

Electromyographic Analytical Effect of Modified Strength Training on Kicking Performance among Football Players

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Abstract

The purpose of the study was to investigate the electromyographic analytical effect of modified strength training on kicking performance among football players. To achieve this purpose of the study, Forty (N=40) male Football players from different colleges of University of Kerala were selected as subjects for the study. The age of subjects ranged from 18-24 years. The subjects were divided at random into two groups of twenty each (n=20). Group-I underwent Modified Strength Training and Group-II acted as Control. The Modified Strength Training underwent their respective training programmes for three sessions (days) per week for twelve weeks. And Group-II acted as control group in which they did not undergo any special training programme apart from their regular programme. Instep football kicking performance was selected for this study. And it was measured through SAI kicking Accuracy Test. All the subjects were tested prior to and immediately after the experimental period on the selected dependent variables. The differences between means of initial and final scores on selected criterion variables were subjected to statistical treatment using dependent t-test, magnitude of improvement (MI) and analysis of covariance (ANCOVA). In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as appropriate. The results of the study showed that there was a significant difference between Modified Strength Training group and Control group.

Keywords: Electromyographic Analysis, Modified Strength Training, Instep Football Kicking

INTRODUCTION

Football, formally known as Association Football, having begun in England in 1848, it is now being played in more than 210 countries throughout the world and more than 150 countries being registered with FIFA (Federation International de Football Association), the international governing body, which was itself established in 1904. It is considered to be the most popular sport in the world, both in terms of participation, and as a spectator sport. It was estimated that in 1984, there were 60 million licensed, and an equal number of unlicensed players. Since that time, the game's popularity has increased in continents of Africa and Asia (*Ohashi et al., 1988*).

Modern football players have become highly skillful and athletic with high level of physical fitness. Modern football demands technical perfection on the part of individual players as well as on team as a whole besides other aspects. Accordingly, the offensive skills of the modern football players have improved to a great extent. The quality of passing and kicking has become crucial for any Football team to successfully advance the ball up-field. Ball possession is maintained by a team by making more passes between and among the team mates, which is considered safer method than any other ball manipulation skill. As soon as the ball is received, each player is found to initiate a pass for 80% of the time and the remaining 20% time the player is found to either dribble or shoot at the goal. The research results indicate that a frequency of 3 to 5 passes is suitable to make more number of attacks and to score goals. It is also understood from the research results that 10 to 12 shots are required to be made at the goal to score a goal in top class competitions (Reilly, 2005). Hence, in the recent past, the principle of penetration has gained more importance than keeping possession of ball. However, the experts are found to differ in their opinions with regard to maintaining ball possession by making more number of passes between and among team members. Nevertheless, passing is accepted as one of the greatest weapons of attack in football (John Parthiban, et al., 2020).

The objective goal in football is scoring, thus, scoring ability with legs, head or with the ball stopped is of vital importance for every football team that requires the best possible technique aiming to send the ball to the opponent goal-net. All other skills in football are of little importance in case players do not take advantage of their opportunity to kick the ball and score. Kicking the ball constitutes the final expression of the game since every time a player attempts to score that doesn't mean he will succeed, however, without performing this skill is very difficult to accomplish anything. A good scoring ability requires the player to be capable to kick the ball in narrow spaces under the pressure of the opponent, plus, team-mates' contribution is needed to provide the opportunity for attempting to score under the best possible conditions (*Garel, 1978*).

Electromyography (EMG) is a diagnostic procedure which accesses the health of muscle and the nerve cells that control the motor neurons. EMG is a technique used to study muscle activity by recording the action potentials from the contracting fibers. This can be done either by surface electrodes or by inserting needle electrodes into the muscle. EMG recordings are made from the rectus femoris, biceps femoris and gastrocnemius of the kicking limb using wire electrodes during an inside and instep kick.

Electromyography is the only method of objectively assessing when a muscles is active. It has been used to establish the roles that muscles fulfill both individually and in group actions. The EMG provides information on the timing, or sequencing, of the activity of various muscles in sports movements. By studying the sequencing of muscle activation, the sports bio mechanist can focus on several factors that relate to the skill, such as any overlap of agonist and antagonist activity and the onset of antagonist activity at the end of a movement. It also allows the sports bio mechanist to study changes in muscular activity during skill acquisition and as a result of training.

Electromyography can also be used to validate assumptions about muscle activity that are made when calculating the internal forces in the human musculoskeletal system. It should, however, be noted that the EMG cannot necessarily reveal what a muscle is doing, particularly in fast multi-segment movements that predominate in sport (*Roger, 2007*).

