Dental caries experience among Albanian pre-school children: a national survey

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Objective: To determine the dental caries experience and treatment needs among 5-year-olds in Albania. ***Research Design:*** This cross sectional study was conducted in 2015 by using a cluster sampling technique. The dmft was used to assess dental caries experience and caries prevalence as percentages of children with dmf>0. Caries treatment needs were assessed with dt/dmft x 100, missing teeth with mt/dmft x 100 and ft /dmft x 100 as the Care Index. ***Participants***: 2,039 five-year-olds, from 17 districts of Albania were selected . Children's residency was divided into 3 main regions (South, West, Central and North). ***Method:*** WHO 2013 diagnostic criteria were used and dental caries was recorded at cavity level d3. ***Results:*** The mean age was 5.4 (SD 0.5) years. The caries prevalence (dmf>0) was 84.1%. The prevalence of children without cavitated lesions (d=0) was 20.1%. The mean dmft index was 4.41 (SD 3.83). The caries treatment needs were 84% (SD 26%). ***Conclusions:*** The Albanian 5-year-olds assessed in this survey had a high dental caries experience and untreated cavities in the primary dentition. The national health authorities should introduce preventive programs and improved dental care access for this age group.

Key words: *5-year-old children, dmft dmf index, caries prevalence, treatments need, Albania, national survey*

Introduction

Dental caries is the most common chronic disease among children and adolescents (Filstrup *et al*., 2003). The evidence indicates that childhood caries is strongly related to their quality of life causing pain, premature tooth loss, malnutrition and affecting growth and development (Sheiham, 2006). It has been recently stated that caries onset early in life is associated with an increased risk of future caries (Alm *et al*., 2007). There is evidence of declining prevalence of dental caries among 5-year-olds in developed countries (Pitts *et al*., 2005). In contrast, the situation is completely different in developing countries, where there is still a high burden of caries among 5-year-olds (Yee and Sheiham, 2002). There are limited data regarding dental caries among Albanian 5-year-olds. Prior to 1990, generations of children had received restorative treatment rather than prevention. This was a period of isolation when most Nordic countries had established data collection to monitor the level of dental caries and proceed with prophylactic measures. European Union candidate Albania has changed dramatically in the last two decades. There is a general perception from its dental community and some local data indicating that dental caries of 5-year-olds is a serious problem. The main challenges are related to poor access to dental services, firstly as the dentists are not evenly distributed through the country (most are in the capital, Tirana) and secondly, because of poverty and lack of a national oral health insurance plan. Albanian drinking water is not currently artificially fluoridated (F-level<0.3 ppm). The only national study

of dental caries experience of 6-year-olds in 2005, had a questionable methodology representing only the main districts of the country and has not been published. Those data indicated that the national mean decayed filled teeth (dft) index for the deciduous dentition was 2.9 . However, for the last decade no scientific reports are available from Albania where there is a young society emerging. The aim of the present study was therefore to determine the dental caries experience and treatment needs among Albanian 5-year-olds.

Methods

This cross sectional study was conducted in the begining of 2015 by the Faculty of Dental Medicine, Tirana. Permission was received from the Local School Authorities who took responsibility for obtaining individual parental consent for their 5-year-olds' participation. The total number of 5-year-olds anticipated in 2015 was 34,061, comprising 18,063 boys and 15,998 girls (ratio 1.13) (INSTAT, 2014).

Sample selection took into account the population density in different districts of the country, their geographical distribution, social economic status and accessibility to examination sites. In Albania, the main economic activities are located in the west and central region followed by southern and northern regions (INSTAT 2014). Of the country's 36 local districts, 17 were randomly selected. Children's residency was divided into three main regions as South (nine districts: Fieri, Gjirokaster, Kucove, Librazhdi, Peqin, Perrenjas, Pogdarec, Sarande, Vlora);

