ORIGINAL ARTICLE

Dental erosion prevalence and associated risk indicators among preschool children in Athens, Greece

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Abstract

Objectives The aims of the study were to investigate dental erosion prevalence, distribution and severity in Greek preschool children attending public kindergartens in the prefecture of Attica, Greece and to determine the effect of dental caries, oral hygiene level, socio-economic factors, dental behavior, erosion related medication and chronic illness.

Material and methods A random and stratified sample of 605 Greek preschool children was clinically examined for dental erosion using the Basic Erosive Wear Examination Index (BEWE). Dental caries (dmfs) and Simplified Debris Index were also recorded. The data concerning possible risk indicators were derived by a questionnaire. Zero-inflated Poisson regression was generated to test the predictive effects of the independent variables on dental erosion.

Results The prevalence of dental erosion was 78.8 %, and the mean and SE of BEWE index was 3.64 ± 0.15 . High monthly family income was positively related to BEWE cumulative scores [RR=1.204 (1.016–1.427)], while high maternal education level [RR=0.872 (0.771–0.986)] and poor oral hygiene level [DI-s, RR=0.584 (0.450–0.756)] showed a negative association.

Conclusions Dental erosion is a common oral disease in Greek preschool children in Attica, related to oral hygiene and socio-economic factors.

Clinical relevance Programs aimed at erosion prevention should begin at an early age for all children.

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Introduction

There has been considerable interest in the epidemiology of dental erosion in young children and adolescents, since there is evidence to suggest that its prevalence and incidence are increasing [1-3]. Dental erosion is the irreversible loss of dental hard tissue by a chemical process not involving bacteria [4] and together with attrition and abrasion comprises a non-carious dental hard tissue destructive process under the general term of "tooth wear" [5-8]. In the primary dentition, tooth tissue loss may be mainly due to erosion. However, since attrition of incisal and occlusal surfaces is very common at the time of exfoliation, it is very difficult to distinguish between the two in the late stages of the primary dentition [9]. Dental erosion may be harmful for deciduous teeth, and unless the causes are addressed, it may predispose to dental erosion in the permanent dentition with serious consequences for dental health [10-13].

Epidemiological studies in preschool children have established a wide range in the prevalence of the disease—from 5.7 [14] to 98 % [15]—with the majority reporting rates between 20 and 78 % [5, 9, 16–21]. However, the results of those studies are hardly comparable due to the variations in sample characteristics and the different indices used [22]. Dental erosion is considered a multifactorial oral disease [23, 24], and regarding preschool children, the main factors that have been implicated are the frequency of consumption of fruit juices and carbonated drinks (especially at bed time), the use of vitamin C supplements, and the presence of dental caries and gastro-oesophageal reflux [14–16, 18–21, 25, 26]. Even though the scientific interest has concentrated mainly on the detection of dietary, tooth or host factors, there are also several studies that have focused on the association between dental erosion and socioeconomic factors such as social class, income, region, parental education level and occupation [5, 14, 19–21, 25, 26]. Moreover, due to the conflicting nature of the results, the relationships to specific socioeconomic indicators remain rather unclear.

In Greece, data concerning the prevalence of dental erosion in various population groups are limited [26, 27], and there is only one published study regarding tooth wear in the primary dentition [26]. Furthermore, there are no studies regarding dental erosion experience in preschool children in association with possible risk indicators that might be important for the early diagnosis and prevention of the disease.

The aims of the present study were to assess the prevalence, distribution and severity of dental erosion in a large sample size of Greek children attending public kindergartens in the Prefecture of Attica, Greece, and to investigate the effect of oral health status, socio-economic level, oral health behavior, as well as erosion related medication and chronic illness on dental erosion.

Study population and methods

The present study comprises part of the analysis of data collected during a larger cross-sectional investigation into the effects of socioeconomic factors and deprivation on the oral health and dental services use in preschool children in Attica. For this purpose, a random sample of 5-year-old Greek children (kindergarten attendance in Greece is compulsory only for the 5-year-old children, according to their year of birth) was drawn from public kindergartens of the prefecture of Attica, which is the most densely populated prefecture of Greece consisting of 120 municipalities and communities. The municipalities were stratified into three area-based income groups, in order to be representative of the socioeconomic structure of the study population, according to the mean annual family income of the residents, as follows [28]: high (23,400€+), medium (between 13,500€ and 23,399€) and low (4,505€-13,499€). A total of 13 municipalities were randomly selected, and 35 public kindergartens were chosen (using random numbers generator) without replacement from the total list of the kindergartens of the selected municipalities. Once a kindergarten was selected, all children were included. One thousand two hundred and ninety (1,290) questionnaires, accompanied by the corresponding informative letters and consent forms, were distributed through the teachers to the parents of the children to be completed by the mothers at home. A total of 605 Greek children who were present in the schools the assigned days of dental examination formed the study sample, and statistical analysis was finally run for 524 matching pairs of children-questionnaires. The details on participation rates and exclusion criteria are presented in a flowchart (Fig. 1).

