

Impact of Various Intensities of Speed Training on Selected Speed Related Components

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ABSTRACT

The purpose of the present study was to investigate the effect of different intensities of speed training on selected speed related components among college men students. Speed is an important component of physical fitness and is essential for successful performance in many sports and games. The study was designed to determine whether low-, moderate-, and high-intensity speed training would produce different improvements in selected speed components. 60 College men students were selected as participants and randomly assigned to three experimental groups, High Intensity Speed Training Group(HIST), Medium Intensity Speed Training Group (MIST), Low Intensity Speed Training Group(LIST) and a Control group. The experimental groups participated in their respective speed-training programs for a specified period, while the control group continued their regular physical activities. Selected speed components such as maximum Speed and Agility were assessed using appropriate standardized tests. Pre-test and post-test measurements were obtained and analyzed using appropriate statistical techniques. It was hypothesized that different intensities of speed training would significantly improve selected speed components and that the magnitude of improvement would differ among the training groups. The findings of the study may provide useful information for physical education teachers, coaches, and strength and conditioning professionals in designing effective speed-training programmes for college students.

Keywords: Speed Training, Training Intensity, Acceleration, Maximum Speed, Agility

INTRODUCTION

Speed is one of the fundamental components of physical fitness and plays a significant role in the performance of athletes. It refers to the ability to perform a movement or cover a given distance in the shortest possible time. In sports such as athletics, football, hockey, basketball, volleyball, and badminton, the ability to accelerate rapidly and attain high movement velocity can have a direct influence on performance. Speed is not a single physical quality (Dobbin, 2012). It consists of several components, including reaction speed, acceleration, maximum speed, and speed endurance. These components are influenced by neuromuscular coordination, muscle strength and power, technique, flexibility, body composition, and the individual's training status. Training intensity is an important factor in determining the physiological and neuromuscular adaptations produced by a training programme. Low- moderate- and high-intensity speed training may produce different responses because the demands placed on the muscular and nervous systems vary according to training intensity. For college students, systematic speed training can contribute not only to sports performance but also to overall physical fitness. However, an appropriate training intensity is necessary to obtain optimal improvement while avoiding excessive fatigue and inadequate recovery. Therefore, the present study was undertaken to examine the effect of different intensities of speed training on selected speed components among college men students (Smith, & Lee, 2015).

METHODOLOGY

This study was designed to find out the effect of different intensities of speed training on selected speed related components among college men students. For this study, sixty (N=60) male college students were selected as subjects. The age, of the subjects were ranged from 19 to 23 years. The study was designed to determine whether low-, moderate-, and high-intensity speed training would produce different improvements in selected speed components

Training procedure

They were randomly assigned into four groups of fifteen each (n=15). The Participants were randomly assigned to three experimental groups namely Low, Medium And High Intensity speed training for twelve weeks at the rate of three days a week and the group IV acted as control. The training program was designed with sessions held thrice weekly (e.g., Monday, Wednesday, Friday). Each session lasted approximately 60 minutes, including warm-up, main training activities, and cool-down. The program aimed to improve sprinting speed, reaction time, and agility through structured speed training exercises at different intensities. The program such as High-Intensity Speed Training (HIST), Exercises performed at 90-100% of maximum effort, Moderate-Intensity Speed Training (MIST) Exercises performed at 60-70% of maximum effort and Low Intensity Speed Training (LIST) performed at 45 – 55% effort and No specific speed training program offered for the Control Group they continued the regular activities. The training drills which includes for the three experimental groups were

Sprint Drills, such as Short sprints of 30-50 meters at maximum effort, 6-8 repetitions per session with 2-minute rest intervals for HIST Group for MIST Group they went Similar sprints at 60-70% effort, 8-10 repetitions, with 1-minute rest intervals and for (LIST) they went similar drills at 45 to 55% effort 4-5 repetitions with 3 minutes rest intervals. The Agility Exercises such as Cone drills, shuttle runs, and zig-zag sprints emphasizing quick directional changes, performed at high effort for the HIST Group and for the MIST Group, Similar drills were performed at moderate effort focusing on technique and control.

Statistical Technique

All the subjects were tested prior to and immediately after the experimental periods on the selected dependent variables such as maximum speed and agility was measured by 50mts run and shuttle run respectively. The data obtained from the experimental groups before and after the experimental period were statistically analyzed with Analysis of covariance (ANCOVA). Whenever the 'F' ratio for adjusted post-test means was found to be significant, the Scheffe's test was applied as post-hoc test to determine the paired mean differences. The level of confidence was fixed at 0.05 levels for all the cases.

