The Nutritional and Anthropometric Status of Gaelic Football Players

Sue Reeves and Kieran Collins

The aim of this study was to investigate the dietary intakes and anthropometric profiles of county and club Gaelic football players and compare them to soccer players and control subjects. Seven-day dietary records were analyzed and anthropometric measurements were taken midway through the Gaelic football competitive season. The county group with a mean height of 1.82 ± 0.04 m were significantly taller (p < .05) and had less body fat than any other group. The county and club teams consumed 151 ± 11 and 150 ± 16 kJ · kg⁻¹ · day⁻¹, respectively, with 52.2 ± 5% and 49.5 ± 9% of their energy intakes as carbohydrate. This compares to 173 ± 11 kJ · kg⁻¹ · day⁻¹ for the soccer players and 159 ± 8 kJ · kg⁻¹ · day⁻¹ for the controls, with 57 ± 4% and 44.9 ± 5% of their energy from carbohydrate. The nature of Gaelic football demands a balanced diet, rich in energy and carbohydrate and with adequate calcium is consumed; the subjects needed to increase these dietary components in order to meet the energetic demands of competition and training. Additional nutritional counseling was provided on an individual basis.

Key Words: Gaelic football, nutrition recommendations, energy intake, carbohydrate

Introduction

At the time of writing, the Gaelic Athletic Association (GAA) boasted the highest number of playing members of any sporting organization in Ireland and regulated four distinctive games—namely Hurling, Camogie, Handball, and Gaelic football (18). Gaelic football is the most popular of these games and is played throughout the world. There are many similarities between Gaelic and Australian rules football, which have resulted in “compromise rules” games between the two nations. With this new international perspective, it has been suggested that in the future the GAA will evolve from its current amateur status to that of professional (31). Increasingly, teams are turning to the field of sports science, not only for physiological and psychological support, but also nutritional counseling. Currently, there is little information available regarding the nutritional requirements of Gaelic football players.

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Gaelic football is a physiologically demanding game that is characterized by irregular changes of pace and anaerobic efforts superimposed on light to moderate aerobic activity (27). A suitable nutritional intake that contains a variety of nutrients and adequate amounts of energy is essential to supply the required fuel sources—namely carbohydrate, protein, and fat. Appropriate nutrition can optimize energy stores for competition, reduce fatigue, and allow players to train for longer durations and recover faster between sessions, as well as maintain general health (36).

It has been suggested that Gaelic footballers are subject to broadly similar physiological demands and exhibit similar fitness profiles to soccer players (14); therefore, it could be assumed that both groups would have similar nutritional requirements. However, there are some differences between the two codes, and these include the facts that the playing surface is approximately 40% larger than a soccer field (130–145 m vs. 80–90 m). There are 15 players per team with which to cover the playing surface, whereas there are 11 players on a soccer team. The ball is played with the hands as well as the feet, resulting in increased upper body action. A high degree of physical contact between players is evident, since shoulder-to-shoulder force is permitted. Finally, Gaelic football games are 60 min in duration (70 min for county games) compared to 90 min play in soccer.

Since there is little information available regarding the nutritional requirements of Gaelic football players, this preliminary study, aims to compare the dietary intakes and anthropometric profiles of county Gaelic football players and club level Gaelic football players, with professional soccer players and healthy non-sporting controls from the general population.

Methods

Participants

Data was collected midway through the GAA competitive season. A team of male county Gaelic football players and a team of club level Gaelic football players were recruited during the Cork inter-club county championship. Club Gaelic football teams are usually based in a player’s hometown or parish; the best club players are then selected to represent their county in the inter-county championships. Twelve football players from the county Gaelic team and 13 from the club Gaelic football team managed to complete the study. Any club Gaelic footballers who had played at county level were excluded in order to keep the two groups distinct. A group of 21 English professional soccer players and a control group of 20, who did not regularly participate in any sport were also recruited.

Dietary Analysis

Subjects were provided with a 7-day food diary and were asked to carry the diaries with them and record everything they ate and drank. A full description of the foods consumed was requested, including the type and brand, how the food was cooked, and the amount consumed. The diaries were then analyzed using the computer package Diet 5 for Windows (Univation, Aberdeen). In order to assess habitual food intake in free living individuals, there are many debates over how long food diaries should be recorded to portray an accurate picture. Whilst 7-day diaries are advocated to account for individuals who substantially vary their intake of food from day
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to day (4), Basiotis et al. (3) maintain that the number of days required to estimate usual intake depends on the nutrient being studied. While 41 days of records may be required to assess vitamin A intakes, 3 days may be more than adequate to estimate energy. Diaries were kept for 7 days in this study; longer lengths of study may cause boredom on the part of the subject and may result in less accurate records or greater dropout rates (15).