Head teachers of all the kindergartens who were approached agreed to participate in the dental survey. Approval for the



Fig. 1 Participation rates and exclusion criteria of the study population

study was obtained from both the Ministry of Education and the Ethical Committee of the University of Athens Dental School.

The children were examined in their school settings, during the years 2009-2011 under artificial light (Darey lamp), using a mouth mirror and the WHO periodontal probe. The examination was performed by one trained examiner (MM), who recorded dental caries experience and dental erosion as well as the oral hygiene level. Oral hygiene was recorded using the Simplified Debris Index (DI-s) [29]. The teeth were then cleaned and/or dried using cotton rolls. Dental caries experience was recorded using WHO standardised criteria and was expressed by the dmfs index [30]. Dental erosion was measured by the Basic Erosive Wear Examination Index (BEWE), where buccal/facial, occlusal and lingual/palatal surfaces of all teeth were examined, and the highest score found was recorded for each sextant. Once all the sextants had been assessed, the sum of the scores was calculated (cumulative score) [31]. For deciduous dentition the teeth sextants were as follows: 1: 55-54, 2: 53-63, 3: 64-65, 4: 74-75, 5: 73-83 and 6: 84-85. The criteria of scoring are shown in Table 1.

The questionnaire of the main cross-sectional investigation consisted of a combination of open and close-ended questions regarding demographic and socioeconomic data, oral hygiene and dietary habits, oral health behaviors and biological variables. For the present study, the specific variables selected were the following: (1) gender, (2) socioeconomic level assessed by parental level of education and monthly family self-reported income, (3) behavioral factors measured by frequency of tooth brushing, age and reason of child's first dental visit, (4) erosion related medication (vitamin C supplements, inhalers and liquid iron supplements) and (5) chronic illness related to gastric acid reflux (vomiting, regurgitation and heartburn) (Table 2). Data concerning age, gender and nationality were obtained from school registers.

Intra-examiner reproducibility, by re-examination of 5 % of the sample 1 month later, was assessed at child level using kappa statistics and was found to be 0.71 and 0.94 for dental erosion and caries experience, respectively.

The analysis of data was carried out using the software Data Analysis and Statistical Software ver. Stata/IC 12.0. Clinical and coded questionnaire data were first entered into

Table 1 BEWE criteria for grading erosive wear [31]	Score		
	0	No erosive tooth wear	
	1	Initial loss of surface texture	
	2 ^a	Distinct defect, hard tissue loss <50 % of the surface area	
^a In scores 2 and 3, den-	3 ^a	Hard tissue loss ≥50 % of the surface area	
tine often is involved			

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Table 2 Independent variables included in the regression models

Variables	Number (%)
Mother's education level (years)	
≤13	234 (45.9)
>13	276 (54.1)
Father's education level (years)	
≤13	265 (52.8)
>13	237 (47.2)
Monthly family income	
Low (≤1467€)	101 (21.3)
Medium (1468–2937€)	248 (52.2)
High (>2938€)	126 (26.5)
Frequency of tooth brushing	
Rare	109 (20.8)
Once a day	261 (49.9)
Twice a day or more	153 (29.3)
Age of first dental visit (years)	
≤3.5	192 (44.1)
>3.5	243 (55.9)
Reason of dental visit	
Preventive dentistry	403 (92.0)
Restorative dentistry	35 (8.0)
Erosion related medication	
No medication	447 (85.3)
Vit. C supplements (vit. C, inhalers, liquid iron complements)	12 (2.3)
Other medication	65 (12.4)
Erosion related chronic illness	
No	449 (85.7)
Yes (vomiting, regurgitation, heartburn)	75 (14.3)
Total ^a	524 (100)

