

Comparative Evaluation of Pulp Stone Prevalence among Hypertensive, Diabetic and Healthy Individuals

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Abstract

Introduction: Pulp stones are calcified bodies that form within the dental pulp chamber and are commonly picked up incidentally on routine radiography such as orthopantomograms. While their exact cause is not fully understood, a combination of local and systemic influences has been proposed, and vascular, metabolic and chronic inflammatory disturbances seen in certain systemic diseases have been suggested to promote pulp mineralization.

Aim: To determine how frequently pulp stones occur in hypertensive and diabetic patients in comparison with systemically healthy individuals.

Materials and Methods: Digital panoramic radio graphs of 75 adults aged 30-60 years were reviewed, comprising 25 confirmed hypertensives, 25 confirmed diabetics and 25 systemically healthy controls, and each film was examined for the presence or absence of pulp stones.

Results: Pulp stones were identified in 22 of the 25 hypertensive patients and 22 of the 25 diabetic patients, compared with only 3 of the 25 healthy controls, giving an overall detection rate of 47 of 75 patients (62.7%) across the study population.

Conclusion: Pulp stones occurred markedly more often in patients with hypertension or diabetes than in healthy individuals, with a distribution pattern in maxillary teeth, first molars, and bilateral involvement in hypertensives. This association suggests that pulp stones detected on routine panoramic radiographs may serve as a simple, non-invasive disjunctive marker prompting further medical evaluation for chronic microvascular disease, although age-matched prospective studies are required before a causal relationship can be confirmed.

Keywords: Pulp Stones, Pulpal Calcification, Hypertension, Diabetes Mellitus, Panoramic Radiograph, Microvascular Disease

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1. INTRODUCTION

Pulp stones, also referred to as denticles, are discrete calcified masses that develop within the coronal or radicular pulp and are among the most frequently encountered incidental findings on routine dental radiographs, including orthopantomograms taken for unrelated reasons. Despite being a common observation, the precise mechanism underlying their formation has not been fully established and current evidence points to a combination of local factors within the pulp and broader systemic influences acting together. A growing body of literature has drawn attention to the possibility that pulp stones are not purely a local dental phenomenon but may instead reflect wider physiological changes taking place elsewhere in the body. Alterations in pulpal microcirculation, metabolic derangements, and chronic low-grade inflammation, all features of several common

systemic conditions, have been proposed as contributors to pulpal mineralisation. On this basis, pulp stones have been increasingly considered as a potential radiographic clue to underlying systemic health status rather than an isolated, clinically inconsequential curiosity.



PULP STONES AND SYSTEMIC DISEASE ASSOCIATIONS

Pulp Stones in Hypertension

Hypertensive arteriolosclerosis is a systemic vascular process that affects the microcirculation of multiple end organs, and

the dental pulp is no exception. Sustained elevation in blood pressure produces arteriolar wall stress and intimal thickening, which in turn predisposes to microvascular calcification and sclerosis within pulpal vessels. The resulting impairment of pulp perfusion is thought to stimulate reparative or reactive mineralisation within the pulp. Vascular calcification affecting both the medial and intimal layers is well documented in chronic hypertension, and comparative studies have reported both a higher occurrence of pulp stones and a greater number of affected teeth in hypertensive individuals relative to normotensive controls

Pulp Stones in Diabetes Mellitus

A parallel mechanism has been proposed for diabetes mellitus. Chronic hyperglycaemia leads to microangiopathic change and thickening of the vascular basement membrane, changes that mirror those seen in the retinal and renal microvasculature and that also extend to the vasculature supplying the dental pulp. The resulting reduction in pulpal blood flow and consequent hypoxia, together with collagen glycation, favor dystrophic calcification within the pulp. Advanced glycation end-products generated during sustained hyperglycaemia further promote connective tissue calcification. Several comparative radiographic studies have reported a higher prevalence of pulp stones in diabetic patients compared with systemically healthy controls.

