

Prevalence of pulp stones in IOPA radiographs

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ABSTRACT

The presence of calcifications or hard deposits within the pulp chamber of the teeth is referred to as pulp stones. There is a geographic and ethnic variation in the occurrence of these calcifications in the population. The article assessed the occurrence of pulp stones. As a secondary objective, the gender or age difference was also assessed. This study was carried out retrospectively by analyzing the archived dental radiographs. A total of 100 radiographs were taken for the analysis based on random sampling. The selected samples were scanned for the occurrence of pulp stones. From a total of 100 subjects, 15% had more than one pulp stone. This study revealed the prevalence of dental stones in the sample population was low. However, of the teeth examined, the mandibular arch had a higher incidence when compared to the maxillary arch. No significant correlation was found among gender or age. Further studies on a larger scale are required to find possible associations that would help determine clinical outcomes.

Key words: Innovative technology, Intra Oral Periapical Radiograph (IOPA, prevalence, pulp stones, radiographs

INTRODUCTION

Pulp stones are calcifications that can be located inside the pulp. The pulp stones may be discrete entities or may be present as a diffuse poorly defined stones. Both of these presentations may be free-floating or may be partially/completely embedded into the dentin. The pulp stones are classified as true and pseudo pulp stones. The true stones contain irregular dentin, whereas pseudo pulp stones are in fact degenerative pulp calcifications. This classification is not widely accepted and has led to a number of newer histological classifications.^[1] Pulp stones typically

consist of calcified tissue in compact degenerative masses or made up of denticles with a central empty cavity which may be filled with epithelial remnants which is in turn peripherally surrounded by odontoblasts.^[2] The exact reason for the occurrence of pulp stones is unknown, however, some predisposing factors have been identified. Although the exact etiology is not known, there are established predisposing factors.^[3] Other factors implicated in pulp stone formation are long-standing irritants which include dental caries, restorations, and chronic inflammation. Studies also show that pulp stones are an attempt at repair by the pulp in response to any irritant.^[3-5] Incidentally, there is an increase in the occurrence of these pulp stones with increasing age. Progression of a carious lesion stimulates inflammatory changes of the pulp, resulting in secondary or reparative dentin formation. The number of pulp stones is highly variable ranging from 1 to 12. There have been instances of more than 30 stones being reported from a single tooth. The size is also variable from microns to centimeter size. There is a greater tendency for pulp stones to occur in the coronal pulp rather than the radicular pulp.^[6]

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Females have also been reported to have a higher tendency of pulp stone occurrences in comparison to males with a prevalence of around 20%.^[7-9] Histological examinations, however, have noted higher prevalence rates.^[10] The occurrence of pulp stones is increased in patients with systemic or genetic diseases.^[11,12] Many studies exist that have reported associations between cardiovascular diseases with pulp stones, one radiographic examination, whereas another suggests that 74% of subjects with a known heart disease history reported detectable pulpal calcifications and 39% of subjects with no history of heart disease had pulp stones.^[13] However, till date, there is no literature which has conclusive evidence to support the above hypothetical role of systemic diseases.

Radiographic examination can be considered a reliable means in the identification of pulp stones. A number of studies have documented the prevalence of pulp stones among various populations. This study will help determine the prevalence and possible correlations. This study will shed light on the importance of radiographic examination and a possible connection to systemic diseases.

This study aims to retrospectively determine the prevalence of pulp stones in the Indian population.

METHODOLOGY

This study was carried out on archived dental radiographs. The Institutional Scientific Review Board had cleared the study with the number IHEC/SDC/OMFS/21/181. A total of 100 radiographs of patients from Saveetha Dental College were assessed. The inclusion criteria were adult patients who underwent root canal treatment. Radiographs of the patients were procured from Dental Information Archiving Software (DIAS). The collected digital radiographs were

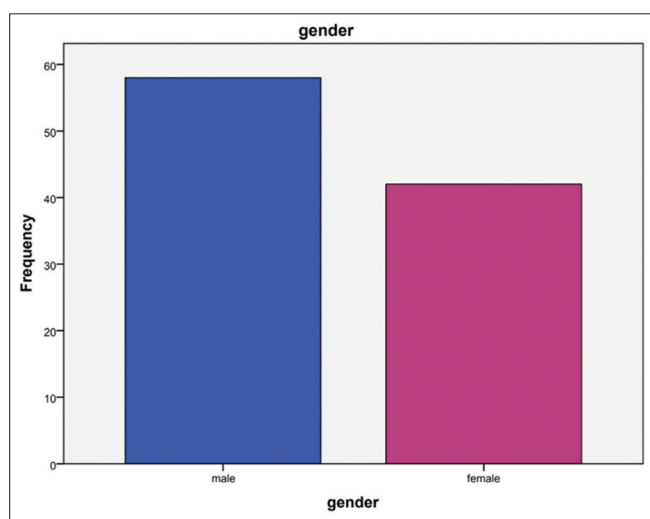


Figure 1: Bar graph showing the gender distribution of the sample for the study. The study sample consisted of 42% males and 58% females