^a Totals less than 524 are due to missing data

two different files and then merged into the final data file. Missing data were handled using list-wise deletion (complete case analysis). Descriptive statistics were performed for the scale variables BEWE cumulative scores, dmfs and DI-s, and frequency distributions were provided for categorical factors. As BEWE cumulative scores, dmfs and DI-s distributions were non-normal showing a considerable skewness, interquartile ranges were also calculated. A zero-inflated Poisson regression (ZIP) was generated to explore the predictive effect of independent variables on BEWE cumulative scores. The zero-inflated Poisson regression generates and combines two separate models: a logit model (inflate) for the "certain zero" cases (BEWE cumulative scores = 0 vs BEWE cumulative scores >0), predicting whether or not a child would be in this group, and a Poisson model to predict dental erosion severity (the counts for those children with BEWE cumulative scores >0).

Univariate and multivariate analyses were performed. The multivariate analysis was run in the level of main effects, which is the predictive effect of each independent variable on BEWE cumulative scores when all the other variables held constant. The interpretation of ZIP regression was based on exponential Poisson regression coefficients {OR for the logit process/rate ratio (RR) for the count process}, in terms of the expected change in odds/rate ratio for BEWE cumulative scores for a unit change in the corresponding predictor. Additionally, Vuong test was used to compare the ZIP model to the standard Poisson with the specified predictors, and the likelihood ratio (LR) chi-square tested the overall fit of the predictors [32]. All reported p values were two-tailed with an alpha level of 0.05 and 95 % confidence intervals indicating statistical significance.

Results

Clinical examination was carried out in 306 boys (50.6 %) and 299 girls (49.4 %), with a mean age of 5.11 ± 0.5 years. Four hundred and seventy seven (78.8 %) of the examined children were found to have at least one tooth surface affected by dental erosion. The mean BEWE cumulative scores and SE of the mean were 3.64 ± 0.15 , while mean and SE of the mean dmfs were 0.83 ± 0.13 . Mean DI-s scores and SE were 0.15 ± 0.01 , indicating good oral hygiene level [33]. The interquartile range of BEWE cumulative scores, dmfs and DI-s indices were 5, 0 and 0.17, respectively. As shown in Table 2, more than half of the mothers (54 %) were highly educated, while most of the fathers (53 %) had lower education levels. The majority of the families had a medium monthly family self-reported income (1,468–2,937€). More than half of the children had their first dental visit after 3.5 years of age. The main reason for this initial dental visit was prevention (check-ups and preventive interventions -92 %) while there were also 86 children (16.5 %) who had never visited the dentist. Medication intake and chronic illness were observed in low frequencies (14 %).

BEWE cumulative scores ranged between 0 and 14 in the total sample (Fig. 2). One hundred and twenty eight children (21.2 %) had BEWE cumulative score 0. A large number of children had BEWE cumulative score 1 (125 children, 20 %), which means that they had at least one tooth with initial loss of surface texture, followed by 76 children (12.5 %) with BEWE cumulative score 2. The rest of the children were distributed in lower frequencies between cumulative scores 3 and 12, and only three children had the highest value of 14.

The prevalence of dental erosion by dental arch and tooth position is illustrated in Fig. 3. More specifically, 69 % of the children had dental erosion in their maxillary anterior teeth, which were the most affected teeth, followed by the mandibular molars which were affected in 42 % of the sample. Dental erosion prevalence was higher in the mandibular posterior teeth compared to the maxillary ones. On the contrary, the sites with the lowest prevalence rates were the mandibular anterior teeth (6 %). The most affected dental surfaces were the maxillary labial surfaces (67 % of the children), while the lowest prevalence of 3 % was recorded in the lingual mandibular surfaces. In the posterior teeth, the affected surfaces were mainly the occlusal, and only 28 children (4.5 %) had the buccal surfaces of their posterior teeth (1st molars) attacked by erosion (data not shown).

As far as severity of lesions is concerned, Fig. 4 presents the prevalence of dental erosion by dental arch and tooth position, according to the scoring criteria of BEWE. The numbers in each column refer to the percentage of children who had at least one tooth surface affected by erosion according to the corresponding criterion. However, children



Fig. 2 Distribution of children according to BEWE cumulative scores (N=605)

Fig. 3 Prevalence of dental erosion in primary dentition by dental arch, tooth position and tooth surfaces (N=605)



who have been classified with score 2 or 3 may also present lesions corresponding to criterion 1 or 1 and 2, respectively. Approximately 50 % of the affected children had distinct erosion defects with hard tissue loss less than half of the surface area (score 2) in both arches. The most common lesions in anterior teeth were the initial ones (score 1), recorded in 54 % of the affected children, while in the posterior teeth lesions with score 2 were recorded in 68 % of the affected children. Loss of hard tissue over 50 % of the surface area (score 3) was observed in very low rates, under 8 % in all subgroups.

