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A STUDY ON EFFECTIVENESS OF RESISTED AND UNRESISTED SPRINT TRAINING ON MAXIMUM OXYGEN CONSUMPTION AND ANAEROBIC POWER

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ABSTRACT

The purpose of this study was to evaluate the resisted and unresisted sprint training on maximum oxygen consumption and anaerobic power. For this purpose, 45 male students from the department of physical education, Sri Krishnadevaraya University, Anantapur, aged 21 to 24 years took part in the study. The subjects confined to this study were randomly segregated into three groups of 15 each. Group-I underwent resisted sprint training, group-II followed unresisted sprint training and group-III acted as control. The training regimen lasted for twelve weeks. The maximum oxygen consumption and anaerobic power were selected as criterion variables, and they were assessed using standard tests and procedures, before and after the training regimen. Analysis of covariance was used to determine the statistical significance of resisted and unresisted sprint training on selected criterion variables, and to assess the difference in the effectiveness of independent variables. The analysis of data reveals that both the experimental treatments had significant impact on maximum oxygen consumption and anaerobic power, furthermore the findings reveals that there is a significant difference in the level of effectiveness of resisted and unresisted sprint training.

INTRODUCTION

Running velocity is a key factor in the success of most sports as it is the fastest athletes who win the race or any opponent. Improvement of running velocity is considered more difficult compared to other physical abilities, such as strength and endurance, as it is also significantly affected by hereditary factors (Bouchard, Malina & Perusse, 1997; Simoneau & Bouchard, 1998). Good performance in a run require to start fast as well as achieve and maintain as high a speed as possible, and is divided into secondary phases: acceleration phase, maximum speed achievement, maintenance phase and deceleration phase.

Athletic training programs are designed to enhance performance of all phases of sprinting and include a combination of plyometric training, sprint training (non-resisted, uphill and downhill running, resisted [chutes, sleds, weighted vests] and assisted towing), and resistance training (Alcaraz *et al*., 2008; Callister *et al*., 1988; De Villarreal, Gonzalez-Badillo & Izquierdo, 2008; Kristensen, Van Den Tillaar and Ettema, 2006; Spinks, 2007; Zafeiridis *et al*., 2005).

Resisted sprint training includes modalities designed to create an overload effect such as the parachute, sled, harness, or weighted vest. The objective of the overload is to elicit a greater neural activation and to increase the recruitment of fast-twitch muscle fibers.

There are athletic training programs that are designed to enhance performance of all phases of sprinting, which includes a combination of plyometric training, sprint training (*non-resisted, uphill and downhill running, resisted [chutes, sleds, weighted vests] and assisted towing*), and resistance training. These training regimens may induce the adaptation process of aerobic and anaerobic energy metabolism for better.

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However, there is scarcity for studies in comparing the influences of resisted and unresisted sprint training on energy metabolism. Hence, in this investigation an attempt is made to evaluate the effectiveness of resisted and unresisted sprint training on maximum oxygen consumption and anaerobic power.

Thereby, it was hypothesised that:

a. There would be a significant improvement on maximum oxygen consumption and anaerobic power due to experimental treatments, and

b. There would be a significant difference in the level of effectiveness between experimental groups on selected criterion variables.

Methodology

Subjects

To achieve the purpose of the study, 45 male students were selected at random as subjects from the department of physical education, SriKrishnadevaraya University, Anantapur, and they were aged 21 to 24 years. The selected subjects neither have the experience of organised fitness training nor participating in any other special coaching programme. The subjects confined to this study were randomly segregated into three groups of 15 each. Group-I underwent resisted sprint training, group-II followed unresisted sprint training and group-III acted as control. The training regimen lasted for twelve weeks.

Variables: The independent variables used in the present study were resisted and unresisted sprint training. The criterion variables chosen for the present study were maximum oxygen consumption and anaerobic power, and these were assessed by means of one-mile run and running based anaerobic sprint test.

Training Protocol: The unresisted sprint training group performed flat running alone, while the resisted sprint training group performed with external load. Both the experimental groups performed their training distance comprised of 30-80 metres run based on their target personnel best, with the initial intensity fixed at 75% for resisted sprint training and 85% for unresisted sprint training. Thereafter, the training intensity was increased once in three weeks by 5%. The rest interval between repetitions was 3-5minutes, where they stay active and between sets they performed other balance or trunk activities for 10-15min.

