Activities in Physical Education and Sport
2017, Vol. 7, No. 1, pp. 104-106

OBESITY, DIET, PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR AMONG YOUTH IN THE REPUBLIC OF MACEDONIA

Preliminary communication

Jakimoska–Jordanoska Rozida[1] and Simovska Vera[2]
[1]Public Healthcare Center, Department for School Medicine, Prilep, Republic of Macedonia
[2]"St. Clement of Ohrid" University of Bitola, Study for Nutrition,1st May, Bitola, Republic of Macedonia

Abstract

Extensive research during the last few decades has identified that behavior risk factors such as unhealthy diet, inadequate physical activity, obesity and tobacco use are the main global targets in prevention of NCD's. The objectives of our cross-section study were to estimate the nutrition status among youth and the significant correlation between nutrition status and health behavior including dietary habits, physical activity levels and sedentary behavior. The sample size was 400 randomly selected school-aged children and adolescents from 14 to 18 years old. Standardized, non-quantitative Food Frequency Questionnaire (FFQ), the International Questionnaire for assessment of Physical Activity (IPAQ) - short version and the anthropometric measurements: body weight and height, and body mass index (BMI kg/m^2) presented in percentile using the WHO Child Growth Standards were used. Statistical analysis was included within descriptive statistics, Pearson Chi-square test and Logistic regression analysis using the SPSS Statistics17.0. There was significant difference in high intensity physical/sports activity between two groups. Sedentary behavior had the highest influence on development of childhood obesity. 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 overweight and obesity in youth require systems-level approaches that include the skills of registered dietitians/nutritionists, sports coaches as well as consistent and integrated messages and environmental support across all sectors of society, especially educational sector.

Keywords: *nutrition status, school-aged children, young adolescent, anthropometric measurements, Body mass index (BMI kg/m^2), Food Frequency Questionnaire (FFQ), Pearson Chi-square test, regression analysis, Food Frequency Questionnaire (FFQ),*

INTRODUCTION

The World Health Organization monitoring framework for NCD's points out that research of behavioral, social, economic and political determinants are important to provide guidance for policy legislative and financial measures (WHO A Comprehensive Global Monitoring Framework including indicators and a set of voluntary global targets for the prevention and control of NCD, 2012) (Declaration of First Global Ministerial Conference on Healthy Lifestyles and Noncommunicable Disease Control, 2011).

Combining behavioral, social and medical theories is the most practical approach to develop strategies and programmes for NCD's prevention and health promotion (Puska et al., 2009). A large number of NCD's such as cardiovascular disease (CVD), type 2 diabetes mellitus (T2DM) and certain types of cancer are preventable through modification of several strong causal behavioral risk factors. A cornerstone is the WHO Expert Report on Nutrition and Prevention of Chronic Diseases from 2002. Based on this background, the World Health Assembly in 2004 adopted the WHO's Global Strategy on Diet, Physical Activity and Health (WHO Global Strategy on Diet, Physical Activity and Health 2004). People's behaviors are significantly influenced by their social and physical environment.

Republic of Macedonia needs to address growing NCD's epidemic through health promoting partnerships, strategy and program. The first research study on health-risk behaviours among the Macedonian population was carried out in 2002 year (Simovska, 2005) using the locally adapted WHO CINDI Health Monitor questionnaire. Evidence has lead to initiatives to develop and implement a national intervention program for NCD's prevention and control and health promotion using the WHO CINDI Protocol in Republic of Macedonia with aim to change population behavior.

Nutrition and physical activity education of youth are in the focus of the modern healthcare and educational system (Position of the Academy of Nutrition and Dietetics: Interventions for the Prevention and Treatment of Pediatric Overweight and Obesity, 2013), (Simovska, 1993).

In 2016 the World Health Assembly welcomed the report of the Commission on Ending Childhood Obesity and its 6 recommendations to address the obesogenic environment and critical periods in the life course to tackle childhood obesity. The Assembly requested the Director-General to develop an implementation plan to guide the further action.

The aims of our research were to estimate the prevalence of overweight and obesity in school-aged children are

young adolescents, and the significant correlation between nutrition status, dietary habits, physical activity and sedentary behavior.

The first goal was to estimate correlation between the nutrition status, dietary habits and physical activity, and the second goal was to confirm statistical significance between two experiment 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 Republic of Macedonia.

METHODS

The cross-sectional study examined correlation between overweight and obesity, dietary habits and physical activity levels including the sitting time. Standardized, non-quantitative Food Frequency Questionnaire (FFQ) was originally designed to provide descriptive qualitative information about food-consumption patterns (Food and Nutrition Policy for Schools: A Tool for the Development of School Nutrition Programmes in the WHO European Region, 2006). International Questionnaire for assessment of Physical Activity (IPAQ) - short version was used like suitable questionnaire in our national and regional surveillance systems.