In the statistical analysis, the variables presented in Table 2 were tested in a univariate and multivariate zero-inflated Poisson regression model. Dental caries (dmfs) and oral hygiene (DI-s) were used as independent variables. The results are presented in Table 3. Univariate analysis revealed statistically significant associations between dental erosion severity (non-zero BEWE cumulative scores) and DI-s values (RR=0.655, 95 % CI=0.531–0.808), mother's education level (RR=0.888, 95 % CI=0.810–0.973) and erosion related medication intake (RR=1.234, 95 % CI=1.090–1.398). When vitamin C intake was tested as a separate

variable, the expected BEWE cumulative scores rate ratio increased by 1.45 (RR=1.45, 95 % CI=1.08–1.95). However, it must be pointed out that only 2 % of the sample population used this supplement. Concerning the inflated part of the regression analysis, only dmfs was statistically significant; a unit increase in dmfs scores was increasing the likelihood of a child to be in the dental erosion free group (OR=1.066, 95 % CI=1.001–1.135).

Regarding multivariate analysis, dental caries (dmfs) and erosion related medication lost their effect on predicting BEWE scores. On the contrary, DI-s retained its predictive effect with a slight decrease in the expected rate ratio by 0.07 points (RR=0.584, 95 % CI=0.450–0.756). High maternal education level continued to have a positive effect reducing the expected counts of BEWE cumulative scores compared to the reference category (RR=0.872, 95 % CI 0.771–0.986). However, high family income levels resulted in a higher rate ratio for BEWE cumulative scores by a factor of 1.20 (RR=1.204, 95 % CI=1.016–1.427). None of the independent variables were statistically significant in the inflated part of the ZIP regression. The model as a whole was statistically significant (likelihood ratio χ^2 (13)=39.38,





Table 3Zero-inflated Poissonregression analyses (univariate	Predictive variables	BEWE cum. scores >0		BEWE cum. scores = 0	
and multivariate) between BEWE cumulative scores (de-		RR (95 % CI)	<i>p</i> -value	OR (95 % CI)	<i>p</i> -value
pendent variable) and predictive variables	Univariate analysis ^a				
	Mother's education level (years)				
	≤13 ^b vs >13	0.888 (0.810-0.973)	0.011*	0.934 (0.598-1.462)	0.768
	Erosion related medication				
	No ^b /yes	1.234 (1.090–1.398)	0.001**	3.031 (0.514-9.818)	0.062
	dmfs	0.986 (0.966-1.008)	0.209	1.066 (1.001–1.135)	0.045*
	DI-s	0.655 (0.531-0.808)	0.000**	1.100 (0.944-4.235)	0.070
	Multivariate analysis ^c				
	Gender				
	(Boys ^b vs girls)	0.956 (0.856-1.067)	0.421	0.842 (0.464-1.464)	0.542
	Mother's education level (years)				
	≤13 vs >13	0.872 (0.771-0.986)	0.029*	1.600 (0.833-3.074)	0.158
	Father's education level (years)				
	≤13 vs >13	0.993 (0.873-1.122)	0.910	0.668 (0.357-1.250)	0.207
	Monthly family income				
	Low (≤1467€) ^b	_	-	_	_
	Medium (1468–2937€)	1.150 (0.989–1.333)	0.070	1.431 (0.637–3.215)	0.386
	High (>2938€)	1.204 (1.016-1.427)	0.032*	1.412 (0.563-3.542)	0.462
	Frequency of tooth brushing				_
	Rare ^b	_	-	-	
	Once a day	1.029 (0.0885–1.195)	0.714	1.401 (0.598–3.284)	0.437
	Twice a day or more	1.022 (0.868-1.205)	0.789	1.620 (0.670-3.923)	0.285
	Age of first dental visit (years)				-
	≤3.5 vs >3.5	0.931 (0.833-1.040)	0.205	0.751 (0.428-1.316)	0.316
	Reason of dental visit				
	Preventive dentistry ^b	-	-	_	_
	Restorative dentistry	1.112 (0.897–1.378)	0.332	0.936 (0.304-2.878)	0.908
* p <0.05, ** p <0.001 ^a Only statistical significant	Erosion related medication				
	No ^b /yes	1.168 (0.993–1.374)	0.061	1.517 (1.935–2.673)	0.700
results	Erosion related chronic illness				
^b Indicates reference category	No ^b /yes	1.001 (0.846-1.186)	0.986	0.851 (0.684–3.362)	0.305
^c Likelihood ratio χ^2 (13)=39.38, $\chi^2 p$ =0.0002, Vuong test of zip vs standard Poisson z=5.74,	dmfs	0.983 (0.955-1.013)	0.260	1.047 (0.951–1.153)	0.352
	DI-s	0.584 (0.450-0.756)	0.000**	1.871 (0.719–4.866)	0.199
	cons	4.843 (3.941-6.513)	0.000	0.117 (0.037-0.368)	0.000

