

EFFECT OF CORE STABILITY TRAINING AND FARTLEK TRAINING ON ENDURANCE AMONG HANDBALL PLAYERS

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ABSTRACT

- **Purpose:** To investigate how a combined regimen of core stability training (CST) and fartlek training impacts endurance performance in handball players, a sport demanding both anaerobic power and aerobic capacity.
- **Background:** Handball requires intermittent high-intensity efforts with frequent transitions between offense and defense, relying on both aerobic endurance and anaerobic bursts. Core stability enhances proximal control for distal mobility, improving throwing velocity and movement efficiency, while fartlek training—a variable-intensity aerobic method—boosts cardiovascular endurance and recovery.
- **Methods:** Male adolescent handball players underwent a 6-week intervention integrating progressive core strengthening exercises (e.g., cross curls-up, side bridges, bird-dog) with fartlek running sessions, compared to regular training controls. Performance was assessed via muscular endurance tests (Bourban test), shoulder mobility/stability (Y Balance Test), and endurance capacity (Yo-Yo Intermittent Recovery Test).
- **Key Findings:** The combined training significantly improved core muscle endurance and shoulder stability, critical for handball-specific skills. Fartlek training enhanced aerobic endurance, reflected in improved Yo-Yo IR1 scores, indicating better high-intensity intermittent running capacity. However, throwing velocity showed no significant change, suggesting skill-specific training remains essential.

CONCLUSION

Integrating core stability and fartlek training effectively elevates endurance and physical readiness in handball players, supporting enhanced performance during match play's demanding intermittent efforts. Coaches should consider this combined approach to optimize conditioning while maintaining sport-specific skill development.

The purpose of this study was to investigate the effect of core stability training and fartlek training on endurance among handball players. Sixty (N=60) male handball players from Shivamogga district, Karnataka, aged 18–22 years, who had participated in inter-collegiate tournaments, were randomly divided into three groups: Core Stability Training Group (n=20), Fartlek Training Group (n=20), and Control Group (n=20). The experimental groups underwent their respective training programs for 12 weeks, while the control group did not receive any special training. Endurance was assessed through a standard test before and after training, and the data were analyzed using ANCOVA.

The pre-test mean values of endurance were 5.11 (CST), 5.22 (FT), and 5.42 (CG), with no significant difference among the groups ($F=1.34$, $p>0.05$). The post-test mean values improved to 5.69 (CST), 6.23 (FT), and 5.46 (CG), showing a significant difference ($F=6.27$, $p<0.05$). The adjusted post-test means were 5.84 (CST), 6.26 (FT), and 5.28 (CG), with an obtained F-value of 58.98, which was greater than the critical value of 3.16 ($p<0.05$). Post hoc analysis confirmed that both CST and FT significantly improved endurance compared to the control group, with fartlek training producing superior gains (mean difference = 0.98).

compared to CST (mean difference = 0.56).

The findings indicate that both core stability training and fartlek training are effective in enhancing endurance, but fartlek training is more impactful due to its direct stimulation of aerobic and anaerobic systems relevant to handball performance. Core stability training, while less effective than fartlek, still provides meaningful improvements by enhancing posture, trunk control, and running economy.

Key words : Core Stability Training, Fartlek Training, Endurance and Handball Players

INTRODUCTION

Endurance is a fundamental physical quality for handball players: match play requires repeated high-intensity efforts interspersed with lower-intensity recovery, sometimes for 90 minutes or more. Aerobic endurance underpins the ability to sustain pace across a match, recover between sprints, and maintain technical and tactical effectiveness late in games. Improving players' endurance therefore remains a central goal of conditioning programs at all levels of the sport.

Two training approaches commonly used to develop handballers' endurance are fartlek training and core stability training (CST), though they operate through different mechanisms. Fartlek — “speed play” — is a variable-pace continuous run that mixes harder efforts with recovery sections; it is practical for handball because it mimics the variable, intermittent nature of match play. Fartlek sessions can be easily integrated within field work and adapted for age, fitness level and game demands.

Core stability training targets trunk musculature and neuromuscular control to improve the ability to transfer force between lower and upper limbs, maintain posture under perturbation, and stabilize the torso during rapid changes of direction or contact. Although CST is often promoted for injury prevention, it may also indirectly support endurance performance by improving movement economy, postural control and efficient breathing mechanics during prolonged activity.

Physiologically, fartlek training stresses the aerobic system and, through properly dosed faster segments, places players near their VO_2 max or lactate threshold intermittently — stimuli known to improve maximal oxygen uptake and endurance performance. Core training, conversely, primarily improves intramuscular endurance of trunk stabilizers and neuromuscular coordination; when combined with running work this may reduce wasted movement and improve running economy, thereby helping players sustain a given speed for longer with lower relative effort.

Because the two methods address complementary determinants of endurance (cardio respiratory and biomechanical/neuromuscular), combining CST with field-based fartlek sessions may yield additive benefits. Several applied studies and reviews in team sports suggest that integrated programs— e.g., stability and movement control work plus interval or variable-pace running — can improve endurance measures and match-related fitness more than isolated approaches.

