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Effect of staircase training and core strength training on endurance and reaction time of intercollegiate level athletes

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Abstract

This purpose of the study was to find out the pre-test post-test random group design was followed in this research. Subjects, college students were randomly selected based on inclusion and exclusion criteria were divided into three groups, namely, experimental group I, experimental group II and control group. Experimental group I underwent 12 weeks stair case training experimental group II underwent core training for 12 weeks and the control group was kept strictly under control and not involved in any special activities. Prior to experimental treatment, all the subjects were measured of selected variables, namely, biomotor and performance variables Scores on prior to and after completion of experimental treatment on were collected, which formed pre and post experimental scores. The difference between the initial and final means was considered as the effects of stair case training and core training on selected biomotor and performance variables. The obtained data were subjected to statistical analysis using ANCOVA to compare the initial and final scores in all cases 0.05 level was fixed to test the hypothesis.

Keywords: Core strength training, endurance and reaction time

Introduction

Coaches are experts in identifying the physical characteristics needed for success in their field; however, they lack the skills necessary to assess the psychological factors that have been proven to have a significant impact on athletic performance. Coaches have relied on informal judgments of constructs such as an athlete's motivation and level of aggression to determine their potential to succeed. Everyone has heard stories of athletes that were told they lacked the physical skill to perform but due to the psychological resources of drive and determination, these individuals have overcome their physical limitations and gone on to be highly productive individuals. The identification, quantification and implementation of these psychological attributes in selection decisions can therefore have a significant impact on a program's success.

Stair Case Training

“Training programme which have been used to improve sprinting speed include weight training, wind sprint stairs sprinting. Such programmers are designed to develop leg strength, leg speed, speed endurance and explosive power.

Staircase training is a suitable exercise to burn fat and improve the condition of heart and lungs.

Staircase training is a creative, fund and very challenging patterns of movement, that is, on and off stair case can challenge the legs, footsteps and arms also.

Correct staircase or stepping technique also prevent injuries and improves performance.

Core Strength Training

The terms “core” or “core strength” are some of the most common words / phrases heard around the gym or track in recent years. Many runners would accept the idea that it would be desirable to have a strong core, but rarely do we think about what that really means or why exactly it would be helpful.

Core strength training may be a relatively new, buzz term in the fitness industry but coaches and athletes have understood its value for many years.

The core region consists of far more than just the abdominal muscles. In fact, core strength training aims to target *all* the muscles groups that stabilize the spine and pelvis. It's these muscle groups that are critical for the transfer of energy from large to small body parts during many sporting activities.

Need of the study

Physical fitness helps to enjoy physical activity sustain skills, learning and enhance performance on the athletic field. Specific physiological systems of the body should be adopted to support a particular game. Since different games make different demands upon the organism with respect to neurological, cardio-respiratory systems are highly adaptable to exercise.

The athletes and coaches advocate different training and coaching methods to improve their biomotor and performance variables of athletes. The investigator was interested to find out the effect of stair case training and core training on selected biomotor and performance variables such of intercollegiate level athletes.

Statement of problem

Hence, the investigator outlines the purpose of the study as to find out the effect of stair case training and core strength training on endurance and reaction time of intercollegiate level athletes.

Objectives of study

1. To estimate the effects of stair case training and core strength training on selected biomotor variables, endurance of intercollegiate level athletes.
2. To estimate the effects of stair case training and core strength training on selected performance variables reaction time of intercollegiate level athletes
3. To compare the effect of stair case training and core strength training on selected biomotor variables and performance variables of intercollegiate level athletes.

Hypotheses

1. It was hypothesized that stair case training and core strength training would significantly influence selected biomotor variables endurance compared to control group.
2. It was hypothesized that stair case training and core strength training would significantly influence selected performance variables reaction time of intercollegiate level athletes compared to control group.
3. It was hypothesized that there would not be no significant difference between treatment groups, namely, stair case training and core strength training on selected biomotor and performance variables of intercollegiate level athletes.

Significance of study

Although the results of several studies seem to indicate that stair case training and core strength training might improve selected biomotor and performance variables of athletes. And the present study would be significant in the following ways:

- The study would be significant in linking link between stair case training on athlete's biomotor and performance variables that could pave way for stair case training to be applied in athletic training.
- The study would be significant in linking link between core strength training on athlete's biomotor and performance variables that could pave way for core strength training to be applied in athletic training.

- Further with the present study design that determined the variable most influenced by these forms of training among the athlete's biomotor and performance indicators, that require improvement of this specific attributes in athletes may adopt the same as part of training.
- Results of the present study would pave way for further research on stair case training and core strength training that evidence database that defines the role of exercise interventions based on stair case training and core training in athletic training.

