



# EFFECTS OF CIRCUIT TRAINING WITH KETTLEBELL ON EXPLOSIVE POWER AND STRENGTH ENDURANCE AMONG HANDBALL PLAYERS

**K.Ooraniyan<sup>1</sup>, S. Senthil Kumaran<sup>2</sup>, P. Jenith<sup>3</sup>**

<sup>1, 2, 3</sup> PhD Research Scholar, Department of Physical Education, Bharathiar University, Coimbatore, Tamilnadu.

## ABSTRACT

The determination of the study was to find out the effects of circuit training with kettlebell on explosive power and strength endurance among handball players. To achieve the purpose of the study thirty handball players were selected as subjects from department of physical education, bharathiar university coimbatore, tamilnadu. The age of the subjects were ranged from 21 to 25 years. The subjects were further classified at random into two equal groups of 15 subjects, Group-I underwent Circuit Training (using kettlebell) and group-II acted as Control Group (CG). Training period limited with three days in a week for eight weeks of training. The selected criterion variables explosive power and strength endurance assessed before and after the training period. The collected data were statistically analyzed by using Analysis of Covariance (ANCOVA). From the results of the study it was found that there was a significant enhancement on explosive power and strength endurance among the handball players.

**KEYWORDS:** Circuit Training, Kettlebell, Explosive Power, Strength Endurance and Handball Players.

## 1. INTRODUCTION

In today's world, a sport is a marvel in and of itself. History sports have never been more popular, composed, or critical as they are today. All of the playing actions are dominated by explosive strength and power (Kumar, 2014); also, it is a high-intensity interval sport in which players compete in a continuous brief period of high-power work out followed by periods of low-level force action (Kunstlinge, 1987). As a result, players must have explosive power as well as strength endurance. "In a complete circuit, there are normally 6 to 12 platforms, each focused on one exercise, so that all regions of the body are covered." The entire circuit should be finished as quickly as possible, and the circuit should be repeated three times. A fixed quantity of work is allotted ahead of time.

## 2. METHODOLOGY

The determination of the study was to find out the effects of circuit training with kettlebell on explosive power and

strength endurance among handball players. To achieve the purpose of the study thirty handball players were selected as subjects from department of physical education, bharathiar university, Coimbatore, tamilnadu. The age of the subjects were ranged from 21 to 25 years. The subjects were further classified at random into two equal groups of 15 subjects, Group-I underwent Circuit Training (using kettlebell) and group-II acted as Control Group (CG). Training period limited with three days in a week for eight weeks of training. The selected criterion variables explosive power and strength endurance assessed before and after the training period. The collected data were statistically analyzed by using Analysis of Covariance (ANCOVA).

## 3. STATISTICAL TECHNIQUE

The collected data were statistically analyzed by using Analysis of Covariance (ANCOVA).

**Table 1: Analysis of co variance on explosive power of experimental and control group**

|                          | Ex (CTK) | CG     | Source of Variance | Sum of Squares | Df | Means Squares | F ratio |
|--------------------------|----------|--------|--------------------|----------------|----|---------------|---------|
| Pre-Test Means           | 204.33   | 205.47 | BG                 | 9.63           | 1  | 9.63          | 0.12    |
|                          |          |        | WG                 | 2235.06        | 28 | 79.82         |         |
| Post-Test Means          | 229.33   | 204.87 | BG                 | 4489.63        | 1  | 4489.63       | 44.59*  |
|                          |          |        | WG                 | 2819.07        | 28 | 100.68        |         |
| Adjusted Post-Test Means | 229.77   | 204.42 | BG                 | 4800.57        | 1  | 4800.57       | 89.48*  |
|                          |          |        | WG                 | 1448.44        | 27 | 53.65         |         |

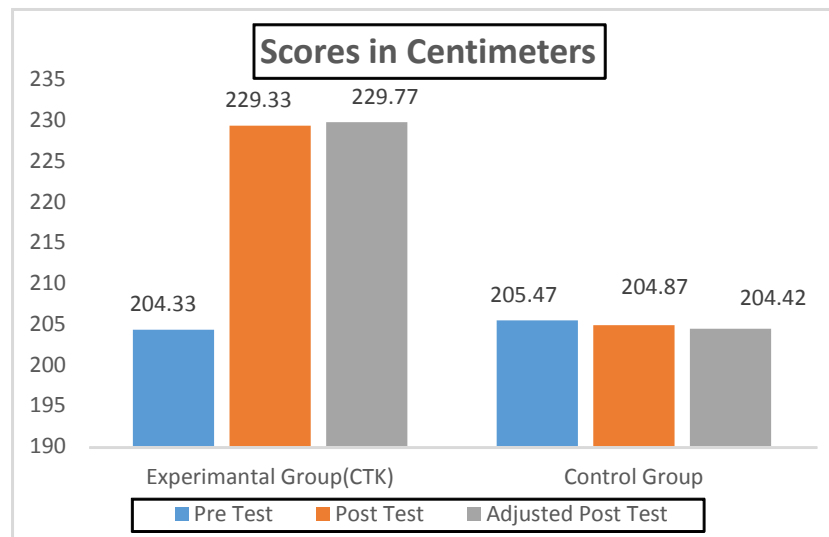
\*Significant at 0.05 level of Confidence.