METHODOLOGY

To achieve this purpose of the study, Forty (N=40) male Football players from different colleges of University of Kerala were selected as subjects for the study. The age of subjects ranged from 18-24 years. The subjects were divided at random into two groups of twenty each (n=20). Group-I underwent Modified Strength Training and Group-II acted as Control. The Modified Strength Training underwent their respective training programmes for three sessions (days) per week for twelve weeks. And Group-II acted as control group in which they did not undergo any special training programme apart from their regular programme. Instep football kicking performance was selected for this study. And it was measured through SAI kicking Accuracy Test.

ANALYSIS OF THE DATA

The differences between means of initial and final scores on selected criterion variables were subjected to statistical treatment using dependent t-test, magnitude of improvement (MI) and analysis of covariance (ANCOVA). In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as appropriate.

The results of the dependent 't'-test and magnitude of improvement (MI) on the data obtained for Instep Kicking performance of the subjects in the pre-test and post-test of the Modified Strength group and Control group have been analyzed and presented in Table-1.

Table – 1

The Summary of Mean, Dependent ‘t’ – test and Magnitude of Improvement (MI) for the Pre and Post tests on Instep Kicking Performance of Modified Strength Training group and Control group

Test	Modified Strength Training Group	Control Group
Pre Test Mean SD (\pm)	16.35 \pm 1.28	17.25 \pm 1.79
Post Test Mean SD (\pm)	22.65 \pm 2.15	17.40 \pm 2.13
“t” Test	11.27*	0.24
Magnitude of Improvement	38.53%	0.87%

* Significant at 0.05 level.

(Instep Kicking Performance Scores in Points)

The table value required for 0.05 level of significance with df 19 is 2.09.

From table-1 shows that the pre-test mean and standard deviation of Instep Kicking Performance of Modified Strength Training group and Control group are 16.35 \pm 1.28 and 17.25 \pm 1.79 respectively. The post-test mean and standard deviation are 22.65 \pm 2.15 and 17.40 \pm 2.13 respectively.

The obtained dependent t-ratio values between the pre and post test means on Instep Kicking Performance of Modified Strength Training group and Control group are 11.27 and 0.24 respectively. Since the obtained ‘t’ test values the Modified Strength Training group are greater than the table value 2.09 with df 19 at 0.05 level of confidence, it is concluded that Modified Strength Training group had registered significant improvement on the Instep Kicking Performance.

From the table-4.13, it is also observed that the magnitude of improvement (MI) of Instep Kicking Performance due to the influence of Modified Strength Training is 38.53%, than control group 0.87%. It indicates that the Modified Strength Training programme had registered better percentage of improvement in developing the Instep Kicking Performance.

The analysis of covariance on Instep Kicking Performance of the pre, post, and adjusted test scores of Modified Strength Training group and Control group have been analyzed and presented in Table – 2.

Table – 2

Computation of Analysis of Covariance of Pre Test, Post Test and Adjusted Post Test on Instep Kicking Performance of Modified Strength Training group and Control group

Test	Modified Strength Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	F-ratio
Pre-Test Mean	16.35	17.25	Between Groups	8.10	1	8.10	3.20
			Within Groups	96.30	38	2.53	
Post-Test Mean	22.65	17.40	Between Groups	275.63	1	275.63	57.12*
			Within Groups	183.35	38	4.83	
Adjusted Post-Test Mean	23.44	16.61	Between sets	430.76	1	430.76	138.81*
			Within Sets	114.82	37	3.10	

* Significant at 0.05 level of confidence

Table value for $df (1, 38)$ at 0.05 level = 4.10, Table value for $df (1, 37)$ at 0.05 level = 4.11
(Instep Kicking Performance Scores in Points)

Table-2 shows that the obtained F-ratio value of 3.20 for pre test mean of Modified Strength Training group and Control group on Instep Kicking Performance is less than the required table value of 4.10 for significance with df 1 and 38 at 0.05 level of confidence.

The obtained F-ratio value of 57.12 for post test mean of Modified Strength Training group and Control group on Instep Kicking Performance is more than the required table value of 4.10 for significance with df 1 and 38 at 0.05 level of confidence.

The obtained F-ratio value of 138.81 for adjusted post test mean of Modified Strength Training group and Control group on Instep Kicking Performance is higher than the required table value of 4.11 for significance with df 1 and 37 at 0.05 level of confidence.

