

# Association between Oral and Systemic Health: A Scoping Review

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## Abstract

Impact of optimal oral health on the overall health has emerged as a bidirectional relationship, that is, from oral cavity to the body and vice versa. We as oral health care professionals are in a unique position to identify the oral manifestations of various systemic diseases and play an integral role in public awareness about the importance of better oral health and its systemic linkage. Moreover, elderly population are more afflicted with chronic systemic diseases, particularly diabetes mellitus and respiratory and cardiovascular diseases, and require specialized care and comprehensive education about the influence of poor oral health on the worsening of preexisting systemic diseases. This article aims to highlight the significance of oral health on the overall health and need to increase public awareness about the association of oral and systemic health for optimal well-being.

## Keywords

- ▶ education
- ▶ oral
- ▶ overall health
- ▶ oral systemic link

## Introduction

Impact of oral health on the overall health became apparent in 1989, and since then oral cavity has been described as a window to the general health of the patient. Various cliches like “you cannot have good general health without good oral health” and “the mouth is the mirror of the body” are gaining popularity, indicative of oral and systemic health linkage.<sup>1</sup> Oral cavity is the harbor of diverse group of microorganisms comprising bacteria, fungi, and viruses that play a key role in the maintenance of oral and systemic health. However, when the oral microbiota balance is altered, termed “microbial dysbiosis,” active pathogens evade the host immune response, resulting in a variety of systemic diseases.<sup>2</sup> In 1879, Willoughby D. Miller observed a role of oral microorganisms in

the development of brain abscess and pulmonary and gastric diseases, and stated “oral foci of infection as a cause of systemic diseases.” Focus of infection refers to the localized area of tissue infected with microorganisms and foci of infection may disseminate through the blood stream to organs, thereby resulting in bacteremia, metastatic tissue injury, and inflammation.<sup>3</sup>

Various systemic diseases such as cardiovascular, respiratory, gastrointestinal, kidney, and diabetes mellitus have been linked to oral microorganisms as a potential focus of infection. Among oral diseases, significant relationship has been elucidated between periodontal disease and increased risk of diabetes mellitus, cardiovascular disease, and preterm low birth weight.<sup>1,2</sup> In consideration to above, it is utmost important for oral health care professionals to educate

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patients and the general public regarding the importance of good oral hygiene and its influence on the general health.

### Importance of Patient's History

It is said, "Listen to your patient, they are telling you the diagnosis." Proper history taking has a key role in achieving a diagnosis and it requires good communication between the physician and the patient. Patients complaints and medical history that includes any past/present medical illness, adverse allergic reactions, surgery and use of medications, family history, personal history of oral hygiene maintenance, and presence of deleterious habit of tobacco use, and alcohol consumption should be recorded.<sup>4</sup> The physician should listen to the patient's chief complaint and its associated symptoms carefully and without interruption. The patient should be questioned about the psychological stress, and any trouble he or she is facing due to the current problem. Patients should be assured that we as oral physicians are here to "cure the particular disease." However, it becomes challenging when patients report with multiple concerns. In these scenarios, open conversation with affirmations and active listening help in understanding the patient's perspective, his or her experience, concerns, and impact of the illness on general health and day-to-day function. In some cases, for example, light-headedness may suggest a cardiovascular cause and feeling of giddiness may correlate with an anxiety, etc. A working diagnosis can be achieved by obtaining proper history from the patient; however, in doubtful or suspicious conditions, a thorough physical examination, review of systems, and diagnostic tests can assist in achieving an accurate diagnosis.<sup>4,5</sup>

