

# Prevalence of Dental Caries in Children between 6 and 18 Years from City Sofia

Djema Grozdanova

Department of Public dental health, Faculty of Dental Medicine - Sofia, Medical University – Sofia, Bulgaria

Address for Correspondence:  
Dr. Djema Grozdanova  
E-mail: j\_grozdanova@abv.bg

**Abstract:** ***Aim:** To determine the incidence of dental caries among a representative group of children at the age between 6 and 18 years from Sofia. **Materials and Methods:** The study includes 445 children who were assessed the prevalence of dental caries index of Klein, Palmer & Knutson (1938) - DMFT, taking into account the total number of teeth that are with caries (D), missing (M) or with restoration (F) for each individual. **Results:** The results showed that 67% aged between 6 and 12 years, and 70% of 13-18 years have been diagnosed with caries. The value of the index DMFT in both groups is from 1.88 to 3.6. Free from the caries are 33% and 30% from both groups. **Conclusion:** The number of children free of caries is still far from the number of those in the developed countries. The results show the need of preventive measures in order to improve dental health in children.*

**Keywords:** DMFT index; dental caries; children.

## 1. Introduction

Pediatric oral health care is part of the health policy in Bulgaria. Its realization includes legislative, economic and social measures involving dentists, parents and teachers. Some of the tasks, included in the European 2020 health strategy involve improving the system for collecting data about caries prevalence and periodontal diseases. The components of this system are: administration, research, quality and performance, recording and analyzing patients' oral status [1].

## 2. Aim

To estimate the total number of caries cases among a representative group of children between the age of 6 and 18 years, from Sofia.

## 3. Materials and Methods

The study includes 445 children (169 children aged 6-12 years and 276 children aged 13-18) from three schools located in the central part of Sofia. The spread of caries was estimated by using the index of Klein, Palmer & Knutson (1938) - DMFT. The criteria of WHO for diagnosis of the hard tooth structures (WHO Oral Health Surveys Basic Methods Geneva, 1997) were met as well as the standards for infection control. Dental mouth mirror and sterile gloves were used under optimal artificial light.

All students' parents were required to sign inform consents. The ethical standards for medical research on humans, included in the Declaration of Helsinki of the World Medical Association approved by the 18th World Medical Assembly-Helsinki, Finland, 1964 and last amended by the 52nd General World Medical Assembly, Edinburgh, Scotland, 2000 were met.

The information recorded in individual files that included the age and sex of the student as well as the total number of teeth, affected by caries. The collected data was analyzed and indexes were estimated: "Number of patients, affected by caries" - Ep, "number of teeth per patient affected by caries"-Et, intensity of dental caries-DMFT. Statistical data processing was performed by software SPSS for Windows 7.

## 4. Results

The range of patients, affected by caries, is a key indicator in the study of caries. Table 1 shows the results obtained from the study, showing the number of patients affected (Ep).

**Table 1:** Distribution of caries in persons (Ep) by age and sex

Reviewed students	sex	
	6-12 age	13-18 age
Boys	53%	53%
Girls	56%	53%
Total	54,5%	53%

It is clear that boys in both groups are equally affected. With the girls from the group of 6-12 the percentage is higher than that of the 13-18 year olds. The results are disturbing because in both age groups, more than half of the students are affected by caries.

The ratio between caries-affected teeth and all examined teeth are presented in Table 2.

**Table 2:** Distribution of caries in teeth (Et) by age and sex

Reviewed students	Number of teeth 6-12 age	Decayed teeth (D) 6-12 age	Number of teeth 13-18 age	Decayed teeth (D) 13-18 age	% Decayed teeth 6-12 age	% Decayed teeth 13-18 age
Boys	2851	187	2892	402	6,6%	13,9%
Girls	1302	84	5088	524	6,4%	10,3%
Total	4153	271	7980	926	6,5%	12,1%

In 6-12 year-olds, the average rate was 6.5% and for 13-18 year-olds is 12.1%. The conclusion is that with the increase of age the number of teeth affected by caries also increases.

Table 3 presents the intensity of tooth decay in children observed in the study.

**Table 3:** DMFT index in children between 6-18 years

Reviewed students	Number of students 6-12 age	Number of students 13-18 age	Decayed teeth 6-12 age	Decayed teeth 13-18 age	DMFT 6-12 age	DMFT 13-18 age
Boys	117	100	178	423	1,5	4,23
Girls	52	176	118	524	2,26	2,98
Total	169	276	296	947	1,88	3,6

The results show that the value of the index DMFT in the group 13 -18 is twice - higher than the value of the same index in 6 -12. This clearly shows the trend of deterioration of the students' oral health with increasing of age. In the first age group (6-12 years) values for girls were higher compared to the values in boys. In the second age group (13-18) was observed inverse relation. Higher values were observed in boys, which can be explained with the entering in puberty and neglecting of oral hygiene care.

