

## Kettlebells Influence in Optimizing Physical and Physiological Training Parameters in Women Kabaddi Players

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### ARTICLE DETAILS

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**Research Paper**

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### ABSTRACT

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The integration of kettlebell training (KT) in sports performance has received attention due to its potential to improve the physiological attributes of athletes. This study investigates the effects of kettlebell training on core strength, muscular endurance, oxygen consumption, and respiratory rate among a group of 30 kabaddi athletes. The intervention group (KBG) participated in kettlebell training, while the control group (CG) did not receive any training. Measurements were taken before. After the training period, statistical analysis was conducted using t-tests. The results indicate that the KBG experienced improvements in core strength, muscular endurance, and oxygen consumption compared to the CG as supported by t ratios (14.63\*, 25.66\* 8.097\*, respectively). Furthermore, after the intervention, the KBG demonstrated a decrease in rate (t ratio 11.309\*), whereas no significant change was observed in this parameter for the CG. These findings highlight how kettlebell training can potentially optimize physiological factors that enhance the performance of female kabaddi athletes.

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### Introduction:

An athlete's performance is a measure of their abilities, including their physiological qualities. Lately, kettlebell training has become increasingly popular in sports programs because it enhances attributes like breathing rate, oxygen absorption, stamina, and core strength. Kabaddi, a demanding contact sport, requires levels of core strength, endurance, and cardiovascular fitness to succeed. This underscores the importance of maintaining a rate during intense gameplay.(Levine et al., 2022). Achieving optimal levels of core strength, muscular endurance, and cardiovascular fitness is essential for success in kabaddi. However, it is equally important to ensure that athletes do not compromise their respiratory rate during intense gameplay. (Stone et al., 2022) Kettlebell training, a versatile form of resistance training, utilizes a cast-iron weight with a handle to enhance strength, power, endurance, and mobility. The athletic requirements for kabaddi, including muscular endurance, agility, and proficiency, are relatively high (Prabakaran & Sridar, 2022)(Melo et al., 2023). The performance of female kabaddi athletes can be enhanced by improving their physical and physiological parameters. (Profile, 2023) This study explores the effects of kettlebell training on core strength, muscular endurance, oxygen consumption, and respiratory rate in 30 female kabaddi athletes.

Kettlebell training can improve all aspects of fitness, from balance to strength, cardio, flexibility, and mobility. It can also help develop power endurance, which involves moves that are performed quickly, such as the snatch and the clean and jerk. (Alex Polish, 2023; Caine Wilkes, OLY, 2023; Jason C. Brown, 2023; Page, 2023)

The study focused on female kabaddi athletes who underwent kettlebell training, yielding significant improvements in core strength, muscular endurance, oxygen consumption, and a remarkable reduction in respiratory rate compared to the control group. Based on statistical analysis like pre-test and post-test measurements and t-tests, the study underscores the distinct advantages of kettlebell training on the performance of female kabaddi athletes.(Rajasekaran & Mahaboobjan, 2022)(Seethalakshi & Suresh, 2019)

This study highlights the importance of incorporating kettlebell training into sports performance programs to improve physical and physiological attributes in female kabaddi athletes. Overall, kettlebell training is a complementary technique for improving core strength, muscular endurance, oxygen consumption, and respiratory rate in this particular athletic population.

### **Materials and Methods:**

**Experimental Approach to the Problem:**

**Samples:** The study sample comprised 30 female kabaddi players, with 15 in the intervention group (KBG) and 15 in the control group (CG). All participants were from SRM IST and were matched based on age, experience, and baseline physical parameters.

