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Comparison of body fat percentage of u21 soccer teams of Bhutan, Bangladesh and inter-university team of India

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Abstract
The Body fat percentage (BF%) is a factor contributing to the soccer performance and athlete health. Body fat percentages have been widely studied in soccer, with its impact in playing performance of athlete observed over time. However, a paucity of current data exists in comparing body fat percentage among different national and university athletes playing soccer. The purpose of this descriptive study was to compare Body fat percentage among three different soccer teams. A total of 33 athletes from 3 different countries participated: Bhutan (n=11), Bangladesh (n=11) and Inter-university team from India (n=11). Body Height (BH) and Body Mass (BM) were measured using stadiometer and caliberated digital scale, respectively. Body Fat Percentage (BF%) was assessed using Bio-electrical Impedance Analysis (BIA). One -way analysis of variance (ANOVA) was used to assess difference among the teams. Least Squares Difference (LSD) post hoc analysis were performed when a significant finding (p≤0.05) was identified. Bhutan team had the lowest BF% (7.30±1.84) in comparison to Bangladesh team (8.57±1.87) and Inter-university team of India (10.05±1.38). Assessment of body composition is an important component of an ongoing monitoring of athletes interested to improve soccer performance. These data may assist in the establishment of descriptive values for use in goal setting and exercise programming.

Keywords: Fat percentage, Bio-scan 916 and impedance

Introduction

The body composition is a factor contributing to the soccer performance. The body composition varies with age and sex are the desirable body composition athletes can vary depending on the sport, training load and energy intake. Professional and amateur athletes care about body fat for aesthetic and health reasons and perhaps, most importantly to gain a competitive edge. The physiological composition of the athletes is also important in the preparation of players for competitive performance. The measurement of body composition provides additional information for counseling clients on diet and exercise programs. If the percentage body fat is known, it is possible to calculate the desired weight: Desired weight = current weight - [(current weight x (% fat/100)] / [1.00 - (ideal % fat/100)] (Jackson & Pollock, 1985. Optimal percentage body fat varies with the goal of the client. For example, an athlete's optimal percentage fat could depend on his or her particular sport. For the average person, the acceptable ranges for body fat are fairly broad: 12-25% for men, 18-30% for women (Henson, 1988. Many methods of body composition analysis have been developed such as hydrostatic weighing, total body water, determination by isotope dilution, computed tomography, and measurement of total body potassium. In the game of soccer, where excess adipose tissue acts as a dead weight, it not only can lead to the effect on energy expenditure but also hampers the ability of the body to lift repeatedly against gravity. The several published studies exist in which body composition was measured between different soccer teams also considered substitution player samples, which makes it difficult to analyse the actual impact of body compositions on the main playing members of a team which consists of 11 players. Therefore, the additional research is needed to expand on previous findings involving the impact of body composition on playing 11 members of a soccer team.

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Subject and method

A total of 33 male athletes of u-21 age category participated from the following teams: Bhutan (n=11), Bangladesh (n=11) and University athletes of India (n=11). Data was collected from Dr. Tao memorial tournament held at Guwahati in 2019 in the same institution where the tournament was held. Data for each participant was collected within one visit at the institution prior to the match. The participants in this study were all trained athlete of u21 age category from three countries; Bhutan, Bangladesh and India (collegiate athletes), who were following soccer specific training regimen and were involved in regulation competition in both international and national tournament. All athletes had access to a qualified soccer coach and nutrition experts. On the available literature, reviewed and accordance with professional educator the body fat % selected as a variable of the study. Maltros Bio-electrical impedance Analyzer (BIA) were used to measured body fat % in three different soccer teams. Comprehensively, evaluate body composition parameters amongst athletes, body height, body mass and body fat percentage (BF%) were evaluated at one point of time per athlete per team within prior to their matches being played in the tournament. At a minimum, athletes were instructed to refrain from exercise, eating and drinking for at least 2 hours prior to testing. However, the majority of testing was conducted in the early morning prior to the match. Upon arrival to the competition arena, height and body mass were recorded to the nearest 0.01 cm and 0.02 kg, respectively using a stadiometer and digital caliberated according to manufacturer guidelines with subjects barefoot. All subjects were placed in a spine position on a mat, with limbs away from the trunk. Determination of resistance and reactance were measured using electrodes placed on ipsilateral and contra lateral sides of the body. The obtained data in the experiment were analyzed and processed by using 17.0 SPSS statistical program. The tests for significance difference across teams performed via one -way analysis of variance (ANOVA). Least Significance Difference (LSD) post hoc analysis were performed when a significant finding (p<0.05) was identified and level of significant was set at 0.05.

