STAR
Research Journal

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PHYSICAL EDUCATION

RELATIVE EFFECT OF SAQ TRAINING VERSES ASSISTED SPRINT TRAINING ON SELECTED SPEED RELATED PARAMETERS

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Abstract

The purpose of the study is to investigate the relative effect of SAQ training verses assisted sprint training on selected speed related parameters. To achieve the purpose of the study, forty five male students from the Department of Physical Education and Sports Sciences, Annamalai University, India were selected as subjects. Their age ranged from 18 years to 23 years. The selected subjects were randomly assigned into three equal groups of 15 subjects each. Group-I underwent SAQ training, group-II underwent assisted sprint training and group-III acted as control. The research design of the study was pre and post test random group design. In order to nullify the initial mean differences the data collected from the three groups prior to and post experimentation on selected speed related parameters were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since, three groups are involved, whenever the obtained 'F' ratio value in the adjusted post test mean is found to be significant, the Scheffe's test is applied as post hoc test to determine the paired mean differences, if any. The result of the study reveals that due to the effect of SAQ training and assisted sprint training the selected speed related parameters of the subjects was significantly improved. It was also concluded that SAQ training is significantly better than assisted sprint training groups in improving the stride length and reaction time however assisted sprint training is significantly better than SAQ training in improving stride frequency.

Keywords: SAQ training, Assisted sprint training, Speed related parameters.

Introduction

Sprinting speed is determined by the length of stride and stride frequency (speed of stride). Length of stride depends primarily upon leg length and leg power. Leg speed and frequency mostly depend upon speed of muscle contractions and neuromuscular co-ordination. Researcher demonstrated that the length of stride, rather than the rate of acceleration of the leg, is the main limitation in sprinting. It is known that length of stride can be increased by increasing leg power, which is the ability to apply more force rapidly and thereby project the body faster and further with each stride. Leg speed is innate, but stride length can be improved by increasing muscular strength and mobility. Whereas, Eicher (1975) is of the opinion that increasing either factor automatically increases a runner's sprinting speed. Though stride frequency is an inborn quality, it might be possible to improve slightly through training.

Acceleration, speed, and agility have been found to be independent, unrelated qualities that produce a limited transfer to each other. The next step is to investigate methods that produce the integral effects that can be used in the conditioning of athletes. But, it is found that few studies have investigated the training methods that produce the integral effects on various abilities. One of the most popular training methods that produce the mentioned results is the SAQ (speed, agility, quickness) method. Within the context of randomized intermittent, dynamic and skilled movement type sports (randomized intermittent, dynamic type sports [RIDS]), to which athletics undoubtedly belongs, the integrated effects are wanted. The problem is to decide which type of conditioning should be implemented (programmed or random conditioning) to improve SAQ in athletics.

Sprinting can be defined as the ability to run at maximum speed for a short duration. 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. There are other forms of assisted running which are safer and less expensive, such as sprinting with the wind and sprinting downhill. Unfortunately, it is impossible to control either the velocity or availability of wind, and, therefore, this technique has major limitations. Further, since the wind velocity is never constant, it is hard to keep sprinters within the 10% window.

Various studies have demonstrated that the SAQ and assisted sprint training can produce significant changes in running speed and running kinematics. However the longer-term training adaptations after SAQ and assisted sprint training on speed parameters remain unclear. Hence, the investigator was much interested to conduct a study to compare the effect of different sprint training, such as SAQ and assisted sprint training on speed related parameters.

Methods

Subject and Variable

To achieve the purpose of the study, forty five male students from the Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu, India were selected as subjects. Their age ranged from 18 years to 23 years. The selected subjects were randomly assigned into three equal groups of 15 subjects each. Group-I underwent SAQ training, Group-II underwent assisted sprint training and group-III acted as control. The selected dependent variables stride length, stride frequency and reaction time was assessed by conducting 50 meters run test and Reaction Time Ruler Test.

