Sealing of Fissures and Pits of First Permanent Molar at Children with High Caries Risk

SUMMARY

The results of epidemiological study realized in 2007 by calibrated paedodontists for estimation of oral health condition of children in the Skopje region showed unfavourable values (DMFT-8.10 at 12 years old children). Especially alarming is a condition of the first permanent molars at 8 years old children (DMFT-3.18). In general aim to prevent caries, we sealed fissures of first permanent molars right after their eruption at 6386 children in the Skopje region (98.01% of total number of children born 2002) and 17.242 teeth (68.76%) were sealed. Non-erupted teeth were sealed later, right after their eruption. The teeth with registered presence of initial caries were not sealed. The sealing was conducted by GC Fuji Triage.

The first evaluation of the effects of sealing was conducted after 2 years by the same calibrated paedodontists and the marked reduction of DMFT index 0.87 (reduction of caries of the first permanent molars from 72.65%) was noticed, and the second evaluation, 3 years after the beginning of the sealing, showed values of the DMFT index from 1.07 (reduction of 66.36%). These results show that sealing of fissures and pits is an effective primary preventive measure for caries control, especially in areas where there is a high caries risk in children population.

Keywords: Pits; Fissures; Caries Risk, prevention; Sealing; Glass-ionomer

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ORIGINAL PAPER (OP)

Introduction

According to the opinion of the most of the experts in preventive dentistry, the control of dental caries can be successfully conducted by application of the following primary preventive measures2,6,7,9:

- Mechanical and chemical control of dental plaque;
- Application of fluoride (systemic and topical);
- Discipline of sugar intake regime;
- Sealing of fissures and pits;
- Education and motivation for keeping oral health.

The oral hygiene and sugar intake control have the primary role in the prevention of caries7,9. On the other hand, the same are mostly related to the tradition and mentality of people, so the measure of promoting oral health in these spheres give results in a longer time period. But, even in the conditions with good oral hygiene, with toothbrush, the dental plaque cannot be efficiently eliminated when accumulated in the fissures and pits; that is why such places remain to be caries risk.

In the past years observation was made of the caries incident and conclusion was made that the caries of occlusal surfaces is 56-70% of all caries lesions in children from 5-17 years of age6. At the end of the sixties, putting plastic mass over occlusal surfaces of teeth, which penetrates into deep fissures and fulfils the parts that cannot be cleaned by toothbrush, was the suggested procedure. Plastic mass had the role of sealant and presented barrier between teeth and oral environment.

Many studies show that fissure sealants are an effective primary preventive procedure for caries prevention in occlusal surfaces1,5. Many years ago, several materials were used as fissure sealant. More of dental materials that were used for tooth filing were used also as sealants, for example, some kinds of composites and glass ionomer cements1,12,14,21.
According to the fact that occlusal surfaces have the highest participation in DMFT index between children, in this project we set the aim to seal occlusal fissures and pits of first permanent molars right after their eruption at children in Skopje region.

Fluorides have strong influence on the process of demineralisation and remineralisation, which is the reason that numbers of authors recommend sealing to be done with dental materials that will provide enough fluorides after their application, which will help the process of remineralisation18. Having in mind the fact that glass-ionomer cements make chemical connection with enamel, humid environment does not compromise adherence, as well as that glass-ionomer cements from all dental materials release most fluorides, sealing of fissures and pits was conducted with Fuji Triage, a glass-ionomer cement that releases even 5-6 times more fluorine from Fuji IX that was the riches material with fluorine until recently.

Material and Method

Sealing the fissures and pits of the first permanent molar was conducted by 142 calibrated paedodontists according to the standards of WHO, who, after the privatization of the dental sector, continued to work in frame of public health. Except sealing, they have obligation to make other primary preventive measures according to the National strategy of prevention of oral diseases in children at age 0-14 in FYROM.

The sealing covered 6.386 children at age 6 in the Skopje region and 17.242 first permanent molars were sealed. The teeth which not erupted at the time of the activities were sealed later, right after their eruption. Before the beginning of the sealing activities, DMFT index was registered in children at age 8 and 12.

Coloured Fuji Triage was use as a sealant for better visualization if it eventually falls. The sealing was conducted in professional conditions, in school dental offices. Before setting the sealant, professional elimination of dental plaque was made and conditioning with 20% polyacrylic acid in the period of 20 sec.

The effects from sealing of DMFT index were followed-up twice; the first evaluation was done after 2 years and the second 3 years after sealing by the same calibrated paedodontist who were involved in the preparation of the study in registration of the DMFT index at the beginning.

Results

The results for values of DMFT index in the children at age 8 and 12 from the Skopje region, got from epidemiologic study conducted in 2007, as the results of evaluation effects of sealing after 2 and 3 years, are shown on the following figures and tables - figure 1 depicts the DMFT index of children at the beginning of the study, tables 1 and 2 show the DMFT indices at the first and second evaluation, and figure 2 compares the results of the procedures after 2 years.

