Effect of Plyometric Drills executed in Vertical and Horizontal Plane on Running Speed

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ABSTRACT

The study was conducted to compare the effect of plyometric training drills, executed in horizontal and vertical plane, on mnning speed. The study was conducted on 60 Hr. Secondary school boys belonging to various sports disciplines. The subjects were divided into three equal groups of 20 subjects each. Group I carried out the training programme consisting of drills executed in vertical plane, Group II carried out drills in horizontal plane and the third group was kept as Control Group. The training programme was carried out twice a week, for ten weeks. Control Group carried out their daily physical education session. Considering the level of the boys, the load was not increased during the experiment period.

ANOVA, ANACOVA and POST HOC statistical procedures were used to interpret the data. It is concluded that plyometric training, executed in vertical and horizontal plane, leads to improvement in running speed. The mean difference between the experimental groups, after 10 weeks training, is statistically significant. The drills carried out in horizontal plane are better than the drills carried out in vertical plane, for speed training.

It is also understood that the training carried out for ten weeks, at constant volume, and with best possible effort, leads to continuous improvement in performance.

INTRODUCTION

Sports coaches and sports scientists always look for new, better or different ways to improve performance. What is now popularly known as plyometrics was discovered and refined over the past 30 or so, years. Plyometric exercises are specialized high intensity training technique used to develop strength and speed. Plyometric movements, in which a muscle is loaded and than contracted in rapid sequence, use the strength, elasticity and innervation of muscle and surrounding tissues to jump higher, run faster, or hit harder, depending on the desired training goal.

Verchoshansky and chornosov (1975) made an experiment with the novices in sprint, over a time of 2 years, and found that jump exercises are very important for power in the sprinters.

According to Otason (1976) leg strength of sprinters can be improved by all types of jumping and bouncing exercises, like continuous hops and steps and all types of multi-jumps with or without extra loading.

Singh(1984) states that acceleration

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ability can be improved indirectly by improving the explosive strength.

Hoskisson and Falls (1989) stated that stride frequency could be improved upto 17%, with specific exercises like plyometrics.

Brady and Maraj (1998) have stated that to run fast, the sprint drills like bounding in horizontal plane, during practice, facilitate to make better sprinters.

The plyometric exercises, in the literature, to develop running speed are a combination of drills executed in horizontal and vertical plane. The aim of the present work is to study the effect of plyometric drills executed in horizontal and vertical planes, on running speed.

METHODOLOGY

The study was conducted on 60 Hr. Secondary school boys belonging to various sports disciplines The subjects were divided into three equal groups of 20 subjects each. Group I carried out the training programme consisting of drills executed in vertical plane; Group II carried out drills in horizontal plane; and the third group was kept as Control Group. The training programme was carried out twice a week. Considering the level of the boys, the load was not increased during the experiment period and the children were motivated to give their best during training and testing. Control Group carried out their daily physical education session.

ANOVA, ANACOVA and POST HOC statistical procedures were used to interpret the data. 30 meter test was used to assess the speed performance of the subjects in the beginning, mid and post 10 week training programme.

Training Programme executed by Experimental Groups

Experimental Group 1 (Vertical plane)	**Experimental Group II (Horizontal plane)**	**Repetition x Sets**
Skipping	Skipping	50X3
High Knee action	High Knee action	15X3
Consecutive jumps	Consecutive jumps	5X2
Ankle Jumps	Ankle Jumps	5X2
Hopping	Hopping	3X2
Depth Jump	Depth Jump	3X2

RESULT & DISCUSSION

The results presented in Table 1 indicate significant difference among pre, mid and post training test results of experimental Group I (5.272) and experimental Group II (12.476), but the Control Group does not show any significant difference (0.534).

Table-1 : Analysis of Variance for speed (30 meter run) tests conducted at different periods of two experimental groups and a control group.

Groups	Means			SV	SS	df	MS	F
	Pre-test	Mid test.	Post test					
Exp.Gr.l	5.022	4.80	4.577	B W	1.971 10.656	2 57	0.986 0.187	5.272*
Exp.Gr.ll	4.829	4.022	4.42	B W	1.677 3.829	2 57	0.838 0.067	12.476*
Control.Gr	5.196	5.135	5.078	B W	0.140 7.490	2 57	7.023 0.131	0.534

*Significant at 0 05 level F.05 (2,57) = 3.16 B : Between groups W : Within groups

Table-2 : Ordered paired means and difference between the means for speed test (30 meter run) at pre, mid and post tests of experimental Group-I.

Means			Difference between means	Sheffe's Confidence Interval (CI)
Pre test	Mid test	Post test		
5.022	4.80		0.222	0.343
5.022		4.577	0.445*	0.343
	4.80	4.577	0.233	0.343

*Significant at 0 05 level (Sheffe's confidence Interval 0.206)

Table-3 : Ordered paired means and difference between the means for speed test (30 meter run) at pre, mid and post tests of experimental Group-II.

Means			Difference between means	Sheffe's Confidence Interval (CI)
Pre test	Mid test	Post test		
4.829	4.622		0.207*	0.206
4.829		4.420	0.409*	0.206
	4.622	4.420	0.202*	0.206

*Significant at 0 05 level (Sheffe's confidence Interval 0.206)

Table-4 : Analysis of Covariance for speed (30 meter run) tests conducted at different periods of two experimental groups and a control group.

