

Combined Effect of Jump Rope Training Associated with Plyometric Training on Agility Balance and Speed Endurance among Inter Collegiate Hockey Players

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Abstract: The purpose of the study was to find out the combined effect of Jump Rope Training Associated with plyometric Training on agility balance and speed endurance among Inter Collegiate Hockey Players. Thirty Six (36) male Hockey players those who are studying Bachelor degree from Rajapalayam Rajus' College and Senthikumara Nadar College, Virudhunagar were selected randomly as subjects. The Hockey players from the above mentioned colleges were restricted to act as subjects for this study. The age of the subjects ranged from 18 to 23 years. The selected subjects were divided into two groups. Group I underwent Jump Rope Training associated with Plyometric Training (JRTAWPT) and Group II acted as control (CG). The experimental group (Jump rope training associated with circuit training) was subjected to do specific training for five days (Monday, Tuesday, Wednesday, Thursday and Friday) for up to eight weeks. The training was restricted to practice on the morning session. The Jump rope training associated with circuit training was selected as Independent Variable and the criterion variables Agility, Balance and Speed Endurance were selected as dependent variables and the selected dependent variables were assessed by the standardized test items. Agility was assessed by 4x10 Mts Shuttle Run and the unit of measurement in seconds and Balance was assessed by Stork Stand Test and the unit of measurement in Seconds and the speed Endurance was assessed by 150 Meters Run and the unit of measurement in seconds. The experimental design selected for this study was pre and post test randomized design. The data were collected from each subject before and after the training period and statistically analyzed by using paired sample 't' test and analysis of covariance (ANCOVA). It was found that there was a significant improvement and significant difference exists due to the combined effect of Jump rope Training Associated with Plyometric Training on Agility, Balance and Speed Endurance among Inter Collegiate Hockey Players.

Introduction

Jump Rope Training (JRT) was probably introduced to America in the 1600s by the Dutch settlers of New Amsterdam. It may surprise that, a long time rope jumping was strictly a body's activity, at least in Western culture. The 1960s found jump ropes primarily in the hands of school children during the play time. They began to teach rope jumping as an exercise with superior athletic training properties. The late 1960s and the 1970s heralded a new era for exercise, including jump roping. Although a variety of people had long insisted that exercise was important for physical health and emotional well-being. It wasn't until this time that the scientific evidence was persuasive enough to substantiate their claims. Health experts were then able to convince the public that our sedentary life styles were increasing our risk for the heart disease, obesity, low back pain, certain types of cancer, osteoporosis, and depression, to name a few. Jump rope training showed that regular exercise like rope jumping not only reduced the likelihood of these alignments; it even often reversed them. (Solis, 1992).

Since 1978 The American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) and the American Heart Association (AHA) have vigorously promoted rope jumping through their sponsorship of Jump Rope for Heart (JRFH), the world's biggest event in rope jumping. **Sakure, (2024)** JRFH takes place primarily in elementary schools. Rope jumping insisted to educate the participants and the community about the heart disease and to familiarize participants with habits like rope jumping that promotes health (**Solis, 1992**).

The term Plyometrics and stretch shortening cycle are used synonymously by some authors, whereas others use the term stretch – shortening cycle instead of Plyometric to differentiate from the literal translation of the Greek word Pliometric (Plio – more, Plythein – increase, metric – measure), meaning “to increase the measurement. The use of terminology often seems to differ by field of study. In the physiology literature, the term stretch-shortening cycle is used to describe activities such as running, jumping, and throwing. However, in the rehabilitation and conditioning literature, the term Plyometric is used to describe these activities when they are part of training designed to capitalize on the maximizing force production or enhancing performance (**Chu and Myer, 2013**).

Plyometrics is a method of mounting explosive power, and significant module of physical performance. From a realistic point of view plyometric training is comparatively easy to educate and learn, and it places smaller amount bodily demands on the remains than strength or endurance training. Plyometric quickly is becoming an essential part of the overall training programme in many sports. From a physiological point of view, plyometrics is confounding. Practical experience supports yet do not fully appreciate how it's works. Although some of the basic nuro muscular processes fundamental plyometrics are known, little research has been done on what actually occurs at this level as a result of plyometric training (**Radcliffe & Farentinos, 1985**).

The origin of the term plyometrics taught to be derived from Greek word “Pleythein”, meaning to augment or to increase, or from the Greek root words “plio” and “metric”, meaning more and measure, respectively. Today plyometrics refers to exercise characterized by powerful muscular contractions in response to rapid, dynamic loading or stretching of the involved muscles. Plyometric movements are performed in wide spectrum of sports in which power is useful. Most sports can be played more skilful when athletes have the power that combines strength and speed. Plyometric is one of the best way is to develop explosive power for sports (**Radcliffe & Farentinos, 1985**).

