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Dental fluorosis in primary teeth: a study in rural schoolchildren in Shaanxi Province, China

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Summary. *Objective.* The aim of this study was to assess the prevalence and severity of fluorosis in the primary dentition of 7–8-year-old Chinese schoolchildren in areas with fluoride concentrations in the drinking water ranging from 0·35 to 7·6 mg L^{-1}.
Subjects and methods. Four hundred and seventy-two children from 13 different schools were divided into four groups according to the fluoride concentration of the drinking water: (A) ≤ 1·0 mg L^{-1}; (B) 1·1–2·0 mg L^{-1}; (C) 2·1–3·8 mg L^{-1}; and (D) 7·6 mg L^{-1}. Clinical examinations were made under field conditions, and dental fluorosis on the buccal surfaces of all teeth was recorded using the Thylstrup–Fejerskov Index (TFI).
Results. The prevalence of dental fluorosis in primary teeth varied from 6·2% to 96·6% according to the fluoride concentration of the drinking water. The differences of median of TFI scores between all groups were statistically significant ($P < 0·001$) except for groups B and C. No statistically significant difference in the severity of dental fluorosis was observed between genders. The second primary molars were most severely affected by dental fluorosis. Disregarding group A, TFI scores between 3 and 4 were most frequently recorded. Dental fluorosis was symmetrically distributed in both jaws.
Conclusion. Dental fluorosis is prevalent in the primary teeth of children living in areas supplied with drinking water with fluoride concentrations higher than 1·0 mg L^{-1}. The primary teeth may act as biomarkers of fluoride exposure. The examination of primary teeth may give an early warning of this condition, and thus, provide a basis for intervention to prevent dental fluorosis in the permanent teeth.

Introduction

Dental fluorosis in primary teeth is considered to be relatively rare [1] and/or less severe in comparison to dental fluorosis in the permanent dentition [2–4]. This has been explained by a 'placental barrier', which was supposed to prevent the transfer of fluoride from the mother's blood to the foetus [5]. While it is now accepted that dental fluorosis may affect both dentitions, the influence of fluoride on primary teeth has not been thoroughly studied. Among the available reports, the prevalence and severity of fluorosis varies from one study to another, from region to region, and according to the investigation methods employed [1,6–10]. McKay [11] stated that 'except in extremely rare instances, the temporary teeth are not subject to this lesion'. Warren [1] found that 11·6% of US children developed mild fluorosis in their primary teeth in areas with water fluoride concentrations of 0·7–1·2 mg L^{-1}. Forsman [10] reported from Sweden that most primary teeth were affected severely (Dean's index ≥ 3) in areas with 10 mg L^{-1} fluoride in drinking water and 80% were affected where the drinking water contained

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5 mg L^{-1} fluoride. In the UK, Murray and Shaw [12] reported that 32·7% of the children exhibited some form of enamel opacities in primary teeth in a low fluoride area (0·26 mg L^{-1} fluoride in drinking water).

No previous report has been published that deals with fluorosis in the primary teeth of Chinese children.

The present study, which is part of a greater project on fluoride and fluorosis in Shaanxi Province, China, reports on the prevalence and severity of fluorosis in the primary dentition of 7–8-year-old children living in rural areas with varying fluoride concentrations in the drinking water.

Subjects and methods

Study area

Shaanxi Province is located in north-western China, between 31–39° N and 105–110° E. Topographically, the province is divided into three parts: a northern plateau, a central plain and a southern mountain area. The total population of Shaanxi is about 36 million, two-thirds of whom live in the countryside. The province is known for endemic fluorosis. It has been calculated that close to five million of the inhabitants live in high-fluoride areas. More than two million cases of dental fluorosis and 200 000 cases of skeletal fluorosis have been reported [13].

