

Prevalence and Severity of Dental Caries in 6- and 12-Year-Old Children in Constanta District (Urban Area), Romania

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Abstract

Aim: To assess the caries prevalence and severity in 6- and 12-year-old children from the urban areas of the Constanta district in 2007, by evaluation of Decayed, Missing, and Filled permanent Teeth/Surfaces (DMFT/S), decayed, missing, and filled teeth/surfaces (dmft/s), Significant Caries (SiC) and Care Indices. **Methods:** An epidemiological cross-sectional survey was carried out on randomly selected samples of children aged 6 (n=163) and 12 (n=259) years by three trained and calibrated examiners. Dental caries were diagnosed at the caries into dentine (D3) threshold and the World Health Organization 1997 criteria were used to produce DMFT, dmft, SiC and Care Indices, which were then statistically analysed. **Results:** In the permanent teeth of the six-year-old children, the mean DMFT was 0.91 (SD=1.30), the mean DT was 0.9 (SD=1.29), the SiC was 2.51 (SD=1.02), 41.1% had caries in permanent teeth, and the Care Index was only 1.1%. In the primary teeth of the six-year-olds, the mean dmft was 5.74 (SD=3.73), the mean dt was 5.23 (SD=3.44), the caries prevalence was 88.3%, and the Care Index was 3.3%. In 12-year-old children, the mean DMFT was 3.31 (SD=3.04), the mean DT was 2.94 (SD=2.94), SiC was 6.68 (SD=2.52), the caries prevalence was 77.2%, and the Care Index was 7.6%. **Conclusions:** The study revealed a very high level of caries prevalence and dental treatment needs in both age groups. These results show the necessity for reorientation of oral health services towards oral health promotion, in order to improve the oral health status of young people.

Key Words: Caries Prevalence, Caries Severity, 6- and 12-Year-Olds, Romania

Introduction

The current concept of health suggests that oral health should be defined in terms of general physical, psychological, and social wellbeing [1]. It therefore follows that poor oral health has a considerable negative impact on individuals and communities, due to the resulting pain, suffering, and decrease in the quality of life as a whole.

As an important determinant of general health and quality of life, the oral health policies of all countries should be based on accurate epidemiological data regarding oral health status, risk factors, and oral health care delivery systems [2].

In the last 30 years, the prevalence of dental caries in most western countries has steadily declined. There have been no comprehensive national surveys in Romania to show the children's state of oral health at country level. However, two "national pathfinder" surveys have suggested that

in 1992 the "national" mean Decayed, Missing, and Filled permanent Teeth (DMFT) for 12-year-olds was 4.1 [3] and 2.8 [4] in 2000, far higher than in most developed countries. In the Constanta district, caries prevalence was high with a mean DMFT of 4.66 in 12-year-olds in 2001 [5].

In 2001, the National Programme P.N.I.5 for caries prevention was started in the Constanta district [5].

Aim

Against this background, the aim of this study was to assess the caries prevalence and severity in 6- and 12-year-old children from an urban area, Constanta district (Romania), in 2007.

Methods

The epidemiological cross-sectional survey was carried out on representative and randomly selected

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samples of 6- (n=163) and 12-year-old children (n=259) attending public schools from three representative cities of the Constanta district (Constanta, Mangalia, and Basarabi), between February and April 2007. School authorities were responsible for and obtained the informed consent from parents of the children who were recruited for the survey.

Three trained and calibrated examiners examined the children. The clinical examination was carried out in the dental offices of the schools by one trained examiner, using plain mouth mirrors, ball-ended dental probes, and sterile gloves, under optimal artificial light. The usual infection-control protocols were followed.

The World Health Organization (WHO) criteria were used for the caries diagnosis and registration [6]. Dental caries was diagnosed at the caries into dentine (D3) threshold, using a visual method without radiography, fibre-optic transillumination, or compressed air. Enamel and precavitated lesions were excluded. With the exception of incisors, missing primary teeth were assumed to have been extracted as a result of caries.

The data were registered on individual charts. The DMFT Index for the permanent teeth and the decayed, missing, and filled teeth (dmft) Index for the primary teeth, the mean number of decayed (DT/dt), missing (MT/mt) and filled (FT/ft) teeth were calculated. The mean Significant Caries (SiC) Index, as the mean value of DMFT for the one-third of the sample with the highest scores [7], was also calculated.

