

# FREQUENCY AND ASSOCIATED FACTORS OF PULP STONES AMONG PATIENTS PRESENTING TO AYUB DENTAL TEACHING HOSPITAL ABBOTTABAD

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## ABSTRACT

**Objective:** To determine the frequency of pulp stones with the aid of radiographs in the selected population.

**Materials and Methods:** A retrospective study on dental radiographs i.e. orthopantomogram (OPG) from patients who had been advised OPG from January 2018 to December 2019 was conducted by two consultants at Ayub Dental Section. Out of the total 600 radiographs available, only 145 fulfilled the inclusion and exclusion criteria of the study. Descriptive statistics were given for the patient's age, gender, and tooth with pulp stones. Whiles associations were determined by chi-square test for gender and tooth type with pulp stones present. Where a significant value was considered  $p$  value  $\leq 0.05$ .

**Results:** Out of the total 145 cases selected, only 30.34% cases were identified as having pulp stones of which 43.18% were male and 56.81% were females. Pulp stones were significantly higher in the maxillary arch (36.36%) than the mandible (22.72%) and first molar than other molars. The most frequent individual tooth that presented with pulp stone was the maxillary first molar.

**Conclusion:** Pulp stones were higher in the maxillary arch than the mandibular arch and in females than males. Cardiovascular patients had a higher number of pulp stones than other groups.

**Keywords:** Pulp stone, Calcification, Prevalence, Radiographic assessment

## INTRODUCTION

One of the difficulties faced by endodontists during endodontic treatment is a calcified pulpal area. This calcification which can be pulp stones is often confined to the pulp chamber but can be seen in the pulp canal which can be free, attached, or embedded to the dentinal walls<sup>1</sup>. Kronfed classified pulp stones into; true stones which consist of irregular dentine and false that are degenerative pulp calcifications in

histology<sup>2</sup>. The size of these particles can range from microscopic to size, that it may occupy the whole pulp chamber<sup>3-5</sup>.

The etiology behind this anatomical structure formation is still not truly understood, but multiple factors have been associated with pulp stone formation in literature. These factors are genetic, age of patients, orthodontic movement of teeth, circulatory disturbance like trauma to the pulp, and irritants like caries and deep restorations<sup>6,7</sup>. The clinical implication of a structure like pulp stones is that during root canal treatment it obstructs the canal orifices which leads to difficulty during treatment. So for a clinician, it is important to have information of any

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such structure before treatment commences. Another implication of pulp stones is that conflicting research results exist on the relationship between pulp stones and other calcific disorders. As the recent study concluded that pulp stones have no association with all bladder stones but at the same time another study concluded that patients with pulp stones have a 5.78 times greater chance of having kidney stones<sup>7,8</sup>.

The prevalence of pulp stones, based on studies that used the radiographic examinations for screening, has presented results that range from 8% to 50%<sup>9-15</sup>. This broad range is because of the methodology of these studies. As some observed prevalence in the total number of teeth. While others inpatient and Orthopantomogram (OPG). Such as in 2018 a regional study at Kerala India examined dental patients on the basis of OPG radiograph criteria if their pulp chamber had calcifications (pulp stones). Results in this study showed prevalence to be 28.9% in their population<sup>14</sup>. Another regional study conducted in Iran presented the prevalence to be 9 % of the total teeth examined, to be present with pulp stones with no significant difference when it came to gender distribution<sup>15</sup>. To our knowledge, local literature is deficient on this topic at present. Hence the significance of this study will be the contribution to already deficient regional data. Also to provide valuable information on pulp stone presence, in the local population for an endodontist.

The aim of this study was to assess the frequency of pulp stones with the aid of radiographs in the selected population.

