

## DIETARY HABITS AND LIFESTYLE OF URBAN ADOLESCENTS FROM TROGIR, CROATIA: A PILOT STUDY

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**Objective** - The research was undertaken to analyze the dietary habits and lifestyle of adolescents from Trogir, Croatia, and to determine the proportion of overweight subjects according to International Obesity Task Force (IOTF) standards.

**Subjects and Methods** - This pilot study was undertaken in 2009 on a sample of 497 adolescents aged 14-19 years, 322 of whom were girls (79%). The subjects filled out an anonymous questionnaire about their lifestyle and dietary habits and they were measured anthropometrically. The cut off value for overweight was defined according to IOTF standards and is equivalent to Body Mass Index (BMI) equal or higher than 25 kg/m<sup>2</sup> in adults.

**Results** - We detected gender differences in terms of lifestyle and dietary habits. Breakfast is equally often skipped by both boys and girls, but girls significantly often skip also lunch ( $p=0.050$ ) and dinner ( $p<0.001$ ). Boys consumed low-quality diet significantly more often than girls. While half of the population consumed olive oil daily, it can be said for less than 30% of girls and 40% of boys eat fresh fruit ( $p=0.018$ ). Number of boys and girls who smoke did not differ significantly but twice as much boys than girls consumed alcohol (48% vs. 24%,  $p<0.001$ ). On the other hand, boys were more often involved in out-of-school sports ( $p<0.001$ ). In this population, 22.8% of boys and 9% of girls had BMI  $\geq 25$  kg/m<sup>2</sup> for their age and sex.

**Conclusion** - This study results indicate the presence unhealthy lifestyle and dietary habits of the adolescents from Trogir, especially boys. Therefore, we will focus on planning the programme to elevate awareness regarding the importance and effect of healthy adolescents' lifestyle on decreased morbidity and mortality risk in the adulthood.

**Key words:** Lifestyle ▪ Dietary habits ▪ Physical activity ▪ Croatia

## Introduction

Over the past few decades obesity has become an increasingly important public health problem due to its direct and indirect effects on morbidity and even mortality in the population (1). The period of adolescence is one of the critical periods for the development of obesity (2). The growth of number of obese and overweight children and adolescents is taking on epidemic proportions, not only in the United States of America, but also in European countries (3), including Croatia (4). Excessive body weight in childhood and adolescence is linked with obesity in adults, but also the occurrence of cardiovascular and metabolic diseases in increasingly early twenties (5).

The approach to an overweight/obese child is complex for both experts and parents (6). The limitations of using medication therapy in the treatment of obese children are well known. In the attempt to resolve the growing problem of obesity in children and young people, increasing attention is being paid to optimal diet and a healthy lifestyle (7). Unhealthy dietary habits are significantly related to a higher Body Mass Index (BMI) (8). According to data from literature, young people have insufficient knowledge of healthy dietary habits (9, 10). The typical Mediterranean diet is thought to help to maintain or improve health: it is very rich in cereals, vegetables and fruit with a low content of meat, while the main source of dietary fat is olive oil (11).

The aims of this pilot study, conducted in Trogir, Croatia, a small coastal town where the majority of population still largely consumes a traditional Mediterranean diet, were to obtain and analyze data about lifestyle and dietary habits of the adolescent population (14-19 yrs). Additionally, we assessed the proportion of overweight adolescent boys and girls according to the IOTF cut offs (12). We presume that the analyses of the collected data could be a good starting point for planning and creating a national Croatian program to prevent obesity.

## Subjects and Methods

The study was conducted in Trogir, Croatia, in April 2009. The subjects were healthy pupils from the 1st to 4th grades of a high school (gimnazija) who were born and live permanently in Trogir, Croatia, where they also receive health care.

This pilot study was undertaken as part of a scientific project of the Ministry of Science of the Republic of Croatia, approved by the Ethics commission of the Medical Faculty of the University of Split. In the preparatory phase, the principals of the schools were first of all acquainted with the purpose and aims of the study, which were then explained directly to the pupils. A doctor undertook measurements of body mass and height, and conducted the survey of the pupils.

