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Influence of Different Intensities of Plyometric Training on Selected Speed Parameters

S. CHIDAMBARA RAJA

Associate Professor, Department of Physical Education and Sports Sciences, Annamalai University.

ABSTRACT

The purpose of the present study was to find the effect of varied intensities of plyometric training on selected speed parameters, such as, speed and speed endurance. For this purpose, forty male players of various games studying in various departments of Manipal University, Mangalore, with the age group of 18 – 25 years were selected. They were divided into four equal groups, each group consisted of ten subjects, in which group - I (n = 10) underwent low intensity plyometric training (LPTG), group – II (n = 10) underwent medium intensity plyometric training (MPTG), group - III (n = 10) underwent high intensity plyometric training (HPTG) and group - IV remained as control. The training period was three days in a week for twelve weeks. The selected criterion variables such as speed and speed endurance were assessed by administering 50 meters run and shuttle run test. Prior and after the training periods, the subjects were tested for speed and speed endurance. The Analysis of Covariance (ANCOVA) was applied as statistical tool, to find out which group has significantly improved the speed and speed endurance. Whenever the adjusted post-test mean 'f' ratio was significant, the Scheffé S was used as post hoc test. It was concluded after applying the statistical tool, that three training groups, such as, low (LPTG), medium (MPTG) and high intensities (HPTG) of plyometric training group has improved the speed and speed endurance, when compared with the control group. It was concluded from the result of the study all the training groups such as, low intensity plyometric (LPTG) training, medium intensity plyometric (MPTG) and high intensity plyometric (HPTG) training group were significantly improved their speed performance and moreover, there was no significant difference was occurred between the training groups on speed and speed endurance after their respective training programmes.

KEYWORDS : varied intensities of plyometric training, speed and speed endurance

INTRODUCTION

Training is a systematic process of repetitive progressive exercise of work involving, learning and acclimatization.(***C.E. Kalf and D.D. Aruheim***, 1993). Training means are various physical exercises and other objects methods and procedures, which are used for the improvement maintenance and recovery of performance capacity and performance readiness. (***Hardhayal Singh***, 1991)

The basic training procedures will serve better when utilized with modifications suited to the individual or a group. The best training programme is that which increases the desired quality at a higher rate without causing unwanted effects. (**Boucher and Malina**, 1993)

Plyometric training enhances the tolerance of the muscle for increased stretch loads. This increased tolerance develops efficiency in the stretch shortening cycle of muscle action. During the stretching (eccentric lengthening phase) of muscle action a greater amount of elastic energy is stored in the muscle. This elastic energy is then reused in the following concentric action to make it stronger. This leads us to a fundamental principle of plyometric training: the rate, not the magnitude of the stretch, is that which determines the utilization of elastic energy and the transfer of chemical energy into mechanical work. (**www.Gambetta.com**)

Speed is one of the most important physical qualities required for successful performance in jumps, especially in the horizontal jumps and the polevault.

Speed endurance required to resist fatigue due to loading at sub-maximal and maximum intensity (approximately 85 – 100% maximum intensity), and predominantly and aerobic production of energy. (F. Updyke and Parry B.Johnson, 1970)

MATERIALS AND METHODS

In this study, the effects of varied intensities of plyometric training on speed and speed endurance have been examined. Forty male students studying in Manipal University, Mangalore were selected and divided into four equal groups, each group consisted of ten subjects, in which group -1 (n = 10) underwent low intensity plyometric training, group – II (n = 10) underwent medium intensity plyometric training, group - III (n = 10) underwent high intensity plyometric training and group - IV remained as control. For the purpose of collection of data on speed, 50 meters dash was administered and for speed endurance, the 110 meters dash was administered. Before applying the experiment all the subjects of the varied intensities of plyometric training groups and control group attended the pre-test, which was conducted a day prior to the commencement of the training and the data were collected on speed and speed endurance. After twelve weeks of training the post-test was conducted one day after the training period to find out any changes in the criterion variables.

Table – I
ANALYSIS OF COVARIANCE ON SPEED OF LOW MEDIUM AND HIGH INTENSITY PLYOMETRIC TRAINING AND CONTROL GROUPS

	Low Intensity Plyometric Training Group	Medium Intensity Plyometric Training Group	High Intensity Plyometric Training Group	Control Group	'F' Ratio
Speed (in seconds)					
Pre-test Mean ± S.D.	8.81 ± 0.0031	8.76 ± 0.0046	8.89 ± 0.0072	8.86 ± 0.0085	0.221
Post-test Mean ± S.D.	8.79 ± 0.0097	8.71 ± 0.0019	8.68 ± 0.0088	8.97 ± 0.0051	2.181
Adj. Post-test Mean	8.513	8.466	8.377	9.001	12.357*
Speed endurance (in seconds)					
Pre-test Mean ± S.D.	17.59 ± 0.026	17.81 ± 0.018	17.71 ± 0.077	17.91 ± 0.009	0.387
Post-test Mean ± S.D.	16.30 ± 0.057	16.61 ± 0.091	16.30 ± 0.097	18.17 ± 0.063	9.866*
Adj. Post-test Mean	16.411	16.631	16.281	18.121	18.287*

*Significant at .05 level of confidence. (The table value required for significant at .05 level with df 3 and 36 and 3 and 35are 2.85 and 2.86 respectively).