(The table values required for significance at 0.05 level of confidence with df 2 and 28 and 2 and 27 were 4.20 and 4.21 respectively).

### 3.1 Discussion on Findings of Explosive Power

The obtained F value on pre test scores 0.12 was lesser than the required F value of 4.20 to be significant at 0.05 level. This proved that there was no significant difference between the experimental and control group at initial stage and the randomization at the initial stage were equal. The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 44.59 was greater than the required F value at 4.20. This proved that the differences between the post-test mean at the subjects were significant. Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated

and subjected to statistical treatment. The obtained F value at 89.48 was greater than the required F value at 4.21. This proved that there was Significant differences among the means due to eight weeks of circuit training with kettlebell on explosive power among handballplayers.

**Fig 1: Bar Diagram showing Pre, Post and Adjusted Means on Explosive Power**

**Table 2: Analysis of co variance on strength endurance of experimental and control group**

|                          | Ex (CTK) | CG    | Source of Variance | Sum of Squares | df | Means Squares | F ratio |
|--------------------------|----------|-------|--------------------|----------------|----|---------------|---------|
| Pre-Test Means           | 55.87    | 52.00 | BG                 | 112.133        | 1  | 112.13        | 2.64    |
|                          |          |       | WG                 | 1189.733       | 28 | 42.49         |         |
| Post-Test Means          | 72.40    | 61.87 | BG                 | 832.133        | 1  | 832.13        | 25.74   |
|                          |          |       | WG                 | 905.333        | 28 | 32.33         |         |
| Adjusted Post-Test Means | 71.03    | 63.23 | BG                 | 417.074        | 1  | 417.07        | 36.19   |
|                          |          |       | WG                 | 311.129        | 27 | 11.52         |         |

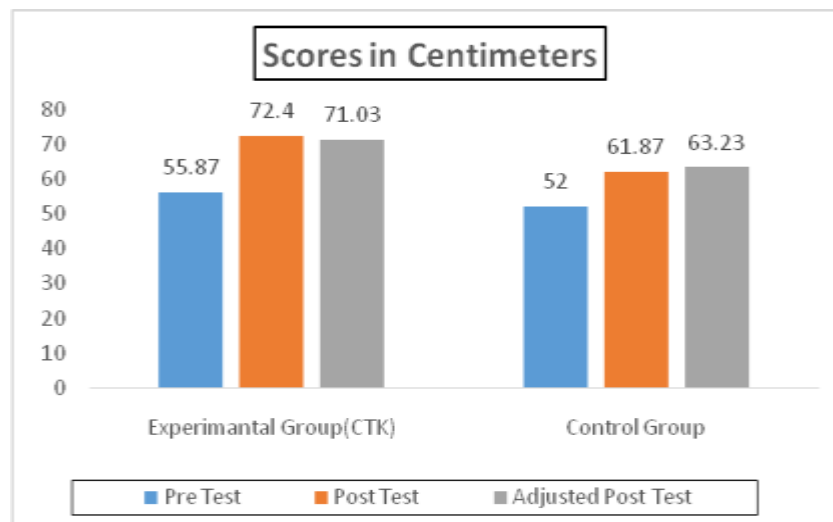
\*Significant at 0.05 level of Confidence.

(The table values required for significance at 0.05 level of confidence with df 2 and 28 and 2 and 27 were 4.20 and 4.21 respectively).

### 3.2 Discussion on Findings of Strength Endurance

The obtained F value on pre test scores 2.64 was lesser than the required F value of 4.20 to be significant at 0.05 level. This proved that there was no significant difference between the experimental and control group at initial stage and the randomization at the initial stage were equal. The post test scores analysis proved that there was significant difference between the groups as the obtained F value at 25.74 was greater than the required F value at 4.20. This proved that the

differences between the post-test mean at the subjects were significant. Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 36.19 was greater than the required F value at 4.21. This proved that there was Significant differences among the means due to eight weeks of circuit training with kettlebell on strength endurance among handball players.



**Fig 2: Bar diagram showing pre, post and adjusted means on strength endurance**

## 4. CONCLUSIONS

On the basis of the interpretation of the data, there was a significant difference between experimental group and control group on selected variable of explosive power and strength endurance, further it was concluded that eight weeks of circuit training programme with kettlebell significantly improve on selected variables such as explosive power and strength endurance among handball players.

