P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIF): 5.93
IJPESH 2025; 12(5): 31-33

https://www.kheljournal.com
Received: 28-06-2025
Accepted: 29-07-2025

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The effect of resistance training on selected motor components of football players

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DOI: https://www.doi.org/10.22271/kheljournal.2025.v12.i5a.3953

Abstract
This experimental study investigates the effect of resistance training on selected motor components—strength, agility, and speed—among male football players aged 14 to 18 years from Pimpri Chinchwad. A total of 30 participants were selected and subjected to a structured resistance training regimen to enhance their physical performance. Pre- and post-training assessments were conducted using the 50-meter dash to measure speed, the T-test to assess agility, and the Isometric Knee Extension test to evaluate strength. The collected data were analyzed to determine improvements in these motor components resulting from the resistance training intervention. The results indicated significant improvements in all tested areas, underscoring the positive impact of resistance training on the athletic abilities of football players. This study provides valuable insights into the role of resistance training in enhancing the physical fitness of adolescent athletes engaged in competitive sports, particularly football.

Keywords: Resistance training, speed, agility, strength

Introduction
Resistance training is a fundamental component of physical conditioning and athletic development, playing a crucial role in enhancing various physiological and performance-related attributes. It is widely employed across diverse populations—from elite athletes seeking to optimize performance to individuals aiming to maintain overall health and fitness. Over the years, resistance training has garnered considerable attention in the field of sports science, particularly for its capacity to improve key motor components such as strength, speed, and agility—factors essential for athletic success.

The effectiveness of resistance training lies in its varied methodologies, including traditional weightlifting, plyometric exercises, and sport-specific training regimens. Scientific research has consistently demonstrated its positive impact on neuromuscular adaptations, resulting in increased muscular strength, power output, and movement efficiency. These adaptations are especially valuable in team sports such as football, where explosive movements, rapid acceleration, and dynamic strength are critical for optimal performance.

This paper explores the principles and methodologies of resistance training and reviews scientific evidence supporting its benefits. Additionally, it examines the application of resistance training in football, with a focus on its role in developing essential motor components that contribute to success in the sport. By understanding the relationship between resistance training and athletic performance, this study aims to underscore its importance in contemporary sports conditioning programs.

Methodology
The research design employed for this experimental study was a pre-test, post-test non-equivalent groups design. In this design, an experimental group, which underwent a resistance training intervention, was compared to a control group that continued with standard football training.

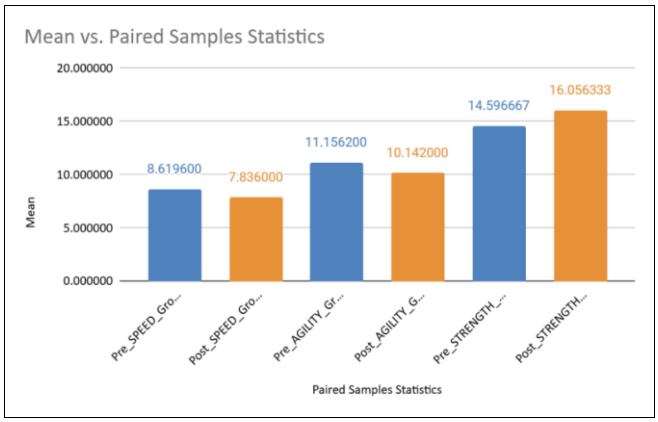
Sample Population
The population for this study comprised male football players aged between 14 and 18 years.

Sampling
A purposive sampling technique was used to select 30 players from City FC. These participants were then divided into two groups: an experimental group of 15 players and a control group of 15 players.

Results

Table 1: Paired Samples Test: Experimental Group

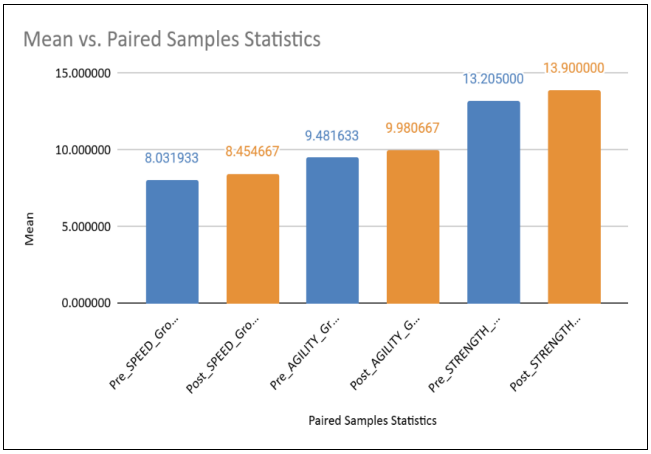
	Variables	Test	Mean Differences	S. D.	t	Sig. (2-tailed)
Pair 1	Speed	Pre Post	.7836000	.0773931	39.214	.000
Pair 2	Agility	Pre Post	1.0142000	.0721825	54.417	.000
Pair 3	Strength	Pre Post	1.4596667	.4117709	13.729	.000



There was a statistically significant improvement in Speed, Agility, and Strength in the experimental group following the intervention. All changes are highly significant ($p < 0.001$), indicating that the resistance training program was effective in enhancing physical performance across all measured variables.

