Assessment of Dietary Carbohydrate Intake of the Iasi School Children Aged 7-10 Years

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The aim of this study was to evaluate the carbohydrate intake of school children aged 7 to 10 years. With this end in view, a questionnaire on the amount and frequency of consumption of high-carbohydrate foods and beverages was administered to 205 school children aged 7 to 10 years. Data were analyzed using SPSS 15.0. Of these children 87.3% enjoyed eating sweets, without gender and socio economic status differences. The consumption of sweets between meals was a food habit in both rural (72.2%) and urban children (62.6%).The frequency of sweet food and drink consumption was of over 3 times daily in 61.7% of the children. 69.4% of children consumed carbonated drinks every day. Children exposure by frequent consumption of large amounts of sweet foods and beverages is an important risk factor for dental caries and obesity. Controlling carbohydrate consumption through nutritional counseling is essential for improving overall and oral health.

Keywords: Carbohydrates, dental caries, obesity, nutritional counseling

Proper nutrition is an essential factor related not only to overall physical and mental health but also to oral health. Nutritional factors are directly involved in the etiology and progression of oral diseases and represent a significant risk factor among children, adults and elderly[1].

The strategies for oral disease prevention recommended by the World Health Organization focus on promoting healthy lifestyle and reducing risk factors to oral health that arise from environmental, economic, social, and behavioral causes. These goals can be achieved if health services are more oriented towards primary care and prevention [2].

The influence of carbohydrate intake on the caries process has been a subject of research and debate for over100 years. In this regard, establishing a relationship between the consumption pattern of a particular type of food (sugars) and dental caries in time periods and different geographic regions is relevant evidence in public health [3].

Dietary controlis anessentialmethod for dental caries prevention together withthe use of fluorideby general and topical routes, mechanical and chemical control of bacterial plaque and sealing of dental grooves and fissures, promoted through sustained oral and general health education. Adequate exposure to fluoride has a significant effect on dental caries prevention by increasing tooth resistance, but it does not eliminate caries unless there is a reduction in carbohydrate intake[4].

Nutritional factors associated with a significant risk for dental caries include the amount and frequency of fermentable carbohydrate consumption, intake frequency of sugar-sweetened beverages, time required to consume sweet foods and acidic drinks and when they are consumed.

Experimental part

A study based on a questionnaire given to 205 school children aged 7 to 10 years (classes I-IV) was initiated in 7 schools in Iasi, Romania. Of these, 57.3% were girls and 42.7% boys. The questionnaire included 10 questions about the amount and frequency of carbohydrate intake (table 1). Data were analyzed by gender, socioeconomic status and place of residence, using SPSS 15.0. The study was conducted between September 2014 and February 2015,with the agreement of the Iasi county School Inspectorate.

The study group consisted of 205 children (57.5% girls and 42.5% boys). As to the area of residence, 83.9% were

Table1

QUESTIONNAIRE FOR ASSESSING THE CARBOHYDRATE INTAKE IN CHILDREN

Nr. crt.	Question
1.	Do you like sweets?
2.	What kind of sweets do you like more?
3.	What time of day you eat sweets?
4.	How many times a day you eat sweets?
5.	Do you snack between meals?
6.	How often per day do you snack between meals?
7.	Do you eat sweets as snacks between meals?
8.	Do you enjoy sweet carbonated drinks?
9.	How often a day you drink sweet carbonated drinks?
10.	What time of day you drink sweet carbonated drinks?

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urban and 16.1% rural children. The structure of the study group according to socio economic status based on parental income (SES) was: high in 25.8%, average in 57.9%, and low in16.3% of the study children.

Results and discussions

The results revealed that87.3% of the children enjoyed eating sweets without gender (89.2% girls and 85.5% boys) and socio economic status differences (fig. 1). In relation to their place of residence,72.6% of urban children compared to 75.8% of rural children reported preference for sweets.

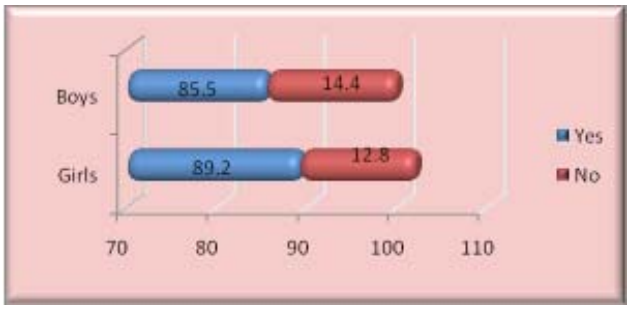

Fig. 1. Gender-related preference for sweets in the study group

Carbohydrates are the most important dietary factor involved in the etiology of dental caries and of other severe general diseases, such as obesity and diabetes. The comparative importance of the frequency and amount of consumed sugars is difficult to assess, the two variables being equally associated with the caries risk [5].

It has been demonstrated that the main source of carbohydrates in children diets, both boys and girls, is represented by concentrated sweets and non-diet carbonated sweetened soft drinks, the second most important source being pastries.

One third of the subjects consumed sweets at lunch (33.4%) and 55.6% between meals. 27.1% of boys and 26.3% of girls said they only eat sweets between meals (fig.2).

