

Original Research

Assessment of pulpal changes in periodontitis patients: An observational study

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ABSTRACT:

Background: Dental pulp communicates with the periodontium through apical, lateral, or accessory canals. There is general consensus that pulpal disease can initiate or perpetuate periodontal disease through the apical foramen. Hence: the present study was undertaken for assessing the pulpal changes in periodontitis patients. **Materials & methods:** A total of 100 freshly extracted human teeth were included in the present study. Only those teeth were included which extracted due to presence of severe chronic periodontitis. Immediately after carrying out extraction procedures, teeth were cleaned with normal saline followed by sectioning from 2 to 3 mm of apical portion of the roots. After sectioning, storing of the specimens was done in ten percent formalin solution for 10 days. After complete fixation of pulp tissue, decalcification of the specimens was done in six percent nitric acid. After completion of decalcification, embedding of the specimens was done in paraffin wax followed by longitudinal sectioning in a microtome for producing a 5 µm thickness. All the sections were stained under H and E and were analyzed under microscope for assessing the pulpal changes. **Results:** Mild pulpal inflammation was present in 25 patients while moderate to heavy inflammation was present in 75 patients. Fibrosis of the pulp tissue was seen in 44 patients as it was absent in 56 patients. In the present study, pulp calcification was seen in 39 percent of the patients while it was absent in remaining 61 percent of the patients. Pulp necrosis was found to be present in 80 percent of the patients. This necrosis was either complete or partial. **Conclusion:** Degenerative changes of the pulp tissue are commonly associated with periodontal pathologies. However; further studies are recommended.

Key words: Periodontitis, Pulpal changes

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INTRODUCTION

Dental pulp communicates with the periodontium through apical, lateral, or accessory canals. Studies in human beings and in experimental animal models have shown that pulpal pathosis can cause varying degrees of periodontal changes. Following successful root canal therapy, pathologic changes of endodontic origin usually disappear, and the periodontium returns to normal. However, the interrelationship of periodontal disease and pulpal pathosis is controversial, with several opposing and apparently irreconcilable lines of evidence being supported in the literature.¹⁻³

There is general consensus that pulpal disease can initiate or perpetuate periodontal disease through the apical foramen. However, periodontal disease causing pulpal

disease remains a topic of debate. It has been suggested in the past that since inflammation follows venous drainage and venous blood flows outward from pulp into periodontium, periodontal disease cannot affect pulp. However, later studies demonstrated that teeth affected with chronic periodontitis showed pathologic changes in pulp in the form of inflammatory alterations, localized necrosis, calcification, root resorption and deposition of secondary dentin.^{4, 5} The histological changes in the pulp tissue of periodontally involved teeth can vary from normal to necrotic. The reasons for such a melange in their respective findings may include lack of uniform documentation of case histories, lack of definitive criteria for selection of cases and their descriptive histological

observations.⁶⁻⁸ Hence: the present study was undertaken for assessing the pulpal changes in periodontitis patients.

MATERIALS & METHODS

The present study was conducted with the aim of assessing the pulpal changes in periodontitis patients. A total of 100 freshly extracted human teeth were included in the present study. Only those teeth were included which extracted due to presence of severe chronic periodontitis. Complete demographic data of all the patients was obtained. Based on the criteria described previously in the literature, diagnosis of periodontitis was verified in the patients from whom extracted teeth were obtained. Immediately after carrying out extraction procedures, teeth were cleaned with normal saline followed by sectioning from 2 to 3 mm of apical portion of the roots. After sectioning, storing of the specimens was done in ten percent formalin solution for 10 days. After complete fixation of pulp tissue, decalcification of the specimens was done in six percent nitric acid. After completion of decalcification, embedding of the specimens was done in paraffin wax followed by longitudinal sectioning in a microtome for producing a 5 µm thickness. All the sections were stained under H and E and were analyzed under microscope for assessing the pulpal changes. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

In the present study, a total of 100 tooth specimens were analyzed. On examination, it was seen that mild pulpal inflammation was present in 25 patients while moderate to heavy inflammation was present in 75 patients. Fibrosis of the pulp tissue was seen in 44 patients was it was absent in 56 patients. In the present study, pulp

calcification was seen in 39 percent of the patients while it was absent in remaining 61 percent of the patients. Pulp necrosis was found to be present in 80 percent of the patients. This necrosis was either complete or partial.