## 5. REFERENCES

1. V Vallimurugan and J Vijay (2021) Influences of Blood Pressure and Respiratory Rate Response to Yogic Programme among Women Badminton Players. EPRA

- International Journal of Research and Development, Volume: 6, Issue: 9, Pages: 23-27.
2. V Vallimurugan (2020) Effect of Yogasana and Pranayama Practices on Selected Physical and Physiological Variables among Physical Education Students. Bharathiar National Journal of Physical Education and Exercise Science, Vol 1, Issue 1 Pages 14-20.
3. U Srikumar, V Vallimurugan (2016) Effect of yoga, Pranayama with natural diet on physical fitness variables among patients of coronary artery disease. Int J App Res, Vol 2 Pg no: 585-590.
4. CA Vijayarani, V Vallimurugan, M Suresh Kumar (2012) Influence of yogic practices on selected physiological and psychological variables of adolescent's boys. Recent



- Research in Science and Technology, Vol 2, Issue 4.*
5. B Vivekanth, V Vallimurugan (2019). *Effect of Strength Training on Physical Fitness Variables of Intercollegiate Volleyball Players. International Journal of Applied Research*; 5(6): 442-444
  6. Muniyappan, R., & Vallimurugan, V. (2017). *Effect of six weeks specific drills with meditation on skill performance of inter collegiate male hockey players. IJAR*, 3(7), 1158-1660.
  7. Ashwin, A. L., & Vallimurugan, V. (2014). *Effect of Fartlek Training on Vital Capacity among Hockey Players. International Journal of Recent Research and Applied Studies*, 1(10), 37-39.
  8. Vallimurugan, V., & Vincent, J. P. (2012). *Effect of SAQ Training On Selected Physical Fitness Parameters of Men Football Palyers. International Journal of Advanted and Inovation Research*, 1(2), 2278-7844.
  9. Kunstlinger U, Ludwig HG, Stegemann J. *Metabolic changes during volleyball matches. International Journal of Sports Medicine*. 1987;8:315-322
  10. Hakkinen K. *Changes in physical fitness profile in female volleyball players during the competitive season. J Sport Med Phys Fitness*. 1993;33:223-232.
  11. <https://www.bodybuilding.com/exercises/goblet-squatC>
  12. <https://www.onnit.com/academy/alternating-double-reverse-lunge-kettlebell-exercise/>
  13. AshishPhulkar. *Effect of Circuit Resistance Training and Aerobic Circuit Resistance Training on Leg Explosive Power of Male Football Players International Journal of Physiology, Nutrition and Physical Education*. 2017; 2(1):139-141 2
  14. .Gettman LR, Pollock ML. *Circuit weight training: a critical review of its physiological benefits. The Physician and Sports Medicine*. 1981; 9:44-60.
  15. Kraviz Len. "New Insights into Circuit Training". University of New Mexico, 1996.
  16. Manohar M. Mane and Sarvesh Kumar Yadav. *The Effects of Circuit Training for the Development of Vertical Jumping Ability, Endurance, Agility and Skill Ability in Football Players' Boys Aged 10 to 12 Years. Variorum, Multi-Disciplinary e-Research Journal*. 2011; 01:IV,
  17. Morgan RE, Adamson GT. *Circuit Training (2nd Ed.)*. Bell and Sons Ltd.: London, 1961.
  18. Punitha P, Mahaboobjan A. *Effect of Circuit Training on Physical Fitness Variables among College Women Kabaddi Players, Paripex - Indian Journal of Research*. 2017; 6(10):79-81.
  19. Scholich M. *Circuit Training for All Sports: Methodology of Effective Fitness Training*. Sport Books Publisher: Toronto, 1990.
  20. SudhakarBabu M, Paul Kumar PPS. *Effect of Selected Circuit Training Exercises on*
  21. *Sprinters of High School Girls, International Journal of Science and Research (IJSR)*, 2013, 2(11), available at [www.ijsr.net](http://www.ijsr.net) 9.
  22. Taşkin H. *Effect of Circuit training on the sprint-agility and anaerobic endurance, Journal of Strength Conditioning Response*. 2009; 23(6):1803-10.
  23. Alcaraz PE et al., *Physical performance and cardiovascular responses to an acute bout of heavy resistance circuit training versus traditional strength training, Journal of Strength and Conditioning Research*. 2008; 22(3):667-71.
  24. Clanton RE, Dwight MP. *Team handball: Steps to Success*. Champaign, IL: Human Kinetics, 1997.
  25. Gettman LR et al., *The effect of circuit weight training on strength, cardio respiratory function and body composition adult men, Med Sci Sports*. 1978; 10(3):171- 6.
  26. Kaikkonen H et al., *The effect of heart rate controlled low resistance circuit weight training and endurance training on maximal aerobic power in sedentary adults, Scand Journal Med Sci Sports*, 2000; 10(4):211-5.
  27. Kass JE, Castriotta RJ. *The effect of circuit weight training on cardiovascular function in healthy sedentary males, Journal of Cardiopulmonary Rehabilitation*. 1994; 14:378-383. 6.
  28. Marczinka Z. *Playing handball, A comprehensive Study of the game, Budapest: International Handball Federation*, 1993. 7.
  29. Peterson SR et al., *The influence of high-velocity resistance circuit training on aerobic power, Journal of Orthopedic and Sports Physical Therapy*. 1988; 9:339- 344. 8.
  30. Zatsiorsky, Vladimir M, Kraemer, William J. *Science and Practice of Strength Training*, 2006.