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West and Central (five districts: Durres, Elbasani, Kavaje, Lushnje, Tirana); and North (three districts Peshkopia, Shkodra, Tropoja). The cluster sampling was applied because it was achievable with our constrained resources. Referring to the WHO, Basic Oral Health Survey 5th Edition, at least 25-50 subject should be planned for a cluster. Kindergardens were set as clusters and their list was provided by each district's Local School Authority and Dental Public Health Service. It is obligatory for all 5-year-olds to attend kindergartens before registering for school. The number and size of the kindergartens was larger in the main districts than the others. The study's 41 clusters were distributed based on each district's population density. All 5-year-olds in each cluster were included in the sample. The final sample size was 2,039. All the examiners were trained and calibrated against a standard examiner before conducting the study. Twenty five children were re-examined by each examiner and inter-examiner agreement was calculated using the Kappa statistic. The Kappa value for inter-examiner reliability was 0.83. The WHO diagnostic criteria were used and dental caries was recorded at cavity level d3 (WHO, 2013). Dental examinations were conducted in kindergardens with the child seated on an ordinary chair. Single used instruments, sharp probe and artificial light were used for dental examination to confirm the caries diagnosis. In case of any doubt the tooth was marked as sound. No radiographs were taken. Data were entered on prepared standard forms. The dmft index was calculated to describe the children's dental caries experience (Bratthall, 2000; WHO, 2013). Children's age, gender, decayed (d), missing (m) and filled (f) teeth were recorded for the incisor, canine and molar regions. Caries prevalence was calculated as the percentage of children with at least one affected tooth (dmf>0). The prevalence of children without caries was taken as the percentage of children without cavitated lesions (dt=0). Data were also categorised by caries experience using the dmft WHO criteria: 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 x100%), the Missing Index (mt∕dmft x100%) and the Care Index (ft ∕dmft x100%) were calculated for the sample.

Statistical calculations were performed with SPSS v.22 for standard descriptive statistical calculations (mean and standard deviation), Mann-Whitney test, one way ANOVA and Tukey post hoc tests for comparison of groups. The results were evaluated within a 95% confidence interval. Statistical significance level was set at $p<0.05$.

Results

Examined during the study were 2,039 children: 976 girls (47.9%) and 1,063 boys (52.1%). Demographic characteristics of caries prevalence, mean dmft, dt/dmft, ft/dmft and mt/dmft for the study population are presented in Table 1. The caries prevalence (dmf>0) was 84.1%. The prevalence of children without cavitated lesions (d=0) was 20.1%. The mean caries experience was dmft=4.41 SD 3.83, (95%CI 4.24,4.58). The distribution of children's dmft score as a whole is shown in Figure 1. Regarding gender, boys had higher mean dmft scores (4.73, SD 4.03) than girls (4.06, SD 3.36) (p=0.001). The distributions by WHO catagories and by gender are presented in Table 2. Half of the sample had moderate or high caries experience with 18.8% in the moderate category and a further 33.3% having high caries experience. Molars constituted 69.7 % of all decayed teeth. It should be noted that incisors and canines were restored less often than molars.

The mean caries experience for three regions of Albania is in Table 3. While caries experience (dmft) was the lowest (3.70SD 3.59) in West and central Albania (p<0.001), there were significant differences between the three regions regarding treatment needs (dt/dmft) (p<0.05; p<0.001).
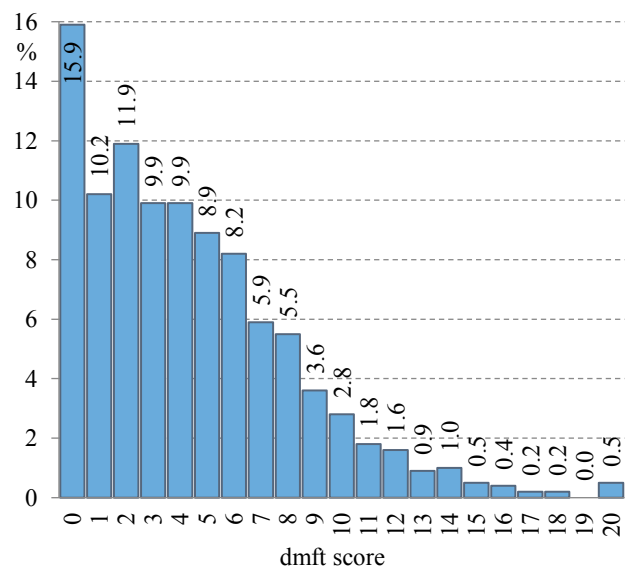

