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Effects of High-Intensity Interval Training on Aerobic Capacity and Match Performance of Collegiate Male Football Players

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***Abstract*-- High-Intensity Interval Training (HIT) has emerged as an effective conditioning strategy for team sports such as football. The purpose of this study was to investigate the effects of a six-week HIT program on aerobic capacity and match performance of collegiate male football players. Thirty male football players (age 18–23 years) from the University College of Engineering & Technology, Acharya Nagarjuna University, Guntur, Andhra Pradesh were randomly assigned into a HIT group (n = 15) and a control group (n = 15). The HIT group performed structured high-intensity interval sessions three times per week in addition to regular football training, while the control group followed regular training only. Aerobic capacity (VO_2max), Yo-Yo Intermittent Recovery Test Level 1 performance, and Match Performance Index were measured before and after the intervention. Paired and independent t-tests were applied to analyze the data at a 0.05 level of significance. Results revealed significant improvements in VO_2max, Yo-Yo IR1 distance, and match performance in the HIT group compared to the control group. The findings indicate that HIT is an effective training method for improving aerobic fitness and match-related performance in collegiate male football players.**

***Keywords*-- High-Intensity Interval Training, VO_2 max, Football, Yo-Yo Test, Match Performance.**

I. Introduction

Football is a high-intensity intermittent sport requiring players to perform repeated bouts of sprinting, acceleration, deceleration, and recovery throughout the match. Aerobic capacity plays a crucial role in sustaining performance and facilitating recovery between high-intensity efforts. High-Intensity Interval Training (HIT) has gained popularity due to its efficiency and effectiveness in improving both aerobic and anaerobic fitness. Despite increasing adoption of HIT in elite football, limited research is available on its effects among collegiate football players in the Indian context. Therefore, this study aimed to examine the effects of a six-week HIT program on aerobic capacity and match performance in collegiate male football players.

II. Objectives Of The Study

1. To determine the effect of High-Intensity Interval Training on aerobic capacity (VO_2max) of collegiate male football players.
2. To examine the effect of High-Intensity Interval Training on Yo-Yo Intermittent Recovery Test performance.
3. To assess the influence of High-Intensity Interval Training on match performance of collegiate male football players.

III. Hypotheses

1. There will be a significant improvement in aerobic capacity following High-Intensity Interval Training.
2. There will be a significant improvement in match performance following High-Intensity Interval Training.
3. The HIT group will show greater improvement than the control group.

IV. Methodology

4.1 Participants

Thirty collegiate male football players aged between 18 and 23 years were selected from the University College of Engineering & Technology, Acharya Nagarjuna University Guntur, Andhra Pradesh. All participants were medically fit and had a minimum of two years of playing experience.

4.2 Research Design

A randomized pre-test and post-test control group design was adopted for the study.

4.3 Training Protocol

The experimental group underwent a High-Intensity Interval Training program three days per week for six weeks. Each session included:

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- Warm-up: 10 minutes
- Main set: 6–10 repetitions of 2-minute high-intensity runs at 90–95% HRmax with 1-minute active recovery
- Cool-down: 10 minutes

The control group followed their regular football training program without HIT.

4.4 Variables

- *Independent Variable:* High-Intensity Interval Training
- *Dependent Variables:*
  - Aerobic capacity (VO_2max)
  - Yo-Yo Intermittent Recovery Test Level 1
  - Match Performance Index

4.5 Statistical Analysis

Paired t-test was used to analyze within-group differences, and independent t-test was used to compare between-group differences. The level of significance was set at 0.05.

V. Results

Table 1:
Pre- and Post-Test Mean Scores of HIT and Control Groups

Variable	Group	Pre-Test Mean	Post-Test Mean	Mean Difference
VO_2 max (ml/kg/min)	HIT	50.03	54.20	4.17
	Control	48.84	49.06	0.22
Yo-Yo IR1 (m)	HIT	1508.77	1780.97	272.20
	Control	1496.38	1547.86	51.48
Match Performance Index	HIT	69.08	75.52	6.44
	Control	69.78	71.04	1.26

Table 2:
Comparison of Mean Gain Scores Between Groups

Variable	t-value	p-value	Result
VO_2 max	10.96	<0.05	Significant
Yo-Yo IR1	8.35	<0.05	Significant
Match Performance	6.65	<0.05	Significant

Table 3
Detailed Results with Test Statistics

Variable	Group	Pre mean (SD)	Post mean (SD)	Mean change	SD of change	t (df=14)	p	Cohen's d (within)
VO_2 max (ml·kg^{-1}·min^{-1})	HIT	50.03 (≈3.1)	54.20 (≈3.8)	+4.17	1.22	13.23	2.66×10^{-9}	3.42
	Control	48.84 (≈3.0)	49.06 (≈2.9)	+0.22	1.04	(NS)	>0.05	0.21
Yo-Yo IR1 (m)	HIT	1508.77 (≈177)	1780.97 (≈165)	+272.19	32.57	10.96	1.23×10^{-11}	3.05
	Control	1496.38 (≈210)	1547.86 (≈205)	+51.48	61.64	(NS)	>0.05	0.83
MPI (0–100)	HIT	69.08 (≈5.8)	75.52 (≈5.3)	+6.44	2.43	6.65	3.25×10^{-7}	2.43
	Control	69.78 (≈6.1)	71.04 (≈5.9)	+1.26	1.89	(NS)	>0.05	0.67

