Aseel A, Ghaida A , Shouq A, Taif A, Lama A, Nusaybah A, Lamis A, Danah B, Shaden A, Salma A, Arwa A, Rahaf A, Nahaia A, Wejdan A, Aminah A. Bridging the gap: dental interventions for improved glycemic control in diabetic patients: A systematic review of published studies. Pharmacy Practice 2025 Apr-Jun;23(2):3180.

https://doi.org/10.18549/PharmPract.2025.2.3180

**Original Research**

# Bridging the gap: dental interventions for improved glycemic control in diabetic patients: A systematic review of published studies

Aseel Alotaibi, Ghaida Alqahtani, Shouq Alqahtani, Taif Almutairi, Lama Alruhaimi, Nusaybah Alsohibani, Lamis Alshehri, Danah Bajunayd, Shaden Alharbi, Salma Alsahli, Arwa Alhamed, Rahaf Abdulaziz, Nahaia Alnaiem, Wejdan Alharthi, Aminah Alanazi

Received (first version): 06-July-2024 Accepted: 13-Nov-2024 Published online: 22-May-2025

**Abstract**

**Background:** Diabetes poses an increased risk for oral health complications like periodontal disease and candidiasis. Proper dental management can help reduce these risks and support medical glycemic control. Methods: A systematic search of 5 databases was conducted from 2013 to 2023. Included studies evaluated interventions or assessed relationships between dental care and diabetes outcomes. Two reviewers independently screened titles/abstracts and full-texts, extracted data, and assessed risk of bias. **Results:** An initial search found 895 records, of which 48 were duplicates and 79 were excluded after title/abstract screening. 284 studies underwent full-text review, with 145 excluded for not meeting criteria. 10 studies ultimately met all inclusion criteria. Current evidence establishes periodontitis as a risk factor for worsening diabetes and complications. Periodontal therapy helps manage glycemic control and is most effective with intensive follow-up support. Diabetes increases oral candidiasis risk. Maintaining optimal blood glucose levels reduces periodontal disease prevalence. **Conclusion:** Current evidence indicates periodontal therapy positively impacts glycemic control in diabetics and intensive follow-up may maximize benefits. Diabetes increases susceptibility to oral candidiasis. Curricula changes equip future dentists to coordinate care considering patients' medical needs

**Aseel alotaibi**. PharmD student, Princess Nourah University, kingdom of saudi Arabia , Riyadh, 12211. Aseel722@gmail.com
**Ghaida Alqahtani**. PharmD student, Princess Nourah Bint Abdulrahman University, Kingdom of Saudi Arabia, Riyadh, 12211. Ghaida6687@gmail.com
**Shouq Alqahtani**. PharmD student, Princess Nourah Bint Abdulrahman University , Kingdom of Saudi Arabia, Riyadh , 12211 . shq2245@gmail.com
**Taif Almutairi**. PharmD student, Princess Nourah Bint Abdulrahman University , Kingdom of Saudi Arabia, Riyadh , 12211. Taif_79652@hotmail.com
**Lama Alruhaimi**. PharmD student,Princess Nourah Bint Abdulrahman University , kingdom of saudi Arabia , Riyadh, 12211. Alruhaimi6lama@gmail.com
**Nusaybah Alsohibani**. PharmD student, Princess Nourah University , kingdom of saudi Arabia , Riyadh, 13211. Nassibahsuliman@gmail.com
**Lamis Alshehri**. PharmD student,Princess Nourah Bint Abdulrahman University , kingdom of saudi Arabia , Riyadh, 12211. lameeees227@gmail.com
**Danah Bajunayd**. PharmD student, Princess Nourah Bint Abdulrahman University , Kingdom of Saudi Arabia, Riyadh , 12211. Danaameen76@gmail.com
**Shaden Alharbi**. PharmD student, Princess Nourah Bint Abdulrahman University , Kingdom of Saudi Arabia, Riyadh , 12211 . Alharbishaden2026@outlook.com
**Salma Alsahli**. PharmD student, Princess Nourah Bint Abdulrahman University, Kingdom of Saudi Arabia, Riyadh, 12211 . salmaaliss888@gmail.com
**Arwa Alhamed**. General Dentist, AlFarbi medical college Riyadh ,Saudi Arabia, Dr.arwaalhamed@hotmail.com
**Rahaf Abdulaziz**. College of Medicine and Surgery, King Khalid University, Abha, Saudi Arabia. dr.rahafalamri78@gmail.com
**Nahaia Alnaiem**. Dental department, Second Health Cluster, North Riyadh Dental Complex. Nalnaiem@moh.gov.sa
**Wejdan Alharthi**. Dental department, Second Health Cluster, North Riyadh Dental Complex, wealharthi@moh.gov.sa
**Aminah Alanazi**. Medical Affairs, Riyadh Health Cluster I - Executive Management for Excellence in Community Health - Co-Executive Management for Medical Affairs - Management. Amfalanazi@moh.gov.sa

## INTRODUCTION

Diabetes mellitus is a chronic condition characterized by high levels of blood glucose resulting from defects in insulin production, insulin action, or both[1]. According to the World Health Organization (WHO), the number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014[2]. The WHO projects that diabetes will be the seventh leading cause of death in 2030[3]. A study by Abdulellah Alotaibi et al. from Saudi Arabia shows an increasing prevalence of both type 1 and type 2 diabetes, especially in females, older children, adolescents and urban populations[4]. The rise was documented by 8 included studies applying various research designs and diagnostic tools, with 3 focusing on type 1 diabetes and 5 on type 2 diabetes[4].





