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The prevalence of pulp stones and their correlations with patient demographics at a Private Dental Teaching Hospital in Peshawar.

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Abstract:

Objective: To assess the frequency of pulp stones utilizing periapical radiographs and analyze their relationship with the patient's demographics.

Material and method: A cross-sectional study was conducted using dental periapical radiographs from patients who had received periapical advice. Out of the 250 available radiographs, only 200 met the study's inclusion requirements. Descriptive statistics were provided for the patient's age, gender, and tooth with pulp stones. A significant value was defined as a p-value ≤0.05, and relationships between gender and tooth type with pulp stones were assessed using the chi-square test. Data was entered and analyzed using SPSS 26.

Results: Results showed that 60% of the participants were females, while 40% were male. 63.5% of the pulp stones were found in the maxillary arch. Pulp stones were more common on the right side of the mouth (64%), and most common in first molars (42%). Pulp stones were most common in individuals aged 35–48, and they were more frequent in women than men. 30% of the pulp stones were found in the root apex, and 70% were found in the canal orifice.

Conclusion: According to this study, pulp stones are highly prevalent among patients, and they are significantly correlated with age, gender, and dental arch. The significance of taking demographics into account while diagnosing and treating pulp stones is important for dental professionals in order to have successful treatments. Future research is needed to identify strategies for diagnosis, treatment, and prevention of pulp stones.

Keywords: Pulp stones, Frequency, Periapical radiographs, Radiographic evaluation.

Introduction:

The dental pulp contains calcified or mineralized objects called pulp stones, dispersed throughout the pulp's coronal and radicular regions.[1] Although frequently limited to the pulp chamber, this calcification can also be observed in the pulp canal, which may be embedded, free, or linked to the dentinal walls. These particles can range in size from tiny to the point where they fill the entire pulp chamber.[2] Although they are asymptomatic and can affect both young and old people, there is evidence that the appearance of PULP stones is enhanced with age.[3]

Although the exact cause of this anatomical structure's genesis is still unknown, some circumstances have been linked to the formation of pulp stones in literature.[4] These include genetics, patient age, periodontal disease, orthodontic tooth movement, damage to the pulp, irritants such as deep restorations and cavities, and a variety of systemic illnesses, the majority of which are metabolic. Pulp stones have also been linked to these factors.[5]

pulp stones have therapeutic implications in that they obstruct the canal orifices during root canal therapy, making treatment harder. So for a doctor, knowing information about any such structure is crucial before treatment begins.[6] According to some writers, these pulp stones can result in several issues, including idiopathic dental pain when they are linked to a nerve bundle, root canal therapy failure because of obstruction, and canal perforation from an improperly placed file passage.[7] According to earlier research, kidney stones, renal illness, diabetes, and cardiovascular disorders are all linked to the existence of pulp stones. Consequently, pulp stones can act as biomarkers for these kinds of illnesses.[8]

Considering the high occurrence of dental pulp mineralization little has been reported relating to their morphology, microscopic characteristics, and chemical composition. This may help shed light on potential processes that contribute to their development and, in turn, improve our comprehension of the etiological variables influencing them.[9]

Currently, there is a lack of local literature on this subject, as far as we are aware. The study's contribution to the already inadequate regional data will therefore be its relevance. For an endodontist, it will also yield important data regarding pulp stone prevalence in the community. The goal of this study was to evaluate the prevalence of pulp stones in the chosen population using periapical radiographs and identify any correlations between the conditions and the patient's demographic profile like age, gender, dental status, tooth type, dental arch, and right or left side.

MATERIALS AND METHODS:

A total of 250 patients' periapical radiographs were chosen randomly from the Sardar Begum Dental College's Radiology Department database. The hospital's ethics committee gave its approval before the patient's data could be analyzed. Using a normal viewing box and controlled ambient light, two examiners retrospectively reviewed these periapical radiographs to find pulp stones. The posterior teeth's pulp chambers contained distinct radiopaque objects that were recognized as pulp stones and graded as either present or absent.

The observation was not conducted to determine the features of the pulp stones, such as their quantity, size, and location in the pulp chamber. The patient did not have a systemic illness, and the maxillary and mandibular posterior teeth were present in all four quadrants (wisdom was not taken into account). Mandibular and maxillary posterior teeth with crowns, bridges, or endodontic therapy were excluded. Only 250 out of the 200 available radiographs met the study's inclusion requirements. The correlation between the occurrence of pulp stones and the patient's gender, age, tooth type, dental arch, right or left side, and dental health was examined using the Chi-square test.