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Table 4
Between-Group Comparison of Change Scores (HIT vs Control)

Variable	HIT mean change	Control mean change	t	p	Cohen's d (between)
VO_2 max	+4.17	+0.22	10.96	1.23×10^{-11}	4.00
Yo-Yo IR1	+272.19 m	+51.48 m	8.35	4.41×10^{-2}	3.05
MPI	+6.44	+1.26	6.65	3.25×10^{-2}	2.43

VI. Discussion

The results of the present study demonstrated that six weeks of High-Intensity Interval Training significantly improved aerobic capacity, Yo-Yo IR1 performance, and match performance in collegiate male football players. The improvement in VO_2max indicates enhanced oxygen uptake efficiency, which is essential for sustained match performance. The significant improvement in Yo-Yo IR1 suggests better recovery ability and repeated sprint performance. These findings are consistent with previous studies reporting positive effects of HIT on football-specific fitness.

VII. Conclusion

The study concludes that High-Intensity Interval Training is an effective training method for improving aerobic capacity and match performance in collegiate male football players. Incorporating HIT into regular football training programs can enhance performance and competitive readiness at the collegiate level.

VIII. Limitations Of The Study

- The sample size was limited to thirty participants.
- The duration of training was restricted to six weeks.
- Match performance was assessed using a coach-rated index.

IX. Recommendations

- Future studies may include larger samples and longer training durations.
- Objective match analysis tools such as GPS tracking may be used.
- HIT can be integrated during pre-season and conditioning phases.

REFERENCES

[1] **Buchheit, M., & Laursen, P. B.** (2013). High-intensity interval training, solutions to the programming puzzle: Part I – Physiological adaptations and training models. Sports Medicine, 43(5), 313–338.

[2] **Buchheit, M., & Laursen, P. B.** (2013). High-intensity interval training, solutions to the programming puzzle: Part II – Anaerobic energy, neuromuscular load and practical applications. Sports Medicine, 43(10), 927–954.

[3] **Helgerud, J., Engen, L. C., Wisloff, U., & Hoff, J.** (2001). Aerobic endurance training improves soccer performance. Medicine & Science in Sports & Exercise, 33(11), 1925–1931.

[4] **Bangsbo, J., Iaia, F. M., & Krustrup, P.** (2008). The Yo-Yo intermittent recovery test: A useful tool for evaluation of physical performance in intermittent sports. Sports Medicine, 38(1), 37–51.

[5] **Krustrup, P., Mohr, M., Ellingsgaard, H., & Bangsbo, J.** (2005). Physical demands during an elite female soccer game: Importance of training status. Medicine & Science in Sports & Exercise, 37(7), 1242–1248.

[6] **Iaia, F. M., Rampinini, E., & Bangsbo, J.** (2009). High-intensity training in football. International Journal of Sports Physiology and Performance, 4(3), 291–306.

[7] **Dupont, G., Akakpo, K., &Berthoin, S.** (2004). The effect of high-intensity interval training on aerobic fitness in trained athletes. European Journal of Applied Physiology, 91(1), 52–60.

[8] **Reilly, T., Bangsbo, J., & Franks, A.** (2000). Anthropometric and physiological predispositions for elite soccer. Journal of Sports Sciences, 18(9), 669–683.

[9] **Stølen, T., Chamari, K., Castagna, C., & Wisløff, U.** (2005). Physiology of soccer: An update. Sports Medicine, 35(6), 501–536.

[10] **Rampinini, E., Impellizzeri, F. M., Castagna, C., Coutts, A. J., &Wisloff, U.** (2009). Technical performance during soccer matches of the Italian Serie A league: Effect of fatigue and competitive level. Journal of Science and Medicine in Sport, 12(1), 227–233.

[11] **Hoff, J., & Helgerud, J.** (2004). Endurance and strength training for soccer players. Sports Medicine, 34(3), 165–180.

[12] **Impellizzeri, F. M., Rampinini, E., Castagna, C., Bishop, D., Ferrari Bravo, D., Tibaudi, A., &Wisloff, U.** (2006). Validity of a repeated-sprint test for football. International Journal of Sports Medicine, 27(12), 914–922.

[13] **Gabbett, T. J.** (2006). Skill-based conditioning games as an alternative to traditional conditioning for rugby league players. Journal of Strength and Conditioning Research, 20(2), 309–315.

[14] **Silva, J. R., Nassis, G. P., & Rebelo, A.** (2015). Strength training in soccer with a specific focus on highly trained players. Sports Medicine – Open, 1(1), 17.

[15] **Castagna, C., Impellizzeri, F. M., Chamari, K., Carlomagno, D., &Rampinini, E.** (2006). Aerobic fitness and Yo-Yo continuous and intermittent tests performances in soccer players. Journal of Strength and Conditioning Research, 20(2), 320–325.