www.pharmacypractice.org (eISSN: 1886-3655 ISSN: 1885-642X)

https://doi.org/10.18549/PharmPract.2025.2.3180

**Types of Diabetes**

Type 1 diabetes results from the body's failure to produce insulin and is formerly known as juvenile diabetes or insulin-dependent diabetes mellitus (IDDM)[3,5,6]. Type 2 diabetes results from insulin resistance, in which cells fail to use insulin properly, usually combined with an absolute insulin deficiency and formerly known as non-insulin-dependent diabetes mellitus (NIDDM)[3,5]. Type 1 diabetes is typically diagnosed in childhood or early adulthood and has a sudden onset over days or weeks. The risk is increased with a family history of autoimmune disorders[6]. Around 90-95% of diabetes cases are type 2 diabetes, which develops due to insulin resistance where cells do not properly respond to insulin combined with relative insulin deficiency[7]. This type is often associated with modifiable risk factors like obesity, a sedentary lifestyle, and advanced age[7]. In contrast to type 1 diabetics, those with type 2 diabetes often have hyperinsulinemia initially before pancreatic beta cell function declines over several years[7]. Around 1-2% of cases are secondary or rare types of diabetes that occur due to genetic syndromes, diseases of the exocrine pancreas, drug or chemical-induced diabetes, or other causes[8]. Finally, gestational diabetes involves the new onset of high blood sugars during pregnancy and affects up to 50% of women with prior gestational diabetes, putting them at high risk for developing type 2 diabetes later in life[9]. Proper management is crucial for all types to prevent acute complications and reduce risks of long-term complications that can impact multiple organ systems[9]. Figure 1 visually depicts the major categories and subtypes of diabetes based on etiology and pathophysiology.

**Diagnosis of Diabetes**

The clinical presentation of diabetes can vary depending on the type but commonly includes symptoms of polydipsia (excessive thirst), polyuria (excessive urination), polyphagia (excessive hunger), unexplained weight loss, fatigue, irritability, nausea, and blurry vision. In severe cases, diabetic ketoacidosis can occur, which involves high blood sugar, dehydration, and a buildup of ketones in the body[10]. Diagnosis is based on symptoms in conjunction with laboratory tests. The standardized diagnostic tests include a fasting plasma glucose level over 126 mg/dL or a 2-hour post-load plasma glucose over 200 mg/dL during an oral glucose tolerance test. Glycated hemoglobin (HbA1c) testing provides a long-term picture of average blood glucose control over the past 3 months, with levels over 6.5% indicative of diabetes[10].

**Diabetes Complications**

Sustained hyperglycemia over many years leads to serious diabetic complications involving small and large blood vessels. Microvascular complications affect the eyes (retinopathy), kidneys (nephropathy leading to renal failure), and nerves (neuropathy with numbness and risk of foot ulcers/amputation). Neuropathy can also cause autonomic dysfunction like gastroparesis and cardiovascular issues[11]. Macrovascular complications relate to accelerated atherosclerosis, increasing risks of limb ischemia, coronary artery disease, and stroke. Wound healing is impaired due to microvascular and neurologic factors[12]. Additional diabetes-related disorders often co-occur, such as hypertension, dyslipidemia, and NAFLD/NASH. Prompt diagnosis and achieving optimal blood glucose control can prevent or delay these debilitating complications, which contribute greatly to the morbidity and mortality associated with the condition[12].

**Oral Health Challenges in Diabetic Patients**

Diabetes poses an increased risk to oral health, with diabetic patients being more prone to infections, periodontal disease, and dental caries[13]. High blood glucose levels associated with poor glycemic control provide an ideal environment for the growth of cariogenic bacteria[13]. Additionally, since diabetes is considered a systemic condition affecting overall health, individuals with poorly controlled diabetes are more susceptible to infections[14].

**I. Periodontal Disease**

Periodontal disease is seen more frequently and is often more severe in people with diabetes due to alterations in leukocyte function, collagen metabolism, and impaired wound healing[15]. Maintaining optimal oral health and glucose control can help lower the risk of oral complications associated with diabetes[15]. Since periodontal disease and infections of the oral cavity may have adverse metabolic effects and impair glycemic control in people with diabetes, proper dental management of patients with diabetes is crucial[16]. With the rising prevalence of diabetes worldwide, dental professionals need to understand how to best care for patients with diabetes to prevent oral and systemic complications. Although guidelines exist for the care of diabetic patients from dental and medical organizations, implementing evidence-based protocols can be challenging in clinical practice[16].

As part of the dental management of diabetic patients, an understanding of the relationship between diabetes and periodontal disease is crucial. Periodontitis increases the risks of diabetes complications by releasing inflammatory mediators and pathogens into the circulation, potentially worsening insulin resistance and impairing glycemic control[15,17]. Several studies suggest periodontal therapy in diabetic patients leads to improvements in clinical parameters of periodontal disease as well as hemoglobin A1c (HbA1c) levels, a measure of average blood sugar over approximately 3 months[18,19,20]. A systematic review by Radmand, 2018 found nonsurgical periodontal therapy to be an effective adjunct to treating glycemic control, with a 0.4% reduction in HbA1c levels post-therapy[21]. The American Academy of Periodontology recommends periodontal treatment as an essential part of supporting overall medical management for patients with diabetes[22].

