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Impact of plyometric exercise on selected physical fitness factors of adolescent boys

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Abstract
The purpose of the study was to examine the impact of plyometric training on chosen physical fitness variables of adolescent boys. The age varies between 11 to 15 years. Subjects were divided randomly into two teams, training cluster and control cluster. Training cluster performed a plyometric program for eight weeks, weekly five days. Pre- and post-tests measurements were taken for sprint, muscular strength and endurance, leg explosive power and pushups for two teams. Results showed that coaching teams improved in considerably ($p<0.05$) in five dependent variables. Plyometric exercises seem to be viable and effective way to improve physical fitness capability of the adolescent boys.

Keywords: plyometric training, physical fitness, agility, leg explosive power, pushups

Introduction

Children and adolescents got to participate frequently in physical activities that enhance and maintain vas and contractor health. Whereas boys and women have historically been inspired to participate in aerobic coaching and strength building activities, a growing variety of kids and adolescents are experiencing the advantages of plyometric coaching. Plyometrics see exercises that link strength with speed of movement to supply power and were initial acknowledged merely as "jump coaching."

Plyometric coaching conditions the body through dynamic, resistance exercises. This type of coaching usually includes hops and jumps that exploit the muscles' cycle of continuance and shortening to extend muscle power. Plyometric exercises begin with a fast stretch of a muscle (eccentric phase) and are followed by a fast shortening of an equivalent muscle (concentric phase). With plyometric coaching, the nervous system is conditioned to react a lot of quickly to the stretch-shortening cycle. This type of coaching enhances a child's ability to extend speed of movement and improve power production. Regular participation in a very plyometric educational program may additionally facilitate to strengthen bone and facilitate weight management. Further, plyometric coaching performed throughout the season might decrease the chance of sports-related injuries. This might be of specific profit to young female athletes who seem to be at inflated risk for knee injuries as compared to young male athletes. (Avery D. Faigenbaum, Ed.D.and Donald A. Chu, Ph.D., PT, ATC).

There are thousands of plyometric exercises, starting from low intensity double leg hops to high intensity drills like depth jumps. though the latter is often related to plyometric coaching for the mature jock, common games and activities like child's game, jumping rope and jumping jacks also can be characterised as plyometrics as a result of each time the feet create contact with the bottom the extensor are subjected to the stretch shortening cycle. In fact, plyometrics are a natural a part of most movements, as proved by the jumping, hopping and skipping seen on any college playground. With qualified employment and age-appropriate instruction, plyometric coaching are often a secure, effective and fun technique of learning for youngsters and teenagers. However, there's the potential for injury to occur if the intensity and volume of the educational program exceeds the talents of the participants. Youngsters and adolescents ought to develop an adequate baseline of strength before collaborating in a very plyometric educational program, or they must merely begin plyometric coaching with lower intensity drills and bit by bit attain higher intensity drills over time. though further clinical trials are required to work out the foremost effective plyometric educational program for youngsters and adolescents, starting with one to a few sets of six to ten repetitions on one higher body exercise (e.g., ball chest pass with a one-kilogram ball) and one lower body exercise (e.g. double leg hop) doubly per week on nonconsecutive days looks cheap. If multiple sets are performed, participants should be given adequate rest and recovery between sets (e.g., 2 to four minutes) so as to fill the energy necessary to perform successive series of repetitions with the same intensity.

Materials and Methods

The 20 adolescent boys were randomly chosen from the govt. senior secondary school, Rewari as subjects and their age ranged between 11 to 15 years. They were divided into two groups. The cluster - i used to be considered as an experimental group – I and group - II was considered as the control cluster. The control cluster wasn't given any exercise and also the experimental group was given plyometric coaching for five days per week for eight weeks. The evaluated parameters were speed (30 m dash), leg explosive power (standing broad jump) Muscular strength and endurance (sit ups) and upper body strength and endurance (pushups). The parameters were measured before and once the plyometric coaching programme. The collected data on physical fitness parameters because of impact plyometric exercise was analyzed by computing mean and standard deviation in order is to find out the significant improvement if any't' test was applied.

Table 1: Analysis of the Pre and Post test data and 't' ratio on Speed of Experimental group

Variables	Group	Test	Mean	Standard Deviation	Mean Difference	't' value
Speed	Experimental Group	Pre	9.64	0.87	0.03	6.43
		Post	9.61	0.55		
	Control Group	Pre	10.72	0.86	0.19	1.75
		Post	10.53	0.98		

Table t- ratio at 0.05 level of confidence for 14 df = 2.145

The mean value of experimental group on Speed among boys in pre and post training are 9.64 and 9.61, the corresponding standard deviation are 0.87 and 0.55 respectively. The't' value as per the't' test is 6.43 and these values are greater than the required table value of 2.145 for significance at 0.05 levels for 14 degrees of freedom. The mean value of control group pre and post training are 10.72 and 10.53 the corresponding standard deviation are 0.86 and 0.98 respectively. The 't' value as per the 't' test is 1.75. Since it is lesser than the critical 't' value 2.145, it is not significant at 0.05 level of confidence.