Training Programme

Based on the results of the pilot study the training programme was designed. The training sessions were conducted three days a week over a period of twelve weeks. The SAQ training was administrated to the experimental group, which include speed, agility, and quickness drills. The experimental group undertook three SAQ training sessions in a week. Sessions were progressively structured to gradually increase intensity over each of the 12 weeks. The assisted sprint training exercise included in this training programme was downhill running. The training distance comprised of 30, 40 and 50 metres and the initial intensity was fixed at 80% of the groups' personal best, as measured in the pilot study. The assisted sprint training group underwent downhill run with 3˚ inclination.

Statistical Technique

The data collected from the three groups prior to and post experimentation on selected dependent variable was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since three groups are 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 all the cases the level of confidence was fixed at 0.05 for significance.

Results and Discussion

The pre and post test data collected from the experimental and control groups on speed related parameters is statistically analyzed by analysis of covariance and the results are presented in table–I.

Table I. : Analysis of Covariance on Selected Speed Related Parameters of Experimental and Control Groups

Variables	SAQ Training Group	Assisted Sprint Training Group	Control Group	S o V	Sum of Squares	df	Mean Squares	'F' ratio
Stride length (cm)	165.00	163.50	160.9	B	82.99	2	41.50	33.21*
				W	51.23	41	1.25	
Stride frequency (Number)	3.29	3.35	3.18	B	0.224	2	0.112	8.09*
				W	0.569	41	0.014	
Reaction time (Second)	0.15	0.17	0.20	B	0.012	2	0.006	59.19*
				W	0.003	41	0.0001	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 41 is 3.22)
*Significant at .05 level of confidence

Table-I shows that the adjusted post-test means on stride length of SAQ training, assisted sprint training and control groups are 165.00, 163.50 and 160.90 respectively. The obtained 'F' ratio value 33.21 of stride length is greater than the required table value of 3.22 for the degrees of freedom 2 and 41at 0.05 level of confidence. Hence, it is concluded that significant differences exist between the adjusted post test means of SAQ training, assisted sprint training and control groups on stride length.

The adjusted post-test means on stride frequency of SAQ training, assisted sprint training and control groups are 3.29, 3.35 and 3.18 respectively. The obtained 'F' ratio value 8.09 of stride frequency is greater than the required table value of 3.22 for the degrees of freedom 2 and 41at 0.05 level of confidence. Hence, it is concluded that significant differences exist between the adjusted post test means of SAQ training, assisted sprint training and control groups on stride frequency.

The adjusted post-test means on reaction time of SAQ training, assisted sprint training and control groups are 0.15, 0.17 and 0.20 respectively. The obtained 'F' ratio value 59.19 of reaction time is greater than the required table value of 3.22 for the degrees of freedom 2 and 41at 0.05 level of confidence. Hence, it is concluded that significant differences exist between the adjusted post test means of SAQ training, assisted sprint training and control groups on reaction time.

Since, the obtained 'F' ratio value in the adjusted post test means on selected speed related parameters is found to be significant, the Scheffe'S test is applied as post hoc test to find out the paired mean difference, and it is presented in table-II.

Table II. Scheffe's Post Hoc Test for the Differences among Paired Means of Experimental and Control Groups o**n** Selected Speed Related Parameters

Variables	SAQ Training Group	Assisted Sprint Training Group	Control Group	Mean Difference	Confidence Interval
Stride length	165.00	163.50		1.50*	1.04
	165.00		160.90	4.10*	1.04
		163.50	160.90	3.60*	1.04
Stride frequency	3.29	3.35		0.06*	0.10
	3.29		3.18	0.11*	0.10
		3.35	3.18	0.17*	0.10
Reaction time	0.15	0.17		0.02*	0.01
	0.15		0.20	0.05*	0.01
		0.17	0.20	0.03*	0.01

*Significant at .05 level

From table-II the Scheffe's post hoc analysis proved that significant mean differences exist between SAQ training and assisted sprint training groups, SAQ training and control groups, assisted sprint training and control groups on stride length, stride frequency and reaction time. Since, the mean differences are higher than the confident interval value of 1.04, 0.10 and 0.01 at .05 level of significance. Hence, it is concluded that due to the effect of SAQ training and assisted sprint training the stride length, stride frequency and reaction time of the subjects is significantly improved. It is also concluded that SAQ training is significantly better than assisted sprint training in improving stride length and reaction time however assisted sprint training is significantly better than SAQ training in improving stride frequency.

