

## REVIEW OF THE EFFECTS OF CORE MUSCLE EXERCISES ON SUBCUTANEOUS FAT PERCENTAGES OF BADMINTON PLAYERS

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### Abstract

Badminton involves jumping to reach a shuttle at the highest possible point when descending for a better stroke, such as in a smash and drop shot. Hence, the body weight has to be lifted repeatedly against gravity, and extra mass in the form of fat would be a disadvantage. Moreover, fat tends to be localized in the trunk and lower body segments. It has been established that an excess percentage of body fat is detrimental to health, and that the percentage of body fat required for excellence in performance differs from sport to sport and between males and females. Core muscle exercises strengthen the abdominal muscles, back muscles and the muscles around the pelvis. To increase the efficiency of physical activities, one must strengthen the core muscles. A stable and strong midsection can improve posture and balance. The present study was conducted to assess the impact of core muscle exercises on subcutaneous fat percentage of badminton players. To achieve this purpose, twenty five badminton players were included in the study, whose age ranged from 17-21 years. The subjects were given selected core muscle own-body-weight exercises without any equipment, including ten different pilates exercises with 20 sec break in between. The subjects underwent this training for six days in a week continuously for four weeks. The subcutaneous fat ratios in the arms, trunk, legs and whole body were measured before and after training. The obtained pre- and post-test data were statistically analyzed using a t-test. The results showed significant differences in the subcutaneous fat percentage in the arms, trunk, legs and body of the badminton players.

*Keywords:* Core muscle, subcutaneous fat, visceral fat, badminton players, pilates exercise

## **Introduction**

Badminton involves jumping to reach a shuttle at the highest possible point when descending for a better stroke, as in a smash and drop shot (Huang et al., 2014). Hence, the body weight has to be lifted repeatedly against gravity, and extra mass in the form of fat would be a disadvantage. Moreover, fat tends to be localized in the trunk and lower body segments. It has been established that excess body fat is detrimental to health, and that the percentage of body fat required for excellence in performance differs from sport and between males and females (Schwimmer et al., 2003 & Mascherini et al., 2017).

The subjects selected for this study included badminton players pursuing an engineering course. In the Indian education system, after completion of SSC – X class schooling, they will enter into the intermediate, which is of two years study. During this course of time, they will be concentrating only on studies and undertake little physical activity. As this is the deciding stage of their future, whether to enter into the engineering, medicine, agriculture, pharmacy, dental or other bachelor's degree courses, students tend to put on weight due to lack of physical activity and stress, which hinders performance (Pelletier, Lytle, & Laska, 2017, & Serlachius, Haneer, & Wardle, 2007). Studies reveals that exercise is one of the most important and common components of weight loss and weight management programs (Dietz, 2004). Aerobic exercise has been shown to increase the likelihood of body weight management (Lehri and Mokha, 2006) Progressive resistance training has been shown to be effective in decreasing abdominal subcutaneous and visceral fat (Ibanez et al., 2005). Therefore, training, especially aerobics and resistance, has a positive effect on weight management by decreasing fat percentage in the body. Exercises efficiency will increase by decreasing the fat and strengthening the core muscles.

The core is made up of many muscles, including the rectus abdominis, transverse abdominis, erector abdominis, erector spinae and the internal and external obliques. Since various combinations of muscles are involved, the one which works on those is the efficient core exercises. Core stability is defined in athletic setting as the optimum production, which can transfer and control force from the center of the body to the limbs, through stabilization of the position and motion of torso (McGill, 2001 & Zemková, 2015). Core stability exercises are an essential fitness component of badminton players during smashing the shuttlecock through the game.

Core muscle exercise has a significant effect on the subcutaneous fat percentage of engineering college badminton players. Core strength training plays an important role in badminton sport. It can enhance stability of the players in terms of the movement of the spine and pelvis. Therefore, the athletes can improve the work efficiency, coordination output and cohesion of upper and lower limbs connecting and injury prevention (Wang & Li, 2007). Subcutaneous fat varies from training and in terms of gender and assessment technique (Kostek, 2007). Hence, the present study was envisaged to understand core muscle exercises' effect on subcutaneous fat among engineering college men badminton players.

