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## Exploring the influence of Pilates training on vital capacity and core abdominal muscular strength in basketball players

**R Naveen and Dr. T Radhakrishnan**

**Abstract**

This study explores the impact of Pilates training on vital capacity and core abdominal muscular strength in college-level basketball players. The importance of these physiological aspects in basketball performance is highlighted, and the potential benefits of Pilates, with its focus on breath control, core engagement, and precise movements, are discussed. The study involved thirty-eight college-level basketball players, randomly divided into an experimental group (undergoing Pilates training) and a control group (no additional training). Vital capacity was measured using a peak flow meter, and core abdominal muscular strength was assessed through a plank test. The Pilates training program spanned twelve weeks, with sessions three times a week. The results show a significant improvement in vital capacity and core abdominal muscular strength in the experimental group compared to the control group. Statistical analysis reveals that the Pilates training program had a substantial impact on these variables. The findings suggest that Pilates exercises, focusing on controlled breathing and core engagement, contribute to enhanced respiratory efficiency and core strength in basketball players. The study concludes that Pilates can be a valuable supplemental training tool for improving vital capacity and core strength in basketball players, potentially influencing on-court performance, endurance, and agility. The authors recommend further research to explore additional possibilities and applications of the Pilates method in basketball training.

**Keywords:** Pilates training, vital capacity, and core abdominal muscular strength

**Introduction**

Basketball demands explosiveness, agility, and unwavering control. Every jump, crossover, and shot hinges on a player's physical prowess. Two crucial elements fuelling this prowess are often overlooked: Vital capacity and core abdominal muscular strength. Vital capacity, the maximum amount of air one can inhale and exhale, directly impacts endurance and oxygen delivery to muscles. Core strength, the foundation of all movement, governs stability, agility, and power transfer. While traditional basketball training prioritizes strength and conditioning, the relationship between vital capacity, core strength, and on court performance remains under explored. This is where Pilates takes center stage. Pilates, with its emphasis on breath control, core engagement, and precise movements, holds promise as a supplemental training tool for basketball players. Its controlled exercises target deep core muscles, promoting stability and power transfer a crucial advantage for explosive leaps and powerful drives. Additionally, Pilates focus on controlled breathing techniques may enhance vital capacity, potentially improving oxygen utilization and delaying fatigue during intense games. This article delves into the emerging science behind Pilates potential impact on basketball performance. The scholar examine the evidence linking Pilates to improved vital capacity and core strength, explore specific Pilates exercises beneficial for basketball players, and analyze the potential impact on key performance metrics like endurance and agility. By unveiling the connection between Pilates, vital capacity, and core strength, we aim to equip basketball players and coaches with a new training frontier. So, take a deep breath, grab your mat, and prepare to explore how Pilates can take your game to the next level, both on and off the court.

## Methodology

The purpose of the study was to explore the influence of vital capacity performance as well as core abdominal muscular strength for college level men basketball players. Thirty-eight college level players were randomly selected, and their age will be ranged between 18 and 25 years. They were divided into two equal groups of nineteen each. No attempts were made to equate the groups. Experimental group I underwent N (19) Pilates training (PT) for a period of twelve weeks, and group II N (19) acted as control group (CG), the subjects in control group were not given any training program other than their regular activity. Vital capacity was assessed by "peak flow meter" and the unit of measurement was in milli-litter (ml), core abdominal muscular strength was assessed by "plank test" and the unit of measurement was in seconds. The parameters were measured at baseline and to post treatment

twelfth week of Pilates training were recorded. The Pilates training program was conducted for 50 minutes for session in a day, 3 days a week for a period of twelve weeks duration. These 50 minutes included 10 minutes warm up, Pilates training practices for 30 minutes and 10 minutes warm down. Every four weeks of training 10% of intensity of load was increased from 65% to 85% of workload. The volume of training prescribed based on the number of sets and repetitions. The collected data before and after training period of twelve weeks on the above said variables due to the Pilates Method practices were statistically analyzed with 't' test to find out the significant improvement between pre and post-test. In all cases the criterion for statistical significance was set at 0.05 level of confidence.