Groups	Means			SV	SS	df	MS	F
	Exp. Gr.-I	Exp. Gr.-II	Control Gr.					
Pre test	5.022	4.829	5.195	B W	1.34 7.18	2 57	0.67 0.126	5.336*
Mid test	4.80	4.622	5.135	B W	2.71 7.20	2 57	0.36 0.126	10.739*
Adjusted means	4.794	4.808	4.954	B W	0.283 0.0086	2 56	0.141 0.0002	920.08*

*Significant at 0 05 level F.05 (2,57) = 3.16 B : Between groups W : Within groups

Table-5 : Palred adjusted final means and difference between the pre and mid test means for two experimental and control group in 30 meter speed test.

Means			Difference between means	Sheffe's Confidence Interval (CI)
Exp. Gr. I	Exp. Gr. II	Control Gr.		
4.794	4.808		0.014*	0.011
4.794		4.954	0.160*	0.011
	4.808	4.954	0.146*	0.011

*Significant at 0 05 level (Sheffe's confidence Interval 0.011)

Table-6 : Analysis of Covariance for speed (30 meter run) tests conducted at different periods among two experimental groups and a control group.

Groups	Means			SV	SS	df	MS	F
	Exp. Gr.-I	Exp. Gr.-II	Control Gr.					
Pre test	5.022	4.829	5.196	B W	1.34 7.18	2 57	0.672 0.126	5.336*
Mid test	4.577	4.420	5.078	B W	4.71 7.59	2 57	2.357 0.133	17.694*
Adjusted means	5.132	5.092	4.823	B W	0.746 0.0923	2 56	0.373 0.0016	226.273*

*Significant at 0 05 level F.05 (2,57) = 3.16 B : Between groups W : Within groups

Table-7 : Paired adjusted final means and difference between the pre and post test means for two experimental and control group in 30 meter speed test.

Means			Difference between means	Sheffe's Confidence Interval (CI)
Exp. Gr. I	Exp. Gr. II	Control Gr.		
5.132	5.092		0.040*	0.032
5.132		4.823	0.309*	0.032
	5.092	4.823	0.269*	0.032

*Significant at 0 05 level (Sheffe's confidence Interval 0.032)

Table-8 : Analysis of Covariance for speed (30 meter run) tests conducted at different periods among two experimental groups and a control group.

Groups	Means			SV	SS	df	MS	F
	Exp. Gr.-I	Exp. Gr.-II	Control Gr.					
Mid test	4.800	4.622	5.135	B W	2.71 7.18	2 57	1.36 0.136	10.739*
Post test	4.577	4.420	5.078	B W	4.71 7.59	2 57	2.36 0.133	17.694*
Adjusted means	4.631	4.655	4.789	B W	0.228 0.085	2 56	0.1139 0.0015	75.348*

*Significant at 0 05 level F.05 (2,57) = 3.16 B : Between groups W : Within groups

Table-9 : Paired adjusted final means and difference between the mid and post test means for two experimental and control group in 30 meter speed test.

Means			Difference between means	Sheffe's Confidence Interval (CI)
Exp. Gr. I	Exp. Gr. II	Control Gr.		
4.631	4.655		0.024*	0.031
4.631		4.789	0.158*	0.031
	4.655	4.789	0.134*	0.031

*Significant at 0 05 level (Sheffe's confidence Interval 0.031)

Post hoc test results presented in Table 2 and 3 indicate significant difference between pre and post test results in experimental Group I and pre and mid, pre and post test results in case of experimental Group II.

The results presented in Table 4 show difference between pre and mid test adjusted for the three groups with a significant 'F' ratio value of 920.08. The difference between pre and mid test adjusted final means of experimental Group I and experimental Group 11(0.014), experimental Group I and Control Group (0.160) and experimental Group II and Control Group (0.146) presented in Table 5 is found to be significant. A similar trend has been observed in adjusted final means of pre and post test results (Table 6 & 7)

The adjusted final means of mid and post test (4.631, 4.655, 4.789) for experiment Group I, experiment Group II and Control Group, respectively, revealed an 'F* value of 75.348, which is significant (Table 8).

The Table 9 shows the mid and post test adjusted final means; and the difference between the adjusted final paired means of experimental Group I and II was found to be non significant (0.024); and experimental Group I and Control Group (0.158) and experimental Group II and Control Group showed (0.134) a significant difference.

The results of the study indicate that five weeks and ten weeks training leads to an improvement in running speed performance. The effect of 5 weeks and 10 weeks training was found to be significant in case of Group II which carried out the training programme consisting of drills executed in horizontal plane; whereas, the significant value in case of Group I, which carried out the training programme, consisting of drills executed in vertical plane, was achieved after 10 weeks of training. The study also reveals that there is a non significant difference between training effect of vertical and horizontal plyometric drills on 30 meter speed performance.

On the basis of the trend of results, it is being concluded that plyometric exercises, carried out in horizontal or vertical plane, are suitable training means to improve running speed; and drills earned out in horizontal plane are better than drills carried out in vertical plane The results of this study are in line with the results of the studies conducted by Verchoshansky & Chornosov (1975), Hoskisson & Falls (1989) Brady & Maraj (1998), Rimmer & slievert (2000).

CONCLUSION

- There is a statistically significant difference between effect of vertical and horizontal plyometric training drills, on running speed.
- Plyometric training, executed in vertical and horizontal plane, leads to improvement in running speed.
- The horizontal plyometric exercises are considered to be better than exercises carried out in vertical plane to improve running speed.
- Training carried out for ten weeks, at constant volume, and best effort, leads to continuous improvement in performance.

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