Table – I shows that the pre-test values of speed for low intensity plyometric group, medium intensity plyometric training group, high intensity plyometric training group and control group were 8.81 ± 0.0031, 8.76 ± 0.0046, 8.89 ± 0.0072 and 8.86 ± 0.0085 respectively. The obtained 'F' ratio value of 0.221 for pre-test scores on speed was lesser than the required table value of 2.85 for significance with df 3 and 36 at .05 level of confidence. The post-test mean values all experimental groups and control group were 8.79 ± 0.0097, 8.71 ± 0.0019, 8.68 ± 0.0088 and 8.97 ± 0.0051 respectively. The obtained 'F' ratio value of 2.181 for post-test scores on speed was lesser than the required table value. The adjusted post-test mean values of speed for all the training groups and control group were 8.513, 8.466, 8.377 and 9.001 respectively. The obtained 'F' ratio value of 12.357 for post-test scores of experimental groups and control group was greater than the required table value of 2.86 for significance with df 3 and 35 at .05 level of confidence.

Table – I also shows that the pre-test values of speed endurance for low intensity plyometric group, medium intensity plyometric training group, high intensity plyometric training group and control group were 17.59 ± 0.026, 17.81 ± 0.018, 17.71 ± 0.077 and 17.91 ± 0.009 respectively. The obtained 'F' ratio value of 0.387 for pre-test scores on speed endurance was lesser than the required table value of 2.85 for significance with df 3 and 36 at .05 level of confidence. The post-test mean values of speed endurance for all the training groups and control group were 16.30 ± 0.057, 16.61 ± 0.091, 16.30 ± 0.097 and 18.17 ± 0.063 respectively. The obtained 'F' ratio value of 9.866 for post-test scores on speed endurance was greater than the required table value. The adjusted post-test mean values of speed endurance for all the training groups and control group were 16.411, 16.631, 16.281 and 16.121 respectively. The obtained 'F' ratio value of 18.287 for post-test scores of experimental groups and control group was greater than the required table value of 2.86 for significance with df 3 and 35 at .05 level of confidence.

The result of this study showed that there was a significant difference among low intensity plyometric group, medium intensity plyometric training group, high intensity plyometric training group and control group on speed and flexibility. Further to determine which of the paired means has a significant increase, Scheffé *S* test was applied. The result of the follow-up test is presented in Table – II.

Table - II
SCHEFFĚ *S* TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POST-TEST MEAN OF SPEED AND FLEXIBILITY

Adjusted Post-test Mean on Speed					
Low Intensity Plyometric Training Group	Medium Intensity Plyometric Training Group	High Intensity Plyometric Training Group	Control Group	Mean Difference	Confidence Interval at 0.05 level
8.513			9.001	0.488*	0.399997
	8.466		9.001	0.535*	0.399997
		8.377	9.001	0.624*	0.399997
Adjusted Post-test Mean on Flexibility					
16.411			18.121	1.71*	0.766228
	16.631		18.121	1.49*	0.766228
		16.281	18.121	1.84*	0.766228

* Significant at .05 level of Confidence.

Table – II shows that the adjusted post-test mean difference in speed between low intensity plyometric training group and control group, medium intensity plyometric training group and control group and high intensity plyometric training group and control group were 0.488, 0.535 and 0.624 respectively, which was significant at .05 level of confidence.

Table – II also shows that the adjusted post-test mean difference in speed endurance between low intensity plyometric training group and control group, medium intensity plyometric training group and control group and high intensity plyometric training group and control group were was 1.71, 1.49 and 1.84 which was significant at 0.05 level of confidence.

The adjusted post-test mean difference between low intensity plyometric training group and medium intensity plyometric training group, low intensity plyometric training and high intensity plyometric training group, medium intensity plyometric training group and high intensity interval training group, which was insignificant at 0.05 level of confidence.

It may be concluded from the results of the study that there was a significant improvement of speed after the low intensity plyometric group, medium intensity plyometric training group and high intensity plyometric training group. The results of the study also show that there was a significant improvement in speed endurance after the low intensity plyometric group, medium intensity plyometric training group and high intensity plyometric training group.

Discussion

All the training groups, such as, low, medium and high intensity plyometric training group, were improved their speed when compared with the control group. Where as, all the training groups were differ significantly each other, moreover, the high intensity plyometric training group have much higher improvement in speed when compared with the low and medium intensities of plyometric training group. **Gopinath** (2000) also found that there was a significant improvement in speed after the plyometric training programme. **de Villarreal, Gonzalez-Badillo and Izquierdo** (2008) also found that there was a significant improvement in maximum strength after the different frequencies of plyometric training.

The improvement in speed endurance was significant for the low intensity plyometric group, medium intensity plyometric training group and high intensity plyometric training group when control group. **Elsayed** (2012) also found that there was a significant improvement in speed endurance after the plyometric training for last preparatory phase before in-season competition athletes.

Conclusions

Based on the result of the study, the following conclusions were drawn:

The improvement in speed endurance was significant for the low intensity plyometric group, medium intensity plyometric training group and high intensity plyometric training group when compared with the control group. The training load in stretch-shortening exercise may not be sufficient to improve the speed endurance for low, medium and high intensities of plyometric training group.

All the training groups, such as, low, medium and high intensity plyometric training group, were improved their speed when compared with the control group.

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