

# The Connection between Oral Health and Systemic Health: How Dentistry Can Help Prevent Chronic Diseases

Majid Mohammad Alshammari<sup>1\*</sup>, Nasser mohammedaldhafeeri<sup>2</sup>, Mohammed Khaled Almutlaq<sup>3</sup>, Mohammed Khalif Aldhafeeri<sup>4</sup>, Hamad Ghafel Aldhfeeri<sup>5</sup>, Nasser Siran Alharbi<sup>6</sup>, Yazeed aied Alrawili<sup>7</sup>

<sup>1</sup>General Dentist - Aziziyah Dental center - HafarAlbaten -Saudi Arabia, Email:Malshammari108@moh.gov.sa

<sup>2</sup>Consultant internal medicine-king khalid general hospital, Email:namoaldhafeeri@moh.gov.sa

<sup>3</sup>General Dentist - Qassim - Qwarah - Saudi Arabia, Email:Mkalmutlaq@moh.gov.sa

<sup>4</sup>General Dentist - Dental center- HafarAlbaten -Saudi Arabia, Email:mokhaldhafeeri@moh.gov.sa

<sup>5</sup>Resident doctor - king khaled hospital - hafaralbatan -saudi Arabia, Email:Hgaldhafeeri@moh.gov.sa

<sup>6</sup>General Dentist - Albaladiyahcentar-HafarAlbaten-Saudi Arabia, Email:Nalharbi165@moh.gov.sa

<sup>7</sup>General Dentist - Public health and community health- Hafar Albaten -Saudi Arabia,

Email:Yalrawili@moh.gov.sa

\*Corresponding Author

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## ABSTRACT

Recent studies have increasingly demonstrated that oral health is closely linked to systemic health, with oral diseases playing a role in the risk and advancement of various chronic health issues. This article examines the relationship between oral health and systemic illnesses like cardiovascular disease, diabetes, respiratory issues, and various cancers. We also explore the preventative function dentistry can serve in addressing these risks, emphasizing both the biological processes at play and the possibilities for early interventions within dental environments.

**Keywords:** cardiovascular disease, diabetes, respiratory issues, various

## INTRODUCTION

Oral health has traditionally been considered separately, emphasizing the prevention of cavities, gum issues, and upkeep of oral cleanliness. Nevertheless, as studies grow, it becomes evident that oral health is essential to overall well-being. Inadequate oral health has been associated with the onset and worsening of various chronic illnesses, highlighting the necessity for a more comprehensive approach to dental care. By recognizing the links between oral health and overall health issues, dentists can take an active approach in preventing chronic illnesses, which may lower their occurrence and effects.

### Oral-Systemic Connection: Biological Mechanisms

The processes that connect oral health to systemic diseases are intricate, involving various pathways and elements like chronic inflammation, bacterial migration, and immune reaction.

**Chronic Inflammation:** Dental issues such as periodontitis result in ongoing inflammation. Persistent inflammation is recognized as a risk factor for conditions such as cardiovascular disease (CVD), diabetes, and even Alzheimer's disease. In periodontal disease, inflammation in the gums caused by bacteria can release inflammatory markers into the bloodstream, affecting other regions of the body.

**Bacterial Translocation:** The mouth contains a varied microbiome, with harmful bacteria that can infiltrate the bloodstream via the gums, especially in those with periodontal issues. These bacteria may spread to far-off organs, possibly causing or aggravating issues such as endocarditis or respiratory illnesses.

## Key Systemic Diseases Linked to Oral Health

### 1. Cardiovascular Disease (CVD)

Research has found that individuals with periodontal disease have a higher risk of developing cardiovascular diseases. One theory is that the bacteria from gum disease can enter the bloodstream, leading to arterial plaque formation and inflammation. Studies indicate that people with periodontitis are at a 25-30% higher risk of CVD.

### 2. Diabetes

Diabetes and periodontal disease have a bidirectional relationship: diabetes increases the risk of gum disease, and severe periodontitis can exacerbate diabetes by impairing glycemic control. Inflammation from periodontal disease may worsen insulin resistance, making blood sugar levels harder to control and increasing diabetes-related complications.

### 3. Respiratory Diseases

Oral health can also impact respiratory health. Bacteria in the mouth can be inhaled into the lungs, especially in older adults or individuals with compromised immunity, contributing to infections like pneumonia. The mouth can be a reservoir for pathogens that worsen respiratory diseases, emphasizing the importance of oral hygiene for individuals with chronic respiratory conditions.