**II. Candidiasis**

Along with periodontitis, diabetic patients are also more susceptible to oral fungal infections or candidiasis[23]. A study by Zomorodian et al. 2016 found the prevalence of oral candidiasis to be higher in diabetic patients compared to nondiabetics[24]. Factors that may increase the risk of candidiasis development include older age, poor metabolic control, the

presence of other immunocompromising conditions or the use of immunosuppressive drugs such as glucocorticoids and medications containing xylitol[25]. Given its higher incidence in people with diabetes, thorough oral soft tissue examination, diagnosis, and timely treatment of candidiasis are important components of dental care[25].

**III. Dental Caries**

In addition to infections, dental caries also pose a significant challenge in managing oral health in diabetic patients[26]. Several studies have demonstrated an increased prevalence and severity of coronal and root caries in individuals with diabetes compared to nondiabetic controls[27,28]. High dietary carbohydrate intake combined with poor plaque control in the setting of hyperglycemia promotes the growth of mutants streptococci and lactobacilli acidogenic bacteria responsible for caries formation[29]. The use of xylitol-containing preventive agents and regular professional cleaning/polishing procedures are important to inhibit bacterial adhesion, plaque regrowth, and acid production in at-risk patients[29].

**Importance of Medical-Dental Collaboration**

Given the bidirectional link between periodontal and systemic diseases, optimal medical collaboration is crucial in the management of oral health issues in diabetic patients[14]. Regular monitoring of glycemic control through routine HbA1c testing allows dental teams to assess the risk of complications and schedule appointments when levels are well-controlled to minimize the risk of adverse outcomes[17]. Communication with the patient's medical provider regarding scheduling of dental visits, antibiotic prophylaxis before procedures if needed, and periodontal treatment plans also facilitates coordinated care[30]. Medication review aids in the identification of xerostomic or immunosuppressive drugs that may exacerbate oral conditions. Joint medical-dental consultations can help establish individualized treatment plans balancing metabolic and oral needs[30].

While general guidelines exist, assessing the totality of current research evidence will allow for a more nuanced understanding of best practices tailored for different settings, phases of care, and patient characteristics. With the rising global prevalence of diabetes, facilitating evidence-based oral healthcare through a comprehensive review of the current literature has the potential for substantive public health impact. This systematic review aims to assess and synthesize the available literature on dental management strategies for patients with diabetes to provide clear recommendations that can be readily translated into clinical care.

## METHODS AND MATERIALS

**Search Strategy**

The search strategy for this systematic review was designed to be comprehensive in order to identify all relevant published literature on the topic. Both electronic database searches and reference list screening of eligible studies were performed. The major electronic databases PubMed, EMBASE, Web of Science, CINAHL and Cochrane Central Register of Controlled Trials were searched from year 2013 to 2023 without any restrictions on date. Both medical subject headings (MeSH) and keywords related to the concepts of "Diabetes", "Type 1 diabetes", "Type 2 diabetes", "Dental management", " and "HbA1c" were used to search titles, abstracts and indexes terms as appropriate for each database. Search terms were tailored for each database using Boolean operators to combine concepts. Reference lists of all included studies and relevant reviews were also manually searched to identify any additional studies not indexed in the databases. All retrieved citations were imported into reference management software, and duplicates were removed prior to screening. This rigorous search strategy aimed to capture all possible literature addressing the review objective in order to summarize the current best available evidence on this topic without any omissions.

**Eligibility Criteria**

**Inclusion Criteria:**

- Studies must be original research published in peer-reviewed journals from January 2013 to July 2023.
- Research must involve human subjects undergoing dental treatment who have a diagnosis of diabetes.
- Studies assessing dental students' ability to monitor blood glucose, take appropriate medical history and plan for emergencies related to fluctuating glucose levels during dental visits.
- Literature addressing dental student education on the implications of diabetes control and comorbidities on oral health, periodontal disease risk and post-operative healing.

**Exclusion Criteria:**

- Reviews, letters, editorials, case reports and studies published in languages other than English will be excluded.
- Animal or cadaver studies that do not involve human subjects with diabetes will not be considered.
- Opinion pieces, conference abstracts, and book chapters without original data relevant to the research question will not be included.
- Studies published prior to January 2013 in order to capture current practices will be excluded from this review.

**Data Extraction**

For data extraction, a standardized electronic form was developed a priori to ensure consistent capture of all relevant information from included studies. The form included fields for study characteristics such as authors, year of publication and design, as well as variables related to the review question, such as population demographics, interventions/exposures, and outcomes of interest. Data was extracted independently by two reviewers and cross-checked for accuracy and completeness. Any discrepancies in extracted data between the reviewers were discussed until a consensus was reached.

**Risk of Bias**

The methodological quality and risk of bias of included studies were assessed independently by both reviewers using a standardized tool suitable for the study designs. For randomized controlled trials, the Cochrane Risk of Bias 2 tool was utilized to evaluate aspects such as randomization, blinding, incomplete outcome data and selective reporting. For observational studies, the AXIS tool was employed to assess quality based on domains like participant selection, outcome measurement and account of potential confounding factors. Any disagreements between reviewers in quality assessments were resolved through discussion.