Table 4 presents the incidence of caries in 12-years-old children.

**Table 4:** DMFT index in children of 12 years

Reviewed students	Decayed teeth (D)	Teeth with filling (F)	Missing teeth (M)	DMFT
94	90	71	0	1,7

The value of DMFT in 12-year-old patients examined in this study was 1.7. For comparison, the value of DMFT in 12 year olds, examined in the framework of the National Program for prevention in the period 2009-2014, was 5.65.

## 5. Discussion

Oral health is included in the "Strategy against chronic diseases in Europe" [2]. Work on the policies of prevention is aimed at training in oral hygiene and the use of daily basic methods - brushing twice a day with fluoride toothpaste, use of dental floss for clean interdental spaces, balanced diet, sugar-free gum and regular visits at the dentist's office [2]. A priority is to encourage the communication between patients and dentists [2, 3].

The time between the ages of 6 and 18 years is one of the most important periods for oral health. This is the time during which students learn basic facts and rules for maintaining good dental health. In this process they need the help of their parents, teachers and dentists to learn, reinforce and apply their knowledge in the prevention of oral diseases and oral hygiene [4].

Dental care in Bulgaria after 2000 is characterized by the absence of effective prevention programs involving children and students, leading to aggravation of the negative trends in oral health in all age groups.

Peneva and colleagues did a research, which showed that six-year-old children had an average of 6 advanced caries cases and 4 primary. Affected teeth were 34% and gradually increasing with age, as the lighter carious lesions are becoming more severe and reversible become irreversible over time, due to the worsening conditions of the oral environment [5]. 80% of children at the age of 12 are affected by caries. The intensity of dental caries - DMFT is 4.3 which mean that a child has an average of 4.3 permanent teeth affected by caries. The data refers to cases of advanced caries. If we include the teeth with enamel caries, which is reversible, the data would show an average of 7 affected teeth. Every fourth 18 years-old has one permanent tooth removed [5]. Reports show that in Bulgaria prophylaxis is confined to preventive examinations and nothing else. Sealing of fissures is almost not applied, oral hygiene is extremely neglected, no remineralizing procedures are being done [4,6,7,8].

By 2012 Bulgaria has no national statistics, only some data, obtained from individual researches. In 1995 Marteler, in his report, presents data for Bulgaria - 3.1 DMFT for 12 year-olds. In this report there's no author and source for the data quoted [9]. Epidemiological studies on dental caries performed in the city of Plovdiv show a constant reduction in the number of 12 year-old children, affected by caries [6,7,8].

For comparison, the value of DMFT in 12 year-olds examined during the National Program for Prevention in 2009-2014 was 5.65. Within this program 360 children from Sofia were divided into three target groups, each consisting of 120 children - 6 years old, 12 years old and 18 years old. Each group had an equal number of boys and girls (60-60). The tests were carried out in 2010. The children were selected randomly from all regions of Sofia. The study showed big difference between the children living in the central part of the city and those from the suburbs - 1.7-5.6.

Current understanding of the nature of dental caries as a multifactorial disease and as a process that if left without control may occur and develop at any age and social group, requires persistence and implementation of prevention programs, even in countries which have achieved real control over the disease [2,10]. This control requires complex measures, including a risk assessment of dental caries, instructions for healthy behavior and professional oral health care by general dentists [10].

For the last 15 years the initial caries prevention has been given a high priority in the work of dentists [2, 10]. The aim is to increase resistance of hard dental structures and especially the one of the enamel by remodeling the oral environment and creating prevention programs, thus influencing risk factors responsible for caries development. With significant importance are the monitoring of the carbohydrate intake, local application of fluoride, sealants and remineralizing agents [2]. Decrease in the prevalence of dental caries was achieved in Western Europe, North America, Canada, Australia, New Zealand and Japan. For example, in France the average number of teeth, affected by caries in 12-years-old children dropped from 4.2 in 1987 to 1.2 in 2006. In Denmark and Finland the DMFT index in 1975 was 5.2 - 6.9, decreasing to 0.7 in 2008 - 2009 [4]. Decrease in the prevalence of dental caries in the above-mentioned regions and countries have been achieved as a result of the continuous application of the programs for the prevention of oral diseases. The progress in terms of dental health in France in recent years has been directly related to the application of mass and individual prevention. Golden rules to be followed are: development of diets which include the so called "Sugar-free" products; the trend in increasing market for brushes and toothpaste; the increased role of fluorine; increased activity of dentists; training and increasing awareness of teachers and medical staff; creation and distribution of educational materials in schools and in dental clinics and offices, initiating screening procedures and programs, to make sure that each and every child takes responsibility for his own dental and oral health [4].