Figure 1. *The distribution of the whole study sample's dmft score*

Table 1. Demographic characteristics of caries prevalence, mean dmft, dt/dmft, ft/dmft, mt/dmft, and for the study population

	Boys (n=1,063, 47%)			*Girls (n=976, 52.1%)*			*Overall (n=2,039)*		
Mean age in yrs	5.5 (SD 0.5)			5.4 (SD 0.5)			5.4 (SD 0.5)		
Caries prevalence dmft>0	84.3%			83.9%			84.1%		
Caries free dmft=0	15.7%			16.1%			15.9%		
Children with dt=0	19.3%			20.9%			20.1%		
		SD	*95%CI*		*SD*	*95%CI*		*SD*	*95%CI*
dmft	4.73	4.03	4.48, 4.97	4.06[a]	3.36	3.83, 4.28	4.41	3.83	4.24, 4.58
dt/dmftx100, %	84	25	83 ,86	83	27	81 ,85	84	26	82 ,85
ft/dmftx100, %	6	20	5 , 8	7	21	5 , 8	7	20	6 , 8
mt/dmftx100, %	8	17	7 , 9	9	20	7 ,10	8	19	7 , 9

[a] p=0.001 (Mann-Whitney test)

Table 2. Dental caries severity of 5 years old children in Albania, overall and by gender

Dental Caries Categories	Range of dmft	Overall			Boys			Girls		
		n	%	Mean dmft (SD)	n	%	Mean dmft (SD)	n	%	Mean dmft (SD)
Absent	0	324	15.9	0	167	15.7	0	157	16.1	0
Very low	1	207	10.2	1 (0)	100	9.4	1 (0)	107	11	1 (0)
Low	2-3	445	21.8	2.45 (0.49)	201	18.9	2.44 (0.49)	244	25	2.46 (0.49)
Moderate	4-6	384	18.8	4.47 (0.49)	199	18.7	4.48 (0.50)	185	19	4.44 (0.50)
High	6+	679	33.3	8.81 (3.01)	396	37.3	8.95 (3.13)	283	28.9	8.58 (2.80)

Table 3. Caries experience (dmft), treatment needs (dt/dmft), care index (ft/dmft) for three different economic areas of Albania

Part of the country	n	dmft (SD)	p	dt/dmftx100 % (SD)	p	ft/dmftx100 % (SD)	p [c]
Western & Central parts (WC)	792	3.70 (3.59)	<0.001 [a]	84 (28)	<0.05 [a]	6 (21)	≤0.05
Northern part (N)	342	5.02 (4.49)	0.63 [b]	91 (19)	<0.001 [b]	2 (13)	<0.05
Southern part (S)	905	4.80 (3.67)		81 (26)		9 (22)	

[a] p value WC vs N and S; [b] p value N vs S; [c] Tukey Post Hoc Tests

Discussion

It has been a tradition for Nordic countries to produce cross-sectional long term dental caries studies (Holst et al., 2004; Stecksén-Blicks et al., 2004). They have provided a descriptive approach to analyze trends in the development of dental caries among children over the decades. Dental caries may be recognized in three different dimensions; the tooth surface, the child, or the population. The practitioner evaluating the tooth surfaces in children can predict longterm caries activity in a society. In this way, it is easy to develop an oral health policy and control the rate of dental caries in children. It has been stated that the progression of dental caries is higher in the primary dentition than in permanent dentition (Mejare et al., 2001). Today, it is vital to have a snapshot of the total community of Albania. The present study is the first trying to present the nationwide caries prevelance of 5-year-olds. As Albania is a small sized country, the present sample of 17 local districts in the three main regions of Albania might have provided representative national data.

