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Effect of plyometric training on selected performance related variable among school handball players

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Abstract

Background: Sport is all forms of competitive physical activity which, through casual or organized participation, aim to use, maintain or improve physical ability and provide entertainment to participants. Handball is a game which is quite faster and need more explosiveness comparative to other game. Plyometrics, also known as "jump training" or "plyos", are exercises based around having muscles exert maximum force in as short a time as possible, with the goal of increasing both speed and power. The aim of the study was to find out the effect of plyometric training on selected performance related variable among the school level handball players.

Methods: For the study a total of forty (N=40) male students were selected from Government Higher Secondary School, Vayakara, Kannur and their age ranged from 15 to 18 years. They were equally divided (n=20) in to an experimental and control group. Following performance related variables were selected for the present study. Speed, Agility and Explosive Strength. The pre and post test data pertaining to the respective performance related variable were collected by employing standard test used on both the experimental and control group. The training programmes were conducted for six weeks with three days per week. Training was given in simple to complex method total duration was 90 minutes. The data was analyzed and the mean difference between the initial and final scores of experimental and control groups were compared by using dependent 't' test in SPSS 16th version.

Results and Conclusion: The result of the study seems that participation in six weeks plyometric training programme resulted in improvement of playing ability and the performance related variables.

Keywords: Speed, agility, strength, explosive strength, plyometrics

1. Introduction

Sports are usually governed by a set of rules or customs which serve to ensure fair competition, and allow consistent adjudication of the winner. Winning can be determined by physical events such as scoring goals or crossing a line first, or by the determination of judges who are scoring elements of the sporting performance, including objective or subjective measures such as technical performance or artistic impression. In sports fitness plays a major role, fitness was commonly defined as the capacity to carry out the day's activities without undue fatigue. Physical fitness is considered a measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypo kinetic diseases, and to meet emergency situations. For the study handball was chosen in which fitness act as an important component. Handball is a team sport in which two teams of seven players each (Six outfield players and a goalkeeper on each team) pass a ball to throw it into the goal of the other team. A standard match consists of two periods of 30 minutes, and the team which scores the most goals wins. The game is quite fast and includes body contact, as the defenders try to stop the attackers from approaching the goal. Contact is allowed only when the defensive player is completely in front of the offensive player; i.e., between the offensive player and the goal. Any contact from the side or especially from behind is considered dangerous and is usually met with penalties. When a defender successfully stops an attacking player (Who loses the ball over a line), the play is stopped and restarted by the attacking team from the spot of the infraction or on the 9-metre line.

Unlike in basketball, where players are allowed to commit only 5 fouls in a game, handball players are allowed an unlimited number of faults, which are considered good defense and disruptive to the attacking team's rhythm.

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For improving the performance attributes, the researcher has imparted Plyometrics training to analysis whether there will be any improvement in it.

Plyometrics, also known as "jump training" or "plyos", are exercises based around having muscles exert maximum force in as short a time as possible, with the goal of increasing both speed and power. This training focuses on learning to move from a muscle extension to a contraction in a rapid or "explosive" way, for example with specialized repeated jumping. Plyometrics are primarily used by athletes to improve performance, and are used in the fitness field to a much lesser degree. Plyometrics have been shown to have benefits for reducing lower-extremity injuries in team sports while combined with other neuromuscular training (i.e. strength training, balance training, and stretching).

2. Material & Methods

2.1 Participants

For the study a total of forty (N=40) male students were selected from Government Higher Secondary School, Vayakara, Kannur and their age ranged from 15 to 18 years. They were equally divided (n=20) in to an experimental and control group.

2.2 Study design

Following performance related variables were selected for the present study. Speed, Agility and Explosive Strength. The purpose of the study was explained to the subjects briefly by the investigator. The procedure of each test was explained clearly and demonstrated for clear view and the subjects were motivated to their best during the test. The training programmes were conducted for six weeks with three days per week. Training was given in simple to complex method total duration was 90 minutes. The intensity was decided on the basis of average of maximum repetition of the subjects and before setting the intensity the investigator asked to the subjects to do the selected exercises to their maximum repetition for find out the average capacity of the group. The programme started with fifteen minutes of warm up, sixty minutes of exercises and fifteen minutes of warm down session.