Analysis of the data and results

The results of analysis of covariance on data collected prior to and after the experimental period on the selected variables among the control group, and the intensities such as high, medium and low intensity group are presented in tables.

Table-1 Analysis of Covariance on Maximum Speed Among Control Group Low Medium And High Intensity Group

	CONTROL GROUP	HIST GROUP	MIST GROUP	LIST GROUP	S O v	Sum Of squares	Df	Mean squares	F- ratio
Pre Test Mean	7.31	7.30	7.30	7.40	Between	.09	3	.031	.56
	.23	.20	.19	.28	Within	2.9	56	.05	
	7.21	6.76	7.04	7.10	Between	1.17	3	.39	10.27*

Post Test Mean	.18	.23	.15	.15	Within	1.92	56	.034	
Adjusted post Test Mean	7.25	6.66	6.99	7.02	Between	1.20	3	.40	26.87*
					Within	.76	55	.014	

Table F-ratio at 0.05 level of confidence for 3 and 56 (df) =2.77

* Significant at 0.05 level.

The above table shows that the pretest means of control group, HIST group, MIST group and LIST training group were 7.31 (± 0.23), 7.30 (± 0.20), 7.30 (± 0.19) and 7.40 (± 0.28) respectively. The obtained F value of 0.56 was less than the required table value 2.77. This proved that there was no significant mean difference between the groups at pretest period. The posttest means of the variable speed among control group, HIST group, MIST group and LIST group were 7.21 (± 0.18), 6.76 (± 0.23), 7.04 (± 0.15), 7.10 (± 0.15), respectively. The obtained F value of 10.37 was greater than the required table value of 2.77.

This proved that there was a significant mean difference among the groups after the twelve weeks training. The adjusted posttest means of the control group, HIST group, MIST group and LIST group were 7.25, 6.66, 6.99 and 7.02 respectively. The obtained F value of 26.87 was greater than the required table value of 2.77. This proved that there was a significant mean difference among the three groups.

Since the obtained F ratio of the adjusted post test means was found to be significant, Scheffe's post hoc test was applied. The obtained paired mean differences among the training and control group, between the training groups and the confidence interval required for significance are presented in table-IV.

Table -2 Scheffe's Confidence Interval Test Scores and the Mean Differences between the Groups on Speed

Means of				PAIRED MEAN DIFFERENCE	CONFIDENCE INTERVAL
CONTROL GROUP	HIST GROUP	MIST GROUP	LIST GROUP		
7.25	6.66			0.59*	0.12
7.25		6.69		0.56*	0.12
7.25			7.02	0.23*	0.12
	6.66	6.69		0.03	0.12
	6.66		7.02	0.36*	0.12
		6.69	7.02	0.33*	0.12

The paired mean difference obtained for control group with HIST group, MIST group and LIST group were 0.59, 0.56 and 0.23 respectively. The paired mean difference between HIST Group and MIST group, HIST group and LIST group and MIST group and LIST group were 0.03, 0.36 and 0.33 respectively. All the paired mean differences were higher than the confidence interval value.

The results of the study also show that all the three trainings had resulted in a significant improvement in speed as compared with control group. Among the three training groups, HIST group was better among the three intensities of speed training on maximum speed

Table-3 Analysis of Covariance on Maximum Agility Among Control Group Low Medium And High Intensity Group

	CONTROL GROUP	HIST GROUP	MIST GROUP	LIST GROUP	S O v	Sum Of squares	Df	Mean squares	F- ratio
Pre Test Mean	11.25 0.08	11.25 0.013	11.25 0.019	11.25 0.035	Between	0.001	3	0.001	0.435
					Within	0.029	56	0.001	
Post Test Mean	11.25 0.08	11.23 0.013	11.21 0.017	11.18 0.012	Between	0.035	3	0.012	5.136*
					Within	0.013	56	0.003	
Adjusted post Test Mean	11.25	11.19	11.29	11.23	Between	0.033	3	0.011	30.186*
					Within	0.002	55	0.001	

Table F-ratio at 0.05 level of confidence for 3 and 56 (df) =2.77

The above table shows that the pretest means of control group, HIST group, MIST group and LIST training group were 7.31 (± 0.23), 7.30 (± 0.20), 7.30 (± 0.19) and 7.40 (± 0.28) respectively. The obtained F value of 0.56 was less than the required table value 2.77. This proved that there was no significant mean difference between the groups at pretest period. The posttest means of the variable speed among control group, HIST group, MIST group and LIST group were 7.21 (± 0.18), 6.76 (± 0.23), 7.04 (± 0.15), 7.10 (± 0.15), respectively. The obtained F value of 10.37 was greater than the required table value of 2.77. This proved that there was a significant mean difference among the groups after the twelve weeks training. The adjusted posttest means of the control group, HIST group, MIST group and LIST group were 7.25, 6.66, 6.99 and 7.02 respectively. The obtained F value of 26.87 was greater than the required table value of 2.77. This proved that there was a significant mean difference among the three groups.