The questionnaire for this pilot study was constructed with the aim of obtaining basic indicators of the lifestyle and some dietary habits of Trogir adolescents. The subjects, by means of this anonymous questionnaire, answered questions about: the habit of skipping breakfast, lunch, supper (eating meals regularly in relation to skipping individual meals 3 or more times a week), participation in out-of-school sport activities (no/yes three or more times a week), history of daily or occasional cigarette smoking (yes/no) and consumption of alcoholic beverages at least once a week (yes/no). Dietary habits were analysed of daily consumption of: olive oil and fresh fruit daily, meat and fresh fish (at least three times a week), white bread, meat products, artificial fruit juice and vitamin drinks (Cedevita). Since this was a pilot study, due to the size of the sample and its possible dispersal, primarily qualitative and not quantitative characteristics were observed.

An unhealthy lifestyle was considered to include irregular meals (skipping breakfast, lunch or supper), consumption of alcoholic drinks, smoking and not taking part in out-of-school sporting activities. Unhealthy die-

tary habits were considered to be: daily consumption of white bread, artificial juices and vitamin drinks, and processed meat products 3 times a week. Healthy dietary habits were considered to be daily use of olive oil and consumption of fresh fruit, fish and meat three times a week.

The anthropological measurements were taken from all subjects in sports clothes, using digital scales with a Secca 2000 height measure. Body weight (BW) (kg) was measured to accuracy of 10 grams, and body height (BH) (cm) to accuracy of 1 mm.

The Body Mass Index (BMI) was calculated for each subject on the basis of the proportion of body weight and the body height squared ( $BMI = BW/BH^2$  kg/m<sup>2</sup>). Overweight was defined by an equivalent BMI of 25 kg/m<sup>2</sup>, for age and sex according to the International Obesity Task Force (IOTF) (12). Adolescents whose BMI was  $\geq 25$  kg/m<sup>2</sup> were considered overweight and adolescents whose BMI was less than 25 kg/m<sup>2</sup> were considered normal weight (not overweight).

Anthropological measurements and anonymous questionnaire were analysed in a total of 459 adolescents, 322 (70.15%) girls and 137 (29.63%) boys, which comprises about 60% of the adolescent population of Trogir (Only pupils of the high school/ (gimnazija) were included in the pilot study,

but not the vocational high school due to the better cooperation of the subjects). The average age of the subjects was  $16.7 \pm 1.2$  years (minimum 13.7; maximum 18.5 years). By examination of the medical documentation the doctor excluded from the study subjects with chronic non-infectious diseases (n=13) for which it was known that they could be a limiting factor for appropriate growth and development, and 25 pupils who were not at school when the measurements were taken were also excluded.

### Statistical analysis

The results are shown in the parameters of descriptive statistics. The differences in dietary habits and lifestyle by sex of the subjects were tested by the  $\chi^2$ -test for independent samples. The differences established were considered to be statistically significant at a level of significance of  $p < 0.05$ . The data were statistically processed using the Microstat program.

### Results

Boys and girls differed in terms of their lifestyle. Almost evenly they skipped breakfast three or more times per week, but girls avoided lunch ( $p=0.05$ ) and dinner ( $p<0.001$ ) more often (Table 1). They also differed significantly in regular out-of-school sports

**Table 1** Lifestyle of male (n=137) and female (n=322) adolescents in Trogir, Croatia

Lifestyle	Boys n (%)	Girls n (%)	p*
Unhealthy			
Skipping breakfast (three times per week)	67 (48.5)	161 (51.1)	0.616
Skipping lunch (three times per week)	29 (21.2)	94 (30.1)	0.050
Skipping dinner (threetimes per week)	42 (30.9)	204 (64.3)	<0.001
Alcohol drinks (once a week)	66 (48.2)	80 (24.8)	<0.001
Smoking (every day)	83 (25.8)	27 (19.8)	0.216
Healthy			
Out of school sports (3 times per week)	38 (27.9)	36 (11.1)	<0.001

\*Chi square test, derived from a clinical questionnaire.