Result

Various descriptive measures like mean, standard deviation of selected variable were calculated and presented in Table 1 and graphical presentation in figure 1. The result pertaining Analysis of Variance and L.S.D Post Hoc Test for the selected variable is presented in table 2 and 3 respectively.

Table 1: Descriptive statistic of Fat percentage of selected team

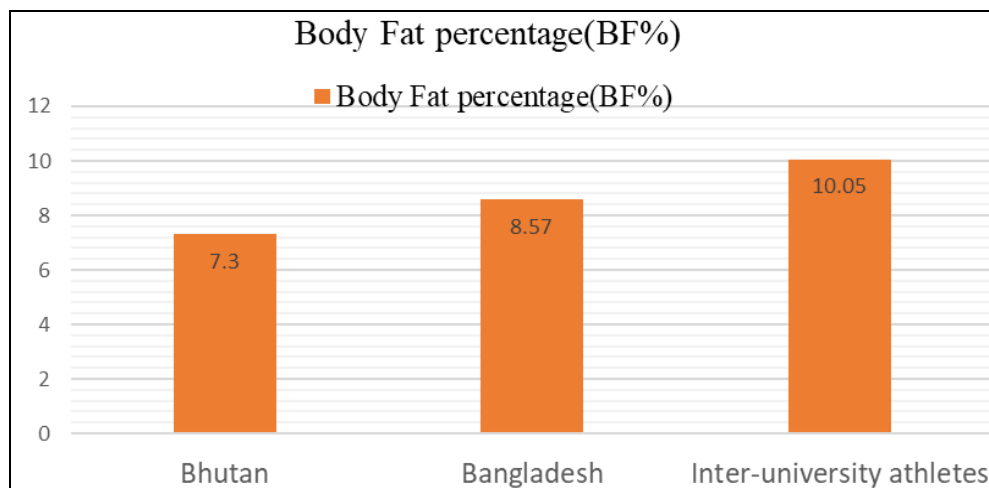| Group	N	Mean	Std. Deviation
Bhutan	11	7.30	1.84
Bangladesh	11	8.57	1.87
Inter-University	11	10.05	1.38
Total	33	8.64	2.01

Fig 1: Graphical representation of Fat percentage

One way analysis (ANOVA) was applied to find out the difference among the groups. The result presented in Table 2, showed that there was a significance difference in body fat percentage among the three teams at the $p<.05$ level [F (2,30)=7.09; p=0.03]

Table 2: One way analysis of variance (ANOVA) of fat % among Groups

Group	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	41.925	2	20.962	7.095	0.03
Within Groups	88.642	30	2.955		
Total	130.566				

As the result of one way analysis of variance was significance at the level of 0.05, showed that there was a significance difference in body fat percentage among the three teams at the $p<.05$ level [F (2,30)=7.09; p=0.03]. In that case L.S.D Post Hoc test was used to compare of each group and is presented in Table 3.

Table 3: Pair wise Comparison of Fat percentage among teams.

(I) Teams	(J) Teams	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Bhutan	Bangladesh	-1.27273	.73295	.093	-2.7696	.2242
	Collegiate	-2.75818*	.73295	.001	-4.2551	-1.2613
Bangladesh	Bhutan	1.27273	.73295	.093	-.2242	2.7696
	Collegiate	-1.48545	.73295	.052	-2.9823	.0114
Collegiate	Bhutan	2.75818*	.73295	.001	1.2613	4.2551
	Bangladesh	1.48545	.73295	.052	-.0114	2.9823

* p-value < 0.05 is significant

The L.S.D Post Hoc comparison indicate that the mean score for the Bhutan Team (M=7.30, SD=1.87) was significantly different than the inter-university team of india (M=10.05, SD=1.38). However, Bangladesh (M=8.52, SD=1.87) did not differ significantly from both Bhutan and Inter-university athlete of India.

