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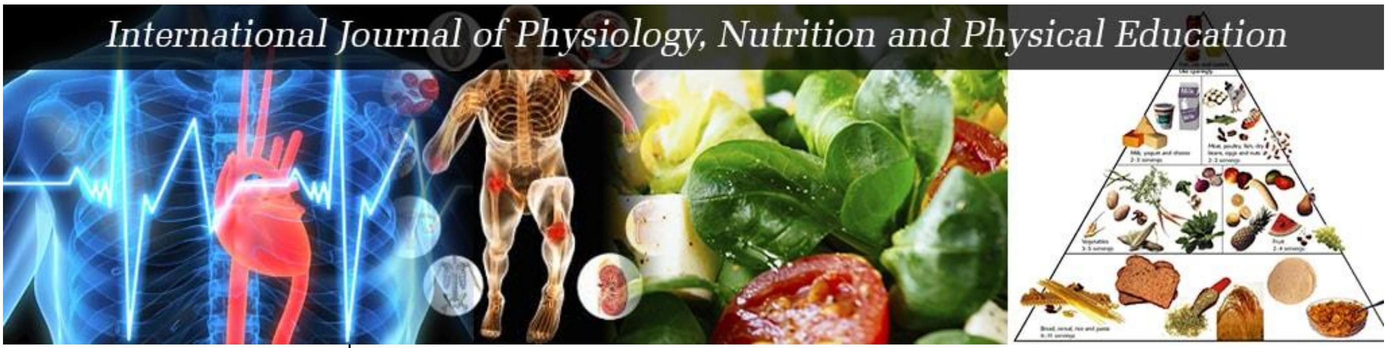

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Analysis of the Changes on Anaerobic Power in Response to Assisted and Resisted Sprint Training among Male Sprinters

Dr. I Devi Vara Prasad

Abstract
The rationale of this study was to analyze the changes on anaerobic power in response to assisted and resisted sprint training among male sprinters. For the purpose of this study, forty five male sprinters from various colleges affiliated to Acharya Nagarjuna University, Ongole, Andhra Pradesh, India, aged 18 to 23 years took part in the study. Subjects were randomly assigned to assisted sprint training group (n=15), resisted sprint training group (n=15) and control (n=15) group. The training regimen lasted for twelve weeks. The assisted sprint training exercises included in this training programme was downhill sprinting, assisted towing and high speed treadmill sprinting. The resisted sprint training exercises included in this training programme was weighted vest, sprint parachutes and harness running. The criterion variable selected was anaerobic power and it was assessed by using Running based anaerobic power test prior to and immediately after the training. Analysis of covariance was employed to establish degree of significant modification on chosen dependent variable. The findings of the study revealed that due to the effect of twelve weeks of assisted and resisted sprint training the anaerobic power of male sprinters was significantly improved.

Keywords: Assisted and resisted sprint training, Anaerobic power

Introduction

Speed is the key to success in sports and games. Each sports demands specific requirement of speed for successful performance. Assisted, resisted and un resisted sprint trainings are the most competent ways to improve various speed parameters. The speed of an athlete is the product of stride length and stride frequency. It is apparent that to increase speed, a runner must bring about an increase in both the parameters or in either of the parameters without causing the other to be reduced to a comparable extent.

Maximum running speed is an important factor for success in many sports. Different modalities of training have been employed in the development of maximum running speed. Two commonly used forms of speed training are assisted (or over speed) and resisted sprinting. During assisted sprinting, the athlete runs while being pulled along by some type of device, often an elastic cord or a rope-and-pulley system. During resisted sprinting, the athlete runs against some type of resistance, often in the form of a weighted object or a parachute that the athlete tows behind them. It has been speculated by coaches that these training methods will induce changes in an athlete's sprinting ability. Despite the popularity of both resisted and assisted methods of sprint training, and the commercial availability of various devices for carrying out the training, the evidence to support these training methods has been largely anecdotal. As a result, it remains unclear as to what biomechanical, neuromuscular and physiological changes may be induced by this type of training, as well as its effectiveness in improving sprint performance.