### Oral Manifestations of Systemic Diseases

Various systemic diseases such as cardiovascular, respiratory, gastrointestinal, renal, hematological, diabetes mellitus, osteoporosis may be accompanied by an oral change that may be nonspecific or specific, indicative of an underlying systemic disease. Diabetes mellitus has become a major global illness affecting more than 171 million people worldwide, characterized by severe periodontal disease, increased susceptibility to infection, and poor wound healing. Diabetic patients may report with symptoms of dry mouth, taste alterations, and burning sensation. Oral candidiasis, lichen planus, denture stomatitis, and an increased rate of dental caries may be observed in patients with diabetes mellitus.<sup>6</sup> Gastrointestinal diseases may manifest as diffuse swelling of lips or face, mouth ulcers, mucosal tags, pigmentation and cobblestone appearance of mucosa, atrophic tongue, and erosion of the enamel.<sup>7</sup> In chronic renal failure patients receiving hemodialysis, dry mouth, mucosal pallor, altered taste, and halitosis known as uremic fetor and metallic taste are commonly observed oral findings. Another uncommon oral finding seen in dialyzed patient is uremic stomatitis that clinically appears as painful plaques or crusts predominantly on the buccal mucosa, ventral surface of the tongue, and floor of the mouth.<sup>8</sup>

Iron deficiency anemia is another public health illness and according to National Family Health Survey Reports, 2004–

2005, around 55% of women in India have been reported to have low hemoglobin levels. It is characterized by mucosal pallor, recurrent oral ulcers, tongue depapillation, burning sensation, angular cheilitis, and dry mouth.<sup>9</sup> In patients suffering from hematological disorders, characteristic oral findings such as mucosal and gingival bleeding, swelling, hemorrhagic petechiae, purpura, ecchymosis, bullae, ulcerations, and atypical bone findings are evident.<sup>10</sup> Cancer is a complex life-threatening disease, and metastatic tumors pose a diagnostic and therapeutic challenge to physicians. Oral metastasis is uncommon and occurs from the metastatic spread of tumor cells from the lung, prostate, and kidney. Clinically they appear as bony swelling with tenderness, submucosal masses, exophytic gingival growth, ulceroproliferative growth associated with pain, bleeding, and trismus.<sup>10</sup> Therefore, thorough clinical examination is essential for accurate diagnosis of metastatic oral lesion.

Coronavirus disease 2019 (COVID-19) has affected millions of people across the globe. Some oral manifestations such as recurrent herpes simplex virus infection, oral ulcerations, geographic tongue, taste alterations, and candidiasis have been found in COVID-19 patients, which may be due to stress, immunosuppression, and hyperinflammatory response to coronavirus.<sup>11</sup>

### Detection of Systemic Diseases

Oral changes give an important clue to diagnose systemic diseases, and early detection through patient's history, clinical examination, and noninvasive methods is essential for optimal well-being of the patient.

Careful clinical examination of any unusual oral finding plays a significant role in detection of underlying systemic lesion. Currently, human saliva as an oral biofluid to detect and monitor the disease progression is capturing interest of the researchers. Collection of saliva is easy, noninvasive, and reflects the physiological and pathological states of the body. Salivary biomarkers are emerging as a promising diagnostic tool in detection of diabetes mellitus; viral infections; autoimmune, neurodegenerative, and cardiovascular diseases; and precancer screening.<sup>12</sup>

Oral changes observed in a patient with an underlying systemic disease can be further diagnosed by radiographic examination. Panoramic radiographs are routinely used screening tools in clinical practice, and various radiographic changes such as alveolar bone loss, loss of lamina dura, and decrease in jawbone density are suggestive of a systemic disease. Poor glycemic control has been reported to correlate positively with alveolar bone loss on radiographs. Thin mandibular cortical width on panoramic radiographs is suggestive of osteoporotic changes and these patients should be referred for bone density testing. Oral physicians have an important role in radiological detection of tumors such as brown tumor lesions in the jaw that arise due to high osteoclastic activity, particularly in hyperparathyroidism and radiographically appear as unilocular or multilocular soap bubblelike radiolucencies. Cancers that metastasize to jaw bones from distant organs appear radiographically as ill-defined lytic or opaque lesions.<sup>13</sup>

Hence, for detection of systemic diseases, proper clinical-radiological correlation is required for better prognosis.

