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Dental health of 5-year-old children and parents' perceptions for oral health in the prefectures of Athens and Piraeus in the Attica County of Greece

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Summary. *Objectives.* This study was undertaken in 2001 in order to investigate the dental health status of 5-year-olds in an urban community within Attica County in Greece and the views of the carers of this age group.

Methods. Three hundred and forty-five nursery children were examined, using the WHO methods and criteria. Parents' views were recorded in a questionnaire.

Results. Overall, 48·4% had some experience of dental decay. The mean dmft of the whole study population was 2·6, whereas the mean dmft of the subjects with active decay was 5·4; in these cases untreated decay was the highest component (mean dt = 5·0). A questionnaire using phone calls to the children's homes achieved a 100% response rate. Ninety-five per cent of parents thought that a child should visit the dentist at this early age and 79·5% of responders answered that they had already visited the dentist with their child for different reasons. Three-quarters (75·4%) of parents had received information about fluoride, whereas 72·5% answered that did not use any type of fluoride for their child at home. It was reported that 63·5% of children ate snacks, sweets, cakes, biscuits, and gums between the main meals of the day and 31% of the subjects more than once per day.

Conclusions. Caries indicies were higher from the National 2003–4 survey and were attributed to the increasing number of immigrants in some areas. The population under investigation had the appropriate information for the prevention of dental decay but they appear to maintain unhealthy behaviours in their everyday living.

Introduction

There is a relative lack of systematic epidemiological data in Greece to describe variations in children's dental health, variations in caries, and changing patterns in relevant knowledge and behaviours. Three review studies [1–3] carried out research reviewing publications from 1975 to 1999, which showed that since 1990 there is a decline in caries in children aged 2–5, 6 and 12 years, which is greater in the permanent than the primary dentition. Caries experience, however, remained high particularly in the primary dentition. Treatment needs, although declining the last 15 years, remained high, more in the primary and less in the permanent teeth. Also, there were great inequalities within different areas of the country. The provided information for preschool children was, however, scarce, as fewer studies deal with this age compared with those conducted on other age groups. Mean dmft for 5-year-olds ranged from 2·7 to 5·7 in 1980–1990, whereas in 1990–1996 the range dropped to 1·4–3·5. Caries experience in the latest periods ranged from 41 to 62%. Since the late 1990s, no epidemiological study was published concerning this age group.

In order to have a clear view of the dental health of 5-year-old children from the area of Athens and Piraeus in Attica County, it was decided in 2001 to collect epidemiological data using a detailed protocol, strict diagnostic criteria, and training/calibration of the examiners. In order to elicit the views of those individuals most intimately associated with the target group, i.e., the mothers and carers of 5-year-old children, a questionnaire was used.

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Materials and methods

The selection of the children examined followed the method of multistage sampling and the criteria set by the World Health Organization (WHO) [4]. Both the Hellenic Community Health System (IKA) and the Ministry of Education, which allowed the examination to take place in the nurseries, approved the design of the study. Attica County was divided into six large areas according to education authorities. The total number of nurseries in the two prefectures of Athens and Piraeus was 853. In order to achieve the appropriate number of nursery schools, a school in every one from the six different areas was chosen by random numbers and thereafter 1 in every 45 nursery schools was blindly selected. Then all 5-year-old children from these nursery schools were examined. To minimize the problems of absentees and refusals, an additional nursery school was selected from every area. The total number of 18 nurseries was selected and the collected sample of 5-year-old children was 448. A questionnaire was created using different questions related with dental health behaviour and beliefs of mothers/carers, dental attendance patterns, and dietary habits of the children.

The examination was performed by the first author (DK), with the assistance of the third author (VM). The examiner was trained and calibrated with the examination method and criteria of WHO [4]. The examination criteria, recording procedure, questionnaire, and the statistical method were initially calibrated in a nursery school, which was not included in the finally selected sample. Additionally, intraexaminer reproducibility for all the examined clinical parameters was calculated re-examining 10% of the total sample and ranged from 0·88 to 0·93, using Kappa statistics. The clinical examination under artificial light took place in the nurseries and the questionnaires were completed by telephone call to the children's homes the same afternoon after the examination.

