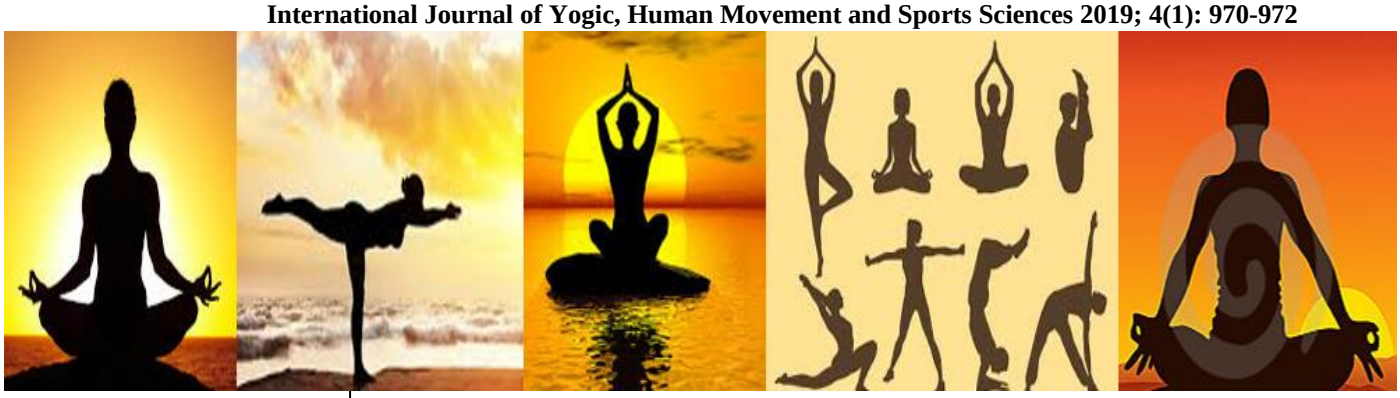
International Journal of Yogic, Human Movement and Sports Sciences 2019; 4(1): 970-972



ISSN: 2456-4419
Impact Factor: (RJIF): 5.18
Yoga 2019; 4(1): 970-972

www.theyogicjournal.com
Received: 01-11-2018
Accepted: 03-12-2018

Dr. R Sevi
Assistant Professor,
Department of Physical Education, Annamalai University, Tamil Nadu, India

Dr. M Muthuraj
Director of Physical Education, Chekkanurani, Madurai, Tamil Nadu, India

K Palanisamy
Director of Physical Education, Govt. Arts College, Nandanam, Chennai, Tamil Nadu, India

Correspondence
Dr. R Sevi
Assistant Professor,
Department of Physical Education, Annamalai University, Tamil Nadu, India

Impact of plyometric and resistance training on leg strength of school athletes

Dr. R Sevi, Dr. M Muthuraj and Dr. K Palanisamy

Abstract
The purpose of the study was to find out the impact of plyometric and resistance training on leg strength of school athletes. To achieve the purpose of the study, forty five school athletes were selected as subjects. The subjects were aged between 14 to 15 years. The subjects were divided into three groups (fifteen each) namely plyometric training group – I, resistance training group – II and control group – III. The data collected from the three groups prior to and post experimentation were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). When the obtained 'F' ratio value was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases statistical significance was fixed at 0.05 levels. The result showed that there was a significant improvement on leg strength of the school athletes.

Keywords: Plyometric, resistance training and leg strength

Introduction
The term "plyometrics" was coined by Fred Wilt after watching Soviet athletes prepare for their events in track and field; he felt this was a key to their success (Wilt and Yessis, 1984) [5]. It is a poor term to describe what happens, but it has since been accepted and is now well established. When Wilt learned of the work being done by Michael Yessis on Soviet (Russia) training methods, they quickly collaborated to help disseminate information on plyometrics.
Since its introduction in the early 1980s, two forms of plyometrics have evolved. In the original version of plyometrics, created by Russian scientist Yuri Verkhoshansky, it was defined as the shock method (Yuri, 1966) [6]. In this, the athlete would drop down from a height and experience a "shock" upon landing. This in turn would bring about a forced eccentric contraction which was then immediately switched to a concentric contraction as the athlete jumped upward. The landing and takeoff are executed in an extremely short period of time, in the range of 0.1- 0.2 seconds. The shock method is the most effective method used by athletes to improve their speed, quickness, and power after development of a strong strength base.
Resistance training is any exercise that causes the muscles to contract against an external resistance with the expectation of increases in strength, tone, mass, and endurance. The external resistance can be dumbbells, rubber exercise tubing, your own body weight, bricks, bottles of water, or any other object that causes the muscles to contract.