The tests used to assess the selected performance related variables are presented in table 1.

Table 1: Variables selected

Variables	Test	Units of Measurements
Speed	30-Yard Dash*	Seconds
Agility	Shuttle Run*	Seconds
Explosive Strength	Vertical Jump*	Centimeter

2.3 Statistical analysis

The 't' test brought out the significant mean differences between the initial and final scores of experimental and control groups. The statistical analyses are given in the following tables and figures. The level of significance chosen was 0.05 level of confidence throughout the study to determine the significance different with 19 degree of freedom.

3. Results

Table 2: T-ratio of experimental and control group on Speed

Control Factors	Pre test			Post test			df	t-ratio
	N	Mean	SD	N	Mean	SD		
Experimental	20	4.40	.15	20	4.31	.13	19	5.98*
Control	20	4.42	.18	20	4.42	.17	19	.11

Note: * Significant at the 0.05 level of confidence (t.o5 (19) =2.09)

Table 2 shows the number of subjects, mean, standard deviation and 't' value of 30 yard test of control and experimental group. The mean values of experimental group pre and post-test were 4.40 and 4.31 and that of control group pre and post were 4.42 and 4.42. The standard deviation of experimental and control group pre and post were .15, .13 and .18, .17 respectively.

The table 2 indicates that, there was a significant difference between the pre and post test scores of 30 yard sprint test of experimental group, since the calculated 't' value of 5.98 is higher than tabulated 't' value of 2.09 at 0.05 level of significance with 19 degrees of freedom. In the case of control group there was no significant difference. The difference in means of 30 yard sprint test is presented in fig 1.

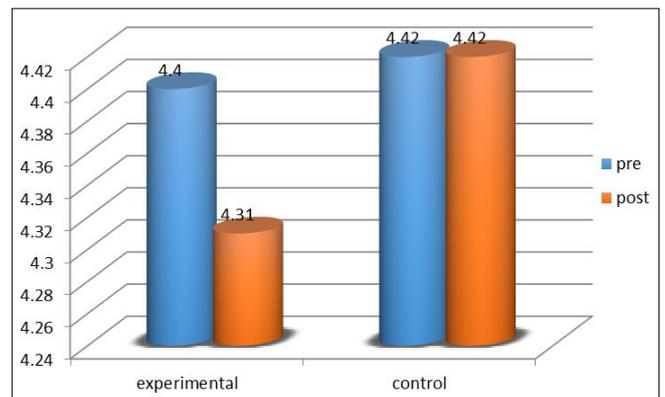


Fig 1: Illustration of pre and post mean score of Speed

Table 3: T-ratio of experimental and control group on Agility

Control Factors	Pre test			Post test			df	t-ratio
	N	Mean	SD	N	Mean	SD		
Experimental	20	10.42	.56	20	10.20	.48	19	6.98*
Control	20	10.47	.47	20	10.46	.42	19	.48

Note: * Significant at the 0.05 level of confidence (t.o5 (19) =2.09)

Table 3 shows the number of subjects, mean, standard deviation and 't' value of shuttle run test of control and experimental group. The mean values of experimental group pre and post-test were 10.42 and 10.20 and that of control group pre and post were 10.47 and 10.46. The standard deviation of experimental and control group pre and post were .56, .48 and .47, .42 respectively.

The table 3 indicates that, there was a significant difference between the pre and post test scores of shuttle run test of experimental group, since the calculated 't' value of 6.98 is higher than tabulated 't' value of 2.09 at 0.05 level of significance with 19 degrees of freedom. In the case of control group there was no significant difference. The difference in means of Shuttle run test is presented in fig 2.

