

NUTRITION AND FOOTBALL THE FEMALE CONSIDER AS SPECIAL POPULATION

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“SPECIAL” POPULATIONS IN FOOTBALL...

- Females and youth are frequently described as “special” populations
- Together these two populations outnumber male players.

- What makes females “special” is that they tend to eat less when training and competing, compared to their male counterparts, leading to lower intakes of energy, carbohydrate, and some nutrients.



- Youth football players are special in regard to energy and nutrient requirements to promote growth and development, as well as to fuel sport.

- There is limited research on dietary habits of these two populations, but the available literature suggests that many female and youth players need to increase carbohydrate intake, to increase fluid intake, and develop dietary habits to sustain the demands of training and competition.



WELSH WOMEN'S FOOTBALL TEAM POSE FOR A PHOTOGRAPH IN 1959

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FEMALE PLAYER

- FIFA estimates that in the future, there will be more women playing football than men.
- Women have come a long way from the days when The Football Association of England (FA) banned women from playing on Football League Grounds in 1921, stating that “the game of football is quite unsuitable for females and ought not to be encouraged”.

- Data from Football Worldwide survey (www.FIFA.com) indicated that women in 177 countries played football.
- The FA reported there were 131,000 registered female players and about 1.4 million females played football at various levels of competition in England (The FA.com, 2005).

- Understanding the usual dietary patterns and nutritional intakes of females could help coaches, trainers, and sports dietitians to develop nutritional strategies to fuel performance and prevent fatigue over the course of a long competitive season.

ENERGY DEMANDS OF FOOTBALL

- The male players cover an average distance of 11 km during a match coupled with other energy expending activities including tackling, turning, and accelerating.
- Use of distance covered in a match as a way to assess energy expenditure underestimates the true cost of energy used in football.
- Brewer reviewed nutritional aspects of female soccer players and reported that a female player covers less distance in a match than a male, but the relative intensity of activity is maintained around 70% of maximal oxygen uptake which is similar to males.

- It has been estimated an energy expenditure of about 1,100 kcal for a 60 kg football player during a match.
- Fogelholm *et al.* estimated total energy expenditure to be 2,218 kcal.d-1 from measurements of resting energy expenditure and analyses of 7-day activity records of 12 female football players.

- Because chronic undernutrition suppresses resting energy expenditure (Loucks, 2004), however, such calculations of total energy expenditure will underestimate the amount of dietary energy required to restore the healthy functioning of all physiological systems in undernourished individuals.



ENERGY AND NUTRIENT INTAKES OF FEMALE FOOTBALL PLAYERS

- What is known about dietary intakes of female football players is very limited.
- Two recent studies, conducted in the U.S., assessed dietary intakes of female players from the Under-21 (U-21) national soccer team (Mullinix *et al.*, 2003) and those competing in the National Collegiate Athletic Association (NCAA) Division I (Clark *et al.*, 2003).
- The athletes in the U-21 national team (average age 19.2 years) averaged 2,015 kcal.d⁻¹, whereas the NCAA players averaged 2,290 kcal.d⁻¹.

- Both researchers found the women consumed less energy than would be predicted by estimated energy expenditure equations and that most athletes consumed energy levels more suited to individuals with low activity levels.




- Researchers have repeatedly observed endocrine signs of energy deficiency in both amenorrhoeic and eumenorrhoeic female athletes (Loucks, 2004).
- Research directed at accurate assessment of energy intake, energy expenditure, body composition, and hormone status would help to answer the question of energy needs in female football players.

- Absolute carbohydrate intake in studied groups of female football players was lower than the recommendations from the Joint Position Statement of the American College of Sports Medicine, the American Dietetic Association, and the Dietitians of Canada (2000).
- Females consumed an average of 4.7 g carbohydrate.kg-1.day-1 (Mullinix *et al.*, 2003) and 5.2 grams of carbohydrate.kg-1.day-1 in the pre-season, and 4.3 g carbohydrate.kg-1.day-1 post-season (Clark *et al.*, 2003).
- These values are below the recommendations of **7 to 8 g carbohydrate.kg-1.day-1** for athletes participating in heavy training and competition. Mean carbohydrate intake failed to approach levels of dietary carbohydrate sufficient to maintain glycogen levels.

- When carbohydrate intake is expressed as a percent of total energy intake, these women were eating approximately 52% of energy intake as carbohydrate, but their absolute intake of carbohydrate was not optimal.





ENERGY AND MACRONUTRIENTS NEEDS IN FEMALE PLAYERS—ARE THERE GENDER DIFFERENCES?

- It is clear that energy and macronutrient intakes in males are generally greater than in female athletes, but energy and macronutrient needs may be different in females.
- Loucks (2004) reported that energy intake is a special concern for females because of reproductive disorders associated with an energy intake that is too low to support high energy demands in sport.
- When energy and carbohydrate intakes are normalized by body weight, female athletes consume far less than men—about 30% less.

- Kirkendall (2000) summarized the physiological aspects of football and concluded that there are three trends that are seen in football players:
- (1) pre-game levels of glycogen are lower in football players than in other athletes;
- (2) significant glycogen depletion occurs in the first 45 minutes (first half) of play;
- (3) at the end of the game, glycogen is totally depleted.



