RELATIVE PREVALENCE OF CARIES IN FIRST AND SECOND PREMOLARS IN URBAN NIGERIANS

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INTRODUCTION

Many studies had been carried out on the prevalence of caries with particular reference to first and second permanent molars. (3, 4, 10, 11, 21) Jackson et al. showed that the first permanent molars are more prone to caries attack than the second permanent molars in English children aged 11-13 years and it was postulated that eruption time could be responsible for this pattern of caries attack.

However, in African countries such as Nigeria, Uganda and Zambia it has been shown that second permanent molars are more vulnerable to caries attack than the first permanent molars. (3, 4, 11, 21) Various reasons such as enamel maturation, genetic factors, morphological differences and environmental factors have been postulated for this pattern of caries attack but none of these reasons, could be said to be responsible for this pattern of caries attack in Africans.

With respect to first and second premolars, little or no attention has been paid to specific study of the relative prevalence distribution of caries in this tooth type in our environment despite the fact that these teeth are next to permanent molars in order of importance with respect to mastication.

Akpata and Jackson (1978)4 showed that out of 1031 decayed, missed and filled teeth observed in 820 subjects aged 15-21 years, 142 were premolars; and this represented 13.77 % of the total number of DMF value. This clearly showed that the level of caries in premolars was, lower than the permanent first and 2nd molars with a DMF value of 824 (79.9%).

However, the emphasis being paid on the relative caries vulnerability «in first and second premolars as well as maxillo-mandibulo-quadrant distribution of caries in this tooth type by investigators has been very low.

The purpose of this study was to determine the relative prevalence and jaw distribution of caries in first and second premolars as well as to compare the pattern of caries vulnerability in this tooth type with that of first and second permanent molars.

MATERIAL AND METHOD

The treatment records of patients who attended the conservation clinic at the Department of Restorative Dentistry, Lagos University Teaching Hospital, College of Medicine, University of Lagos from 1991-1995 were scrutinised; and all first and second premolars that were diagnosed and treated for caries were charted (recorded in accordance with their relative positions in upper and lower jaws).

Classifications of patients with respect to treatment modalities, sex, age and socio-economic status were not considered. All first and second premolars that were treated without specific diagnosis of caries were excluded from the study. The age range of patient was between 16 years and 60 years with a mean age of 25 years.

A comparative analysis of the relative distribution of caries in first and second premolars with respect to upper and lower jaws as well as night and left quadrants of the jaws was carried out using ratios and percentages. Chi-square test was used to test the level of significance of any observed variations.

RESULTS

Table 1 shows quadrant distribution of caries in upper and lower first and second premolars. From this table, it can be seen that the figures of carious teeth observed on the right sides of upper and lower jaws are greater than those of the teeth on the left sides of both jaws with a ratio of 1.2:1, in respect of the second premolars only, and a combined ratio of 1.2:1, in respect of first and second premolars combined. The difference between the right and left sides in the distribution of caries, involving the maxillary and mandibular premolars, is also statistically significant with P<0.05 (Table 5).

Table 2 shows that maxillary premolars are more vulnerable to caries attack than the mandibular premolars.
Table 1: Distribution of caries in maxillary and mandibular first and second premolars according to quadrants

<table>
<thead>
<tr>
<th>Tooth</th>
<th>Maxillary</th>
<th>Mandible</th>
<th>Ratio of max : mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st premolars</td>
<td>335</td>
<td>98</td>
<td>3.4 : 1</td>
</tr>
<tr>
<td>2nd premolars</td>
<td>460</td>
<td>230</td>
<td>2.0 : 1</td>
</tr>
<tr>
<td>Total</td>
<td>795**</td>
<td>328**</td>
<td>2.4 : 1</td>
</tr>
</tbody>
</table>

** Difference is not significant

Table 2: Distribution of caries in maxillary and mandibular first and second premolars according to the jaw

<table>
<thead>
<tr>
<th>Tooth</th>
<th>Ratio of right sides of the jaws: the left sides of the jaws</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st premolars</td>
<td>Upper and lower right quadrant</td>
</tr>
<tr>
<td>2nd premolars</td>
<td>237</td>
</tr>
<tr>
<td>Total</td>
<td>599*</td>
</tr>
</tbody>
</table>

* Difference is statistically significant

Table 3: Combined distribution of second premolars as compared with first premolars

<table>
<thead>
<tr>
<th>Jaws</th>
<th>Second Premolars (No. of observations)</th>
<th>First Premolars (No. of observations)</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>U/L jaws (Combined)</td>
<td>690***</td>
<td>433***</td>
<td>1.6:1</td>
</tr>
</tbody>
</table>

*** Difference is statistically significant

Table 4: Percent distribution of upper and lower first and second premolars

<table>
<thead>
<tr>
<th>Tooth</th>
<th>No. of observation</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>U/L first premolars</td>
<td>433</td>
<td>38.56</td>
</tr>
<tr>
<td>UL second premolars</td>
<td>690</td>
<td>61.44</td>
</tr>
<tr>
<td>Total</td>
<td>1123</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5: Results of the chi-squared tests

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>X2</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Right sides of the jaws vs the left sides of the jaws</td>
<td>4.97</td>
<td>1</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>(2) Upper jaw premolars vs lower jaw premolars</td>
<td>98.38</td>
<td>1</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>(3) Second premolars vs first premolars</td>
<td>58.96</td>
<td>1</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

DISCUSSION

Premolars occupy important positions in the dental arches, and these positions are used in the determination of Pont Index for the purpose of orthodontic and prosthodontic management. This tooth type is also next to permanent molars in order of importance with respect to mastication. Therefore, any pathological condition affecting premolars should be of interest to the practising dentists.