Methodology

To achieve the purpose, thirty six (36) male hockey players those who are studying Bachelor degree from Rajapalayam Raju's College and Senthikumara Nadar College, Virudhunagar were selected randomly as subjects. The hockey players from the above mentioned colleges were restricted to act as subjects for this study. The age of the subjects ranged from 18 to 23 years. The selected subjects were divided into two groups. The study restricted to select the male hockey players as a subject of the study. They were assigned randomly into two groups (Group I) underwent Jump Rope Training Associated with Plyometric Training (JRTAWPT) and (Group II) acted as control (CG) of eighteen each. The experimental group were subjected to the Jump rope training associated with plyometric training (JRTAWPT) during the evening hours for five days (Monday, Tuesday, Wednesday, Thursday and Friday). The training was restricted to practice on the morning session and Group II acted as control. **Kabadagi, (2024)** The control group was instructed to practice their regular routine work of the morning hours. The Jump Rope Training Associated with Plyometric Training (JRTAWPT) was selected as Independent Variable and the criterion variables Agility, Balance and Speed Endurance were selected as dependent variables and the selected dependent variables were assessed by the standardized test items. Agility was assessed by 4x10 Mts Shuttle Run and the unit of measurement in seconds, balance was assessed by stork Stand test and the unit of measurement in seconds, and the speed endurance was measured by

150 meters run and the unit of measurement in seconds. The experimental design selected for this study was pre and post randomized design. **Mugadlimath, (2024)** The data were collected from each subject before and after the training period and statistically analysed by using paired sample 't' test and analysis of co variance (ANCOVA).

Training Programme

Training Schedule for Plyometric Training

Week	Name of the Exercise	Intensity	Reps	Sets	Recovery
I Week	Med ball Box Jump	45%	6-8	2	50 Sec
	Box Skip	45%	6-8	2	50 Sec
	Alternate Leg Bound	45%	6-8	2	50 Sec
	Double Leg Bound	45%	6-8	2	50 Sec
	Lateral Bound	45%	6-8	2	50 Sec
	Double Leg Box Bound	45%	6-8	2	50 Sec
	Ankle Box Hop	45%	6-8	2	50 Sec
	Single Leg Stride Jump	45%	6-8	2	50 Sec
	Med Ball Twister	45%	6-8	2	50 Sec
	Depth Jump	45%	6-8	2	50 Sec
II Week	Med ball Box Jump	50%	8-10	2	60Sec
	Box Skip	50%	8-10	2	60Sec
	Alternate Leg Bound	50%	8-10	2	60Sec
	Double Leg Bound	50%	8-10	2	60Sec
	Lateral Bound	50%	8-10	2	60Sec
	Double Leg Box Bound	50%	8-10	2	60Sec
	Ankle Box Hop	50%	8-10	2	60Sec
	Single Leg Stride Jump	50%	8-10	2	60Sec
	Med Ball Twister	50%	8-10	2	60Sec
	Depth Jump	50%	8-10	2	60Sec
III Week	Med ball Box Jump	60%	8-12	3	70 Sec
	Box Skip	60%	8-12	3	70 Sec
	Alternate Leg Bound	60%	8-12	3	70 Sec
	Double Leg Bound	60%	8-12	3	70 Sec

	Lateral Bound	60%	8-12	3	70 Sec
	Double Leg Box Bound	60%	8-12	3	70 Sec
	Ankle Box Hop	60%	8-12	3	70 Sec
	Single Leg Stride Jump	60%	8-12	3	70 Sec
	Med Ball Twister	60%	8-12	3	70 Sec
	Depth Jump	60%	8-12	3	70 Sec
IV Week	Med ball Box Jump	65%	8-12	4	70 Sec
	Box Skip	65%	8-12	4	70 Sec
	Alternate Leg Bound	65%	8-12	4	70 Sec
	Double Leg Bound	65%	8-12	4	70 Sec
	Lateral Bound	65%	8-12	4	70 Sec
	Double Leg Box Bound	65%	8-12	4	70 Sec
	Ankle Box Hop	65%	8-12	4	70 Sec
	Single Leg Stride Jump	65%	8-12	4	70 Sec
	Med Ball Twister	65%	8-12	4	70 Sec
	Depth Jump	65%	8-12	4	70 Sec

Training Schedule For Jump Rope Training

Week	Name of the Exercise	Jump Time	No of Jumps	Reps	Sets	Recovery
Week I	Bounce Step	20 Sec	30	2	2	50 Sec
	Alternate Foot Step	20 Sec	25	2	2	50 Sec
	High Step	20 Sec	25	2	2	50 Sec
	Side Straddle	20 Sec	25	2	2	50 Sec
	Forward Straddle	20 Sec	25	2	2	50 Sec
	Skier's Jump	20 Sec	25	2	2	50 Sec
	Bell Jump	20 Sec	25	2	2	50 Sec
	Half Twister	20 Sec	25	2	2	50 Sec

