The Prevalence of Pit and Fissure Sealants among Twelve Year Olds Living in Puerto Rico during 1997

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Objective: to estimate the prevalence of pit and fissure sealants on first permanent molars in twelve year olds living in Puerto Rico and to further evaluate dental sealant prevalence by 1) urban/rural and public/private school status as well as 2) gender;

Design: population-based, cross-sectional study;

Setting: public and private schools encompassing the 11 health regions of Puerto Rico.

Subjects: a probabilistic sample of 12-year old school attendees in Puerto Rico representing a population of approximately 70,000.

Method: during April through December 1997, the first permanent molars of 1435 subjects were evaluated by visual and tactile methods for the presence of dental sealants.

Results: the data collected revealed that 4.3% of 12 years olds presented at least one permanent first molar sealed. A statistically significant difference (p=0.01) between urban-public (2.5%), rural-public (3.39%) and urban-private (11.0%) schools was observed. The prevalence of sealants was higher in males (5.5%) than females (2.9%); (p= 0.02).

Conclusions: the prevalence of dental sealants in the first permanent molars of 12-year olds living in Puerto Rico during 1997 (4.3%) is lower than that reported in the United States (18.5%). Sealant prevalence was higher in males and students attending (urban) private schools.

Key words: Pit and fissure sealant, 12-year-old, Cross-sectional study, Puerto Rico, Dental sealants prevalence

Dental sealants are caries preventive resins that are applied to the pit and fissure surfaces of teeth. Sealants inhibit the caries process by acting as physical barriers, preventing the accumulation of substrate, bacteria, and their metabolic byproducts on caries-susceptible enamel surfaces (1). The American Dental Association and the Surgeon General of the United States of America advocate the utilization of pit and fissure sealants as a primary preventive measure for dental caries (2,3), and the United States Department of Health and Human Services has established the goal that 50% of children (aged 8 and 14 years) have pit and fissure sealants on their permanent molars by the year 2010 (4). In Puerto Rico, the Department of Health has established a goal that 30% of children aged 8 to 14 years will have sealants on their permanent molars by the year 2010 (5).

The application of dental sealants is underemployed as a preventive measure. In 1995, Cherry-Peppers (6) reported that only 15% of U.S. children (6-17 years old) had dental sealants (17% whites and 5% blacks). The under-utilization of dental sealants by practitioners has been attributed to concerns regarding: 1) the potential for sealing teeth with caries, 2) limited sealant longevity, 3) limited or no insurance coverage, 4) sensitivity of the technique for routine success, and 5) the potential lack of efficacy of the procedure. In addition, there has been a lack of emphasis on the use and benefits of sealants by dental schools. Improvements in materials and knowledge have addressed some of these concerns; however, older dentists may not employ sealants as a routine procedure (7-10, 2).
Of particular concern is achieving efficacious sealant placement in high-risk populations. In fact, Caucasian and African American populations of lower socioeconomic status (SES) have a lower prevalence of dental sealants than populations with higher SES levels (6). In the US, 18.5% of 5-17 year olds presented sealants in 1988-91 (11).

In Puerto Rico a health reform program for the medically indigent (representing 30% of the total population) was gradually implemented, beginning in 1994 and completed in 2000. Dental coverage under the Puerto Rico health reform program includes pit and fissure sealants; both permanent and primary molars are eligible for sealants among children up to eight years of age, and secondary permanent molars are eligible for sealants in children up to the age of 14 (12).

Although only limited data are available regarding the prevalence of pit and fissure sealants in Puerto Rican children, the “Administración de Seguros de Salud de Puerto Rico”, the agency that monitors the Health Reform Program, estimated an increase in dental sealant utilization in the first permanent molars of 8 year olds, from 2% in 1992 to 8% in 1998 (12).

The primary objective of this study was to estimate the prevalence of pit and fissure sealants on first permanent molars in twelve year olds living in Puerto Rico during 1997 and to further evaluate dental sealant prevalence by 1) urban/rural and public/private school status, as well as, 2) gender. The information obtained in the study is necessary in order to evaluate and plan primary caries prevention programs at the community level in Puerto Rico.

Methods

Sample Design: The study design and sampling have been described previously (13). Briefly, a cross-sectional, nationally representative oral health study of Puerto Rican 12-year olds was conducted in 1997. A probabilistic stratified sample of public and private schools (71) was selected from the eleven health administrative regions of Puerto Rico, according to the type of school and economic status. Both urban and rural communities were represented. In ten regions, five public schools and one private school were selected; in the North Region ten public and five private schools were selected. Children were examined for the presence of pit and fissure dental sealants in addition to dental caries and dental fluorosis. The Institutional Review Board of the Medical Sciences Campus of the University of Puerto Rico approved the study.

