

## Pulp Calcifications in Primary Teeth

Suresh Kumar, BDS(Luck), MDS(Std), Satish Chandra, BDS(Luck), MDS (Born), and Jagdish Narain Jaiswal, BDS(Luck), MDS(Luck)

Information regarding the prevalence of pulp calcifications in primary teeth is lacking. The occurrence of pulp calcifications in 120 primary maxillary and mandibular extracted teeth was evaluated radiographically. Twenty-five percent of second molars presented evidence of pulp calcifications; approximately 3% of central incisors were calcified. No other categories of teeth displayed pulp involvement. The low occurrence of pulp calcifications in primary teeth support the view that the occurrence of pulp calcification increases with age.

The subject of pulp calcification in permanent teeth has been widely studied, and it has been accepted by many (1-3) that the incidence of such calcifications increases with age. Many pulps may be the site of calcifications, but unless they are sufficiently large, they cannot be identified radiographically. It has been estimated that only about 10% of the pulp calcifications can be seen by radiographic observations (4). A thorough survey of the literature failed to disclose much information on pulp calcifications affecting the primary dentition. Therefore, this study was undertaken with the aim of determining the radiographic occurrence of pulp calcifications in the primary dentition.

Pulp stones (denticles or nodules) are calcified masses, found commonly in the dental pulps of healthy, diseased, and even unerupted teeth (5). Their locations are more in the coronal than radicular portions of the pulp organ and they can be seen as free, attached, and embedded (6, 7). They are classified according to their structure as true, false, and diffuse (8). Their size varies greatly and can be determined more accurately histologically than radiographically (1-4, 10).

The incidence of pulp stones reported in the literature varies widely. James et al. (11) found pulp stones in 56% of young permanent teeth. Stafne and Szabo (9) found them in 46% of 200 teeth studied; Tamse et al. (12) 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 (9), whereas other investigators have reported no sex difference (1, 3, 13). Hill (3) reported a 66% incidence of pulp stones in a 10- to 20-yr-old age group. Virgin et al. (14) studied the prevalence of pulp stones in 6228 maxillary and mandibular premolars and molars. Nineteen percent were found to contain pulp stones in the 12-to 13-yr-old age group.

### MATERIALS AND METHODS

A total of 120 primary maxillary and mandibular teeth was collected for the study from the Department of Pedodontics with Preventive Dentistry, Faculty of Dental Sciences, King George's Medical College, Lucknow. Medical examination of the participants was noncontributory. Teeth were extracted because of carious exposure, of extreme physiological mobility, or for orthodontic purposes. No attempt was made to determine whether the tooth was carious or not. After extraction, the teeth were washed thoroughly in running tap water to remove blood and other debris. The types of teeth used in this study were primary maxillary and mandibular central incisors, lateral incisors, cuspids, first molars, and second molars (Table 1).

All of the teeth were radiographed on double coated fast films of 11/4\* 15/ginch. The films were exposed at 55 kVp, 7 mA. Exposure time used was 1 s and the developing was carried out manually for approximately 2 min. The films were then fixed for about 5 min at 68°F. The films were then thoroughly washed in running tap water and air dried.

All radiographs were reviewed by three investigators independently on three different occasions with consistent results. The radiographs were examined for the presence of pulp stones in the pulp chambers and pulp canals with the help of an X-ray viewer under magnifying lens. Pulp stones were recorded only when a definite radiopaque mass could be seen in the pulp chamber. The data were evaluated by chi-square analysis for statistical significance.

### RESULTS

Radiographic observations of primary maxillary and mandibular teeth are compiled in Table 2 and Figs. 1 and 2. Of 120 teeth studied, only 7 showed the presence of radiopaque bodies regarded as pulp stones within the pulp chambers. One pulp stone was present in a central incisor and six pulp stones were present in second molars.

The second primary molar exhibited a significantly higher number of pulp stones than the other teeth. The results were evaluated by chi-square test and found to be highly significant ( $p < 0.001$ ).

### DISCUSSION

Radiographs of the primary teeth have often demonstrated the presence of radiopaque masses in the pulp cavities that

**TABLE 1. Primary teeth used in the study**

Primary Teeth	Tooth Code	No.	%
Maxillary and mandibular central incisor	A	33	27.5
Maxillary and mandibular lateral incisor	B	30	25.0
Maxillary and mandibular cuspid	C	24	20.0
Maxillary and mandibular first molar	D	9	7.5
Maxillary & mandibular second molar	E	24	20.0
	Total	120	100.0

**TABLE 2. Radiological observations of pulp calcifications in primary teeth\***

Primary Teeth	Tooth Code	Total No.	Pulp Calcification	%
Maxillary and mandibular central incisor	A	33	1	3.3
Maxillary and mandibular lateral incisor B		30	-	
Maxillary and mandibular cuspid	C	24	-	
Maxillary and mandibular first molar	D	9	-	
Maxillary and mandibular second molar	E	24	6	25.0
	Total	120	7	

$\chi^2 = -20.31$  ;  $df = 4$ ;  $p < 0.001$ , highly significant.

have the appearance of calcific bodies. However, these observations, although similar in appearance to those in permanent teeth, are not encountered as often (15).

