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Review

Women's football: Player characteristics and demands of the game

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Abstract

The number of scientific investigations on women's football specific to the topics of player characteristics and demands of the game has considerably increased in recent years due to the increased popularity of the women's game worldwide, although they are not yet as numerous as in the case of men's football. To date, only two scientific publications have attempted to review the main findings of studies published in this area. However, one of them was published about 20 years ago, when women's football was still in its infancy and there were only a few studies to report on. The other review was more recent. Nonetheless, its main focus was on the game and training demands of senior elite female players. Thus, information on female footballers of lower competitive levels and younger age groups was not included. Consequently, an updated review is needed in this area. The present article therefore aims to provide an overview of a series of studies that have been published so far on the specific characteristics of female football players and the demands of match-play. Mean values reported in the literature for age (12–27 years), body height (155–174 cm), body mass (48–72 kg), percent body fat (13%–29%), maximal oxygen uptake (45.1–55.5 mL/kg/min), Yo-Yo Intermittent Recovery Test Level 1 (780–1379 m), maximum heart rate (189–202 bpm), 30 m sprint times (4.34–4.96 s), and counter-movement jump or vertical jump (28–50 cm) vary mostly according to the players' competitive level and positional role. There are also some special considerations that coaches and other practitioners should be aware of when working with female athletes such as the menstrual cycle, potential pregnancy and lactation, common injury risks (particularly knee and head injuries) and health concerns (e.g., female athlete triad, iron deficiency, and anemia) that may affect players' football performance, health or return to play. Reported mean values for total distance covered (4–13 km), distance covered at high-speed (0.2–1.7 km), average/peak heart rate (74%–87%/94%–99% HR_{max}), average/peak oxygen uptake (52%–77%/96%–98% VO_{2max}), and blood lactate (2.2–7.3 mmol/L) during women's football match-play vary according to the players' competitive level and positional role. Methodological differences may account for the discrepancy of the reported values as well. Finally, this review also aims to identify literature gaps that require further scientific research in women's football and to derive a few practical recommendations. The information presented in this report provides an objective point of reference about player characteristics and game demands at various levels of women's football, which can help coaches and sport scientists to design more effective training programs and science-based strategies for the further improvement of players' football performance, health, game standards, and positive image of this sport.

Keywords: Female soccer players; Match-play requirements; Physical and physiological profiles

1. Introduction

"The future of football is feminine", is the famous declaration of Joseph S. Blatter, current Fédération Internationale de Football Association (FIFA) president, that reflects the rising popularity of the women's game around the world and highlights the clear objective of FIFA to continue supporting its growth.[1] Currently, about 29 million women play football, which corresponds to nearly 10% of the total number of male and female footballers worldwide.[2,3] The number of registered female players (at the youth and senior level) grew by over 50% in 2006 compared to the previous FIFA Big Count in 2000.[3] Additionally, the number of international competitions,

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professional and recreational leagues for female players of various age groups has considerably increased in recent years. This has given a large number of female footballers the opportunity to train and compete in professional environments, which at the same time has raised the performance expectations placed upon players and increased the need for specific scientific research that could help improve their performance.

Despite the increased popularity and professionalization of women's football around the world, there is still limited scientific research specific to female players compared to their male counterparts, especially in the areas of players' physical and physiological characteristics and game demands. For instance, in the case of men's football, there are numerous full-text peer-reviewed studies that have been published on these topics including players of several nationalities, competitive levels, age groups, and playing positions. Additionally, several comprehensive literature reviews have been published in order to discuss and summarize the findings of a large number of studies in this area.[4–12]

In women's football, on the other hand, only one journal review article dealing specifically with the applied physiology of female soccer (football) players was found in the present literature review.[13] This review article was published about 20 years ago, when women's football was still in its infancy and there were only a few published studies to report on. More recently, a book chapter with specific focus in reviewing the game and training demands of senior elite female football players has been published.[14] However, information on female football players of lower competitive levels and younger age groups was not included. The number of scientific publications specific to player characteristics and game demands in women's football has noticeably grown since then including information of players of several nationalities, competitive levels, age groups, and playing positions.[15–66] Consequently, an updated review is needed in this area.

Therefore, the purposes of the present literature review are: 1) to provide an overview of a series of studies that have been published so far on the specific characteristics of female footballers and the demands of match-play; 2) to identify areas/topics that require further scientific research in women's football; and 3) to derive a few practical recommendations from the information gathered in this review. Knowledge and understanding of this information can help coaches and sport scientists to design more effective training programs and science-based strategies for the further improvement of players' football performance, health, game standards, and positive image of the women's game.

2. Player characteristics

Several investigations specific to female football players of various nationalities, competitive levels, and positional roles have reported on their age, anthropometry, physiological, and physical attributes (Tables 1 and 2). However, they are still not nearly as numerous as in the case of scientific reports on male football players. Furthermore, several studies have highlighted the main physical and physiological differences that exists between the genders[67–69] and a few considerations that are characteristics only of females, and therefore, not present in their male counterparts, such as the menstrual cycle,[70–73] potential pregnancy and lactation,[70,74] injury risks,[75–79] and health concerns.[64,72] These reports also emphasized how these traits could affect players' football performance, health or their return to play. Hence, coaches of female players should be well educated on these topics.

2.1. Age and anthropometry

The age and body height of elite female football players competing at most recent FIFA Women's World Cup (Germany 2011) have been recently reported.[80] The average age for all 16 participating teams was approximately 25 years (range: 21–28 years). The average age of the top four most successful teams in this tournament (Japan, USA, Sweden, and France) was in the upper range of 26–28 years. The youngest and oldest players of this tournament were a midfielder (16 years) and a goalkeeper (38 years), respectively. In agreement with other reports on male football players,[11] female goalkeepers also seem to have longer careers than the field players. Some explanatory reasons for this may include that experience plays a crucial role for the goalkeeping position, that goalkeepers are less vulnerable to injuries, and that the game overall physical demands placed upon them are lower compared to those of the field players.[8,11] In terms of body height values reported from the FIFA Women's World Cup Germany 2011,[80] the average height of all teams was 168 cm. The tallest team was Germany (173 cm) and the shortest Japan (163 cm). The tallest individual player was 187 cm (a central defender) and the shortest 152 cm (a midfielder). Three of the four semi-finalists were among the tallest teams in the tournament (USA, Sweden, and France). However, world champion Japan was the shortest team of the tournament. Goalkeepers (mean height 172 cm and range 162–185 cm) were slightly taller than the field players.[49]

The mean values of age (12–27 years), body height (155–174 cm), body mass (48–72 kg), and percent body fat (13%–29%) reported in other publications for female players vary according to their nationality, competitive level, and positional role (Table 1). In the case of percent body fat, the type of measurement method used may also account for the discrepancies among the reported values. In men's football, it has been shown that there may be anthropometric predispositions for some positional roles (such as goalkeeping, central defense, and attack), with tall players having a certain competitive advantage and, therefore, being selected to play these roles.[7] A few studies also show that female goalkeepers tend to be taller and heavier than the field players[23,35,39,43,48,63,81] (Table 1). However, most of these studies have used a general categorization of playing positions (only goalkeepers, defenders, midfielders, and forwards), Thus, it is still unknown if there are anthropometrical differences among more specific positional roles (e.g., goalkeepers (GK), central and external defenders (CD, ED), central and external midfielders (CM, EM), and forwards (F)). Further