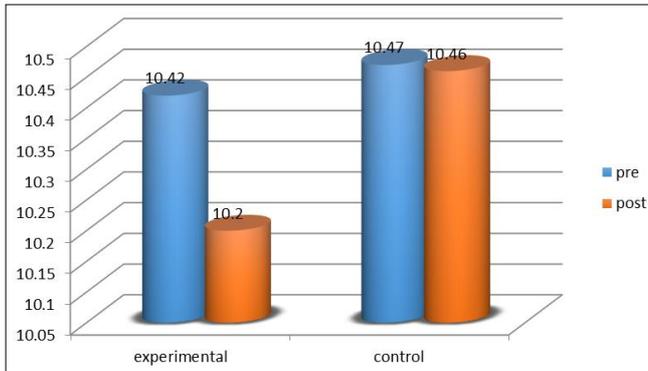


Fig 2: Illustration of pre and post mean score of Agility

Table 4: T-ratio of experimental and control group on Explosive Strength test

Control factors	Pre test			Post test			df	t-ratio
	N	Mean	SD	N	Mean	SD		
Experimental	20	52.75	2.30	20	57.35	1.49	19	10.38*
Control	20	53.65	3.15	20	54.05	3.11	19	6.28

Note: * Significant at the 0.05 level of confidence (t.05 (19) =2.09)

Table 4 shows the number of subjects, mean, standard deviation and ‘t’ value of vertical jump test of control and experimental group. The mean values of experimental group pre and post-test were 52.75 and 57.35 and that of control group pre and post were 53.65 and 54.05. The standard deviation of experimental and control group pre and post were 2.30, 1.49 and 3.15, 3.11 respectively.

The table 4 indicates that, there was a significant difference between the pre and post test scores of vertical jump test of experimental group, since the calculated ‘t’ value of 10.38 is higher than tabulated ‘t’ value of 2.09 at 0.05 level of significance with 19 degrees of freedom. In the case of control group there was also significant difference. The difference in means of vertical jump test is presented in fig 3.

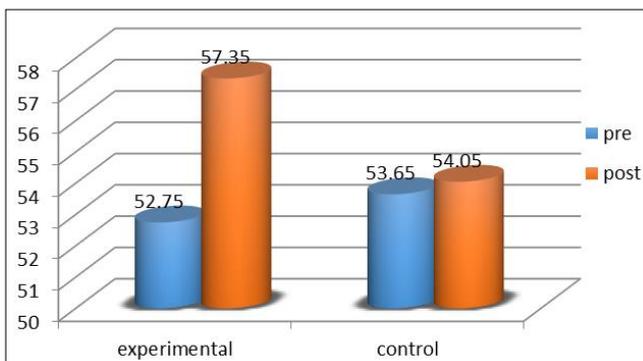


Fig 3: Illustration of pre and post mean score of explosive strength

4. Discussion

Six weeks of plyometric training had improved all the performance related variables of junior school handball players, namely speed, Agility, explosive strength. Playing ability was also improved the subjects selected for the study had no previous experience on plyometric training. They had been through their regular coaching schedule probably this could have been the reason for the improvement. The subjects had enthusiastically participated in the training program since they found the training to be interesting due to the freshness of the exercise, they did which was different from the usual routine ensured their whole hearted participation leading to the improvement in the performance related variables.

The findings regarding the variable of the variable of Speed is agreement with the findings of Amanda M (2003) [1], Brown, E. Lee and Ferrigno (2005) [5], Michael G. Miller (2006) [13] and Kvorning (2006) [11].

The variable of Agility is agreement with the findings of Hamid Arazi and Abbas Asadi (2011) and Cavala M, & Katic R (2010) [6]. The variable of cardiovascular endurance is agreement with the findings of Campell J *et.al* (2003) and Chu K.S. and Rhodes E.S. (2001).

Explosive Strength is in agreement with the findings of Mishra Sharad Chandra (2009) [14], Chimeral, N.J., *et al.* (2001) [8] and Vatromir Srhoj *et al.* (2006) [16]. Even in the control group there was a significant change in speed, and agility. This could be attributed to sampling error and probably to the inherent nature of the training programme.

5. Conclusion

The result of the study seems to be permitting the following conclusions. Participation in six weeks plyometric training programme resulted in improvement of playing ability and the following performance related variables such as Speed, Agility & Explosive Strength.

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