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Prevalence of Pulp Stones Among Patients with Renal Stones: A Cross-Sectional Study

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ABSTRACT

Objective: To determine the frequency of pulp stones in patients with renal stones

Materials and Methods: A total of 171 participants diagnosed with renal stones, both males and females within the age range of 30-65 years, residing in Pakistan, and possessing intact molars were included. Exclusion criteria comprised edentulous subjects, individuals with central nervous disorders, and those with restored or missing molars. Age and gender and pulp stones (on bitewing radiographic images) were recorded. Chi-square test was run to determine association of pulp stone with gender and age.

Results: The mean age was 48.91±6.91 years. Males were 84 (49.1%) while females were 87 (50.9%). Among the participants, 101 individuals (59.1%) were found to have pulp stones, while 70 individuals (40.9%) did not have pulp stones. The association of pulp stone with age was statistically significant.

Conclusion: Pulp stones are quite common in patients with renal stones. Gender does not show a significant association with pulp stones. However, age exhibits a significant distribution in relation to pulp stone prevalence, with certain age groups showing higher frequencies compared to others.

Keywords: Molar, Pulp Stone, Pulp Calcification, Renal Stone

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INTRODUCTION

Pulp stones are ectopic calcifications, commonly found in coronal pulp chamber in the teeth.[1, 2] The pooled prevalence of pulp stones has been reported to be higher in males (36.53%) compared to females (32.58%), with an overall prevalence of 49.73% in the studied population.[3] The prevalence of pulp stones, calcifications within the pulp chamber of teeth, varies significantly in radiographic examinations, with rates ranging from 8% to 90%.[4] These variations can be attributed to differences in study design, methodology, diagnostic criteria, and radiological procedures. Ethnic and geographic factors also play a role, as different populations and ethnic groups may exhibit varying prevalence rates due to genetic, dietary, oral hygiene, and environmental influences.[5, 6]

Pulpal calcifications can appear as individual calcified stones or scattered lesions within the tooth pulp. These calcifications can occur spontaneously within the pulp chamber or become attached or embedded in the dentin.[7] They exhibit variations in diamater and morphology. Generally, they are more commonly found in the coronal part of the pulp rather than the root portion, with a higher prevalence in maxillary teeth.[8] Furthermore, there is a higher occurrence of pulpal calcifications in females compared to males.[9] Although they are more frequently observed in older individuals, these calcifications can also occur in younger people.[10] Interestingly, they can manifest in teeth that are sound, carious, erupted, or even impacted.[11]

Various factors, including aging, biological, physical, and chemical variables, contribute to the development of pulp stones. Local factors such as oral trauma, caries, restorations, orthodontic therapy, periodontal disease, and systemic disorders like dentinogenesis imperfecta and heart and kidney diseases are considered potential risk factors.[12] Pulp stones mainly consist of calcium and phosphorus, with additional presence of fluoride, sodium, and magnesium. Similar to pulp stones, renal stones also contain calcium and are more commonly found in males. nephrolithiasis, or kidney stone formation, has been recognized as a risk factor for the development of pulpal calcifications.[13]

A study carried out in India examined the prevalence of coronal pulp stones in molar teeth and investigated their association with age and gender among a sample of 500 patients. The findings revealed an overall prevalence of 41.8%, with a higher prevalence observed in females.[7]

Investigating the prevalence of pulp stones and their correlation with gender and age in patients with renal stones is of utmost importance to enhance our comprehension of this dental anomaly and enhance diagnostic and treatment strategies in the field of endodontic care. This study aims to shed light on the connection between dental pulp stones and renal stones. Recognizing the challenges posed by dental pulp stones in endodontic treatment, along with understanding their prevalence and associated risk factors, will prompt clinicians to update their skills and knowledge in effectively managing cases involving pulp stones, particularly in patients with a history of renal stones.

The objective of this study was to determine the frequency of pulp stones in patients with renal stones. Based on this objective, the null hypothesis of the study was that there is no significant association between the presence of renal stones and the occurrence of pulp stones with respect to age and gender, while the alternate hypothesis stated that a significant association exists between renal stones and pulp stones, with variations observed across different age groups and genders.