Table 1. Mean dmft and its components for the total sample and for children with caries experience (dmft > 0).

dmft/component	Mean value (SD) Total sample	Mean value (SD) Children with caries experience
Decayed (d)	2·4 (3·8)	5.0 (4·2)
Missing (m)	0·1 (0·4)	0·1 (0·6)
Filled (f)	0·2 (0·4)	0·3 (1·0)
Decayed and filled (d.f.)	2·5 (3·9)	5·3 (4·2)
dmft	2·6 (4·1)	5·4 (4·4)

Clinical recordings and completed questionnaires were entered on to computer and analysed using the statistical SPSS program for Windows in a PC.

Results

There were 448 children in the selected study population. Of this population, it was possible to examine 345 children (77% of the total). The mean age of the children examined was 5·95 (range 5·92–5·98). In total, 184 boys and 161 girls were examined, representing 53·5% and 46·5% of children seen, respectively. Overall, 51·6% of the children were caries free, 48·4% had some experience of dental decay, and the mean dmft was 2·6 (s.d. 4·1). The mean dmft of those children with caries experience (i.e., dmft > 0) was 5·4 (s.d. 4·4). Mean dmft and its components for the total sample and for those with dmft > 0 are presented in Table 1. Mean dmft varied significantly from 0·6 in the third nursery school of north-west of Athens to 5·0 in the 45th nursery school of Piraeus. Finally, mean dmft was collectively calculated according to division into six areas from education authorities and varied from 1·6 in the south of Athens to 4·1 in the centre of Piraeus (Table 2).

A questionnaire was completed for all 345 children examined. Parents were very cooperative and helpful because of the instruction and incitement given by nursery teachers, whose role was fundamental to this excellent response rate.

Table 2. Mean dmft by area examined and socioeconomic distribution.

Area	Socioeconomic status	Nurseries	No. of children	Mean dmft (SD)
North-west of Athens	Medium	3	53	2·4 (4·7)
North-east of Athens	Medium-high	3	78	2·5 (3·8)
Centre of Athens	Low	4	84	3·2 (4·4)
Centre of Piraeus	Low	2	40	4·1 (4·5)
South-west of Athens	Medium	2	23	2·6 (4·1)
South of Athens	High	4	67	1·6 (3·2)
Total		18	345	2·6 (4·1)

Overall, 327 (95%) parents reported that their young child needed a dentist at this early age. Only 5 (1·5%) parents answered that their child should not go to the dentist at this early age and 13 (3·5%) said that they were not sure. Over three quarters (274, 79·5%) of parents reported that their child had already visited a dentist, whereas 61 (17·6%) had not, and 10 (2·9%) parents were not sure. One hundred and seventy-two (50%) of parents reported that they visit the dentist with their child relatively regularly, 20 (5·8%) said that they visit only for pain, 79 (23%) gave no answer, and 74 (21·2%) were not sure/did not know.

Oral hygiene practices were investigated and less than half (164, 47·5%) of parents reported that the child brushed his/her teeth twice a day, 78 (22·6%) reported three times a day, 58 (17%) answered once a day, 27 (7·8%) not at all, and finally 18 (5·1%) reported other variable patterns. Additionally, 237 (68·7%) parents reported that the child brushed his/her teeth alone, 86 (25%) helped them with brushing, and 13 (3·8%) gave no answer. Nine (2·5%) parents gave different answers from those included, e.g., that they sometimes helped their child with brushing teeth but not always.

Parents were asked if they had heard about fluoride and its uses. Three quarters (260, 75·4%), indicated they had heard about fluoride but 29 (8·6%) were unsure. The remaining 56 (16%) said no. They were then asked what they had heard about fluoride. One hundred and ninety-two (55·7%) parents mentioned topical fluoride therapy at the dentist every 6 months, 66 (19·3%) that fluoride strengthens enamel, 1 (0·1%) indicated tablets and drops, 1 (0·1%) the negative health effects, and 85 (24·8%) gave no answer.

As shown in Table 3, overall one-fifth (71, 20·5%) of parents said that they used regularly some form of fluoride for their child at home, whereas a greater number (250, 72·5%) did not and 24 (7%) were unsure. Those parents who claimed to use fluoride for their child were then asked to indicate what form of fluoride they used and their answers are also seen in Table 3.

Table 3. Number and percentage of fluoride supplements usually used.

Type of fluoride	Number	%
Fluoride mouthwash	26	7·5
Fluoridated toothpaste	37	10·5
Both	8	2·5
Total no. of users	71	20·5
No use	250	72·5
I am not sure	24	7

Finally, parents were asked about the consumption of sugar by their child between the main meals of the day. Overall, 220 (63·5%) parents said that their child ate sweets regularly between the main meals, whereas the remaining 125 (36·5%) did not give a clear negative answer. Of the 220 children who consumed sweets, 113 (32·5%) ate sweets once every day, whereas 70 (20%) ate sweets 2–3 times per day, and the remaining 37 (11%) exhibit various other patterns.