Methodology
The purpose of the study was to find out the impact of plyometric and resistance training on leg strength of school athletes. To achieve the purpose of the study, forty five school athletes were selected as subjects. The subjects were aged between 14 to 15 years. The subjects were divided into three groups (fifteen each) namely plyometric training group – I, resistance training group – II and control group – III. The leg strength was measured by leg lift dynamometer. The data collected from the three groups prior to and post experimentation were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). When the obtained 'F' ratio value was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases statistical significance was fixed at 0.05 levels.

Training Programme

The training programmes were scheduled for one session a day for plyometric training and resistance training groups each session lasted between forty to forty five minutes approximately including warming up and warming down. During the training period, the experimental groups underwent their respective training programme three days per week (alternative days) for twelve weeks in addition to their curriculum. In plyometric training the intensity was fixed at low, medium & high, the training volume ranged from 60 to 110 foot contacts per session for twelve weeks. In resistance training the initial intensity was fixed at 40% of their 1RM and it was progressively increased once in a week by 5% for 12 weeks.

Results

Table 1: Analysis of Covariance on Leg Strength of Experimental and Control Groups

	Plyometric Training	Resistance Training	Control Group	S O V	Sum of Squares	DF	Mean squares	'F'ratio
Pre-test Mean SD	73.01	72.86	73.33	B	1.73	2	0.86	0.11
	2.17	3.54	2.66	W	341.06	42	8.12	
Post-test Mean SD	75.60	77.73	73.84	B	120.17	2	60.08	8.65*
	2.26	3.21	2.31	W	291.45	42	6.95	
Adjusted Post-test Mean	75.65	77.90	73.51	B	143.77	2	71.88	53.27*
				W	55.31	41	1.34	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 42 is 3.23 and degree of freedom 2 and 41 is 3.22) *Significant at. 05 level of confidence

Table-1 showed that the pre-test mean and standard deviation on leg strength of plyometric training, resistance training and control groups were 73.01 ± 2.17, 72.86 ± 3.54 and 73.33 ± 2.66 respectively. The obtained 'F' ratio value of 0.11 for pre-test means on leg strength of plyometric training, resistance training and control groups were less than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence. It revealed that there is statistically insignificant difference among the plyometric training, resistance training and control groups during pre-test period. It was inferred that the random assignment of the subjects for the three groups was successful.

The post-test mean and standard deviation on leg strength of plyometric training, resistance training and control groups are 75.60 ± 2.26, 77.73 ± 3.21 and 73.84 ± 2.31 respectively. The obtained 'F' ratio value of 8.65 for post-test means on leg strength of plyometric training, resistance training and control groups are greater than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence.

The adjusted post-test means on leg strength of plyometric training, resistance training and control groups are 75.65, 77.90 and 73.51 respectively. The obtained 'F' ratio value of 53.27 on leg strength were greater than the required table value of 3.22 for the degrees of freedom 2 and 41 at 0.05 level of confidence. It was observed from this finding that significant differences existed among the adjusted post-test means of experimental and control groups on leg strength. Since, the adjusted post-test 'F' ratio value was found to be significant the Scheffe's test is applied as post hoc test to determine the paired mean differences, and it is presented in table-2.

Table 2: Scheffe's Test for the Difference between the Adjusted Post Test Paired Means of Leg Strength

Adjusted Post Test Means			DM	CI
Plyometric Training	Resistance Training	Control Group		
75.65	77.9		2.25*	1.07
75.65		73.51	2.14*	1.07
	77.9	73.51	4.39*	1.07

*significant

Table-2 showed the Scheffe's test result that there was significant difference existed between the adjusted post-tests means values 2.25, 2.14 and 4.39 of plyometric training and resistance training, plyometric training and control groups, resistance training and control groups respectively on leg strength, which are higher than the confidence interval value 1.07 at 0.05 level of significance. However both experimental groups had significantly improved on leg strength when compared to control group.