This study provides radiographic data about the occurrence of pulp calcifications in primary dentition. A radiographic study was done because the detection of pulp stones in clinical situations can be done only by dental radiographs (16).

No similar study on the same age group is reported in the literature, therefore, comment and comparison of results with others are not possible.

Although the exact cause of pulp calcifications is not known, it is clearly shown that the incidence of pulp calcifications increases with age (1-3, 13, 17).

Sayegh and Reed (17) demonstrated that dental caries act as a local factor which increases the incidence of pulp calci-

fications in teeth of children and young adults. On the other hand, Tamse et al. (12) found no significant difference between the presence of pulp stones and the condition of the crown. Yaacob et al. (15), in a histological study, reported that the presence of caries does not have any significant influence on the formation of pulp calcifications. Therefore, no attempt was made in this study to distinguish between carious and noncarious teeth. This was confirmed in our study also, where out of seven radiographically examined teeth with pulp stone four were carious and three noncarious.

Yaacob et al. (15) also reported in their study that the difference in the occurrence of pulp calcifications between the sexes, jaws, or each individual tooth was also insignificant.

Langeland and Rodrigues (5), Tamse et al. (12), and Wheeler (18) stated that molars are the largest teeth in the arches, presenting generous pulp chambers with greater amounts of pulp tissue and better blood supply that may contribute to conditions that can cause calcifications.

Moss-Salentijn et al. (10) reported that the radiographically observed incidence of pulp stones was lower than histologically observed incidence. This difference was due in large part to the fact that calcified structures with a diameter smaller than 200  $\mu$ m could not be seen in the radiographs.

Although the etiology of pulp calcifications is not known for certain, the process of formation seems to go on throughout the life-span of the tooth in the presence of an appropriate stimulus. Hence, the longer the life of the tooth, the greater the chance of pulp calcifications to occur. The short life-span of the primary teeth in the mouth, the longest surviving only until about the 12th yr of life, must be the factor that is responsible for low prevalence of pulp calcifications. These findings lend support to the belief that pulp calcifications increase with age (15).

Yaacob et al. (15) stated that in the presence of a large pulp stone, the pulp cavity may be so obliterated that it would be possible for the nerves to be entrapped between it and the dentinal wall. Although there have been suggestions that pain is the sequel in such a case, the validity of the concept has not been proven beyond doubt. A pulpotomy may not be easily performed in a tooth with a large stone, especially when it is attached to the dentinal wall.

## References

1. Shafer WG, Hine MK, Levy BM. A textbook of oral pathology. 3rd ed. Philadelphia: WB Saunders, 1974:292.
2. Kronfield R. Histopathology of the teeth and their surrounding structures. 1st ed. Philadelphia: Lea & Febiger, 1933:57.
3. Hill TJ. Pathology of the dental pulp. J Am Dent Assoc 1934;21:820-44.
4. Bhaskar SN. Synopsis of oral pathology. 6th ed. St. Louis: CV Mosby, 1981:154-6.
5. Langeland IL, Rodriguez H. Periodontal disease, bacteria and pulpal Histopathology. Oral Surg 1974;37:257-70.
6. TenCate AR. Oral histology, development, structure and functions. St. Louis: CV Mosby. 1980:176.
7. Major IA, Pindborg JJ. Histology of the human tooth. Copenhagen: Munksgaard, 1973:61-2.
8. Orban JB. Oral histology and embryology. 5th ed. St. Louis: CV Mosby, 1962:157.
9. Stafne EC, Szabo SE. The significance of pulp nodules. Dent Cosmos 1933;75:160-4.
10. Moss-Salentijn L, Hendricks Klyvert M. Epithelially induced denticles in the pulps of recently erupted noncarious human premolars. J Endodontol 1983;9:154-60.
11. James VE, Schour I, Spencer J. Biology of the pulp and its defence. J Am Dent Assoc 1959;5:903-11.
12. Tamse A, Kaffe L, Littner MM, Sahni R. Statistical evaluation of radiologic survey of pulp stones. J Endodontol 1982;8:455-8.
13. Sundell JR, Stanley HF I, White CL. The relationship of coronal pulp stone formation to experimental operative procedures. Oral Surg Oral Med Oral Pathol 1968;25:579-89.
14. Baghdady VS, Ghose LJ, Nahoom HY. Prevalence of pulp stones in a teenage Iraqi group. J Endodontol 1968;14:309.
15. Yaacob B, H, Harold AB J. Pulpal calcifications in primary teeth. J Pedodont 1986; 10:254.
16. Osborne JW, TenCate AR. Advanced dental histology. 3rd ed. Bristol: John Wright and Sons, 1976:157.
17. Sayegh FS, Reed AJ. Calcifications in Dental pulp. Oral Surg 1968;25:873-82.
18. Wheeler RC. Dental anatomy, physiology and occlusion. 4th ed. Philadelphia: WB Saunders, 1974:237.