Aim and Objectives

The aim of the present study was to evaluate the prevalence of pulp stones in individuals with a systemic disease and to compare this with prevalence in systemically healthy controls. The specific objectives were, first, to assess the presence or absence of pulp stones radiographically in each of the three study groups; second, to compare pulp stone occurrence between the hypertensive group and the control group; and third, to compare pulp stone occurrence between the diabetic group and the control group.

5. MATERIALS AND METHODS

Digital panoramic radiographs were examined for the presence of pulp stones in the permanent dentition of patients allocated to one of three groups: hypertensive, diabetic, and systemically healthy controls.

Inclusion Criteria

Patients of either gender aged between 30 and 60 years were eligible for inclusion. Participants in the disease groups required a confirmed diagnosis of hypertension or diabetes mellitus as appropriate, while participants in the control group were required

to be systemically healthy. All included patients were willing to undergo a panoramic radiographic examination.

Exclusion Criteria

Patients unwilling to undergo a panoramic radiograph were excluded, as were patients presenting with systemic diseases other than hypertension or diabetes mellitus.

6. RESULTS

A total of 75 patients were included in the study, comprising 25 hypertensive patients, 25 diabetic patients, and 25 systemically healthy controls. Pulp stones were present on panoramic radiographs in 22 of the 25 hypertensive patients and in 22 of the 25 diabetic patients, whereas only 3 of the 25 healthy controls showed radiographic evidence of pulp stones. Across the entire sample, pulp stones were detected in 47 of the 75 patients examined, with the remaining 28 patients showing no radiographic evidence of pulpal calcification. Additional radiographic parameters recorded included the unilateral or bilateral distribution of pulp stones, their distribution according to tooth number, and their distribution between the maxillary and mandibular arches, all of which showed patterns favoring the hypertensive and diabetic groups over the controls.

Table 1: Pulpstones Present/ Absent

GROUP	PULPS TONES PRESE NT	PULPS TONES ABSEN T	TO TA L
HYPERT ENSIVE	22	3	25
DIABETI C	22	3	25
CONTRO LS	3	22	25

Graph 1: Unilateral/Bilateral Pulpstones. Above Graph shows unilateral pulpstone prevalence in both hypertensive & diabetic patients when compared with Bilateral pulpstones

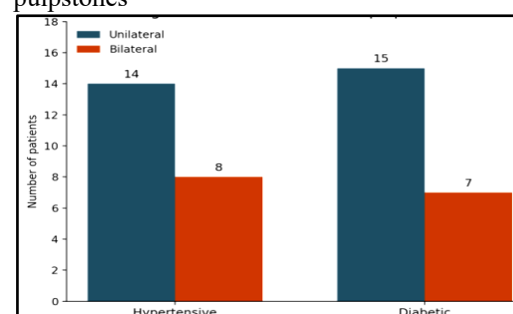
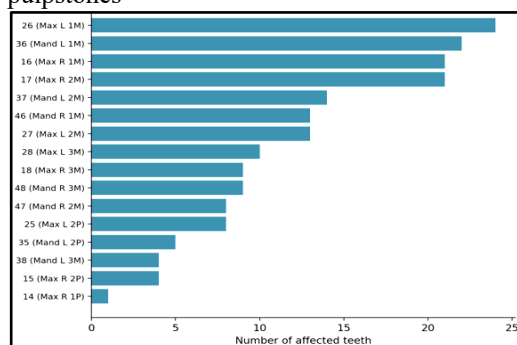
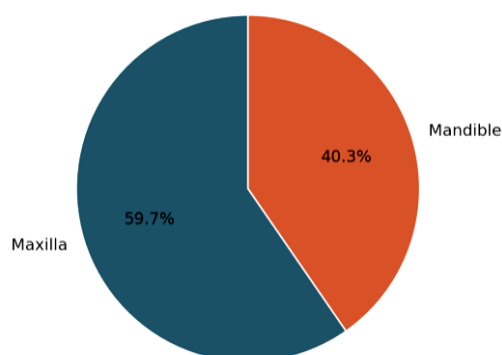


