to improve power in order to enhance performance. Throughout this century and no doubt long before jumping, bounding and hopping exercises have been used in various ways to enhance athletic performance. In recent years this distinct method of training for power or explosiveness has been termed plyometrics. Whatever the origins of the word the term is used to describe the method of training which seeks to enhance the explosive reaction of the individual through powerful muscular contractions as a result of rapid eccentric contractions.

Plyometric is a type of exercise training designed to produced fast, powerful movements, and improve the function of the nervous system, generally for the purpose of improving performance in a specific sport. Plyometric movements, in which a muscle is loaded and then contracted in rapid sequence, use the strength, elasticity and innervations of muscle and surroundings tissues to jump higher, run faster, or hit harder, depending on the desired training goal. Plyometric is used to increase the force of muscular contraction, often with the goal of increasing the height of a jump. Plyometric Training Exercises was designed to produce fast, powerful movements of own body weight. Plyometric training can be so beneficial to basketball players are that, unlike standard weightlifting, they improve the explosion of the leg muscles rather than simply building strength and muscle mass. Players should incorporate basketball plyometrics into their workouts gradually and should be sure to include plenty of rest intervals in the workout so that the body can recover sufficiently between sets and between exercises. Chu (1991) [2] and Martino (2008) [20] also conducted a study on a group and found that an anaerobic power significantly improved pre to post-4 in both groups.

Vertical jumps of plyometrics can change the values greatly, from 22 to 48 cm in female players and from 40 to 75 cm in male players. (Ziv G *et al*. 2010) [28]. John Shaji (2009) [15] also studies to examine the effects of plyometric training following a four-week training program on vertical jump height, forty-yard dash and anaerobic power. The results of the study show that plyometric training significantly improves anaerobic power and single leg vertical jump height independent of one another. (T Bury 2006) [25] Effectiveness of strength training combines with plyometric training on physical performance in preadolescent players of soccer game the results clearly indicate that participation in a supervised of strength and plyometrics exercise can improve athletic performance in preadolescent soccer players. (Markovic G. 2007) [19] conducted a research on effect of plyometric training on vertical jump height in healthy individuals. These results justify the application of plyometric training for the purpose of development of vertical jump performance in healthy individuals. (French D. 2009) [10, 26]. compared the effects of two plyometric training technique on power and agility in youth soccer player. The study concludes that both depth jump and countermovement jump plyometrics are worthwhile training activities for improving power and agility in youth soccer players.

Significance of the problem

Plyometric training is very much beneficial for the improvement of various muscle groups of various sports. For example volley ball player is interested in increasing the vertical jump height by plyometric training, javelin thrower improve his upper body strength for more explosive launch.

The aim of plyometric training is to improve muscle power. The study was recognized the effect of plyometric training on take-off and touch-down of male hurdlers in 400 meters hurdle race

Statement of the problem

The problem is stated as "Effect of Plyometric Training on Take-Off and Touch-Down of Male Hurdlers in 400 Meters Hurdle Race"

Objectives of the study

1. To find the effect of plyometric training on take-off distance of first hurdle of experimental group.
2. To find out the effects on take-off distance of fifth hurdle of experimental group in 400mtrs race.
3. To detect the effect of plyometric training on touch-down distance of first hurdle of experimental group.
4. To know whether plyometric training effect touch-down distance of fifth hurdle of experimental group significantly or not.
5. Evaluation of twelve weeks of plyometric training regarding touch-down distance of ninth hurdle of experimental group.
6. To find out the effect of take-off and touch-down timings of first hurdle of experimental group.
7. To detect the effect of plyometric training on take-off and touch-down of fifth hurdle of experimental group.
8. To find out the effect of plyometric training on take-off and touch-down of ninth hurdle of experimental group.

Hypotheses

1. Significant effect of plyometric training on take-off distance of first hurdle of experimental group was hypothesized.
2. It is hypothesized that there will be significant effect of plyometric training on take-off distance of fifth hurdle of experimental group in 400mtrs race.
3. It is hypothesized that there will be significant effect of plyometric training was on take-off distance of ninth hurdle of experimental group.
4. There will be significant effect of plyometric training on touch-down distance of first hurdle of experimental group.
5. Significant effect will be found not found on the touch-down distance of fifth hurdle of experimental group.
6. Twelve weeks of plyometric training will effect significantly when touch-down distance of ninth hurdle of experimental group will be measured.
7. It was hypothesized that take-off and touch-down timings of first hurdle of experimental group will be significant.
8. Plyometric training will effect take-off and touch-down of fifth hurdle significantly.
9. Take-off and touch-down of ninth hurdle of experimental group will have significant effect twelve weeks of plyometric training.

Delimitations of the study

1 Male of twenty five to twenty eight years was considered as the samples for the study.

2 Study was delimited to Govt. degree College pattan, baramulla, Jammu and Kashmir.

3 Effect of plyometric exercises were considered for the study.

Method and Procedure

Sampling

Study comprises of fourteen male samples between the age group of 25 to 28 years from Govt. degree College pattan, baramulla, Jammu and kashmir. Selections of the samples were made through purposive sampling technique. Population of the study comprises of the youth from BaramullaS district. From fourteen selected youth, they were divided in two groups of seven each i.e. Control group (G1) of seven subjects and Experimental group (G2) of seven subjects. For the purpose of study pre-test, post-test equivalent group design was used.

