

# Influence of Diabetes in the Development of Apical Periodontitis: A Critical Literature Review of Human Studies

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## Abstract

**Introduction:** The aim of this study was to perform a critical review of the literature that investigated the association between diabetes and apical periodontitis. **Methods:** An electronic search was performed on PubMed/MEDLINE, LILACS, Scientific Electronic Library Online (SciELO), and Cochrane Collaboration databases. Human studies assessing the effect of diabetes in apical periodontitis development or in healing after root canal treatment were included. The outcome was apical periodontitis. **Results and Conclusions:** Nine articles were included. The results presented in the literature to date are still scarce and incipient, and the evidence for such an association is not yet conclusive. However, the published results trend to converge on a positive association between diabetes and a larger number of periapical lesions. (*J Endod* 2017;43:370–376)

## Key Words

Endodontics, hyperglycemia, periapical periodontitis

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<http://dx.doi.org/10.1016/j.joen.2016.11.012>

Diabetes encompasses a group of highly prevalent metabolic changes. According to the World Health Organization, in 2013, 382 million people had diabetes; this number is expected to increase to 592 million by 2035 (1). It is caused by a deficiency in the secretion and/or use of insulin, leading to state of chronic hyperglycemia (2). Several systemic alterations are related to diabetes, such as microvascular and macrovascular alterations (3, 4), decrease in the number of polymorphonuclear leukocytes (5), retinopathy, nephropathy, neuropathy, and changes in the wound-healing process (6, 7). Changes in the oral cavity are also visible, such as periodontal disease (7, 8), xerostomia, dental caries, candidiasis, Bell's facial palsy, burning mouth syndrome (7), and an increase in apical periodontitis prevalence (9).

The scientific literature has shown reliable evidence for an association between diabetes and periodontal disease (10, 11). However, the relationship between diabetes and apical periodontitis of endodontic origin remains unproven because the results obtained from studies in the endodontic field are controversial. Therefore, the aim of this study was to perform a critical review of the literature that has investigated the association between diabetes and apical periodontitis of endodontic origin.

## Materials and Methods

A search was performed on PubMed/MEDLINE, LILACS, Scientific Electronic Library Online (SciELO), and Cochrane Collaboration databases. A search strategy centered along the terms related to diabetes and apical periodontitis (the outcome) was used. The following MESH terms were used: "Diabetes Mellitus", "Diabetes Mellitus, Type 2", "Diabetes Mellitus, Type 1", "Hyperglycemia", "Periapical Abscess", "Periapical Granuloma", "Periapical Diseases", and "Periapical Periodontitis". In addition, free text terms were used to provide a reproducible search strategy (Supplementary Material).

## Inclusion Criteria

Human studies assessing the effect of diabetes in apical periodontitis development or in the healing of apical periodontitis after root canal treatment were included in this review. No filters that could restrict the article publication period were used, and only articles published in English were included. All articles published up to September 2016 were reviewed, and some relevant studies found in the reference lists of the selected articles were also included. Publications that did not meet these inclusion criteria such as animal studies, case reports, case series, and literature reviews were excluded.

## Selection of the Studies and Data Extraction

The titles and the abstracts of the researched articles were screened independently by 2 reviewers (C.T.M., M.B.) to identify possible eligible studies that met the

Significance
Studies that take into account the behavior of the periapical tissues after a bacterial invasion into the root canals in individuals with diabetes are still relevant to delineate the prognosis of root canal treatment in patients with this systemic disease.

inclusion criteria. Relevant data from the included articles were extracted and analyzed independently by these same reviewers. Cases of disagreement were reanalyzed together until consensus was reached. The outcome was apical periodontitis.

### Methodological Quality Assessment

The methodological quality was evaluated during the critical reading of the included articles. The observational studies were assessed according to STROBE statement (STrengthening the Reporting of OBservational studies in Epidemiology), which is an international guide developed by researchers, journal editors, and professionals from the fields of epidemiology, methodology, and statistics involved in the conduct of observational studies for assessing risk of bias and

other methodological criteria (12). In addition, the clinical study included was appraised following the basic principles of research.