![Figure 1. DMFT index in children at age 8 and 12 in the Skopje region in 2007](image1)

![Figure 2. DMFT at 8 year old children before sealing, after the first and the second evaluation](image2)

<table>
<thead>
<tr>
<th>Table 1. DMFT index in children at age 8 in the Skopje region in 2010 - first evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>number of the examined children</td>
</tr>
<tr>
<td>total number and percent of children</td>
</tr>
<tr>
<td>100%</td>
</tr>
</tbody>
</table>
Table 2. DMFT index in children at age 8 in Skopje region in 2011 - second evaluation

<table>
<thead>
<tr>
<th>total number of children</th>
<th>number of examined children</th>
<th>sealed first permanent molars</th>
<th>unsealed first permanent molars</th>
<th>decayed first permanent molars</th>
<th>extracted first permanent molars</th>
<th>filled first permanent molars</th>
<th>non-erupted first permanent molars</th>
<th>number of unexamined children</th>
</tr>
</thead>
<tbody>
<tr>
<td>6994</td>
<td>6374</td>
<td>16915</td>
<td>1638</td>
<td>4031</td>
<td>53</td>
<td>2763</td>
<td>96</td>
<td>620</td>
</tr>
<tr>
<td>100%</td>
<td>91,13%</td>
<td>66,34%</td>
<td>6,42%</td>
<td>15,81%</td>
<td>0,20%</td>
<td>10,83%</td>
<td>0,37%</td>
<td>0,88%</td>
</tr>
</tbody>
</table>

Discussion

The sealing of fissures and pits is a primary preventive measure providing maximum protection from caries on occlusal surfaces, but apart from this, the experts opinion is that it is not enough used by dentist in everyday practice.

Ripa et al\textsuperscript{16}, made researches in children at age 8 and 9 during 2 years. The first group of children used 0.2% fluoride solution for individual rinsing of mouth, and the second group used the same solution plus sealing of fissures and pits. From 51 participants in the first group, 24 got occlusal caries lesion and from 84 participants in the second group only 3 got caries lesion. Authors concluded that the implementation of these 2 preventive measures can almost fully eliminate caries. Sealing would be most economical if it is done on those teeth which are caries sensitive\textsuperscript{16}.

Glass-ionomer cements are materials that contain high level of fluorine release during the application. That is why glass-ionomers are frequently used, especially at caries-risk patients, and they provide fluorine protection from their application until fall out.

The results of the presented epidemiological research by calibrated paedodontists, made in 2007, showed that only 2 years after eruption, in 3 from 4 permanent molars caries appeared on occlusal surfaces (DMFT at 8 years old children was 3.18), which shows a high caries risk.

Having in mind the attitude of ADA (American Dental Association) that the sealing of fissures and pits is absolutely indicated, with no exception, on all individuals with high caries risk, and it is best done with glass-ionomer cement\textsuperscript{15}. According to this, we decided to seal with Fuji Triage - glass-ionomer cement that releases the biggest quantity of fluorine compared to other glass-ionomer cements available at the market. The program activities planned sealing of all first permanent molars of children in the Skopje region, right after their eruption. From total 6516 children at the age of 6, we examined 6.386 (98.06%), and 17.242 (68.76%) erupted teeth were sealed. The remaining teeth that were sealed later, successively, after their eruption, were not included in the results presented in this study because their eruption came 1 year or more later, and this would compromise the results after 2 and 3 years.

After the first evaluation (2 years after sealing), we confirmed that on 3.886 (15.49%) teeth there was caries, 1654 (6.59%) teeth were filled, and 28 (0.11) were extracted, that means that reduction of caries is achieved on the first permanent molar of 72.65%. The results of the researches in the second evaluation after 3 years of sealing showed caries reduction of 66.36%.

There is an insignificant increasing of the number of caries teeth registered after the second evaluation. After the first monitoring of the sealed teeth, we found certain inconsistency by same paedodontists who participated in the project (partial covering of fissures system with sealant); we considered that it could have some influence on the results of the achieved caries reduction. Such inconsistency in fissures and pits sealing pointed to the need for better education of next student generations of students.

Increasing the caries reduction in the participants in our study could also be due to participation in other primary preventive measures that are part of National strategy, but we consider that it is of minor influence because changing mentality (good oral hygiene, sugar intake control, fluorine intake, education and motivation for oral health) needs longer time.

Encouraged by the results in the first and second evaluation concerning the reduction of caries of the first permanent molar, Coordinative Body for implementation and monitoring of National Strategy, recommended sealing to be conducted on all permanent teeth with fissures system (first and second premolars and second molars) and the results of effect of the next clinical evaluation will be published soon.

Conclusion

The results of clinical evaluation of the sealing effect of fissures and pits in the first permanent molars showed that the fissure sealing is the primary preventive measure for tooth caries control, especially in environments with high tooth caries risk in children.
References