**Statistical analysis**

A statistical analysis plan was prepared a priori to synthesize data from the included studies. Initially, a descriptive analysis would be conducted to summarize the general characteristics of the studies. Heterogeneity between studies would be evaluated both clinically and statistically to determine suitability for quantitative synthesis. If appropriate, a meta-analysis would be performed using either a fixed or random effects model, depending on the heterogeneity findings. Planned subgroup analyses by factors such as diabetes type or study design were also specified in advance.

## RESULTS

The systematic review protocol will be designed based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a comprehensive and unbiased synthesis of the available evidence.

An initial search of databases retrieved 895 records that were potentially relevant to the systematic review examining the Dental Management of Diabetic Patients. The first step before screening these records involved removing any that were clearly ineligible based on predetermined criteria. 48 records were found to be duplicate publications of the same studies and were removed. Automation tools used in the screening process then assessed the titles and abstracts of remaining records and identified 54 as out of scope for the review, such as animal studies or comments/letters rather than research articles. An additional 25 records were removed at this stage for other reasons, such as being protocols rather than completed studies.

After implementing these eligibility checks to narrow down the records, 768 remained for formal screening. At this phase, the reviewer assessed the titles and abstracts of the remaining records according to the pre-established inclusion/exclusion criteria. Out of these, 284 articles appeared to meet preliminary criteria, or it was not clear from the abstract if they were eligible, so their full texts were retrieved for more detailed assessment. After examining the full texts, 145 studies were excluded at this stage as they did not meet all the inclusion criteria. The 139 potentially relevant reports that passed full-text screening then had their eligibility checked in more depth. At this phase, any studies published more than 10 years ago were excluded in order to ensure that only the most recent and up-to-date evidence was included. Non-English language publications were also excluded due to resource constraints for translation. Finally, 23 reports were removed because, upon closer examination of the full text, they were found not directly to align with the objective and scope of the review.

In total, 10 studies met all of the pre-specified inclusion criteria and none of the exclusion criteria after the eligibility assessment phase. These 10 articles were included in the systematic review and formed the evidence base examined in the subsequent stages of the review process, including quality assessment and data extraction. The PRISMA flow diagram **(**Figure 1**)** clearly depicts the process of identifying, screening and selecting the final group of studies to include in the review.

## DISCUSSION

This systematic review aimed to evaluate the current evidence regarding dental management strategies for patients with diabetes. Ten studies meeting the inclusion criteria provided insights into various aspects of care.

The paper provides a thorough overview of the current understanding of the relationship between periodontitis and diabetes. Several studies examined the relationship between periodontal therapy and glycemic control in diabetic patients. Preshaw and Bissett discuss epidemiological studies that establish periodontitis as a risk factor for worsening glycemic control and diabetes complications[31]. They also review interventional evidence demonstrating the positive effects of

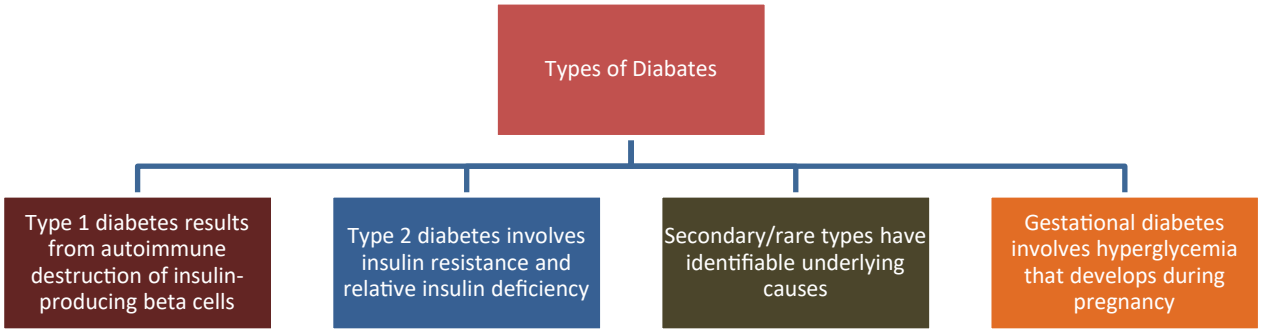


**Figure 1.** Types of Diabetes

periodontal therapy on short-term HbA1c reductions[31]. This comprehensive evaluation of the bi-directional association is strengthened by consideration of both observational and randomized controlled data. A potential limitation is the focus mainly on type 2 diabetes, with less discussion of links to type 1 diabetes[31].

Chalini Sundar et al. conducted a study evaluating the effects of periodontal therapy on glycemic control in 266 patients with type 2 diabetes mellitus (T2DM)[32]. They found that nonsurgical periodontal treatment significantly reduced HbA1c levels in this cohort[32]. The mean pre-treatment HbA1c was 8.44%, while post-treatment it decreased to 7.98%, a clinically meaningful reduction of 0.46%. Sundar et al. also reported greater reductions in patients with specific characteristics. Those who had good pre-treatment glycemic control regularly followed up after initial therapy and demonstrated good oral hygiene saw HbA1c reductions of up to 0.60%[32]. The result provides additional evidence that resolving periodontal inflammation through nonsurgical therapy can positively impact glucose management in diabetics. The observed effect is comparable to results reported in another study by Quan Li et al. This meta-analysis selected 9 RCTs investigating the effects of periodontal therapy on glycemic control in diabetics, as measured by HbA1c levels[33]. The pooled analysis of over 1000 patients found a statistically significant absolute reduction in HbA1c of 0.27% compared to controls, supporting the notion that resolving periodontal inflammation through treatment may help lower blood glucose levels in diabetics in the short term[33].