viewed in the computer screen for the presence of pulp stones as evidenced by a calcification, in the pulp chamber or root canal system. Calcifications were identified by the presence of free or attached radiopacities in the pulp chamber. Gender, age, tooth number, and presence of pulp stones were recorded.

The data collected were entered in a spreadsheet and analyzed using SPSS 19, IBM Corporation, Chicago, IL, USA. The required statistical analysis was performed.

RESULTS

The total sample was 100 patients of the age group 10–70 years. In this study sample, 42% were males and 58% were females [Figures 1 and 2]. The sample had 45% maxillary teeth and 55% mandibular teeth. The prevalence of pulp stones according to the age groups were 10–20, 21–30, 31–40, 41–50, 51–60, and 61–70 was 13% \pm 1.2, 0.6% \pm 0.04, 31–40 \pm 28% \pm 2.5, 15% \pm 0.9, 0.3% \pm 0.004, and 0%, respectively. Females showed a prevalence rate of 23%, whereas males demonstrated 13%. On the basis of tooth number, the prevalence rate among maxillary anterior was 13%, mandibular anterior was 18%, maxillary posterior was 14%, and mandibular posterior was 15%. Patient's gender, age, and tooth number had no significant correlation in the present study [Figures 3 and 4].

DISCUSSION

Our institution has carried out several studies of high scientific caliber in the past and this was in line with those articles.^[14-24] The radiographic analysis of pulp stones is a noninvasive method.

It is only possible when the diameter of pulpal calcifications is more than 200 μ m.^[15] Hence, minute pulp stones would