Based on the suggestions of local authorities, the investigation was performed in two rural areas know for severe endemic fluorosis: Baoji County in the west and Jingbian County in the north. The local source of drinking water was mainly ground water. Each village had one or two wells, 20–30 m deep. Water samples (500 mL), one from each well, were collected during the summer and autumn in 2002, and analysed for fluoride with a fluoride selective electrode (Model PF-1, Electric and Optic Accessory Factory, Shanghai, China), according to established methods (GB/T 7484–198, China), at the laboratory of the Shaanxi Institute of Endemic Disease Control, Xi'an, China.

Taking into consideration the fluoride concentrations in the groundwater wells, primary village schools were selected according to the following criteria: (1) school authorities consented to take part in the study; (2) at least one class of 7–8-year-old children should be available; (3) the selected schools served communities with comparable socioeconomic standards; (4) the same water source should have been used over the past 9 years; and (5) apart from the drinking water, no fluoride source should be available.

All 7–8-year-old children registered in the selected schools were invited to participate. Relevant information about the participants, such as date and place of birth, was recorded according to the registry forms of the schools.

The children were informed about the investigation and the possibility of withdrawal one day before the examination was performed.

A total of 531 registered students from 13 primary village schools were selected for the investigation. Out of these, 492 (92·7%) attended the examination, and 39 (7·3%) were lost because of absence from school or unwillingness to be examined. Of the 492 participants who were examined, 20 (4·1%) were excluded, eight because they were not lifelong residents of their respective villages and 12 because they had teeth which could not be recorded.

Clinical examination

The clinical examinations were carried out in 2002 by the principal investigator (R.J.P.) under field conditions [14]. At the time of the examination, the examiner was unaware of the fluoride concentration of the relevant drinking water sources.

During the examination, the selected children were seated on ordinary chairs outside the school building. Illumination was by indirect sunlight.

Teeth were cleaned and dried by cotton rolls, and subsequently examined by the use of mirror and explorer, according to World Health Organization recommendations [14]. The buccal surface of each primary tooth present in the mouth was examined and scored for dental fluorosis according to the modified Thylstrup–Fejerskov Index (TFI) [15]. All scores were recorded by a medically trained assistant.

To test intra-examiner reliability, 29 children (approximately 5% of the sample) were re-examined one month after examination. The agreement was moderate, with a Cohen's kappa of 0·58 [16].

Data analysis

The participants were divided into four groups, A, B, C and D, according to the fluoride concentration of the drinking water. Based on the findings of previous reports [4,17], the TFI scores for the upper right second molar were used to express the individual overall TFI score. The TFI score for the right

upper and lower second molars were used for the maxilla and mandible, respectively. The TFI scores for all the teeth of the individual were used to show the distribution of TFI scores in the dentition.

Statistical analyses were carried out by the use of SPSS, Version 11·5, computer program. The Binomial test was used for assessing the gender distribution of the participants. The prevalence of dental fluorosis (TFI score ≥ 1) by fluoride group was analysed by the chi-square test. The median of TFI scores in the different groups, as well as between genders and according to age, were checked by the nonparametric test and the Mann–Whitney *U*-test. The Wilcoxon signed-rank test was used for the comparison of the percentages of dental fluorosis of the maxillary and mandibular dentitions. The significance level was set at $P < 0{\cdot}05$.

Result

A total of 27 wells served the population in the study areas. The range of fluoride concentrations of the wells, according to group, is shown in Table 1.

Table 2 gives the frequency and percentage distribution of the participants by age and gender, and by fluoride group. Within each age group, gender was equally distributed across the four fluoride groups.

The prevalence of dental fluorosis in primary teeth increased with the fluoride content of the drinking water, from 6·2% in children from areas with ≤ 1·0 mg L^{-1} (group A) to 96·6% in children from the village with 7·6 mg L^{-1} fluoride in the drinking water (group D). The median TFI score varied from 0 in group A to 4 in group D (Table 3).

Table 1. Fluoride concentration in drinking water.

