

Effect of Multiple Physical Training Regimens on Speed Performance Among College Men Handball Players

B. Karunakaran^{1*}, Dr. P. Kaleeswaran²

¹Ph.D. Research Scholar (Part Time), Alagappa College of Physical Education, Alagappa University, Karaikudi, Tamil Nadu, India

²Professor, Alagappa College of Physical Education, Alagappa University, Karaikudi, Tamil Nadu, India

DOI: <https://doi.org/10.36348/jaspe.2026.v09i04.007>

| Received: 16.02.2026 | Accepted: 09.04.2026 | Published: 11.04.2026

*Corresponding author: B. Karunakaran

Ph.D. Research Scholar (Part Time), Alagappa College of Physical Education, Alagappa University, Karaikudi, Tamil Nadu, India

Abstract

The purpose of the study was to determine the multiple physical training regimens on selected physical fitness variables among college men handball players. To attain the purpose sixty (N=60) Handball players studying various affiliated colleges in Alagappa University, Karaikudi, Tamil Nadu, India. Their age is between 17 and 21 years. The selected subjects were divided at random into four groups of fifteen each (n=15). Group-I underwent High-Intensity Interval Training (HIIT), Group-II underwent Functional Training (FT), Group-III underwent Combined High-Intensity Interval Training and Functional Training (HIITFT) and Group-IV acted as Control group(CG). Speed was selected as dependent variable and it was assessed by 50 meters run. The duration of the training period was restricted to eight weeks and number of sessions is five days per week. The data was collected prior to and immediately after the training period of eight weeks. The data obtained from the experimental groups before and after the experimental period were analyzed by using the statistical technique with depended 't' test and Analysis of Covariance (ANCOVA). Whenever, the obtained 'F' ratio for the adjusted post-test was found to be significant the Scheffe's Post hoc test was used to access the paired mean differences. In all cases, 0.05 level is fixed as level of confidence to test the significance which is considered as appropriate. The results of the study observed that there is a notable difference among High-Intensity Interval Training (HIIT) group, Functional Training (FT) group, combined High-Intensity Interval Training (HIIT) and Functional Training (FT) group and Control group on Speed. Further the results of the study concluded that combined High-Intensity Interval Training (HIIT) and Functional Training (FT) group is better than groups on developing Speed.

Keywords: High-Intensity Interval Training (HIIT), Functional Training (FT), Combined High-Intensity Interval Training (HIIT) and Functional Training (FT), Speed, Handball.

Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

1. INTRODUCTION

Handball is a sport that demands high-intensity intermittent exercise, with repeated running, jumping, sprinting and changes of direction (i.e., 10- to 12-m sprints of 2.3 s each; 50 turns per game) (Chelly *et al.*, 2011). It requires a combination of aerobic power and anaerobic capacity that will allow the frequent repetition of short-duration high-intensity actions, interspersed with brief recovery intervals (i.e., 825 short duration (2–6 s) high-intensity actions, with 6 s intervals) (Hermassi *et al.*, 2018). Playing handball can improve both aerobic and anaerobic performance³. However, to maximize their abilities, handball players must engage in additional hand ball-specific training, both physical and technical, to improve intermittent aerobic effort, speed, agility, strength, power, and ball throwing in both offensive and defensive phases of the game^{3,6,7}. To improve players'

physical fitness, coaches must schedule sessions that combine speed and explosive strength training (Hermassi *et al.*, 2017).

In Handball, where the physical and tactical demands are particularly high, High-Intensity Interval Training (HIIT) has become a cornerstone of contemporary athletic preparation. In order to replicate the high-intensity intermittent nature of Handball games, HIIT alternates periods of intense activity with brief recovery intervals. Handball players who must sustain prolonged physical exertion while performing short, explosive movements like sprints, jumps, and quick directional changes will find this training method especially helpful as it is highly effective in improving both aerobic and anaerobic fitness (Buchheit *et al.*, 2013; Buchheit & Laursen, 2023).

Performance work against resistance is used in functional strength training in a way that directly enhances strength growth. Simply put, the main objective of functional training is to transfer strength gains made in one movement to improve the performance of other movements by impacting the entire neuromuscular system.

Training our bodies to accomplish the kinds of movements we employ on a daily basis is known as functional strength training. According to Mackelvie *et al.* (2002), the time spent honing this particular strength, flexibility, and agility has the best transferability into everyday activities. Combining all aspects of fitness to achieve optimal performance for your unique demands is known as functional strength. Functional strength training will help you reach your fitness objectives, whether they are to feel better, look better, or perform better. To identify your strengths and weaknesses, Functional Strength starts with a detailed assessment of your present level of fitness. A program will be created to strengthen your areas of weakness and enhance your strengths based on the findings of your evaluation (Michael, 2004).