### 4. Cancer

Emerging research suggests a potential link between poor oral health and certain cancers, particularly oral, pancreatic, and gastrointestinal cancers. The inflammatory and bacterial burden associated with chronic gum disease may play a role in cellular changes that predispose individuals to cancer. While the exact mechanisms are still being investigated, oral bacteria and inflammatory markers are known to influence cancer pathways.

## The Role of Dentistry in Chronic Disease Prevention:

### Early Detection and Intervention in Dentistry: The Gateway to Systemic Health

Dentists hold a unique position in healthcare, often seeing patients more regularly than general physicians. This frequent contact allows them to notice subtle changes in oral health that may indicate the early stages of systemic diseases. Studies have shown that certain oral conditions can serve as "red flags" for systemic diseases like cardiovascular disease, diabetes, and others. Through routine check-ups and preventive care, dentists can provide early warning signs and help initiate interventions that can significantly improve patient outcomes.

### 1. Periodontal Disease as an Indicator of Systemic Health Risks

Periodontal (gum) disease, characterized by inflamed and infected gums, is among the most common oral health issues. It can often signal broader health concerns due to its association with systemic inflammation. Chronic periodontitis, for instance, is a known indicator of diabetes and cardiovascular risk. For example:

- **Diabetes:** Periodontal disease and diabetes have a bidirectional relationship. People with diabetes are more prone to gum disease due to immune system compromise, but untreated periodontal disease can also worsen blood glucose control, leading to poor diabetes management.
- **Cardiovascular Disease:** Inflammation is a shared factor between gum disease and cardiovascular disease (CVD). Chronic periodontal infection may contribute to arterial inflammation, potentially accelerating the development of atherosclerosis (plaque buildup in arteries). Dentists who recognize signs of severe periodontitis may, therefore, refer patients for cardiovascular evaluations, especially in those with other risk factors like high blood pressure. CVD refers to heart and blood vessel conditions like atherosclerosis, coronary heart disease, stroke, and myocardial infarction. It is caused by a combination of genetic and environmental factors. Chronic infection and inflammation have been linked to CVD, with biofilm acting as a predisposing factor.

The link between oral bacteria and cardiac disease is not a new finding in the literature. Oral bacteria, such as *Streptococcus mutans* (cariogenic) and *Porphyromonas gingivalis* (periodontitis), can cause platelet aggregation and thrombus formation. According to the literature, 42% of atheromas in patients with severe periodontal disease have one or more periodontal pathogens present. *P. gingivalis* has been shown to actively invade fetal bovine heart and aortic endothelial cells.

A 14-year study found that patients with periodontal disease were 25% more likely to develop CVD than those who were orally healthy.

Men younger than 50 with periodontal disease are 72% more likely to develop CVD. Periodontal disease increased the risk of strokes, both fatal and non-fatal, by twofold. Although there is strong evidence of a link between periodontal disease and CVD, it is unclear whether it is a direct or causal relationship.

Periodontal disease releases bacteria that can enter the circulation and invade

- **Rheumatoid arthritis:** Periodontitis has been directly associated with rheumatoid arthritis, in which the presence of both periodontal inflammation and high numbers of periodontopathic bacteria have been associated with the onset of rheumatoid arthritis and increased rheumatoid arthritis disease activity. Furthermore, the presence of periodontal inflammation appears to affect rheumatoid arthritis treatment when using synthetic and biologic disease-modifying antirheumatic drugs, since it reduces their efficacy. On the other hand, nonsurgical periodontal therapy seems to play a role in the control of rheumatoid arthritis disease activity, through the reduction of C-reactive protein, erythrocyte sedimentation rate, 28-joint disease activity score with erythrocyte sedimentation rate, and rheumatoid arthritis disease clinical activity levels, and also by improving the control of rheumatoid arthritis activity in patients that do not respond to biologic disease-modifying antirheumatic drugs. Considering these data, both the medical and

dental professions must be aware of the importance of periodontal health in rheumatoid arthritis patients, and therefore, efforts must be implemented to prevent and treat periodontal diseases in these patients.

## 2. Detecting Other Early Signs Through Oral Health Examination

Dental professionals are trained to recognize signs that may indicate systemic issues beyond the oral cavity. For instance:

- **Erosions and Lesions:** Specific types of lesions or erosions in the mouth can indicate gastrointestinal issues, such as acid reflux or certain autoimmune conditions.
- **Dry Mouth and Gum Swelling:** Chronic dry mouth can be an early sign of Sjögren's syndrome, a systemic autoimmune condition. Gum swelling, discoloration, and other unusual gum tissue changes might indicate immune or hormonal imbalances.
- **Oral Cancer Screenings:** Dentists routinely screen for oral cancer, identifying suspicious lumps, lesions, or discolorations that may be precursors to cancer. Detecting cancer early in the oral cavity, where it can be easier to treat, is a significant health benefit of regular dental visits.