		Fluoride concentration (mg L^{-1})		
Group	Wells (*n*)	Minimum	Maximum	Mean
A	12	0·3	1·0	0·6
B	5	1·2	2·0	1·5
C	9	2·1	3·8	3·2
D	1	7·6	7·6	7·6
Total	27	0·3	7·6	2·0

A Kruskal–Wallis *H*-test revealed a statistically significant effect for fluoride group ($\chi^2 = 156{\cdot}0$, d.f. = 3, $P < 0{\cdot}001$). The results of a Mann–Whitney *U*-test revealed statistically significant differences between the median TFI scores for all groups, except groups B and C (Table 3).

Table 4 depicts the median TFI scores, and twenty-fifth and seventy-fifth percentiles, according to age and gender, separately for the four fluoride groups investigated. The effect of age was only statistically significant in fluoride group C ($Z = -2{\cdot}214$, $P = 0{\cdot}027$), with 7-year-olds having higher seventy-fifth percentile TFI scores in comparison to their 8-year-old counterparts (4 and 2·25, respectively).

No statistically significant difference for gender was found in the distribution of TFI scores within groups A, B, C and D.

Table 2. Frequency distribution of participants by gender and age.

	7-year-olds			8-year-olds			
Group	Male [*n* (%)]	Female [*n* (%)]	*P*-value	Male [*n* (%)]	Female [*n* (%)]	*P*-value	Total
A	69 (53·5)	60 (46·5)	0·48	51 (53·1)	45 (46·9)	0·61	225
B	15 (40·5)	22 (59·5)	0·32	23 (50·0)	23 (50·0)	1·00	83
C	38 (49·4)	39 (50·6)	1·00	28 (48·3)	30 (51.7)	0·90	135
D	8 (44·4)	10 (55·6)	0·82	5 (45·5)	6 (54·5)	1·00	29
Total	130	131	1·00	107	104	0·89	472

Table 3. The prevalence and severity of dental fluorosis in primary teeth: Thylstrup–Fejerskov Index (TFI).

					TFI ≥ 1	
Group	Number	Median	Twenty-fifth percentile	Seventy-fifth percentile	Number	Percentage
A	225	0*	0	0	14	6·2
B	83	0**	0	2	26	31·3
C	135	0**	0	4	54	40·0
D	29	4*	4	4	28	96·6
Total	472	0	0	1	122	25·8

*The significantly different median of TF-scores was found between all groups.
**No statistically significant different median of TF-scores was found between group B and C.

Table 4. Median of Thylstrup–Fejerskov Index (TFI) scores by age and gender for the four fluoride groups.

	Group A			Group B			Group C			Group D		
Variable	*n*	Median	Percentile (25, 75)	*n*	Median	Percentile (25, 75)	*n*	Median	Percentile (25, 75)	*n*	Median	Percentile (25, 75)
Gender:												
male	120	0	0, 0	38	0	0, 3	66	0	0, 4	13	4	4, 4
female	105	0	0, 0	45	0	0, 3	69	0	0, 4	16	4	4, 4
Age (years):												
7	129	0	0, 0	37	0	0, 3	77	0*	0, 4	18	4	4, 4·25
8	96	0	0, 0	46	0	0, 1	58	0	0, 2·25	11	4	4, 5

*$P < 0{\cdot}05$.

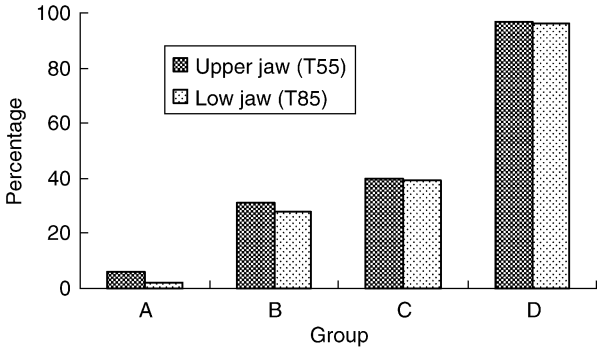

Fig. 1. Comparison of the percentage of dental fluorosis in the upper and lower jaw by fluoride group.