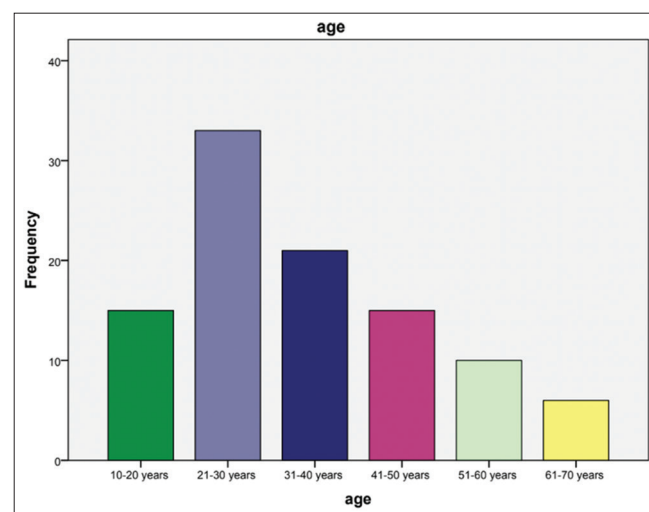


Figure 2: Bar graph showing the age distribution of the samples

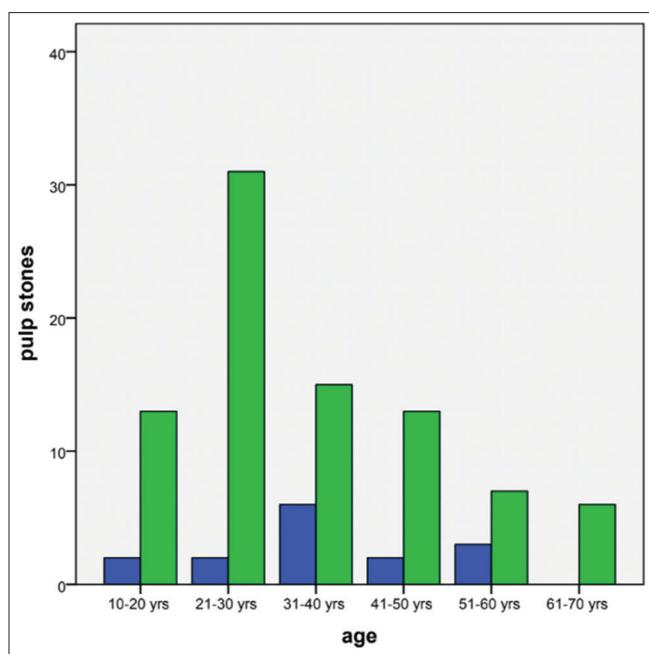


Figure 3: Graph representing age wise distribution

be left undetected through radiographic means.^[25,26] A number of studies used the paralleling technique to take the radiographs, and some employed periapical and bitewing radiographs,^[8,26] whereas some studies even used panoramic radiographs for determining the prevalence of pulp stones.^[27-29] There has been no single radiographic modality pointed out so far. In this study, bisecting angle technique was primarily used to take the radiographs of patients undergoing root canal treatment.

The age wise distribution of pulp stones is depicted in Figure 3. These findings were almost same with the results reported by Sisman *et al.* (15%)^[7] and Ranjitkar, who reported 10% of prevalence rates.^[1] The values of our study were lower than the values given by al-Hadi Hamasha *et al.* (22%),^[8] Baghdady *et al.* (19%),^[9] and Gulsahi *et al.* (21%).^[30] Some studies even reported lower prevalence rates. Nayak *et al.* reported 5% of pulp stones^[31] and Nayak *et al.* in a study, reported a 9.35% of prevalence of pulp stones.^[31] The results of this study are comparable to the previous literature.

Some studies have elucidated that pulp stone prevalence was more frequently seen in females when compared to males.^[1,30] Our study showed no significant associations with gender and pulp stone prevalence. Previous studies have reported the prevalence increases in frequency with age.^[1,30] Some studies have reported associations of pulp stones with specific age groups, where one reported that pulp stones were often seen in the 40–50 age band^[32] and least among the 12–14 age group. However, another study reported no significant associations with age and occurrence of pulp stones and age which was also shown in our study [Figure 3].

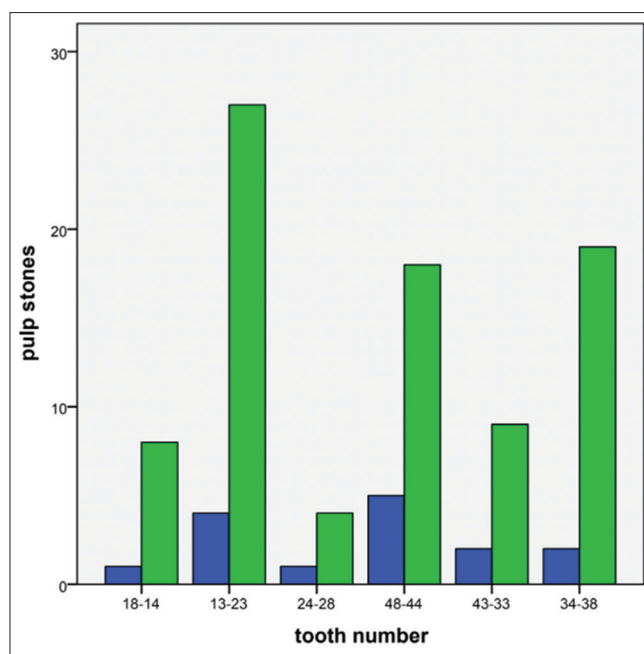


Figure 4: Bar Graph representing sextant wise distribution of pulp stones

Pulp stones are most frequent in the mandibular arch in the current study. This is in contrast to previous studies, where maxillary teeth showed a higher occurrence of pulp stones,^[32] there is no association between pulp stones and tooth number in our study Figure 4. In contrast, previous studies have determined significant occurrences between pulp stones and tooth number, with studies reporting higher occurrences in maxillary first and second molars. Some studies even reported a higher occurrence in molars than premolars. Many studies have suggested a correlation of dental pulp stone occurrence with systemic diseases. Some studies have reported a significant relationship between the development of pulp stones in patients with a history of diabetes mellitus and cardiovascular disease and some with renal diseases.^[33,34] As a limitation, we would like to state that the patient's medical history was not analyzed.

CONCLUSION

In this study, we observed a low prevalence of pulp stones. However, of the teeth examined, the mandibular arch had a higher incidence when compared to the maxillary arch. No significant correlation was found among gender or age. Further studies on a larger scale are required to effectively determine prevalence rates among Indian population, that would help determine clinical outcomes and possible correlations to underlying systemic diseases could likely make pulp stones a marker in the diagnosis of those conditions.

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Conflicts of interest

There are no conflicts of interest.

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