## **Methodology**

The aim of the study was to determine the effect of core muscle exercise on subcutaneous fat percentage among engineering college badminton players. As India is popular in badminton and Hyderabad city is a hub, most of the students are fascinated with indoor badminton. The engineering college students consider badminton to be a major game. Hence, this study has been conducted with subjects who play badminton.

### *Subjects*

25 college men students were randomly selected from engineering colleges, in Hyderabad, Telangana. Their ages ranged from 17 to 21 years. The five best badminton players were chosen from five colleges, for a total of 25 students. The inclusion criteria included subjects that have represented their college in intercollegiate badminton tournaments during their course of study.

### *Selection of variables*

The subcutaneous fat percentages of the subjects were measured in the arms, trunk, legs and whole body using the Omron HBF 375 Karada Scanner before and after training.

### *Procedures*

The subjects were informed of the purpose of the training and the importance of core muscle exercises. All the subjects wholeheartedly cooperated with this study. During training, ten core muscle exercises were performed at one minute each and with twenty seconds' break between each exercise. This was performed for three sets. The ten core muscle exercises included the butterfly sit up, high to low boat, hallow hold to jackknife, side bend, plank, leg raise, flutter kicks, toe touch crunches, leg pulls and toe taps. This training was continued for 6 days in a week with one session per day for four weeks. Each session started with a warm-up and ended with limbering (cool) down.



**Figure 1:** Experiment was conducted on a subject

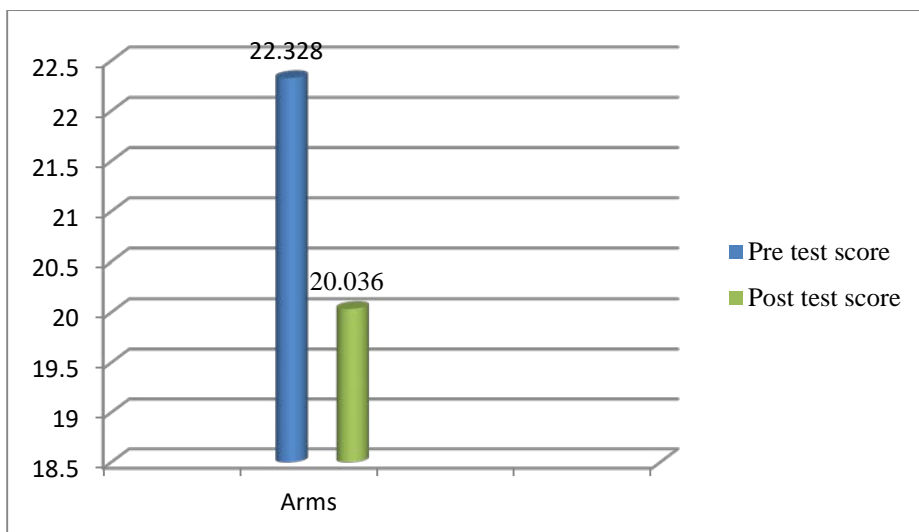
**Analysis and interpretation**

Before training, a pretest was conducted for the subcutaneous fat percentage of the subjects with the scanner and after the training post test were conducted. The test scores were statistically analyzed.