Table 5. Percentage distribution of individuals according to Thylstrup–Fejerskov Index (TFI) score and group.

	TFI score				
Group	0	1–2	3–4	5–6	> 7
A	93·8	4·0	2·2	0·0	0·0
B	68·7	8·4	21·7	0·0	1·2
C	60·0	6·7	28·1	4·4	0·7
D	3·4	0·0	72·4	20·7	3·4

A Wilcoxon signed-rank test of the median TFI score of the upper and lower jaw revealed a tendency towards a higher percentage of dental fluorosis in maxillary teeth as compared to mandibular teeth (Fig. 1). In group A, this difference was statistically significant ($Z = -2{\cdot}26$, $P = 0{\cdot}024$), while nonsignificant differences were found in the three other groups ($P > 0{\cdot}05$).

In children consuming drinking water with a fluoride content of > 1·1 mg L^{-1}, a relatively high percentage were recorded as having TFI scores of 3–4 (Table 5)

Figure 2 shows the symmetrical distribution of the percentage of fluorosis between contralateral teeth in both the maxilla and the mandible for all groups. This demonstrates that dental fluorosis in primary teeth is symmetrically distributed in both jaws.

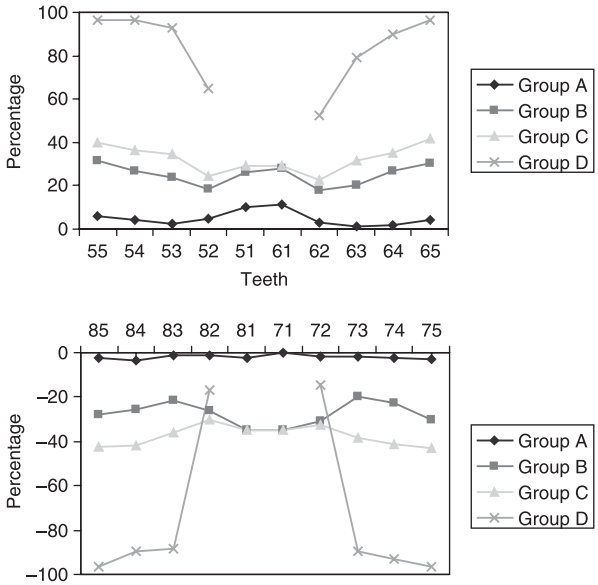

Fig. 2. Percentage of dental fluorosis according to tooth type and group.

As demonstrated by Fig. 2, primary molars and canines were generally more affected by dental fluorosis in comparison to the incisors. This was most pronounced in group D. The second molar was the most affected tooth, followed by the first molar and the canine. In contrast to this general pattern, the central incisor had a higher prevalence of dental fluorosis than the lateral incisors, with an exception for group D. In group D, however, nearly all central incisors were exfoliated.

Discussion

According to some reports [7,10], dental fluorosis in the primary dentition is seen only in areas with a high concentration of fluoride in drinking water. However, Thylstrup [2] found fluorosis in the primary teeth of all examined children in areas with a

moderate water fluoride concentration (3·0 mg L^{-1}) in Tanzania.

In the present investigation, the prevalence of dental fluorosis in primary teeth was low (6·2%), and from a clinical point of view, it was insignificant in children living in areas with water fluoride concentrations of ≤ 1·0 mg L^{-1}. In agreement with previous reports [2,4,18], a positive relationship was found between the prevalence and severity of dental fluorosis in primary teeth and the concentration of fluoride in drinking water. Thus, in areas with 1·1–4·0 mg L^{-1} fluoride in drinking water, 31–40% of the examined children had fluorotic primary teeth, and at the 7·6 mg L^{-1} level, nearly all children were affected by dental fluorosis in one or more of their primary teeth. Forsman [10] and Thylstrup [2] reported even more severe findings in children consuming drinking water with a comparable level of fluoride. In a Chinese setting, fluoride concentrations of ≤ 1·0 mg L^{-1} seem to be of little significance with regard to fluorosis in the primary dentition.

