Research Article   **Open Access**

Correlation between Obesity, Diet, Physical Activity and Sedentary Behaviour among School-aged Children and Young Adolescents in Macedonia

Simovska-Jarevska Vera[1]* and Jakimoska–Jordanoska Rozida[2]

[1]Department of Technology and Technical Sciences-Veles, St. Kliment Ohridski University of Bitola, Macedonia

[2]Public Health Care Center, School of Medicine, Prilep, Macedonia

*Corresponding author: Simovska-Jarevska Vera, Department of Technology and Technical Sciences-Veles, St. Kliment Ohridski University of Bitola, Macedonia, Tel: +38978510780; E-mail: vera.simovska@uklo.edu.mk

Abstract

Diet and physical activity education in school-aged children and young adolescents are in the focus of the modern healthcare and education system. The aims of our cross-section study were to estimate the prevalence of obesity in youth, and the significant correlation between nutrition status, health behavioural and biological markers. The sample size was 400 randomly selected school-aged children and adolescent from 14 to 18 years old. They were divided into two population groups of school-aged children (12-13 years old) and young adolescent (17-18 years). Standardized, non-quantitative Food Frequency Questionnaire (FFQ) and the International Questionnaire for assessment of Physical Activity (IPAQ-short version) were used as well as the anthropometric measurements: body weight and height, body mass index (BMI kg/m^2) presented in percentile using the WHO Child Growth Standards. Statistical analysis was included descriptive statistics, Pearson Chi-square test and Logistic regression analysis using SPSS Statistics 17.0. In accordance with the distribution of Pearson Chi-square=16.94 ($p<0.001$), there was statistical significance between nutritional status of study participants in both, first and second study groups. Also, there was significant difference in high intensity sports activity between two groups (Pearson Chi-square=26.59; $p<0.001$). Sedentary behaviour had the highest influence on development of childhood obesity (Wald=2.81; $p=0.09$). Significant correlation was estimated between obesity and sweetness food (pasta, rise and potatoes), soft drinks, but drinking water had a protective effect. Prevention and treatment of pediatric overweight and obesity require systems-level approaches that include the skills of registered dietitians, sports coaches as well as consistent and integrated messages and environmental support across all sectors of society, especially educational sector. The next step is to develop an innovative "Skills for health" model including nutrition and physical activity education program in Macedonia.

Keywords: Diet; Physical activity; Sedentary behavior; Obesity; School-aged children; Education, National program

Introduction

Global computerization worldwide is a social phenomenon associated with the nutrition and health status of children and adolescents. Diet and physical activity education in school-aged children and young adolescents are in the focus of the modern healthcare and educational system [1]. The aims of our research were to estimate the prevalence of obesity in school-aged children and young adolescents, and the significant correlation between nutritional status, health behavioural and biological markers.

The first goal was to estimate correlation between children obesity, diet, physical activity/ inactivity, and the second goal was to confirm statistical significance between both groups, physically active and inactive.

The specific objective was to develop an innovative "Skills for health" model including nutrition and physical activity education program in Macedonia.

Material and Methods

The cross-sectional study examined the correlation between obesity, dietary habits and physical activity including sitting time. Standardized, non-quantitative, Food Frequency Questionnaire (FFQ) and the International Questionnaire for assessment of Physical Activity (IPAQ-short version) [2] were used as well as the anthropometric measurements: body weight and height, body mass index (BMI kg/m^2) presented in percentile using the WHO Child Growth Standards [3]. Some functional variables (arterial tension and pulse) and biochemical analysis included as biological markers (hemoglobin, erythrocytes).

The total sample was 400 randomly selected school-aged children and adolescent from 14 to 18 years old. They were divided into two population groups of school-aged children (12-13 years old) and young adolescent (17-18 years), with equal numbers of both genders: boys and girls, selected by blind choice. They have filled in questionnaires where the questions were divided in three main research fields:

1. Anthropometric data: Body height, weight, body mass index (BMI kg/m2) presented in percentile using the WHO Child Growth Standards

2. Food frequency questionnaires (FFQ) adapted from the approved standards with 72 different types of foods

3.   International Physical Activity Questionnaire (IPAQ)-short version.

Statistical analysis was included descriptive statistics, Pearson Chi-square test and Logistic regression analysis using SPSS Statistics 17.0.

