

Caries experience and treatment needs among Albanian 12-year-olds

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Objective: To determine the dental caries experience and treatment needs among 12-year-olds in Albania. **Research design:** This 2011 cross sectional survey used cluster sampling with DMFT and SiC indexes used to assess dental caries experience; DT/DMFT to assess untreated caries; FT/DMFT the care index and MI/ DMFT as missing index. **Participants:** 1928 12-year-olds selected from state schools across 16 local districts with a mix of urban and rural areas and contrasting socio-economic groups. **Method:** WHO protocols were used. **Results:** The caries prevalence (DMFT>0) was 87% (95%CI 85.6,88.4) and 29.6% were without cavitated carious lesions (DT=0). The mean caries experience (DMFT) was 3.73 (sd 2.71) for boys, 3.71 (sd 2.61, p=0.88) for girls and 3.72 (sd 2.66) overall. The caries treatment needs DT/DMFT was 56% (sd 0.36), the mean FT/DMFT (Care Index) was 31% (sd 0.34) and the mean SiC index was 6.72 (sd 1.92). **Conclusions:** Dental caries experience and untreated dental caries were high compared with 12-year-olds in most European Union Member States. This suggests an urgent need for a national preventive program and improved access to oral care for this age group.

Key words: dental caries, DMF index, caries prevalence, dental treatment needs

Introduction

Dental caries is a public health problem responsible for tooth loss in childhood and subsequently in adulthood which affects oral hygiene, eating habits and quality of life. A decline in caries experience has been reported in many developed countries whereas a slow increase seems to be evident in developing ones (Petersen, 2003). Many developing countries go through political and economic change influencing their population's affluence and lifestyle resulting in increased consumption of high sugar products which together with low daily fluoride exposure and a lack of dental services tend to result in high caries prevalence (Bastos *et al.*, 2012; Masood *et al.*, 2012; Petersen, 2003; Twetman, 2009).

Albania is an eastern European country that from 1944 to 1990 was under the communist political system when the dental care service was entirely public, financed by the government and focused more on treatment than prevention. Being isolated and living in such a centralised economy prevented the health care system following other countries' models. Nowadays Albania is undergoing many reforms in an effort to become a member of the European Union. Several years ago the Ministry of Health presented the Oral Health Strategy which was intended to focus more on prevention (Ministry of Health, 2000). However, there is still no national caries preventive program and oral health services are provided mainly by private dental practitioners. In 1993 the dental care system went through a privatization process. Currently, private practice accounts for 95% of the provision of oral health care, while the dental public service only accounts for 5%. Most dentists are practicing in the capital, Tirana, or the main towns leaving a lack

of dentists in the rest of the country. Unfortunately, oral care remains more focused on treatment than on prevention. The national health insurance system does not cover dental procedures so the patients pay for everything out of their pockets. The dental public service is obliged by law to provide free preventive and treatment those aged up to 18 years. Albania does not have programmes for fluoridated water, salt or milk. The fluoride level in tap water is less than 0.3 ppm so toothpaste is the main source of fluoride exposure.

Previous national studies of dental caries experience for 12-year-olds indicated that in 2005 the national mean decayed, missing, or filled teeth (DMFT) index was 3.1 (sd 2.33), the Significant Caries (SiC) index was 5.8 and 15% were caries-free (Ministry of Health, 2005). A recent study investigating the dental caries prevalence of the 7- to 15-year-old Albanians in Tirana showed that caries experience for deciduous dentition (dmft) was 2.08 and for the permanent dentition DMFT=2.32 (Laganà *et al.*, 2012). There are no recent data reporting national dental caries prevalence in Albania. Also no national study concerning caries experience in Albania has been published in the international literature. Most of the previous studies were performed locally and did not include areas with low socio economic status and lack of oral health care.

The objective of this study was to measure the dental caries experience nationally and treatment needs for the age group of 12-year-olds in Albania. Also the study investigated differences in caries experience of children living in different socio-economic regions.

Material and Methods

This cross sectional study was conducted during 2011. Permission was received from the Albanian Ministry of Health and Local School Authorities. Each school authority was informed by the local dental public health service about the aim of the study.