It is known [19] that the mineralization sequence of the primary teeth beings with the lower central incisors and ends with the upper second molars, and more or less the same sequence is followed in the termination of mineralization. The lower primary incisors are normally fully formed at birth, and therefore, should be totally protected from fluorosis at this time – if placenta acts as an effective barrier against fluoride. Most of the lower temporary incisors in the present subjects had been lost by the age of 7–8 years. However, it is interesting to note that 20% of the remaining incisors in all four groups of children were diagnosed as having dental fluorosis.

According to the present study, a high degree of symmetry of fluorosis exists in the primary dentition. This confirms findings by Thylstrup [2], but is at odds with Warren [4], who found a rather weak symmetry of appearance between right and left tooth pairs.

According to the Fig. 2, the second primary molar was the most affected tooth, followed by the first molar and the canine. The lower incisors and the lateral upper incisors were the least affected. Most previous reports have not commented on the distribution pattern of dental fluorosis in the primary dentition. However, Thylstrup [2] reported a decrease in the severity from the posterior teeth to the anterior teeth. This finding was supported by Opinya [17] and Fejerskov [3], who concluded that, in both permanent and primary dentition, 'the teeth which mineralize early in life, develop less dental fluorosis', which is in harmony with the authors' findings. However, they noticed that the maxillary central incisors showed more severe fluorosis than the maxillary lateral incisors (Fig. 2).

In groups A, B and C, slightly more fluorosis was seen in the 7-years-old children than in the 8-years-olds. The difference was statistically significant in group C (the seventy-fifth percentiles were 4 and 2·25, respectively; Table 4), while in the high-fluoride area (group D), the 8-year-old children had higher TFI scores than the 7-year-olds (the seventy-fifth percentiles were 4·25 and 5, respectively; Table 4). This would seem to be in accordance with Aasenden [20], who noticed that very mild and mild degrees of enamel fluorosis in the permanent dentition tended to improve with time. Fejerskov *et al*. [3] agreed with this, but noticed that the enamel of teeth with severe fluorosis may easily be broken over the years, thereby indicating a higher TFI score with time. On the other hand, this age 'trend' might also be explained by possible (unrecorded) time related variations in the fluoride content of the drinking water.

It may be of interest to note that the majority of the fluorotic teeth in this study were given TFI scores of between 3 and 4 (Table 5). With the exception of group A, this tendency was seen in all groups. Similar findings were also reported by Opinya [17]. No definite explanation is offered, but the findings might indicate the existence of a 'cut-off point', above which the ameloblasts cannot tolerate the fluoride concentration without losing the ability to produce adequate enamel. Alternatively, this phenomenon could also be explained by the complexities of the diagnosis of dental fluorosis in primary teeth, which have thinner enamel and a more whitish appearance than permanent teeth. In addition, as the incremental pattern of Reizius is often lacking or is much less pronounced than in permanent teeth, the milder degree of fluorosis is not as characteristic of primary teeth as it is of their permanent successors [3].

As stated above, dental fluorosis in primary teeth may be overlooked partly because it is less prevalent and less severe in comparison to fluorosis in the permanent dentition. The primary dentition has also traditionally been neglected because it is temporary. However, findings of fluorosis prevalences ranging from 30% to 97% strongly indicate that drinking water with fluoride concentrations > 1·0 mg L^{-1} may have a detrimental effect on the mineralization of tooth enamel in small children. Milsom *et al*. [21] reported that children with defects in their primary

teeth are also more likely to have defects in their permanent teeth. Thus, primary teeth may act as a biomarker of fluoride exposure, and thereby, give an indication as to what should be expected in the permanent dentition.

Dental fluorosis is caused by excessive fluoride ingestion during the period of enamel mineralization. The calcification of all primary teeth starts during pregnancy and finishes before the child is one year of age [19]. Thus, in order to cause fluorotic changes in primary teeth, the intake of fluoride should occur before the end of the first year of life. The first permanent teeth also start mineralizing during this critical first year. Thus, if dental fluorosis has already been diagnosed in the primary dentition, steps may be taken to avoid damage to the permanent successors, which may be of greater importance both aesthetically and clinically.