2. METHODOLOGY

The purpose of the study was to determine the multiple physical training regimens on selected physical fitness variables among college men handball players. To

attain the purpose sixty (N=60) Handball players studying various affiliated colleges in Alagappa University, Karaikudi, Tamil Nadu, India. Their age is between 17 and 21 years. The selected subjects were divided at random into four groups of fifteen each (n=15). Group-I underwent High-Intensity Interval Training (HIIT), Group-II underwent Functional Training (FT), Group-III underwent Combined High-Intensity Interval Training and Functional Training (HIITFT) and Group-IV acted as Control group (CG). Speed was selected as dependent variable and it was assessed by 50 meters run. The duration of the training period was restricted to eight weeks and number of sessions is five days per week. The data was collected prior to and immediately after the training period of eight weeks. The data obtained from the experimental groups before and after the experimental period were analyzed by using the statistical technique with depended 't' test and Analysis of Covariance (ANCOVA). Whenever, the obtained 'F' ratio for the adjusted post-test was found to be significant the Scheffe's Post hoc test was used to access the paired mean differences. In all cases, 0.05 level is fixed as level of confidence to test the significance which is considered as appropriate.

3. Analysis of Data

The Analysis of covariance (ANCOVA) on Speed of experimental groups and control group have been analyzed and presented in Table -1.

Table 1: The Summary of Mean and Dependent 't' Test for the Pre and Post Tests on Speed of Experimental Groups and Control Group

Mean	High-Intensity Interval Training Group (HIITG)	Functional Training Group (FTG)	Combined High-Intensity Interval Training and Functional Training Group (HIITFTG)	Control Group (CG)
Pre- Test Mean	7.71±0.17	7.77±0.18	7.71±0.23	7.65±0.20
Post-Test Mean	6.75±0.35	7.12±0.15	6.45±0.31	7.58±0.27
't'-test	2.24*	2.30*	3.11*	0.17

* Significant at 0.05 level.

(Table value required for significance at .05 level for 't'-test with df 14 is 2.15)

Table-1 shows that the pre-test means on Speed of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) are 7.71±0.17, 7.77±0.18, 7.71±0.23 and 7.65±0.20 respectively. The post-test means are 6.75±9.36, 7.12±0.15, 6.45±0.31 and 7.58±0.27 respectively. The obtained dependent t-ratio values between the pre and posttest means on Speed of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) are 2.24, 2.30, 3.11 and 0.17 respectively.

The table value required for significant difference with df 14 at 0.05 level is 2.15. It was concluded that experimental groups such as High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG) and Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) had registered significant improvement on Speed.

To find out the significance improvement between groups on Speed analysis of covariance (ANCOVA) was applied. Whenever the 'F' ratio for adjusted posttest means was found to be significant, Scheffe's test was followed as a post hoc test to determine which of the paired means difference was significant.

Table 2: Computation of Analysis of Covariance of Experimental Groups and Control Group on Speed

Test	High-Intensity Interval Training Group (HIITG)	Functional Training Group (FTG)	Combined High-Intensity Interval Training and Functional Training (HIITFTG)	Control Group (CG)	Source of Variance	Sum of Squares	df	Mean Squares	F ratio
Pre-Test Mean	7.71	7.77	7.71	7.65	Between	0.10	3	0.03	0.81
					Within	2.40	56	0.04	
Post Test Mean	6.75	7.12	6.46	7.58	Between	10.65	3	3.55	43.00*
					Within	4.62	56	0.08	
Adjusted Post Test Mean	6.75	7.11	6.46	7.60	Between	10.76	3	3.59	43.63*
					Within	4.52	55	0.08	

* Significant at 0.05 level of confidence, (Speed Scores in Numbers)

Table value for df (3, 56) at 0.05 level = 2.76 Table value for df (3, 55) at 0.05 level = 2.78

The table-2 shows that the pretest means value on Speed of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) are 7.71, 7.77, 7.71 and 7.66 respectively. The obtained ‘F’ ratio of 0.10 for pre test scores was lesser than the table value of 0.81 for degrees of freedom 3 and 56 required for significance at 0.05 level of confidence on Speed.