In addition, the percentage of subjects with dental caries (% DMFT/dmft >0), the percentage with untreated decayed teeth (% D), the percentage of caries-free subjects, and the Care Index percentages (FT/DMFT multiplied by 100 for permanent teeth and ft/dmft multiplied by 100 for temporary teeth) were calculated. Finally, the Decayed, Missing, and Filled Surfaces (DMFS) Index in per-

manent teeth and decayed, missing, and filled surfaces (dmfs) Index in primary teeth, as well as their components, were calculated following the WHO 1997 protocol [8].

Statistical analysis

Data were analysed using statistical software: Microsoft Excel (Microsoft Corporation, Redmond, USA) and SPSS 12 for Windows (SPSS Inc, Chicago, USA). Student's t-test was used to compare the indices (boys vs.girls).

Results

All parents consented to their children's inclusion in the survey. The samples were therefore 163 six-year-olds (79 boys and 84 girls) and 259 12-year-olds (125 boys and 134 girls). The sampling error was 0.07.

The mean DMFT for six-year-olds was 0.91 (± 1.30). There was no significant difference for this index between boys (0.73 ± 1.22) and girls (1.08 ± 1.35) (Table 1). The maximum value of DMFT in this age group was 4. Twelve children had this DMFT value (i.e., all four permanent molars carious at six years of age). A further 13 had a DMFT value of 3. Thus 25 six-year-old children (15%) had three or more carious molars (Figure 1).

The mean DT among six-year-old children was 0.9 (± 1.29), without significant differences between boys (0.72 ± 1.21) and girls (1.07 ± 1.34). The mean FT was 0.01 (± 0.11); no children had extracted permanent teeth due to caries at this age. Decayed teeth had the greatest contribution of the total DMFT (98.7%), whereas the filled component contribution was very small (1.3%). The SiC at the age of six-years was 2.51 (± 1.02), with higher values for girls (2.78 ± 0.87) than boys (2.23 ± 1.10) (Table 1). The caries prevalence and percentage of six-year-old children with untreated caries in permanent teeth were both 41.1%. Thus 58.9% of six-year-old children were caries-free. The Care Index

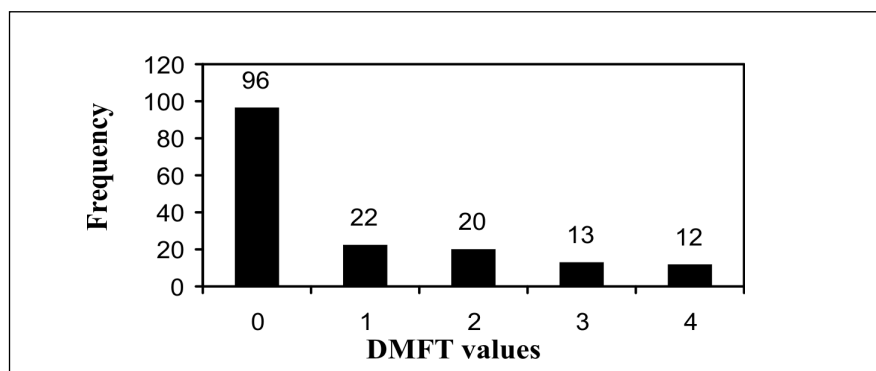


Figure 1. The frequency of DMFT values in six-year-old children.

Table 1. Prevalence of Dental Caries in Permanent Teeth of Six-Year-Old Children. Values are Expressed as Mean±Standard Deviation

	Total (n=163)	Boys (n=79)	Girls (n=84)
Age (months)	73.6±3.9	74.4±3.7	72.8±2.9
DMFT	0.91±1.30	0.73±1.22	1.08±1.35
DT	0.90±1.29 (98.7% of DMFT)	0.72±1.21	1.07±1.34
MT	0	0	0
FT	0.01±0.11 (1.3% of DMFT)	0.01±0.11	0.01±0.10
SiC	2.51±1.02	2.23±1.10	2.78±0.87
% with DMFT>0 (n)	41.1 (n=67)	32.91 (n=26)	48.8 (n=41)
% with D>0 (n)	41.1 (n=67)	32.91 (n=26)	48.8 (n=41)
% caries-free (n)	58.9 (n=96)	67.1 (n=53)	51.2 (n=43)
Care Index (%)	1.1	1.4	0.9
DMFS	1.36±2.18	1.05±1.88	1.65±2.40
DS	1.29±2.02	1.02±1.86	1.54±2.14
FS	0.07±0.43	0.02±0.22	0.11±0.56

DMFT: Decayed, Missing, and Filled permanent Teeth; DT: mean number of decayed teeth; MT: mean number of missing teeth; FT: mean number of filled teeth; SiC: Significant Caries Index; %DMFT: percentage with dental caries; %D: percentage with untreated decayed teeth; DMFS: Decayed, Missing, and Filled Surfaces; DS: mean number of decayed surfaces; FS: mean number of filled surfaces.

was extremely low (1.1%). The mean DMFS was 1.36 ± 2.18 , with no significant difference between boys (1.05 ± 1.88) and girls (1.65 ± 2.40). The mean DS was $1.29 (\pm 2.02)$ and the mean FS was $0.07 (\pm 0.43)$ (Table 1).