Delimitation

The study was delimited in the following aspects

1. 75 Intercollegiate level athletes competed in different disciplines of athletic events, represented their Colleges were selected as subjects randomly from different colleges in Andhra Pradesh, India.
2. The selected subjects were in the age group of 18 to 25 years.
3. The students reported a history of a musculoskeletal pathology, or any serious disability or ongoing medical condition were excluded from the study.
4. The selected subjects were grouped into three, namely, stair case training group, core strength training and control groups.
5. The following variables were selected for this study

A. Dependent Variables

Biomotor Variables

- I. Endurance

Performance Variables

- II. Reaction time

B. Independent Variables

- I. Stair Case Training for 12 weeks
- II. Core Training for 12 weeks

Limitation

This study was limited in the following aspects.

1. Socio-economic and cultural status of the subjects were not taken into consideration.
2. Factors like nutrients, heredity, environment, life style habits and the students programme outside the college were not taken into consideration.
3. The height and weight of the subjects were not taken into consideration.
4. Previous training of the subjects of any kind prior to six months of experimental treatment were not taken into consideration.
5. The climatic conditions at the time of testing the subject would have influenced the results.
6. Daily routine of the subjects were not controlled.
7. The amount of sleep the subject had prior to testing was not taken into consideration.
8. The subjects emotional state, medication underwent prior to six months of experimental period, caffeine intake were not considered for this study.

Definition of terms

Biomotor Variables: For the purpose of the study, biomotor variables strength, endurance, coordination and flexibility were selected.

Athletic performance physical fitness variables: For the

purpose of the study, athletic performance physical fitness variables, speed, agility, explosive power and reaction time were selected.

Stair case Training: exercise apparatus that stimulates the act of climbing stairs is considered as stair case training for the purpose of the study.

Core Training: A training programme that contains the progressive training of the musculature of the lumbo-pelvic-hip complex and or the transverses abdomens, which has a central role in posture and in stabilizing the lumbar spine is considered as core training.

Methodology

The purpose of the study was to find out the effect of stair case training and core training on selected biomotor and performance variables of intercollegiate level athletes. In this chapter, selection of subjects, selection of variables, research design, tester reliability, and instrument reliability, orientation of the subject, training methods, test administration, and statistical techniques are discussed.

Selection of subjects

In this study, the investigator was interested to find out the effects of stair case training and core training on selected biomotor and performance variables of intercollegiate level athletes. To achieve the purpose of the study, the investigator randomly selected active young adults between age group of 18 to 25 years, who were studying in different colleges in Andhra Pradesh and represented their colleges in intercollegiate level track events. Finally, randomly selected 75 intercollegiate level male athletes from different events

were selected for this study. Subjects were randomly allocated into three groups, namely, experimental group I, experimental group II and control group. Those in the interventional groups were oriented to the exercise program that needed to be followed along the course of study. Method of training, duration and the testing procedures were explained in detail.

Experimental Design

For this purpose, pre-test post-test random group design was followed in this research. Subjects, college students were randomly selected based on inclusion and exclusion criteria were divided into three groups, namely, experimental group I, experimental group II and control group. Experimental group I underwent 12 weeks stair case training experimental group II underwent core training for 12 weeks and the control group was kept strictly under control and not involved in any special activities. Prior to experimental treatment, all the subjects were measured of selected variables, namely, biomotor and performance variables Scores on prior to and after completion of experimental treatment on were collected, which formed pre and post experimental scores. The difference between the initial and final means was considered as the effects of stair case training and core training on selected biomotor and performance variables. The obtained data were subjected to statistical analysis using ANCOVA to compare the initial and final scores in all cases 0.05 level was fixed to test the hypothesis.

Criterion Measures

By reviewing literature, and in consultation with professional experts, the researcher selected tests to assess the variables selected for this study, which is presented in Table.

Table 1: Showing the variables, tests and units of measures for the study

S. No	Variable	Test	Unit of Measurements
1.	Biomotor Variables: Muscular Endurance	Sit ups for 1 minute	Numbers
2.	Performance Variables: Reaction time	Simple Reaction time	Seconds

The intraclass correlation coefficient obtained for test-retest data are presented in Table.

Table 2: Intra class correlation coefficient of test-retest scores

S. No	Variable	Test	Obtained 'r'
1.	Biomotor Variables: Muscular Endurance	Sit ups for 1 minute	0.92*
2.	Performance Variables: Reaction time	Simple Reaction time	0.89*

* Significant at 0.01 level.

Collection of data

Data on the tests administered as per procedure described above, were collected from the subjects at initial assessment and at the end of 12th week of the experimental treatment. The collected data were tabulated and put to statistical analysis.