**Table 2** Dietary habits in male (n=137) and female (n=322) adolescents from Trogir, Croatia

Dietary habits	Boys n (%)	Girls n (%)	p*
<b>Unhealthy habits</b>			
White bread (every day)	122 (90.4)	234 (72.3)	<0.001
Artificial juices (every day)	110 (79.7)	226 (70.6)	0.044
Vitamin drinks (every day)	55 (42.31)	103 (32.5)	0.049
Meat products (3 times per week)	58 (43.9)	77 (24.5)	<0.001
<b>Healthy habits</b>			
Olive oil (every day)	76 (55.9)	152 (48.1)	0.129
Fresh fruit (every day)	82 (59.4)	225 (70.7)	0.018
Meat (3 times per week)	48 (35.6)	92 (29.1)	0.176
Fish (3 times per week)	9 (6.6)	18 (5.6)	0.695

\*Chi square test, Derived from a clinical questionnaire.

activities ( $p < 0.001$ ). Every second boy and every fourth girl reported to consume alcohol at least once a week ( $p < 0.001$ ). There were no gender differences in terms of their daily smoking habit (19.8% v. 25.77%).

We also detected differences in dietary habits of boys and girls (Table 2). Boys reported to consume white bread ( $p < 0.001$ ), meat products ( $p < 0.001$ ), manufactured fruit juices ( $p = 0.044$ ) and vitamin drinks ( $p = 0.049$ ) more often than girls. Every day consumption of white bread is reported by more than 90.4% boys and 72.3% girls ( $p < 0.001$ ).

In contrast, girls eat fresh fruit more often than boys ( $p = 0.018$ ). Considering the other food included in the questionnaire, habit of eating meat at least thrice a week is reported in approximately one third of both boys and girls, while equally often consumption of fish is reported in only 6 to 7% of girls and boys, respectively. Half of the adolescent population consumed olive oil daily. In the population covered by the study, 22.8% ( $n = 30$ ) of boys and 9% ( $n = 29$ ) of girls had BMI  $\geq 25$  kg/m<sup>2</sup> for their age and sex. Boys and girls differed significantly in terms of the distribution of normal weight and overweight ( $\chi^2 = 15.86$ ;  $p < 0.001$ ).

## Discussion

The results of this pilot study indicate the unhealthy lifestyle and dietary habits of adolescents in a small Dalmatian town Trogir in Croatia. The unhealthy lifestyle of the adolescents is seen in skipping meals, low levels of inclusion in out-of-school sporting activities and widespread use of alcoholic drinks and smoking.

In childhood and adolescence (un)healthy dietary habits are formed, but also lifestyle in general (13). The positive effects of a Mediterranean diet are well-known for healthy individuals and the population (14). Optimal nutrition has a significant effect on growth and development but it is also one of the important aspects of prevention of obesity.

The results obtained of the analysis of the dietary habits of young people in this Dalmatian town show that olive oil is used daily by half the population, whilst only 5 to 6% of them eat fish three times a week. Although the results regarding daily consumption of fresh fruit in this population were somewhat better than the results from literature (15), it should be pointed out that various artificial juices are consumed every day by as many as 70 to 80% of young people, whilst more than

90% of them eat white bread. During adolescence, boys and girls often have a different attitude towards their body weight, probably more from aesthetic than health reasons. The results on the lower frequency of overweight in the population of girls, and their habits of eating more fresh fruit, less white bread and meat products than the boys, support this view.

The results obtained may be explained by the insufficient knowledge of the population about the importance of a "healthy" diet for current and future health, but may also be seen through the relatively limited economic circumstances in the environment in which the study was conducted. Almost half the observed population of adolescents do not eat breakfast, one third of boys and almost two thirds of the girls do not eat supper, and one fifth of the boys and one third of the girls skip lunch three or more times a week. Previous studies in the same population (16) as well as the results of Timlin et al. (17) confirmed the significant connection between the habit of skipping breakfast and BMI values. On the other hand, by skipping breakfast they lose one quarter to a third of the necessary daily intake of energy, which can also lead to the development of malnutrition (18).