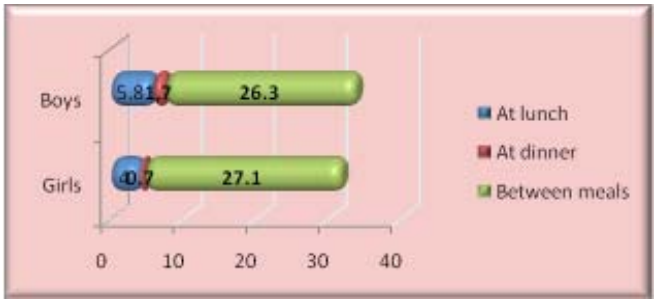

Fig. 2 . Gender-related moment of sweet consumption

Our results confirm the literature data on the unhealthy eating habits among children with respect to the consumption of sweet foods and carbonated soft drinks [6, 7]. The increased frequency of carbohydrate intake is associated with a drastic decrease in oral *p*H, exceeded buffering capacity of saliva, repeated acid attacks on dental structures, and initiation of caries process.

Snacks were consumed between meals by 84.6% of subjects. *Eating sweet foods as snacks* was the choice of most subjects (69.5%).A higher proportion of rural children(77.2%) used to eat sweets between meals compared with urban children (67.6%). The vast majority of subjects in the average and high socio economic status groups reported eating sweets between meals (fig. 3). The number of daily carbohydrate intakes was over 3 times a day in 61.7% of children.

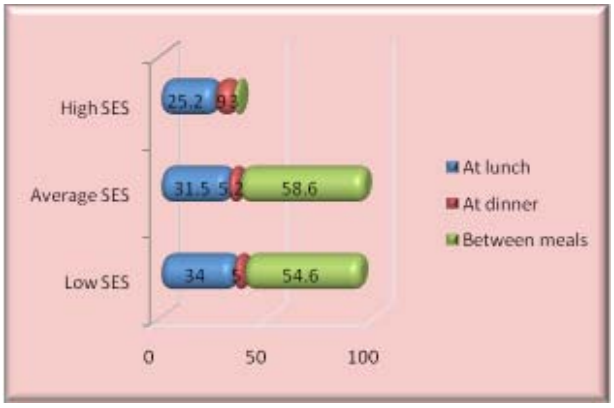

Fig.3. Moment of sweet consumption by socioeconomic status

Sweet carbonated drinks wereconsumed everyday both during meals and between meals by 70.4% of children and at least once a day by 78.3% of subjects, with no significant gender and socioeconomic status differences.Sugary drinks, such as fresh fruit juices, soft drinks (including diet and sport drinks), alcoholic beverages in different combinations and some herbal teas are associated, besides caries risk, with dental erosion, closely related with exposure time.

Dental caries is theresult of fermentation process, enamel demineralization being initiated by strong organic acids (lactic, pyruvic and formic). Stephan showed in his studies in the early 1940s that sucrose causes a drastic drop in pH due to the rapid acid production in dental plaque followed by a slow recovery (Stephancurve), thus demonstrating with certainty a causal relationship. However, the relationship between carbohydrate intake and dental caries is difficult to quantify because of the limitations inherent to under- or over-reporting by subjects of their eating habits in relation to sugar androle of several factors influencing the prevalence of dental caries, including the mineral content of the diet (calcium fluoride, phosphorus), oral hygiene habits and oral health educational level [8]. Synthesis studies in the literature also show that the relationship between carbohydrates and oral health is a dynamic one based on eating patterns, composition and presentation form of foods, length of*time*that*teeth*are *exposed to sugar,*and quality of saliva. At the same time, other factors important in preventing dental caries have to be considered, such as the use of using topical fluoride in the form of toothpaste, fluoride content in drinking water and oral hygiene habits [9].

Dentists have the major responsibility of providing nutrition counseling to his/her patients encouraging them to reduce the intake frequency of sugary foods and drinks and to eat a diet rich in vegetables and fruits and drink water and milk in order to ensure an adequate and balanced diet[10].

Conclusions

The results of this study demonstrate the need to initiate actions of nutrition counseling of children and their parents on the amount, content and frequency of consumption of sweet foods and drinks, essential for preventing dental caries and improving general health.

References

1.*** Tokyo declaration on dental care and oral health for healthy longevity .World Congress 2015.http://www.who.int/oral_health/tokyodeclaration032015/en/. Accessed : 28 Apr. 2015

2.CROWE, M., BLACKWELL, D., DALTON, M.,O'REILLY, E.D. HOURIHAN, F. Journal of the Irish Dental Association,57, no.4, 2011, p.191.

3.SHEIHAM,A. Public Health Nutrition, no. 4, 2001, p. 569.
4.MOYNIHANP.J. British Dental Journal, no. 193, 2002 ,p. 563.
5.BURT, P.A., PAI, S. J. Dent. Educ., 65, no. 10, 2001, p.1017.
6.GREGORY, J., LOW, S., BATES, C.J., National Diet and Nutrition Survey: young people aged 4–18 years. Vol. 1: report of the diet and nutrition survey London: HMSO 2000.
7.AMARAL, R.C., SCABAR, L.F., SLATER, B., FRAZÃO, P.J.Appl. Oral. Sci.,22, no.5, 2014, p. 416.
8.TOUGER-DECKER R., LOVEREN C., Am. J.Clin.Nutr. ,78, no. 4, 2003, p.881.
9.BURT, B., PAI, S., Is sugar consumption still a major determinant of dental caries? A systematic review. In: Consensus Development Conference on diagnosis and management of dental caries throughout life. Bethesda, MD: NIH, 2001.
10.BÂRLEAN, L., DĂNILĂ, I., SĂVEANU, I.,BALCOŞ, C.,Prevenţie Oro-Dentară. Ed."Gr.T.Popa" U.M.F.Iaşi 2012

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