A recent limited survey indicated that the mean caries score in the deciduous dentition (dmft) was 2.08 in 7-15 yrs Albanian children. However this age group is in the mixed dentition (Laganà et al., 2012). In the present study the mean dmft score was found to be 4.41 in the primary dentition, The present dmft score and caries prevalence is rather high when compared to other European communities (Hescot et al., 2007; Mantonanaki et al., 2013; Santamaria et al., 2015; Wagner et al., 2014). However, regarding these European studies, the communities that were assessed had participated in oral health preventive programs for several years and the decrease in caries experiences was related to the use of fluoride toothpaste and access to dental care. It should be noted that during these same years in Albania there was no oral health program of any sort for this age group. Holst et al. (2004) recently recommended that a preventive program with focus on primary prevention and individual risk assessment should also be targeted at the whole population of 5-year-olds and their parents. This statement recognized the importance of oral health education and dietary counselling. Moynihan (2012) stated that 'It is widely accepted that there is an association between the amount and frequency of free sugar intake and dental caries'. Therefore, diet needs to be influenced in the long term by the dental practitioner who treats children and adolescents.

In the present study a huge percentage of children (84.1%) experienced dental caries in the primary dentition. From this point of view our emphasis must be rather on prevention. Ministry of Health, Dental Associations and Dental Schools must be the main agencies to support this programme in Albania by encouraging dentists to focus more on oral health behaviours for parents and children. Dental practitiners, pediatricians, nurseries and schools have to collaborate for a successful preventive program. Firstly informing parents during pregnancy and early childhood about the importance of healthy food and establishing an early dental examination. The chain should be followed in the kindergardens and school canteens. Diet needs to be influenced in the long term by the dental practitiners treating children and adolescents. In biannual recalls, age related diet advice should be given (Caglar and Kuscu, 2016). Dentists should guide their patients about the sugar content of processed foods.

Controlling of advertisement of sugar laden products geared towards children, introduction of taxes on products high in sugar must be on the agenda of government. It is important to know how to read labels and interpret them correctly (added sugars, fat, etc.). Governemnt and media support in promoting the use of home care fluoridated products (toothpaste) is of great importance. Nowadays social media might be a factor to measure interest of Albanian youngsters about oral health to promote a caries free society.

The data of the study indicated that the treatment need (dt/dmft) was 84% meaning that more than 2/3 of the caries experience consisted of untreated caries. The care index (ft/dmft) was very low (7%) showing that there is a lack in the provision of care. Molars have the highest caries prevalence (69.7%) compared to incisors and canines. This caries pattern seems to be comparable with another study in Riyadh, Saudi Arabia, were the majority of children had molar caries (Wyne, 2008). Furthermore, the care index indicated that 98% of all treatment had been performed in molars leaving almost all incisors and canines untreated.

In the current study, the study population was divided into three parts taking into consideration the economic activity indicator based on data from the Albanian Institute of Statistics. Caries experience (dmft) was the lowest (3.70 SD 3.59) in West and Central Albania in comparison with other regions and these differences were statistically significant. This might be due to this region's hosting the capital city, Tirana, where most of the dentists work and patients have better access to a wide range of treatment options. Furthermore, INSTAT verifies that this is the most developed region of the country and more affluent than the two other regions. There is evidence that a high level of caries prevalence in 5-year-olds is related to low socio- economic status (Jigjid *et al.*, 2009).

Conclusions

The Albanian 5-year-olds assessed in this survey had a high level of dental caries experience in the primary dentition. Caries lesions were higher among the primary molars than incisors and canines. There is a lack of caries treatment indicating a low level of access to dental care making this age group prone to other complications of untreated caries. This suggests that further efforts should be made by the government, health authorities and professional organisations to reduce caries prevalence. These could include a national preventive program and improving access to dental care for this age group.

Acknowledgement

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