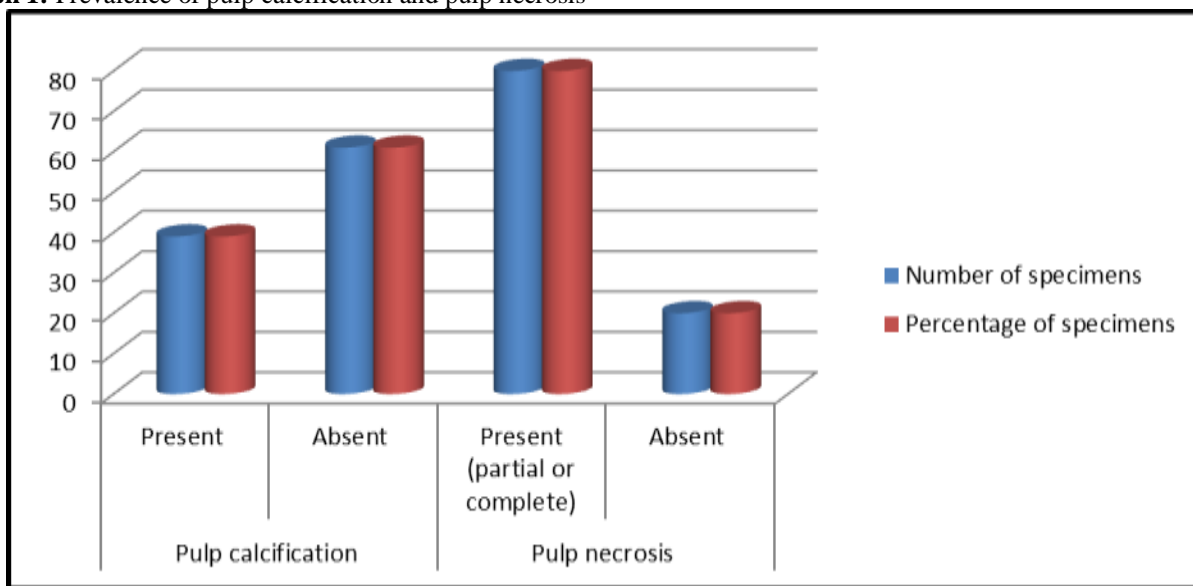
Table 1: Pulpal changes in periodontitis patients

Parameter		Number of specimens	Percentage of specimens
Inflammation	Mild	25	25
	Moderate to heavy	75	75
Fibrosis	Present	44	44
	Absent	56	56

DISCUSSION

Periodontitis is a bacterial infection that affects the marginal periodontium. It results in inflammatory events that progressively alter the support and anchorage mechanisms in the alveolar socket of the tooth through irreversible exchanges of physiological substrates and that gradually deteriorate if not treated. Currently, it is also considered as the main reason for tooth loss. The relationship between the pulp of a tooth and its surrounding periodontium is indisputable. A healthy periodontal tissue feeds and supports the dental roots. According to some studies, pulpal lesions only occur when periodontitis affects the dental apex. However, other authors state that pulpal lesions may occur even though the inflammatory periodontal process does not affect the apical periodontium. Periodontal disease may cause pulpal damage; as a result, several teeth can be expected to lose their vitality by periodontitis.⁹⁻¹¹ Hence: the present study was undertaken for assessing the pulpal changes in periodontitis patients.

Graph 1: Prevalence of pulp calcification and pulp necrosis



In the present study, a total of 100 tooth specimens were analyzed. On examination, it was seen that mild pulpal inflammation was present in 25 patients while moderate to heavy inflammation was present in 75 patients. Fibrosis of the pulp tissue was seen in 44 patients while it was absent in 56 patients. The concept of "retrograde pulpitis" was instigated in 1963 by Seltzer and others. Periodontal lesion routinely produced atrophic and degenerative changes in the pulp of involved teeth due to interference of nutritional supply. Many pulp stones in several human cases of periodontal disease were found by Grajewska. Nemeč et al. showed that findings related to periodontally affected teeth included acute and chronic pulpitis, vascular congestion and pulp necrosis.⁸⁻¹¹ Rubach WC and Mitchell DF observed that denticles were most common in the coronal pulp, and took a variety of forms, from diffuse to concentric laminated bodies. Serial sections revealed that many of the structures appearing as free pulp stones were actually projections of primary or, more often, secondary dentine from the internal pulpal wall, sectioned in such a plane as to make them appear as free denticles. The presence of surrounding odontoblasts indicated that such structures were dentine.¹² The dental pulp may also respond to irritation with a range of degenerative changes including fibrosis and calcification. A wide range of nonspecific mediators of inflammation such as histamine, bradykinin, serotonin, interleukins and arachidonic acid metabolites (PGE₂) are released in response to bacterial invasion and tissue injury. These cause vasodilatation and increased vascular permeability. The tissue becomes edematous as a result of filtration of serum proteins and fluid from the vessels. The flow stasis causes an aggregation of red blood cells and an elevation of blood viscosity. It also produces tissue hypoxia or ischemia, which suppress cellular metabolism in the affected area of the pulp. This results in tissue necrosis. In addition, neutrophils in the area degenerate and release intracellular lysosomal enzymes to digest the surrounding tissue, forming necrotic tissue. As time progresses, necrotic pulp tissue becomes infected by oral microorganisms penetrating into the root canal system through exposed dentinal tubules and lateral/accessory canals.¹¹⁻¹⁵