A sedentary lifestyle is also considered to be one of the risk factors for the development of obesity (19). In the population studied, only 28% of boys and 11% of girls are involved in some form of out of school sporting activities, which naturally leaves room for intensive promotion of engagement in sport, not only in order to prevent obesity (20), but as a desirable lifestyle in general (21).

A consumption of alcohol during adolescence correlates with the consumption of alcohol in adulthood and its harmful effects on the function of various organs (22). Boys and girls in the population studied do not differ significantly in terms of the frequency

of consumption of alcohol in relation to developed countries (23).

It should be pointed out that about 19.8% of the girls and 25.8% of the boys smoke every day while among Greek female students prevalence was 50.8%, and prevalence among male was 43.8% (24). The social environment has a significant effect on the formation of attitudes about the harmfulness of smoking which should be emphasized in preventive programs in the population studied here too (24).

Although the results of this pilot study are local in character and the frequency of obesity is lower than in other Mediterranean areas for instance (26), they indicate the need for additional involvement by experts in the form of education of adolescents and their parents in order to recognize the growing problem of obesity and the importance of forming a healthy lifestyle and dietary habits for a healthy adult population. Programs of intervention should especially be aimed at boys since they are significantly more frequently overweight and have more unhealthy dietary habits than girls.

This pilot study is in line with the results of other research which point out a healthy lifestyle and dietary habits in young people as factors which may contribute to a reduction in morbidity and mortality in adults (27, 28, 29) and therefore may be taken as a starting point for regional and even national research into the lifestyle and dietary habits of adolescents.

## Conclusion

The obtained results indicate the presence of unhealthy lifestyle and dietary habits in Trogir adolescents. Boys and girls differ in their eating habits and lifestyle. It is vital to educate adolescents more about the importance of regular meals and the need for out-of-school sporting activities, and the harmfulness of

consuming alcoholic beverages and smoking. Although the rate of overweight in these adolescents is one of the lower ones recorded in literature, it is still necessary to point out that overweight is a potential problem, especially amongst the boys in this population.

#### Authors' contributions:

Conception and design: IB; Acquisition, analysis and interpretation of data: IB, DM and HT; Drafting the article IB and HT; Revising it critically for important intellectual content: IB and HT.

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## References

1. Lawlor DA, Chaturvedi N. Treatment and prevention of obesity - are there critical periods for intervention? *Int J Epidemiol.* 2006;35(1):3-9.
2. Dietz WH. Critical periods in childhood for the development of obesity. *Am J Clin Nutr.* 1994;59:955-9.
3. Lissau I, Overpeck MD, Ruan WJ, Due P, Holstein BE, Hediger ML; Health Behaviour in School-aged Children Obesity Working Group. Body mass index and overweight in adolescents in 13 European countries, Israel, and the United States. *Arch Pediatr Adolesc Med.* 2004;158(1):27-33.
4. Antonić Degač K, Kaić Rak A, Mesaroš-Kanjski E, Petrović Z, Capak K. Stanje uhranjenosti i prehrambene navike školske djece u Hrvatskoj. *Pedijatr Croat.* 2004;48:9-15.
5. Burke V, Beilin LJ, Simmer K, Oddy WH, Blake KV, Doherty D, et al. Predictors of body mass index and associations with cardiovascular risk factors in Australian children: a prospective cohort study. *Int J Obes (Lond).* 2005;29(1):15-23.
6. Muris P, Meesters C, van de Blom W, Mayer B. Biological, psychological, and sociocultural correlates of body change strategies and eating problems in adolescent boys and girls. *Eat Behav.* 2005;6(1):11-22.
7. Matthews VL, Wien M, Sabate J. The risk of child and adolescent overweight is related to types of food consumed. *Nutr J.* 2011;24;10(1):71.
8. Toselli AL, Villani S, Ferro AM, Verri A, Cucurullo L, Marinoni A. Eating disorders and their correlates in high school adolescents of Northern Italy. *Epidemiol Psichiatr Soc.* 2005;14(2):91-9 .
9. Chemperek E, Zolnierzuk- Kieliszek D, Plowas M. Knowledge of rules of healthy lifestyle and their realization among students of junior and senior high schools. *Ann Univ Mariae Curie Sklodowska [Med].* 2004;59(1):24-31.
10. Hassapidou M, Fotiadou E, Maglara E, Papadopoulou SK. Energy intake, diet composition, energy expenditure, and body fatness of adolescents in northern Greece. *Obesity (Silver Spring).* 2006; 14(5):855-62.
11. Barbagallo CM, Cavera G, Sapienza M, Noto D, Cefalù AB, Polizzi F, Onorato F, et al. Nutritional Characteristics of a Rural Southern Italy Population: The Ventimiglia di Sicilia Project. *Journal of American College of Nutrition.* 2002;21(6):523-9.
12. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ.* 2000;320:1240-43.
13. Lien N, Lytle LA, Klepp KI. Stability in consumption of fruit, vegetables, and sugary foods in a cohort from age 14 to age 21. *Prev Med.* 2001;33:217-26.
14. Lazarou C, Panagiotakos DB, Matalas AL. Level of adherence to the Mediterranean diet among children from Cyprus: the CYKIDS study. *Public Health Nutr.* 2009;12(7):991-1000.