### Oral and Systemic Health Connection

Oral and systemic health per se, are deeply connected. Severe periodontal disease can worsen the glycemic control in type II diabetes mellitus and risk of developing diabetes complications of retinopathy and neuropathy becomes higher.<sup>4</sup> Moreover, oral microbes, particularly *Streptococcus viridans* and *S. sanguis*, have been implicated as a causative agent of bacterial endocarditis characterized by inflammation of the inner lining of the heart.<sup>14</sup> Similarly, oral-derived bacteria can colonize the gut, leading to impaired digestion. Patients often complain of pain while swallowing, bitter taste in the back of the mouth, sensation of lump in the throat, and regurgitation of food. Few patients with gastroesophageal reflux disease (GERD) do not present with symptoms of heartburn, and in these instances, dentists can identify the signs of GERD based on the oral manifestations and patterns of enamel erosion.<sup>1,7</sup> Osteoporosis is a disabling disorder most commonly prevalent in postmenopausal women characterized by decrease in bone density and fragile and weak bones susceptible to fracture. Oral physicians may play a pivotal role in early diagnosis of several oral health problems in postmenopausal women such as periodontal disease, tooth loss and temporomandibular joint disorders.<sup>10</sup>

Oral care should be an integral part of medical care in medically compromised patients suffering from chronic diseases such as human immunodeficiency virus (HIV) infection and cancer.<sup>1</sup> Therefore, health care professionals worldwide should be educated about the requirement for collaborative efforts between medical and dental health care professionals to manage complex chronic diseases. Furthermore, effect of medications such as antihistamines, antihypertensives, calcium channel blockers, antianxiety, antipsychotic drugs, anticoagulants, and immunosuppressants taken by the patient for systemic diseases can adversely affect the oral mucosal tissues, resulting in dry mouth, lichenoid reactions, ulcerations, candidiasis, gingival bleeding, and enlargement. Oral physicians are many a time first to encounter adverse drug reactions in the oral cavity and should take the opinion of the concerned specialist for drug dosage modification or substitution by an alternative drug.<sup>15</sup>

Tobacco usage has become a public health problem, particularly among the youngsters. Initial signs of tobacco usage are seen in the oral cavity as brown staining of the teeth and in mucosal tissues as red or white patches, increased gingival recession, and exposed root surfaces.<sup>16</sup>

### Warning Oral Signs indicative of underlying systemic problems

The warning oral signs which may be indicative of underlying systemic problems include the following<sup>1,10</sup>:

- Chronic nonhealing oral ulcer.
- Mouth or jaw pain.

- Bleeding or swollen gingiva.
- Lump or mass in the mouth.
- Mucosal pallor, tongue depapillation, taste alterations, and burning sensation.
- White or red patches in the mouth.
- Loosening of permanent teeth and premature loss of deciduous teeth.
- Persistent bad breath, dry mouth, and fissuring at angles of the mouth.
- Presence of nonscrapable white or red patches.
- Nonhealing extraction site.

### Need for Educating the Patients

Oral health care professionals are at the forefront in screening of oral diseases and in educating patients about the connection between oral health and systemic health. Counseling of patient about optimal oral health is an effective way to make them familiar with oral signs of various systemic diseases. Patients' perception of a dental practitioner as a physician is essential for adherence to the counseling sessions and treatment compliance. Practitioners should have proactive verbal communication skills to impart comprehensive education to the patient. It has been well established that gingivitis, or bleeding gums, is the first oral sign of poor oral hygiene; therefore, plaque control is the initial step toward optimal gingival health.<sup>10,17</sup> Patients should be emphasized the need to maintain good oral hygiene, schedule regular dental visits, to use antibacterial mouth washes, to brush teeth twice daily, floss daily, replace toothbrush after 3 months if the bristles get splayed, limit the foods with added sugar, and avoid alcohol and tobacco consumption.<sup>18</sup> Elderly population should be provided specialized care and education for healthy aging, that is, to maintain functional ability in the older age. Educational and motivational symposiums may be organised by the dentists and the physicians combined, to make the patients aware of the association between oral and systemic health.

### Conclusion

Oral health and systemic health are closely associated with each other. It is imperative that both the dentists and the physicians work in complete symbiosis so as to provide best of care to the patients. Also, more efforts need to be taken to make the patients aware about the association between oral and systemic health.

#### Conflict of Interest

None declared.

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