EXPERIMENTAL DESIGN

Find out the study effect of core stability training and fartlek training on endurance among handball players .The study was formulated as a true random group design consisting of a pre-test and post test. The subjects men handball players who are participated inter collegiate tournaments in Shivamogga district (N=60) were randomly assigned to three equal groups of twenty and their age ranged between 18-22 years. The selected subjects were divided into

three groups randomly. Experimental Group I was considered core stability training group, experimental group II was fartlek training group and control group was not involved in any special treatment. Pre test was conducted for experimental Groups I and II and the control group on endurance. Experimental groups underwent the respective training for 12 weeks. Immediately after the completion of 12 weeks training, all the subjects were measured of their post test scores on the selected criterion variable. The difference between the initial and final scores was considered the effect of respective treatments. To find out statistical significance of the results obtained, the data were subjected to statistical treatment using ANCOVA. In all cases 0.05 levels was fixed to test the significance of the study.

RESULTS ON ENDURANCE

The statistical analysis comparing the initial and final means of endurance due to Core stability training and Fartlek training among handball players is presented in Table I

Table I

ANCOVA RESULTS ON EFFECT OF CORE STABILITY TRAINING AND FARTLEK TRAINING COMPARED WITH CONTROLS ON ENDURANCE

	CORE STABILITY TRAINING	FARTLEK TRAINING	CONTROL GROUP	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	OBTAINED 'F'
Pre-Test Mean	5.11	5.22	5.42	Between	0.97	2	0.48	1.34
				Within	20.61	57	0.36	
Post-Test Mean	5.69	6.23	5.46	Between	6.21	2	3.10	6.27*
				Within	28.20	57	0.49	
Adjusted Post-Test Mean	5.84	6.26	5.28	Between	9.39	2	4.69	58.98*
				Within	4.46	56	0.08	
Mean Diff	0.58	1.01	0.04					

Table F-ratio at 0.05 level of confidence for 2 and 57(df)=3.16, 2 and 56 (df)=3.16.

*Significant

As shown in Table I, the obtained pre test means on endurance on Core stability training group was 5.11, Fartlek training group was 5.22 and control group was 5.42. The obtained pretest F value was 1.34 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 Core stability training group was 5.69, Fartlek training group was 6.23 and control group was 5.46. The obtained post test F value was 6.27 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 58.98 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 II.

Table II
Multiple Comparisons of Paired Adjusted Means and Scheffe's Confidence Interval Test Results on endurance

Core stability Training Group	MEANS			Required . CI
	Fartlek training Group	Control Group	Mean Difference	
5.84	6.26		-0.42*	0.22
5.84		5.28	0.56*	0.22
	6.26	5.28	0.98*	0.22

* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Core stability training group and control group (MD: 0.56). There was significant difference between Fartlek training group and control group (MD:0.98).There was significant difference between treatment groups, namely, Core stability Training group and Fartlek training group. (MD: -0.42).

The ordered adjusted means were presented through line diagram for better understanding of the results of this study in Figure I.

LINE DIAGRAM SHOW IN GPTEST,POST TEST AND ORDERED ADJUSTED MEANS ON ENDURANCE

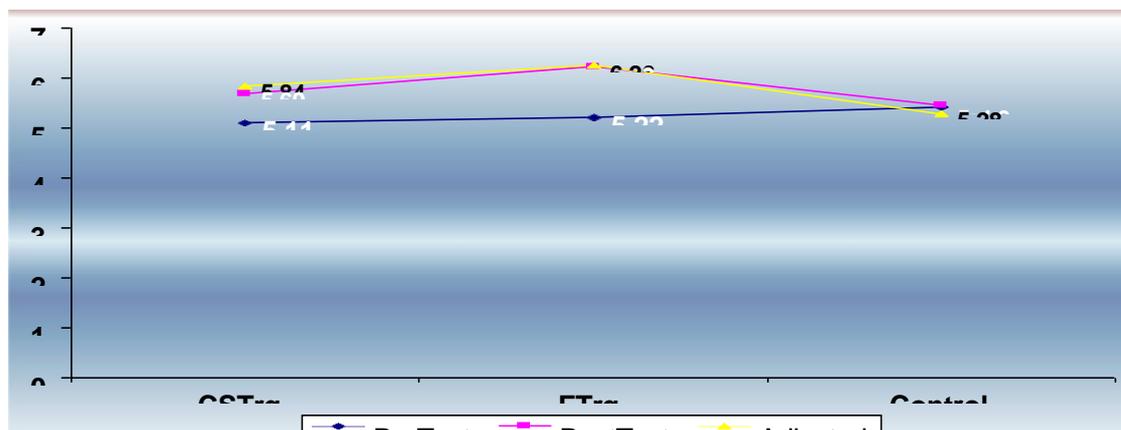


Figure I

DISCUSSIONS ON FINDINGS ON ENDURANCE

In order to find out the effect of Core stability training and Fartlek training on endurance the obtained pre and post test means were subjected to ANCOVA and post hoc analysis through Scheffe's confidence interval test.

The effect of Core stability training and Fartlek training on endurance is presented in Table-I.

The Analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 58.98 was greater than the required table F value to be significant at 0.05 level.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table II proved that there was significant difference between Core stability training group and control group (MD:0.56) and Fartlek training group and control group (MD:0.98). Comparing between the treatment groups, it was found that there was significant difference between Core stability training and Fartlek training group among handball players.

Thus, it was found that Fartlek training was significantly better than Core stability training and control group in improving endurance of the handball players.

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