The degree of association between dmft and the following parameters drawn from the questionnaire was investigated: dental attendance, tooth brushing frequency, fluoride use, and sugar consumption. Using a correlation coefficient calculation (r), no statistically significant association was found to exist between dmft and the variables investigated (r = 0·1–0·34).

Discussion

In this study, dental examinations were undertaken on 345 (77% of the total) children in 18 nurseries in Athens and Piraeus areas in Attica County. Previous studies [5] conducted in nurseries in the UK have achieved a similar proportion of examined children.

Overall, 48·4% of the children examined had some experience of dental decay as defined by the WHO criteria. This figure is similar to the findings of

Table 4. Epidemiological studies in 5-year-olds in the Athens area since 1990.

Authors	Year	Areas of Athens (no. of areas examined)	No. of children	dmft	% experience	Care index
[6]	1991	North-east, south-west, south (3)	55	2·87	50·9	7%
[7]	1992	West, north (2)	65	1·38	–	–
[8], [9]	1994	North, central, south-west, and Piraeus (3)	200	1·62	45·5	23·4%
[10]	1994	Central (1)	318	1·48	42·5	14·8%
HDA National survey* [11]	2002–4	North, central, south-west (3)	151	1·2	42·8	13·44%
Present study	2001	North-east, north-west, south-east, south, centre, Piraeus (6)	345	2·61	48·4	5·7%

*Immigrant children excluded.

previous Greek studies of the period 1990–2000, as can be seen in Table 4. The range of caries experience in these studies was 42·5–50·9%.

The overall mean dmft was 2·6 and the mean dmft of those children with caries experience was 5·4, figures that appear to be unexpectedly higher than the findings of previous studies in Athens in the last 15 years (Table 4). Earlier this year, preliminary results from a national survey organized by the Hellenic Dental Association in 11 different counties of Greece [11], showed much better national means for children up to 12 years, compared to a similar WHO study in 1985 [12]. For 5-year-olds, the national mean was 1·8, whereas in the Athens area the value was 1·2. This difference with this study that was conducted in the same period might be attributed to different study designs, as in this study a greater number of more widely selected children from different areas were examined, as seen in Table 4. Also, there has been a considerable change in the population in Attica County in the last 15 years, with the number of families with immigrant background increasing to more than 10% of the total population and affecting much the overall oral health values. In the preliminary results given by the national study of the Hellenic Dental Association, dmft values for immigrant children were excluded in the first place for various study design reasons, whereas in our study there were no exceptions. Support for this assumption is the study by Lygidakis *et al*. [13], evaluating oral health and dietary habits of preschool immigrant children in the Athens area in 1996, that showed a great dmft value 5·5 for 5-year-olds, caries experience 88·7%, whereas overall OHI-S index and dietary habits were much worse than similar values in local children reported in the same period by the same researchers [7].

The main component of the overall mean dmft was untreated decay (d = 2·4, m = 0·1, f = 0·2), a finding that was also stressed in a previous study [10] that found the component d being 1·2, for dmft 1·5. Also, this finding was apparent and in the recent national survey [11], which found the component d being 1·5, for dmft 1·8 in 5-year-old children. The mean dmft in this study varied between the different areas from 4·1 in the centre of Piraeus to 1·6 in the south of Athens. The mean dmft in the centre of the two cities (Athens and Piraeus) was 3·2 and 4·1, respectively, and 1·6 in the south of Athens and 2·6 in the south-west of Athens. Over one-third of the children examined (36%) were residents in the broader centre of the two cities, areas more deprived than the ones surrounding Athens, which are preferred by residents with higher socio-economic status. Also, in these central areas the proportion of children with immigrant background living there is much higher, in some of the nurseries selected approaching 30–40%. Children from these more deprived areas had a significantly higher mean dmft, in an extent and severity that was greater than anticipated. This study highlighted a dental public health problem indicating a need to enhance preventive programmes for these underprivileged categories. This association between deprivation and poor dental health is well documented in numerous national and other studies [14–16].

