

## Sealing of the first permanent molar – applicability on the patients' first visit to the Pediatric Dentistry Department

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### Summary

**Aim.** To evaluate the applicability of pit and fissure sealing on the first permanent molars in young schoolchildren according to the status of the occlusal surface of these teeth at the moment of the first visit to the Pedodontics Department.

**Materials and methods.** The study group consisted of 126 children (62 boys) aged 6 to 9 years ( $8.02 \pm 1.01$ ). The initial status (sound / stained pits and fissures / decayed or filled) of the occlusal surface of 501 first permanent molars was recorded.

**Results.** 46.03% of the children had all occlusal surfaces of their first permanent molars caries-free. 63.46% of the studied molars had sound occlusal surfaces where a pit and fissure sealant could be applied if needed. 9.78% had stained pits and fissures while 26.75 % had dentin caries, either treated or untreated. Girls have significantly more decayed/filled occlusal surfaces on first permanent molars than boys (27.45% versus 24.39%,  $p=0.05$ ).

**Conclusions.** Early carious involvement of the first permanent molar represents a serious restraint for the applicability of pit and fissure sealants even a short time after eruption. Early dental visits can increase the possibilities of applying preventive measures on this tooth.

### Introduction

Many epidemiological studies on caries in school children show a relatively high caries prevalence in young permanent teeth, especially in first permanent molars. Escort and Roland (1993) estimate that caries in the first permanent molars represent, at 6 years of age, almost 100% of caries, at 9 they form 9/10ths and at 12 three quarters, which is why the condition of the first permanent molars is considered to reflect the general state of the mouth [1], Occlusal surfaces of the first permanent molars are most commonly affected, even during the first years after the emergence of these teeth [2],

The wide use of preventive means (e.g. local or general fluoridation) led to a dramatic decrease of caries prevalence on smooth tooth surfaces. Thus, occlusal caries remain the most common pattern [3,4], This is confirmed by Hicks et al. who found that more than 85% of the carious lesions in permanent teeth are located on pit and fissure surfaces [5]. In their 8 years longitudinal study concerning carious involvement of the first permanent molar, the same authors report a 4.5 times higher percentage of decay on pit and fissure surfaces compared to smooth surfaces. Moreover,

they note that in the 7 to 9 years age group occlusal surfaces are most frequently affected. This finding is consistent with those of Raadal et al. who point out that, at 7 to 8 years of age, caries in the permanent dentition are exclusively represented by occlusal decay of the first permanent molar [6].

Previous studies [7, 8, 9] conducted in both rural and urban areas of our country are also consistent with these findings. For example, Grivu et al. (1982) reported for an urban area of Romania (Timisoara) high caries prevalence for the occlusal surfaces of the first permanent molars of young schoolchildren: 33.33% for 7 years olds, 72.52% for 8 years olds and 91.66% for 9 years olds [9].

A more recent study (1992-2000), conducted upon schoolchildren aged 6 to 8 from a general urban population, reports, for occlusal caries, a proportion of 64.96% of the total caries located on the first permanent molar [10]. Concerning the rural area of the country, Luca and al. reported, for children aged 6 to 9, a proportion of 21.83% affected first permanent molars, 77.67%; of which had caries on the occlusal surface [11].

The high prevalence of caries on pit and fissure surfaces, especially on those of the first

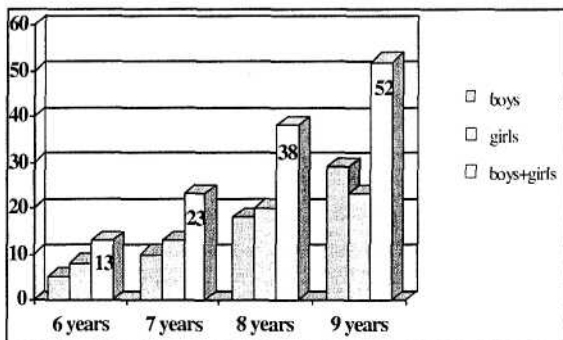
permanent molars in young schoolchildren point out the need of applying caries prevention on these teeth whenever and wherever possible. Pits and fissures sealing represents one of the most commonly used preventive means in current pedodontic practice. The limits of the method are drawn by the fact that, at the moment of their first visit to a dental clinic, many young children already have caries on their first permanent molars, usually located on the occlusal surfaces.

