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Research Article

Identification of differences in height, weight, and body mass index based on playing position in amateur female football athletes

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ABSTRACT
Background: Research interests in women's football has increased over recent years. Several factors can influence a woman's fitness level, including body composition (height, weight, and body mass index). Knowledge of anthropometry can help assess and evaluate the specifics of training programs. This is to identify players who may be considered necessary to successfully implement tactical roles and reference norms for developing future football-playing talent. Objective: This study aimed to identify differences in height, weight, and body mass index based on playing positions of female amateur football athletes. Methods: The population and sample in this study were 24 amateur female football players, and the research design used a measurement test. One-way ANOVA was used to test the difference in each variable. Result: The results show significant differences between the variables tested based on the player's position in the team, which could not be determined with significant results for the height variable of 0.738 > 0.05, then for the weight value of 0.213 > 0.05, and the BMI variable of 0.213 > 0.05. 0.143 > 0.05. Conclusion: This finding concludes that there are no significant differences in height, weight, and BMI in amateur women football players based on playing position. However, players must maintain ideal body proportions to support physical performance during matches or competitive seasons.

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Introduction

Football is an intense activity that blends tactics, physical attributes, and physical conditions to create a beautiful game. A person's physical condition will influence the form of play and mastery of techniques born within the player. The better the physical condition, the better the mastery of the game and techniques. In recent years, women's football has garnered more attention from academics (Harkness-Armstrong et al., 2022). An increasing amount of emphasis in the literature is being focused on investigating the compatibility of locomotor activity carried out at various speeds.

However, Despite the increasing interest in sports science and performance, there is still a lack of comprehensive research on the physical demands placed on female football players (Castellano et al., 2011; Loturco et al., 2015; Ramirez-Campillo et al., 2016). Scientific research on female football athletes still needs to be conducted, especially at the professional level (Faul et al., 2007). Additionally, much of the research published to date has been completed using small sample sizes concerning the number of players, matches, or both (McCormack et al., 2014). Significant global growth and development in women's football has occurred in recent years. Global, continental, and national governing bodies have implemented women-specific football strategies and increased investment to support the development of the sport from the grassroots level to elite playing standards (FIFA, 2018, 2019).

Knowledge of anthropometry can assist in evaluating the specificity of current training programs, identifying players who may lack certain qualities considered essential for the successful execution of

their tactical role, and reference norms for developing future playing talent (Datson et al., 2014; Ingebrigtsen et al., 2011). By anthropometric conditions, female football players are lighter, shorter in height, and have a lower body fat percentage than volleyball and basketball players (Santos et al., 2014), and are comparable in body size to field hockey players (Ohya et al., 2015).

This is likely accurate because, in comparison to athletes who play on fields, football players cover a greater distance throughout a game. In addition, football players with lower body fat percentages outperform those with greater levels on game-specific endurance tests (Mujika et al., 2009), indicating the importance of optimal body composition. Focusing on developing position-specific physical fitness is crucial, particularly now that players are assigned duties within a team. The idea has been refined by movement analysis of professional female football players, demonstrating that forwards engage in more sprint actions during games than midfielders or defenders (Vescovi & Favero, 2014).

Although some studies have shown differences between certain positions (Bradley et al., 2014; Haugen et al., 2012; Sedano et al., 2009), other studies have reported similarities between playing positions (Ingebrigtsen et al., 2011; Milanovic et al., 2012). This may be due to female players receiving similar training despite their different positions (Martinez-Lagunas et al., 2014). On the other hand, previous research measured professional athletes, so it is new in this study to find out about amateur athletes, especially women. Thus, this study aimed to identify differences in height, weight, and body mass index based on the playing positions of female amateur football athletes.

Method

Research Design

A descriptive quantitative analytical method has been applied in this study.

Participants

The study included 24 female amateur football players from Batu City, with an average age of (19.4 ± 0.7 years) as the population and sample. Athletes were selected according to predetermined sample selection criteria, and those selected agreed to participate in this study. The sample selection provisions also comply with the code of ethics when conducting research.

Data Analysis

Statistical analysis of the data used the SPSS version 26 program. Shapiro-Wilk and Levene's tests were applied to verify the normality of data and homogeneity of data variance. A One-Way ANOVA analysis was used in this research to identify based on playing position.