Concerning the high levels of untreated dental decay and the low number of fillings found in this study (care index 5·7%), it was surprising to find that, overall, 95% of parents reported that their child should visit a dentist at this early age and 79·5% reported that they had already visited a dentist. Self-reported attendance, however, is not always reliable, as has been demonstrated in previous studies [17,18]. Also, there is a question on parent's perception of what constitutes a visit to the dentist, as they may perceive screening as a visit and not understand the need to actively register their child with a dentist. This problem of caries left untreated was also indicated in the recent Hellenic national survey [11]; national care index for 5-year-old children was 13·4%, meaning that 86·6% of the children had untreated needs. Previous epidemiological reports in Athens 10–15 years earlier did not address clearly this issue, revealing conflicting results because of different study areas selection. It appears, however, that care index at that time was, at least in one case, better than the present one, addressing again the problem of population change in certain areas of Athens. The finding of caries left untreated may indicate that: (a) general dental practitioners still leave primary teeth untreated; and (b) as utilization of dental services in Greece is highly depended on family income [19], parents of lower socioeconomic groups do not attend for dental treatment regularly. Studies in the UK have also discussed this existing problem, which has been attributed to both parents and dentist's attitudes. In these reports, one-third of the parents, although attending regularly NHS practices, wanted asymptomatic primary teeth to be left untreated [20], whereas there is still a high proportion of general dental practitioners who do

not follow the guidelines of the British Society of Paediatric Dentistry for restoring carious primary teeth [21,22]. As a result of these attitudes, the care index for 5-year-olds in the last British national survey conducted in 2003/2004 [23], is similar to the Hellenic one, being only 12%, which means that 88% of primary teeth caries remains untreated.

The percentage of reported brushing frequency two to three times a day (70·1%) appears much better from the figures reported 10–15 years before [6,7], indicating an increasing awareness of the public on oral health care. It must be accepted, however, that reported toothbrushing frequency, might not reflect what actually happens at home. An important finding is that only 25% of the parents help their children with brushing, showing that the importance of parental involvement in this young age group should be stressed again.

Despite the fact that 75·4% of parents reported that they had heard about fluoride and its importance, a similar percentage (72·5%) answered that they had never used any type of fluoride for their child at home. This difference between parent's belief and behaviour indicated that there might be barriers to fluoride use, e.g., no encouragement by the dentist, not available fluoride supply, not so sure that the intervention would work. Despite the dental profession's belief that fluoride message is well into the community, these results show that public awareness still requires considerable rising. Other impressive findings from this question stress more the public ignorance; only 13% of the parents knew that toothpastes contain fluoride, meaning that the remaining either does not know it or they ignore their effect. Additionally, 10% reported use of fluoride mouth wash, usage not indicated at this age [24]. The results of this study, indicating the low fluoride use by preschool children, may partly explain the high caries indices in the caries-affected group of children examined in Athens. The relationship of caries experience in primary teeth to daily salivary fluoride levels has been well-documented previously [25].

Overall, 63·5% of parents reported that their child ate sweets between the main meals, whereas the remaining were unsure or gave no answer, meaning that their child might also have regular sweets consumption. Thirty-one per cent of parents said that their child ate sweets more than once per day between meals. This finding, associated with the low fluoride intake through regular toothpaste usage as discussed previously, may overall explain the high levels of dental decay found in the group of caries-affected children in this study [26].

What this paper adds

- Despite obvious caries decline, there are certain population groups that still have high caries indices.
- Caries left untreated remain a problem that should be addressed by the profession.
- Public awareness concerning fluoride use requires further rising.

Why this paper is important to paediatric dentists

- Certain groups of preschool children still require considerable attention by paediatric dentists.

Conclusions

1 Five-year-old children in the prefectures of Athens and Piraeus in Attica County had a mean dmft of 2·61. Overall, 51·6% were caries free.
2 For those children with caries experience (mean dmft > 0 = 5·40), untreated decay was the highest component (mean dt = 4·95).
3 Children from the centres of the two cities, Athens and Piraeus, had worse dental health than children attending nursery schools elsewhere in the prefectures.
4 Ninety-five per cent of the parents reported that they knew the need for children to attend a dentist at an early age. The attendance rate was 79·5%.
5 Only 20% of parents reported the use of fluoride at home, although three-quarters claimed to have heard about fluoride and its importance in preventing dental decay.
6 A high proportion of children consumed sugar between the main meals of the day.
7 There was no association between parents reported views and the dental health of the children. The variables examined statistically were reported dental attendance, tooth brushing frequency, fluoride use, sugar consumption between meals, and dmft.

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