MATERIALS AND METHODS

This cross-sectional descriptive study was conducted on 171 patients at the Department of Operative Dentistry and Endoodntics, Peshawar Dental College, and Nephrology Department of Prime Medical Hospital, located on Warsak Road, Peshawar, Pakistan. The research received approval from the Institutional Review Board. Prior to their participation, each subject received a detailed explanation and provided written informed consent. The study included subjects diagnosed with renal stones who were recruited from the outpatient department of Prime hospital, Peshawar. For participant selection, a non-probability consecutive sampling technique was employed, targeting males and females within the age range of 30-65 years, residing in Pakistan, and possessing intact molars (as observed on panoramic radiographs). Exclusion criteria comprised edentulous subjects, individuals with central nervous disorders, those with restored or missing molars, and those unable to provide informed consent. The sample size for this study was determined using the WHO sample size tool, considering

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a 95% confidence level and a 7.5% margin of error. The calculation took into account the previous prevalence of pulp stones, which was found to be 41.8%.[7]

The participants' age and gender were documented, and all the bitewing images were obtained within the operative department of Peshawar Dental College. Two observers were responsible for evaluating all the radiographs. The presence of distinct radiopaque foci within the tooth's pulp chamber was identified as pulp stones. Consensus between the two observers was required to confirm the presence of such radiographic characteristics as pulp stones. All the collected data were meticulously recorded using a specially designed proforma. Bias and confounders were controlled by adhering to inclusion/exclusion criteria and implementing stratification techniques.

Data analysis was conducted using SPSS version 24. Mean and standard deviation (SD) were calculated for age, while frequency and percentages were computed for gender and pulp stones. The association between pulp stones and gender, as well as age groups, was determined by applying the chi-square test. The level of significance was $p<0.05$.

RESULTS

The mean age was 48.91±6.91 years. The characteristics and distribution of the variables were examined and are presented in the table 1. The gender distribution of the participants revealed that 84 individuals (49.1%) were male, while 87 individuals (50.9%) were female. Among the participants, 42 individuals (24.56%) fell into the age group of 30-35 years. The age group of 36-40 years had 21 individuals (12.28%). For the age group of 41-45 years, there were 36 individuals (21.052%). In the age group of 46-50 years, 17 individuals (9.94%) were included. The age group of 51-55 years accounted for 20 individuals (11.69%). Among the participants, 15 individuals (8.77%) were in the age group of 56-60 years. Lastly, the age group of 61-65 years consisted of 20 individuals (11.69%).

Table 1: Gender and Age Distribution of The Study

Variable	Characteristics	n (%)
Gender	Male	84(49.1)
	Female	87(50.9)
Age group(years)	30-35	42(24.56)
	36-40	21(12.28)
	41-45	36(21.052)
	46-50	17(9.94)
	51-55	20(11.69)
	56-60	15(8.77)
	61-65	20(11.69)

Table 2 presents the frequency of pulp stones among the study participants. Among the participants, 101 individuals (59.1%) were found to have pulp stones, while 70 individuals (40.9%) did not have pulp stones.

Table 2: Frequency of Pulp Stones

Pulp stones	n(%)
Present	101(59.1)
Absent	70(40.9)

Table 3 displays the association between the presence of pulp stones and gender. Among the participants, 47 males (46.53%) were found to have pulp stones, while 54 females (53.46%) had pulp stones. On the other hand, 37 males (52.85%) were observed to be without pulp stones, while 33 females (47.14%) did not have pulp stones. The association was not statistically significant (p=0.416).

Table 3: Association of Pulp Stones With Gender

Pulp stones	Male	Female	P-value
Present	47(46.53)	54(53.46)	0.416
Absent	37(52.85)	33(47.14)	

Table 4 presents the association between the presence of pulp stones and different age groups. The association between pulp stones and the different age groups was found to be statistically significant ($p < 0.001$), indicating a strong association between age and the presence of pulp stones. Among the age groups examined, the most common occurrence of pulp stones was observed in individuals aged 41-45 years, where 24% had pulp stones. The least common occurrence was seen in individuals aged 36-40 years, with only 8.91% having pulp stones. Among individuals aged 30-35 years, 23 (22.77%) had

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pulp stones, while for the age group of 36-40 years, the number was 9 (8.91%). In the 41-45 years age group, 25 (24%) individuals had pulp stones, and similarly, 10 (9.9%) individuals in the 46-50 years age group were affected. Among individuals aged 51-55 years, the prevalence of pulp stones was 10 (9.9%), and the same number was observed in both the 56-60 years and 61-66 years age groups.