Experimental Design: The experimental design used for the present study was random group design involving 45 volunteers as subjects.

Statistical Techniques: Analysis of covariance was computed for the data collected from experimental and control groups. Further, since three groups were involved, whenever the *F* ratio was significant, Scheffé S post hoc test was used to determine which of the paired means differed significantly. In all cases, the level of confidence was fixed at 0.05 for significance.

Results and Discussion

The descriptive analysis of data collected on selected criterion variables before and after twelve weeks of training is presented in Table 1.

Table 1: Computation of Mean and Standard Deviation on Maximum Oxygen Consumption and Anaerobic Power

Variables	Groups	Pretest		Posttest	
		$\bar{X}$	σ	$\bar{X}$	σ
VO_2max	Control	2.993	.155	3.087	.110
	Resisted	2.895	.136	3.240	.102
	Unresisted	2.917	.134	3.329	.297
Anaerobic Power	Control	227.6	4.188	231.0	4.986
	Resisted	222.7	6.777	317.8	11.663
	Unresisted	223.7	3.634	293.4	23.148

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Analysis of covariance was used to determine the significant influence of resisted and unresisted sprint training on maximum oxygen consumption and anaerobic power and it is presented in Table 2.

Table 2 : Analysis of Covariance on Maximum Oxygen Consumption and Anaerobic Power of Control and Experimental Groups

	Control Group	Resisted Sprint Training Group	Unresisted Sprint Training Group	Source of Variance	Sum of Squares	df	Mean Squares	F Ratio
VO_2max	3.099	3.232	3.326	Between	0.368	2	0.184	4.976*
				Within	1.514	41	0.037	
Anaerobic Power	229.834	318.583	293.783	Between	53160.70	2	26580.35	113.735*
				Within	9581.91	41	233.70	

*Significant at 0.05 level of confidence

The table value required for significance for the df of 2, 41 is 3.22 .

Table 2 demonstrates that the adjusted posttest means on maximum oxygen consumption and anaerobic power among groups were found to be significantly varied, since the obtained *F* ratio of 4.976 and 113.735 respectively were greater than the required table value of 3.22 for the degrees of freedom 2 and 41at 0.05 level of confidence. Since, the obtained *F* ratios on maximum oxygen consumption and anaerobic power were found to be significant, the post hoc tests were applied and it was given in Table 3 and 4.

Table - 3: Scheffé S Test on Maximum Oxygen Consumption among Groups

Adjusted Post Test Means				Confidence Interval
Control Group	Resisted Sprint Training Group	Unresisted Sprint Training Group	Mean Difference	
3.099	3.232		0.133	0.178
3.099		3.326	0.227*	0.178
	3.232	3.326	0.094	0.178

*Significant at 0.05 level of confidence

Table 3 shows that unresisted sprint training group is significantly effective in improving maximum oxygen consumption as compared to control and resisted sprint training groups.

Table - 4: Scheffé S Test on Anaerobic Power among Groups

Adjusted Post Test Means				Confidence Interval
Control Group	Resisted Sprint Training Group	Unresisted Sprint Training Group	Mean Differences	
229.834	318.583		88.749*	14.16
229.834		293.783	63.949*	14.16
	318.583	293.783	24.800*	14.16

*Significant at 0.05 level of confidence

Table 4 demonstrates that both the experimental groups are significantly effective in improving anaerobic power as compared to control group. Further, it shows that the resisted sprint training is considerably better than the unresisted sprint training group in enhancing anaerobic power.

The findings of this study exhibits that 12 weeks of resisted and unresisted sprint training significantly enhanced the capability of maximum oxygen consumption and anaerobic power. These findings were substantiated by the previous research findings of some (MacDougall *et al*. 1996; Wenzel, 1992; Medbo &

Burgers, 1990) that a relatively brief period of sprint training increased aerobic and anaerobic capacities in initially untrained individuals.

Conclusion

It was found that both the resisted and unresisted sprint training may develop the capability of maximum oxygen consumption and anaerobic power, of which resisted sprint training contributes to the better development of anaerobic power, on the other hand unresisted sprint training enhanced maximum oxygen consumption than the counterparts.

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