Results and Discussion

Result

Descriptive statistics show a slight variation in height, weight, and body mass index among the players tested based on team position, as shown in Table 1.

Table 1. Description of Height, Weight, and BMI

Playing Position	Height (cm)	Weight (kg)	BMI (kg/m^2)
Goalkeeper	156.0 ± 2.6	47.7 ± 2.5	19.6 ± 0.5
Defender	155.0 ± 4.9	54.1 ± 6.2	22.5 + 2.1
Midfielder	153.1 ± 3.7	50.3 ± 4.4	21.5 ± 1.9
Forward	154.8 ± 4.1	54.3 ± 6.1	22.9 ± 2.4

The average height of the tallest female players in the goalkeeper position is 156.0 ± 2.6 cm. The most considerable average value of body weight for forward players is 54.4 ± 6.1 kg. The Body Mass Index of players in all positions in the normal category is in the ratio between (18-25 kg/m2).

Furthermore, the difference in test values between variables does not show significant differences, as shown in Table 2.

Table 2. Variable Difference Test Value

Variable	F	Sig.
Height (cm)	0.425	0.738
Weight (kg)	1.634	0.213
BMI (kg/m^2)	2.023	0.143

Our research, conducted with the scientific rigor of one-way ANOVA, has provided significant insights into player development. Despite not finding significant differences in the variables tested according to the player's position in the team, the results for the height, weight, and BMI variables are robust, with values of 0.738, 0.213, and 0.143, respectively, all greater than 0.05.

Growth and maturity significantly impact player development from a young age regarding anthropometric changes (e.g., height, body mass, fat percentage) and physical abilities (Villaseca-Vicuña et al., 2021). Body mass percentage is significant for the overall ability of female football players because if there is an increase in body mass, there will be a proportional decrease in muscle mass (Milanovic et al., 2012). As a result, a deficit appears in the development of explosive strength necessary for several changes in the direction of movement, jumping, and running abilities. A high negative correlation exists between body fat percentage and performance in activities requiring body mass to be moved through space, either vertically, jumping, or horizontally, such as running (Can et al., 2004).

Regarding the fact that we are dealing with elite female players and members of the national team, it has been reported that the value of body fat percentage is much higher among all players, no matter what position they occupy in the team. The average body fat value of 25.9% is inversely proportional to the average value of top football players, namely 13.7-19% (Krustrup et al., 2005; Misigoj-Durakovic et al., 1997; Sporiš et al., 2007).

Female midfield players have the highest body mass percentage, in contrast to research by Sporiš et al. (2007), where midfield players have the lowest body mass percentage. The results are consistent with other studies showing international similarities in levels of female football players concerning anthropometry (Milanovic et al., 2012; Sporis et al., 2007). It is interesting to note that forwards weigh more about their height than defenders and midfielders, possibly because they have more muscle.

Another explanation could be that players in the middle of the field are often lighter and slimmer to cover more ground during the game, while goalkeepers run less and use less energy. In addition, greater height will be advantageous for goalkeepers who need to protect the goal mouth (Reilly et al., 2000). The mean body weight (52.2 kg) and height (1.54 m) of the participants in this study have not been included in the values reported in reviews of international female players (range for mass: 56.8–64.9 kg and range for height: 1.61- 1.70 m) (Harkness-Armstrong et al., 2021).

Conslusions

This study highlights that height, weight, and BMI do not differ based on playing position, almost the same conclusion as made about female football players in Europe and other wealthy nations. However, these similarities must be further identified with motor characteristics in all playing positions. A suggestion that could be made is for fitness coaches to find out and program the physical condition of female players. So, physical training programs, especially at the club level, are developed specifically for each field position, so players become more competitive and thrive internationally. Fitness assessments must be carried out continuously for baseline and comparison purposes. This must be done with existing normative data to guide player development throughout their career.

Authors' contributions

ENA is responsible for data compilation, analysis, article conception, writing, and revision. KNK, FAH, SRW, and SP are responsible for article conceptualization and strict and critically revised manuscripts. All authors read and approved the final manuscript.

Competing interests

The authors declare no competing interests.

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