15. World Health Assembly global strategy on diet, physical activity and health. Resolution WHA55.23. Geneva, World Health Organization, 2002.
16. Bralić I, Kovačić V. Social and behavioural determinants of body mass index among adolescent females in Croatia. *Public Health*. 2005;119(3):189-91.
17. Timlin MT, Pereira MA, Story M, Neumark-Sztainer D. Breakfast eating and weight change in a 5-year prospective analysis of adolescents: Project EAT (Eating Among Teens). *Pediatrics*. 2008;121(3):638-45.
18. Chitra U, Reddy CR. The role of breakfast in nutrient intake of urban schoolchildren. *Public Health Nutr*. 2007;10(1):55-8.
19. Hancock JR, Poulton R. Watching television is associated with childhood obesity: but is it clinically important? *Int J Obesity*. 2006;30:171-5.
20. Boutelle K, Neumark-Sztainer D, Story M, Resnick M. Weight control behaviors among obese, overweight, and nonoverweight adolescents. *J Pediatr Psychol*. 2002;27(6):531-40.
21. Suris JC, Parera N. Don't stop, don't stop: physical activity and adolescence. *Int J Adolesc Med Health*. 2005;17(1):67-78.
22. Crabbe JC, Harris RA, Koob GF. Preclinical studies of alcohol binge drinking. *Ann N Y Acad Sci*. 2011;1216:24-40.
23. Centers for Disease Control and Prevention (CDC). Vital signs: binge drinking among high school students and adults --- United States, 2009. *MMWR Rep*. 2010;59(39):1274-9.
24. Nikolakopoulou NM. Prevalence of smoking among Greek students: A short report. *Int J Adolesc Med Health*. 2008; 20(3): 283-284.
25. Lazuras L, Rodafinos A, Eiser JR. Adolescents' support for smoke-free public settings: the roles of social norms and beliefs about exposure to secondhand smoke. *J Adolesc Health* 2011;49(1):70-5.
26. Serra-Majem L, Aranceta Bartrina J, Pérez-Rodrigo C, Ribas-Barba L, Delgado-Rubio A. Prevalence and determinants of obesity in Spanish children and young people. *Br J Nutr*. 2006;96(Suppl 1):67-72.
27. Neumark-Sztainer D, Wall M, Larson NI, Eisenberg ME, Loth K. Dieting and disordered eating behaviors from adolescence to young adulthood: findings from a 10-year longitudinal study. *J Am Diet Assoc*. 2011;111(7):1004-11.
28. Nikolakopoulos KM, Nikolakopoulou NM. Dietary habits and physical activity in youth. *Int J Adolesc Med Health*. 2009; 21(2):197-201.
29. World Health Organization. Health policy for children and adolescent, Health behaviour in school-aged children international report from the 2005/2006 survey, 2008.

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