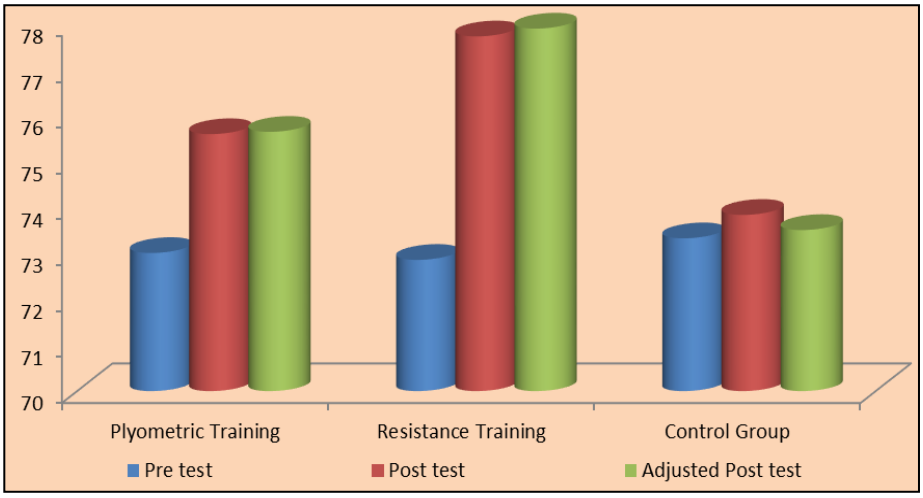


Fig 1: Mean Scores of Pre, Post Test and Adjusted Post Test of Plyometric and Resistance Training and Control Groups on Leg Strength

Discussion on Findings

The present result of the study stated that both plyometric and resistance training groups had significant improvement on leg strength comparing to the control group. The following studies are supporting the present study result. Saeed (2015) [3] assessed the effects of short term plyometric training in non-athletic men, the study result showed that significant increase on strength of the subjects. Kumaran and Muthuraj (2013) [2] examined the analysis of resistance training on strength and power parameters. The results of the study showed that there were significant improvements in strength and power parameters between the pre and post-test of the experimental periods. Beurskens *et al*., (2015) [1] investigated effects of resistance vs. balance training on MIF and BLD of the leg extensors in old adults; they concluded that both training regimens resulted in increased maximal isometric force (MIF). Tillman *et al*., (2015) [4] evaluated the lower limb progressive resistance training improves leg strength.

Conclusion

Conclusion of the study stated that both plyometric and resistance training groups had significant improvement on leg strength comparing to the control group. Moreover resistance training had high impact to increase on leg strength.

References

1. Beurskens R, Gollhofer A, Muehlbauer T, Cardinale M, Granacher U. Effects of heavy-resistance strength and balance training on unilateral and bilateral leg strength performance in old adults. PLoS One, 2015, 10(2).
2. Kumaran G, Muthuraj M. Analysis of resistance training on strength and power parameters. Physical Education and Sports Research Journal. 2013; 2(12):1-4.
3. Saeed Changizi Ashtiyani. The effect of short-term plyometric training program on sprint, strength, power and agility performance in non-athletic men. Biosciences Biotechnology Research Asia. 2015; 12(2):1389-1395.
4. Tillman A, Muthalib M, Hendy AM, Johnson LG, Rantalainen T, Kidgell DJ *et al*. Lower limb progressive resistance training improves leg strength but not gait speed or balance in Parkinson's disease. Front Aging Neurosci. 2015; 24(7):40.
5. Wilt Fred, Yessis Michael. Soviet Theory, Technique and Training for Running and Hurdling. Championship Books, 1984, 1.
6. Yuri Verkhoshansky. Perspectives in the Improvement of Speed-Strength Preparation of Jumpers. Legkaya Atletika (Track and Field). 1966; 9:11-12.