## 3. Routine Check-ups as Preventive Health Visits

Routine dental check-ups serve as preventive visits, offering dentists a chance to monitor subtle changes over time that could signal systemic health shifts. Dental visits are ideal for spotting early disease markers, as they often involve a detailed examination of the gums, teeth, tongue, throat, and other tissues. When these visits occur regularly:

- Dentists can identify deviations from a patient's usual oral health that could indicate issues like vitamin deficiencies, diabetes-related oral changes, or even systemic infections.
- Patients who might not frequently visit a primary care doctor can still benefit from regular health monitoring, as their dental provider may identify areas of concern and refer them to appropriate medical specialists.

## 4. Patient Education as a Key Preventive Strategy

By educating patients on the link between oral and systemic health, dentists can empower them to manage their health holistically:

- **Discussing Oral-Systemic Links:** Dentists can inform patients about how oral health impacts systemic conditions, emphasizing the need for oral hygiene routines, balanced nutrition, and habits like smoking cessation, which affect both oral and systemic health.
- **Customized Oral Health Plans:** For patients with existing chronic conditions, dentists can offer tailored care plans. For instance, a patient with diabetes may need more frequent cleanings and specialized periodontal care to maintain gum health and avoid infection.
- **Monitoring at-Home Health:** Through guidance on at-home care, such as proper brushing, flossing, and managing symptoms like dry mouth, dentists can help patients maintain a proactive stance in their oral health, which, in turn, supports systemic well-being.

## 5. Collaborative Health Model: Dentistry and Primary Care

Dentists can also contribute to a collaborative health model by working closely with primary care physicians. When dental issues indicate systemic risks, dentists can share their findings with patients' physicians, enabling a more comprehensive approach. By fostering a partnership with primary care providers:

- **Co-Management of Conditions:** Dentists and physicians can jointly manage conditions like diabetes or CVD, creating integrated care plans that address both oral and systemic health.
- **Timely Referrals and Follow-Ups:** Dentists can refer patients to primary care or specialists for further evaluation of health concerns flagged during dental visits, ensuring patients receive timely diagnosis and treatment.

## Non-Invasive Screening in Dental Practices: Enhancing Early Detection of Systemic Diseases

Non-invasive screenings in dental settings represent a progressive approach to health care, allowing dental professionals to screen for potential systemic issues with minimal discomfort for the patient. As research continues to illuminate the link between oral health and chronic diseases, integrating health screenings into routine dental visits can provide a critical early warning system, benefiting patients and the healthcare system as a whole. Below, we explore the different types of non-invasive screenings that can be incorporated into dental practices, their benefits, and their impact on patient health.

### 1. Blood Pressure Monitoring

Regular blood pressure checks are one of the simplest and most informative non-invasive screenings that dentists can incorporate into routine exams. High blood pressure is often called a "silent killer" because it can

progress without noticeable symptoms, leading to increased risk for heart disease, stroke, and other serious conditions. By routinely measuring blood pressure, dentists can identify patients who may not be aware of their hypertension risk and guide them toward further medical evaluation and management.

- **Benefits of Early Blood Pressure Detection:** Dentists who identify elevated blood pressure in patients can play a critical role in their health by:
  - Encouraging patients to seek further evaluation by a primary care provider or cardiologist.
  - Offering education on lifestyle changes, such as reducing salt intake and managing stress, which can help manage blood pressure.
  - Reducing the risk of sudden complications during dental procedures, particularly if anesthesia or sedation is involved.
- **Implementation in Practice:** Blood pressure checks are quick and require minimal equipment. Dentists or dental hygienists can incorporate this screening before any procedures, ensuring patients with high blood pressure receive appropriate referrals for follow-up care.

## 2. HbA1c Testing for Diabetic Patients

HbA1c tests measure average blood sugar levels over the past 2-3 months, providing insights into a patient's long-term glucose control. Elevated HbA1c levels indicate poor blood sugar management, increasing the risk for complications in people with diabetes and also making them more susceptible to oral conditions like periodontal disease.