RESULTS:

In the present study, we used periapical radiographs to observe the frequency of pulp stones in the selected population and determine whether there is an association between the occurrence of pulp stones and the patient's gender, age, tooth type, dental arch, right or left side, and dental status. 250 cases selected. Only 200 cases were identified as having pulp stones. Among the selected cases 40% (80) were males and 60% (120) were females. 63.5% (127) were in the maxillary arch and 36.5% (73) were in the mandibular arch.36% (72) of the pulp stones were in 1^{st} premolars, 13% (26) were among 2^{nd} premolars, 42% (84) were among 1^{st} molars and 23.5% were among 2^{nd} molars. In the right quadrant of both maxilla and mandible, 64% (128) of the pulp stones were noted and in the left maxilla and mandible, 34% (72) of pulp stones were noted. 30% (60) of pulp stones were found in the root apex, while 70% (140) were found in the canal orifice. The study found that patients between the ages of 35 to 48 had the highest prevalence of pulp stones.

Pulp stones were substantially more common in first molars than in second molars. These pulp stones were also found to involve the right side more than the left side and were

significantly more common in females than males. Table 1 shows the prevalence of pulp stones in different groups.

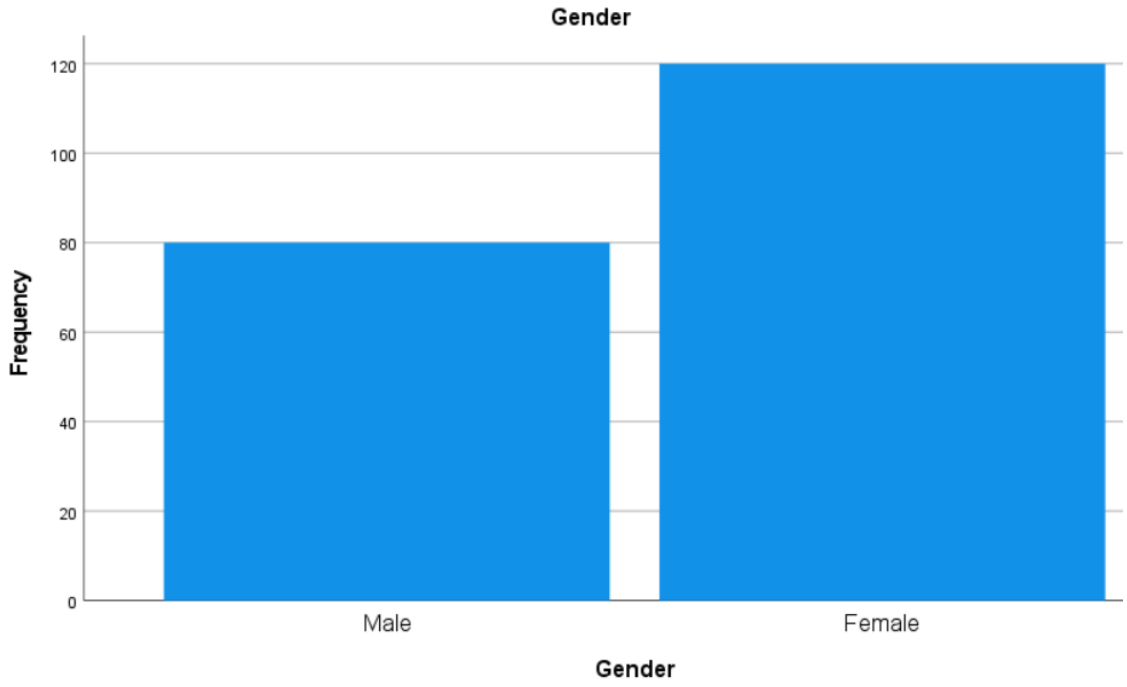
Table 1: Prevalence of pulp stones

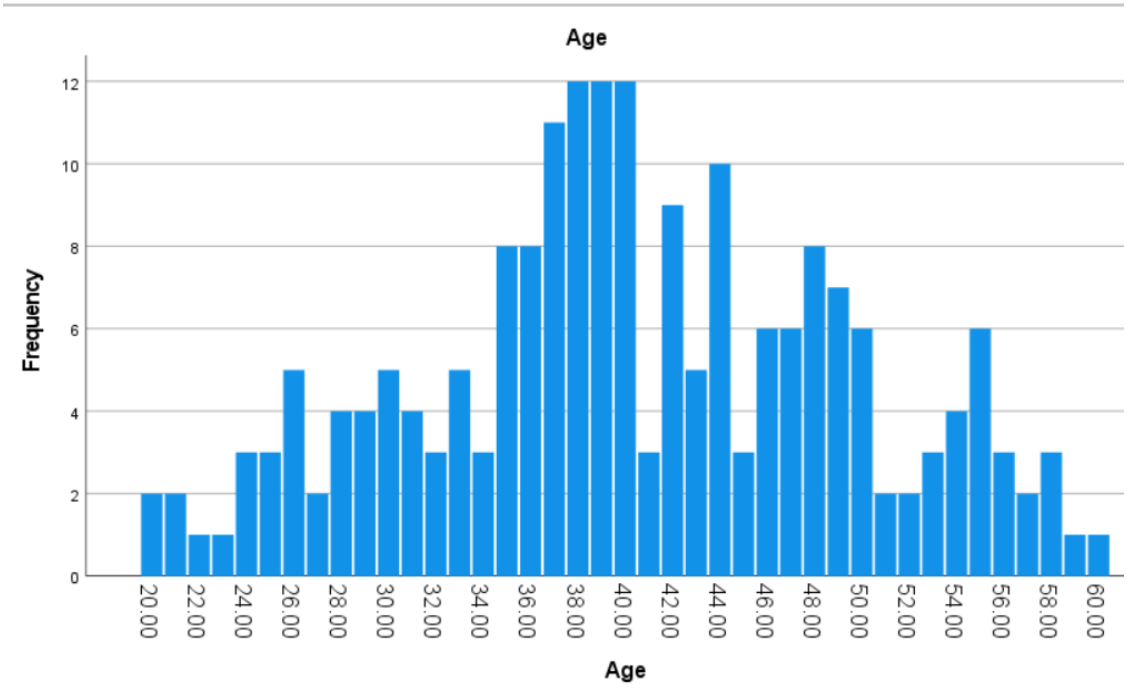
S.no	Gender	Total number	Arch		Quadrants		Premolars		Molars		Location
			Maxillary	Mandibular	Right	Left	1st	2nd	1st	2nd	Orifice
1	Male	80	50	30	51	29	18	7	32	23	60
2	Female	120	77	43	77	43	25	19	52	24	80
	Total	200	127	73	128	72	43	26	84	47	140

A chi-square test was performed to find the strength of association between different variables. The results showed that each value except gender, shows a highly significant association. While gender shows a significant association.

Table 2: chi-square test

Test Statistics:	Gender	Age	Arch	Quadrant	Premolars	Molars
Chi-square	8.000a	85.360b	13.520a	15.201c	4.629d	11.611e
df	1	40	1	1	1	1
Asymptomatic Significant	.005	<.001	<.001	<.001	<.001	<.001