Table 2: Paired Samples Test: Control Group

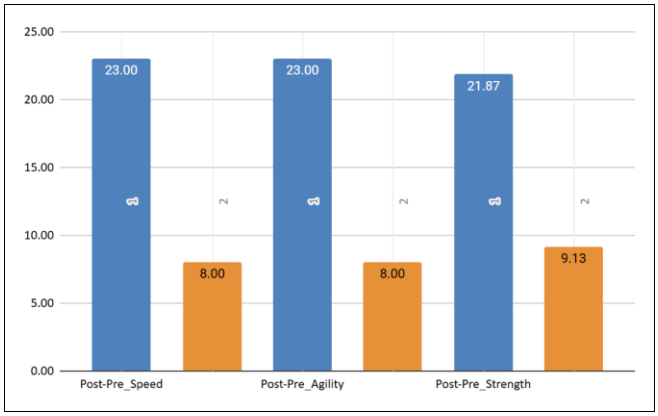
		Mean Differences	Std. Deviation	t	Sig. (2-tailed)
Pair 1	Pre Speed-Post Speed	.4227333	.0337252	48.546	.000
Pair 2	Pre Agility-Post Agility	.4990333	.0363674	53.145	.000
Pair 3	Post Strength-Pre_strength	.6950000	.1538697	17.494	.000



Significant improvements were observed in Speed, Agility, and Strength in the control group as well. All improvements are statistically significant ($p < 0.001$). However, the magnitude of improvement was generally lower compared to the experimental group, suggesting that standard football training also contributes to performance enhancement, albeit to a lesser extent.

Table 3: Mann Whitney Test: Experimental vs Control Group

	Post-Pre Speed	Post-Pre Agility	Post-Pre Strength
Mann-Whitney U	0.000	0.000	17.000
Wilcoxon W	120.000	120.000	137.000
Z	-4.671	-4.675	-3.962
Asymp. Sig. (2-tailed)	.000	.000	.000
Exact Sig. [2(1-tailed Sig.)]	.000b	.000b	.000b



The Mann-Whitney U test revealed significant differences between the experimental and control groups in Speed, Agility, and Strength post-intervention ($p = 0.000$ for all). The experimental group outperformed the control group across all variables, with the most pronounced differences observed in Speed and Agility.

Conclusion
Based on the findings of the present study, the following conclusions were drawn:

Strength Performance – Isometric Knee Extension Test:
- The experimental group demonstrated a substantial improvement in quadriceps strength, with the mean score increasing from 10.14 (pre-test) to 16.05 (post-test), accompanied by a low standard deviation.
- The control group exhibited a marginal improvement, with the mean score increasing from 13.20 (pre-test) to 13.90 (post-test), with a moderate standard deviation.

Agility Performance – T-Test

- The experimental group showed a notable increase in agility, with the mean score improving from 10.14 (pre-test) to 11.15 (post-test), along with a slight increase in standard deviation.
- The control group also improved, with the mean score changing from 9.98 (pre-test) to 9.48 (post-test), with a relatively low standard deviation.

Speed Performance – 50m Dash Test

- The experimental group exhibited a significant enhancement in sprint speed, as indicated by an increase in mean score from 7.83 (pre-test) to 8.61 (post-test), with a low standard deviation.
- The control group showed a smaller increase, with the mean score rising from 8.45 (pre-test) to 8.03 (post-test), and maintained a low standard deviation.

Comparison Between Experimental and Control Groups

- Post-test comparisons revealed that the experimental group significantly outperformed the control group across all performance metrics—strength, agility, and speed.
- The most pronounced improvements were observed in speed and agility, as evidenced by both paired and non-parametric test results.

Implications for Practice

- The findings indicate that a structured resistance training program is highly effective in improving quadriceps strength, agility, and sprint performance in adolescent football players.
- These results suggest that football coaches and strength and conditioning professionals should consider integrating resistance training into both in-season and off-season training regimens to enhance athletic performance.

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