Oral Examinations: The National Institute of Dental and Craniofacial Research (NIDCR) carries diagnostic criteria for oral health surveys include guidance for assessing the presence or absence of pit and fissure sealants (14). Four calibrated examiners standardized to using the NIDCR criteria performed the visual/tactile oral examinations using #23 explorers, flat surface mirrors, external light sources and compressed air; no radiographs were employed (13).

Data Analysis

Gender and public/private school status were incorporated into the modeling as potential explanatory variables. Public/private school attendance was used as a surrogate for socioeconomic status (SES) level (13). STATA statistical software was used to analyze the data. Prevalence was calculated using weighting procedures by probability of selection, stratification by health regions, and clustered. Estimates were produced by gender and urban-rural-public/private school status. For between-group comparisons, “p values” were calculated.

Results

A total of 1,435 subjects were examined between April and December 1997. The distribution of the demographic characteristics of gender, residence and school type were as follows: 49% females, 51% males; 62% urban, 38% rural; 18% private schools, 82% public schools. During the data collection process 1,621 eligible students were identified of which 1,435 were examined for a response rate of 89%. The Kappa statistic for interexaminer reliability ranged from .83 to .95.

Overall, 4.3% of the 12-year olds living in Puerto Rico during 1997 had at least one dental sealant on their first permanent molars (Tables 1-3). Children attending urban–private schools had a statistically significant (p=0.01) higher prevalence of sealants (11.0%) than both urban–public (2.5%) and rural–public (3.4%) school children (Table 1). Similarly, more males (5.6%) than females (3.0%) had dental sealants (p=0.02) (Tables 2-3). Overall, children with sealants averaged 2.2 first permanent molar sealants.

<table>
<thead>
<tr>
<th>Table 1. Prevalence of first permanent molar sealants in twelve-year old children by urban/rural-public/private schools in Puerto Rico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban/Rural Public/Private</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Urban/public</td>
</tr>
<tr>
<td>Rural/public</td>
</tr>
<tr>
<td>Urban/Private</td>
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<tr>
<td>TOTAL</td>
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</tbody>
</table>

* weighted by probability of selection
Table 2. Prevalence of first permanent molar sealants in twelve-year old children by gender in Puerto Rico

<table>
<thead>
<tr>
<th>Gender</th>
<th>N*</th>
<th>% Total N</th>
<th>Weighted Sealed N</th>
<th>% With Sealants</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>37324</td>
<td>52.2</td>
<td>2072</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>34034</td>
<td>47.7</td>
<td>1018</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>71358</td>
<td>100</td>
<td>3090</td>
<td>4.3</td>
<td><strong>0.0176</strong></td>
</tr>
</tbody>
</table>

*weighted by probability of selection

Table 3. Prevalence (%) of first permanent molar sealants in twelve-year old children by gender and urban-rural/public-private schools in Puerto Rico

<table>
<thead>
<tr>
<th>Gender</th>
<th>Urban/Public</th>
<th>Rural/Public</th>
<th>Urban/Private</th>
<th>% With Sealants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2.3</td>
<td>5.0</td>
<td>16.0</td>
<td>5.6</td>
</tr>
<tr>
<td>Female</td>
<td>2.7</td>
<td>1.8</td>
<td>6.0</td>
<td>3.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.5</td>
<td>3.4</td>
<td>11.0</td>
<td>4.3</td>
</tr>
</tbody>
</table>

This may be partially explained by the high caries rate in Puerto Rico, (13) and the fact that on average, the first permanent molars would have been erupting around 1992, prior to health reform. These facts may likewise explain the average (2.2) sealants per child with sealants.

In this study, twelve-year old males had a higher prevalence (statistically significant) of pit and fissure sealants than twelve-year old females. In a similar stratified sample of North Carolina children ages 6-17 no difference was found between genders (15); however, Gonzalez et al, in a study of Wisconsin children, reported that females are more likely than males to have had sealants present (16).

Conclusions

The prevalence of dental sealants in the first permanent molars of 12-year olds living in Puerto Rico (4.3%) is lower than that reported for the United States (18.5%). The prevalence of sealants was higher among males than females and higher in students attending urban private schools than among both rural and urban public school students.

Recommendations

1) The high levels of dental caries and the low prevalence of pit and fissure sealants in Puerto Rico calls for the establishment of community and school-based sealant programs, particularly in low socioeconomic areas.

2) The Puerto Rico Department of Health should promote the use of pit and fissure sealants among Health Reform providers for the benefit of the population, particularly at the lower socioeconomic levels, within which dental caries is also more prevalent (14).

3) Dental School curricula should emphasize the importance and efficacy of dental sealants as a primary preventive modality.

4) New studies to investigate the impact of the Health Reform on the prevalence of sealants should be commissioned.

References


