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**EXTENDED  
ABSTRACT**

# Effect of FIFA 11+ Level 3 on Muscular Strength and Muscular Endurance Among Young Adult Footballers

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## I. INTRODUCTION

In recent years, injury prevention and performance enhancement have become key areas of focus in sports science, particularly in football. One widely adopted warm-up programme is the FIFA 11+, developed by the FIFA Medical Assessment and Research Centre (F-MARC), which aims to reduce injury risk and improve physical readiness among players [3]. While the programme is primarily known for its preventive benefits, emerging research suggests it may also have a positive impact on various physical performance indicators [2]. Therefore, this study aims to investigate the effectiveness of the FIFA 11+ warm-up programme in enhancing muscular strength and muscular endurance among youth football players.

## II. METHODS

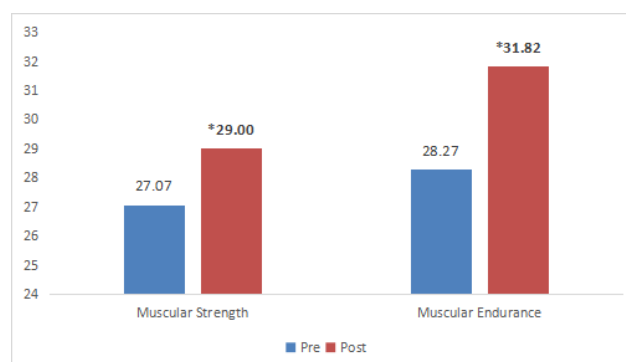
A total of 20 male development football players aged 18 were assigned to either the FIFA 11+ Level 3 warm-up group or the traditional warm-up group. Muscular strength was measured using the Handgrip Strength Test and muscular endurance using the One-Minute Squat Test, both assessed immediately before and after the warm-up. The FIFA 11+ group performed the structured FIFA warm-up while the traditional group completed a standard routine. Data were analyzed using paired sample t-tests for within-group changes and independent sample t-tests for between-group comparisons.

## III. RESULTS AND DISCUSSION

### A. Effect of Traditional Warm Up and Level 3 FIFA 11+ Warm Up on Muscular Strength and Endurance

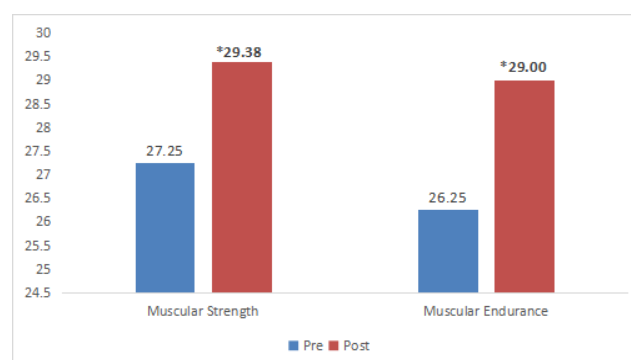
Paired sample t-test analysis revealed statistically significant improvements in both muscular strength and muscular endurance for participants in both intervention groups. In the FIFA 11+ Level 3 warm-up group, muscular strength increased from  $27.07 \pm 3.80$  kg to  $29.00 \pm 3.55$  kg ( $p < 0.05$ ), while muscular endurance improved from  $28.27 \pm 3.80$  to  $31.82 \pm 3.80$  repetitions ( $p < 0.05$ ). Similarly, the traditional warm-up group also showed significant gains. Muscular strength increased from  $27.25 \pm 3.52$  kg to  $29.38 \pm 3.65$  kg ( $p < 0.05$ ), and muscular endurance improved from  $26.25 \pm 3.91$  to  $29.00 \pm 3.10$  repetitions ( $p < 0.05$ ). These

findings indicate that both warm-up protocols effectively enhanced muscular strength and muscular endurance among development players.



\* $p < 0.05$

Fig. 1 Effect of Level 3 FIFA 11+ warm-up on muscular strength and endurance.



\* $p < 0.05$

Fig. 2 Effect of traditional warm-up on muscular Strength and endurance.

### B. Comparison Between FIFA 11+ Level 3 and Traditional Warm-Up

Independent samples t-test results indicated no statistically significant differences between the FIFA 11+ Level 3 group and the traditional warm-up group in both muscular strength and muscular endurance ( $p > 0.05$ ). Despite the lack of

statistical significance, descriptive data revealed a trend toward greater improvements in muscular endurance within the FIFA 11+ group compared to the traditional warm-up group. In contrast, gains in muscular strength appeared comparable across both groups.

TABLE I  
COMPARISON BETWEEN FIFA 11+ AND TRADITIONAL WARM UP IN  
MUSCULAR STRENGTH

Variables	Group	Mean (SD)	t	df	Sign. (2-tailed)
Muscular Endurance	FIFA11+ Level 3	-3.90±2.13	2.56	18	0.020
	Traditional Warm up	-3.80±3.55			
Muscular Strength	FIFA11+ Level 3	-4.25±3.96	2.14	18	0.046
	Traditional Warm up	-0.75±4.74			

\* $p < 0.05$

### CONCLUSIONS

The findings of this study indicate that the FIFA 11+ Level 3 warm-up program produced improvements in muscular strength and endurance among young adult football players. However, these improvements were not significantly greater than those observed in the traditional warm-up group, suggesting that while Level 3 FIFA 11+ enhances physical

readiness, it may not outperform traditional warm-up routines in short-term application. This limited difference may be due to the nature of FIFA 11+ as a preventive warm-up protocol rather than a targeted performance-training program. Although Level 3 implies advanced exercises designed to improve balance and neuromuscular control, the duration and frequency applied in this study might not have been sufficient to achieve significant adaptations [2]. Prior research highlights that consistent and progressive training interventions are often required for substantial improvements in strength and endurance [3]. Nevertheless, FIFA 11+ remains a practical and evidence-based option for improving general preparedness and reducing injury risks during football participation [1].

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### REFERENCES

- [1] Ebert, T., Steib, S., Pfeifer, K., & Zech, A. (2018). Effects of the FIFA 11+ warm-up program on physical performance in amateur football players: A cluster-randomized controlled trial. *Sports*, 6(3), 61. <https://doi.org/10.3390/sports6030061>.
- [2] Mandic, R., Knezevic, O., Krkeljas, Z., & Peric, M. (2022). The effects of the FIFA 11+ injury prevention program on performance in young athletes. *Journal of Strength and Conditioning Research*, 36(2), 380–387. <https://doi.org/10.1519/JSC.0000000000004001>.
- [3] Soligard, T., Myklebust, G., Steffen, K., Holme, I., Silvers, H., Bizzini, M., Junge, A., Dvorak, J., Bahr, R., & Andersen, T. E. (2008). Comprehensive warm-up programme to prevent injuries in young footballers: Cluster randomised controlled trial. *BMJ*, 337, a2469. <https://doi.org/10.1136/bmj.a2469>.