Body Composition Changes in Female Collegiate Soccer Athletes From Preseason to Postseason

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Abstract
Preseason studies have suggested that percent body fat (%BF) and lean mass do not change from pre- to postseason in female collegiate soccer athletes. There are few changes may be seen in athletes competing in other sports. PURPOSE: To document changes from preseason to postseason in body mass (BM), %BF, lean body mass (LBM), and total body water (TBW) of female division I collegiate soccer athletes.METHODS: Twenty-four healthy, female collegiate soccer athletes (age 19.6 ± 1.2, height 1.66 ± 0.05 m, mass 62.05 ± 4.6 kg) from a competitive NCAA Division I women’s soccer program volunteered for this study. Data were collected over the course of the single season. The independent variable was time period (preseason vs. postseason). The dependent variables were: body mass, %BF, fat distribution, and lean mass.

Design: A repeated measures, non-randomized experimental design was used to study changes in anthropometric measurements over the course of a single season. The single independent variable was time period (preseason vs. postseason). The dependent variables were: body mass, %BF, fat distribution, and lean mass.

Results: Descriptive statistics for each anthropometric variable by time is presented in Table 1. No differences were found between preseason and post-season measurements, respectively, for body mass (62.05 ± 61.13 kg; t(23) = 2.29, P = 0.03), lean body mass (46.84 ± 45.57 kg; t(23) = 1.65, P = 0.05), LBM (61.75 ± 66.12; t(23) = 1.44, P = 0.05), and %BF (24.38 ± 25.25; t(23) = 1.79, P = 0.05, table 2). There were differences in skinfold thickness measurements: suprailliac (19.5 ± 16.8 mm; t(23) = 2.05) and supraacromial (15.98 ± 17.70 mm; t(23) = 2.57, P = 0.05, table 2) assessment sites. The covariates of field position was a significant factor in the changes noted in trips [F(1, 22) = 1.2, P = 0.47] and suprascapular [F(1, 22) = 0.55, P = 0.47] thickness (table 2).

Introduction
Body composition (BC) is an effective indicator of the physical fitness and overall health of an athlete. Excess body fat is detrimental and fat-free mass (FFM) is beneficial for athletic performance. Preseason studies have suggested that percent body fat (%BF) and lean mass do not change from pre- to postseason in female collegiate soccer athletes. There are few changes may be seen in athletes competing in other sports. For example, it has also been shown that lower percent body fat (%BF) is related to better sprint performance (8), and fat free mass contributes to the production of power during high-intensity activities and provides greater absolute strength (3). Excess %BF serves as dead weight in activities such as running and jumping, during which the body mass must be repeatedly lifted against gravity.

The typical collegiate soccer athlete spends multiple hours per week conditioning, strength training, practicing, and competing in games throughout the competitive season (6). It is common for elite female soccer players to complete several training sessions per week, covering distances of 4-7 km per session (5). In one study of elite female soccer players, %BF was reported to be in excess of energy intake (5). This would increase the risk of decreased energy availability and subsequent metabolic, reproductive, and bone-related changes. A negative energy balance could lead to a decrease in lean mass.

Several athletes have examined pre-season to postseason BC changes in female soccer athletes (1,10). Most pre- to postseason investigations have shown %BF and FFM to be constant from pre-season to postseason (1,10), even though BC changes are seen in other women’s sports (10). However, some studies have reported the loss of lean mass during the competitive soccer season (6). This could be indicative of a negative energy balance.

The purpose of this study was to document changes from pre- to postseason in body mass, %BF, fat distribution, and lean mass in female collegiate soccer athletes using readily available skinfold measures.

Methods
Subjects: Twenty-four healthy, female athletes (age 19.6 ± 1.2, height 1.66 ± 0.05 m, mass 62.05 ± 4.6 kg) from a competitive NCAA Division I women’s soccer program volunteered for this study. The study protocol was approved by Institutional Review Board at Florida Gulf Coast University.

Procedures: Participants were screened at the beginning of their organized conditioning season in August (preseason) and again in December after the end of their competitive season (postseason). The following anthropometric measures were obtained: height, mass, and skinfold thickness taken at the pectoral, abdominal, and anterior thigh sites. The sum of the skinfolds was used to estimate percent body fat (%BF) for the entire body using Durnin’s formula. In females, %BF ranged from 15.98 ± 17.70 mm; t(23) = 2.57, P = 0.05, table 2) assessment sites. The covariates of field position was a significant factor in the changes noted in trips [F(1, 22) = 1.2, P = 0.47] and suprascapular [F(1, 22) = 0.55, P = 0.47] thickness (table 2).

Discussion
The pre-season body composition characteristics of these groups were similar to those reported by other investigators (1,10,6,16). It is common for elite female collegiate athletes to experience significant changes in body mass, %BF, or lean mass from pre- to post-season. When the researchers controlled the analysis for age and field position, the results were not influenced. In general, females demonstrate an increase in fat mass and %BF in their 20s (4). The female soccer athletes in this study and others had a lower %BF than average female athletes. The female athletes in this study may be more athletic and physically active before beginning college and showed no significant change in %BF during the competitive season.

Conclusion
The results of this and similar studies must be interpreted with caution. There are differences in BC methods used to assess BC variables. Different measurement techniques can yield different results (6,10). Many studies with college female athletes have used hydrostatic weighing, but these are more inaccurate and time consuming than DXA. The negative of these techniques include the required equipment and increased difficulty of collecting repeated measures of individual athletes across time. Monitoring individual and team body composition at various points during the season is useful for athletes, coaches, and athletic trainers. The aim of this study was to document changes in body composition for female collegiate soccer athletes should be in the healthy normal range with a lower %BF than the student population at preseason. %BF should not change significantly throughout the competitive season. %BF should be measured at least twice per season. This could be indicative of a negative energy balance.