The study was conducted among 12-year-olds of the 5th and 6th grade, mainly in the state schools of Albania. These schools make up over 95% of the country's schools. Sixteen of the country's 36 local districts were randomly selected and included those from all over the country with contrasting socioeconomic conditions in the south, north and (more economically active) west-central areas of Albania (INSTAT, 2010). The list of schools and their districts was provided by the Local Health Authorities and Dental Public Health Services. Cluster sampling, with each elementary school as a cluster, was used because it was achievable within the available resources constraints. The total number of participants required was calculated based on the population density of the different districts for a confidence interval 95% ($n \geq 41$ per cluster). The final sample size was 1,928 12-year-olds.

Dental examinations were performed by trained and calibrated examiners. There was one dental examiner for each local district except for Tirana which had three examiners. All the examiners went through a training and calibration process (Castiglia *et al.*, 2007). The Kappa value for inter-examiner reliability was 0.79. Data were entered in a standard form by a public service dental nurse. The clinical dental examinations were conducted in the schools with the children seated on a chair under artificial light. No radiographs were taken during the study. The examiners were advised to take 15 minute break after each hour and to examine no more than 25-30 subjects per day to avoid any bias from visual fatigue. The WHO diagnostic criteria were used and dental caries was recorded at cavity level D3 (WHO, 1997). The DMFT and SiC indices were calculated to describe the children's dental caries experience (WHO, 2003; Bratthall, 2000).

The data were entered and processed using SPSS v20 to calculate measures of central tendency and dispersion

for continuous variables and frequencies and percentages for each categorical variable. Threshold significance was taken as $p=0.05$. Caries prevalence was calculated as the number of children with at least one affected tooth ($DMFT > 0$) as a percentage of children. The caries free prevalence was taken as the percentage of children without any caries experience ($DMFT = 0$) while the prevalence of children without caries was taken as the percentage of children without cavitated lesions ($DT = 0$). The data were also categorised by caries experience using the DMFT WHO criteria for 12-year-olds: 0, none; 0–1.1, very low; 1.2–2.6, low; 2.7–4.4, moderate; 4.5–6.5, high; and, ≥ 6.6 , very high caries experience (WHO, 2002). In addition, the Decay Index representing the caries treatment need ($DT/DMFT \times 100\%$), the Missing Index ($MT/DMFT \times 100\%$) and the Care Index ($FT/DMFT \times 100\%$) were calculated for the sample. The dental caries data were evaluated by gender and for three socio-economic areas using one-way ANOVA test.

Results

The 1,928 participants from the 16 local districts were 968 boys (50.2%) and 960 girls. Their the mean age was 12.03 years (sd 0.36), caries prevalence ($DMFT > 0$) was 87% (95%CI 85.6,88.4), proportion of caries-free children ($DMFT = 0$) was 13% (95%CI 11.6,14.5) overall, prevalence of children without cavitated lesions ($DT = 0$) was 29.6% and mean caries experience was $DMFT = 3.72$ (sd 2.66, 95%CI 3.59,3.83) overall - all these with no significant differences by gender (Table 1). Caries treatment needs presented by the mean $DT/DMFT$ was 56% (sd 0.36) in the sample and slightly higher in boys 58% (sd 0.35) compared to girls 54% (sd 0.37, $p=0.019$). The mean Care Index ($FT/DMFT$) was 31% (sd 0.34) in the sample and lower in boys than girls (28% vs 33%, $p=0.003$). The mean Missing Index ($MT/DMFT$) was 13% for the sample and mean SiC index was 6.72 (sd 1.92, 95%CI 6.57,6.85) neither showing a gender difference.

