ISSN: 2349 - 4891

International
Journal of Recent Research and Applied Studies
(Multidisciplinary Open Access Refereed e-Journal)

Effect of Various Intensities of Plyometric Training on Speed and Explosive Power

Rajeeva, M[1] & Dr. K. Sivakumar[2]

[1]*Ph.D., Scholar, Department of Physical Education, Annamalai University, Chidambaram, Tamilnadu, India.*
[2]*Associate Professor, Department of Physical Education, Annamalai University, Chidambaram, Tamilnadu, India.*

Received 16th November 2016, Accepted 15th December 2016

Abstract

The purpose of the present study was to find the effect of varied intensities of plyometric training on speed and explosive power. For this purpose, sixty male players of 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 fifteen subjects, in which group - I (n = 15) underwent low intensity plyometric training (LPTG), group – II (n = 15) underwent medium intensity plyometric training (MPTG), group - III (n = 15) underwent high intensity plyometric training (HPTG) and group - IV (n=15) remained as control. The training period was three days in a week for twelve weeks. The selected criterion variables such as speed and explosive power were assessed by administering 50 meters run and Sergeant jump test. The Analysis of Covariance (ANCOVA) was applied as statistical tool, to find out which group has significantly improved the speed and explosive power. 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, when compared with the control group. The training period for the present study was twelve weeks and three days per week (alternative days). 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 and explosive power in terms of vertical distances and moreover, there was no significant difference was occurred between the training groups on speed and explosive power in terms of vertical distances after their respective training programmes.

Keywords: Varied Intensities of Plyometric Training, Speed, Explosive Power.

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.

Correspondence
Rajeeva, M
E-mail: rajeev.mbedra@gmail.com

Methodology

In this study, the effects of varied intensities of plyometric training on speed and explosive power in terms of vertical distances have been examined. Sixty 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. Speed was assessed by administering 50 meters dash and for explosive power, Sergeant jump test was administered. The training period for the present study was twelve weeks and three days per week (alternative

days). The Analysis of Covariance (ANCOVA) was applied as statistical tool, to find out which group has significantly improved the speed and explosive power. Whenever the adjusted post-test mean 'f' ratio was significant, the Scheffe's was used as post hoc test.

Results and Discussion

Table I. Analysis of covariance on speed and explosive power 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.	7.953 ± 0.324	7.767 ± 0.504	7.852 ± 0.503	8.135 ± 0.351	2.049
Post-test Mean ± S.D.	7.775 ± 0.316	7.605 ± 0.487	7.663 ± 0.303	8.217 ± 0.303	6.089*
Adj. Post-test Mean	7.749	7.762	7.737	8.012	20.21*
Explosive power (in centimeters)					
Pre-test Mean ± S.D.	27.73 ± 2.37	25.93 ± 2.49	27.60 ± 2.898	26.00 ± 2.56	2.163
Post-test Mean ± S.D.	29.53 ± 2.199	27.93 ± 2.43	29.87 ± 2.88	24.47 ± 2.67	14.006*
Adj. Post-test Mean	28.666	28.769	29.125	25.239	87.836*

*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).

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 explosive power in terms of vertical distances. Further to determine which of the paired means has a significant difference, the Scheffé *S* test was applied. The result of the follow-up test is presented in Table – II.

Table II. Scheffe *s* test for the difference between the adjusted post-test mean of speed and explosive power

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
Adjusted Post-test Mean on Speed					
7.749			8.012	0.263*	0.11531
	7.762		8.012	0.25*	0.11531
		7.737	8.012	0.275*	0.11531
Adjusted Post-test Mean on Explosive Power					
28.666			25.239	3.427*	0.77708
	28.769		25.239	3.530*	0.77708
		29.125	25.239	3.886*	0.77708

* 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 0.263, 0.25 and 0.275 respectively, which was significant at .05 level of confidence. Table – II also shows that the adjusted post-test mean difference in explosive power 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 3.427, 3.530 and 3.886 respectively, which was significant at .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 explosive power in terms of vertical distances after the low intensity plyometric group, medium intensity plyometric training group and high intensity plyometric training group. It was also found that there was no significant difference between the training groups on selected criterion variables such as speed and explosive power in terms of vertical distances.

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. Whereas, 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 explosive power in terms of vertical distances was significant for the low intensity plyometric group, medium intensity plyometric training group and high intensity plyometric training group when control group. Fabricius (2011) also found that there was a significant improvement in explosive power in terms of vertical distances after the plyometric training.

Conclusions

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

1. All the training groups, such as, low, medium and high intensity plyometric training group, were improved their speed when compared with the control group.
2. The improvement in explosive power 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.
3. The overall result of the study shown that there was no significant difference occurred between the training groups, such as, low intensity plyometric group, medium intensity plyometric training group and high intensity plyometric training groups respectively.

References

1. C. Boucher and R.M. Malina, "Genetic of Physical Fitness and Motor Performance", *Exercise and Sports Sciences Reviews*, 11, (1993), 3206.
2. C.E. Kalf and D.D. Aruheim, *Modern Principles of Athletic Training*, (St. Louis: The C.V. Mosby Publishers, 1963), p. 93.
3. E.S. de Villarreal, J.J. Gonzalez-Badillo and M. Izquierdo, "Low and Moderate Plyometric Training Frequency Produces Greater Jumping and Sprinting Gains Compared with High Frequency", *Journal of Strength and Conditioning Research*, 22:3, (May 2008), 715 – 25.
4. F. Updyke and Parry B.Johnson, *Principle of Modern Physical Education, Health and Recreation*, (New York: Rinchart and Winsten Inc., 1970), p.118.
5. Fabricius, David Leslie, "Comparison of Aquatic – and Land-based Plyometric Training on Power, Speed and Agility in Adolescent Rugby Union Players", *Unpublished M.Ed., Thesis*, Stellenbosch University, 2011.
6. Hardayal Singh, *Science of Sports Training*, (New Delhi: D.V.S. Publication, 1991), p.5.
7. R. Gopinath, "Effect of Resistance Training, Plyometric Training and Combined Resistance and Plyometric Trainings on Strength, Power and Speed Parameters", *Unpublished Doctoral Thesis*, Annamalai University, (2000).
8. Rex Hazeldine, *Fitness for Sport*, (Marlborough: The Crawford Press, 1985), p.52.