**Selection of Variables/Test:**

**Table .1**

Variables		Test Items
Physical Variables	Core Strength	Plank - Mints
	Muscular Endurance	Sit ups - Numbers
Physiological Variables	Oxygen Consumption	Wet spirometer - Litters
	Respiratory Rate	Expirograph - Numbers

**Results & Discussion:**

**Table .2**

**T-TEST FOR CORE STRENGTH**

Groups	Pre-Test		Post-Test		df	T-Ratio
	Mean	SD	Mean	SD		
<b>KBG</b>	1.167	.095	1.26	.098	14	14.63*
<b>CG</b>	1.199	.079	1.19	.083	14	.274

*\* Statistically significant at the 0.05 confidence level*

*(The table value for significance at the 0.05 level with 14 df is 2.145)*

The table-2 presents initial mean and standard deviation (SD) values for core strength measurements, reflecting pre-intervention averages and variation within the KBG and CG. The KBG displayed a pre-test mean and SD of  $1.167 \pm 0.095$ , and the CG had  $1.199 \pm 0.079$ . Post-intervention, the KBG's mean core strength rose to  $1.26 \pm 0.098$ , while the CG's mean was  $1.19 \pm 0.083$ , indicating changes in core strength. Both groups had 14 degrees of freedom for t-test calculations. The KBG's t-ratio, at 14.63\*, and the CG's t-ratio, at 0.274, are reported. Figure 1 visually illustrates pre and post-test

mean values of core strength. The t-ratio assesses the mean difference between groups relative to within-group variability, a critical measure for statistical significance. Notably, the KBG exhibited a significant core strength improvement post-intervention, with a t-ratio of 14.63\*, surpassing the critical t-value of 2.080. Conversely, the CG's t-ratio of 0.274 is below the critical threshold, indicating non-significant changes in core strength. In summary, the KBG demonstrated a highly significant improvement, while the control group did not exhibit a significant enhancement in core strength following the intervention.

**Table. 3**  
**T-TEST FOR MUSCULAR ENDURANCE**

Groups	Pre-Test		Post-Test		df	T-Ratio
	Mean	SD	Mean	SD		
<b>KBG</b>	34.26	1.58	38.20	1.61	14	25.66*
<b>CG</b>	34.20	1.74	33.53	1.76	14	2.092

*\* Significant at the 0.05 confidence level*

*(The table value for significance at the 0.05 level with 14 df is 2.145)*

The table-3 presents the initial mean and standard deviation (SD) values for muscular endurance measurements, depicting pre-intervention averages and variation within the KBG and CG. The KBG exhibited a pre-test mean and SD of  $34.26 \pm 1.58$ , while the CG had  $34.20 \pm 1.74$ , representing the average and variability in muscular endurance scores within each group before the intervention. Post-intervention, the KBG demonstrated a noteworthy increase in mean muscular endurance to  $38.20 \pm 1.61$ , whereas the CG's mean was  $33.53 \pm 1.76$ , indicating changes in muscular endurance. Both groups had 14 degrees of freedom for t-test calculations, with the KBG's t-ratio at an impressive 25.66\*, and the CG's at 2.092. Figure-2 visually depicts mean values of muscular endurance before and after the intervention. The table emphasizes that the KBG exhibited a substantial and statistically significant improvement in muscular endurance following the intervention. The KBG's t-ratio of 25.66\* significantly exceeds the critical t-value of 2.080, indicating a highly significant enhancement. Conversely, the CG's t-ratio of 2.092 falls below the critical threshold, suggesting non-significant changes in muscular endurance. Consequently, the control group did not demonstrate a substantial improvement in muscular endurance following the intervention. These findings underscore the intervention's effectiveness in significantly enhancing muscular endurance, as evidenced by the considerable t-ratio and the asterisk denoting statistical significance in the KBG.

**Table .4**  
**T-TEST FOR OXYGEN CONSUMPTION**

Groups	Pre-Test		Post-Test		df	T-Ratio
	Mean	SD	Mean	SD		
<b>KBG</b>	48.86	4.155	54.33	3.51	14	8.097*
<b>CG</b>	50.40	4.79	50.60	4.92	14	.587