Given the above considerations, our aim was to evaluate the applicability of pit and fissure sealing on the first permanent molars of young schoolchildren at the moment of the patients' first visit to the pedodontics clinic according to the status of the occlusal surface of these teeth.

### Materials and methods

The study group consisted of 126 children (62 boys) aged 6 to 9 years ( $8.02 \pm 1.01$ ) who sought treatment for either temporary or permanent teeth. The subjects were clinically examined at the time of their first visit to the Pedodontics Department of our Faculty. Age and sex distribution of the study group is given in *figure 1*. We chose the 6 to 9 years age group in order to obtain an image of the first permanent molar's status during the period when pit and fissure sealing is highly recommended, especially in high-risk patients.

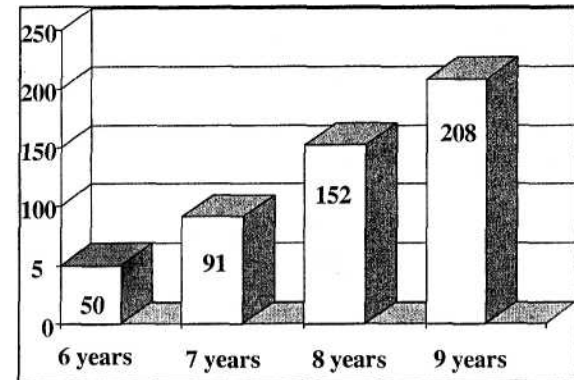
Figure 1. Age and sex distribution of the study group (N = 126)



The subjects were clinically examined according to the WHO recommendations [12]. 501 first permanent molars were taken into account, as of the 504 molars expected to be found, 3 had not yet emerged by the time of the examination. Age distribution of the studied molars is given in *figure 2*. For each tooth the initial status of the occlusal surface (sound/ with stained pits and fissures/ with

cavity lesions or fillings) was recorded at the time of the patients' first visit to the clinic. We need to specify that, for the molars with stained pits and fissures, initial diagnosis was maintained only if subsequent exploratory removal of the stained tissues revealed no more than a slight, incipient carious involvement, confined to the enamel. Data was stored and analyzed using Microsoft Windows Excel 2000 and Chi square.

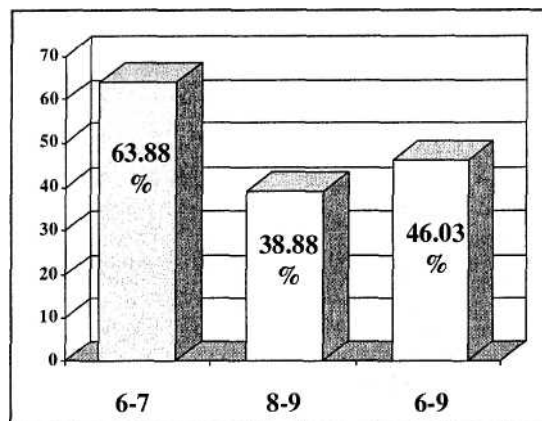
Figure 2. Age distribution of the studied M6 (N = 501)



### Results

Of the 126 children examined, 46.03% had all occlusal surfaces of the first permanent molars sound (*figure 3*). The proportion of these subjects decreases dramatically with age, from 63.88% for the 6-7 years age group to 38.88% for the 8-9 years age group. In the most numerous age group (9 years), the corresponding figure is *figure 3*,

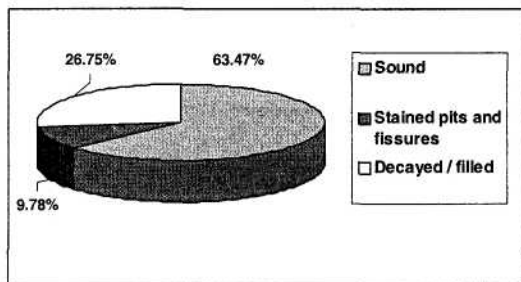
Figure 3. Proportion of children with all occlusal surfaces of the first permanent molars sound



Of the 501 first permanent molars taken into account, 63.47% had sound occlusal surfaces.