To ensure the subjects were not underreporting their food intakes, basal metabolic rate (BMR) was calculated using the FAO/WHO/UNU equation (12) for males aged 18–30 years for each subject. Energy intakes (EI), which are less than 1.5 times BMR, suggest that unless there is a loss of body weight, the subject is not accurately recording all foods consumed in their 7-day diaries (16). No subjects were excluded from the study on the basis of underreporting.

Anthropometry

In order to assess appropriate nutritional intakes, measures of body weight and composition were necessary. Body mass was measured with a digital balance (Seca, Germany) to the nearest 0.1 kg. The balance was calibrated for accuracy with the use of known weights. Height measurements were read to the nearest 0.5 cm from a fixed stadiometer (Seca, Germany). Subjects were measured while bare foot, heels together, and heads in the Frankfort plane. Skinfold thickness measurements were taken with Harpenden skinfold callipers (British Indicators, UK) to the nearest 0.1 mm. Total body fat was estimated from the sum of four skinfold values taken at the biceps, triceps, sub-scapular, and supra-iliac (9), and calculated using the Durnin and Womersley equations (10).

Statistical Analysis

Values are presented as mean values ± standard deviation. A power calculation based on the anthropometric results was undertaken in order to work out the minimum sample size. The combined standard deviation for the difference in body fat (%) was calculated as 2.23 and then, using the equation of Lehr (21), it was calculated at 80% power and \( p = .05 \) and thus determined that at least 10 subjects per group would be required. Between-group comparisons were made using one-way analysis of variance (ANOVA) and post hoc Tukey tests, adopting a significance level of .05. Data were analyzed using Excel and SPSS (Microsoft Corporation) software.

Results

The subjects’ anthropometric characteristics are presented in Table 1. There were no significant differences in age between the groups. The Inter-Country Gaelic footballers were taller \( (p < .05) \) than all other groups. Body weight was lower \( (p < .05) \) in the professional soccer players compared to the other groups. Conversely, the control group was heavier and possessed a higher percentage of body fat \( (p < .05) \) than the other groups.

Table 2 shows the average daily energy intakes and amounts of carbohydrate, fat, protein, and alcohol in the subjects’ diets. All groups reported similar energy intakes. Although the control group consumed more, this was not statistically significant. The soccer players consumed significantly more of their energy intake.
from carbohydrate than any other group \((p < .01)\). The county Gaelic players consumed more than the club players and controls \((p < .05)\). Fat intakes as both grams and as percentage energy intake were significantly lower \((p < .05)\) in the county players compared to all other groups and significantly higher \((p < .01)\) in the control group compared to all other groups. There were no significant differences in protein intakes. Alcohol consumption was higher \((p < .05)\) in club level Gaelic football players and controls compared to the other groups. All the groups had intakes that were in line with the UK’s Department of Health (DoH) guidelines \(7\).

Table 3 depicts the daily dietary intakes of the selected micronutrients—calcium, iron, vitamin C, and vitamin E. There were no significant differences between the groups in micronutrient status with the exception of the club Gaelic football players who consumed more calcium \((p < .01)\) than the other groups. All the micronutrients were above the dietary reference values \(7\), with the exception of calcium in the county group, which was on average 17% below recommendations.

**Discussion**

The anthropometric characteristics of the Gaelic players reported here are comparable to the county players in other studies, the heights and weights of both groups of Gaelic football players being higher than the soccer players \(33\). However, in a study of Liverpool University students, Florida-James and Reilly \(14\) reported that soccer players were both taller and heavier than Gaelic players, with a significantly greater muscle mass. This could be a reflection of the level of Gaelic football played, county teams having taller and heavier players with relatively lower percent body fat than English club teams \(26\). To this effect, Keane et al. \(19\) observed that elite players were more likely to be taller and have a greater body mass index than club players due to the more robust nature of top level competition. It has also been observed that county players, as well as being taller and heavier, have greater explosive power than English professional soccer players as a result of competing for possession of the ball in the air as well as on the ground \(32\).