In primary teeth, the mean dmft in six-year-old children was $5.74 (\pm 3.73)$ (Table 2), with no significant difference between boys (6.03 ± 4.01) and girls (5.47 ± 3.44). The maximum value of dmft was 18 (i.e., one six-year-old had 18 decayed primary teeth) and the absolute frequency of dmft values showed that 75.5% of the subjects (n=123) had three or more decayed, missing, or filled primary teeth (Figure 2).

The mean number of decayed primary teeth (dt) was $5.23 (\pm 3.44)$, with no significant difference between boys (5.41 ± 3.74) and girls (5.07 ± 3.14). The mean number of missing primary teeth (mt) was $0.31 (\pm 0.81)$ and the mean number of filled primary teeth (ft) was $0.19 (\pm 0.50)$ (Table 2). The dmft index consisted mostly of decayed teeth (91.1%); the proportion of the missing primary teeth was 5.6%, whereas the percentage of filled primary teeth was only 3.3%. The percentage of subjects with dental caries (dmft>0) was 88.3%. Only 11.7% of six-year-old children were free of caries in their primary teeth. The percentage of subjects with untreated decayed primary teeth was

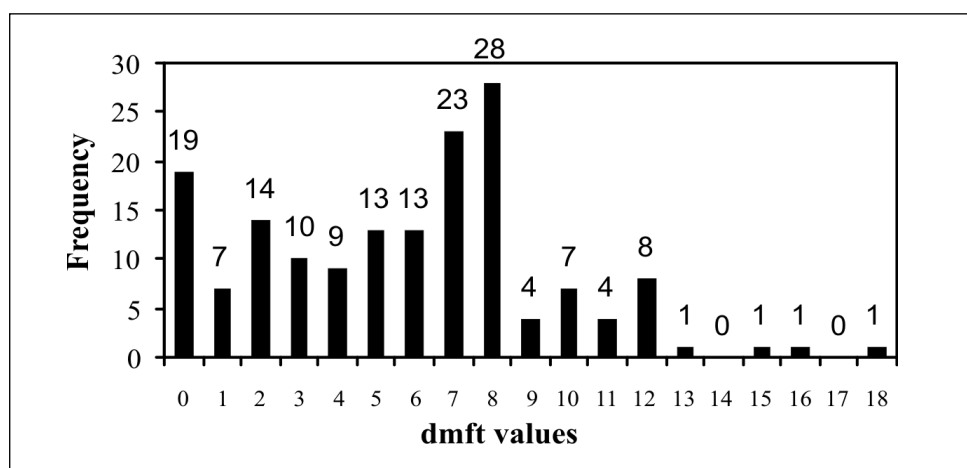
Figure 2. The frequency of dmft values in six-year-old children.

Table 2. Prevalence of Dental Caries in Deciduous Teeth of Six-Year-Old Children. Values are Expressed as Mean±Standard Deviation

	Total (n=163)	Boys (n=79)	Girls (n=84)
Age (months)	73.6±3.9	74.4±3.7	72.8±2.9
dmft	5.74±3.73	6.03±4.01	5.47±3.44
dt	5.23±3.44 (91.1% of dmft)	5.41±3.74	5.07±3.14
mt	0.31±0.81 (5.5% of dmft)	0.41±0.90	0.22±0.71
ft	0.19±0.50 (3.3% of dmft)	0.20±0.51	0.17±0.49
% with dmft >0 (n)	88.3 (n=144)	87.3 (n=69)	89.3 (n=75)
% with d>0 (n)	87.7 (n=143)	86.1 (n=68)	89.3 (n=75)
% caries-free (n)	11.7 (n=19)	12.6 (n=10)	10.7 (n=9)
Care Index (%)	3.3	3.3	3.1
dmfs	12.15±10.47	13.15±11.45	11.22±9.44

dmft: decayed, missing, and filled deciduous teeth; dt: mean number of decayed teeth; mt: mean number of missing teeth; ft: mean number of filled teeth; %dmft: percentage with dental caries on temporary teeth; %d: percentage with untreated temporary decayed teeth; dmfs: decayed, missing, and filled surfaces.