\* *Significant at 0.05 level of confidence*

*(The table value required for Significance at 0.05 level with df 14 is 2.145)*

The table-4 outlines the initial mean and SD values for oxygen consumption levels in both the KBG and CG. Before intervention, KBG exhibited a mean and SD of  $48.86 \pm 4.155$ , whereas CG had  $50.40 \pm 4.79$ . These figures represent baseline oxygen consumption averages and variability within each group. Post-intervention, KBG demonstrated a marked increase in mean oxygen consumption ( $54.33 \pm 3.51$ ), while CG's mean remained relatively stable ( $50.60 \pm 4.92$ ). With 14 degrees of freedom for t-test calculations, both groups yielded t-ratios crucial for assessing statistical significance. KBG's t-ratio of 8.097\* significantly exceeded the critical t-value of 2.080, indicating a substantial improvement in oxygen consumption. Conversely, CG's t-ratio of 0.587 fell below the critical threshold, suggesting a lack of statistical significance and negligible improvement in oxygen consumption. Figure-3 presents the mean values of oxygen consumption. This underscores the intervention's efficacy in significantly enhancing oxygen consumption among kabaddi athletes, evident in the substantial t-ratio and the asterisk denoting statistical significance for KBG. In contrast, CG's lack of significant change highlights the distinct impact of the KT intervention. This nuanced understanding emphasizes the pivotal role of KT in optimizing physiological parameters, particularly oxygen consumption, crucial for the demanding aerobic nature of kabaddi.

**Table .5**  
**T-TEST FOR RESPIRATORY RATE**

Groups	Pre-Test		Post-Test		df	T-Ratio
	Mean	SD	Mean	SD		
<b>KBG</b>	15.933	1.099	14.20	1.01	14	11.309*
<b>CG</b>	16.266	.883	15.93	.961	14	1.784

\* *Significant at 0.05 level of confidence.*

*(The table value for significance at the 0.05 level with 14 df is 2.145)*

This table presents the results of a t-test to evaluate a specific intervention's effect on respiratory rate. The initial mean and SD values for respiratory rates are displayed. For the KBG, the pre-test means, and SD was  $15.933 \pm 1.099$ ; for the CG, it was  $16.266 \pm 0.883$ . These represent the average respiratory rate and the variation in respiratory rates within each group before the intervention. The post-test means and SD values are provided. Following the intervention, the KBG's mean respiratory rate was  $14.20 \pm 1.01$ , while the CG's mean was  $15.93 \pm 0.961$ . These indicate the changes in respiratory rates after the intervention. Both groups had 14 degrees of freedom for their t-test calculations. The t-ratio is included for each group. The KBG's t-ratio is 11.309\*, while the CG's t-ratio is 1.784. Figure 4 represents the mean values of respiratory rate. The t-ratio measures the difference between the means of the two groups relative to the variability within each group and is a critical statistic in determining the significance of the results. The table highlights that the KBG showed a substantial and statistically significant improvement in respiratory rates after the intervention. The t-ratio of 11.309\* for the KBG is notably higher than the critical t-value of 2.080, indicating a significant improvement. On the other hand, the CG's t-ratio of 1.784 is below the critical t-value of 2.080, signifying that the changes in respiratory rates in this group are not statistically significant. Therefore, the control group did not demonstrate a considerable improvement in respiratory rates following the intervention.

