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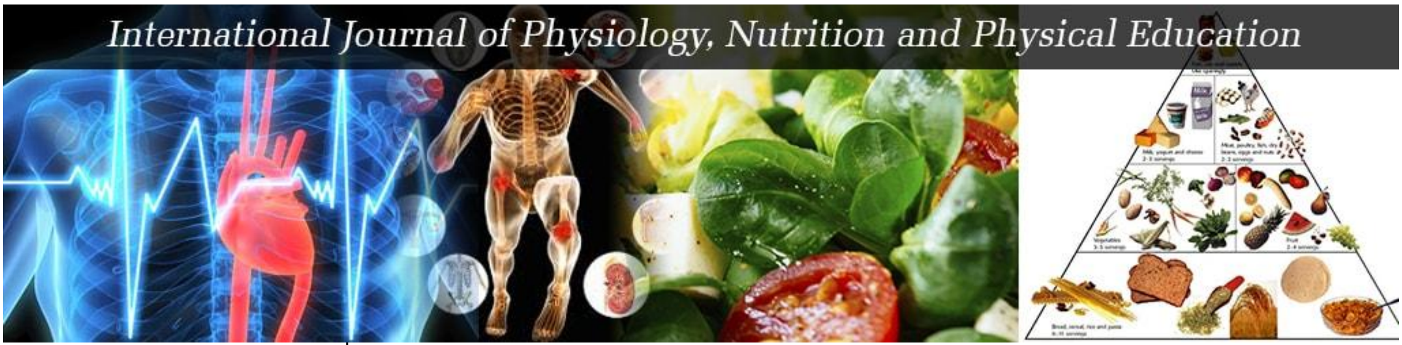

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Effect of specific training programme on stride length and stride frequency of hurdlers

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Abstract
The intention of this study was to investigate the effect of specific training programme on stride length and stride frequency of hurdlers. To achieve the purpose of the study thirty male students studying bachelor’s degree in physical education in the Department of Physical Education, Annamalai University were selected as participants and their age ranged from 18 to 22 years. The selected participants (N=30) were classified into three equal groups of ten each (n=10) at random. Group-I underwent speed training, Group-II underwent plyometric training and group-III acted as control. The training regimen lasted for twelve weeks. The selected dependent variables stride length and stride frequency were assessed using standard tests and procedures, before and after the training regimen. Analysis of covariance was used to determine the significant difference existing between pretest and posttest means on selected dependent variables of experimental and control groups. The results suggest that both the speed training and plyometric training are significantly improved the stride length and stride frequency of hurdlers. However, no significant differences were found between plyometric training group and speed training group in improving stride length and stride frequency.

Keywords: Specific training, stride length and stride frequency, hurdlers

Introduction

Scientific training methods and application of basic principles of body mechanics in sports skill have been attributed to the higher level of performance in sports skills. Performance is the combined result of coordinated exertion and integration of a variety of functions. Genetic factor probably plays an important role in an individual’s performance. Moreover performance to a certain extent depends upon the physical and motor fitness qualities in which definite improvement can be achieved through appropriate training (Boucher & Malina, 1999) [3]. Singh (1991) [14] reported that high sports performance is not merely the product of physical, psychic and physiological prerequisites possessed by an individual sportsman. High performances are achieved after prolonged periods of training.

Hurdling is the act of running and jumping over an obstacle at speed. Hurdling is, because of its technical and energy demands, an exciting and challenging event. The technical component of hurdling is clearly much greater than in sprinting, yet the concept of the hurdles race must be one of a sprint, with adjustment for each hurdle. There are many physical factors that contribute to a hurdler’s success, the primary ones being speed, power, endurance, flexibility, height, and quickness. While speed is arguably the most significant factor, it is also true that, over the years, the best hurdlers have not necessarily been the best sprinters. It is also a common belief that the more powerful hurdlers have an advantage over the others.

Taking these factors into consideration, it is possible to choose a model of technical preparation which would be optimal for the given athlete, However in order to be equal to this task, one should have a wide range of exercises at one's command, from which one can select those exercises most specifically suitable to bring about the desired results, Obviously, in spite of a thorough evaluation of the athlete. There are some other factors that influence the organization of the training such as the training period (phase), the training objectives, the training conditions (indoor or outdoor).

The range of technical training exercises is very wide. A great many specialists in the 110 meters hurdles present ideas of perfecting technique which are based on different grounds.