In the present study, pulp calcification was seen in 39 percent of the patients while it was absent in remaining 61 percent of the patients. Pulp necrosis was found to be present in 80 percent of the patients. This necrosis was either complete or partial. Zuza et al reported that clinical attachment loss, depth of periodontal probing, and gingival recession are related to negative pulpal response, which is significantly affected by the progression of periodontitis. Similarly, Cardon et al showed that pulp conditions depend on the severity of the active periodontal disease. The results of the present study support this hypothesis, indicating that periodontal defect affects the pulp volume and surface area.^{13, 14} K Fatemi et al evaluated the possible effects of moderate to advanced periodontal disease on the different

aspect of dental pulp structure. Twenty hopeless permanent teeth were extracted from systemically healthy adults because of moderate to advanced chronic periodontitis, with a bone loss of >6 mm and a mobility of grade 2 or 3. Upon extraction, the apical 2 to 3 mm of the roots were immediately sectioned. Four to five sections were mounted on each slide, and every third slide was stained with hematoxylin and eosin. The specimens were histologically processed and examined by an oral pathologist. Non-inflamed pulp, with partial or complete necrosis in some sections and several non-necrotic sections, was found in only 6.3% of teeth. Most teeth (58.3%) displayed edematous pulps. Slightly fibrotic pulps were seen in 52.1% of sections. Odontoblastic integrity was seen in 31.3% of teeth. Most teeth (77.1%) displayed no pulp stones. In 43.8% of teeth, the pulp vessels displayed dilatation. Moderate to advanced periodontal disease can affect the dental pulp.¹⁵

CONCLUSION

From the above results, the authors conclude that degenerative changes of the pulp tissue are commonly associated with periodontal pathologies. However; further studies are recommended.

REFERENCES

1. Langeland K, Rodrigues H, Dowden W. Periodontal disease, bacteria, and pulpal histopathology. *Oral Surg Oral Med Oral Pathol.* 1974;37:257-70.
2. Torabinejad M, Kiger RD. A histologic evaluation of dental pulp tissue of a patient with periodontal disease. *Oral Surg Oral Med Oral Pathol.* 1985;59:198-200
3. Stahl SS. Pulpal response to gingival injury in adult rats. *Oral Surg Oral Med Oral Pathol.* 1963;16:1116-9.
4. Grajewska I. Ultrastructural study of the dental pulp in patients with adult periodontitis. *Ann Univ Mariae Curie Skłodowska Med.* 1997;52:23-8.
5. Nemeč A, Pavlica Z, Stiblar-Martincic D, Petelin M, Erzen D, Crossley D. Histological evaluation of the pulp in teeth from dogs with naturally occurring periodontal disease. *J Vet Dent.* 2007;24:212-23.
6. Czarnecki RT, Schilder H. A histological evaluation of the human pulp in teeth with varying degrees of periodontal disease. *J Endod.* 1979;5:242-53.
7. Sheykhrezaee MS, Eshghyar N, Khoshkhounejad AA, Khoshkhounejad M. Evaluation of histopathologic changes of dental pulp in advanced periodontal diseases. *Acta Med Iran.* 2007;45:51-7.
8. Ekblom A, Hansson P. A thin-section and freeze-fracture study of the pulp blood vessels in feline and human teeth. *Arch Oral Biol* 1984;29:413-24.
9. Grajewska I. Ultrastructural study of the dental pulp in patients with adult periodontitis. *Ann Univ Mariae Curie Skłodowska Med* 1997;52:23-8.
10. Rubach WC, Mitchell DF. Periodontal disease, age, and pulp status. *Oral Surg Oral Med Oral Pathol* 1965;19:482-93.
11. Nemeč A, Pavlica Z, Stiblar-Martincic D, Petelin M, Erzen D, Crossley D. Histological evaluation of the pulp in teeth from

- dogs with naturally occurring periodontal disease. *J Vet Dent* 2007;24:212-23.
12. Rubach WC, Mitchell DF. Periodontal disease, age, and pulp status. *Oral Surg Oral Med Oral Pathol.* 1965;19:482-93.
 13. Zuza EP, Vanzato Carrareto AL, Pontes AEF, et al. Chronic periodontal disease may influence the pulp sensitivity response: clinical evaluation in consecutive patients. *ISRN Dent* 2012;2012:246875.
 14. Cardon EB, Waick RC, Rêosing CK. Analise da sensibilidade pulpar em dentes com diferentes graus de perda de inserção periodontal. *Periodontia* 2007;17:49-54.
 15. K Fatemi, R Disfani, R Zare, A Moeintaghavi, Saadat A. Ali, and H. R Boostani. Influence of moderate to severe chronic periodontitis on dental pulp. *J Indian Soc Periodontol.* 2012 Oct-Dec; 16(4): 558-561.