The post Test mean values on Speed of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) are 6.75, 7.32, 6.46 and 7.583 respectively. The obtained ‘F’ ratio of 43.00 for post- Test scores was higher than the table value of 2.76 for degrees of freedom 3 and 56 required for significance at 0.05 level of confidence on Speed.

The adjusted post-Test means on Speed of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) are 6.75, 7.31, 6.46 and 7.60 respectively. The obtained ‘F’ ratio of 43.63 for adjusted post-Test scores was higher than the table value of 2.78 for degrees of freedom 3 and 55 required for significance at 0.05 level of confidence on Speed.

The results of the study indicate that there are significant differences among the adjusted post Test means of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) in Speed.

To determine which of the paired means have a significant difference, the Scheffe’s test is applied as Post hoc Test and the results are presented in Table – 3.

Table 3: The Scheffe’s Test for the Differences Between the Adjusted Post Tests Paired Means on Speed

Adjusted Post-test Means				Mean Difference	Confidence Interval
High-Intensity Interval Training Group (HIITG)	Functional Training Group (FTG)	Combined High-Intensity Interval Training and Functional Training (HIITFTG)	Control Group (CG)		
6.75	7.11			0.36*	0.30
6.75		6.46		0.29	0.30
6.75			7.60	0.85*	0.30
	7.11	6.46		0.65*	0.30
	7.11		7.60	0.49*	0.30
		6.46	7.60	1.14*	0.30

* Significant at 0.05 level of confidence

The table 3 shows the pair wise comparison on Speed of different groups. The confidence interval value is 0.30.

- The results indicated that their significant differences were found in High Intensity Interval Training Group and Functional Training Group (0.36), High Intensity Interval Training Group and

Control Group (0.85), Functional Training Group and Combined High Intensity Interval Training and Functional Training Group (0.65), Functional Training Group and Control Group (0.49) & Combined High Intensity Interval Training and

Functional Training Group and Control Group (1.14).

- The results indicated that there were no significant differences were found in High Intensity Interval Training Group and Combined High Intensity Interval Training and Functional Training Group (0.29)

The graphical representation of pre and post-test mean values of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG),

Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) on Speed is in Figure-1.

The graphical representation of adjusted post-test means values of High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) on Speed is in Figure-2.

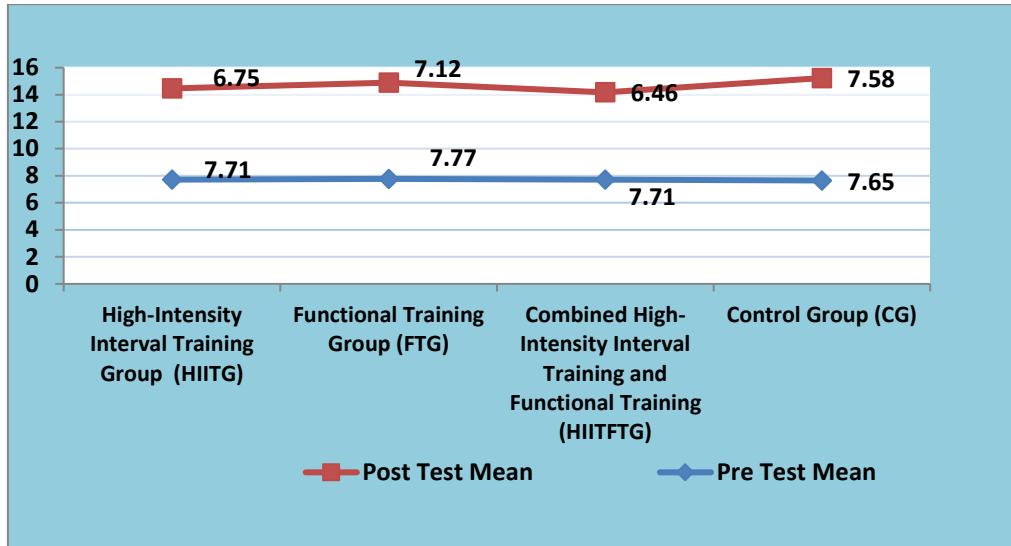


Fig. 1: Pre, Post Test on Speed among Experimental Groups and Control Group (In Seconds)