**Figure: 1**

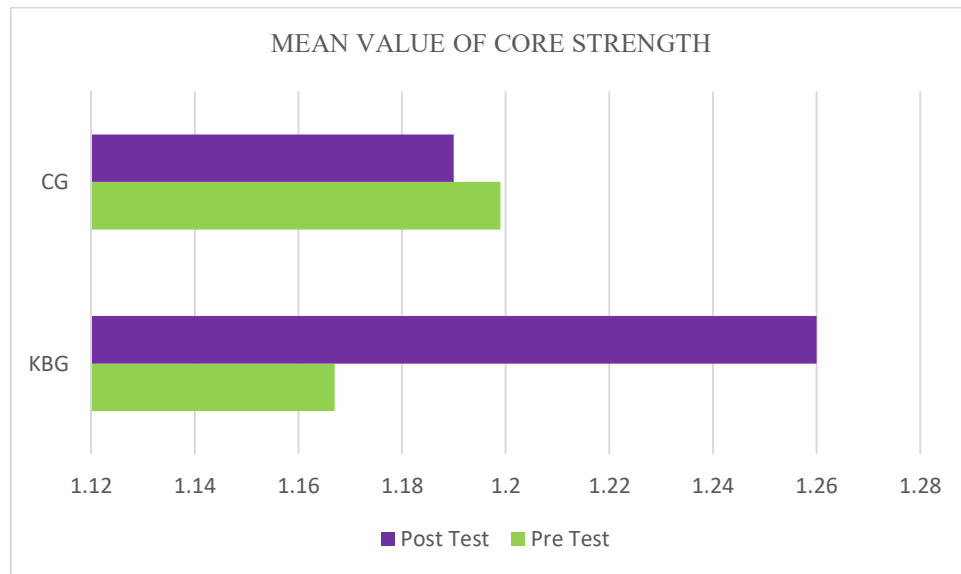


Figure: 2

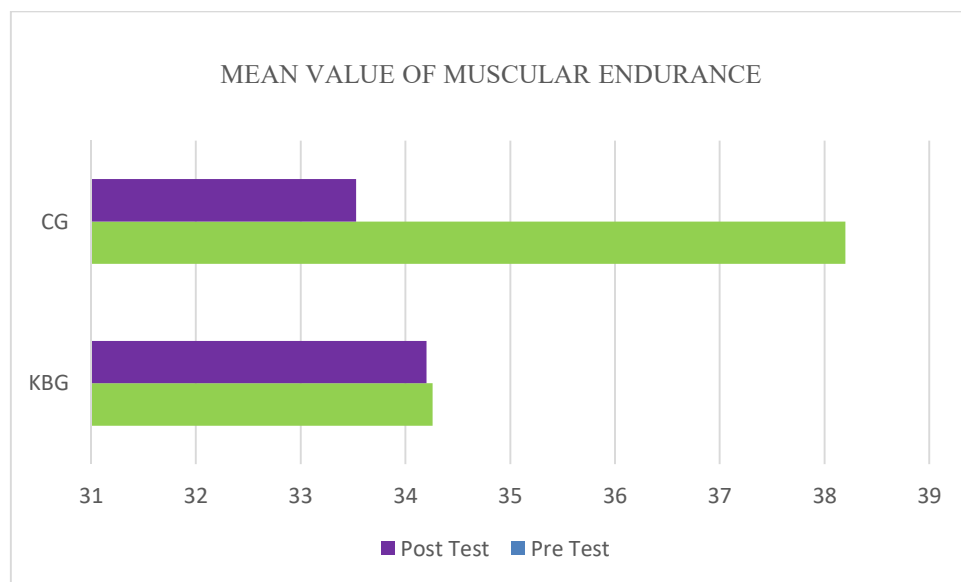


Figure: 3

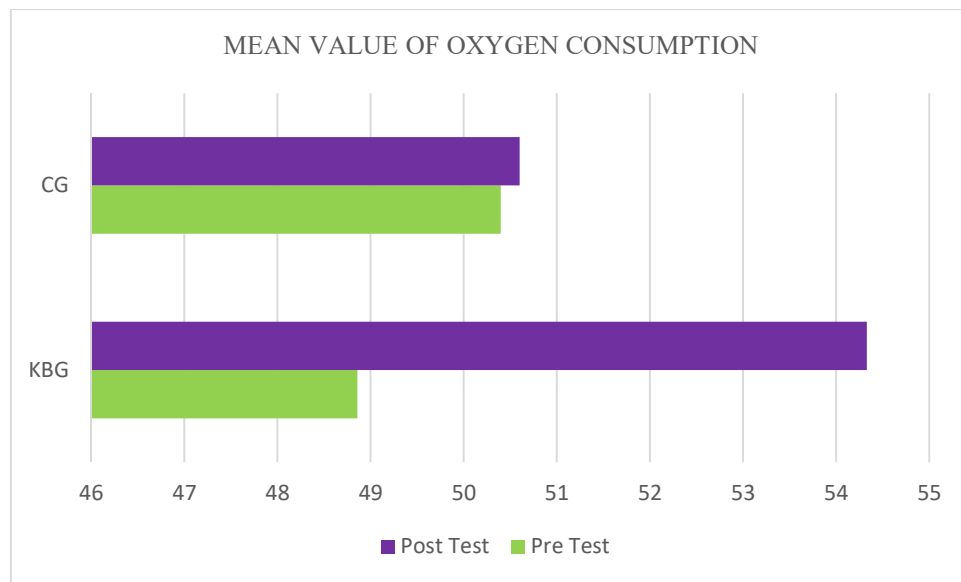


Figure: 4

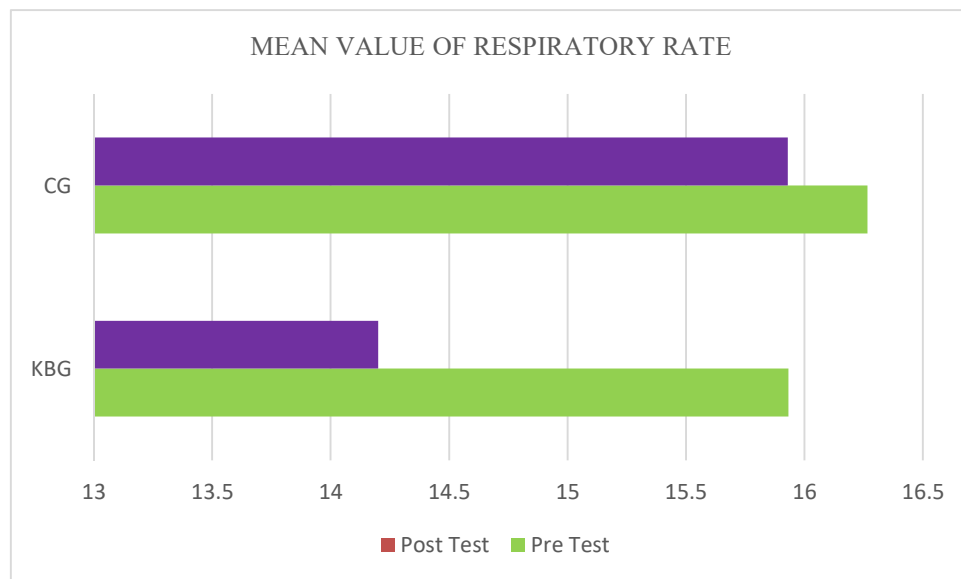


Figure- 1- 4: Pretest and Posttest mean values of the intervention group (KBG) and control group (CG)

Discussion:



The present study provides significant insights into the impact of kettlebell training (KT) on the physiological and physical parameters of female athletes participating in kabaddi. When comparing the intervention group (KBG) that received KT to the control group (CG), which did not get any training, the results demonstrate a substantial improvement in a number of areas. Notable gains were made in the KBG's core strength, which is essential for kabaddi competitors. Additionally, the intervention group showed increased muscle endurance. This indicates that KT benefits kabaddi competitors' physical ability and strengthens their fortitude during games. The KBG revealed a drop in respiratory rate and increased oxygen intake.

The findings highlight KT's potential benefits in enhancing female kabaddi athletes' performance. The KBG experienced improvements in core strength, muscular endurance, oxygen consumption, and respiratory rate. These enhancements contribute to the overall physical and physiological performance of the athletes.

As a control group, however, none of the assessed metrics showed appreciable CG improvements. This supports the idea that KT, rather than natural growth or outside influences, was the primary cause of the KBG advancements. More investigation is required to investigate the long-term impacts of KT on female kabaddi athletes. Developing the best possible procedures for KT implementation in this group is imperative. These results highlight the potential of KT as a valuable technique for improving female kabaddi players' respiratory rate, oxygen intake, muscle endurance, and core strength.

### **Conclusion:**

*The study's findings show that KT can maximize athletes' performance potential. Athletes may hone their talents, overcome obstacles, and reach new heights with focused training methods like kettlebell workouts. This promotes their resilience and general well-being and improves their performance on the field.*

*In conclusion, it has been demonstrated that including KT in the training routines of female kabaddi players may significantly enhance their physical and physiological attributes. The significant improvements in respiratory rate, muscle endurance, core strength, and oxygen consumption highlight the potential advantages of KT for enhancing sports performance. This study creates exciting new research opportunities and allows athletes to grow and become the most*

*excellent versions of themselves in the sports they love, eventually pushing the boundaries of their physical capabilities.*

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