Infant feeding habits should also be taken into consideration when considering the prevention of dental fluorosis. Since breast milk is very low in fluoride [22], even after a mother's intake of relatively high doses of fluoride [23], breastfeeding should be encouraged. According to the available information, only 40% of 4-month-old Shaanxi infants are presently being exclusively breastfed [24].

Studies of fluorosis in the primary dentition may give us useful information about fluoride intake during the first year of life, thereby increasing our knowledge of tolerance levels and possible risk periods in the very young child.

What this paper adds

- Primary teeth mineralised before birth were affected by dental fluorosis.
- Dental fluorosis is prevalent in the primary teeth of children living in areas where the fluoride concentration in drinking water is above 1.0 mg L^{-1}.
- The prevalence and severity of dental fluorosis in primary teeth increased with the fluoride concentration in drinking water.

Why this paper is important to paediatric dentists

- Primary teeth may give early warning of dental fluorosis and provide a basis for intervention.
- Breast feeding should be encouraged since breast milk is low in fluoride, even after mothers intake high doses of fluoride.

Conclusion

Dental fluorosis was found in the primary dentition of children in Shaanxi Province, even in areas with fluoride concentrations in drinking water of less than 1·0 mg L^{-1}.

Since dental fluorosis was also found in teeth which are fully mineralized before birth, the placenta does not seem to be a very effective barrier for fluoride.

The degree, but not the pattern, of dental fluorosis in primary teeth changed with an increase in the fluoride concentration in the drinking water.

Dental fluorosis in the primary dentition is symmetrically distributed. A tendency for the degree of fluorosis to gradually increase from the incisors to the molar teeth was observed. However, the maxillary central incisors showed more severe fluorosis than the maxillary lateral incisors.

The primary teeth may be used as a biomarker of fluoride exposure. Thus, dental fluorosis in the primary dentition may be the first sign of excessive fluoride intake in a child. Examination of the primary teeth may give early warnings, and thus, provide a basis for intervention to prevent dental fluorosis in the permanent teeth.

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Résumé. *Objectif.* Evaluer la prévalence et sévérité de la fluorose des dents temporaires chez des enfantsâgés de 7-8 ans dans des zones dont la concentration en fluorures dans l'eau de consommation va de 0,35 à 7,6 mg/L.
Matériel et méthode. Quatre cent soixante-douze enfants issus de 13 écoles différentes ont été divisées en 4 groupes selon les concentrations en fluorures des eaux de boisson (A ≤ 1,0 mg/l, B = 1,1–2,0 mg/l, C = 2,1–3,8 mg/l et D = 7,6 mg/l). Les examens cliniques ont été réalisés sur place et la fluorose a été évaluée sur les faces vestibulaires de toutes les dents selon l'indice de Thylstrup / Fejerskov (TFI).

Résultats:

1 La prévalence de la fluorose des dents temporaires a varié de 6,2% à 96,6% selon la concentration en fluorures des eaux de boisson. Les différences de médianes des scores de TF entre tous les groupes étaient statistiquement significatifs ($p <$ 0,001) sauf pour les groupes B et C.
2 Aucune différence statistiquement significative dans la sévérité des fluoroses dentaires n'a été observée entre les genres.
3 Les secondes molaires temporaires ont été les plus affectées par la fluorose dentaire. Hormis dans le groupe A, les scores de 3-4 ont été les plus fréquemment retrouvés.
4 La fluorose dentaire était distribuée de façon symétrique dans les deux mâchoires.

Conclusion. Dans les zones dépendant d'une eau de consommation avec des concentrations supérieures à 1,0 mg/L, la fluorose dentaire est également prévalente dans les dents temporaires. Ces dents peuvent servir de biomarqueur d'exposition aux fluorures. L'examen des dents temporaires peut constituer un signal d'alerte et servir par là même de base à une intervention pour prévenir la fluorose des dents permanentes.