### Results

Nine studies were included: 1 nonrandomized clinical trial, 1 retrospective study, and 7 cross-sectional studies, which were published between 1968 and 2015. Figure 1 presents a flowchart of the review process.

### Characteristics of the Included Studies

The main features of the included studies are presented in Table 1 and are described and discussed below.

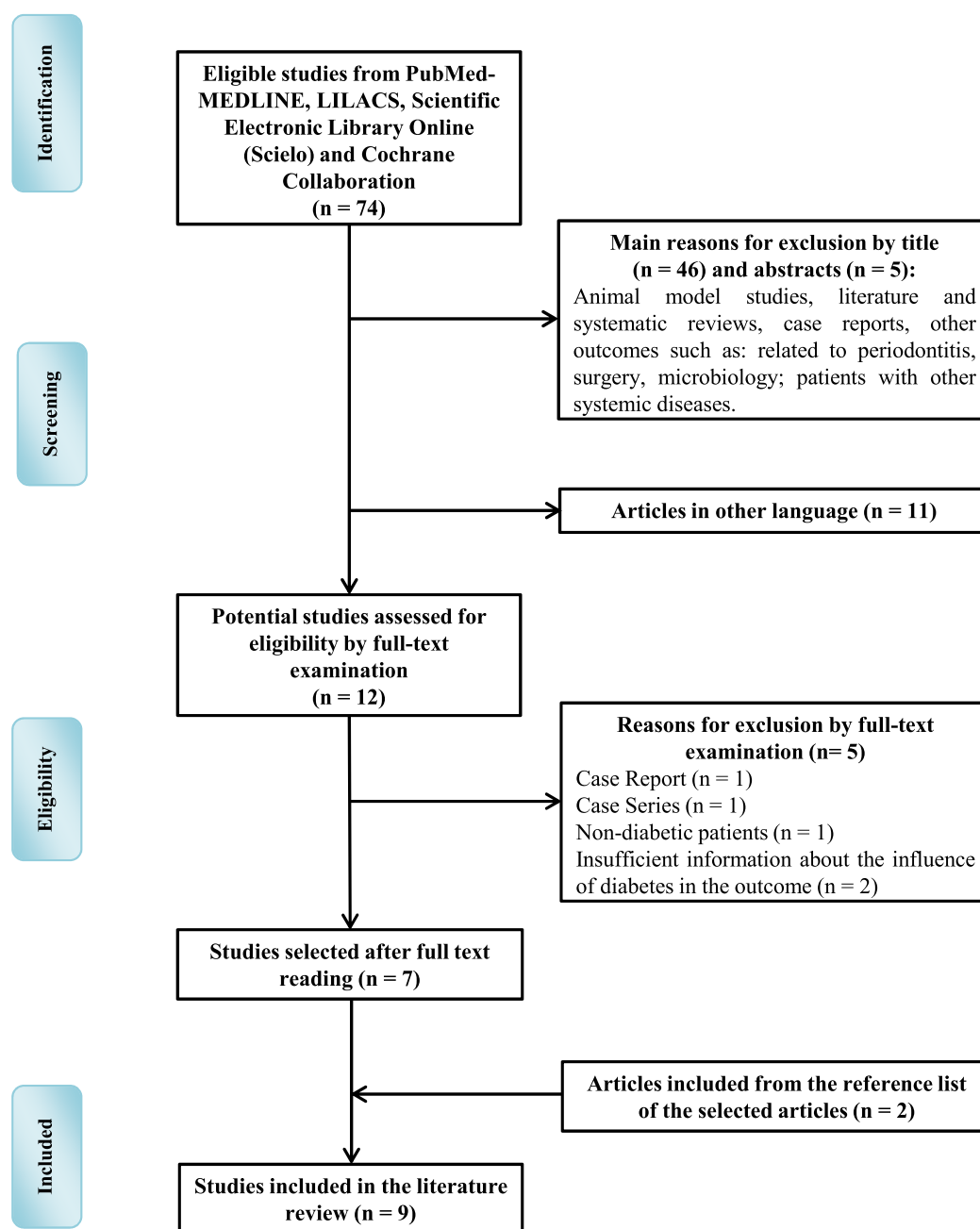


Figure 1. Flowchart of the review process.

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