p=0.0002), and Vuong test suggested that the zero-inflated model was a significant improvement over standard Poisson (z=5.74, Pr > z=0.0000).

Gender, father's education level, frequency of tooth brushing, chronic illness and use of dental services were not found to affect dental erosion in this group of children.

Discussion

Pr > z = 0.000

Research on tooth wear and related factors has received great interest in recent years. The present study focused on dental erosion in preschool children and recorded the prevalence, distribution and severity of this clinical entity in a sample of considerable size. The influence of known risk indicators, as well as other possible determinants that have been less examined in previous studies (such as dental plaque, dental caries experience and use of dental services), was investigated.

According to the present results, dental erosion is a common disease in 5-year-old children in Attica with a prevalence that falls within the reported rates observed in previous studies [5, 9, 15-21]. The most affected dental surfaces were found to be the maxillary anterior teeth, a

finding which is in agreement with other studies [9, 15, 16, 20]; however, the rates of prevalence vary. On the other hand, lower rates of erosion were found in the mandibular anterior teeth (6 %), especially in their lingual surfaces, and this may be attributed to the protective effects of the saliva produced by submandibular and sublingual glands [9]. These findings are in accordance with those reported by Taji and co-workers [13]. Within the posterior dentition, the majority of erosion lesions were found in mandibular teeth (42 %), mainly on their occlusal surfaces, even though the coexistence of attrition in these lesions should be considered as well. It may be assumed that due to the late eruption of the molars, the prevalence of dental erosion is distinctively lower compared to anterior teeth. The location of anterior teeth in combination with their earlier eruption subjects them to the influence of acids for longer periods of time. Wiegand and co-workers [9] reported that erosion in posterior teeth was mostly seen in occlusal surfaces involving enamel or enamel-dentine. The latter is in accordance with the erosion severity of lesions recorded in the present study for posterior teeth (scores 1 and 2).

Oral hygiene level appeared to be an important risk indicator for dental erosion in the present study, presenting a stable positive association. However, the effect of dental plaque on dental erosion is not well documented. Johansson et al. [34] were the first to show that dental plaque accumulation on palatal surfaces of maxillary anterior teeth was lower in high-erosion subjects when compared with lowerosion groups. Cheung et al. [35] and Honorio et al. [36] have reported that dental plaque formed in situ can provide a significant level of tooth protection towards dental erosion caused by intrinsic or extrinsic acid sources. There is no clear explanation for this phenomenon. Nevertheless, some researchers argue that dental plaque might act as mechanical barrier towards erosive agents [35, 37, 38], or its "protective" effect against acids of non-bacterial origin might be attributed to the higher buffering capacity [39]. Although this observation has a scientific interest, its clinical interpretation must be made cautiously since dental plaque is responsible for dental caries and periodontal disease. The present observation certainly does not indicate that children should not brush their teeth in order to prevent dental erosion development.

Concerning the possible relation between dental caries and dental erosion, the evidence is also very limited. A positive relation between caries and erosion in preschool children has been reported in a previous study, where it was argued that caries could be a significant predictor for erosion and both may occur even in the same tooth surfaces due to common dietary factors such as carbonated drinks and fruit syrups [19, 40]. This suggestion should be considered with caution as dental caries and erosion have different sites of predilection and mechanisms of development [39]. In the present study, dental caries was inversely related to dental erosion in the univariate analysis, but failed to establish any predictive effect when the other factors entered the model.