The experimental variables used in the present study were assisted and resisted sprint training. Though many methods prevail to develop speed parameters, the role of assisted and resisted sprint training is an undisputed one, lot of researches had been carried out on the effects of sprint training, but still the bone of contention is about the duration to get the maximum benefit. In this context, the investigator makes and attempt to analyze the effect of two different mode of sprint training (*assisted, and resisted sprint training*) on two different groups. Each method of training is designed to achieve specific training goals. The comparative effect of assisted and resisted sprint training on anaerobic power has not been analyzed scientifically. Hence, the investigator is motivated to select assisted and resisted sprint training as experimental variables.

Methodology

Subjects and Variables

For the purpose of this study, forty five male sprinters from various colleges affiliated to Acharya Nagarjuna University, Ongole, Andhra Pradesh, India, in the age group of 18 to 23 years were recruited, with their consent. The selected subjects were randomly assigned to both the experimental and control groups of 15 each. The experimental group-I underwent assisted sprint training and experimental group-II underwent resisted sprint training and group-III acted as control. The selected dependent variable anaerobic power was assessed by using Running based anaerobic power test before and after the training regimen.

Training protocol

During the training period the experimental groups underwent their respective training programme three days per week (*alternate days*) for twelve weeks in addition to their regular programme of the course of study as per their curriculum. The first group performed assisted sprint training and the second group performed resisted sprint training. The assisted sprint training exercises included in this training programme was downhill sprinting, assisted towing and high speed treadmill sprinting. The resisted sprint training exercises included in this training programme was weighted vest, sprint parachutes and harness running. More specifically, the training distance comprised of 50 meters and the initial intensity was fixed at 75% and it was increased once in two weeks by 5%. The subjects performed these runs at maximum relaxed speed with the specified intensity.

Experimental Design and Statistical Procedure

The experimental design used for the present investigation was random group design involving forty five subjects. Analysis of covariance (ANCOVA) was used as a statistical technique to determine the significant difference, if any, existing between pretest and posttest data on selected dependent variable. Whenever, the adjusted posttest ‘F’ ratio value was found to be significant, Scheffe’s post hoc test was applied to find out the paired mean differences. The level of significance was accepted at $P < 0.05$.

Results

Analysis of covariance (ANCOVA) was employed to determine the significant impact of assisted and resisted sprint training on anaerobic power and it is presented in table-I.

Table I: Analysis of Covariance on Anaerobic Power of Assisted and Resisted Sprint Training Groups and Control Group

	Assisted Sprint Training Group	**Resisted Sprint Training Group**	**Control Group**	**SoV**	**Sum of Squares**	**df**	**Mean squares**	**‘F’ ratio**
Pre test Mean	228.46	225.73	230.60	B	154.98	2	77.49	3.17
SD	5.01	6.77	4.18	W	1025.20	42	24.41	
Post test Mean	309.13	332.80	231.20	B	81498.80	2	40749.40	164.78*
SD	13.47	11.66	5.59	W	10386.13	42	247.29	
Adjusted Post test Mean	309.18	332.61	231.42	B	72889.03	2	36444.52	277.46*
				W	11376.04	41	225.01	

**Significant at .05 level of confidence*

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 & 42 and 2 & 41 is 3.23.)

Table–I shows that the pre test means and standard deviation on anaerobic power of assisted and resisted sprint training groups and control group are 228.46 ± 5.01, 225.73 ± 6.77 and 230.60 ± 4.18 respectively. The obtained ‘F’ ratio value of 3.17 on anaerobic power is less than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence, which proves that the random assignment of the subjects were successful as the pre test scores on anaerobic power among groups didn’t differ significantly.

The post test means and standard deviation on anaerobic power of assisted and resisted sprint training groups and control group are 309.13 ± 13.47, 332.80 ± 11.66 and 231.20 ± 5.59 respectively. The obtained ‘F’ ratio value of 164.78 on anaerobic power is greater than the required table value of 3.23 for the degrees of freedom 2 and 42 at 0.05 level of confidence. It confirms that significant differences existed between the groups during the post test period on anaerobic power.

The adjusted post-test means on anaerobic power of assisted and resisted sprint training groups and control group are 309.18, 332.61 and 231.42 respectively. The obtained ‘F’ ratio value is 277.46 of anaerobic power was greater than the required table value of 3.23 for the degrees of freedom 2 and 41 at 0.05 level of confidence. The result of the study shows that, significant differences exist among experimental and control groups on anaerobic power.

Since the adjusted post test mean ‘F’ value was found to be significant, the data on anaerobic power is subjected to post hoc analysis using Scheffé S test and it is presented in table–II.