Statistical Procedure

Statistical analysis were performed using SPSS (Version 11). All data were visually and statistically inspected for normality of distribution. Analysis of covariance (ANCOVA) calculated to compare the pre and post intervention data to estimate statistical significance of the difference within group and between groups, keeping the level of significance at 5%. Further, pair wise comparison was done through Scheffe's post hoc analysis, where significant results were found due to experimental treatments. The statistical analysis comparing the initial and final means of Endurance due to Stair case

training and Core training exercises among intercollegiate level athletes is presented in Table.

As shown in Table III, the obtained pre-test means on Endurance on Stair case training group was 43.16, Core training exercises group was 43.32 was and control group was 42.32. The obtained pre-test F value was 0.29 and the required table F value was 3.16, which proved that there was no significant difference among initial scores of the subjects. The obtained post-test means on Endurance on Stair case training group was 46.32, Core training exercises group was 45.92 was and control group was 42.96. The obtained post-test F value was 3.98 and the required table F value was 3.16, which proved that there was significant difference among post-test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done and the obtained F value 108.73 was

greater than the required value of 3.16 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table.

Table 3: Ancova results on effect of stair case training and core training exercises compared with controls on endurance

	Stair case training	Core training exercises	Control GROUP	Source of Variance	Sum of Squares	DF	Mean Squares	Obtained F
Pre-Test Mean	43.16	43.32	42.32	Between	14.43	2	7.21	0.29
				Within	1784.24	72	24.78	
Post-test Mean	46.32	45.92	42.96	Between	168.43	2	84.21	3.98*
				Within	1524.24	72	21.17	
Adjusted Post Test Mean	46.11	45.57	43.52	Between	92.64	2	46.32	108.73*
				Within	30.25	71	0.43	
Mean Diff	3.16	2.6	0.64					

Table F-ratio at 0.05 level of confidence for 2 and 72 (DF) =3.16, 2 and 71 (DF) =3.16.

*Significant

Table 4: Multiple comparisons of paired adjusted means and Scheffe's confidence interval test results on endurance

Means				Required C I
Stair case training Group	Core training exercises Group	Control Group	Mean Difference	
46.11	45.57		0.55*	0.46
46.11		43.52	2.59*	0.46
	45.57	43.52	2.04*	0.46

* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Stair case training group and control group (MD: 2.59). There was significant difference between Core training exercises group and control group (MD: 2.04). There was significant

difference between treatment groups, namely, Stair case training group and Core training exercises group. (MD: 0.55). The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure.

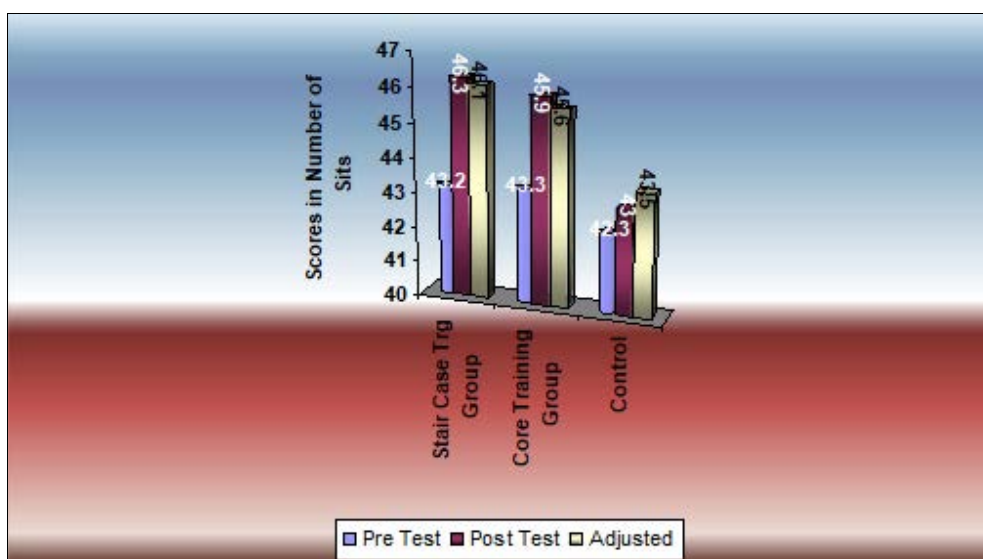


Fig 1: Bar diagram showing pre-test, post-test and ordered adjusted means on endurance

Results on reaction time

The statistical analysis comparing the initial and final means of Reaction Time due to Stair case training and Core training

exercises among intercollegiate level athletes is presented in Table.