The results of the study showed that there was a significant difference between Modified Strength Training group and Control group. The above data also reveal that Modified Strength Training group had shown better performance than Control group in Instep Kicking Performance.

The pre and post mean values of Modified Strength Training group and Control group on Instep Kicking Performance are graphically represented in the Figure -1.

The adjusted post mean values of Modified Strength Training group and Control group on Instep Kicking Performance are graphically represented in the Figure -2.

The Magnitude of Improvement (MI) values of Modified Strength Training group and Control group on Instep Kicking Performance are graphically represented in the Figure -3.

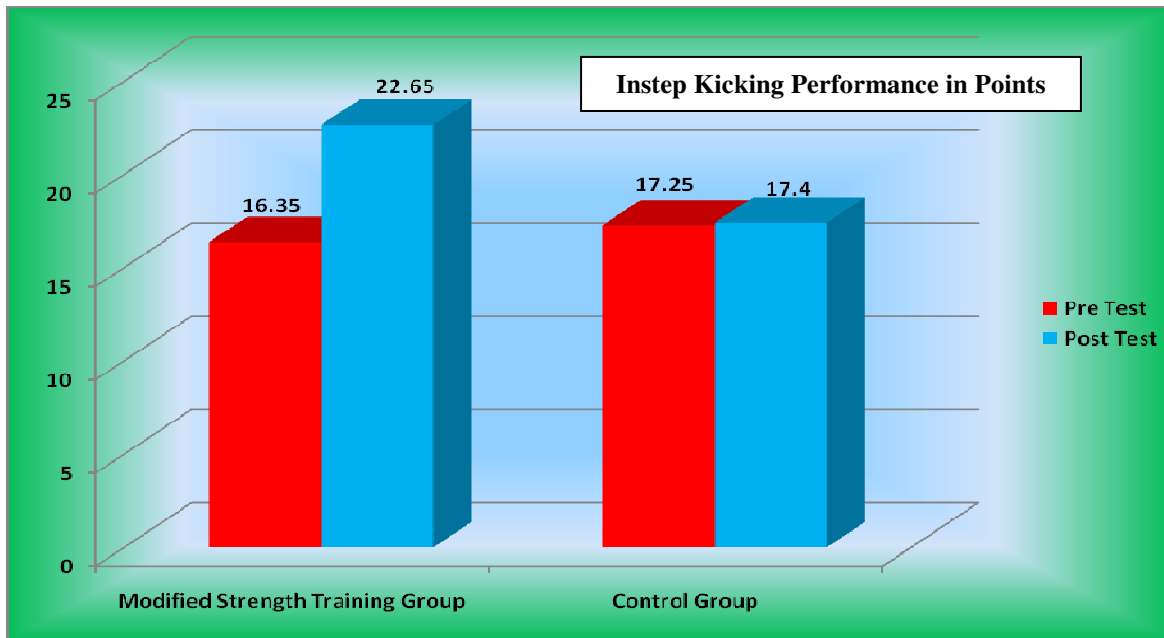


Figure: 1 The Pre and Post test Mean Values of Modified Strength Training group and Control group on Instep Kicking Performance