The results confirm periodontal treatment as an effective adjunct for glycemic management in diabetics. However, Anoop Kapoor et al. found that while systemic antibiotics combined with scaling and root planing provide additional clinical benefits like reduced attachment loss and pocket depth for periodontitis over SRP alone, antibiotics should not be prescribed routinely given their potential risks and side effects, but rather only when strictly needed and as an adjunct rather than substitute for nonsurgical periodontal therapy[34]. Further research is needed to establish the incremental value of adjunctive therapies.

More intensive periodontal therapy may provide greater benefits. Jain et al. (analyzed data from the Studies to Treat and Prevent Periodontitis (STeP) tria[35]l. They observed that patients receiving continued maintenance therapy following scaling and root planing experienced significantly greater reductions in HbA1c levels compared to those receiving no further treatment. Close periodontal monitoring and support could optimize outcomes for diabetics[35].

Oral candidiasis is a fungal infection with increased prevalence in uncontrolled diabetes. Zomorodian et al. found diabetes to be associated with a greater risk of oral candidiasis after adjusting for confounding factors[24]. Zomorodian found that the carriage rate and density of Candida were significantly higher in diabetic patients compared to healthy controls, providing further evidence that diabetes is a strong risk factor for oral candidiasis due to the hyperglycemic environment favoring fungal overgrowth[24]. Célia F. Rodrigues conducted a comprehensive literature review exploring the relationship between diabetes mellitus and candidiasis infections and identified poor glycemic control reflected by HbA1c levels of over 8% as the most important predictor of candidiasis development[36]. Timely diagnosis and treatment of candidiasis is therefore imperative in the dental care of diabetics, especially those with suboptimal metabolic control[37]. Parakh et al. highlighted the importance of meticulous oral exams to detect mucosal lesions in these high-risk patients[37]. Collaboration with medical teams could aid in the identification of people with diabetes requiring close monitoring and candidiasis screening.

High carbohydrate intake and poor plaque control in the presence of hyperglycemia can increase susceptibility to dental caries in people with diabetes. Ana Sofia Coelho et al. conducted a comprehensive systematic review and meta-analysis to evaluate the association between diabetes and dental caries[38]. They performed an extensive search of multiple databases and included 69 observational studies in their review and 40 studies in the quantitative synthesis. The meta-analysis found a significant increase in DMFT scores, a measure of lifetime caries experience, among type 1 diabetics compared to non-diabetic controls[38].

Proper glycemic control is key to reducing oral health risks in diabetics. A systematic review by Kocher et al. found that maintenance of HbA1c levels below 7% through medical interventions was associated with lower periodontitis prevalence compared to levels above 9%[39]. Communication between dental and medical teams is important to coordinate care - a study by Patel et al. demonstrated significantly improved glycemic control when endodontists provided diabetes education to patients[40].

The findings demonstrate the long-term maintenance is important to sustain benefits. Patients with poorly controlled diabetes are also more susceptible to oral candidiasis and dental caries due to hyperglycemia. Meticulous oral examinations and timely diagnosis/treatment of infections are important facets of dental care for diabetics. Proper collaboration between dental and medical professionals can help coordinate glycemic management and oral health care, thereby reducing risks for diabetes complications.

**Recommendations**

This systematic review provides several recommendations for the dental management of patients with diabetes based on the current evidence. Nonsurgical periodontal therapy should be routinely incorporated into care, as it has been shown to effectively lower HbA1c levels and support glycemic control. Intensive follow-up supportive periodontal therapy that extends beyond initial debridement provides even greater benefits and is advised when possible. Thorough soft tissue examinations during dental visits are also important, especially for individuals with poorer diabetes control, in order to promptly diagnose and treat any oral candidiasis infections present. Both lifestyle modifications and medical interventions to maintain optimal blood glucose levels can help diabetic patients further reduce their risk of dental caries