Table 4: Association of Pulp Stones With Age Groups

Age groups	Pulp stones present	Pulp stone absent	P-value
30-35 yrs	23(22.77)	19(27.14)	<0.001
36-40 yrs	9(8.91)	12(17.14)	
41-45 yrs	25(24)	11(15.71)	
46-50 yrs	10(9.9)	7(10)	
51-55 yrs	14(13.86)	6(8.57)	
56-60 yrs	10(9.9)	5(7.15)	
61-66 yrs	10(9.9)	10(14.28)	

DISCUSSION

The objective of this study was to investigate the prevalence of pulp stones in patients with nephrolithiasis. Our findings revealed a high frequency of pulp stones (59.1%) among individuals diagnosed with renal stones.

Previous studies have extensively examined pulp stones by analyzing histological sections or utilizing radiographic criteria. These dental abnormalities are commonly encountered as unexpected discoveries during dental radiographic examinations.[20] Stones found within the pulp are primarily associated with the natural aging of the human pulp. They appear to arise from the body's normal physiological processes that occur during aging.[21] We used bite wing radiograph for studying pulp stone in molar teeth. This small radiograph and has minimal radiations dose. The use of bitewing radiography is a valuable technique for identifying pulp calcifications due to its advantages of low radiation doses, affordability, and technical simplicity.[22] Periapical and posterior bitewing radiographs were predominantly utilized in the majority of research studies for the assessment and evaluation.[14, 15]

In our study, we observed the presence of pulp stones on bite wing radiographs to be 59.1% overall. In a case-control study conducted in Iran with 154 participants, it was observed that 86.30% of the participants with renal stones also had pulp stones. However, the association between pulp stones and renal stones was not found to be statistically significant (p=0.143).[1] However, it is important to note that the prevalence of pulp stones can vary considerably, ranging from 8% to 90%, which can be attributed to the nature of the study, the radiography technology employed, and other factors. The variation in sample size and composition across previous research studies may also contribute to this observed discrepancy.[15, 16]

The association between pulp stones and gender showed no statistical significance. In this case, as the p-value (0.416) is greater than the conventional threshold of 0.05, we do not have enough evidence to reject the null hypothesis. Therefore, we do not find a statistically significant association between pulp stones and gender in this study. A previous study in Iran also found no significant association of gender with distribution of pulp stone (p=01.4).[1] Similar results were found in Yemeni population.[17] Several studies have indicated a higher prevalence of pulp stones in females compared to males.[16, 18] The authors who reported this gender difference suggested that it could be attributed to the more prevalent occurrence of bruxism in women, which may result in long-term dental irritation and contribute to the formation of pulp stones.

The association between pulp stones and the different age groups was found to be statistically significant ($p < 0.001$). Existing research consistently supports the notion that the prevalence of pulp stones rises in correlation with advancing age.[4] Additionally, distinct age categories have been linked to differing frequencies of pulp stone occurrence. Specifically, a study identified a heightened prevalence of pulp stones among individuals aged 40-50[19], while the lowest prevalence was observed in the 12-14 age group. These findings underscore the substantial impact of age on the development and prevalence of pulp stones, with higher frequencies typically observed in older individuals and lower frequencies in younger age cohorts.[20]

Early detection of pulp stones is clinically relevant in endodontic practice, as their presence can complicate access cavity preparation, canal negotiation, and instrumentation, potentially increasing the risk of procedural errors. Timely radiographic identification

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allows clinicians to anticipate such challenges and modify treatment strategies accordingly.

This study has several notable limitations that should be acknowledged. Firstly, the examination of pulp stones was limited to molar teeth, which may not fully represent the prevalence or association with renal stones in other tooth types. Additionally, the absence of a control group hinders the establishment of a definitive association between pulp stones and renal stones. Moreover, the relatively small sample size of 171 participants, along with the fact that it was a hospital-based study, may limit the generalizability of the findings. These limitations highlight the need for further research with larger sample sizes and diverse populations to provide a more comprehensive understanding of the relationship between pulp stones and renal stones.

CONCLUSION

Within the limitations of this study, it can be concluded that pulp stones are quite common in patients with renal stones. Gender does not show a significant association with pulp stones. However, age exhibits a significant distribution in relation to pulp stone prevalence, with certain age groups showing higher frequencies compared to others.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

An ethical clearance letter was obtained from the Institutional Research Board of Prime Foundation Pakistan. IRB approval number: Prime/IRB/2021-374

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REFERENCES

1. Movahhedian N, Haghnegahdar A, Owji F. How the prevalence of pulp stone in a population predicts the risk for kidney stone. Iran Endod J. 2018;13(2):246.