Figure 1 shows the distribution of DMFT index for the whole sample and Table 2 presents the distribution according to the WHO categories and by gender. Half the sample had moderate or high caries experience with

Table 1. Demographic characteristics, caries prevalence, mean DMFT, DT/DMFT, FT/DMFT, MT/DMFT and SiC for the study population (standard deviation and confidence interval)

	Boys:	%	sd	95%CI	Girls:	%	sd	95%CI	p	All:	%	sd	95%CI
Participants	968	50.2			960	49.8				1,928			
Age in yrs	12.04		0.33		12.02		0.42			12.03		0.36	
Caries prevalence ($DMFT > 0$)		86.3				87.6					87.0		85.6,88.4
Caries free ($DMFT = 0$)		13.7				12.4					13.0		11.6,14.5
Children with $DT = 0$		27.7				31.6					29.6		
DMFT	3.73		2.71	3.55,3.89	3.71		2.61	3.54,3.87	0.88	3.72		2.66	3.59,3.83
DT/DMFT		58	0.35			54	0.37		0.02		56	0.36	
FT/DMFT		28	0.32			33	0.35		<0.01		31	0.34	
MT/DMFT		13	0.22			12	0.23		0.49		13	0.22	
SiC	6.79		1.94	6.59,7.00	6.63		1.92	6.43,6.84	0.29	6.72		1.92	6.57,6.85

Table 2. Distribution of caries experience in 12-year-old children in Albania by the six intervals used by WHO

DMFT	Category	All:		Boys:		Girls:	
		n	(%)	n	(%)	n	(%)
1	0	251	(13)	132	(6.8)	119	(6.2)
2	0.1 - 1.1	145	(7.5)	76	(4)	69	(3.5)
3	1.2 - 2.6	283	(14.7)	135	(7)	148	(7.7)
4	2.7 - 4.4	611	(31.7)	297	(15.4)	314	(16.3)
5	4.5 - 6.5	363	(18.8)	178	(9.2)	185	(9.6)
6	≥6.6	275	(14.3)	150	(7.8)	125	(6.5)

Table 3. Caries experience (DMFT), treatment needs (DT/DMFT), care index (FT/DMFT) and SiC for three economic areas of Albania

Area	DMFT	DT/DMFT	FT/DMFT	SiC
West central	3.26 (sd 2.64)	0.57 (sd 0.37)	0.31 (sd 0.35)	6.25 (sd 2.00)
South	3.73 (sd 2.61)	0.54 (sd 0.37)	0.32 (sd 0.35)	6.65 (sd 1.82)
North	4.58 (sd 2.76)	0.60 (sd 0.30)	0.27 (sd 0.29)	7.59 (sd 2.41)
p (We vs N&S)	<0.001	0.063	0.144	<0.001

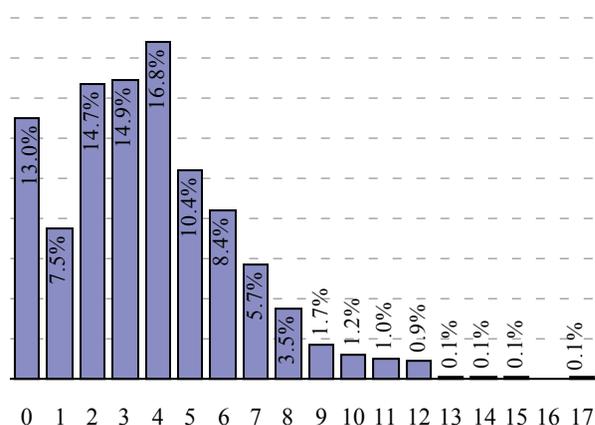


Figure 1. The distribution of study sample's DMFT scores

the modal category being moderate and a further 14.3% having very high caries experience. Data on caries experience, treatment needs, care index and significant caries index based on three different economic regions showed differences which were statistically significant only for caries experience (DMFT) between the West central area (more affluent part) compared with North and South areas (Table 3).

Discussion

Dental caries is a widespread oral disease well documented for many groups and areas but not for Albania as a whole which has no established national oral health surveillance arrangements. This study assessed the dental caries experience and treatment needs among the Albanian 12-year-olds. Their overall mean DMFT of 3.72 is moderate caries experience according to the WHO criteria (2002), with no significant gender difference. Only 13% were caries-free and the SiC index was 7.72.

