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Incidence of Pulpstones in Orthopantomograph

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Abstract: ***Background: Pulp stones are discrete calcifications in the pulp space. A single tooth may have from 1 to 12 pulpstones of varying sizes and shapes. Pulp stones have been noted in patients with systemic/genetic disease such as dentin dysplasia, dentinogenesis imperfect. Aim: The aim of this study is to determine the incidence of pulp stones and to evaluate the frequency of pulp stones in the posterior tooth group of adult population in Chennai by using Orthopantomograph. Materials And Method: Orthopantamograph from 100 patients between the age group of 20 to 60 years were collected and evaluated for pulp stones in the posterior tooth group of both male and female patients visiting Saveetha dental college, Chennai.***

1. Introduction

Pulp stones are discrete calcified bodies in the dental pulps of the teeth in the primary and permanent dentition. A single tooth may have pulp stones ranging from 1 to 12 or more, with varying sizes from minute particle to large masses that occlude the pulp space[1]. They can be seen in the pulps of healthy, diseased, and even unrequited teeth[2]. Their locations are more common in the coronal than in the radicular portions of the pulp and they can be seen as free, attached, or embedded in the dentinal surface of the Pulp chamber. Pulp stones can be classified as true, false, and diffuse. They range in size from small microscopic particles to large masses that almost obliterate the pulp chamber.

The exact cause of pulp calcification is unknown. Some factors have been implicated in pulp stone formation such as genetic predisposition[2], orthodontic tooth movement, dentine dysplasia, dentinogenesis imperfecta and in certain syndromes such as Vander Woude syndrome[3] circulatory disturbance in pulp, age, interactions between the epithelium and pulp tissue, idiopathic factors, and long-standing irritants like caries, deep restorations, and chronic inflammation.

Bernick and Nedelman found decrease in the size of pulp chamber due to the deposition of secondary dentin, with increasing age and progressive deposition of calcified masses originated in the root[4]. When tooth wear, caries or operative intervention is a feature this process becomes more evident. In most pulps, dystrophic calcification is found to be of a variable degree, and even in teeth without caries or restorations scattered calcification occurs, unrelated to disease[5].

Pulp stones appear radiographically as round or ovoid opacities within the pulp. In addition, they may also occur as a single dense mass or as several small opacities. The prevalence of pulp stones in teeth, based on radiographic examination, has been reported to be around 20–25%, while histological examinations reveal higher percentages[6]. This is related to the fact that the radiographical studies do not give a clear picture of the entire pulp cavity.

The frequency of occurrence of pulp stones has been reported to increase with age[8,9]. Some studies did not find any difference in occurrence between gender[7,9,10,11] whereas other studies have found females to have more pulp stones than males[11,12,13].

The aim of this radiographic-based study was to determine the prevalence of pulp stones, and to evaluate possible associations between pulp stones and gender, tooth type, and side.

2. Materials and Methods

A total of 100 digital panoramic radiographs were collected from the department of Oral and Maxillofacial radiology, Saveetha dental college, Chennai. The sample composed a total 100 patients with 47 males and 53 females within the age group of 20 to 60 yrs. They are divided into four groups; Group A, B, C and D [TABLE 1]. Information about the name, age and sex of the patients were recorded. 1565 teeth were evaluated for pulp stones.

Table 1

Group	*Age Range (Years Old)*
A	20-30
B	31-40
C	41-50
D	51-60

Exclusion criteria: Teeth with full veneers, partial dentures and root canal treated teeth were excluded.

Inclusion criteria: Teeth with partial restorations, non-carious teeth of permanent dentition were considered for evaluation. The teeth which were evaluated includes,

Maxillary arch, right and left quadrant : 1st premolar, 2nd premolar, 1st molar and 2nd molar (14,15,16,17,24,25,26 and 27).

Mandibular arch, right and left quadrant : 1st premolar, 2nd premolar, 1st molar and 2nd molar(34,35,36,37,44,45,46 and 47).

The locations of pulp stones were recorded. The type of pulp stone, size, number of pulp stones within the pulp and location within the pulp chamber were not recorded.

3. Result

Digital orthopantomographs of 100 patients were collected. Pulp stones were evaluated according the gender, age group, tooth type and the side of dental arch. The study consisted of 47 males and 53 females ranging between the ages 20 to 60 years with a mean age of 29.8 years.

Pulp stones were found in 70 (70%) of the subjects.

Almost equal number of maxillary (788) and mandibular (777) teeth were examined. Pulp stones were detected in 163 teeth out of a total of 1565 teeth with a prevalence of 10.41%.

Frequency of pulp stones based on the gender:

Among 163 teeth with pulp stones, 67 teeth (41.1%) with pulp stones were detected in males and 96(58.9%) were detected in females (TABLE 2).

Table 2

Gender	*No. of Teeth With Pulp Stone*	*Percentage*
Male	67	41.10%
Female	96	58.90%

Frequency of pulp stones based on the tooth type:

In maxillary 1st premolar, numbers of teeth examined were 196 out of which pulp stones were present in 4 teeth (2%). In maxillary 2nd premolar, number of teeth examined were 199 out of which 14 had pulp stones (7%). In maxillary 1st molar 196 teeth were examined out of which 40 teeth had pulp stones (20.4%). In maxillary 2nd molar 197 teeth were examined out of which 47 has pulp stones (24%).

In mandibular 1st premolar 195 teeth were examined out of which 2 teeth had pulp stones (1.02%). 199, 2nd premolar were examined out of which 4 teeth had pulp stones with a percentage of (2%). In 1st molar, 188 teeth were examined out of which 26 teeth had pulp stones (13.8%). In 2nd molar 195 teeth were examined out of which 26 teeth had pulp stones (13.3%).(TABLE 3).