**Table 1:** Pre and Post test results of the subcutaneous fat percentage of the badminton players.

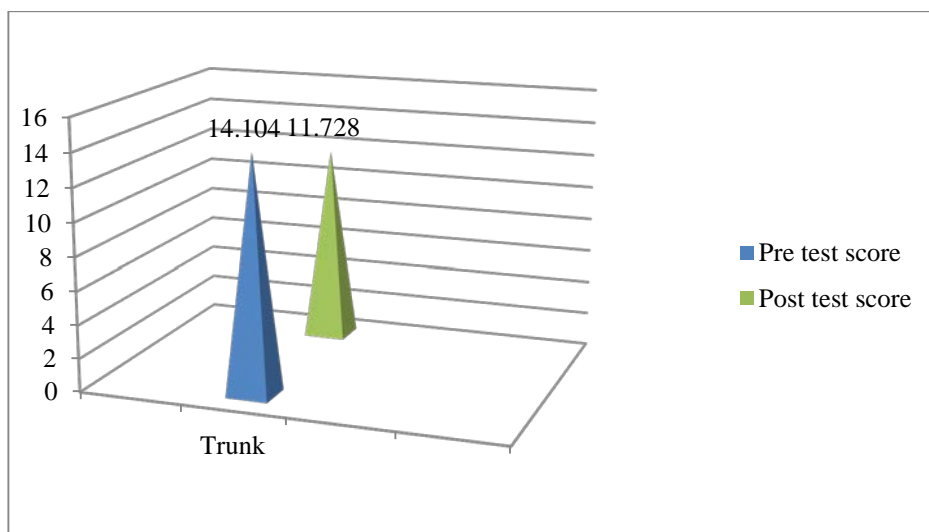
Subcutaneous fat region	Test	Mean	SD	t-value	P-value
Arms	Pre-test	22.328	4.8215	41.69	0.0001
	Post-test	20.036	4.8965		
Trunk	Pre-test	14.104	3.3990	2.49	0.0161
	Post-test	11.728	3.3329		
Legs	Pre-test	22.252	5.7441	35.55	0.0001
	Post-test	19.952	5.6928		
Whole Body	Pre-test	16.068	4.1535	2.52	0.0150
	Post-test	13.148	4.0318		

Significance at 0.05 level



**Figure 2:** The pre- and post-test mean values of the subcutaneous fat percentage in the arms.

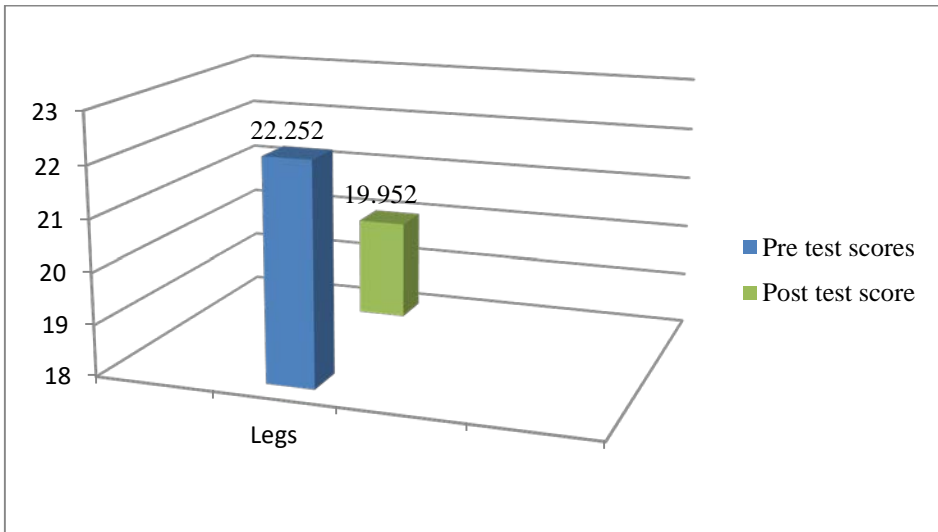
From Table 1, it is clear that the mean value of the subcutaneous fat at arms before training was 22.32; after training was 20.036; and the t-value was 41.69, as shown in Figure 2. Hence, there is a significant difference between the pre- and post-test results in relation to the subcutaneous fat of the badminton players in the arms.