87.7%. The Care Index was low (3.3%). The mean dmfs in six-year-olds was 12.15 (±10.47), with no significant difference between boys (13.15±11.45) and girls (11.22±9.44) (Table 2).

In 12-year-olds (Table 3), the mean DMFT was 3.31 (±3.04), with no significant difference between boys (3.03±2.90) and girls (3.58±3.15).

One 12-year-old had 16 decayed permanent teeth (DMFT 16) and the absolute frequency of DMFT values showed that 54.1% of the subjects (n=119) had three or more DMF permanent teeth (Figure 3). The mean DT was 2.94 (±2.94), without significant differences between boys (2.72±2.83) and girls (3.14±3.04). The mean MT was 0.11 (±0.41) and

Table 3. Prevalence of Dental Caries in Permanent Teeth of 12-Year-Old Children. Values are Expressed as Mean±Standard Deviation

	Total (n=259)	Boys (n=125)	Girls (n=134)
Age (months)	144.37±3.4	143.04±3.5	145.7±2.8
DMFT	3.31±3.04	3.03±2.90	3.58±3.15
DT	2.94±2.94 (88.71% of DMFT)	2.72±2.83	3.14±3.04
MT	0.11±0.41 (3.61% of DMFT)	0.12±0.45	0.11±0.38
FT	0.25±0.67 (7.68% of DMFT)	0.19±0.59	0.31±0.74
SiC	6.68±2.52	6.19±2.55	7.15±2.42
% with DMFT >0 (n)	77.2 (n=200)	76.0 (n=95)	78.3 (n=105)
% with D >0 (n)	71.81 (n=186)	70.4 (n=88)	73.1 (n=98)
% caries-free (n)	22.8 (n=59)	24.0 (n=30)	21.6 (n=29)
Care Index (%)	7.5	6.3	8.6
DMFS	5.19±5.29	4.92±5.16	5.44±5.41
DS	3.98±4.06	3.85±3.98	4.11±4.14
FS	0.63±1.26	0.51±1.21	0.75±1.29

DMFT: Decayed, Missing, and Filled permanent Teeth; DT: mean number of decayed teeth; MT: mean number of missing teeth; FT: mean number of filled teeth; SiC: Significant Caries Index; %DMFT: percentage with dental caries; %D: percentage with untreated decayed teeth; DMFS: Decayed, Missing, and Filled Surfaces; DS: mean number of decayed surfaces; FS: mean number of filled surfaces.

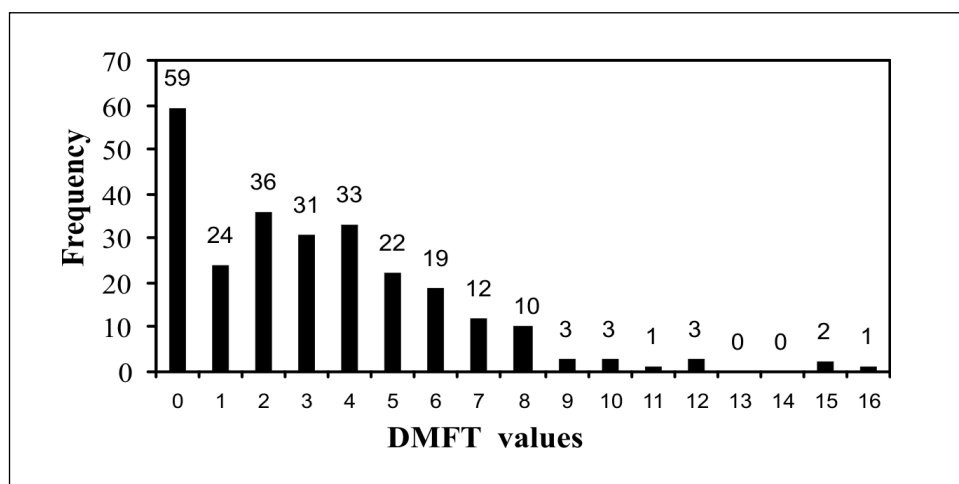


Figure 3. The frequency of DMFT values in 12-year-old children.