Table II: Scheffé S Test for the Differences between the Adjusted Post Test Paired Means on Anaerobic Power

Variable	Adjusted Post Test Mean			Mean differences	Confidence Interval
	Assisted Sprint Training	Resisted Sprint Training	Control Group		
Anaerobic Power	309.18	332.61		23.43*	13.92
	309.18		231.42	77.76*	13.92
		332.61	231.42	101.19*	13.92

**Significant at .05 level.*

Table–II shows that the adjusted post test mean differences on anaerobic power between assisted and resisted sprint training groups, assisted sprint training and control groups, resisted sprint training and control groups are 23.43, 77.76 and 101.19 respectively, which are greater than the confidence interval value of 13.92 at 0.05 level of significance. From the result of the study it was concluded that the anaerobic power of the assisted and resisted sprint training group subjects was significantly improved. However, resisted sprint training is better than assisted sprint training in improving anaerobic power.

The pre, post and adjusted post test mean values of assisted and resisted sprint training groups and control group on anaerobic power was graphical represented in figure-I.

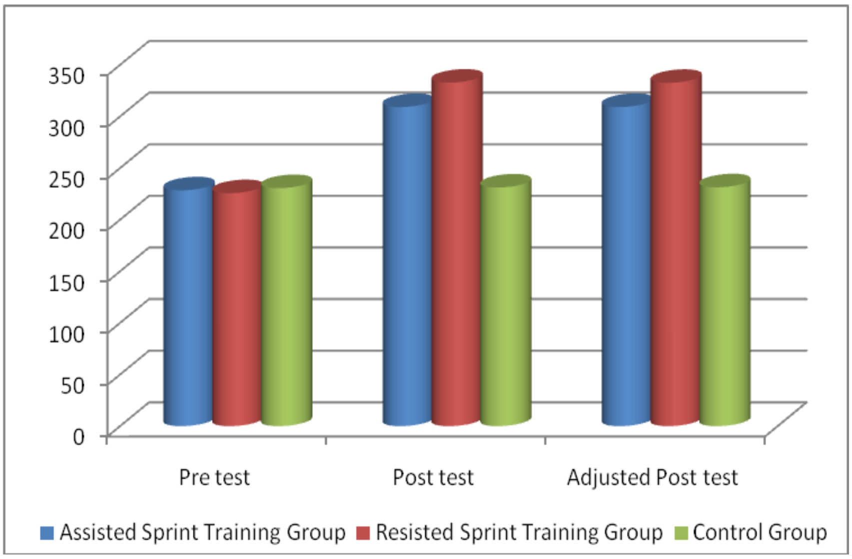

Fig I: Graphical Representation of the Data on Anaerobic Power of Experimental and Control Group

Discussion

Physical activity causes beneficial changes in the functioning of all internal organs, particularly, the heart, lungs and circulatory system. A physically fit person's heart beats at a lower rate and pumps more blood, which denotes the substantial increase of ability to do more physical work. These results are support the observation by Laursen *et al*., (2005) [1] stated that, peripheral adaptation rather than central adaptation are likely responsible for the improved anaerobic capacity following various forms of high intensity training. Rodas *et al*., (2000) [6] suggested that, training of short duration, high loads and long recovery periods seems to be an effective programme for improving the enzymatic actives of the energetic pathways in a short period of time,

MacDougall *et al*., (1996) [2] found that, relatively brief period of sprint training increased aerobic and anaerobic capacities in initially untrained individuals. These results are in agreement with the previous observation by Wenzel (1992) [7] and Nowberry & flowers (1999) [5] in which they found significant improvement in anaerobic power following speed training. Medbo and Burgers (1990) [4] reported that, six weeks of intense exercise of short duration improved anaerobic capacity. They identified that sprinters have better anaerobic capacity than endurance athletes, due to increase in anaerobic energy release. Mahon (2000) [3] postulated that, factors such as motor neuron firing rate and improved coordination were responsible for enhanced anaerobic power performance.

Conclusion

From the result of the study it was concluded that the anaerobic power of the assisted and resisted sprint training group subjects was significantly improved. However, resisted sprint training is better than assisted sprint training in improving anaerobic power. It demonstrated that the anaerobic power performance can be developed by both assisted and resisted sprint training. Hence, it is suggested that, when properly performed, assisted and resisted sprint training can provide significant functional benefits and improvement in overall health and fitness.

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