

Original Research Article

The prevalence of pulp stones in a Hazaribagh population: a radiographic survey

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ABSTRACT

Background: The goal of this retrospective study was to determine the prevalence of pulp stones in a Hazaribagh population. Any possible associations between pulp stones tooth type and dental arch were also evaluated.

Methods: A total of 4625 teeth of 500 patients were examined in our department who came for diagnostic radiograph of posterior teeth. The presence or absences of pulp stones were recorded.

Results: Pulp stones were found in 834 (18.03%) of 4625 teeth detected. The occurrence of pulp stones was most significant in among the age groups of 31-50 years of age. The pulp stones were significantly higher in permanent maxillary first and second molars.

Conclusions: Pulp stones are not only incidental radiographic findings of the pulp tissue but may also be an indicator of some serious underlying disease. On the other hand, they may provide useful information to predict about the susceptibility of patients for other dystrophic soft tissue calcifications such as urinary calculi and calcified atheromas.

Keywords: Cardiovascular disease, Endodontics, Pulp stone

INTRODUCTION

Pulp stones (PS) are discrete calcified masses found in the dental pulp, in the pulp tissue or become attached to or embedded into the dentine.¹ Structurally, pulp stones can be classified as true or false, the former being made of dentine and lined by odontoblasts, whereas false pulp stones are formed from degenerating cells of the pulp that gets mineralized.² The formation of pulp stones is still something of an enigma. Studies show that a high frequency of cell islands, considered to be of epithelial origin, were observed together with pulp stone formation in teeth that had been subjected to experimental intrusion.^{3,4} A number of predisposing factors, including

ageing, caries, operative procedures, as well as periodontal disease have been reported.² The pathological effect of irritation by the microorganisms of dental caries on the pulpal tissue can cause a vascular wall injury, resulting in the deposition of calcium salts within the tissue.⁵ Others are orthodontic tooth movement, idiopathic and genetic predisposing factors.² Pulp stones appear radiographically as round or ovoid opacities within the pulp. In addition, they may occur as a single dense mass or as several small opacities.⁶ The radiographically observed incidence of pulpal calcification was substantially lower than the histologically observed incidence.⁷ This was related to the fact that the radiographical studies do not give a clear

picture of the entire pulp cavity. Depending on their size and location in the pulp chamber, pulp stones can complicate endodontic treatment by impairing access to the root canal orifice through the physical obstruction. Their presence can lead to changes in access cavity preparation in endodontics and slow down the progress of cleaning and shaping the root canal system, particularly for molar teeth. The problems that they cause are similar to those from secondary and tertiary dentin formation.^{2,8,9} The aim of this radiographic-based study was to determine the prevalence of pulp stones in a group of Hazaribagh population, and to evaluate possible associations between pulp stones and age, tooth type, dental arch and to compare the results with published data presenting a new perspective in forensic medicine.

METHODS

A total of 500 ((302 females and 198 males) patients were selected randomly from the OPD of our institute for a period of 6 months. Exclusion criteria included patients who were less than 10 years of age at the time of radiographic examination, records with poor quality radiographs and record with radiographs of only primary teeth. In addition, carious, restored and fractured teeth were not included. Among these, 500 patients a total of 4625 teeth were examined.

All the patients who had undergone a diagnostic radiograph of the premolar and molar region were considered for the study. Patients whose bitewing radiographs were taken bilaterally during routine radiographic examination were included in the present study. Patient's dental status was thoroughly examined for DMF, which were recorded in the proforma. All the radiographs were processed manually using visual method in a dark room under safe light. The radiographs were evaluated for the presence or absence of pulp stones and were documented in the proforma. Statistical analysis of the data was done using the statistical package for the social sciences (SPSS 15.0) using Chi-square analysis. Differences were considered as significant when $P \leq 0.05$.

RESULTS

The distribution of patients with pulp stones according to the age groups is shown in Table 1.

Table 1: Age distribution and its correlation of presence of pulp stone.

Age in years	Total number	Pulp stone	Percentage	P value
10-20	56	08	14.28	<0.001
21-30	180	41	22.77	0.050
31-40	121	38	31.40	0.005
41-50	81	25	30.86	0.063
>50	62	18	29.03	0.234
Total	500	130	26.00	

Statistically significant if $p < 0.05$, Highly significant if $p < 0.005$

The occurrence of pulp stones was most significant among the age groups of 31-50 years of age ($p < 0.005$). Of the 500 patients a total of 130 patients had pulp stones which accounts to 26.00% prevalence. A total of 4625 teeth were examined of which 834 (18.03%) of teeth showed pulp stones.