Week	Name of the Exercise	Jump Time	No of Jumps	Reps	Sets	Recovery
Week II	Bounce Step	20 Sec	40	3	2	70 Sec
	Alternate Foot Step	20 Sec	35	3	2	70 Sec
	High Step	20 Sec	35	3	2	70 Sec
	Side Straddle	20 Sec	35	3	2	70 Sec
	Forward Straddle	20 Sec	35	3	2	70 Sec
	Skier's Jump	20 Sec	35	3	2	70 Sec
	Bell Jump	20 Sec	35	3	2	70 Sec
	Half Twister	20 Sec	35	3	2	70 Sec
Week	Name of the Exercise	Jump Time	No of Jumps	Reps	Sets	Recovery
Week III	Bounce Step	35 Sec	50	2	2	90 Sec
	Alternate Foot Step	35 Sec	45	2	2	90 Sec
	High Step	35 Sec	45	2	2	90 Sec
	Side Straddle	35 Sec	45	2	2	90 Sec
	Forward Straddle	35 Sec	45	2	2	90 Sec
	Skier's Jump	35 Sec	45	2	2	90 Sec
	Bell Jump	35 Sec	45	2	2	90 Sec
	Half Twister	35 Sec	45	2	2	90 Sec
Week	Name of the Exercise	Jump Time	No of Jumps	Reps	Sets	Recovery
	Bounce Step	35 Sec	55	3	2	120 Sec
	Alternate Foot Step	35 Sec	50	3	2	120 Sec
	High Step	35 Sec	50	3	2	120 Sec

Week IV	Side Straddle	35 Sec	50	3	2	120 Sec
	Forward Straddle	35 Sec	50	3	2	120 Sec
	Skier's Jump	35 Sec	50	3	2	120 Sec
	Bell Jump	35 Sec	50	3	2	120 Sec
	Half Twister	35 Sec	50	3	2	120 Sec

Results And Discussion

The data pertaining to the variables in this study were examined by using paired sample 't' test to find out the significant improvement and analysis of covariance (ANCOVA) for each variables separately in order to determine the difference and tested at 0.05 level of significance. The analysis of paired sample 't' test on a data obtained for Horizontal Explosive Power, Vertical Explosive Power and Speed of the pre and post test means of experimental and control groups have been analysed and presented in Table I

Table- I Mean And Paired Sample 'T' Test Of Experimental And Control Groups On Selected Variables

Variables	Mean	Jump Rope Training Associated with Plyometric Training	Control Group
Agility	Pre test Mean	9.92	9.83
	Post test Mean	9.79	9.84
	't' test	7.08*	1.46
Balance	Pre test Mean	98.00	98.72
	Post test Mean	98.94	98.66
	't' test	9.63*	1.00
Speed Endurance	Pre Test Mean	18.42	18.48
	Post Test Mean	18.32	18.48
	't' test	9.63*	1.00

Significant at 0.05 level of confidence (17) = 2.110

The obtained paired sample 't' ratio value on Agility, Balance and Speed Endurance of experimental group is higher than the table value, it is understood that the combined effect of Jump Rope training associated with Plyometric Training has made significant improvement on Agility, Balance and Speed Endurance . However, the control group has not made significant improvement as the obtained 't' value is less than the table value, because it was not subjected to any specific training. The analysis of covariance on the data obtained on Agility, Balance and Speed Endurance due to the combined effect of Jump Rope Training Associated with Plyometric Training and controgroups have been analysed and presented in Table I

ANALYSIS OF COVARIANCE OF EXPERIMENTAL AND CONTROL GROUPS ON SELECTED VARIABLES

Variables	Adjusted Post Test Means		SS	df	Mean	'F' -
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	Jump Rope Training Associated with Plyometric Training	Control Group	Source of Variance			Squares	Ratio
Agility	9.76	9.88	Between	1.38	1	0.138	49.22*
			Within	0.092	33	0.003	
Balance	99.29	98.31	Between	7.92	1	7.92	68.713*
			Within	3.80	33	0.115	
Speed Endurance	18.35	18.45	Between	0.094	1	0.094	92.51*
			Within	0.034	33	0.001	

*Significant at .05 level of confidence, $df(1, 34) = 4.130$

Table II showed that the obtained 'F' ratio values are 49.22, 68.713 and 92.51 which are higher than the table value 4.130 with df 1 and 33 required to be significant at 0.05 level. Since the obtained value of 'F' ratio is higher than the table value, it indicates that there is significant difference has made among the adjusted post means for the combined effect of Jump Rope Training Associated with Plyometric Training and control group on Agility, Balance and Speed Endurance.

The combined effect of Jump Rope Training Associated with Plyometric Training may influence the significant difference on Agility, Balance and Speed Endurance.

Conclusions

1. The Combined Effect of Jump Rope Training Associated with Plyometric Training practices had significantly improves the Agility, Balance and Speed Endurance.
2. There was significant difference among the adjusted post – test means for the Combined Effect of Jump Rope Training associated with Plyometric Training (JRTAWPT) and Control group (CG) on Agility, Balance and Speed Endurance.

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