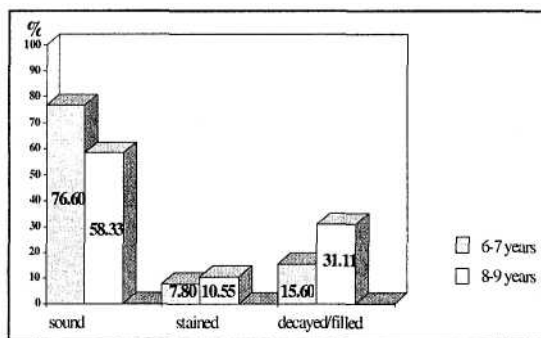
9.78% had stained pits and fissures and 26.75% had occlusal caries that already exceeded an initial stage of decay (figure 4).

**Figure 4. Status of the occlusal surfaces of the studied first permanent molars (N = 501)**



The proportion of molars with sound occlusal surfaces decreases with age from 76.60% in the 6 to 7 years old patients to 58.33% in the 8 to 9 years old subjects. The percentage of teeth with stained pits and fissures does not vary significantly with age. However, the proportion of decayed/filled occlusal surfaces in children of 8 to 9 years of age is two times higher than in children aged 6 to 7 years (31.11% versus 16.60%) (figure 5).

**Figure 5. Status of the occlusal surface of the studied molars in different age groups**

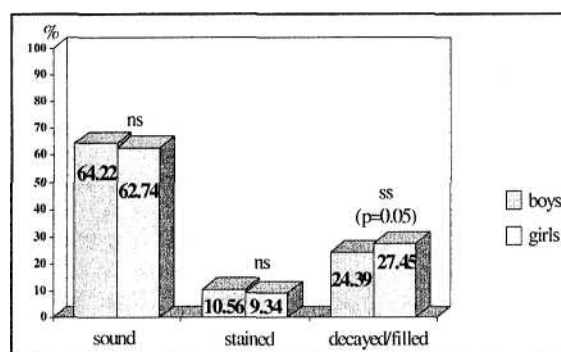


Concerning the differences between sexes, although boys tend to have slightly more sound occlusal surfaces as well as stained pits and fissures than girls, we found no statistical significance in this respect. However, differences in the proportions of decayed/filled occlusal surfaces have been found to be statistically significant (24.39% in boys versus 27.45% in girls,  $p=0.05$ ) (figure 6).

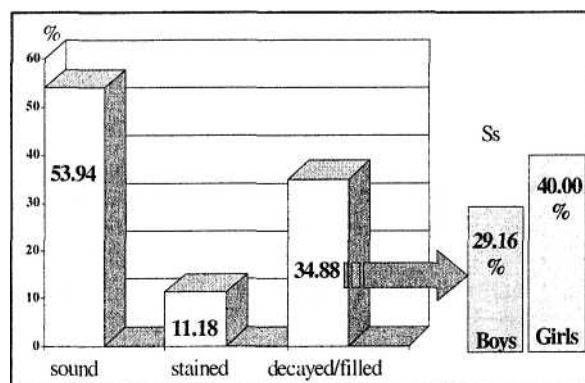
Given that caries usually need a few years to become clinically evident, we considered that, for the first permanent molar, the age of 8 could be taken as an age of reference. This is the reason why

we calculated the proportion of sound/stained/decayed or filled occlusal surfaces of the first permanent molars of all the children of 8 years of age (figure 7). For the 8 years olds we found a proportion of 53.94% sound occlusal surfaces, 11.18% molars with stained pits and fissures and 34.88% occlusal surfaces that had either treated or untreated caries. In this age group, differences between sexes in the proportions of decayed/filled occlusal surfaces (29.16% in boys versus 40.00% in girls) were found statistically significant ( $p=0.05$ ).

**Figure 6. Status of the occlusal surface of the studied molars - differences between sexes (ns = statistically non significant; ss = statistically significant)**



**Figure 7. Status of the occlusal surface of the first permanent molars in the 8 years old group**



## Discussion

The results of the present study show that less than half of the children (43.03%) had all their first permanent molars sound at the moment of their first visit to the clinic. The proportion varies from 63.88% for the 6-7 years olds to 38.88% for the 8-9 years olds. These figures are very close to those reported by Luca et al. for a rural population, where

the corresponding figures were 62.19% for the 6-7 years age group, 33.33% for the 8-9 years age group and 46.71 for the whole study group (aged 6 to 9 years) [7].