Table 5: ANCOVA results on effect of stair case training and core training exercises compared with controls on reaction time

	Stair case training	Core training exercises	Control Group	Source of Variance	Sum of Squares	DF	Mean Squares	Obtained F
Pre-Test Mean	0.243	0.270	0.278	Between	0.017	2	0.009	2.982
				Within	0.208	72	0.003	
Post-test Mean	0.217	0.248	0.291	Between	0.068	2	0.034	7.715*
				Within	0.318	72	0.004	
Adjusted Post Test Mean	0.235	0.243	0.278	Between	0.025	2	0.012	5.342*
				Within	0.165	71	0.002	
Mean Diff	-0.025	-0.021	0.013					

Table F-ratio at 0.05 level of confidence for 2 and 72 (DF) =3.16, 2 and 71 (DF) =3.16.

*Significant

As shown in Table V, the obtained pre-test means on Reaction Time on Stair case training group was 0.243, Core training exercises group was 0.270 and control group was 0.278. The obtained pre-test F value was 2.982 and the required table F value was 3.16, which proved that there was no significant difference among initial scores of the subjects. The obtained post-test means on Reaction Time on Stair case training group was 0.217, Core training exercises group was 0.248 and control group was 0.291. The obtained post-test F value was 7.715 and the required table F value was 3.16, which proved that there was significant difference

among post-test scores of the subjects.

Taking into consideration of the pre-test means and post-test means adjusted post-test means were determined and analysis of covariance was done and the obtained F value 5.342 was greater than the required value of 3.16 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table.

Table 6: Multiple comparisons of paired adjusted means and Scheffe's confidence interval test results on reaction time

Means				Required CI
Stair case training Group	Core training exercises Group	Control Group	Mean Difference	
0.235	0.243		-0.008	0.034
0.235		0.278	-0.043*	0.034
	0.243	0.278	-0.035*	0.034

* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Stair case training group and control group (MD: -0.043). There was significant difference between Core training exercises group and control group (MD: -0.035). There was

no significant difference between treatment groups, namely, Stair case training group and Core training exercises group. (MD: -0.008). The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure.

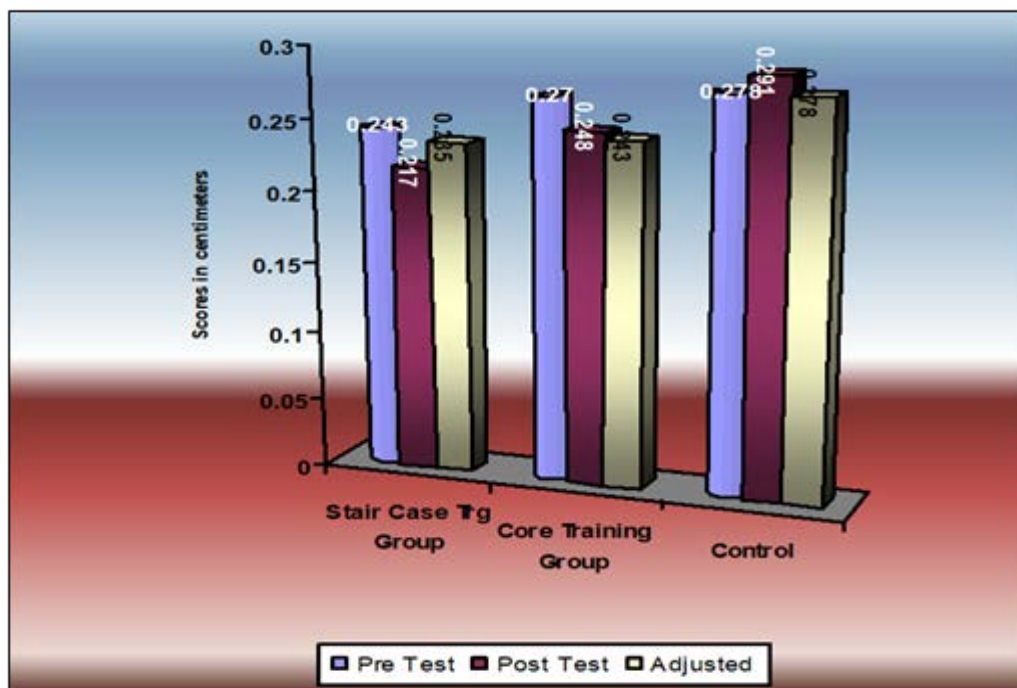


Fig 2: Bar diagram showing pre-test, post-test and ordered adjusted means on reaction time

Conclusions

Within the limitations and delimitations of the study, the following conclusions were drawn

1. It was found that 12 weeks stair case training and core training significantly improved endurance of the intercollegiate athletes compared to control group. It was also found that stair case training was significantly better than core training in improving endurance.
2. It was found that 12 weeks stair case training and core training significantly improved reaction time of the intercollegiate athletes compared to control group. It was also found that there was no significant different between stair case training and core training in altering reaction time of the intercollegiate athletes.

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