In summarization, from the above Table 2 and 3, a one -way ANOVA was performed to compare the body fat percentage (BF %) on Bhutan, Bangladesh and Inter-university athletes. Athletes were divided into three groups based upon their country (Bhutan=11; Bangladesh=11; Inter-university (India=11). The outcome variable was found to be normally distributed and equal variance are assumed based upon results of Levene's test (F=.744(df=2, 30) with resulting p =.484. There was a statistically significant difference in body fat percentage (BF%) for the three teams (F (2,30) =7.095, p=.484). Post-hoc comparison using the LSD test indicated that the mean for Bhutan (M=7.30, SD=1.84) was significantly different from Inter-university athletes of India (M=10.05, SD=1.38). However, Bangladesh (M=8.52, SD=1.87) did not differ significantly from both Bhutan and Inter-university athletes of India. Taken together, these results suggest that Bhutan as a soccer team has the lowest body fat percentage (BF %) compare to both the team. It also suggests that Inter-university athletes have the highest body fat percentage (BF %) compared to other two teams.

Discussion

A lack of descriptive body fat percentage data exists on different national and collegiate athletes playing soccer. Therefore, the purpose of the current study was to establish descriptive data and compare body fat percentage in a national and inter-university teams playing soccer in order to assist coaches and strength practitioners in goal setting and exercise prescription for their athletes. We hypothesized that body fat percentage would vary among different teams depending upon training and physiological nature of the teams. This study can add to the available data and provide a foundation for the establishment of national teams and collegiate athletes descriptive data for body fat percentage (BF%). The result of the study indicates that there is a significant difference in body fat percentage (BF%) among Bhutan, Bangladesh and Inter-university soccer teams. Results from the current study are in support of previously reported data on body fat percentage that clearly distinguished higher from lower-level soccer players. As in this case the comparison between competitive levels strongly that the collegiate soccer team athletes need a higher amount and intensity of training to achieve a physique and body composition similarly those of national teams in order to gain a competitive edge on their opponents during the major inter-university competitions.

Conclusion

From the above result it was clearly revealed that there was a statistically significant difference in body fat percentage (BF%) for the three teams (F (2,30) =7.095, p=.484). Post-hoc comparison using the LSD test indicated that the mean for Bhutan (M=7.30, SD=1.84) was significantly different from Inter-university athletes of India (M=10.05, SD=1.38). However, Bangladesh (M=8.52, SD=1.87) did not differ significantly from both Bhutan and Inter-university athletes of India. In a concluding way the results suggest that Bhutan as a soccer team has the lowest body fat percentage (BF %) compare to both the team.

References

1. Marybarth Noel, Jaci L, Van Heest, Phil Zanes, Carol D. Rodgers. Body composition in division I football players. Journal of strength and conditioning research 2003;17(2),228-237.
2. Pantelis Theodoros Nikolaidis and Nikos vassilias Kary dis. Physique and body composition in soccer players across adolescence. Asian J sports med. 2011;2(2):75-82.
3. Rienzi E, Drust B, Railly T, *et al*. Investigation of anthropometric and work -rate profiles of elite South American international soccer players. J Sports Med Phys Fitness. 2000;40:162-9.
4. Gem Torres -Luque, Fernando Calahorro-Canada, Amador J. zara sancheee *et al*. Body composition using bioelectrical impedance analysis in elite young soccer players: The effect of age and playing position. Sport Sciences for Health. 2015, 203-210.
5. Gabriele Mascherini, Laura Stefani, Hannes Galterer *et al*. Bioelectrical Impedance and soccer performance in professional soccer players. European Journal of Preventive Cardiology, 2014, 21.
6. Brian A Irving, Christopher K Davis, David W Brock. Effect of exercise training intensity on abdominal fat and body composition. Medicine and science in sports and exercise 2008;40(11):1863-1872.
7. Laura Sutton, Mark Scott, Joanne Wallace *et al*. Body composition of English premier league soccer players: Influence of playing position, international status and ethnicity. Journal of sports sciences. 2009;27(10):1019-1026.
8. Jorge Aurlio, Educardo Dias, Tiago Soares *et al*. Relationship between body composition, anthropometry and physical fitness in under-12 soccer player of different positions. International Journal of Sports science 2016;6(1A):25-30.
9. Carling, Christopher, Orhant *et al*. variation in body composition in profession of soccer players: Inter-seasonal and Intra-seasonal changes and the effects of exposure time and player position. Journal of strength and conditioning research: May 2010;24(5):1332-1339.