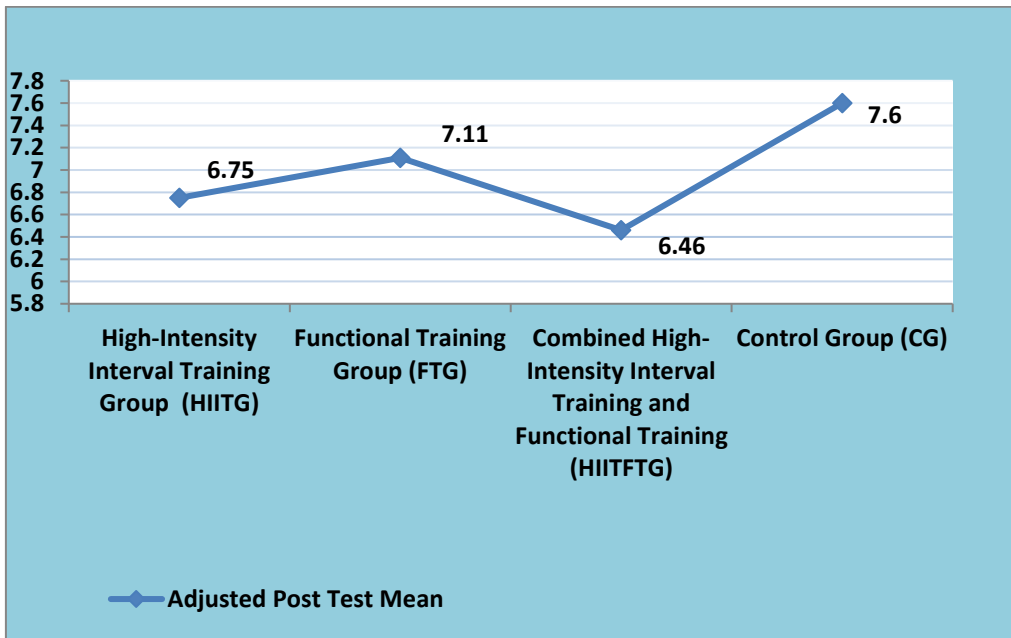


Fig. 2: Adjusted Post Test on Speed among Experimental Groups and Control Group (In Seconds)

4. CONCLUSIONS

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

1. Significant differences in achievement were found between High-Intensity Interval Training

Group (HIITG), Functional Training Group (FTG), Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) and Control Group (CG) in Speed.

2. The Experimental groups namely, High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG) and Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) had significantly improved in Speed
3. The Combined High-Intensity Interval Training and Functional Training Group (HIITFTG) was found to be better than the High-Intensity Interval Training Group (HIITG), Functional Training Group (FTG), and Control group in increasing Speed performance.

REFERENCES

- Buchheit, M., & Laursen, P. B. (2023). Effects of High-Intensity Interval Training (HIIT) on Physical Performance in Female Team Sports: A Systematic Review. *Sports Medicine -Open*, 9(1), 55.
- Buchheit, M., & Laursen, P. B. (2013). High-Intensity Interval Training, Solutions to the Programming Puzzle. *Sports Medicine*, 43(5), 313-338.
- Chelly MS, Hermassi S, Aouadi R, Khalifa R, Van den Tillaar R, Chamari K, Shephard RJ (2011). Match Analysis of Elite Adolescent Team Handball Players. *J Strength Cond Res* 2011; 25: 2410-2417.
- Hermassi S, Chelly MS, Fieseler G, Bartels T, Schulze S, Delank KS, Shephard RJ, Schwesig R (2017). Effects of In-Season Explosive Strength Training on Maximal Leg Strength, Jumping, Sprinting, and Intermittent Aerobic Performance in Male Handball Athletes. *Sportverletz Sportschaden*, 31: 167-173.
- Hermassi S, Schwesig R, Wollny R, Fieseler G, van den Tillaar R, Fernandez-Fernandez J, Shephard RJ, Chelly MS(2018). Shuttle versus Straight Repeated-Sprint Ability Tests and their Relationship to Anthropometrics and Explosive Muscular Performance in Elite Handball Players. *J Sports Med Phys Fitness*. 58: 1625-1634.
- Mackelvie Rj, Khan Km, and Mckay HA. (2002). Is there a Critical Period for Bone Response to Weight – Bearing Exercise in Children and Adolescents, A Systematic Review, *The British Journal of Sports Medicine*, Vol. 36.
- Michael O. (2004). *Functional Training for Sports*, Human Kinetics Publishers; 1st Edition.
- Wagner H, Gierlinger M, Adzamija N, Ajayi S, Bacharach DW, von Duvillard SP. (2017). Specific Physical Training in Elite Male Team Handball. *J Strength Cond Res*. 31: 3083-3093.