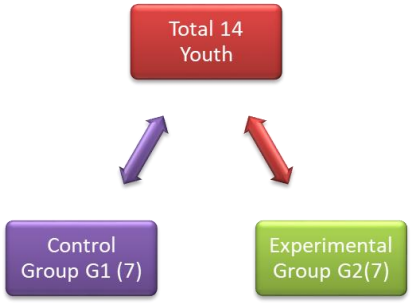

Table 1

Week	Name of exercise	Sets	Repetation	Time	Intensity
1-2	Upper body exercise				
	Explosive start throw	3	15 each sets	20 sec	High Intensity
	Medicine ball sit-up	3	15 each sets	30 sec	Medium Intensity
	Overhead throw	3	15 each sets	25 sec	High Intensity
	Lower body exercise				
	Jump to box	3	15 each sets	30 sec	Medium Intensity
	Depth jump	3	15 each sets	20 sec	High Intensity
	Lateral box push-offs	3	15 each sets	30 sec	Medium Intensity
	Tuck Jumps	3	15 each sets	20 sec	High Intensity
3-5	Upper body exercise				
	Overhead backward throw	5	20 each sets	20 sec	Medium Intensity
	Plyometric sit ups	5	20 each sets	30 sec	High Intensity
	Plyometric push-ups	5	20 each sets	20 sec	Medium Intensity

	Lower body exercise				
	Single leg speed hop	5	20 each sets	30 sec	High Intensity
	Tuck jumps	5	20 each sets	20 sec	Medium Intensity
	Jump to box	5	20 each sets	30 sec	High Intensity
	Zigzag hops	5	20 each sets	20 sec	Medium Intensity
6-8	Upper body exercise				
	Plyometric push-ups	8	25 each sets	30 sec	High Intensity
	Clap push-ups	8	25 each sets	25 sec	Medium Intensity
	Medicine ball push-ups	8	25 each sets	30 sec	High Intensity
	Lower body exercise				
	Jump to box	8	25 each sets	25 sec	Medium Intensity
	Depth jumps	8	25 each sets	30 sec	High Intensity
	Squat jump	8	25 each sets	25 sec	Medium Intensity
	Lateral box push-offs	8	25 each sets	30 sec	High Intensity
9-12	Upper body exercise				
	Overhead throw	12	30 each sets	30 sec	Medium Intensity
	Explosive start throw	12	30 each sets	25 sec	High Intensity
	Plyometric sit-ups	12	30 each sets	35 sec	Medium Intensity
	Lower body exercise				
	Zigzag hops	12	30 each sets	25 sec	High Intensity
	Tuck jumps	12	30 each sets	30 sec	Medium Intensity
	Squat jumps	12	30 each sets	25 sec	High Intensity
	Single leg lateral hops	12	30 each sets	30 sec	Medium Intensity

Medium Intensity: - 65 to 75 %
High Intensity: - 75 to 85 %

Tools

1. The stopwatch was used as the tool to measure the intensity of the plyometric exercise during training.
2. The boxes of different height were used for plyometric training.
3. The steel tape was used for measurement purpose.
4. The medicine ball was used for upper body plyometric exercises.
5. The whistle was used to control the training.

Administration of the training programme

Table 2

Days	Plyometric Exercises
Monday	Warm-up, Upper Body (Plyometric Exercise) Stretching exercise.
Tuesday	Warm-up, Lower Body (Plyometric Exercise) Stretching exercise.
Wednesday	Warm-up, Upper Body (Plyometric Exercise) Stretching exercise.
Thursday	Warm-up, Lower Body (Plyometric Exercise) Stretching exercise.
Friday	Warm-up, Upper Body (Plyometric Exercise) Stretching exercise.
Saturday	Warm-up, Lower Body (Plyometric Exercise) Stretching exercise.

Statistical Techniques

Mean score was calculated from the pre-test and the post-test value of two groups and t-test was applied to find out the significant difference between the groups.

Results and discussion

Owing to the analysis of the results of the present study, the following conclusions have been drawn.

1. There is no significant effect of plyometric training on take-off distance of first hurdle of experimental group.
2. Plyometric training do not effect the take-off distance significantly of fifth hurdle of experimental group in 400mtrs race.
3. Plyometric training has insignificant impact of take-off distance of ninth hurdle of experimental group.
4. There was significant effect of plyometric training on touch-down distance of first hurdle of experimental group.
5. Significant effect was not found on the touch-down distance of fifth hurdle of experimental group.
6. Twelve weeks of plyometric training has significantly affected the touch-down distance of ninth hurdle of experimental group.
7. When take-off and touch-down timings of first hurdle of experimental group were analyzed it was found that twelve weeks of plyometric training has significantly affected the timings.
8. Plyometric training has not affected take-off and touch-down of fifth hurdle significantly of experimental group.
9. Take-off and touch-down of ninth hurdle of experimental group have not affected significantly with twelve weeks of plyometric training.

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