Gender
120
100
80
60
40
20
0
Frequency
Male
Female
Gender


Age
Frequency
0
2
4
6
8
10
12
20.00
22.00
24.00
26.00
28.00
30.00
32.00
34.00
36.00
38.00
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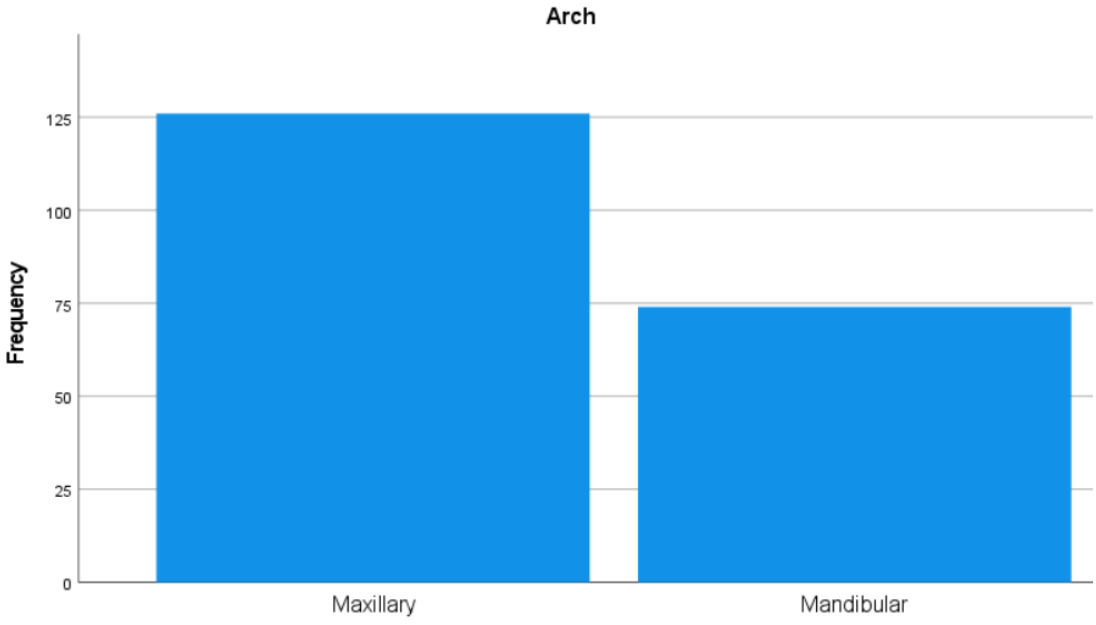
