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CLINICAL ARTICLE

Prevalence of Pulp Stones in a Teenage Iraqi Group

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The prevalence of pulp stones was evaluated radio­graphically in 515 randomly selected 13- to 14-yr- old Iraqi secondary school children. Pulp stones were found in 19.2% of the teeth examined and more were found in the male group than in the female group.

In general, significantly more pulp stones were found in mandibular teeth than maxillary teeth, meanwhile the first molar tooth showed statistically more pulp stones than second molars and premolars in both jaws in both sexes. Slightly higher percent­ages of stones were found in carious teeth com­pared with intact teeth, but in the first molars (except for the mandibular first molar in males) the incidence of pulpal calcifications seems to be much lower in carious teeth.

Pulp stones (denticles or nodules) are calcified masses, found commonly in the dental pulps of healthy, diseased, and even unerupted teeth (1). Their locations are more in the coronal than radicular portions of the pulp organ and can be seen as free, attached, and embedded (2, 3). They are classified ac­cording to their structure as true, false, and diffuse (4). Their size varies greatly and can be determined more accurately histologically than radiographically (5-8).

The incidence of pulp stones varies according to different studies. James et al. (9) found pulpal stones in 56% of young permanent teeth, Stafne and Szabo (10) found them in 46% of 200 teeth studied, Tamse et al. (11) reported 20.7% in a total sample of 300 patients and more in females than in males. A similar sex variation was found by Stafne and Szabo (10), whereas other investigators have reported no sex differ­ence (6, 8, 12).

Although the exact cause of pulp calcification is unknown, it is clearly shown that the incidence of pulp stones increases with age (4, 6, 8, 13). Hill (8) reported a 66% incidence of pulp stones in 10- to 20-yr olds and 90% in those between 50 and 70 yr old. Sayeghand Reed (13) demonstrated that dental caries acts as a local factor which increases the incidence of pulpal calcification in teeth of children and young adults. On

the other hand Tamse et al. (11) found no significant differ­ence between the presence of pulp stones and the condition of the crown.

The aim of this study was to evaluate the radiographic prevalence of pulp stones in a 12- to 13-yr-old Iraqi group and to correlate the condition of the crown (carious or intact) and the presence of pulp stones in premolars and molars in both jaws.

MATERIALS AND METHODS

Five-hundred and fifteen 12-to 13-yr-old randomly selected school children (242 male and 273 female) were selected for this study from Hai-Almualmeen in Baghdad, a residential district of middle socioeconomic status. Medical examination of the participants was not contributory.

A total of 6,228 maxillary and mandibular premolars and molars (2,880 in male studentsand 3,348 in female students) were selected for evaluation. A bite-wing radiograph was prepared for each jaw by using the Rinn bite-wing block paralleling technique with a dental X-ray machine with a 16- inch cone (Fig. I). Kodak DF size 2 film was exposed at 65 kVp and 10 mA and was then processed in an automatic processor. Radiographic observation was conducted by one

FİG1. Bite-wing radiographs were prepared by using the Rinn bite­wing block paralleling technique.

310 Baghdady et al.

Journal of Endodontics

examiner and focused on pulp stones in the coronal pulp chamber and on caries detection, using a radiograph viewer and a magnifying glass. Pulp stones were recorded only when a definitive radiopaque mass could be seen in the pulp cham­ber. The condition of the crown was evaluated by clinical dental examination using plane mouth mirrors and sharp explorers. On this basis, a diagnosis was made of carious or intact crowns and was duly recorded. No attempt was made to determine the severity of the carious lesions. The data were evaluated by chi-square analysis for statistical significance.

TABLE 1. Distribution of teeth according to location, condition, and sex of the patient

Intact Carious Total

Tooth Location

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | M | F | M | F | M | F |
|  | Max\* | 217 | 330 | 109 | 90 | 326 | 420 |
| Pi | Mand | 348 | 360 | 30 | 43 | 378 | 403 |
| P2 | Max | 253 | 311 | 135 | 114 | 388 | 425 |
| Mand | 322 | 355 | 96 | 113 | 418 | 468 |
| Ml | Max | 103 | 139 | 301 | 307 | 404 | 446 |
| Mand | 126 | 97 | 298 | 353 | 424 | 450 |
| m2 | Max | 39 | 151 | 79 | 100 | 118 | 251 |
| Mand | 230 | 263 | 194 | 222 | 424 | 485 |
| Total |  | 1638 | 2006 | 1242 | 1342 | 2880 | 3348 |

\* Max, maxillary; Mand, mandibular.