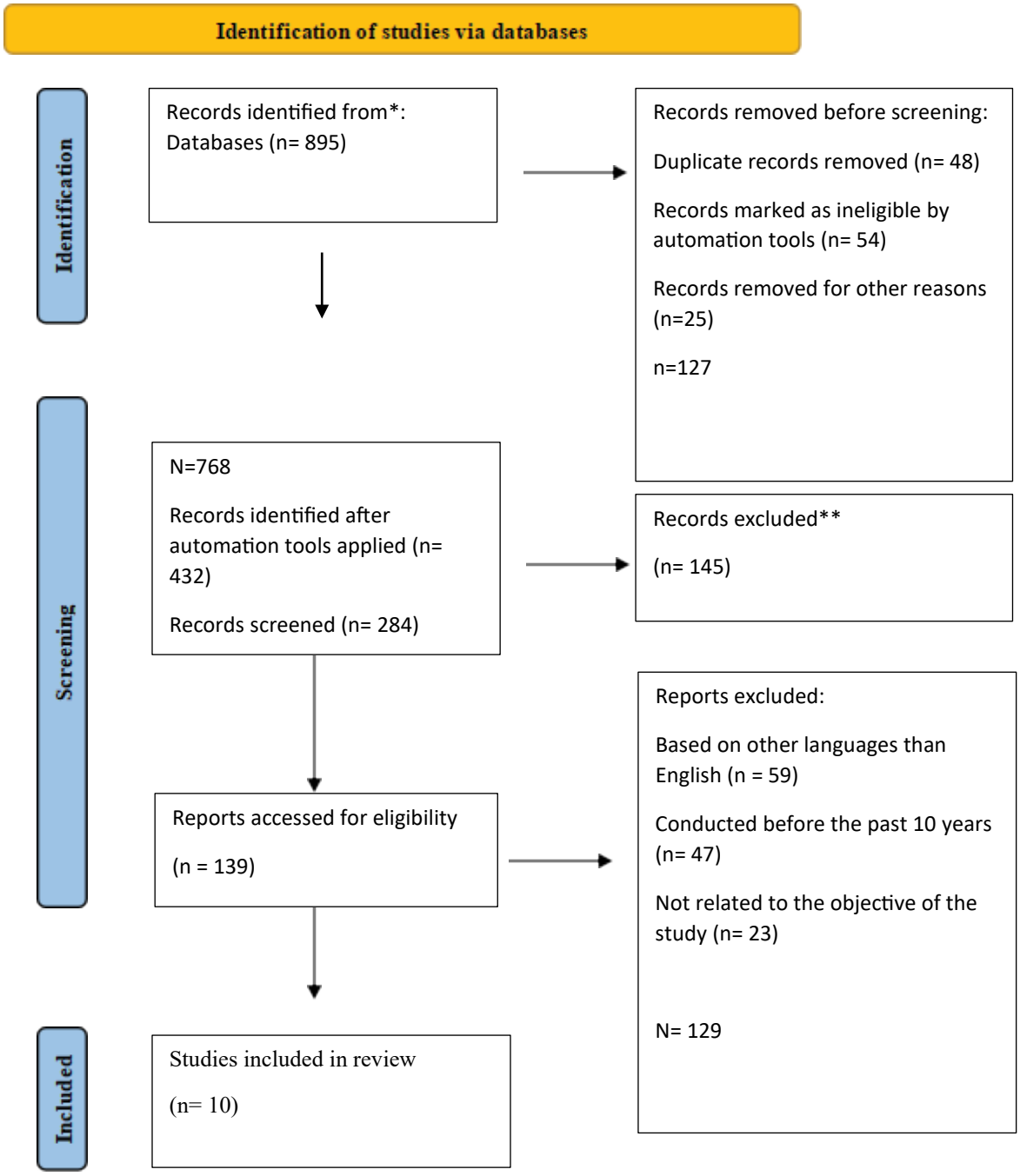


**Figure 2.** PRISMA Diagram

**Table 1.** Summary of the Included Papers

| S.No | Title | Author | Year | Key Findings | Ref. |
|---|---|---|---|---|---|
| 1 | Periodontitis and diabetes | Philip M. Preshaw & Susan M. Bissett | 2019 | Provides an update on knowledge of the links between diabetes and periodontitis. Explains the current terminology used to describe blood glucose and glycated hemoglobin levels. | (Preshaw and Bissett, 2019) |
| 2 | Periodontal therapy as an adjunctive modality for HbA1c reduction in type-2 diabetic patients | Chalini Sundar et al. | 2018 | The key points from the study by Chalini Sundar et al. are that non-surgical periodontal therapy provided a mean HbA1c reduction of 0.46% in 266 T2DM patients, and greater reductions were observed in those with good pre-treatment glycemic control, regular follow-up visits, and good oral hygiene. | (Sundar et al., 2018) |
| 3 | Effect of non-surgical periodontal treatment on glycemic control of patients with diabetes: a meta-analysis of randomized controlled trials | Quan Li et al. | 2015 | The key findings of the systematic review and meta-analysis were that non-surgical periodontal treatment was associated with a statistically significant 0.27% reduction in HbA1c levels compared to controls based on pooled data from 9 RCTs. | (Li et al., 2015) |
| 4 | Systemic antibiotic therapy in Periodontics | Anoop Kapoor et al. | 2012 | Systemic antibiotics added to scaling and root planing (SRP) provided additional clinical improvements compared to SRP alone for periodontitis patients. | (Kapoor et al., 2012) |
| 5 | Effect of scaling and root planing as monotherapy on glycemic control in patients of Type 2 diabetes with chronic periodontitis: A systematic review and meta-analysis | Akanksha Jain et al. | 2019 | SRP treatment resulted in a decrease in HbA1c by 0.26% (P = 0.17) at 3–4 months compared to the control group. Further, on subgroup analysis, SRP therapy revealed a decrease in PPD and CAL at 3–4 months, though statistically insignificant. | (Jain et al., 2019) |
| 6 | Prevalence of oral Candida colonization in patients with diabetes mellitus | Zomorodian et al. | 2016 | Carriage rate and density of Candida were significantly higher in diabetic patients compared to healthy controls, showing diabetes is a strong risk factor for oral candidiasis. | (Zomorodian et al., 2016) |
| 7 | Candida sp. Infections in Patients with Diabetes Mellitus | Rodrigues et al. | 2019 | Diabetes mellitus predisposes individuals to fungal infections like candidiasis due to its immunosuppressive effects. | (Rodrigues et al., 2019) |
| 8 | Dental caries, diabetes mellitus, metabolic control and diabetes duration: A systematic review and meta-analysis | Coelho et al. | 2020 | They found clear evidence that type 1 diabetics have a significantly higher DMFT score compared to non-diabetic controls, indicating greater lifetime caries experience. | (Coelho et al., 2020) |
| 9 | Effects of periodontal disease on glycemic control, complications, and incidence of diabetes mellitus | Robert J. Genco et al. | 2020 | The key findings are that periodontal disease is associated with adverse effects on glycemic control and increased risk of diabetes complications in diabetics. | (Genco et al., 2020) |
| 10 | Effect of periodontal treatment on HbA1c among patients with prediabetes | T. Kocher et al. | 2018 | Among periodontitis patients with prediabetes, HbA1c decreased , whereas 47.9% remained unchanged and 6.3% progressed to diabetes. Median hsCRP values were reduced in the normal HbA1c and prediabetes groups from 1.2 and 1.4 mg/L to 0.7 and 0.7 mg/L, respectively. | (Kocher et al., 2019) |