- **Benefits of HbA1c Testing:**
  - **Early Detection of Diabetes:** Patients with undiagnosed or pre-diabetes may present with elevated HbA1c levels. This early detection can lead to timely intervention, helping patients avoid severe complications of diabetes.
  - **Monitoring for Diabetic Patients:** For patients already diagnosed with diabetes, HbA1c tests in a dental setting can help monitor their disease status, especially if they are not consistently visiting a primary care provider.
  - **Enhanced Oral Care:** Knowing a patient's HbA1c levels can guide the dental team in developing specialized periodontal care plans, as diabetes increases the risk of gum disease and infections.
- **Implementation in Practice:** Portable HbA1c testing devices are available and can produce results in a matter of minutes. Incorporating HbA1c testing for diabetic or at-risk patients during dental visits is feasible and can be a valuable addition to a dental practice focused on holistic patient care.

## 3. Oral Cancer Screenings

Oral cancer screenings are critical in the early detection of malignancies, as survival rates improve significantly when cancer is detected in its early stages. Dentists have an ideal vantage point to spot potential signs of oral cancer, such as abnormal sores, lumps, or color changes in oral tissues.

- **Benefits of Routine Oral Cancer Screening:**
  - **Early Detection of Malignancies:** Patients are often unaware of early signs of oral cancer, which may not cause pain or discomfort in initial stages. Dentists can detect suspicious lesions and refer patients to specialists for a definitive diagnosis.
  - **Targeted Risk Assessment:** Patients who use tobacco or alcohol, or who have a history of HPV, are at increased risk for oral cancer. Screenings can be prioritized for these higher-risk individuals, catching signs before they advance.
  - **Improved Outcomes:** By identifying suspicious changes early, dentists can help patients receive timely treatment, significantly improving the prognosis and quality of life.
- **Implementation in Practice:** Dentists routinely examine the oral cavity and throat during exams, so adding a systematic oral cancer screening is seamless. Using adjunctive screening tools such as special lights or dyes can enhance visual inspection and detect cellular changes that might not be visible with standard lighting.

## 4. Other Non-Invasive Screenings

Beyond the common screenings for blood pressure, HbA1c, and oral cancer, dental practices can integrate additional screenings as part of a holistic approach to health care:

- **Cholesterol and Glucose Screenings:** Some dental practices have adopted basic finger-prick tests to assess cholesterol or blood glucose levels. Elevated cholesterol is a major risk factor for cardiovascular disease, and basic glucose testing can flag patients who may need a more detailed diabetes assessment.
- **Oxygen Saturation and Respiratory Assessment:** Some patients with respiratory conditions or sleep apnea may benefit from an oxygen saturation check or sleep-related screening questions. Dental appliances for sleep apnea, for example, are often prescribed by dentists, so a basic understanding of respiratory status can help tailor care.

## 5. Impact on Patients and the Healthcare System

Non-invasive screenings in dental practices offer several benefits that extend beyond individual patient care:

- **Comprehensive Patient Care:** These screenings allow dentists to address patient health in a more comprehensive way, aligning oral health practices with systemic health needs.
- **Reduction in Healthcare Burden:** Early detection of systemic issues in dental settings can prevent the need for emergency care and intensive treatment, reducing the overall burden on the healthcare system. For example, addressing hypertension early in a dental setting may prevent a cardiovascular event, which would otherwise require costly and intensive medical intervention.
- **Increased Awareness and Patient Engagement:** Patients who are informed about the connections between oral health and overall health are more likely to engage in preventive measures and take an active role in their wellness, ultimately improving both oral and systemic health outcomes.

## Personalized Oral Health Strategies

Dentists can create personalized oral hygiene plans that consider patients' specific health risks. For instance, a patient with diabetes may need a more intensive periodontal care plan to prevent blood sugar fluctuations. By tailoring oral care strategies to systemic health conditions, dental professionals can make a significant impact on patients' overall health outcomes.

## Challenges and Future Directions

While the link between oral and systemic health is established, challenges remain in integrating dentistry with general healthcare. Lack of awareness among patients and health professionals, insurance limitations, and communication barriers between medical and dental fields hinder a collaborative approach. Future research could focus on deeper understanding and improved methods for integrating dentistry with primary healthcare, ultimately establishing protocols that recognize the essential role of oral health in systemic health.

## CONCLUSION

The connection between oral and systemic health underscores the importance of dentistry in preventing and managing chronic diseases. Through regular screenings, patient education, and proactive treatments, dental care can contribute to the prevention and management of chronic diseases like cardiovascular disease, diabetes, respiratory conditions, and some cancers. As more is understood about the biological connections between the oral cavity and the rest of the body, dentistry can expand its role from focusing solely on oral health to being a crucial player in holistic health.

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