Table 2: Distribution of Pulpstones According To Tooth Number. The Above Table shows maxillary molars shows higher prevalence of pulpstones followed by mandibular molars, &

anterior teeth shows least prevalence of pulpstones



Graph 2: Arch Distribution of Pulp Stones. The Above Pie Diagram shows Maxilla have the more prevalence of pulpstones than mandible



6. DISCUSSION

The present study included 75 participants, divided into three groups: 25 patients with diabetes mellitus, 25 patients with hypertension, and 25 healthy controls. In both the diabetes and hypertension groups, 22 out of 25 participants (88%) showed pulp stones, whereas in the healthy control group, 22 out of 25 participants (88%) did not show pulp stones. This indicates a clear difference in the occurrence of pulp stones between individuals with systemic diseases and healthy individuals. The findings of your study are in agreement with the main article by Beytaş Alğan et al. (2025), which demonstrated a significant association between systemic diseases and the presence of pulp stones. In their study, pulp stones were found in 60% of individuals with systemic diseases, compared with 39.15% of healthy individuals, and this difference was statistically significant ($p < 0.001$). The increased occurrence of pulp stones in patients with diabetes mellitus and hypertension may be related to changes in the blood supply and metabolic environment of the dental pulp. The article explains that systemic diseases such as diabetes and cardiovascular disorders can affect pulpal microcirculation. Reduced blood flow may cause localized tissue damage and cell death, followed by dystrophic calcification, resulting in the formation of pulp

stones. In diabetes mellitus, vascular changes, impaired circulation and increased inflammatory responses may contribute to degenerative changes within the pulp. The article specifically reports that diabetic individuals had a higher prevalence of pulp stones, with pulp stones present in 60.5% of diabetic individuals compared with 45.8% of individuals without diabetes ($p < 0.001$). Therefore, the high prevalence observed in your diabetic group (88%) supports the possibility of an association between diabetes and pulp calcification. Similarly, hypertension and cardiovascular conditions may influence pulp stone formation through alterations in the vascular supply of the pulp. The article discusses the possibility that systemic vascular pathology can impair pulpal microcirculation and promote calcification. It also reported a significant relationship between cardiovascular disease and pulp stones. Thus, the high prevalence of pulp stones in your hypertensive group (88%) may be related to vascular changes associated with hypertension. Another important factor is age. The main article found that pulp stone prevalence increased significantly with advancing age ($p < 0.001$). This may be associated with prolonged exposure of the pulp to irritants such as caries, restorations and trauma, together with secondary and tertiary dentin formation and age-related impairment of pulpal microcirculation. Therefore, age should ideally be considered when interpreting the results of your study, particularly if the diabetes and hypertension groups are older than the control group. The present findings are also consistent with earlier studies cited in the article. Nayak et al. reported that among systemic diseases, cardiovascular disease and diabetes were associated with increased pulp stone prevalence. Other studies have similarly reported associations between pulp stones and **diabetes, cardiovascular disease and other systemic disorders.**

CONCLUSION

Pulp stones were identified in 88% of the hypertensive and diabetic patients combined, compared with only 12% of healthy controls, an association considerably larger than the background variation in pulp stone prevalence reported for the general population. The maxillary arch, the first molars, and, specifically among hypertensive patients, bilateral involvement were disproportionately affected, suggesting an identifiable and biologically coherent pattern of distribution rather than a random one. Because the disease and control groups differed appreciably in age, these findings should be interpreted as a strong

association rather than definitive proof of a causal, disease-specific effect, and age-matched prospective studies are needed to confirm the relationship. With this pulp stones may add a simple, non-invasive radiographic marker to the broader clinical assessment of patients at risk of chronic microvascular disease.

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