**Figure 3:** The pre- and post-test mean values of the subcutaneous fat percentage in the trunk.

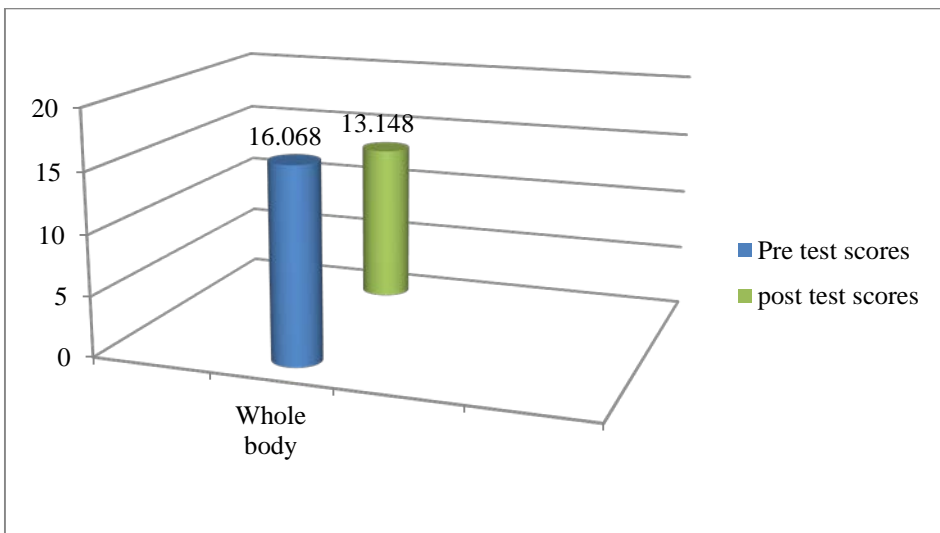
It is clearly depicted in Table 1 that the pre- and post-test scores with respect to their subcutaneous fat percentage in the trunk were 14.104 and 11.728, respectively. The

same is clearly shown in Figure 3. Also, the t-value is 2.4956 is significant at 0.05 level of significance.



**Figure 4:** The pre- and post-test mean values of the subcutaneous fat percentage in the legs.

From the Table 1, it is clear that the mean values of the subcutaneous fat at Legs before training is 22.252, after training is 19.952 and the t value is 35.55. The same is depicted in Figure 4. Hence there is significant difference between the pre and post test results in relation to the subcutaneous fat of the badminton players at Legs.



**Figure 5:** The Pre and Post mean values of the subcutaneous fat percentage at whole body of the players.

It is clearly depicted in Table 1 that the pre and post test scores with respect to their subcutaneous fat percentage for whole body is 16.068 and 13.148 respectively. The same is clearly shown in Figure 5. Also the t value is 2.5222 is significant at 0.05 level of significance.

## **Result and discussion**

The hypothesis has been accepted. A significant effect was found for core muscle exercise on the subcutaneous fat percentage of the engineering college badminton players. The core muscle exercises will decrease fat percentage and improve muscle strength.

The study was performed to determine whether there were any significant differences between the pre- and post-core muscle exercise training with respect to subcutaneous fat percentage at various areas of the body in the engineering college badminton players. After four weeks of core muscle exercise training, there were significant differences in subcutaneous fat percentages in all the four regions, i.e. the arms, trunk, legs and whole body. The fat percentage of the body will hinder the performance of the players by restricting flexible movements, quick action and continuing the game with endurance. Core muscle exercises will decrease the body fat. A main aim of a healthy sport is to decrease the fat percentage and increase the muscle percentage by the training. At an outset, this leads to improvement in the performance of the players.

## **Conclusion**

Based on the analysis of the results and the discussions of findings on this study, the selected core muscle exercise intervention decreased the subcutaneous fat percentage of the badminton players. There was a significant effect on the subcutaneous fat percentage caused by improving core muscle strength.

## **Recommendations**

The following recommendations are in light of the present study's findings.

1. Core muscle strength is important for better performance in all games. Hence, core strength training may be incorporated into any fitness plan.
2. Since the change towards wellness and positive lifestyle is the result of the modified behavior, as made possible through the learning process, the theoretical aspects of physical fitness, exercise science and sports science may also form curricular aspects in technological colleges.
3. Similar studies may be performed by extending the horizons of the study to include other training methods for core strength for different games.

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