and periodontal disease according to various studies. The use of topical fluorides like varnishes and fluoride toothpaste is recommended as an additional prevention strategy. Additional precautions such as prophylactic antibiotic coverage prior to complex dental procedures are suggested for diabetics with other complications based on higher postoperative infection risks.

## CONCLUSION

This review evaluated the relationship between dental management and systemic health outcomes in diabetic patients. The findings suggest that nonsurgical periodontal therapy is effective in lowering blood glucose levels and preventing oral complications in diabetics. Intensive follow-up support maximizes the benefits. Diabetes increases risks of oral infections like candidiasis. Maintaining optimal glycemic control through medical care reduces oral disease prevalence. While limitations exist, current evidence supports an active role for dentists in managing diabetes through prevention, treatment and coordination with medical teams. Further research is still needed to strengthen clinical recommendations.

## References

1. Baynes HW. Classification, pathophysiology, diagnosis and management of diabetes mellitus. J Diabetes Metab. 2015;6(5):1-9.
2. Zhou B, Lu Y, Hajifathalian K, Bentham J, Di Cesare M, Ezzati M, et al. Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants. Lancet. 2016;387(10027):1513-30.
3. Rowley WR, Bezold C, Arikan Y, Byrne E, Krohe S. Diabetes 2030: insights from yesterday, today, and future trends. Popul Health Manag. 2017;20(1):6-12.
4. Alotaibi A, Perry L, Gholizadeh L, Al-Ganmi A. Incidence and prevalence rates of diabetes mellitus in Saudi Arabia: An overview. J Epidemiol Glob Health. 2017;7(4):211-8.
5. Mayer-Davis EJ, Lawrence JM, Dabelea D, Divers J, Isom S, Dolan L, et al. Incidence trends of type 1 and type 2 diabetes among youths, 2002–2012. N Engl J Med. 2017;376(15):1419-29.
6. Syed FZ. Type 1 diabetes mellitus. Ann Intern Med. 2022;175(5):ITC33-ITC48.
7. Ayani NKD, Juniartha IGN, Widyanthari DM. The Correlation between Body Mass Index (BMI) and Salivary pH on Type 2 Diabetes Mellitus Patients in Work Area of Health Center III North Denpasar. J Sustain Glob South. 2022;6:1.
8. Griffin TP, O'Loughlin A, Dinneen SF. How Should Secondary Causes of Diabetes Be Excluded? In: Clinical Dilemmas in Diabetes. 2021. p. 45-67.
9. McIntyre HD, Catalano P, Zhang C, Desoye G, Mathiesen ER, Damm P. Gestational diabetes mellitus. Nat Rev Dis Primers. 2019;5:47.
10. Inzucchi SE. Diagnosis of diabetes. N Engl J Med. 2012;367(6):542-50.
11. Cole JB, Florez JC. Genetics of diabetes mellitus and diabetes complications. Nat Rev Nephrol. 2020;16(7):377-90.
12. Harding JL, Pavkov ME, Magliano DJ, Shaw JE, Gregg EW. Global trends in diabetes complications: a review of current evidence. Diabetologia. 2019;62(1):3-16.
13. Ravindran R, Deepa M, Sruthi A, Kuruvila C, Priya S, Sunil S, et al. Evaluation of Oral Health in Type II Diabetes Mellitus Patients. Oral Maxillofac Pathol J. 2015;6(1).
14. Pearson-Stuttard J, Blundell S, Harris T, Cook DG, Critchley J. Diabetes and infection: assessing the association with glycaemic control in population-based studies. Lancet Diabetes Endocrinol. 2016;4(2):148-58.
15. Wu YY, Xiao E, Graves DT. Diabetes mellitus related bone metabolism and periodontal disease. Int J Oral Sci. 2015;7(2):63-72.
16. Nazir MA, Alghamdi L, Alkadi M, Albeajan N, Alrashoudi L, Alhussan M. The burden of diabetes, its oral complications and their prevention and management. Open Access Maced J Med Sci. 2018;6(9):1545.
17. Polak D, Sanui T, Nishimura F, Shapira L. Diabetes as a risk factor for periodontal disease—plausible mechanisms. Periodontol 2000. 2020;83:46-58.
18. Chen YF, Zhan Q, Wu CZ, Yuan YH, Chen W, Yu FY, et al. Baseline HbA1c level influences the effect of periodontal therapy on glycemic control in people with type 2 diabetes and periodontitis: a systematic review on randomized controlled trials. Diabetes Ther. 2021;12(5):1249-78.
19. Hayashi J, Hasegawa A, Hayashi K, Suzuki T, Ishii M, Otsuka H, et al. Effects of periodontal treatment on the medical status of patients with type 2 diabetes mellitus: a pilot study. BMC Oral Health. 2017;17(1):1-6.
20. Baeza M, Morales A, Cisterna C, Cavalla F, Jara G, Isamitt Y, et al. Effect of periodontal treatment in patients with periodontitis and diabetes: systematic review and meta-analysis. J Appl Oral Sci. 2020;28:e20190248.
21. Radmand SS. Effect of non-surgical periodontal treatment on glycemic control and periodontal status in diabetes mellitus type 2 patient with chronic periodontitis. A systematic review. 2018.
22. Chambrone L, Wang HL, Romanos GE. Antimicrobial photodynamic therapy for the treatment of periodontitis and peri-implantitis: An American Academy of Periodontology best evidence review. J Periodontol. 2018;89(7):783-803.
23. Unniachan AS, Jayakumari NK, Sethuraman S. Association between Candida species and periodontal disease: A systematic review. Curr Med Mycol. 2020;6(1):63.
24. Zomorodian K, Kavousi F, Pishdad GR, Mehriar P, Ebrahimi H, Bandegani A, et al. Prevalence of oral Candida colonization in patients with diabetes mellitus. J Mycol Med. 2016;26(2):103-10.
25. Vila T, Sultan AS, Montelongo-Jauregui D, Jabra-Rizk MA. Oral candidiasis: a disease of opportunity. J Fungi (Basel). 2020;6(1):15.
26. Al-Nasser L, Lamster IB. Prevention and management of periodontal diseases and dental caries in the older adults. Periodontol 2000. 2020;84:69-83.
27. De Lima AKA, Amorim dos Santos J, Stefani CM, Almeida de Lima AD, Damé-Teixeira N. Diabetes mellitus and poor glycemic control increase the occurrence of coronal and root caries: a systematic review and meta-analysis. Clin Oral Investig. 2020;24(10):3801-12.
28. Ribeiro BA, Vieira Lima CP, Alves LS, Damé-Teixeira N. Impact of detection criteria on coronal and root caries estimates in adults with and without type 2 diabetes mellitus. Clin Oral Investig. 2022;1-9.
29. Wade WG. Resilience of the oral microbiome. Periodontol 2000. 2021;86(1):113-22.
30. Atchison KA, Weintraub JA, Rozier RG. Bridging the dental-medical divide: Case studies integrating oral health care and primary