Table 3

Tooth Type **MAXILLA**	*No. of Teeth Examined*	*No. of Teeth With Pulp Stones*	*Percentage*
1st Premolar	196	4	2%
2nd Premolar	199	14	7%
1st Molar	196	40	20.40%
2nd Molar	197	47	23.80%
Mandible			
1st Premolar	195	2	1.02%
2nd Premolar	199	4	2%
1st Molar	188	26	13.80%
2nd Molar	195	26	13.30%

Frequency of pulp stones in each tooth type based on the gender:

Males: Maxillary 1st premolar was detected nil, 2nd premolar was found to be 5 (10.8%), 1st molar was 19(41.3%) and 2nd molar was 16 (34.8%)

Mandibular 1st premolar was found to be 2(4.4%), 2nd premolar was 1 (2.1%), 1st molar was 13 (29.5%) and 2nd molar was 11(23.9%).

Females: maxillary 1st premolar was found to be 4 (4.1%) , 2nd premolar was 9 (16.9%), 1st molar was 21(41.2%) , 2nd molar was 30 (57.7%).

Mandibular 1st premolar was detected to be nil, 2nd premolar was found to be 3 (5.7%), 1st molar was 13(29.5%) and 2nd molar was found to be 15 (30.6%). (TABLE 4)

Table 4

Location	*Male*	*Percentage*	*Female*	*Percentage*
MAXILLA				
1st PREMOLAR	0	0	4	4.1%
2nd PREMOLAR	5	10.8%	9	16.9%
1st MOLAR	19	41.3%	21	41.2%
2nd MOLAR	16	34.8%	30	57.7%
MANDIBLE				
1st PREMOLAR	2	4.4%	0	0
2nd PREMOLAR	1	2.1%	3	5.7%%
1st MOLAR	13	29.5%	13	29.5%
2nd MOLAR	11	23.9%	15	30.6%

Frequency of pulp stones based on the age group:

Group A (20-30 yrs) patients with pulp stones were found to be 45, Group B (31-40 yrs) patients with pulp stones were found to be 15, Group C (41-50 yrs) patients with pulp stones were found to be 6 and Group D (51-60 yrs) patients with pulp stones were found to be 3. Group B patients had the highest percentage prevalence of pulp stones (TABLE 5).

Table 5

Group	*Age Range (Years Old)*	*No. of Patients*	*No. of Patients With Pulp Stones*	*Percentage*
A	20-30	67	45	67.20%
B	31-40	19	15	78.90%
C	41-50	8	6	75.00%
D	51-60	4	3	75%

4. Discussion

Pulp stones or denticles, frequently are found in pulp tissue. As their name implies, they are discrete calcified masses that have calcium-phosphorous ratios comparable to that of dentin. They may be singular or multiple in any tooth and are found more frequently at the orifice of the pulp chamber or within the root canal[16]. They are usually detected in radiographic examination as radio-opaque masses.
The data of the present study were collected from the examination of panoramic radiographs who attended Saveetha dental college and hospital, Chennai. This study investigated pulp stones in adults between the age group of 20-60 years.

Review of the literature reveals a wide discrepancy in the prevalence of pulp stones in different populations. This difference results from the variation in sample and sample size in previous studies. In addition, the presentations of prevalence were also different in the literature. Some investigations presented the prevalence based on person and teeth number[6, 15], and the others reported only the prevalence based on teeth number[13,] . The incidence of pulp stones has been reported to be ranging from 8% to 95 % in the permanent dentition[6, 7, 9, 12, 13, 14, 15].

The results of the present study on a group of 100 patients in Chennai, visiting Saveetha dental college and hospital have

shown an overall patient prevalence of 70% and 10.4% for the number of teeth examined. This value is almost equal to the results of the study by Ranjitkar et al.[9] (10.3%) young Australian adults and less than the study by Baghdady et al.[13] (14.8%) among teenage Iraqi group and Hamasha et al. among Jordanians[16] (22.4%). These variations in prevalence between different populations may be due to ethnic variations and geographical differences. Sample size also contributes to marked differences in the resultant values.

A study Edds et al., pulp stones with cardiovascular disease, states that the highest number of pulp stones ,among all the examined groups were evident in cardiovascular patients. A pilot study of the correlation of pulp stones with cardiovascular disease denmonstrated that patients with cardiovascular disease have an increased incidence of pulp stones.

Rusell had investigated human pulp histologically on non-carious extracted teeth of seven patients suffering from diabetes for a long term duration. Calcifications in diabetics were frequent and often sickle shaped.

Another study by Bissada and Sharawy's on 21 human dental pulps of diabetics and 20 matched controls, no vascular changes groups were found in the dental pulp of both.

Dental pulp of patients who suffer from diabetes mellitus tend to age more readily because of its oblitrative endarteritis and because it has limited or no collateral blood circulation in fully developed teeth[17].

The present study is based on the gender, age group, number of teeth, tooth type. Overall incidence of pulp stones were found to 10.41%. Out of the total number of pulp stones 41.1% were detected in males and 58.9% were detected in females, which suggests that the highest incidence of pulp stones was in female patients. The highest percentage of pulp stones were detected in the maxillary 2nd molar which was 23.8% and the least was detected in mandibular 1st premolar of 1.02%. the highest number of pulp stones were detected in the population group B (31-40 years) which was 78.90%.

5. Conclusion

From our pilot study we were able to detect the incidence of pulp stones with an age and gender differentiation. This was in line with the already evident data in the literature. The shortcomings of the study where the limited sample size. We recommend carrying out large scale studies encompassing the systemic status of the individuals.

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