



Differences in Body Composition of Female Soccer Players at Different Positions

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Abstract

INTRODUCTION: Percent body fat (%BF) can be measured in many ways. Bioelectrical impedance analysis (BIA) is one accepted way. This uses the relation of fat mass to lean mass in the body. A low level electrical current is sent through the body. The flow of the current is affected by the amount of water in the body. Body mass index (BMI) is another way to measure body composition. BMI is calculated by using the equation weight in kilograms divided by height in meters squared. Waist to hip ratio is also a measurement that can be used for body composition. This is measured by taking the circumference of the waist and circumference of the hip and then finding the ratio. Skinfolds are a very acceptable way of measuring body fat percentages because 50% of the body fat is subcutaneous, which can be measured by the calipers used when taking skinfold measurements. Skinfolds are measured by choosing either three or seven site test and then measuring the amount of body fat in that area in millimeters by using the calipers and putting all of those numbers into a specific formula to obtain the percent body fat. Depending on the position played during a soccer game, there may be a difference in body composition due to training techniques and game participation. Research shows that defensive players have a higher percent body fat than offensive players.

PURPOSE: The purpose of this study was to evaluate the difference of body composition of female soccer players at different positions.

METHODS: Twenty women (age 27.8 ± 7.51 yrs), ten offensive soccer players (O: age 27.4 ± 8.78) and ten defensive soccer players (D: age 28.2 ± 6.44) volunteered to participate in this study. Height and weight of each subject was collected. Each subject had body composition assessed by seven site skinfolds (triceps, chest, suprailliac, midaxillary, subscapular, abdominal, and thigh). To perform a skinfold, a fold of skin is held between the thumb and forefinger, about 1 cm above the landmark. Then the jaws of the skinfold calipers were applied to the fold and the spring handles released fully. When the pointer on the dial has steadied, the measurement in millimeters was read and recorded. The measurements were all be taken on the right side and was repeated a second time. Each subject also had a waist to hip ratio measured. This was measured by taking the circumference of the hips and waist and calculating a ratio. The subjects then used a hand held bioelectrical impedance analysis (BIA), which gives a reading of body fat percentage. This reading also gave a calculated body mass index (BMI). Once all the data was collected, a two tailed *t*-test was run to determine the significance of the findings. The level for significance was set at $p \leq 0.05$.

RESULTS: The average height for the offensive players was 25.72 ± 1.15 in and 25.88 ± 0.73 in for the defense. The average weight for the offense was 57.02 ± 6.42 kg and 73.86 ± 15.50 kg for the defense. The %BF calculated from the seven skinfold sites was $18.98 \pm 2.62\%$ for the offense and $25.57 \pm 5.87\%$ for the defense, which had a statistically significant difference ($p = 0.02$). The BIA read from the handheld device was $18.13 \pm 4.32\%$ for the offense and $27.54 \pm 8.21\%$ for the defense, which had a statistically significant difference ($p = 0.03$). The body mass index (BMI) calculated was 20.41 ± 1.92 for the offense and 26.11 ± 5.52 for the defense, which also had a statistically significant difference ($p = 0.02$). The waist to hip ratio measured was 0.71 ± 0.036 for the offense and 0.76 ± 0.058 for the defense. This trended towards a significant difference ($p = 0.07$).

CONCLUSION: The results of this study indicate that defensive players have a higher percent body fat overall when compared to offensive players. These differences may be further attributed to age, activity level, or possible training techniques.

Purpose

The purpose of this study was to evaluate the difference of body composition of female soccer players at different positions.

Methods

Twenty women (age 27.8 ± 7.51 yrs), ten offensive soccer players (O: age 27.4 ± 8.78) and ten defensive soccer players (D: age 28.2 ± 6.44) volunteered to participate in this study. Height and weight of each subject was collected. Each subject had body composition assessed by seven site skinfolds (triceps, chest, suprailliac, midaxillary, subscapular, abdominal, and thigh). To perform a skinfold, a fold of skin is held between the thumb and forefinger, about 1 cm above the landmark. Then the jaws of the skinfold calipers were applied to the fold and the spring handles released fully. When the pointer on the dial has steadied, the measurement in millimeters was read and recorded. The measurements were all be taken on the right side and was repeated a second time. Each subject also had a waist to hip ratio measured. This was measured by taking the circumference of the hips and waist and calculating a ratio.

Methods (cont'd)

The subjects then used a hand held bioelectrical impedance analysis (BIA), which gives a reading of body fat percentage. This reading also gave a calculated body mass index (BMI). Once all the data was collected, a two tailed *t*-test was run to determine the significance of the findings. The level for significance was set at $p \leq 0.05$.