The anthropometric measurements included body weight and height, and body mass index (BMI kg/m^2) presented in percentile using the World Health Organization Child Growth Standards (WHO Child Growth Standards: 2006).

The total sample was 400 randomly selected school-aged children and adolescent from 14 to 18 years old. They were divided into two experiment 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/m^2) presented in percentile using the WHO Child Growth Standards;
2. Food frequency questionnaires (FFQ) of a list of 72 different types of foods and beverages. Data on diet from FFQs are compared with specific disease outcomes like overweight and obesity;
3. International Questionnaire for assessment of Physical Activity (IPAQ) - short version is able to give estimates of time spent in activities of various levels of intensity, and are able to rank participants in levels of reported activity as well as time spend in sedentary behavior (≤1.5METs) (Ainsworth et al., 2011). IPAQ- short version included light intensity physical activity (LIPA ≥1.5-3METs) or non-exercise physical activity and moderate-to-vigorous physical activity (MVPA ≥3METs). Physical inactivity also is defined as MVPA ≤30 min/day.

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

RESULTS

Body Mass Index in normal range (BMI =18.5-24.9 kg/m^2) was estimated in 79% of all study participants. The prevalence of undernutrition 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 undernutrition was 0.5%, and 77% had a normal BMI kg/m^2. 13% were with overweight and 9% were obese of all study participants.

In the same group, 82.5% had moderate-to-vigorous physical activity (MVPA ≥ 3METs), and 17.5% were physically inactive (≤ 3METs) with MVPA ≤ 30 min/day.

In the second group of 200 young adolescents (17-18 years old), the prevalence of undernutrition was 3.75%, and 40.5% of all participants had a healthy body weight. Also, 3.75% was overweight and 2% was obese of all participants in this group. Nearly 60% of all participants had moderate-to-vigorous physical activity (MVPA ≥ 3METs) and 40% time spent in sedentary behavior (≤1.5METs) or physical inactivity (≤ 3METs) with MVPA ≤ 30 min/day.

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

Significant impact on development of child obesity had sitting time and light intensity physical activity (LIPA ≥ 1.5–3METs). Significant correlation was estimated between obesity and sweetness food (pasta, rise and potatoes), soft drinks, but drinking water had a protective effect.

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

DISCUSSION

It is known that morbidity and mortality from main NCD's such as CVD, T2DM and certain cancer related to obesity can be prevented by changes in behavior risk factors associated with the lifestyle of the population, primarily the reduction of unhealthy diet and decreased PALs. Related to the physical inactivity, the WHO proposed target is 10% relative reduction in prevalence of insufficiently physically active youth and adults aged ≥ 18 year by 2025. (WHO A Comprehensive Global Monitoring Framework including indicators and a set of voluntary global targets for the prevention and control of NCD, 2012).

Concerning to clinical and epidemiology studies conducted in Republic of Macedonia, results have shown that reduced levels of physical activity were found in 50% of girls aged from 7 to 12 years independent of educational level in 2004 (Simovska, 2004).

The study results conducted in 2012 among 580 Macedonian school-aged children and adolescent with core range, those aged 10-18 years showed that higher income has an impact on the engagement in organized sports activeties and a low effect on participating in moderate intensity physical activities such as brisk walking and running as well as in MVPA such as cycling (Simovska et al., 2012). Also, the results showed that 59% of children and adolescent had moderate or high levels of physical activity such

as organized sports activities. Only 28% of them had low level of physical activity, especially girls.

From that reason, prevention and treatment of 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 (Simovska et al., 2012) (Food and Nutrition Policy for Schools: A Tool for the Development of School Nutrition Programs in the WHO European Region, 2006).

Secondary prevention should emphasize family-based, developmental appropriate approaches that include nutrition education and dietary counseling including physicians, parenting skills, behavior strategies including social media (Healthy Eating Apps, 2016) and physical activity promotion programs for healthy lifestyle (Simovska, Damjanovska, Vidin, 2007) (Williams et al., 2014).

CONCLUSION

The next step is to develop an innovative model including nutritional and physical activity education program in Republic of Macedonia (Simovska et al., 2014) (Simovska, Stojanovska, Vidin, 2005). Youth sports are a significant source of physical activity, contributing 23 to 60% of daily MVPA. Concerning to screen time recommendations for television and computers/computer games, school-aged children and youth should spend no more than 2 hours per day.

Interventions targeted at the individual level are not likely to be sufficient in addressing the adolescent obesity epidemic without changes in social norms and the environment (Pbert et al., 2016).