At the same time in Eastern Europe the number of children, affected by caries remains high. For example, in 1996 in Latvia the average number of teeth affected by caries was 7 in Poland - 5.1 in Hungary and Croatia - 4.1 [11].

In Bulgaria the issue of the spread of dental caries in children with disabilities is very poorly examined. These children are part of the child population, but remain outside of the programs for active prevention and treatment of oral diseases. There is only limited information about the health knowledge and the level of oral hygiene habits in children with impaired hearing [12,13,14]. Dealing with the fear factor is an important part of the treatment of these children [15]. One of the major risk factors for the development of dental caries in children with autism is the maintaining of good oral hygiene [16].

WHO resolution of 2007 from the 60th World Assembly on Health recognizes the close link between oral health,

general health and quality of life. The need to include programs for promotion of oral health and prevention of oral diseases into programs for integrated prevention and treatment of chronic diseases was underlined [17].

The cost of treatment of dental caries can cost the entire child health funding of a country [18]. The "price" of the negligence of the problem is also high, both financially and in personal and social aspect [19]. It has been shown that oral diseases can be controlled and even eliminated largely through education and prevention initiatives, which in turn would lead to a reduction in public expenditure for treatment of children and students [20].

Global Initiative for School Health of WHO (1995) aims to mobilize and strengthen health promotion and training initiatives in schools to improve the health of students, school staff, families and society [21,22,23]. Food is necessary for the proper growth and development of children. The excessive intake of low-molecular carbohydrates constitutes a serious health issue, which has an unfavorable impact on the dental health status [24]. In the last 5 years we have begun treating the carious lesion in its primary stages by infiltration with low density plastics [25,26]. This is a relatively new microinvasive treatment with huge potential in children's dentistry. This method can be used for stationing of enamel carious lesions developing on the smooth tooth surfaces and in the proximal surfaces of molars and premolars [25,26].

## 6. Conclusion

The number of children free of caries is still far from the number of those in the developed countries. The results show the need of preventive measures in order to improve dental health in children.

## Reference

- [1] **Al-Jundi SH, Hammad M, Alwaeli H.** The efficacy of a school-based caries preventive program: a 4-year study. *Int J Dent Hyg.* 2006 Feb;4(1):30-4.
- [2] **Petersen, P.E., Bourgeois D., Bratthall D. et al.** Oral health information systems-towards measuring progress in oral health promotion and disease prevention. *Bulletin of the World Health Organization* 2005; 83:686-693.
- [3] **Holloway P, Blinkhorn A, Wainwright Y et al.** A method of assessing dental health education material *Int Journal of Health Education* 1997; 35(1): 4-6. **Available at:** <http://www.tandfonline.com/doi/abs/10.1080/1368122.2.1997.1080601>
- [4] **Hescot P, Roland E.** Dental Health in France 1993 - DMF score for 6-, 9- and 12-year-olds. *Publication of the French Union for Oral Health*, 1994. 1-128.
- [5] **Peneva M., Rashkova M., Doichinova L.** Age distribution of caries lesions in children,s permanent teeth – a basis for the choice of a therapeutic solution. **Available at:** <http://www.journal-imab-bg.org>, 2007, 13(2): 58-60.
- [6] **Kukleva M, Kondeva V.** A study on the prevalence of caries incipiens in 7-,12- and 14-year-old children