Results

The average age for the offensive players was 27.4 ± 8.78 years and 28.2 ± 6.44 years for the defensive players. The average height for the offensive players was 25.72 ± 1.15 inches and 25.88 ± 0.73 inches for the defense. The average weight for the offense was 57.02 ± 6.42 kilograms and 73.86 ± 15.50 kilograms for the defense. These demographics can be found in Table 1. The percent body fat calculated from the seven skinfold sites was $18.98 \pm 2.62\%$ for the offense and $25.57 \pm 5.87\%$ for the defense, which had a statistically significant different ($p = 0.02$). This information is pictured in Figure 1. The BIA, which was read from the handheld device, was $18.13 \pm 4.32\%$ for the offense and $27.54 \pm 8.21\%$ for the defense, which also had a statistically significant different ($p = 0.03$). This information is pictured in Figure 2. The calculated BMI was 20.41 ± 1.92 for the offense and 26.11 ± 5.52 for the defense. This also had a statistically significant difference ($p = 0.02$). This information can be seen in Figure 3. A waist to hip ratio was also recorded. This measurement was 0.71 ± 0.036 for the offense and 0.76 ± 0.058 for the defense. This trended towards a significant difference ($p = 0.07$). The waist to hip ratio information can be seen in Figure 4.

Table 1: Demographics of Offensive and Defensive Players

	Age (years)	Height (inches)	Weight (kilograms)	%BF by Skinfolds
Offense	27.4 ± 8.78	25.75 ± 1.15	57.02 ± 6.42	18.98 ± 2.62
Defense	28.2 ± 6.44	25.88 ± 0.73	73.86 ± 15.50	25.57 ± 5.87

Results (cont'd)

