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Original Article

Prevalence of and relationship between pulp and renal stones: A radiographic study



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ABSTRACT

Aim: The aim of the present study was to determine the prevalence of and the relationship between pulp and renal in affected patients and in healthy adults.

Materials and methods: A total of 240 patients participated in the study. Group A consisted of 120 patients who had renal calculi and Group B had 120 randomly selected controls for the study. The periapical radiographs for all patients were evaluated for the presence or absence of the narrowing of dental pulp chambers and pulp canals. The radiographs were also evaluated to determine the presence or absence of pulp stones. The results were compared and analyzed using the Chi-square test ($p < 0.001$).

Results: A total of 164 patients had pulp narrowing and 112 patients had pulp stones, which included 55 controls and 57 renal calculi patients. There was no statistical correlation between pulp narrowing and renal stones ($p > 0.001$) and also between pulp stones and renal stones ($p > 0.001$).

Conclusion: However, there was no significant correlation between the presence of pulp stones and renal stones, and the incidental findings of pulp stones on periapical radiographs can provide useful information in the early diagnosis of the systemic calcifications.

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1. Introduction

Calcified structures located in the dental pulps of normal, diseased, and nonerupted teeth in both primary and permanent dentition are identified as pulp stones.¹ They may be positioned in the coronal or radicular segment of the pulp. Based on the locus, pulp stones can be categorized as embedded, adherent, and free type. The embedded stones are contrived in the pulp but get enclosed in-reach of the canal walls owing to the staking of physiological dentin and are customarily placed at the apical portion of the root.²

Odontoblasts and a calcified tissue simulating the dentin may be contemporaneous over the peripheral aspect of the pulp stones.³ The adherent pulp stones are minimally annexed to the dentin and they are not in the least completely immured by the dentin when correlated to embedded pulp stones. Both category of pulp stones may element eloquently occlude the canals and may be present at a curve which may baffle with the root canal treatment.⁴ Kronfeld and Boyle⁵ classified pulp stones histologically into “true” or “false” types. True pulp stones are much more aberrant in pattern and are lined by odontoblasts. They consist of dentin, whereas false pulp stones are composed of the mineralizing

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degenerating cells of the pulp tissue.^{3,6} A third type of pulp stones, 'diffuse' or 'amorphous' type, is also beamed in proximate confederation with the blood vessels.⁶

Pulp stones have been chronicled as the symptoms of the metamorphosis in the pulp tissue rather than their origin. The explicit pathophysiology of pulp calcification is not known; however, multiple elements such as degeneration of pulp tissue, aging factor, residual epithelium rests in the pulp tissue, operative maneuvers, flawed blood supply of the pulpal tissue, periodontal disorders, orthodontic treatment, long-standing carious lesion, deep fillings, or abrasion, genetic causes, and certain syndromes like the van der Woude syndrome have been put forward as etiological factors in the formation of pulp stones.^{6,7} It has also been observed that an irritated pulp, when endeavoring to overhaul itself, may lead to pulpal stone formation. The carious teeth of children and young adults were reported to have a 5 times higher incidence of calcifications of the pulp than in the teeth which are non-carious.⁶

The pulp calcifications noticeably ensue all through the dentition in patients with systemic or genetic conditions like dentin dysplasia and dentinogenesis imperfecta.⁴ The conditions like hypercalcaemia, gout, and renal calcifications that are noted secondary to the calcium metabolism have been observed as the pre-disposing factors for pulp stone formation. Pulpal calcification has been frequently ascertained in patients with end-stage renal disease (ESRD) and transplanted patients, and a positive correlation between the chronicity of the renal disease and the pulpal obliteration has been noticed in the premolar and molar teeth of such patients.⁸ Various studies have exhorted pulp stones to be a manifestation of systemic illnesses leading to pathological biomineralization in multifarious organs of the body,^{9,10} while a few authors have implied that complex biomechanical and physiologic alterations seen in systemic diseases do not alter the dentin and pulp and hence, no correlation exists between the pulpal calcifications and calcifications in other parts of the body.¹¹

The aim of the study was to determine the prevalence of pulp stones in patients with renal stones and healthy adults and to determine the relationship between the pulp stones and renal stones.

2. Materials and methods

The study included a total of 240 patients to determine the prevalence of pulp stones in patients with renal stones and to determine if any relationship exists between the pulp stones and renal stones. All the patients were divided into 2 groups. Group A consisted of 120 randomly selected renal calculi patients from the Nephrology Department and Group B had 120 randomly selected controls from the patients visiting the outpatient department of College of dentistry for the study. Ethical clearance was obtained from the Institutional Ethical Committee. A detailed medical and dental history of all the patients was recorded. Patients with any history of cardiovascular diseases, gout, gall stones, or any other systemic diseases were excluded from the study. Patients with any attrition or abrasion, presence of radiographically observable periodontal diseases, and presence of Class V restorations were also

excluded from the study. A total of 3452 conventional periapical radiographs (6939 of posterior and anterior teeth) from 240 patients were evaluated for the presence of pulp stones. The radiographs with poor angulations, improper exposures, or faulty processing, which could lead to scoring difficulties and the radiographs with carious and restored teeth were excluded from the study. The periapical radiographs for all patients were evaluated for the presence or absence of the narrowing of dental pulp chambers and pulp canals. Narrowing was defined as a notable reduction in the size of the pulp chamber and the pulp canals. All the radiographs were interpreted by two examiners (oral radiologists) in a dark room by using a standard viewing box under the 2× magnification and with the peripheral light being blocked out, to ensure the accuracy of the diagnosis. Narrowing was defined as a notable reduction in the size of the pulp chamber and the pulp canals. The definite radiopaque masses inside the pulp chambers were identified as pulp stones and scored as present or absent. The data were entered using statistical software SPSS version 20.00 (SPSS Inc., Chicago, USA) and analyzed using the Chi-square test. Statistical significance was set at 5% level of significance ($p < 0.05$).

3. Results

Out of 3452 periapical radiographs, a total of 6939 teeth from 240 patients were evaluated in the study. The mean age of the patients was 33.9 ± 10.6 years for Group A and 34.8 ± 11.2 years for Group B. There were 68 (56.67%) males and 52 (43.33%) females in Group A and 63 (52.5%) males and 57 (47.5%) females in Group B. 75 (62.50%) of renal calculi patients and 88 (73.33%) of controls had pulp narrowing (Table 1). There was no statistical association between pulp narrowing and renal stones (Chi-square = 3.2322, $p = 0.0728$). 112 patients in total had pulp stones, which included 55 (45.48%) of controls and 57 (47.50%) of renal calculi patients (Table 2). There was no statistically significant association between the presence of pulp stones and renal stones (Chi-square = 0.0673, $p = 0.7962$).

4. Discussion

Pulp stones are calcifications established in the pulp chamber or pulp canals of deciduous and permanent dentition. They are usually found on dental radiographs accidentally and the

Table 1 – Distribution of patients with and without pulp narrowing.

	Absence of pulp narrowing (%)	Pulp narrowing (%)	Total (%)
Controls	32 (26.67)	88 (73.33)	120 (100)
Renal calculi patients	45 (37.5)	75 (62.5)	120 (100)
Total	77 (32.08)	163 (67.92)	240 (100)

Chi-square = 3.2322, $p = 0.0728$ ($p > 0.05$).
 $p > 0.001$ (non-significant).

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