Results and Discussion

Healthy Body Mass Index (BMI=18.5-24.9 kg/m^2) was estimated in 79% of all study participants. The prevalence of under nutrition was 4.25%, and the prevalence of overweight and obese was 16.75%.

In the first group of 200 school-aged children (14-15 years old), the prevalence of under nutrition was 0.5%, and 77% had a normal BMI (kg/m^2). 13% were overweight and 9% were obese of all study participants. In the same group, 82.5% had high intensity of physical activity, and 17.5% were physically inactive.

In the second group of 200 young adolescents (17-18 years old), the prevalence of under nutrition was 3.75%, and 40.5% of all participants had a healthy body weight. 3.75% was overweight and 2% was obese of all participants in this group. Nearly 60% had high intensity of physical activity and 40% was sedentary or physically inactive.

In accordance with the distribution of Pearson Chi-square=16.94 (p<0.001), there was statistical significance between nutritional status of study participants in both, first and second study groups.

Significant impact on development of child obesity had sitting time and moderate intensity physical activity per day. Significant correlation was estimated between obesity and sweetness food (pasta, rise and potatoes), soft drinks, but drinking water had a protective effect [4].

Statistical significance was estimated between children obesity and analyzed independent indicators for example level of physical activity including high, moderate and sedentary behavior (physical inactivity). In accordance with the distribution of Pearson Chi-square=26.59 (p<0.001) there was significant difference in high intensity sports activity between two groups. Sedentary behaviour had the highest influence on development of childhood obesity (Wald=2.81; p=0.09). The second factor was moderate intensity of physical activity (Wald score=0.39; p=0.53) and the highest level of physical activity has the lowest influence on development of obesity (Wald score=0.000; p=0.99).

Regarding to nutrition, diet with crisps, sweets and fizzy drinks were positive predicative indicators for children obesity. Drinking more water than fizzy drinks was negative predictive indicator for children obesity.

Conclusion

Prevention and treatment of pediatric overweight and obesity require systems-level approaches that include the skills of registered dietitians, sports coaches as well as consistent and integrated messages and environmental support across all sectors of society, especially educational sector to achieve sustained dietary and physical activity behavior change [5,6].

Secondary prevention should emphasize family-based, developmental appropriate approaches that include nutrition education and dietary counseling including physicians, parenting skills, behavioral strategies, and physical activity promotion programs for healthy lifestyle [7]. The next step is to develop an innovative "Skills for health" model including nutrition and physical activity education program in Macedonia [8].

References

1.   Simovska V (1993) The presence of risk factors for cardiovascular diseases in the family and early detection in their children. University of Belgrade, Medical Faculty, Belgrade. pp: 1-153.

2.   EU Action Plan on Childhood Obesity 2014-2020 (2014) European Commission: Brussels, Belgium.

3.   WHO Child Growth Standards (2006) Length/Height-for-age, Weight-for-age, Weight-for-length, Weight-for-height and Body Mass Index-for age. World Health Organization, Geneva.

4.   Williams J, Scarborough P, Matthews A, Cowburn G, Foster C, et al. (2014) A systematic review of the influence of the retail food environment around schools on obesity-related outcomes. Obes Rev 15: 359-374.

5.   Simovska V (2012) The effect of socioeconomic indicators on dietary habits, physical activity (PALs) and BMI kg/m2 in Macedonian youth. In: Book of Abstracts and Original Papers, The Vth Congress of Sports Medicine and Sports Sciences of Serbia with International participations, Belgrade.

6.   Food and Nutrition Policy for Schools (2006) A Tool for the Development of School Nutrition Programmes in the WHO European Region; WHO Regional Office for Europe: Copenhagen, Denmark.

7.   Simovska V, Damjanovksa M, Vidin M (2007) Skill for health development through teaching for physical and health education - a part of National Strategy / Programme for the promotion of health-enhancing physical activity in Republic of Macedonia. The Review for scientific and professional issues of physical culture Fizicka kultura 3: 99-103.

8.   Ministry of Education and Science of the Republic of Macedonia (2014) Expert Committee: National recommendation on nutrition standards for meals in primary schools in the country. MON, Skopje.