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Original Research Article

Daily food intake in adolescents: Relation to parameters of physical fitness and weight status

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ABSTRACT

Introduction: Balanced nutrition and good physical fitness are the essential parts of a healthy growth and development of children and adolescents. Furthermore, these are the key factors in the prevention of overweight and obesity.
Aim: The aim of the study was to examine daily food intake of adolescents aged 11–14 years and to assess the parameters of physical fitness and weight status among different genders.
Material and methods: The study included 65 adolescents aged 11–14. Data were collected by a 24-h diet recall interview, the European physical fitness test battery (Eurofit) and the assessment of body mass index (BMI), based on body height and weight measurements.
Result: In total, in 64.0% of boys and 62.5% of girls daily energy intake was too low. There was a serious calcium and iodine deficiency and a deficiency of some vitamins (vitamin A and vitamin D) in adolescents. The total score of physical fitness ranged from 3.2 to 5.8. The evaluation of body weight indicated that 9.2% of adolescents were underweight, 23.1% were overweight and 3.1% showed obesity.
Discussion: The assessment of energy expenditure needs to be included in studies for more accurate evaluation of energy balance and relation to weight status. Results on physical fitness in relation to weight status are controversial.
Conclusions: Daily food intake of adolescents is not balanced and with sufficient nutrients. Flexibility was the weakest parameter of physical fitness. The remaining parameters of physical fitness were satisfactory. Only 64.6% of adolescents were classified as normal weight.

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1. Introduction

Childhood and adolescence is a period of rapid growth and development. Both are influenced by nutrition and physical activity, which therefore play a particularly important role during this phase of life. It is important for young people to have knowledge on nutrition in relation to physical activity, good health and improved quality of life, and that good habits are deeply embedded. This plays a particularly critical role considering the trends in childhood obesity across Europe.[15]

Obesity is the most frequent type of malnutrition in developed countries. The prevalence of excess body fat has increased enormously over the last few years, both in children and adults. This dramatic rise has reached epidemic proportions in almost all regions of Europe, North America and Australia. Depending on the demographic origin, population characteristics and definition criteria, epidemiological data show the prevalence of overweight/obesity in children and adolescents ranges between 15% and 25%. Furthermore, the risk of becoming obese seems to be currently on the increase.[9]

Obesity results from an imbalance between energy intake and expenditure.[11] A fundamental principle of nutrition and metabolism states: a change in body weight is associated with an imbalance between energy density of diet and energy expended on life-sustaining processes and physical activity.[7]

Obesity is associated with a variety of health problems, as well as physical (cardiorespiratory endurance, flexibility, muscle strength, muscle endurance and body composition) and motor proficiency (fine manual control, manual coordination, body coordination and strength-and-agility).[12]

Cross-sectional studies have documented the relationship between physical activity, physical fitness and health with a number of cardiovascular risk factors present already in childhood and adolescence.[14] Similarly, longitudinal studies have shown that the degree of physical fitness during childhood and adolescence may determine physical fitness of the subject in adulthood. In addition, poor physical fitness during these stages of life seems to be associated with the presence of cardiovascular risk factors such as hyperlipidemia, hypertension and obesity at a later age.[3]

The effectiveness of prevention of obesity and overweight among children and adolescents depends on early diagnosis, which involves screening in elementary, middle and high schools, as well as the implementation of effective prevention programs and education.[2]

2. Aim

The aim of the study was to examine daily food intake of adolescents aged 11–14 years and to assess the parameters of physical fitness and weight status among different genders.

3. Materials and methods

The study included 65 adolescents (25 boys and 40 girls) aged 11–14 (12.7 ± 1.1 years). The study was conducted in May 2012 at Utena Vyturiai Basic School.

3.1. *Daily food intake assessment*

The 24-h dietary recall interview was used to assess daily food intake. The 24-h dietary recall interview provides estimates of the intake of total daily energy, nutrients and no-nutrient dietary components, as well as dietary behaviors regarding type, quantity and time of each food and beverage consumption. In the interview, respondents reported all foods and beverages consumed in a prior 24-h period (midnight to midnight).

Chemical composition of food was analyzed using food composition databases. The collected data were coded and analyzed with a dietary assessment software. The results were compared with the daily nutrient recommendations for the corresponding age and gender of respondents.[10]

3.2. *Physical fitness assessment*

The European physical fitness test battery (Eurofit)[1] was used to assess physical fitness. Five tests that measure various components of fitness were performed: flamingo balance (general balance), sit and reach test (flexibility), standing-broad jump (explosive strength), sit-ups (trunk strength and endurance), and 10 × 5 m shuttle run (speed and agility). Results were assessed according to the Lithuanian Eurofit reference scales. Different components of physical fitness were analyzed as the number of fitness tests passed (scale ranging from 0 to 10).

3.3. *Weight status assessment*

Weight status was assessed in anthropometric measurements. Body height and weight were measured to calculate body mass index (BMI). Results were interpreted with the use of percentile charts for children.[4]

3.4. *Statistical analysis*

Statistical data analysis was performed with IBM SPSS Statistics for Windows, version 20.0. Results are presented as mean ± SD, minimum to maximum. Differences between groups were tested for statistical significance with Student's t-test. Statistical significance was set at $p < .05$.

4. Results

The analysis of daily food intake in adolescents aged 11–14 years of both genders showed that girls usually consume 1646.7 ± 718.1 kcal/day (recommendations for girls – 2200 kcal/day), boys consume slightly more – 1740.6 ± 770.0 kcal/day (recommendations for boys – 2420 kcal/day) (Table 1). This indicates that daily nutrition does not provide a sufficient amount of energy for adolescents: daily energy intake was too low in 64.0% of boys and 62.5% of girls. However, in 3.0% of boys and 10.0% of girls quantity of food calories consumed was too high.

The analysis of key nutrients in diet revealed that nutrition of most adolescents is not balanced. It was found that fat intake in both genders often exceeded the recommendations: 25% of girls and 20% of boys consume too much fat per day. Although