Many of the same exercises are included but they have different aims and order, On the other hand, all coaches have their own 'methods' which they have found to be successful, It seems that, in spite of the great variety of technical exercises. It is possible to distinguish those particular elements which have the most beneficial influence on technique training. An analysis of the publications and experiences of many coaches makes it possible to distinguish 10 elements which constitute the structure of the 110 meters hurdles technical training. Being familiar with them and employing their various possibilities may help the coach to perfect the hurdler's technique and should consequently produce better results.

Methodology

Subjects and Variables

To achieve the purpose of the study thirty male students studying bachelor’s degree in physical education in the Department of Physical Education, Annamalai University, Chidambaram, Tamilnadu, India, were selected as participants and their age ranged from 18 to 22 years. The selected participants (N=30) were classified into three equal groups of ten each (n=10) at random. Group-I underwent speed training, Group-II underwent plyometric training and group-III acted as control. The selected dependent variables stride length and stride frequency were assessed while administering 50 meters run test.

Training Protocol

The experimental groups were trained at the same time of day in the morning session, three days a week, for 12 weeks. During the training, all subjects were under direct supervision and were instructed on how to perform each exercise. The experimental group-I performed speed training, group-II performed plyometric training. Group-III was the control group which did not undergo any training. The sprint training programme includes acceleration sprint, alternative pace run, speed endurance run, and resisted sprint are performed by experimental group-I. The plyometric training exercises such as double footed jumps over low hurdle, bunny hops, press ups & hand clap, depth jumping, lateral jump single leg, medicine ball side throw are performed by experimental group-II.

Experimental Design and Statistical Procedure

The experimental design used for the study was random group design involving 30 subjects, who were divided at random into three groups. The data collected from the three groups prior to and after experimentation on stride length and stride frequency was statistically examined for significant differences, if any, by applying the analysis of covariance (ANCOVA) with the help of SPSS package. Since three groups were involved, whenever the obtained ‘F’ ratio value was found to be significant for adjusted post-test means, the Scheffe’s test was applied as post hoc test to determine the paired mean differences, if any. In determining the significance of ‘F’ ratio the confidence interval was fixed at 0.05 level.

Result

The pre and post test data collected from the experimental and control groups on stride length and stride frequency was statistically analyzed by ANCOVA and the results are presented in table-I.

Table 1: Analysis of Covariance on Stride Length and Stride Frequency of Experimental and Control Groups

Variable	Speed Training Group	Plyometric Training Group	Control Group	So V	Sum of Squares	Df	Mean Squares	‘F’ ratio
Stride Length	163.50	164.00	160.9	B	82.99	2	41.50	21.07*
				W	51.23	26	1.97	
Stride Frequency	3.29	3.35	3.18	B	0.224	2	0.112	5.60*
				W	0.569	26	0.02	

(The required table value for significance at 0.05 level of confidence with degrees of freedom degree of freedom 2 and 26 is 3.37)
*Significant at. 05 level of confidence

Table-I showed that the adjusted post-test means on stride length of speed training, plyometric training and control groups are 163.50, 164.00 and 160.90 respectively. The obtained ‘F’ ratio value of 21.07 on stride length is greater than the required table value of 3.37 for the degrees of freedom 2 and 26 at 0.05 level of confidence. It was observed from this finding that significant differences existed among the adjusted post-test means of experimental and control groups on stride length.

Table-I also showed that the adjusted post-test means on stride frequency of speed training, plyometric training and control group are 3.29, 3.35 and 3.18 respectively. The obtained ‘F’ ratio value of 5.60 on stride frequency is greater than the required table value of 3.37 for the degrees of freedom 2 and 26 at 0.05 level of confidence. It was observed from this finding that significant differences existed among the adjusted post-test means of experimental and control groups on stride frequency.

Since, the adjusted post-test ‘F’ ratio value was found to be significant the Scheffe’s test was applied as post-hoc-test to determine the paired mean differences, and it is presented in table-II.

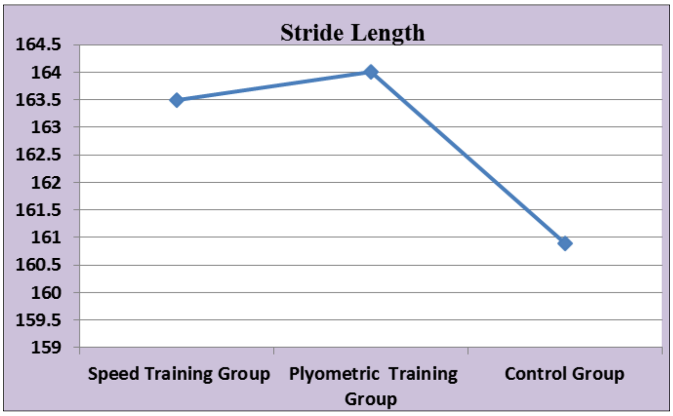
Table 2: Scheffe’s Test for the Difference between the Adjusted Post Test Paired Means of Stride Length and Stride Frequency