Body size and composition are important determinants of energy expenditure and, hence, energy intake and requirements. Studies of work rates have been used to
Table 2 The Daily Intakes of Energy and the Macro-nutrients (Mean ± SD)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Energy (kJ)</th>
<th>Carbohydrate (% of energy intake)</th>
<th>Fat (% of energy intake)</th>
<th>Protein (% of energy intake)</th>
<th>Alcohol (% of energy intake)</th>
<th>Alcohol (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>County</td>
<td>12533 ± 989</td>
<td>432 ± 23*</td>
<td>52.2 ± 5*</td>
<td>25.9 ± 4*</td>
<td>16.0 ± 2.4</td>
<td>0*</td>
</tr>
<tr>
<td>Club</td>
<td>12164 ± 1350</td>
<td>360 ± 30</td>
<td>437 ± 40**</td>
<td>27.5 ± 3.4</td>
<td>105 ± 13</td>
<td>26 ± 4.3</td>
</tr>
<tr>
<td>Soccer</td>
<td>12828 ± 825</td>
<td>741 ± 32</td>
<td>48.9 ± 6**</td>
<td>31.7 ± 5</td>
<td>135 ± 13</td>
<td>14 ± 1</td>
</tr>
<tr>
<td>Control</td>
<td>13897 ± 741</td>
<td>373 ± 32</td>
<td>48.8 ± 5.0</td>
<td>31.9 ± 11</td>
<td>16 ± 2.3</td>
<td>16.3 ± 1.6</td>
</tr>
</tbody>
</table>

*Result was significantly different (p < .05) from all other groups. **Result was significantly different (p < .01) from all other groups.
estimate energy expenditure in different football codes, and it is apparent that similar distances are traveled by individuals during Gaelic and soccer matches. Keane et al. (20) reported than on average 8,594 m is covered during a Gaelic match, whilst 8,680 m has been reported for soccer players (28). Adequate intakes are essential to provide the energy to run these distances, particularly at speed. However, from our results, it was evident that the control group had the highest total daily energy intakes. Any calories consumed above the body’s requirements are stored, and this may account for this group’s significantly greater body weights and percentage body fat. However, if the results are calculated in terms of kJ consumed per kg of body weight per day, it is apparent that the soccer players had the highest energy intakes consuming 173 ± 11 kJ · kg⁻¹ · day⁻¹. The controls, however, consumed 159 ± 8 kJ · kg⁻¹ · day⁻¹, and the county and club Gaelic football players consumed 151 ± 11 and 150 ± 16 kJ · kg⁻¹ · day⁻¹, respectively. In studies of elite Australian footballers, energy intakes of 153 kJ · kg⁻¹ · day⁻¹ have been published (33) similar to the results of the Gaelic footballers in this study. However, intakes of 259 kJ · kg⁻¹ · day⁻¹ have been reported in elite footballers (29), which is greater than that of any of the subjects in this study. The DoH (7) estimates that people with high rates of physical activity should consume on average about 180 kJ · kg⁻¹ · day⁻¹. Economos et al. (11) maintain that, for aerobic sports, intakes between 190–365 kJ · kg⁻¹ · day⁻¹ are appropriate, with levels of 210 kJ · kg⁻¹ · day⁻¹ for endurance athletes. In terms of the recommendations, it appears that the Gaelic and soccer players in this study may benefit from increasing their energy intakes.

Not only is the total amount of energy consumed of great importance, so too is the composition of the energy intake, with great emphasis placed on carbohydrate

Table 3 The Daily Intakes Selected Micronutrients Compared to the Dietary Reference Values (Mean ± SD)

<table>
<thead>
<tr>
<th>Variable</th>
<th>County</th>
<th>Club</th>
<th>Soccer</th>
<th>Control</th>
<th>Dietary reference value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium (mg · day⁻¹)</td>
<td>579.2 ± 224</td>
<td>726 ± 200*</td>
<td>658.8 ± 234</td>
<td>626 ± 280</td>
<td>700</td>
</tr>
<tr>
<td>Iron (mg · day⁻¹)</td>
<td>16.06 ± 3.9</td>
<td>17.54 ± 3.9</td>
<td>11.16 ± 5.6</td>
<td>17.82 ± 48</td>
<td>8.7</td>
</tr>
<tr>
<td>Vitamin C (mg · day⁻¹)</td>
<td>75.1 ± 5.2</td>
<td>72.1 ± 9</td>
<td>94.16 ± 5.5</td>
<td>82.9 ± 6</td>
<td>40</td>
</tr>
<tr>
<td>Vitamin E (mg · day⁻¹)</td>
<td>5.23 ± 2.30</td>
<td>3.9 ± 3.4</td>
<td>4.79 ± 1.79</td>
<td>5.5 ± 4.5</td>
<td>4</td>
</tr>
</tbody>
</table>