Our results are also comparable to those reported by Hescot and Roland for France for 1987 [1]: 74.2% children with all first permanent molars sound at 6 years of age and 32.2% at 9. However, the same authors report higher proportions of children with all first permanent molars sound for 1990 and 1993 (*table 1*). Concerning the differences between sexes, our results are only in part consistent with those of Hescot and Roland, who reported significantly more decayed first permanent molars in girls, too, but also significantly more sound molars in boys. It needs to be mentioned that other studies (1997) found much better percentages of caries-free first permanent molars in young schoolchildren - 79% at the age of 8 [4].

We need to point out that the subjects of the present study live in an urban area where fluoride concentration in tap water is lower than the caries-protective level and the only local fluoridation means is represented by brushing with fluoride paste, provided that is performed. In the given conditions, the percentage of decayed occlusal surfaces in first permanent molars was 26.75%, which represents a serious restraint to the use of pit and fissure sealants. However, besides the 63.47% sound occlusal surfaces on which non-invasive sealing could be applied, an additional 9.78% (represented by the occlusal surfaces with stained pits and fissures) could benefit from invasive sealing (enameloplasty).

Our results are relatively close to those previously reported in other countries for similar conditions (urban area, university clinic). For example, Stempler et al. [13] reported, for children aged 5 to 9 years, a percentage of 59.37% occlusal surfaces that could receive preventive treatment. Other authors report lower percentages of caries-free occlusal surfaces in first permanent molars: 17.4% for children aged 7 to 10 years [14] and 17.3 for children aged 7 to 8 [15] (*table 2*). However, Kuhnisch and al report, for 8-years-old children,

69% sound or sealed occlusal surfaces (46% sound, 23% sealed) and 21% bearing initial caries.

These make a total of 90% occlusal surfaces that could or already had received more or less invasive preventive treatments.

Even though the results of the present study seem to be more encouraging than those of other studies, the fact that more than a quarter (26.75%) of the 501 examined molars already had caries, either treated or not, points out once again the very early carious involvement of first permanent molars who coexist, during the first few years after emergence, with more or less severely affected deciduous teeth. Early carious involvement of the first permanent molar is due in part to the fact that parents tend to consider it as part of the permanent dentition and thus give it very little attention for as long as symptoms are absent. This is also the reason why most of the children of the study group sought treatment for deciduous teeth with acute symptoms rather than for decayed but painless first permanent molars.

## Conclusions

1. The results of the present study reveal a relatively low percentage of first permanent molars that could benefit of pit and fissure sealing as a preventive means. The high percentage of early caries located on the occlusal surfaces represents a serious restraint to the use of pit and fissure sealants.
2. Further preventive programs addressing parents and family need to point out the fact that the first permanent molar is part of the permanent dentition, that it is particularly vulnerable to early caries and therefore needs special attention.
3. Regular dental check-ups need to be started as soon as the first permanent molar emerges, even in the absence of symptoms. This would increase the applicability of either pit and fissure sealing or enameloplasty as non- or minimally invasive caries preventive methods.

Table 1. Proportion of children with all first permanent molars sound. Comparison between the results of the present study and those reported by Hescot and Roland (1993)

	Period	% children with all first permanent molars sound	
		6 years	9 years
Hescot and Roland	1987	74.2	32.2
	1990	86.5	49.7
	1993	96.1	66.4
Present study	1999-2001	6-7 years	8-9 years
		63.88	38.88

Table 2. Proportion of first permanent molars with sound occlusal surfaces. Comparison between the present study and previous ones

Author(s), country	Period	Age of subjects	% sound surfaces in first permanent molars	Conditions
Luca and al, Romania	1999-2001	6-9	76.53	Rural area, general population
Noronha and al, Brasil	1999	7-8	17.3	General population, low socio-economic-cultural level
Stempler et. al, Argentina	1997	5-9	59.37	Urban area, institution of postgraduate professional training
Papruzhenka, Gerasimovitch, Belarus	2001	7-10	17.4	General population, using fluoride toothpaste
Kühnisch J and al, Germany	1997	8	46 (+23% already sealed)	General population, comprising German and immigrant children
Present study	1999-2001	6-9	63.47	Urban area, university clinic

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