Variable	Adjusted Post Test Means			Difference between Means	Confidence Interval
	Speed Training Group	Plyometric Training Group	Control Group		
Stride Length	163.50	164.00		0.50	1.63
	163.50		160.90	3.10*	1.63
		164.00	160.90	3.60*	1.63
Stride Frequency	3.29	3.35		0.06	0.16
	3.29		3.18	0.11*	0.16
		3.35	3.18	0.17*	0.16

***Significant**

Table-II showed that there was significant difference existed between speed training and control groups; plyometric training and control groups on stride length and stride frequency. Since, the mean differences are higher than the confidence interval values. However, no significant differences were found between speed training and plyometric training groups on stride length and stride frequency, since, the mean differences are lesser than the confidence interval values. It reveals that both experimental groups had significantly increased the stride length and stride frequency. However, no significant differences were found between them in altering the stride length and stride frequency.

The adjusted post-test mean values on s stride length and stride frequency of the experimental and control groups are graphically represented in figure- I for better understanding.



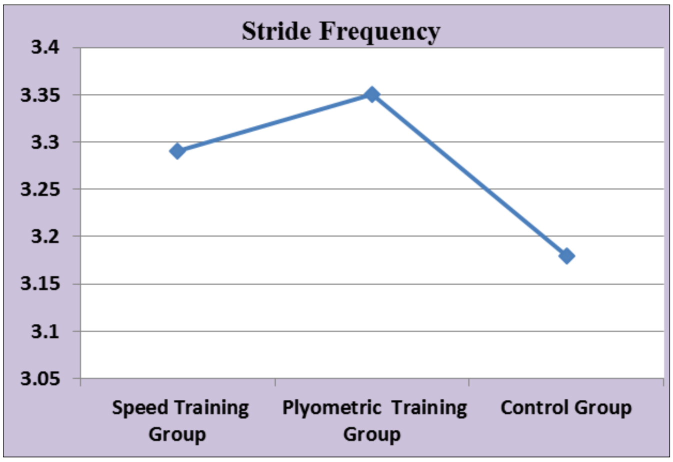


Fig 1: Adjusted Post Test Mean Scores of Experimental and Control Groups on Stride Length and Stride Frequency

Discussions

Athletic training programs are designed to enhance performance of all phases of sprinting and include a combination of plyometric training, sprint training. Rimmer and Sleivert (2000) [12] pointed out that that sprint specific plyometric programme can improve 40 metres sprint performances to the same extent as standard sprint training, possibly shortening ground contact time. A wide variety of training studies shows that plyometric can improve performance in vertical jumping, long jumping, sprinting and sprint cycling. It also appears that a relatively small amount of plyometric training is required to improve performance in these tasks. Just one or two types of plyometric exercise completed 1-3 times a week for 6-12 weeks can significantly improve motor performance (Blackey & Southard, 1987; Gehri *et al*., 1998; Matavulj *et al*., 2001) [1, 7, 11].

In addition, several studies on plyometric training have demonstrated that a significant increase in vertical jump height of ~10% was accompanied with similar increase in sport-specific jumping, (Bobbert, 1990; Little, Wilson & Ostrowski, 1996) [2, 9] sprinting (Chimera *et al*., 2004; Kotzamanidis, 2006) [8] and distance-running performance. Also consistent with previous studies Abass (2009) found that plyometrics exercises (BWT) with depth jumping and rebound jumping characteristics are best used in developing muscle strength of the lower extremities.

Similarly, Dawson *et al*., (1998) [6] found significant improvement in speed and repeated sprinting performance among male subjects, after six weeks of short sprint training sessions. They also suggested that increases in the proportion of type-II muscle fibers are also possible with this type of training. In addition, Casey *et al*., (1996) [4] reported that during sprints, type-II muscle fibers are recruited to a large extent to produce high power output as fast as possible. Majdell & Alexander (1991) [10] and Sharin *et al*., (1997) [13] have found an increase in speed performance following spring training. Therefore, it is observed from the above findings that exercising at higher intensity for short bursts followed by a low intensity recovery resulted in an elevation of speed parameters.

Conclusions

The result of this study demonstrated that, speed training and plyometric training had significant impact on stride length and stride frequency of hurdlers. However, no significant differences were found between speed training and plyometric training in improving stride length and stride frequency. Hence, it is suggested that the speed and plyometric training could be used for an overall development of the physical capacities of the hurdlers.

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