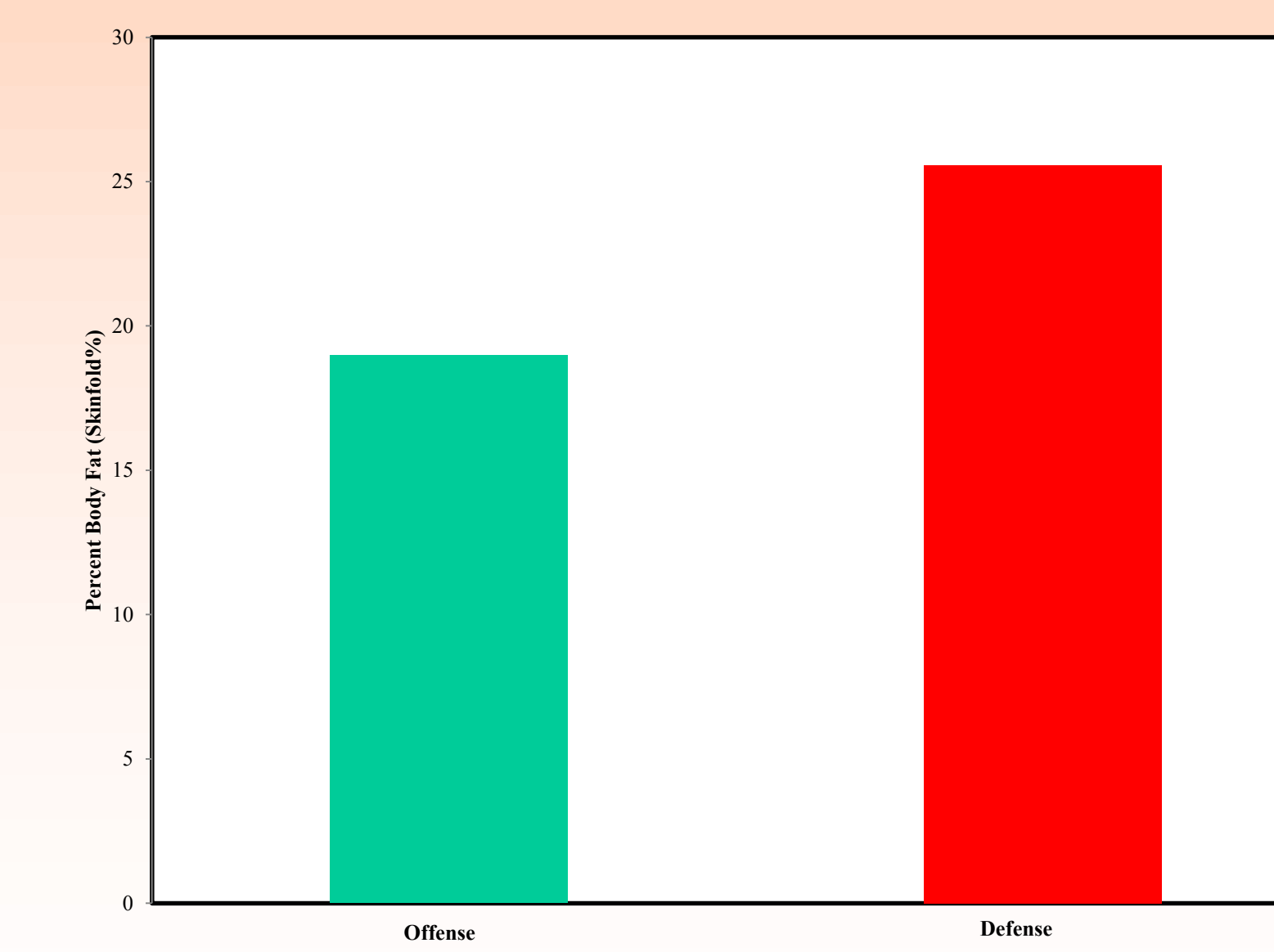


Figure 1: Percent Body Fat Determined By Skinfolds When Comparing Offense And Defense