The strength of community-wide programs is to influence the community as a whole so that the desired behaviors are as easy as possible combining leadership with partnership (Puska et al., 2009).

REFERENCES

Ainsworth, B.E., Haskell, W.L., Hermann, S.D., Meckes, N., Bassett, D.R. Jr, Tudor-Locke C, … Leon, A.S. (2011). Compendium of physical activities: a second update of codes and MET values. *Medicine and Science in Sports and Exercise, 43*(8), 1575-1581.

Declaration of First Global Ministerial Conference on Healthy Lifestyles and Noncommunicable Disease Control, Moscow, 28-29 April 2011. URL: From: http://www.who.int/nmh/events/moscow_ncds_2011/conference_documents/moscow_declaration_en.pdf.

Food and Nutrition Policy for Schools: A Tool for the Development of School Nutrition Programmes in the WHO European Region (2006); WHO Regional Office for Europe: Copenhagen, Denmark. Available online: From: http://www.euro.who.int/__data/assets/pdf_file/0019/152218/ E89501.pdf (accessed on 10 May 2014).

Healthy Eating Apps. (2016). The beta version of high school nutrition program "Eat Move Win". From: www.EatMoveWin.org.

Puska, P. et al. (2009). *The North Karelia Project-From North Karelia to national action.* Publications of the National Institute for Health and Welfare, Helsinki: National Institute for Health and Welfare.From: http://www.thl.fi/thl-client/pdfs/731beafd-b544-42b2-b853-baa87db6a046

Pbert, L., Druker, R.S, Barton, B., Schneider, K.L., Olendzki, B., Gapinski, M.A., ... Osganian S. (2016). A School-Based Program for Overweight and Obese Adolescents: A Randomized Controlled Trial. *J Sch Health. 86*(10), 699-708. doi: 10.1111/josh.12428

Position of the Academy of Nutrition and Dietetics: Interventions for the Prevention and Treatment of Pediatric Overweight and Obesity. (2013). *Journal of the Academy of Nutrition and Dietetics*, *113*(10),1375-1394.

Симовска, В., et al. (2014*). Правилник за стандардите за исхраната и за оброците во основните училишта во Република Македонија* [National recommendation on nutriation standards for meals in primary schools in Republic of Macedonia. In Macedonian.] Скопје: Министерство за образование и наука на Република Македонија.

Симовска, В. (1993). *Присутни фактори ризика за развој кардиоваскуларних поремећаја у породици и њихово рано откривање у деце* [The presence of risk factors for cardiovascular diseases in the family and early detection in their children. In Serbian.] (Unpublished post-graduate subspecialist thesis, University of Belgrade). Београд: Медицински факултет.

Simovska , V. et al. (2012). Effect of socioeconomic indicators on dietary habits, physical activity (PALs) and BMI kg/m^2 in Macedonian youth. *Proceedings, Vth Congress of Sports Medicine and Sports Sciences of Serbia with International participation* (pp.19-21).Beograd: Udruženje sportske medicine.

Simovska, V., Damjanovska, M,, & Vidin, M. (2007). Skill for health development through teaching for physical and health education-a part of National Strategy/Program 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*(2), 99-103.

Simovska, V. (2004). Noncommunicable disease prevention and health promotion through physical activity. *Journal of Macedonian Medical Association, 57*(Suppl.60),30-35.

Simovska, V., (2005). *WHO CINDI Program, 2001-2005 (www.cindi.makedonija.com).* From: http://www.slideshare.net/IskraIskrena/cindihealthmonitorsurveyinmacedonia200220071,

Simovska, V., Stojanovska, V., Vidin, M. (2005). *Modern aspects of health education in the national education programme in the Republic of Macedonia. Proceedings, Ist International Symposium for Physical Education and Sport of Students* (pp. 69-70). Скопје: Факултет за физичка култура, Центар за физичко образование.

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

WHO A Comprehensive Global Monitoring Framework including indicators and a set of voluntary global targets for the prevention and control of NCD .(2012). Second WHO discussion paper. Retrieved March 22, 2012. from: http://www.who.int/nmh/events/2012/discussion_paper2_20120322.pdf

WHO Global Strategy on Diet, Physical Activity and Health. (2004). Geneva,World Health Organization. Retrieved May 11, 2012. from: www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf.

Williams, J., Scarborough, P., Matthews, A., Cowburn, G.., Foster, C., Roberts, N., …Rayner, M. A. (2014). Systematic review of the influence of the retail food environment around schools on obesity-related outcomes. *Obes. Rev., 15,* 359-374.

Corespondence:
Jakimoska–Jordanoska Rozida
Public Healthcare Center
Department for School Medicine
Prilep, Republic of Macedonia.
Email: jorjor21@yahoo.com