## MATERIALS AND METHODS

In this retrospective study, radiographs i.e. orthopantomogram (OPG) were examined by two consultants from the patient data at the department of radiology. This data was of patients who had been advised OPG from January 2018 to December 2019 at Ayub Dental Section. Approval was taken from the hospitals ethical committee beforehand to assess the patient's data. Inclusion for the selected cases was, OPGs of permanent dentition only, posterior teeth were present in all four quadrants (wisdom was not considered) while the patient had no systemic disorder. Exclusion criteria included OPG with bridges and crowns on posterior teeth or that had posterior teeth with endodontic treatment. Out of the total 600 radiographs available, only 145 fulfilled the inclusion

and exclusion criteria of the study. The radiographs were interpreted by two examiners using a standard viewing box and under restrained ambient light. Definite radiopaque structures noted inside the pulp chambers of the posterior teeth were identified as pulp stones and were scored as present or absent. The observation was not made to determine the details of the pulp stones, such as their number, size, and location in the pulp chamber. To make certain the correctness of the diagnosis, the teeth that were established by the two consultant examiners to have pulp stones were scored as being present.

Descriptive statistics were given for patient's age, gender and tooth with pulp stones. While associations were determined by chi-square test for gender and tooth type with pulp stones present. Were significant value was considered  $p$  value  $<0.05$ .

## RESULTS

In the present study not only the prevalence of pulp stones were determined in the selected population. Also the relationship of pulp stone prevalence with gender and arch of jaw was determined. Out of the total 145 cases selected, only 44(30.34%) cases were identified as having pulp stones by our examiners. (FIG 1)

In the total OPGs of patients who presented with pulp stones i.e 44, 43.18% were male and 56.81% were females. (Table2)

The most frequent individual tooth that presented with pulp stone was the maxillary first molar. While maxillary arch presented more with pulp stones as compared to Mandibular arch i.e 36.36% and 22.72% respectively. Where  $P$ -value was 0.031. The most frequent finding was the prevalence of and pulp stones in more than one tooth and first and second molars were both positive for pulp stones in such cases. Also regarding the prevalence of pulp stones, both arches maxillary and mandibular presented with pulp stones more frequently than either of the arches individually i.e. 18 (40.90%). (Table 2).

## DISCUSSION

The frequency of pulp stones among our selected cases of 145 was 30.40%. This figure is less than what Sharma et al<sup>16</sup> presented in Jammu and Sayam et al<sup>17</sup> presented from Jeddah. The reason could be the difference in our exclusion criteria. That is third molars were not considered in this study. While

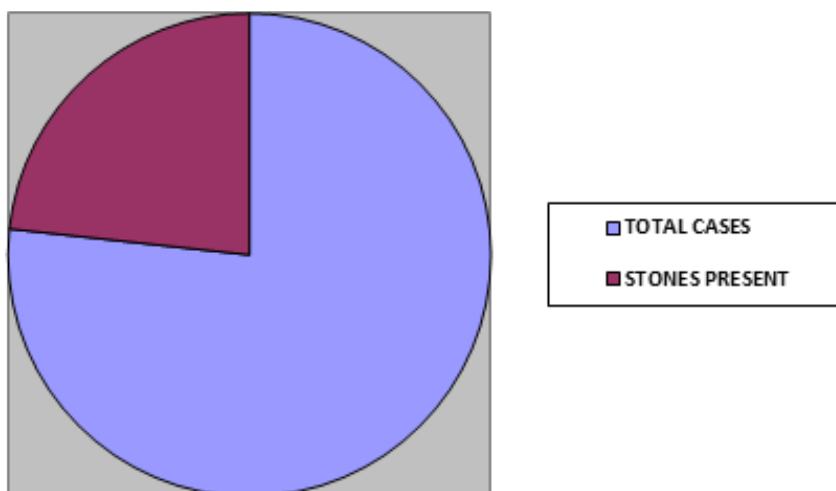


Fig 1: showing the source of information regarding COVID

Table 1: Distribution of teeth with pulp stones on OPG

ARCH/ TOOTH	Second pre-molar	First Molar	Both molars(1st & 2nd molars)	Total		Sig
				n	%	
Maxillary	1	9	6	44	16(36.36%)	0.031
Mandibular	0	3	7	44	10(22.72%)	
Both arches	0	2	16	44	18(40.90%)	
Total	1	14	29	101	44(30.34%)	

Note: No other teeth with pulp stones were identified.