Studies regarding dental erosion prevalence and socioeconomic factors in preschool children present conflicting results [5, 14, 19–21, 25], thus failing to prove any clear associations, especially at a multivariate level. However, the results of those studies are hardly comparable between them or with our results due to methodological differences, variations in study populations and different scoring and diagnostic criteria. In the present study, high family income was positively related to dental erosion unlike the results reported by Harding et al. [20]. It has been argued that families of high income have higher living standards and tend to adopt lifestyles with more healthy dietary habits (consumption of fruits, vegetables and juices) and oral hygiene practices that predispose to dental erosion [7, 13, 39]. On the other hand, low maternal education level was also related to dental erosion in our study. Perhaps children whose mothers have a low level of education may adopt unhealthy dietary habits which also predispose for dental erosion, such as carbonated soft drinks and fast food consumption. It is arguable that similar dietary habits, either healthy or unhealthy, that include high consumption of acidic food may subject children from different socioeconomic backgrounds to similar levels of risk for dental erosion

Medication intake that was found to be a risk indicator for dental erosion at a univariate level failed to perform as a disease predictor in the multivariate analysis, a fact that is in accordance with the findings of Wiegand and co-workers [9]. However, this is in opposition to Al-Malik et al. [19] who found that the use of vitamin C supplements is a predictive factor for dental erosion at a multivariate level.

Finally, the present study failed to support any relation between erosion and oral hygiene habits as well as between erosion and erosion related illness. These results are in agreement with the findings of Wiegand et al. [9] and Al-Malik et al. [19] and may be attributed to the low time of exposure to these agents. The lack of any statistical relationship with the reason for dental visits might be interpreted as evidence that dentists do not focus on dental erosion, neither on detecting the problem nor on giving the proper information to the parents in order to prevent or inhibit the development of the disease.

Our results cannot be interpreted without taking into consideration the limitations that are raised from the use of the erosion index itself and concerns of index standardization and examination conditions. Only a few comparative studies attempted to evaluate the reliability of BEWE index in permanent teeth [27, 41], but there is no scientific evidence for its use on primary teeth. However, one of the intentions of BEWE authors was to develop an index that could serve children and adults, as well as permanent and primary teeth [42]. Furthermore, BEWE is a quantitative measure of the severity of the disease that can allow more reliable estimations and possibly more sensitive evaluations of possible risk factors than the qualitative measures (e.g. prevalence) that have been widely used in previous studies and can be modeled with advanced statistical methods [26, 31]. In addition, the particular conditions of the examination with inadequate drying and lighting of the tooth surfaces increase the difficulties for accurate recordings. Regarding the accuracy of the measurements, intra-examiner reproducibility was found to be 0.71 which indicates a good level of agreement. In the literature there is evidence that a reliable diagnosis of both early enamel and dentine erosive tooth lesions is not very reproducible, especially in primary dentition as primary teeth do not withstand wear forces to the same degree as the permanent, with difficulties in the scoring of severity and the determination of etiology [10, 42]. Chadwick et al. [11] in their report for non-carious tooth conditions in children in the UK refer to difficulties in calibrating examiners and the relatively low levels of agreement that can be obtained between examiners in detecting enamel tooth surface loss. On the contrary, it is possible to have good agreement between examiners when examining sound surfaces and dentine lesions [41] or tooth surface loss in dentine and pulp [11].

The participation rate in this study was 57.67 %. This moderate score is in accordance to the mean rates reported for cross-sectional studies [43] and can be attributed to the hesitation of the parents towards oral examination due to the young age of the children. Also, preschool children have high rates of school absences, and although they were informed before the examination, many of the children were not present. Moderate response rates to the questionnaires could be explained by the difficulty of parents to cooperate when personal information had to be revealed. This is also a possible reason for the missing data that were observed in some questions. The exclusion from the statistical analysis of the cases with incomplete questionnaires may have possibly resulted in the under-representation of low socioeconomic level families, since they had a lower tendency to respond. Finally, as mentioned previously, the present study was not designed exclusively for the examination of dental erosion and its predisposing factors; thus, various aspects of the disease, especially dietary factors, have not been considered.

Conclusions

Dental erosion is a common oral condition in Greek preschool children in Attica, following a moderate level of disease and a pattern similar to those reported in previous studies. A good oral hygiene level, low maternal education level and high monthly family income appeared to be possible risk indicators in this population, while dental caries and behavioral determinants had no effect. Comprehensive epidemiological studies are necessary for the identification of the risk factors and mechanisms involved in erosion development in preschool children.

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Conflict of interest The authors declare that they have no conflict of interest.

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