*Club Gaelic football players consumed significantly more calcium (p < .01) than other groups.
In terms of both grams and percentage of energy intake, adequate carbohydrate was consumed in relation to the DoH (7) recommendations in all groups. However, a greater percentage of the diet should be made of carbohydrate rich foods, particularly in the county group. The county and the soccer players consumed 5.2 ± 0.2 and 5.9 ± 0.5 g of carbohydrate per kg of body weight, respectively. This is less than the 8.2 g · kg⁻¹ · day⁻¹ reported for soccer players (29) and lower than the 6 g · kg⁻¹ · day⁻¹ recommended for athletes in general (11). However, this does fall within the range of 4.5–6 g · kg⁻¹ · day⁻¹ observed in trained athletes but not the 9–10 g · kg⁻¹ · day⁻¹ suggested for the rapid recovery of endurance activity (13). In their study of Australian footballers, Schokman et al. (30) found that on average 415 g of carbohydrate per day was consumed (51.7% of total energy intake). They too recommended that nutritional strategies needed to be put into place so the consumption of sufficient amounts of carbohydrate are consumed before, during, and after exercise, particularly when more than one match is played per week. The importance of carbohydrate in the diet cannot be emphasized enough, since carbohydrate depletion causes a general perception of fatigue, which may disrupt skill performance, fine motor coordination, and concentration (23). Depletion has been associated with lower than average speeds and less distance covered during matches (29). In particular, Bangsbo et al. (2) demonstrated, in Danish footballers, that when carbohydrate was increased to 65% of energy intake, this increased both running distance and duration. However, when match length is such that muscle glycogen stores are not limiting, then elevated pre-match glycogen stores will have little influence on performance (34). Fatigue in events of 60 min duration or less are more likely as a result of an accumulation of metabolic byproducts, such as lactate and hydrogen ions, within the muscle fibers (11). Given the length of club Gaelic football matches, muscle glycogen stores may not be taxed to their full extent. However, inter-county championship games last 70 min, and players will benefit from adequate glycogen reserves.

All the groups consumed adequate amounts of protein for the general public (7) and for athletes (11, 34); however, intakes were slightly below the 142 g · day⁻¹ consumed by elite soccer players (29) and the 138.8 g · day⁻¹ consumed by Australian football players (30). Adequate protein intakes will enhance tissue repair and strength, and supply amino-acids for oxidation to provide energy during intense and prolonged exercise (22).

Fat was consumed by all groups at levels below the maximum recommended for the general public (7) and for athletes (11, 34); however, intakes were slightly below the 142 g · day⁻¹ consumed by elite soccer players (29) and the 138.8 g · day⁻¹ consumed by Australian football players (30). Adequate protein intakes will enhance tissue repair and strength, and supply amino-acids for oxidation to provide energy during intense and prolonged exercise (22).

Fat was consumed by all groups at levels below the maximum recommended for the general public (7) and, with the exception of the controls, were in the 25–30% range recommended for athletes during training (11). When these results were compared to similar studies based on 7-day dietary analyses, it was found that the fat intakes presented here were actually lower than the 138.8 g · day⁻¹ or 18.1% observed by Schokman et al. (30) for Australian football players and the 142 g · day⁻¹ or 32.2% reported by Rico-Sanz (29) for elite soccer players.

The Gaelic and soccer players in this study consumed little alcohol. The control group drank the most and were observed to consume alcohol in greater amounts and on more frequent occasions, typically between 3 and 5 nights per week. The National Research Council (24) state that moderate social drinking does not have any major adverse affects on performance. However, it has been documented that even small quantities of alcohol produce a negative effect on aerobic performance, although anaerobic performance may not affected (25).
All micro-nutrient intakes of all subjects in this study were satisfactory, with the exception of calcium in the county group. In adults, low calcium intakes have been associated with low bone mass and stress fractures (6). Whilst physical activity has a positive effect on bone mass, adequate dietary intakes are essential to maintain optimal bone integrity in physical strength sports such as Gaelic football (8). An increase of calcium in the diets of the county subjects is needed, preferably in the form of low fat dairy products.

From estimates of BMR, energy balance was evaluated by direct comparisons with energy intake. On average, the EI/BMR ratio was calculated to be between 1.5 and 2.2, which is considered appropriate for males who are moderately to very physically active and suggests that our subjects were not underreporting.

Conclusions

From the results of this preliminary study, the county Gaelic footballers were significantly ($p < .05$) taller and had less body fat than any other group. In addition, they were heavier than the club Gaelic footballers and the soccer players. On the basis of these measurements of body composition, appropriate nutritional intakes can be recommended. The dietary intakes of the county and club Gaelic footballers, the soccer players, and the controls were appropriate according to guidelines for the general public (7) with the exception of calcium in the county group. However, the Gaelic football players were low in energy and carbohydrate when compared to standards for athletes (11). The energetic demands of competition and training whilst working in a fulltime job, as most Gaelic Players do, requires a balanced diet, rich in energy and carbohydrate and with adequate calcium consumed. Nutritional counseling may be best performed when based on a prior assessment of habitual food intake and body composition, since specific dietary corrections may need to be made on an individual basis.

References


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