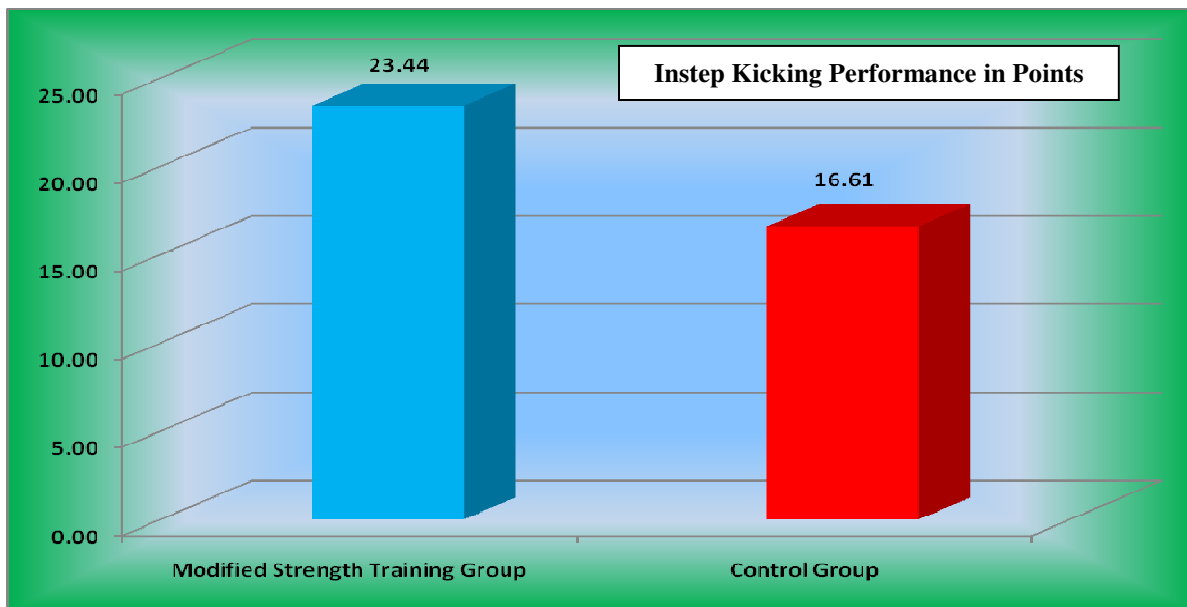


Figure: 2 The Adjusted Post Test Mean Values of Modified Strength Training group and Control group on Instep Kicking Performance

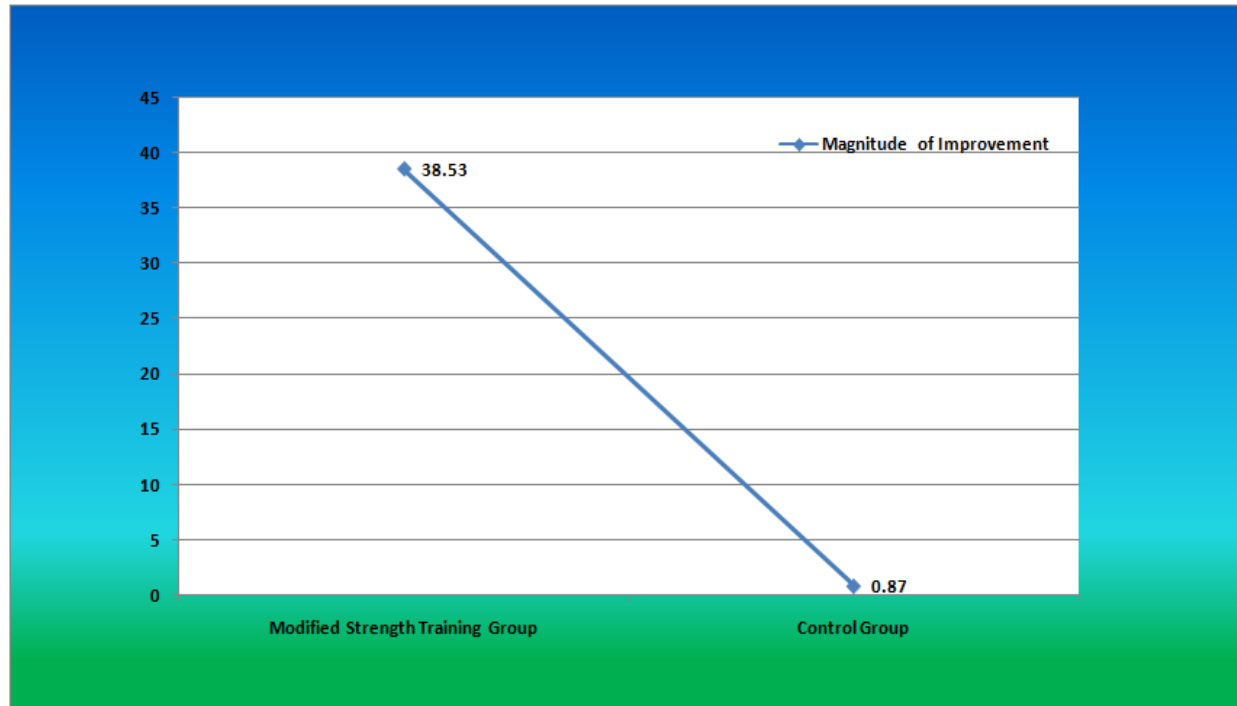


Figure: 3 The Magnitude of Improvement Values of Modified Strength Training group and Control group on Instep Kicking Performance

CONCLUSIONS

From the analysis of the data, the following conclusions were drawn.

1. Significant differences in achievement were found between Modified Strength Training group and Control group in the selected criterion variable such as instep kicking performance.
2. The Experimental group namely Modified Strength Training group found highest instep kicking performance.

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