In this study, it has been shown that the second premolars are more vulnerable to caries than the first premolars in both jaws with a ratio of 1.6:1 (Table 2). This relative difference in vulnerability rate of second premolars as compared with first premolars is statistically significant with P<0.05, df = 1 and K=2 (Table 5).

The occurrence of a relatively higher carious lesions in second premolars, as compared with first premolars, could be explained in terms of the sandwiching of the second premolars between the first premolars and first permanent molars during eruption, with a possibility of greater tendency of plaque and debris accumulation on the erupting second premolars. During eruption, the second premolars lie infra-occlusally in relation to the first premolars and the first permanent molars (2, 9, 16, 18) and this infra-occlusal positions of second premolars (owing to different eruption times) also prevent the teeth from functional participation in masticatory processes with a resultant formation of microbial deposits on the teeth.
Furthermore, proper tooth brushing is also made impossible because children frequently avoid tooth-brushing of erupting teeth as well as eating on the side of the erupting teeth as they are accompanied by gingival bleeding and pain. Therefore, the presence of microbial deposits may be further accentuated; and the erupting teeth are consequently exposed to microbial plaque from one to several months before functional occlusion is obtained (5).

The cumulative effects of the microbial deposits in the initiation of caries may not become apparent until after a few years later in life because caries is a slow growing lesion which requires time before it becomes clinically evident. To this end, studies have shown that the greatest degree of vulnerability of teeth to caries attack usually occurs during the first four years of eruption with the maximum peak at the second year of eruption period (5). The general higher occurrence of caries in second premolars as compared with first premolars can also be attributed to the differences in the anatomical configuration between second premolars and first premolars. The second premolars are characterised by more pronounced fissures and fossae as compared with first premolars.

Therefore, there is a higher tendency of plaque accumulation as well as more difficulty in plaque removal on second premolars.

Comparatively, this finding is similar to the finding of the studies of Moore and Corbett (1971, 1973, 1975 and 1976) (11-15) on caries of permanent teeth in British populations (from ancient time to late 19th century) in which it was shown that the second premolars were more prone to caries than the first premolars. The higher occurrence of caries in second premolars as compared with the first premolars also confirms the finding of the study of Carlos and Gittelson (1965) (7) on caries incidence in permanent teeth in which it was shown that the more posterior the tooth, the greater the vulnerability of the tooth to caries attack.

This study also shows that there is a higher occurrence of caries, involving first and second premolars, on the right sides as compared with left sides of both jaws (Table 1), and this could be attributed to the possibility of a greater attention being paid to the left sides of both jaws during oral prophylactic procedures and masticatory processes. Studies have shown that those sides of the jaws that are frequently well cleaned and used during mastication usually show less microbial deposits as compared with those sides that are less frequently used and cleaned (1, 6, 1, 17). The tendency for higher deposition of plaque on those teeth in the less frequently cleaned and used sides of the jaws may be due to lack of shearing occlusal and tooth brushing forces which are very important in the mechanical removal of plaque. Therefore, a higher prevalence of tooth decay on the right sides of the jaws could be a reflection of a lower level of tooth cleanliness.

In a study carried out by Salako, Adenubi and John (1985) (17) on tooth brushing behaviour and oral hygiene knowledge amongst 250 secondary school children (aged 11-16 years) in Lagos, Nigeria, it was shown that the greatest number of the children concentrated more on cleaning of the surfaces of maxillary and mandibular left posterior teeth than the right ones, and approximately 94.6% of the children were right-handed.

The greater occurrence of caries, involving first and second premolars, in the maxilla compared with the mandible (Table 2) is a reflection of the morphological differences in the anatomical configuration between lower premolars and upper premolars. The cusps, fissures and fossae of the upper premolars are more pronounced than the lower premolars (18). Therefore, there is a greater tendency for plaque accumulation on upper premolars as well as more difficulty in plaque removal.

The pattern of vulnerability of first and second premolars to caries, as found in this study is similar to the pattern of vulnerability of first and second permanent molars to caries as found in the study of Akpata and Jackson (1978) (4).

CONCLUSION

This study shows that second premolars are more prone to caries attack than the first premolars irrespective of the jaws involved. It also shows that there is a relative variation in maxillo-mandibulo-quadrant distribution of caries, involving first and second premolars, with a relatively higher prevalence on the right sides as compared with the left sides of both jaws as well as a greater occurrence in the upper jaw as compared with the lower jaw.
ABSTRACT

The objective of this study was to determine the relative prevalence of caries in first and second premolars as well as maxillo-mandibulo-quadrant distribution of caries among the premolars. It was also aimed at comparing the patterns of caries distribution in first and second premolars with those of the first and second permanent molars based on previous studies.

The treatment records of patients who attended the conservation clinic at the Department of Restorative Dentistry, Lagos University Teaching Hospital/College of Medicine of the University of Lagos from 1991-1995 were scrutinised; and all first and second premolars that were diagnosed and treated for caries were charted.

This study showed that the second premolars were more prone to caries attack than the first premolars irrespective of the jaws involved. The difference in the degree of vulnerability to caries attack between first and second premolars was also statistically significant P < 0.05.

It also showed that there was a relative variation in maxillo-mandibulo-quadrant distribution of caries with a relatively higher prevalence on the right sides as compared with the left sides of both jaws as well as a greater occurrence in the upper jaw as compared with the lower jaw. The difference in relative occurrence of caries between the right and left sides of both jaws as well as the difference in relative caries occurrence between the maxillary and mandibular premolars were also statistically significant P < 0.05 using Chi-square test.

Key words: Caries, Prevalence, and Premolars.

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