## Results

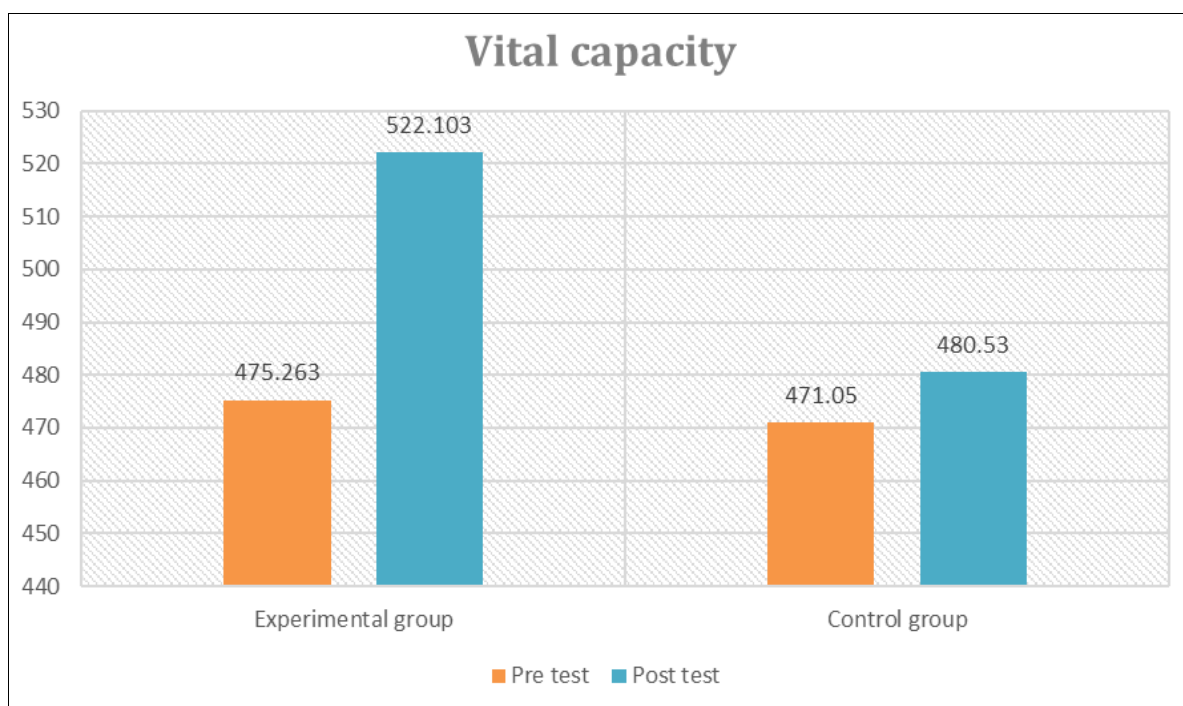
**Table 1:** Computation of 'T' ratio on selected variables of Athletes on experimental group and control group.

Group	Variables		Mean	N	Std. Deviation	Std. Error Mean	'T' Ratio
Experimental Group	Vital Capacity	Pre test	475.263	19	48.690	5.97	7.839
		Post test	522.105	19	52.660		
	Core Abdominal Muscular Strength	Pre test	64.368	19	5.765	0.92	
		Post test	85.105	19	6.911		
Control Group	Vital Capacity	Pre test	471.05	19	50.760	3.008	3.149
		Post test	480.53	19	46.841		
	Core Abdominal Muscular Strength	Pre test	62.736	19	6.234	0.495	
		Post test	63.736	19	5.331		

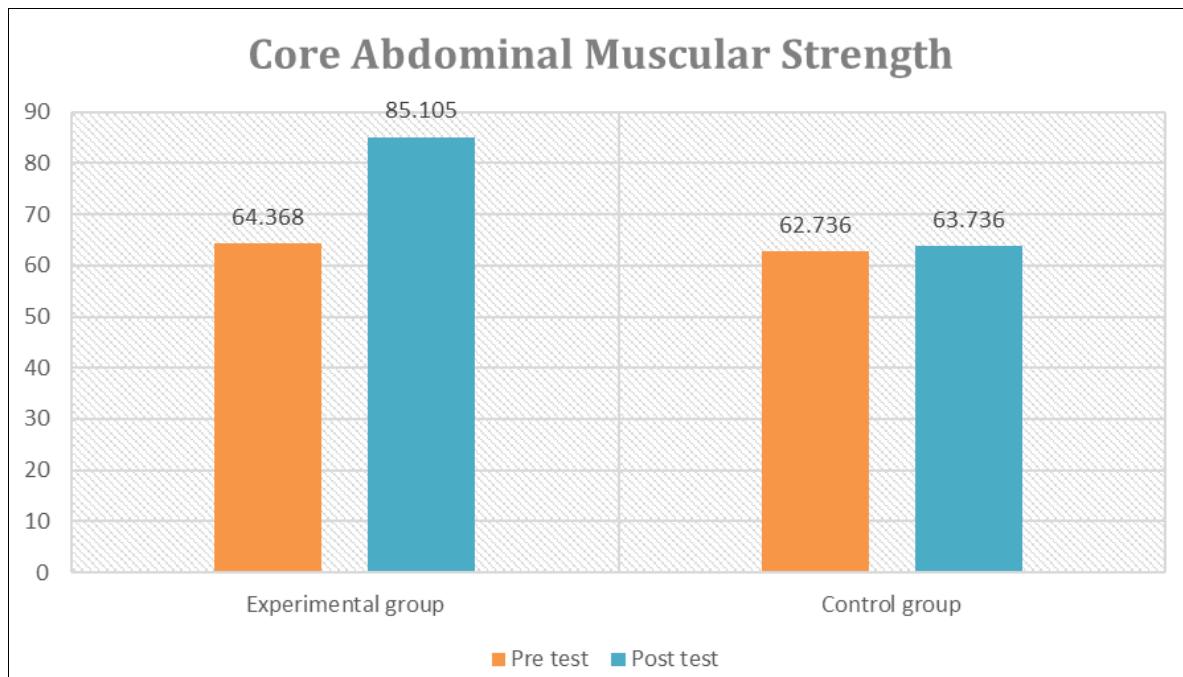
\*Significant level 0.05 level degree of freedom (2.10, 1 and 18)