the mean FT was $0.25 (\pm 0.67)$ (Table 3). The decayed component made the greatest contribution (88.7%) to the total DMFT, the missing teeth contribution was 3.6%, and the filled teeth contribution was 7.7% (Table 3). The mean value of SiC Index in 12-year-old children was $6.68 (\pm 2.52)$, with no significant difference between boys (6.19 ± 2.55) and girls (7.15 ± 2.42). The caries prevalence was 77.2% and the percentage of subjects with untreated decayed teeth (% D) was 71.8%. The Care Index was low (7.5%). The mean DMFS index was $5.19 (\pm 5.29)$, without significant differences between boys (4.92 ± 5.16) and girls (5.44 ± 5.41). The mean DS was $3.98 (\pm 4.06)$ and the mean FS was $0.63 (\pm 1.26)$ (Table 3).

Discussion

It is widely recognised that in the last 30 years, caries prevalence in children has undergone a major decline especially in the well-developed European countries [9] and also in some of the central and eastern European countries, such as Slovenia [10] and Latvia [11].

Despite substantial improvements in oral health in some eastern European countries, in Romania the long political and economical transitional period has been marked by privatisation and decentralisation of the oral health care services. This has placed an emphasis on expensive treatment with very little funding given to preventive and conservative treatment, at both individual and community level. The provision of oral health care is now mainly private, the investment in public oral health care is low, and resources are primarily allocated to emergency care and pain relief.

In 2001, studies in Constanta district indicated the following values for the caries the urban areas of the district: 5.18 dmft in six-year-olds and 9.68

dmfs in six-year-olds; 4.66 DMFT and 7.45 DMFS in 12-year-olds [5,12].

In order to decrease caries prevalence and to improve the oral dental health status in the children of Constanta district, the National Programme P.N.I.5 was started in November 2001. It consists of a school-based programme for caries prevention involving weekly mouth rinsing with Fluorostom (National Institute for Chemical-Pharmaceutical Research and Development, ICCF, Bucharest) solution (NaF 0.275%) [5,12].

The present study has indicated that, after the programme had run for six years, the caries prevalence declined in children from this Romanian area. However, unfortunately, they have not yet met the WHO targets for the year 2000 that at least 50% of children aged 5-6 years are caries-free; and that the DMFT for 12-year-olds should be no higher than 3.0 [13].

In 2004, the WHO Collaborating Centre in Malmo, Sweden, reported that 74% of all countries in the world had succeeded in achieving these goals, or had never exceeded these values in the first place [14].

The results of the present study showed caries prevalence of 41.1% in permanent teeth and 88.3% in primary teeth and values of 0.91 for DMFT, 5.74 for dmft and 2.51 for SiC in six-year-old children. In 12-year-olds the caries prevalence was 77.2% and the values of caries indices were 3.31 for DMFT and 6.68 for SiC.

The percentage of children with more than three DMF teeth (15.3% in six-year-olds and 54.1% in 12-year-olds), the mean number of decayed teeth (0.9-DT and 5.23-dt in six-year-olds and 2.94 in 12-year-olds), and the very low Care Index values (1.1% in permanent teeth and 3.3% in temporary teeth of six-year-old children and 7.5%

in 12-year-old children) indicate that the vast majority of these children were not accessing oral health care other than fluoride rinsing at school. The improvement in the DMFT values in 12-year-olds between 2001 and 2007 suggests that the P.N.I.5 programme of fluoride rinsing [12] has had a beneficial effect. Such programmes cost relatively little and benefit all children and not just those whose parents are prepared to pay for their oral health care. These are important factors that should encourage local health care planners to develop oral health promotion programmes for young people.

There is an urgent need for periodic surveys of caries prevalence and severity so that the outcomes of preventive programmes can be monitored. The WHO has suggested that once the WHO global goal of a mean DMFT for 12-year-olds of less than three DMFT has been reached, the next step should be to reduce the SiC Index, which should be less than 3 in 12-year-olds by the year 2015 [14].

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Conclusions

There is a need to establish a national system in Romania for the periodic collection, analysis, and interpretation of oral health data for all indicator age groups suggested by the WHO.

It is necessary to disseminate the data from this study and also from further extended studies to all oral health care providers in order to establish a national project for oral health promotion and oral disease prevention directed towards children and all other high-risk groups.

The very high level of caries prevalence and dental treatment needs revealed by the present study in children aged both six and 12 years demonstrate the necessity to target oral health services towards community-directed prevention and oral health promotion, in order to improve the oral health status of young people and to achieve the WHO goals for oral health.