The apparent increase in DMFT from 2005's 3.1 (Ministry of Health, 2005) to 2011's 3.7 and SiC 5.8 to

6.7 and caries-free decrease from 15% to 13% should be interpreted with care as the earlier study's smaller sample did not seek to be representative of Albania as a whole.

Comparing the current findings with data from European countries appears to suggest that the mean DMFT for 12-year-olds in Albania are broadly similar to that from other Eastern European countries in the Balkan Peninsula such as Bosnia Herzegovina (4.2), Croatia (4.8), Bulgaria (3.1), Macedonia (6.9), Montenegro (3.4), and Romania (3.3) (Dukić *et al.*, 2011; Kukleva *et al.*, 2009; Nikolovska, 2013; Nuca *et al.*, 2009; WHO, 2013). However, these data relate to earlier studies and possibly using different criteria, so a true comparison is impossible. The same situation is found when comparing caries prevalence with that of 12-year-olds from Bulgaria (81%), Bosnia Herzegovina (63.5%), Croatia (54.2%), Montenegro (88.3%) and Romania (77.2%) (WHO country/area profile, 2013). However, in Western European countries the situation is completely different; for example, the data for mean DMFT and caries prevalence in 12-year-olds was 0.6 and 31% in Denmark (2012), 1.23 and 61% in France (2006), 0.7 and 29.6% in Germany (2009) and 1.1 and 45% in Spain(2010) (WHO, 2013). This low caries prevalence might be related with higher socioeconomic status, well organised community preventive programs, optimal fluoride exposure, better oral hygiene, access to oral health services and improved oral health behaviours (Downer *et al.*, 2008; Zaborskis *et al.*, 2010). The data show that Decay Index (DT/DMFT) representing the treatment needs was 56% and Care Index (FT/DMFT) was 31%. These indicated that decayed teeth were the main contributor to the overall DMFT as untreated caries is an indicator of the low uptake of dental treatment by children. This trend was greater in boys than girls. A similar situation was found in a recent study in Bosnia Herzegovina where the decayed teeth (DT) constituted the major part of the DMFT index (45.4%), followed by 42.1% of filled teeth (Markovic *et al.*, 2013). Also a similar study in Rumania showed that 64% of the study

population had untreated caries (Funieru *et al.*, 2013). This could be due to low fluoride exposure, poor oral hygiene, frequent consumption of sugar and infrequent dental visits (Hysi *et al.*, 2010). Also there are no organised public preventive programs in schools and the treatment provided by public health dentists is not sufficient while the private dental practice is expensive.

In the current study, the sample's caries experience was analysed by socio-economic status. The caries experience DMFT and SiC in the more economically active area were lower than in the other areas taken together. There was the same situation when the south part and north areas were compared indicating a possible association between high caries experience and treatment needs and low socio-economic status. This may be related to the lower income, less oral health knowledge, poor oral hygiene and lack of dental services (Ministry of Health, 2005). In a study conducted in Australia and Vietnam changes in economic and social conditions between and within the populations showed a significant impact on oral health of children. The study found significant decline in caries experience associated with socio-economic status improvement (Do, 2012). Also Masood and colleagues (2012) found that high caries experience in low socio-economic countries was positively related with high *per capita* sugar consumption. This seems likely to be one of the reasons for the high prevalence of dental caries in Albania compared with the EU countries.

It is appropriate to discuss the weaknesses of the study. The sample subjects were not randomly selected and represented mainly the children in the state schools in the selected regions. The method used may suffer from selection bias so the sample might have not been a representative of all 12-year-olds in Albania. However, compared with the previous studies in the country the examined sample should be regarded as far more representative. The only piloting of the study was during examiner calibration on account of the straightforward method and its tried and tested techniques (WHO, 1997).

Conclusions

In conclusion, the caries experience in the 12-year-old Albanians assessed in this survey was high and caries-free prevalence was very low. The data indicate that the country is far from reaching the WHO oral health goal. Untreated caries remains a serious problem accounts for most of the caries experience. This suggests an urgent need for the health authorities to plan a national preventive program and to promote and improve access to oral care.

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