Table 1 shows the calculations of mean, standard deviation, and "t" ratios for both vital capacity and core abdominal muscular strength in the experimental group. Notably, the "T" values for both parameters (7.839 for vital capacity and 22.532 for core strength) exceeded the critical value of 2.10 at the 0.05 significance level for 18 degrees of freedom. This statistically significant difference indicates that the training program effectively enhanced these fitness parameters in the experimental group.

In contrast, the control group's calculations for vital capacity and core strength yielded "t" values of 3.149 and 2.018, respectively. Since both values fall below the critical value of 2.10, these changes were not statistically significant. This suggests that the training program was the driving force behind the improvements observed in the experimental group. Overall, the data from Table 1 strongly suggests that the training program had a significant impact on vital capacity and core abdominal muscular strength.



**Fig 1:** Bar diagram showing Experimental group and control group of athletes on vital capacity



**Fig 2:** Bar diagram showing Experimental group and control group of Athletes on Muscular strength endurance.

### Discussion and Finding

The present experiment study was to explore the influence of Pilates training on vital capacity as well as core abdominal muscular strength for basketball players. Pilates exercises play a crucial role in optimizing the respiratory system and supporting the intricate process of oxygen exchange and carbon dioxide elimination. The diaphragmatic breathing techniques incorporated in Pilates contribute to the efficiency of the respiratory muscles. During Pilates inhalation exercises, the diaphragm descends, and rib muscles expand the chest cavity, facilitating the intake of oxygen into the lungs. This aligns with the natural breathing process described, enhancing the overall functionality of the respiratory system. As individuals engage in Pilates, the rhythmic breathing promotes the expansion and contraction of the chest cavity, aiding the alveoli in filling with air. The focus on controlled movements enhances diaphragmatic function and rib cage mobility, contributing to a more effective exchange of gases in the lungs. Furthermore, Pilates emphasizes core strength, including muscles around the abdomen and ribcage. Strengthening these muscles supports the chest wall during exhalation, aiding the expulsion of air from the lungs. In the broader physiological context, Pilates complements the respiratory process by promoting enhanced oxygen intake, improved circulation, and efficient removal of carbon dioxide. The synchronized movements align with the body's natural respiratory mechanics, creating a holistic approach to respiratory health within the framework of Pilates exercise. The result of the present study indicated that the Pilates training practices improved the variables such as vital capacity and core abdominal muscular strength. The findings of the present study had similarity with the findings of the investigations referred in this study. The Pilates Method took the name Contrology because its creator Joseph Pilates believed that we should have a conscious control of our body movements (AWC Barbosa *et al.*, 2015) <sup>[1]</sup>. Breathing control is central during the execution of Pilates Method exercises, where the expert learns how to breathe properly as an essential part of each exercise through forceful exhaling followed by complete inhaling. Thus, adequate breathing aids in controlling movements. The (DA Hackett *et al.* 20132),

showing a greater lung function in athletes when compared with sedentary individuals. People who perform physical activities regularly present greater respiratory endurance (Martin BJ, and Stager JM, 1981) <sup>[3]</sup>, as well as superior lung volume and inspiratory and expiratory flow rates than the general population. The Pilates Method is a comprehensive conditioning method that embraces six fundamental and interrelated principles: Centering, concentration, control, precision, breathing and movement flow (JE Muscolino and S Cipriani, 2004) <sup>[4]</sup>. The aims of Pilates training are the improvement of general body strength and flexibility, with an emphasis on the core, good posture and alignment and breathing coordination with movement. Pilates, which is a body/mind training regime involving a variety of exercises for core stability, muscular strength, flexibility, attention to muscle control, posture, and breathing (De Almeida Fagundes & B Gorges, 2015) <sup>[5]</sup>.

### Conclusion

It is concluded with the present study that training protocol in the Pilates training applied by the researchers was able to improve vital capacity and core abdominal muscular strength of sub-20 basketball players. Such program presented acute effects, represented by the statistically significant increase of vital capacity and core muscular strength in the post-immediate.

Therefore, the Pilates method behaved as a useful tool in the increase of vital capacity and core muscular strength of basketball players of this condition, both due to the sports modality they practice and by the dynamic cycle. It is hence an important alternative in the prevention as well as recovery of injuries triggered by the lower intensity exercises. Further studies should be conducted with the Pilates method in order to elucidate all the possibilities.

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