The adjusted post test mean values of experimental and control groups on selected speed related parameters is graphically represented in figure-I.

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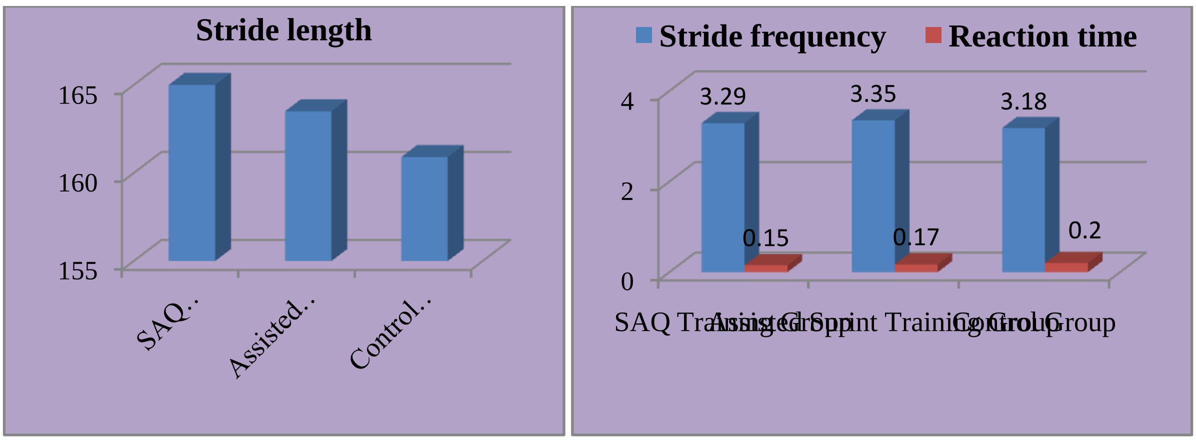
Figure-I. Diagram Showing the Adjusted Post Test Mean Values on Selected Speed Related Parameters of Experimental and Control Groups



The result of this study has shown that 12 weeks of SAQ and assisted sprint training had positive effects on selected speed related parameters. These results demonstrate that specific speed and agility training (SAQ), as part of the overall training process, can be considered a useful tool for the improvement of speed parameters. Bloomfield et al.,'s (2007) viewpoint is that the SAQ regimen is an important training method for the improvement of speed and quickness. SAQ (speed, agility and quickness) training method should be a useful component of fitness training (Pearson, 2001). Hence this form of training is thought to encourage the adaptation of movement mechanics, length and frequency of steps, and increased hip height in the pursuit of increased speed, agility and quickness (Pearson, 2001).

Downhill sprinting provides a very good horizontal plyometric stimulus. As long as the slope is no greater than one percent, even inexperienced athletes can run with optimum sprinting mechanics. The elevation of the centre of mass is greater at takeoff than it is at touchdown, and this means that the vertical distance through which the centre of mass travels also increases. Thus, athletes sprinting down the hill experience greater vertical velocity. Because decline sprinting is an over speed stimulus in both a vertical sense as well as a horizontal sense, it places a great demand on the nervous system. Researchers have found increases in stride rate (Mero & Komi, 1986; Mero & Komi, 1990), ground reaction forces, muscle stiffness, stored elastic energy (Ito *et al.*, 1983; Mero *et al.*, 1987; Mero & Komi, 1990), and increased efficiency of muscle contraction and running skill (Mero *et al*., 1987), during supramaximal running. It was noted that stride rate contributed 6.9% and stride length 1.5% to the increase from maximal to supramaximal running velocity. Therefore, it is observed from the above findings that exercising at SAQ and assisted conditions resulted in an elevation of speed parameters. This seems to be that SAQ and assisted sprint training techniques will somehow impact on the athlete's nervous system to induce greater speed performance.

Conclusions

The result of the study reveals that, due to the effect of SAQ training and assisted sprint training the stride length, stride frequency and reaction time of the subjects is significantly improved. It is also concluded that SAQ training is significantly better than assisted sprint training in improving stride length and reaction time however assisted sprint training is significantly better than SAQ training in improving stride frequencyIn the light of the study undertaken with certain limitations imposed by the experimental conditions, the following conclusions were drawn.

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