health care. J Am Dent Assoc. 2018;149(10):850-8.
31. Preshaw PM, Bisset SM. Periodontitis and diabetes. Br Dent J. 2019;227(7):577-84.
32. Sundar C, Ramalingam S, Mohan V, Pradeepa R, Ramakrishnan MJ. Periodontal therapy as an adjunctive modality for HbA1c reduction in type-2 diabetic patients. J Educ Health Promot. 2018;7:152.
33. Li Q, Hao S, Fang J, Xie J, Kong XH, Yang JX. Effect of non-surgical periodontal treatment on glycemic control of patients with diabetes: a meta-analysis of randomized controlled trials. Trials. 2015;16:291 Kapoor A, Malhotra R, Grover V, Grover D. Systemic antibiotic therapy in periodontics. Dent Res J (Isfahan). 2012;9(5):505-15.
34. Kapoor A, Malhotra R, Grover V, Grover D. Systemic antibiotic therapy in periodontics. Dent Res J (Isfahan). 2012;9(5):505-15.
35. Jain A, Gupta J, Bansal D, Sood S, Gupta S, Jain A. Effect of scaling and root planing as monotherapy on glycemic control in patients of Type 2 diabetes with chronic periodontitis: A systematic review and meta-analysis. J Indian Soc Periodontol. 2019;23(4):303.
36. Rodrigues CF, Rodrigues ME, Henriques M. Candida sp. Infections in Patients with Diabetes Mellitus. J Clin Med. 2019;8(1):76.
37. Parakh MK, Ulaganambi S, Ashifa N, Premkumar R, Jain AL. Oral potentially malignant disorders: clinical diagnosis and current screening aids: a narrative review. Eur J Cancer Prev. 2020;29(1):65-72.
38. Coelho AS, Amaro IF, Caramelo F, Paula A, Marto CM, Ferreira MM, et al. Dental caries, diabetes mellitus, metabolic control and diabetes duration: A systematic review and meta-analysis. J Esthet Restor Dent. 2020;32(3):291-309.
39. Kocher T, Holtfreter B, Petersmann A, Eickholz P, Hoffmann T, Kaner D, et al. Effect of periodontal treatment on HbA1c among patients with prediabetes. J Dent Res. 2019;98(2):171-9.
40. Genco RJ, Graziani F, Hasturk H. Effects of periodontal disease on glycemic control, complications, and incidence of diabetes mellitus. Periodontol 2000. 2020;83:59-65.