RESULTS

Distribution of the teeth according to the location, condi­tion, and sex of the patient is summarized in Table 1. Of the 6,228 teeth examined, 19.2% were found to contain pulp stones. Pulp stones were found in 18.8% of 3,348 teeth in the female group (Table 2) and 19.8% of the 2,880 teeth in the male group (Table 3). The difference was not significant (x2 = 1.0, p< 0.3).

The mandibular teeth showed a significantly higher number of pulp stones than the maxillary teeth in the total sample studied (x2 = 4.7, O,p < 0.03). Moreover, the mandibular first molar showed a higher percentage of pulp stones than second molars and premolars in both jaws for both sexes (Tables 2 and 3).

No significant difference was found between intact teeth and carious teeth in the number of pulp stones, except in the first molars (except for the mandibular first molar in males) where the incidence of palpal calcifications seemed to be much lower in carious teeth (Table 4).

DISCUSSION

Clinical detection of pulp stones can be observed by dental radiograph only (14). The evaluation of this survey on pulp stones was based on the bite-wing paralleling technique rather than periapical radiographs, since distortion could occur in

|  |  |  |
| --- | --- | --- |
| Tooth | Location | No. |
| p | Max\* | 330 |
| Mand | 360 |
| D | Max | 311 |
| “2 | Mand | 355 |
| Nh | Max | 139 |
| Mand | 97 |
| m2 | Max | 151 |
| Mand | 263 |
| Total | Max | 931 |
| Mand | 1075 |
| Total | Max + mand | 2006 |

Max, maxillary; Mand, mandibular.

|  |  |  |  |
| --- | --- | --- | --- |
| Intact Teeth | | | Caries Teeth |
| With Stone | % | No. | With Stone |
| 10 | 3 | 90 | 4 |
| 26 | 7.2 | 43 | 7 |
| 3 | 1.0 | 114 | 3 |
| 5 | 1.4 | 113 | 2 |
| 106 | 76.3 | 307 | 107 |
| 79 | 81.4 | 353 | 149 |
| 21 | 13.9 | 100 | 16 |
| 50 | 19.0 | 222 | 40 |
| 140 | 15.0 | 611 | 130 |
| 160 | 14.9 | 731 | 198 |
| 300 | 15 | 1342 | 328 |

TABLE2. Percentage of pulp stones in the posterior teeth in the maxilla, mandible, and crown condition in the female group

|  |  |  |  |
| --- | --- | --- | --- |
| % | No. | With Stone | % |
| 4.4 | 420 | 14 | 3.3 |
| 16.3 | 403 | 33 | 8.2 |
| 2.6 | 425 | 6 | 1.4 |
| 1.8 | 468 | 7 | 1.5 |
| 34.9 | 446 | 213 | 47.8 |
| 42.2 | 450 | 228 | 50.7 |
| 16 | 251 | 37 | 14.7 |
| 18 | 485 | 90 | 18.6 |
| 21.3 | 1542 | 270 | 17.5 |
| 27.1 | 1806 | 358 | 19.8 |
| 24.4 | 3348 | 628 | 18.8 |

Total

TABLE3. Percentage of pulp stones in the posterior teeth in the maxilla, mandible, and crown condition in the male group

Tooth

R

F„2

Mi

M2

Total

Location

Max\*

Mand

Max Mand

Max Mand Max Mand

Max Mand

Max + mand

|  |  |  |
| --- | --- | --- |
| No. | With Stone | % |
| 217 | 2 | 0.9 |
| 348 | 10 | 2.9 |
| 253 | 6 | 2.4 |
| 322 | 7 | 2.2 |
| 103 | 88 | 85.4 |
| 126 | 54 | 42.9 |
| 39 | 9 | 23.1 |
| 230 | 35 | 15.2 |
| 612 | 105 | 17.2 |
| 1026 | 106 | 10.4 |
| 1638 | 211 | 12.9 |