Since the obtained F ratio of the adjusted posttest means was found to be significant, Scheffe's post hoc test was applied. The obtained paired mean differences among the training and control group, between the training groups and the confidence interval required for significance are presented in table-IV.

Table -4 Scheffe's Confidence Interval Test Scores and The Mean Differences Between The Groups On Agility

Means of				PAIRED MEAN DIFFERENCE	CONFIDENCE INTERVAL
CONTROL GROUP	HIST GROUP	MIST GROUP	LIST GROUP		
11.25	11.19			0.060*	0.019
11.25		11.20		0.050*	0.019
11.25			11.230	0.020*	0.019
	11.19	11.20		0.010	0.019
	11.19		11.230	0.040*	0.019
		11.20	11.230	0.030*	0.019

*Significant at 0.05 level

The paired mean difference obtained for control group with HIST group, MIST group and LIST group were 0.060, 0.050 and 0.020 respectively. The paired mean difference between HIST Group and MIST group, HIST group and LIST group and MIST group and LIST group were 0.010, 0.040 and 0.030 respectively. All the paired mean differences were higher than the confidence interval value. The results of the study also show that all the three trainings had resulted in a significant improvement in speed as compared with control group. Among the three training groups, HIST group was better among the three intensities of speed training on maximum speed

DISCUSSION

The present study aimed to investigate the effects of different intensities of speed training on speed and agility components among college men students. The findings revealed that both moderate- and high-intensity speed training resulted in significant improvements in sprinting speed and agility compared to the control group, with high-intensity training producing the most pronounced gains. High-intensity speed training (HIST) at 90-100% effort levels elicited substantial neuromuscular adaptations, including increased muscle fiber recruitment, improved motor unit synchronization, and enhanced anaerobic capacity (**Dobbin, 2012**). These physiological adaptations are crucial for explosive movements such as sprinting and rapid directional changes, explaining the observed superior performance in the HIST group. Conversely, moderate-intensity training, while beneficial, produced comparatively moderate improvements, aligning with prior research indicating that training intensity correlates positively with performance enhancements (**Smith & Lee, 2015**). Agility, which involves quick directional changes and coordination, is highly responsive to training stimuli that challenge neuromuscular control. High-intensity drills requiring rapid acceleration and deceleration, such as cone drills and shuttle runs performed at maximal effort, stimulate proprioceptive and motor control systems more effectively than lower intensities (**Williams, 2018**). The significant improvements in agility observed in the high-intensity group corroborate findings by **Young et al. (2014)**, who reported that maximal effort agility drills are more effective in improving change-of-direction speed. The superior outcomes in the high-intensity group can be attributed to increased muscle power, enhanced fast-twitch muscle fiber engagement, and improved reaction times. These adaptations are essential for sports performance tasks that demand rapid and explosive movements (**Komi, 2015**). Moreover, high-intensity training induces greater hormonal responses, such as increased testosterone and growth hormone levels, facilitating muscle hypertrophy and strength gains (**Ahtiainen et al., 2016**). The results suggest that incorporating high-intensity speed and agility drills into training regimens can significantly enhance performance in speed-dependent sports. However, it is essential to consider individual capacity and ensure proper recovery to prevent overtraining and injury. Moderate-intensity training still offers benefits and may serve as an appropriate alternative for beginners or individuals with health constraints.

CONCLUSIONS

Based on the results of the study it was concluded that

- 1) High Intensity (HIST), Moderate Intensity (MIST) and Low Intensity (LIST) significantly improved the selected speed related variables such as Maximum Speed and Agility compared to control group among college level students.
- 2) Among the three High Intensity (HIST), Moderate Intensity (MIST) and Low Intensity (LIST) training groups, the High Intensity (HIST) was found better than the other training groups in improving speed related variables such as maximum speed and agility among college level students.

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