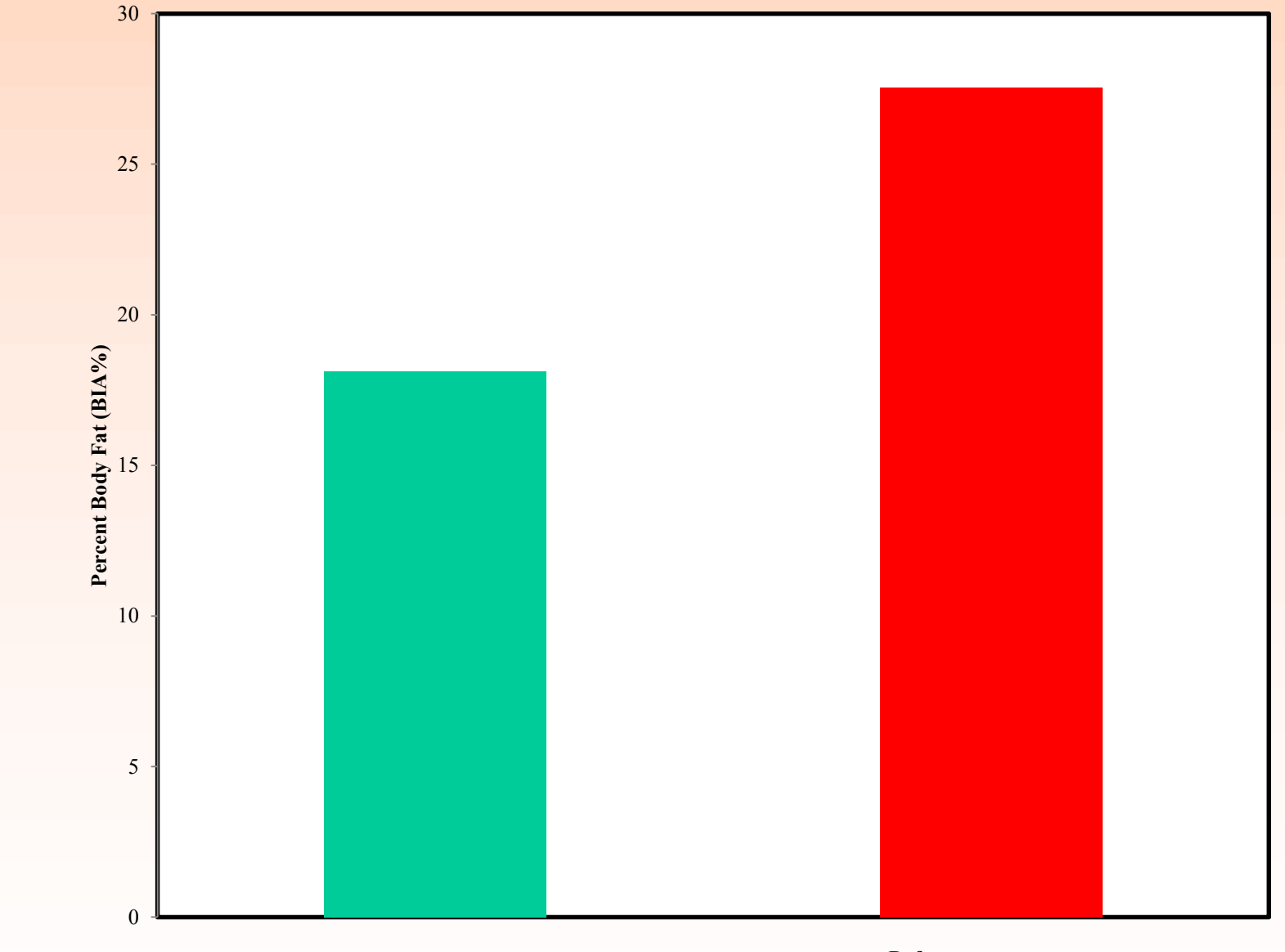


Figure 2: Percent Body Fat Determined By BIA When Comparing Offense And Defense

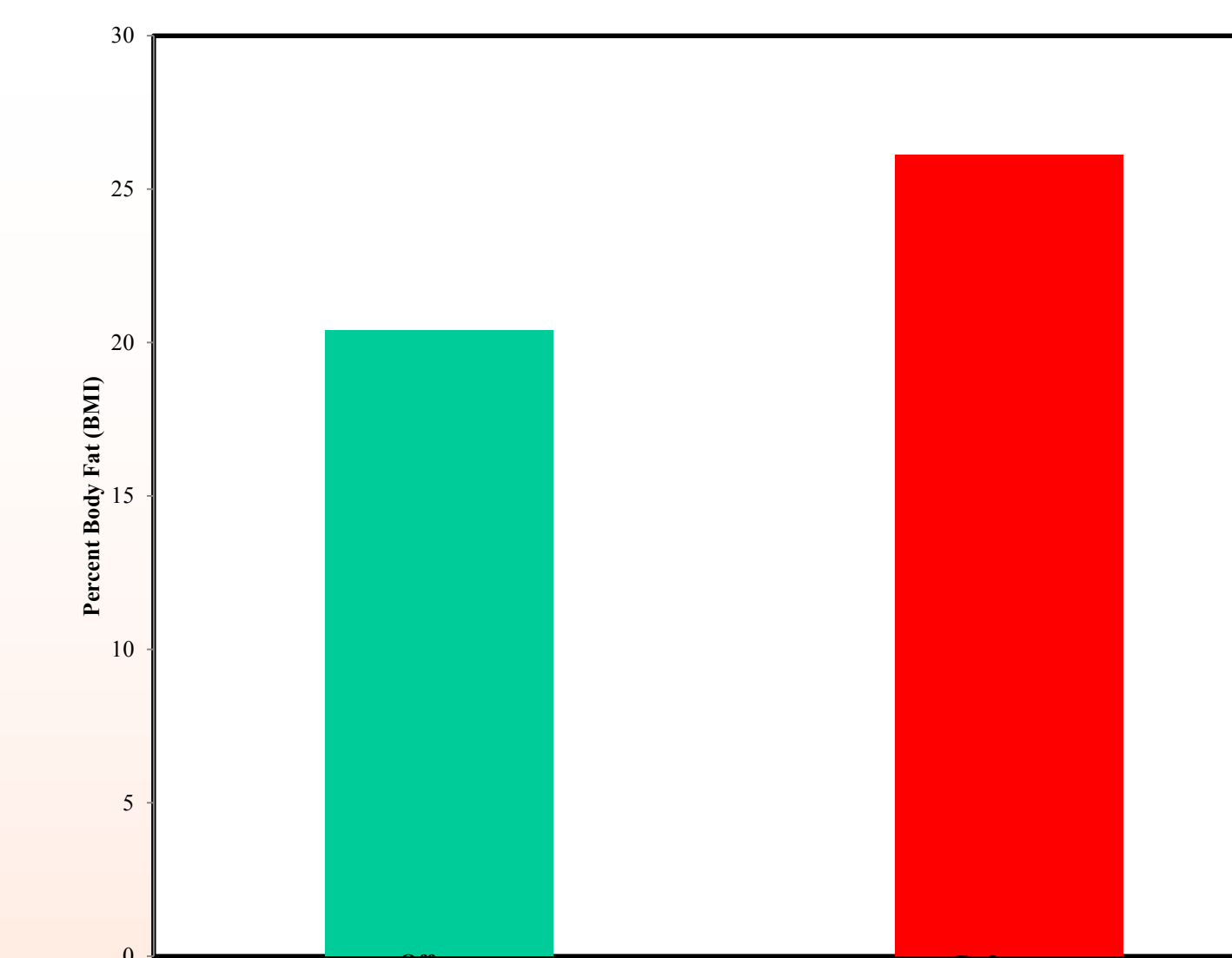


Figure 3: Percent Body Fat Determined By BMI When Comparing Offense And Defense

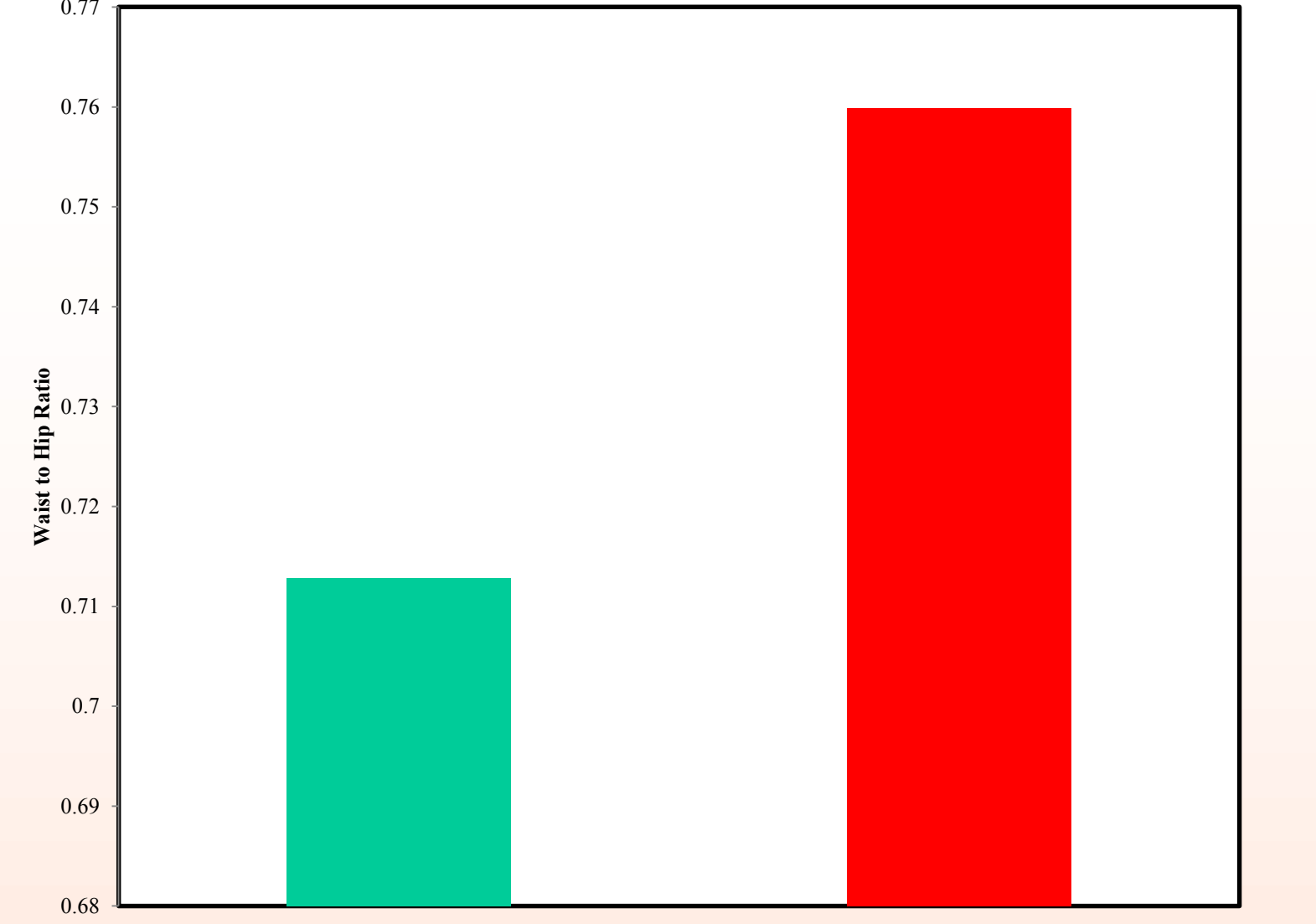


Figure 4: Waist To Hip Ratio When Comparing Offense And Defense

Conclusions

The results of this study indicate that defensive players have a higher overall body composition of fat mass when compared to offensive players. This was found though skinfold measurements, bioelectrical impedance analysis, and body mass index. These statistical differences were significant when compared between offense and defense on all three measurements. Waist to hip ratio was also measured. This statistical difference approached a significant difference between offense and defense. These differences may be further attributed to many different characteristics such as age, training techniques, or daily activity level.