56.00
58.00
60.00
Age


Arch
Frequency
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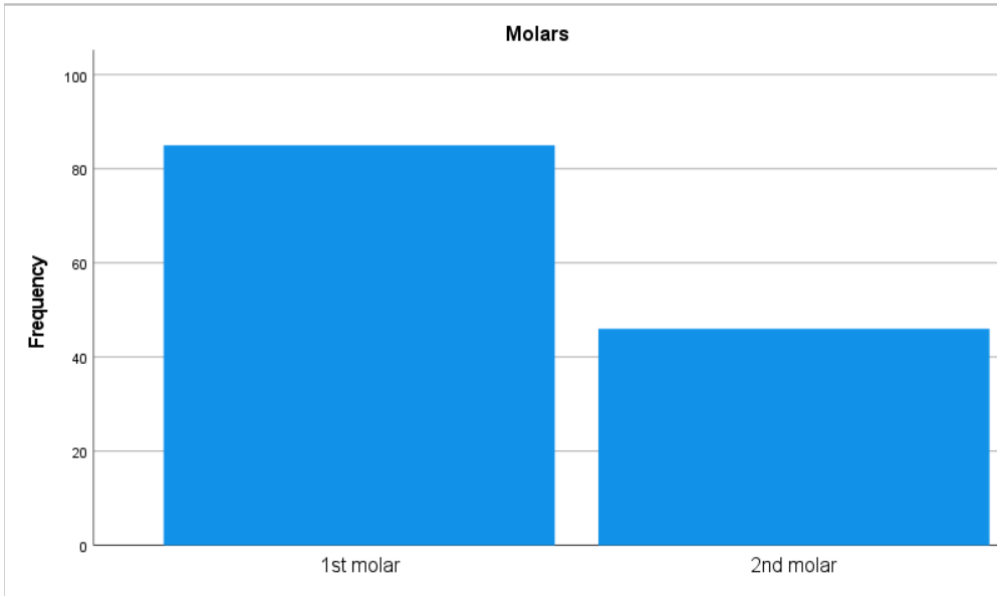
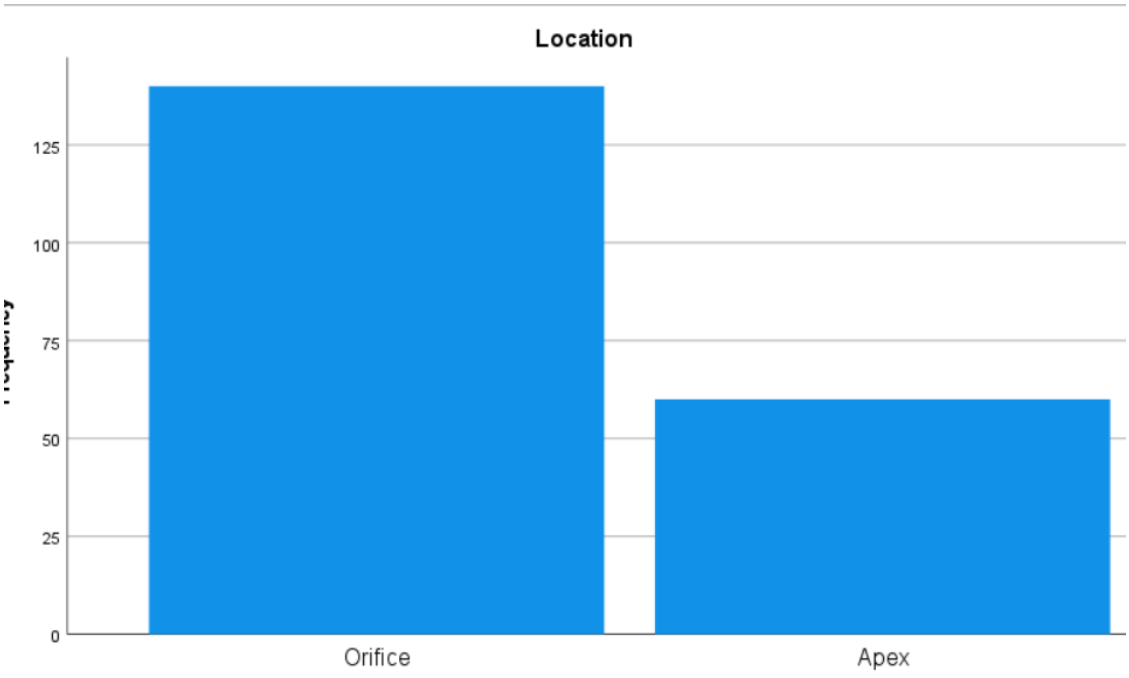
25
50
75
100
125
Maxillary
Mandibular





