Nutritional Practices of Elite Female Surfers During Training and Competition

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The aim of this study was to assess the dietary practices of 10 elite female surfers. Four- and five-day food diaries completed over competition and training periods demonstrated energy intakes (mean ± SD) of 9,468 kJ (±2,007) and 8,397 kJ (±1,831), respectively. This level of energy intake was less than that estimated for the requirements of surfing. Female surfers’ carbohydrate intakes failed to meet the recommendations, and suboptimal zinc intake was observed with 90% of subjects not meeting the Australian RDI. Comparisons between competition and training demonstrated that carbohydrate (g and g/kg body weight) and confectionary (g) intakes were significantly higher (p < .05) and protein intake was significantly lower (p < .05) during competition. These results show that although body fat stores were not compromised (mean 22%), self-reported energy, carbohydrate, and nutrient intakes were marginal in elite female surfers. Questionnaires revealed that 90% of surfers did not have good nutritional habits while traveling, which was compounded by a lack of knowledge of nutritional practices.

Key Words: surfing, carbohydrate, energy, anthropometry, food use

Surfing, a popular sport requiring high skill, is enjoyed at both the recreational and professional levels. Elite surfers are attracting increasing publicity and sponsorship. Prize money for female surfers is $5,000 (US) for the winner of major competitions, and although prize money is gradually increasing, this does not match the winnings for many other elite sports. Women surfers, while overshadowed by their male counterparts, are slowly gaining recognition. Surfing is a unique sport in that competitions are held at beaches, often in remote places all over the world, which means that competitors travel for the majority of the year to compete. Surfing locations often have no permanent catering facilities, and when food is provided it may be of questionable nutritional quality. While training, surfers commonly spend 1 to 5 hr in the water per day depending on the conditions, and during competition, heats and finals usually last 20–40 min. In a study of fitness and energy expenditure,

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Lowdon and Pateman (22) found that surfers have a mean heart rate of 135 (±7) beats per minute during recreational surfing and an energy expenditure of 33.7 kJ per minute during a 60-min surfing session. These data suggest that the fitness or energy cost of surfing is equivalent to other recreational sports such as freestyle swimming, tennis, and cycling (2). No recent fitness studies on elite surfers have been performed, and therefore no data exist on the energy expenditure of surfing.

While surfers spend much time practicing in various conditions and experimenting with equipment (i.e., surfboards, wetsuits) to obtain optimal results, many fail to give their nutritional practices the same attention. Surfing requires a high degree of aerobic and anaerobic fitness, involving endurance paddling to reach the takeoff area (which may take up to 10 min), high-energy power maneuvers to catch the wave, and energy to ride and position the surfboard on the wave (21). This process is repeated many times during a surfing session and is interspersed with periods of breath holding, making surfing a sport requiring high endurance and rapid cardiorespiratory recovery (21). Nutrition plays an important role in endurance performance, and participants need to consume a balanced diet that is high in carbohydrate to aid recovery (10, 11). A nutritious diet is important for athletes, not only to provide nutrients that are conducive to good performance but also to prevent disease, aid in wound healing and tissue growth, and strengthen the immune system (17).

Despite the number of publications concerned with dietary intakes of elite athletes, no studies have investigated the diets of professional surfers. Swimmers have been the focus of much research on dietary habits (4, 15) and will be used in this study as a comparison for the surfers (3, 6, 8, 32). Swimming and surfing have many similarities: Both are aquatic sports, and the athletes' actions in the water are similar as both must overcome water resistance. There are differences, however, such as the upright power maneuvers performed by surfers. The aim of this study was to record the dietary habits and anthropometry of elite female surfers and to determine how the surfers' dietary intakes compare with those of other elite athletes and with the recommendations made for these elite athletes. We hypothesized that because female surfers travel alone and do not have the support of medical teams like other athletes, their diets would be suboptimal, lower in carbohydrates and higher in fat content than, for example, elite female swimmers.

Methods

Subjects

Ten elite female surfers agreed to participate in the study. Written informed consent was obtained from all subjects before entering the study, and the study was approved by Deakin University Ethics Committee (Reference EC-H 16/96). Subjects were recruited during the Quit Women's Classic surf contest at Bells Beach, Torquay, in Victoria, Australia, during April 1996. Subjects were athletes from the top 44 ranked female surfers in the world. Nine of the subjects recruited were based in Australia and 1 subject was based in Hawaii.

Study Design

Data (height, weight, skinfold measurements) were collected to determine the physical characteristics of professional female surfers. All skinfold measurements were taken by the same tester in accordance with the standard protocol specified by the
International Society for the Advancement of Kinanthropometry (27). Calibrated Holtain calipers were used and subjects wore minimal clothing during the measurements. Nine skinfold sites were measured and included biceps, triceps, subscapular fat depot, iliac crest, supraspinal fat depot, abdomen, midthigh, calf, and midaxilla. Body fat percentage was calculated using the equations of Durnin and Womersley (14).

All subjects attended a private interview designed to instruct them in accurately recording food and fluid intake. Detailed instructions were given, including ways to estimate serving sizes using household measures. A grid was also supplied for subjects to provide dimensions of foods that they found difficult to quantify. Dietary intake during the competition was assessed using food diaries (completed on average over 4 consecutive days), and subjects completed training food diaries (completed on average over 5 consecutive days) between competitions. Data were analyzed using Diet/1 (Xyris Software, Version 4.22 based on Nuttab95, the Australian database).

Competition and training questionnaires were analyzed to provide information regarding usual food and fluid intake during these periods, training techniques, food preferences, alcohol intake, supplement use, and problems associated with traveling.

Seven questions were completed during the interview assessing the subjects’ nutritional knowledge. Questions focused on major areas within sport nutrition such as sources of carbohydrate and iron in the diet and whether vitamin supplements and high-protein foods are necessary for endurance athletes.

Dietary data were compared with data previously obtained from elite swimmers and with the recommended dietary intakes (RDIs) of micronutrients established for the Australian population (31). Using results from the 1990 Victorian Nutrition Survey (12), we compared dietary intake information from the general population (food group data) with the athletes’ diets. Anthropometric data were compared with data of elite athletes from other aquatic sports, such as long-distance swimming, swimming (other distances), and water polo (7). The seven skinfold sites used to calculate the sum of seven skinfolds were the biceps, triceps, subscapular fat depot, supraspinal fat depot, abdomen, midthigh, and calf.

**Statistical Analysis**

Two-tailed paired $t$ tests were used to compare the training and competition data for the female surfers. Anthropometry and dietary values are reported as means $(\pm SD)$. Figures 1 and 2 show means $(\pm SEM)$.

**Results**

**Personal Characteristics**

The personal characteristics of the female surfers, swimmers, long-distance swimmers, and water polo players are shown in Table 1. The surfers ranged in age from 18 to 30 years, and their body mass indexes (BMI) ranged from 17.1 to 25.1 kg/m$^2$. Swimmers (distances other than long distance) had the lowest body fat and sum of seven skinfolds. Surfers possessed lower body fat and sum of seven skinfolds than both long-distance swimmers and water polo players. Anthropometry previously recorded from female surfers showed body fat to be between 18.2 and 20.8%; however, different regression equations were used compared with this study (22).