Intact Teeth

|  |  |  |
| --- | --- | --- |
| No. | With Stone | % |
| 109 | 1 | 0.9 |
| 30 | 0 | 0 |
| 135 | 1 | 0.7 |
| 96 | 1 | 1.0 |
| 301 | 115 | 38.2 |
| 298 | 185 | 62 |
| 79 | 14 | 17.7 |
| 194 | 41 | 21.1 |
| 624 | 131 | 21.0 |
| 618 | 227 | 16.8 |
| 1242 | 358 | 28.8 |

Caries Teeth

|  |  |  |
| --- | --- | --- |
| No. | With Stone | % |
| 326 | 3 | 0.9 |
| 378 | 10 | 2.6 |
| 388 | 7 | 1.8 |
| 418 | 8 | 1.9 |
| 404 | 203 | 50.2 |
| 424 | 239 | 56.4 |
| 118 | 23 | 19.5 |
| 424 | 76 | 17.9 |
| 1236 | 236 | 19.1 |
| 1644 | 333 | 20.3 |
| 2880 | 569 | 19.8 |

Total

Vol. 14, No. 6, June 1988

Prevalence of Pulp Stones 311

TABLE4. Sum of chi-square and probability values for the teeth evaluated

|  |  |  |  |
| --- | --- | --- | --- |
| Tooth No.  Mandibular | x2 | df | p |
| Pi | 3 | 1 | 0.05 |
| P2 | 0.1 | 1 | 0.5 |
| M, | 4.3 | 1 | 0.05 |
| m2 | 0.77 | 1 | 0.4 |
| Maxillary |  |  |  |
| Pi | 2.6 | 1 | 0.09 |
| P2 | 0.07 | 1 | 0.5 |
| M, | 52 | 1 | 0.0005 |
| m2 | 0.005 | 1 | 0.5 |

the latter while in the paralleling technique a more standard picture can be obtained by having the central beam perpen­dicular to the long axis of the tooth. Moreover, radiographic­films do not show all of the calcification in the pulp. A very small size denticle is not depicted on a radiographic film (7), since calcified bodies with a diameter smaller than 200 gm cannot be seen in radiographs (5). The 19.2% pulp stone incidence was found in the coronal pulp chambers of the 12- to 13-yr-old group in this study. No similar study on the same age group was found in the English literature.

The frequency of occurrence of pulp stones in the male group was slightly higher than that in the female group, but the difference was not significant. This is in agreement with the finding of others (6, 8, 12). The prevalence of pulp stones in this study was found to be higher in the first molar (in both sexes) than in second molars and premolars; this finding also confirms the results of other investigators (11). The first molar is the first posterior permanent tooth to erupt and contains more pulp stones than others, thus confirming that calcifica­tion of the pulp increases with age (4, 11, 13, 15). Further­more, as the first molar is the largest tooth in the arches, presenting a generous pulp chamber with a greater amount of pulp tissue and a better blood supply (1, 11, 16), it may contribute to conditions that precipitate calcification. Mean­while, mandibular teeth was found to have significantly more pulp stones than maxillary teeth in both sexes. This could be related to our previous finding that mandibular molars erupt earlier than maxillary molars in the Iraq population (17).

Any irritation to the pulp caused by, for example, operative procedures, chronic irritants (caries, abrasion, erosion, peri­odontal disease, and traumatic response to orthodontic treat­ment) have been suggested to have a deleterious influence on the pulp (9, 12, 18). The pathological effect of irritation by the microorganisms of dental caries on the pulpal tissue could produce a vascular wall injury, resulting in deposition of calcium salts within the tissue. Our investigation, however, does not show a definite association between caries and pulp stones, a fact confirmed elsewhere (6), since pulp calcification has been described in unerupted teeth.

Our study shows that in 12- to 13-yr-old males pulp stones were slightly more prone to develop than in the same age females. Likewise, they were found to occur more in mandib­ular than in maxillary teeth, with a higher prevalence in the first molar compared with other teeth (for both sexes). In general, slightly higher rates of stones were found in carious teeth compared with intact teeth, except for permanent first molars. This study does not show a positive relationship between pulp stone incidence and dental caries in the molars.

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