Zusammenfassung. *Ziel.* Feststellung der Prävalenz und Ausprägung der Fluorose von Milchzähnen 7-8 jähriger Kinder in Gegenden mit Fluoridkonzentrationen im Bereich zwischen 0.35 bis 7.6 mg/l.
Materialien und Methoden. Vierhundertzweiundsiebzig Kinder aus 13 verschiedenen Schulen wurden, je nach Trinkwasser-Fluoridkonzentration, vier verschiedenen Gruppen zugeordnet (A < 1.0 mg/l, B = 1.1–2.0 mg/l, C = 2.1–3.8 mg/l und D = 7.6 mg/l). Klinische Untersuchungen wurden unter den Bedingungen einer Feldstudie durchgeführt, Dentalfluorose an Bukkalflächen aller Zähne mittels Thylstrup/ Fejerskov Index (TFI) erhoben.

Ergebnisse:

1 Die Prävalenz der Dentalfluorose schwankte je nach Trinkwasser-Fluoridkonzentration zwischen 6.2% und 96.6%. Die Differenzen der medianen TF-Scorewerte zwischen allen Gruppen waren statistisch signifikant ($p < 0.001$), bis auf die Gruppen B und C.
2 Es wurden keine Unterschiede der Fluorose-Schweregrade zwischen den Geschlechtern beobachtet.
3 Der zweite Milchmolar war am stärksten von Dentalfluorose betroffen. Bis auf Gruppe A wurden die TF-Scorwerte 3 und 4 am häufigsten registriert.
4 Dentalfluorose war in beiden Kiefern symmetrisch verteilt.

Schlussfolgerung. In Gegenden mit einer Trinkwasser-Fluoridkonzentration von größer als 1.0 mg/l ist Dentalfluorose auch bei Milchzähnen prävalent. Milchzähne können als ein Biomarker für Fluoridexposition dienen. Die Untersuchung von Milchzähnen kann frühzeitig warnen und eine Basis für die Prävention der Dentalfluorose bleibender Zähne bieten.

Resumen. *Objetivo.* Valorar la prevalencia y severidad de la fluorosis en dentición decidua de niños de 7-8 años en áreas con concentraciones de flúor en agua potable que oscilan entre 0,35 to 7,6 mg/l.
Material y método. 472 niños de 13 escuelas diferentes se dividieron en 4 grupos, según las concentraciones de flúor en el agua (A ≤ 1,0 mg/l, B = 1,1–2,0 mg/l, C = 2,1–3,8 mg/l y D = 7,6 mg/l). Los exámenes clínicos se hicieron en situación de campo y se registró la fluorosis dental en las superficies vestibulares de todos los dientes, usando el índice Thylstrup/ Fejerskov index (ITF).

Resultados:

1 La prevalencia de fluorosis dental en dientes deciduos varió de 6,2% a 96,6% según la concentración de flúor en el agua potable. Las diferencias de media de las puntuaciones de TF entre todos los grupos fue estadísticamente significativa ($p < 0,001$) excepto el grupo B y C.
2 No se observaron diferencias estadísticamente significativas en la severidad de la fluorosis dental entre los géneros.
3 Los segundos molares deciduos estaban afectados más severamente por la fluorosis dental. Exceptuando el grupo A, los valores de TF 3-4 fueron los registrados con más frecuencia.
4 La fluorosis dental se distribuyó simétricamente en ambas arcadas.

Conclusión. En áreas dependientes del agua con concentraciones de flúor más altas de 1,0 mg/l, la fluorosis dental también es prevalente en dientes deciduos. Los dientes deciduos pueden actuar como un biomarcador de la exposición al flúor. El examen de los dientes primarios puede dar avisos tempranos y así facilitar las bases para la intervención de la prevención de la fluorosis dental en dientes permanentes.

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