Table 2: Analysis of the Pre and Post test data and 't' ratio on Leg explosive power of Experimental group

Variables	Group	Test	Mean	Standard Deviation	Mean Difference	't' value
Leg explosive power	Experimental Group	Pre	1.45	0.12	0.05	7.65
		Post	1.50	0.11		
	Control Group	Pre	1.31	0.09	0.03	1.47
		Post	1.34	0.06		

Table t- ratio at 0.05 level of confidence for 14 df = 2.145

The mean value of experimental group on Leg explosive power among boys in pre and post training are 1.45 and 1.50, the corresponding standard deviation are 0.12 and 0.11 respectively. The 't' value as per the 't' test is 7.65 and these values are greater than the required table value of 2.145 for significance at 0.05 levels for 14 degrees of freedom. The mean value of control group pre and post training are 1.31 and 1.34 the corresponding standard deviation are 0.19 and 0.06 respectively. The 't' value as per the 't' test is 1.47. Since it is lesser than the critical 't' value 2.145, it is not significant at 0.05 level of confidence.

Table 3: Analysis of the Pre and Post test data and 't' ratio on Muscular strength and endurance of Experimental group

Variables	Group	Test	Mean	Standard Deviation	Mean Difference	't' value
Muscular strength and endurance	Experimental Group	Pre	25.17	3.53	2.81	17.38
		Post	27.98	3.58		
	Control Group	Pre	22.58	3.73	1.71	1.62
		Post	24.29	3.81		

Table t- ratio at 0.05 level of confidence for 14 df = 2.145

The mean value of experimental group on Balance among boys in pre and post training are 25.17 and 27.98, the corresponding standard deviation are 3.53 and 3.58 respectively. The 't' value as per the 't' test is 17.38 and these values are greater than the required table value of 2.145 for significance at 0.05 levels for 14 degrees of freedom. The mean value of control group pre and post training are 22.58 and 24.29 the corresponding standard deviation are 3.73 and 3.81 respectively. The 't' value as per the 't' test is 1.37. Since it is lesser than the critical't' value 2.145, it is not significant at 0.05 level of confidence.

Table 4: Analysis of the Pre and Post test data and 't' ratio on Upper body strength and endurance of Experimental group

Variables	Group	Test	Mean	Standard Deviation	Mean Difference	't' value
Upper body strength & endurance	Experimental Group	Pre	25.17	3.53	2.81	17.38
		Post	27.98	3.58		
	Control Group	Pre	22.58	3.73	1.71	1.62
		Post	24.29	3.81		

Table t- ratio at 0.05 level of confidence for 14 df = 2.145

The mean value of experimental group on Flexibility among boys in pre and post training are 25.17 and 27.98, the corresponding standard deviation are 3.53 and 3.58 respectively. The 't' value as per the 't' test is 17.38 and these values are greater than the required table value of 2.145 for significance at 0.05 levels for 14 degrees of freedom. The mean value of control group pre and post training are 22.58 and 24.29 the corresponding standard deviation are 3.73 and 3.81 respectively. The 't' value as per the 't' test is 1.62 since it is lesser than the critical 't' value 2.145 it is not significant at 0.05 level of confidence.

Result and Discussion

In the discussion section of the statistical analysis, what will be noted is that the utilization of the set of plyometric exercises by the experimental group led to a rise in the

explosive strength of the leg muscles, whereas no increase in the explosive leg muscle strength was noted for the members of the control group. Explosive strength had an impact on the rise in the ability for the high jump, still as for the depth jump. Similar results were obtained in a study carried out by Chu (1991).

Conclusion

The plyometric work out program including exercises involving primarily two-foot takeoff jumps, used on a sample of trainee volleyball players, contributed to the rise within the average jumping height in single foot and two-foot takeoff block and spike jumps. A statistically vital distinction was noted between the experimental and management cluster on the premise of that we have a tendency to terminated that the plyometric model will be suggested for the exercise of trainee volleyball players. it's been tested by experimentation that a eight-week plyometric exercise model (with a rise in exercise intensity from 70th to 100%) influences the statistically vital increase in speed, leg explosive power, explosive strength of the leg muscles, and so will increase the jumping skills for the block jump, spike jump, depth jump and triple standing jump. additionally, we've got determined that the regular education program employed in colleges doesn't have a sway on the event of explosive strength.

Recommendations

The proposed plyometric exercise programme ought to be a part of physical preparation of college level athletes, because of their vital influence on raising the amount of the player physically and assuredly. it's necessary to boost the awareness of the trainers with the importance of the precise plyometric exercises within the direction of the talent because of their vital influence on raising the physical and skillful level of athletes. Studies ought to be conducted within the same space on totally different samples in terms of age and gender.

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