- from Plovdiv. – Folia Medica (Plovdiv), 1998;40(4):54-9.
- [7] **Kukleva M, Kondeva V.** Comparative study of the incidence and prevalence of dental caries in 12-year old children from Plovdiv. – Folia Medica (Plovdiv), 1999; 41(2):44-8.
- [8] **Kukleva M, Kondeva V.** Comparative study of the polarization of dental caries in 7-, 12-and 14-year-old children from Plovdiv, Bulgaria. – Folia Medica (Plovdiv), 1999; 41(3):65-70.
- [9] **Marthaler TM, O'Mullane DM, Vrbic V.** The prevalence of dental caries in Europe 1990-1995. ORCA Saturday afternoon symposium 1995. Caries Res. 1996;30(4):237-55.
- [10] **Rashkova M, Peneva M, Doichinova L.** Study of the risk factors for the development of dental caries and creation of a system for evaluation of the risk of caries in children OHDMBSC 2009; 8 (3); 3-11. Available at: <http://oralhealth.ro/volumes/>.
- [11] Available at: <http://www.mah.se/CAPP/Country-Oral-Health-Profiles/EURO/>
- [12] **Doichinova L, Peneva M.** Oral hygiene status of children with hearing impairment. 11<sup>th</sup> Scientific Congress of Bulgarian Dental Association, Burgas - June 17-19, 2011; poster presentation. Abstract book – p.51. Available at: [http://eprints.ugd.edu.mk/3228/1/Burgas\\_2011.pdf](http://eprints.ugd.edu.mk/3228/1/Burgas_2011.pdf)
- [13] **Doichinova L, Peneva M.** Prevalence of dental caries in hearing impaired children than 5 to 12 years old in Sofia. IJSR 2015 January; 4(1): 1088-1091.
- [14] **Doichinova L, Peneva M.** Questionnaire survey on oral hygiene awareness of children with hearing impairment. 11<sup>th</sup> Scientific Congress of Bulgarian Dental Association, Burgas - June 17-19, 2011; poster presentation. Abstract book – p.52. Available at: [http://eprints.ugd.edu.mk/3228/1/Burgas\\_2011.pdf](http://eprints.ugd.edu.mk/3228/1/Burgas_2011.pdf)
- [15] **Tzolova E, Targova S, Doichinova L, Georgieva M.** Influence on behaviour of children with hearing problems for managing the fear during dental treatment. OHDMBSC 2009; 6 (2); 30-34. Available at: <http://oralhealth.ro/volumes/>.
- [16] **Doichinova L, Peneva M.** P.E.C.S. picture system for non verbal communication role in oral hygiene education of children with autism. Available at: <http://fdm.mu-sofia.bg/files/spisanie/ENG/DentalnaMedicina> EN Problems of Dental Medicine 2012, 38(1); 12-18.
- [17] **World Health Organization** sixtieth world health assembly - [http://apps.who.int/gb/ebwha/pdf\\_files/WHASSA\\_WHA60-Rec1/E/cover-intro-60-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/WHASSA_WHA60-Rec1/E/cover-intro-60-en.pdf)
- [18] **World Health Organization**, Global status report on noncommunicable diseases 2010. Available at: [http://www.who.int/nmh/publications/ncd\\_report\\_full\\_en.pdf](http://www.who.int/nmh/publications/ncd_report_full_en.pdf)
- [19] **Mertz E, Mouradian WE.** Addressing children's oral health in the new millennium: trends in the dental workforce. Acad Pediatr. 2009 Nov-Dec; 9(6):433-9.
- [20] **Chapman A, Copestake SJ, Duncan K.** An oral health education programme based on the National Curriculum. Int J Paediatr Dent. 2006 Jan;16(1):40-4.
- [21] **Källestål C, Wang NJ, Petersen PE, Arnadottir IB.** Caries-preventive methods used for children and adolescents in Denmark, Iceland, Norway and Sweden. Community Dent Oral Epidemiol. 1999 Apr;27(2):144-51.
- [22] **World Health Organization** - Regional Office for Europe, 2011. Available at: <http://data.euro.who.int/hfad/>
- [23] **Da Silva K.** A role for the family in children's oral health. N Y State Dent J. 2007 Aug-Sep;73(5):55-7.
- [24] **Doichinova L, Bakardjiev P, Peneva M.** Assessment of food habits in children aged 6–12 years and the risk of caries. Available at: Biotechnology & Biotechnological Equipment 2014; 28 (1) Special Issue. Available at: <http://www.tandfonline.com/doi/full/10.1080/13102818.2014.989180>.
- [25] **Kabaktchieva R, Gateva N, Mihaylova Hr.** Non-operative treatment of non-cavitated approximal carious lesions of permanent children's teeth. Available at: <http://www.journal-imab-bg.org>, 2014, Oct-Dec 20(5): 626-630.
- [26] **Gateva N, Kabaktchieva R, Hr. Mihaylova Hr.** Non-operative treatment of non-cavitated approximal carious lesions of primary molars. IJSR 2014 October; 3(10): 2091-2094