- While these trends are not specific for female athletes, limited studies suggest that female athletes ingest less energy and less carbohydrate than males, so a logical conclusion is that female players may have lower pre-game and half time glycogen levels compared to males.
- Low glycogen stores can lead to sub-optimal performance during the match.

REVISED GUIDELINES FOR CARBOHYDRATE INTAKE INCLUDE:

- Immediately after exercise (0-4 h): 1.0-1.2 g.kg⁻¹.h⁻¹ consumed at frequent intervals
- Daily intake for recovery from training of low-intensity and moderate duration: 5-7 g.kg⁻¹.day⁻¹
- Daily intake for recovery from endurance training of moderate to heavy duration: 7-12 g.kg⁻¹.day⁻¹

- The researchers found that in the final 60 minutes of the 90-minute exercise bout, women utilized more of the ingested carbohydrate compared to males.
- Exogenous carbohydrate may spare more endogenous carbohydrate in females than in males in endurance events.
- These data are preliminary and small numbers of subjects were studied, but gender differences in utilization of fuels should be studied.

- Another concern for active women is the effect of the menstrual cycle on exercise.
- Campbell *et al.* (2001) demonstrated that women have better exercise performance (i.e., greater time to exhaustion in cycle ergometer tests) in the follicular phase of the menstrual cycle as compared to the luteal phase, when exercising in the fasted state.
- When researchers fed the women glucose during the exercise trials there was no difference in exercise performance between the menstrual cycle phases. The results of this study give women another reason to consume adequate carbohydrate when training and competing.

PROTEIN

- Many athletes, as well as sedentary individuals, consume protein in excess of their
- biological requirement, and this holds true for men and women alike.
- Little is known about gender differences in protein metabolism in athletes, perhaps because athletes usually have adequate protein intakes.
- Female athletes in the two dietary intake studies reviewed for this paper showed that females consumed protein in adequate amounts in the preseason, with 1.3 g kg⁻¹.day⁻¹ (Mullinix *et al.*, 2003) and 1.4 g kg⁻¹.day⁻¹ (Clark *et al.*, 2003).

FLUIDS

- Fluid losses in female football players are not well documented.
- Researchers reviewed fluid needs of athletes during exercise and summarized the recommendations, although no research is available to assess gender differences.

MICRONUTRIENTS

- Micronutrient intakes of female soccer players were adequate for all nutrients except vitamin D, vitamin E, folate, calcium, magnesium, phosphorus, and zinc, which were less than 100% of the Dietary Reference Intakes (DRI).

- Two micronutrients of concern in exercising females are iron and calcium. The impact of iron deficiency anaemia on performance is well documented. In a review on haemoglobin and iron deficiency, Ekblom states that iron supplementation in anaemic athletes can increase aerobic power and improve performance.
- It is less clear if athletes with iron deficiency without anaemia (usually defined as low serum ferritin with normal haemoglobin) benefit from treatment with iron supplementation.

- Encouraging female football players to include haem-iron containing foods, as well as pairing non-haem iron containing foods with vitamin C containing foods, is a good strategy.
- In addition, many women can benefit from a vitamin-mineral preparation that contains the DRI for iron.



- It can be concluded that female soccer players have superior BMD compared to inactive females, indicating that hormonal status in these women is sufficient to promote bone health.
- However, because some athletic women strive for thinness, monitoring menstrual status in this population is warranted.

DIETARY SUPPLEMENTS

- Mullinix *et al.* reported that 55% of the U.S. Under-21 female players took nutrient supplements occasionally, 33% took supplements daily, and 11% did not take any supplements.
- The most popular supplements were multivitamin/mineral preparations, vitamin C, calcium, iron, and zinc.
- Clark *et al.* reported that female collegiate football players took multivitamin/mineral supplements and iron, but did not report the percentage of athletes using supplements.

- Although creatine use was not reported by either group of female athletes in the studies reviewed for this paper, creatine supplementation has been investigated as a performance enhancing supplement in both endurance and power athletes.

- Larson-Meyer *et al.* (2000) studied creatine supplementation in female collegiate soccer players to assess changes in body composition and muscle strength.
- Fourteen members of the soccer team were recruited to participate in the study in the off-season.

SPECIAL CONSIDERATIONS

- reported that vegetarians have lower average muscle creatine concentration than meat eaters and it has been suggested that vegetarian athletes might benefit from creatine supplementation.



RECOMMENDATIONS FOR FEMALE PLAYERS

- Provide carbohydrate recommendations in absolute terms (g.kg⁻¹) versus relative terms (percent of energy) and provide levels of carbohydrate consumption for pre-season, inseason, and post-season
- Monitor post-season intake to assure adequate intake of nutrients so athletes report for preseason training with adequate nutrient stores
- Educate athletes on hydration and the preferred beverages for rehydration
- Monitor iron status in females and recommend consumption of an iron-rich diet with adequate energy for those with iron deficiency without anaemia

**Thanks for your
Attention**