2. Palatyńska-Ulatowska A, Fernandes MC, Pietrzycka K, Koprowicz A, Klimek L, Souza RA, et al. The pulp stones: Morphological analysis in scanning electron microscopy and spectroscopic chemical quantification. Med. 2021 Dec 21;58(1):5-11.

3. Jannati R, Afshari M, Moosazadeh M, Allahgholipour SZ, Eidy M, Hajihoseini M. Prevalence of pulp stones: a systematic review and meta-analysis. J EvidBased Med. 2019;12(2):133–9.

4. Ranjitkar S, Taylor JA, Townsend GC. A radiographic assessment of the prevalence of pulp stones in Australians. Aust Dent J. 2002;47(1):36–40.

5. Patil SR, Abd Ghani H, Almuhaiza M, Al-Zoubi IA, Anil KN, Misra N, et al. Prevalence of pulp stones in a Saudi Arabian subpopulation: a cone-beam computed tomography study. Saudi Endod J. 2018;8(2):93.

6. Hsieh CY, Wu YC, Su CC, Chung MP, Huang RY, Ting PY, et al. The prevalence and distribution of radiopaque, calcified pulp stones: a cone-beam computed tomography study in a northern Taiwanese population. J Dent Sci. 2018 Jun;13(2):138–44.

7. Bains SK, Bhatia A, Singh HP, Biswal SS, Kanth S, Nalla S. Prevalence of coronal pulp stones and its relation with systemic disorders in northern Indian central punjabi population. Int Scholar Res Notic. 2014;2014:1-7.

8. Kuzekanani M, Haghani J, J Walsh L, Estabragh M. Pulp stones, prevalence and distribution in an Iranian population. J Contemp Dent Pract. 2018;19(1):60–5.

DOI: 10.33897/fujd.v6i1.452

9. Ravanshad S, Khayat S, Freidonpour N. The prevalence of pulp stones in adult patients of Shiraz Dental School, a radiographic assessment. J Dent. 2015 Dec;16(4):356–61.

10. Gabardo MCL, Kublitski PM de O, Sette IR, Lauschner T, Juglair MM, Baratto-Filho F, et al. Sialometric and sialochemical analysis in individuals with pulp stones. Front Cell Dev Biol. 2020;8:403.

11. Gabardo MCL, Wambier LM, Rocha JS, Küchler EC, de Lara RM, Leonardi DP, et al. Association between pulp stones and kidney stones: a systematic review and meta-analysis. J Endod. 2019 Sep;45(9):1099-1105.e2-e9.

12. Milcent CPF, da Silva TG, Baika LM, Grassi MT, Carneiro E, Franco A, et al. Morphologic, structural, and chemical properties of pulp stones in extracted human teeth. J Endod. 2019;45(12):1504–12.

13. Gabardo MCL, Wambier LM, Rocha JS, Küchler EC, de Lara RM, Leonardi DP, et al. Association between pulp stones and kidney stones: a systematic review and meta-analysis. J Endod. 2019;45(9):1099-105.e2.

14. Nachiappan S, Chandran A, Swathika B, Ganesan S, Mahaprasad A, Muddebihal F, et al. Pulp stones: diagnostic significance in early diagnosis and radiographic correlation with ischemic heart diseases. Indian J Radiol Imag. 2021;31(02):277-83.

15. Kalaji MN, Habib AA, Alwessabi M. Radiographic assessment of the prevalence of pulpstones in a Yemeni population sample. Eur Endod J. 2017 Oct 10;2(1):1–6.

16. Çolak H, Çelebi AA, Hamidi MM, Bayraktar Y, Çolak T, Uzgur R. Assessment of the prevalence of pulp stones in a sample of Turkish Central Anatolian population. Sci World J. 2012; 2012:804278.

17. Kalaji MN, Habib AA, Alwessabi M. Radiographic assessment of the prevalence of pulp stones in a Yemeni population sample. Eur Endod J. 2017 Jul;2(1):1-6.

18. Kannan S, Kannepady SK, Muthu K, Jeevan MB, Thapasum A. Radiographic assessment of the prevalence of pulp stones in Malaysians. J Endod 2015; 41(3):333-37.

19. Mathew ST, Al-Mutlaq MA, Al-Eidan RF, Al-Khuraisi DM, Adam H. Prevalence of pulp stones and its relation with cardiovascular diseases and diabetes mellitus using digital radiographs: A retrospective study. Ann Dent Spec. 2019; 7:18–23.

20. Ravichandran S, Vadivel JK. Prevalence of pulp stones in IOPA radiographs. J Adv Pharm Technol Res. 2022;13(Suppl 1): S63-S6.