Table 2: Distribution of presence of pulp stone according to gender

PULP STONES PRESENT				
GENDER	PRESENT	ABSENT	TOTAL	Sig
MALE	19 (43.18%)	44(43.56%)	63	0.309
FEMALE	25 (56.81%)	57(56.43%)	82	
TOTAL	44	101	145	

the argument to this would be that third molars are not a frequent finding anymore, frequently one or more third molar agenesis is now a more frequent finding in human jaws<sup>5</sup>. Still, a study by George et al<sup>18</sup> in 2018 shows the prevalence to be 28.9%. This study is a regional study i.e. from India. we could not identify any published data from Pakistan and Peshawar in specific.

Regarding gender distribution, this study showed females to have slightly more predilection to present with pulp stones in their dentition. But this difference was found to be statistically insignificant (p=0.309).

This finding concurs with that of Sharma et al<sup>16</sup>, Sayam et al<sup>17</sup>, George et al<sup>18</sup>, Lin et al<sup>19</sup> and Nemati et al<sup>20</sup>. But Sisman et al<sup>1</sup> found no difference in the Turkish population. This predilection towards female has not been explained with rationales in literature, except for a hypothesis that females are more inclined to bruxism hence a probability of calcifications. The most common tooth to present with a pulp stone was the first molar. The same finding which was presented in most of the literature<sup>18,20,21</sup>. An exception was a study by Sharma et al<sup>16</sup> at Jammu where the third molar was the more frequent with

pulp stones. The rationale for the first molar can be that it is the first permanent tooth to erupt and also has the largest surface area for occlusal contact. There was no anterior tooth to present with pulp stones in our study. This finding also concurs with literature<sup>17,21,22</sup>.

In the present study in regards to arch i.e. maxillary and mandibular, pulp stones were found more frequently in the maxillary arch. This association was found to be statistically significant as well ( $p=0.031$ ). Most of the literature<sup>21,22,23</sup> also shows the same result except for Al Hadi et al<sup>25</sup> in 1998, where they presented the mandibular arch with more frequency in pulp stones in the Jordanian population. In the present study not a single case of premolar with pulp stone was present from the mandibular arch. This is contrary to literature where although the frequency is less but premolars did present with stones. The reason could be the use of OPG (panoramic view) which can miss finer anatomical details especially in the anterior region of the jaw<sup>5</sup>.

Earlier studies have shown controversy regarding etiology of pulp stones. Some of these factors are age<sup>26</sup>, genetics, habit like bruxism<sup>27</sup>, long standing irritants, deep filling, and even periodontal disease<sup>25</sup>. Likewise there is also controversy in pulp stone association with systemic diseases. Like in some studies there has been shown association of kidney stones and gall bladder stones with pulp calcifications<sup>7,8</sup>. Same as for coronary diseases were Moura and Paiva<sup>28</sup> and another pilot study confirm a relation between pulp stones and atherosclerosis<sup>29</sup>. But this same point is contradicted by the study from Horley et al<sup>30</sup> where he found no clear correlation between pulp stones and carotid calcifications. Hence further research is still needed to bring this association to a conclusion.

Regarding the draw backs of this study firstly in methodology panoramic view was used to screen for pulpal calcifications. This is not a very accurate method but a convenient one. Bitwing radiograph is considered more accurate for this purpose while histological analysis is the most accurate<sup>25</sup>. In study design we assessed association of only two factors i.e. gender and arch. While literature, shows multiple factors to be associated like age and periodontal health as well<sup>26</sup>. Lastly we could not find published data specific to this region i.e. Pakistan, Abbottabad.

So comparisons could not be made with local data. Based on all the above points the significance of this study is obvious, but the improvements in study design have been put forth for future research on this topic.

## CONCLUSIONS

The frequency of pulp stone in the study population was the same as most regional data. Regarding associations, the female had more predilections towards pulp stones while the maxillary arch showed statistical significance when it came to prevalence of pulp stones in the arch.

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