Table 2: Teeth distribution and its correlation of presence of pulp stone.

Teeth	Total number	Pulp stones	Percentage	P value
Maxillary second premolar	281	09	3.21	<0.001
Maxillary first molar	910	302	33.2	<0.001
Maxillary second molar	902	276	30.6	<0.001
Mandibular second premolar	198	08	4.04	<0.001
Mandibular first molar	1116	125	11.20	<0.001
Mandibular second molar	1218	114	9.35	<0.001
Total	4625	834	18.3	

The distribution of teeth with pulp stones according to the location and tooth type is shown in Table 2. When individual tooth type is taken into consideration, maxillary 1st and 2nd molars showed a strongly positive significance ($p < 0.005$) with 33.2% and 30.6% prevalence respectively to the overall prevalence of 18.03%. The maxillary teeth show more number of pulp stones in comparison to mandibular teeth (Table 1).

DISCUSSION

Calcification in the dental pulp can lead to denticles, commonly known as pulp stones. Therefore, the term "pulp stone" was used to indicate pulpal calcification in the present study. They are often incidental findings on dental radiographs and in the literature the incidence of pulp stones has been investigated in many radiological studies.^{5,10,11} In such studies bitewing and periapical radiographs were used and it was stated that these two radiographic techniques did not show significant differences in the diagnosis of pulpal calcification.^{12,13} However, since the bitewing radiographic technique is a better radiographic method rather than other conventional techniques, it was used in this study to illustrate the pulpal anatomical structure accurately.⁵

When the literature related to pulp stones was reviewed, there were a limited number of studies regarding the incidence of pulp stones. Moreover, the reported rates of prevalence also differed in the studies. Some researchers

reported prevalence based on the number of patients and teeth, whereas the others represented only the rates based on teeth numbers.^{5,11} In the present study, we presented rates based both on the number of patients and teeth. On the basis of the number of patients we found the rate of prevalence to be 130 (26 %) of the subjects and in 834 (18.3 %) of the teeth examined, which is slightly less than the reported range in the literature.^{12,14}

On the basis numbers of teeth examined in previous studies, pulp stones were detected in 834 (18.3%) out of the 4625 teeth examined in 500 subjects. In another study the prevalence of pulp stones was found to be 22.4% in 1,028 of 4,573 teeth examined.¹² Renjitker et al. found the prevalence to be 10.1% in 333 out the 3,296 teeth examined.¹⁰ Another report related to the prevalence of pulp stones showed pulp stone incidence to be 4.8% in 747 out of the 15,326 teeth examined.¹⁴ In the present study, we found that the prevalence of pulp stones was 18.3% in 834 of 4625 teeth examined.

In the literature it was reported that 30-50 years age group had significantly higher prevalence of pulp stones in compared to younger age groups. The occurrence of pulp stones was more frequently found in the maxilla than in the mandible in the present study. These results are in agreement with previous studies.^{5,12,10} The prevalence of pulp stones in the present study was found to be higher in both genders in the first molars than in the second molars and premolars; this finding also confirms the results of other studies.¹¹ This result may be related to the fact that the molars are the largest teeth in the arch, provide a better supply of blood to the pulp tissue and have the strongest chewing force in the arch. This may lead to greater precipitation for calcification.

The etiological factors for the formation of pulpal calcifications includes age, gender, systemic disease, and long-term irritation such as deep caries and restorations.^{15,16} The pathological effect of irritation by the microorganisms of dental caries on the pulpal tissue can cause a vascular wall injury, resulting in the deposition of calcium salts within the tissue. Although the currently held clinical view is that pulp stones have no clinical significance, they lead to complications when endodontic therapy is needed; this may lead to hindering canal location and negotiation. Authors also reported a correlation between pulpal calcification and cardiovascular disease and those subjects with a history of cardiovascular disease were found to have an increased incidence of pulp stones in asymptomatic vital pulps, compared to subjects with no history of cardiovascular disease.^{15,17,18} This shows that pulp stones found incidentally in the pulp tissue play an important role in the diagnosis of a serious underlying disease or condition. In addition, in forensic dentistry, the radiographic matching of pulp stone configurations, along with other features recorded in dental records, may provide valuable information in the identification of deceased persons.¹⁹ The incidence of pulp stones was found to be 26% in a

Hazaribagh population, which is in agreement with previous studies on the subject. Pulp stones are not only incidental radiographic findings of the pulp tissue but may also be an indicator of some serious underlying disease.

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