Discussion:

Pulp stones are the calcified entities found most commonly in the dental pulp of individuals with increasing age. These can cause blockage of pulp canals and cause problems while performing root canal treatment. The current study aimed to determine the prevalence of pulp

stones using periapical radiographs and to examine any potential associations between pulp stone occurrence and patient demographics, such as gender, age, tooth type, dental arch, and dental status. The prevalence of pulp stones was 80% (200) among the selected cases. This comes in contrast to the study done by Khan et all who reported 65% of pulp stones in selected cases, with the maximum number of pulp stones in patients with diabetes (1). Another study done in Saudi Arabia showed 50% prevalence (13).

The maximum number of pulp stones was reported for patients aged 37-40 years, which is similar to other related studies in which the age of participants reported with pulp stones was above years (1,3) but another study also reported maximum number of cases between 30-39 years (5). Among the selected cases 40% (80) were males and 60%(120) were females, showing more pulp stone prevalence among females which is also reported by another study (75% females) (2, 5, 11). In contrast, some studies also reported similar occurrences between both genders (4). 63.5% (127) of pulp stones were in the maxillary arch and 36.5% (73) were in the mandibular arch, which is also reported by another study showing multiple pulp stones in a single mandibular left molar (2). Similarly, multiple pulp stones are also reported by a study in mandibular posterior teeth during mixed dentition (10) But in contrast, another study done by Sezgin et al, reported a maximum number of pulp stones in maxillary molars ($p<0.05$) (5). Another study also reported maxillary teeth having maximum teeth (12).

36% (72) of the pulp stones were in 1st premolars, 13% (26) were among 2nd premolars, 42% (84) were among 1st molars and 23.5% were among 2nd molars. In the right quadrant of both maxilla and mandible, 64% (128) of the pulp stones were noted and in the left maxilla and mandible, 34% (72) of pulp stones were noted. In contrast, a study done in Iran reported a maximum prevalence (38.7%) of pulp stones in mandibular left central incisors and maxillary left second premolar having the least prevalence of 1.3% (11).

Pulp stones were substantially more common in first molars than in second molars, also reported by another study (12,13). These pulp stones were also found to involve the right side more than the left side and were significantly more common in females than males.

Conclusion:

The Dental Teaching Hospital's study on pulp stone prevalence and its relationships to patient demographics shows that pulp stones are common among patients and have a strong

correlation with specific demographic characteristics. In particular, the risk of developing pulp stones rises with age and differs for both sexes and certain dental arches. In clinical practice, these results highlight how crucial it is to take patient demographics into account while diagnosing and treating pulp stones.

It might help dentists anticipate difficulties during operations, especially endodontic treatments, to recognize these correlations. To improve patient care and preventive measures, more research on demographic and lifestyle factors may yield new information.

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