ORAL MANIFESTATIONS OF SYSTEMIC DISEASES: A REVIEW

Richa Wadhawan*, Gaurav Solanki, Sabreena Sabir, Saba Palekar, Aditi Pareekh

Jodhpur Dental College General Hospital, Jodhpur, Rajasthan, India.

ABSTRACT

The oral cavity is an important anatomical location with a role in many critical physiologic processes. It is unique for the presence of exposed hard tissue surrounded by mucosa. Truly the oral cavity is a mirror that reflects and unravels many of the human body's internal secrets. The oral cavity might well be thought as window to the body because oral manifestations accompany a wide array of systemic diseases. In many instances, oral involvement precedes the appearance of other symptoms or lesions at other locations. These oral manifestations must be properly recognized if the patient is to receive appropriate diagnosis and referral for further treatment. This article is intended to highlight the lesions of oral mucosa, dentition, salivary glands, facial skeleton, extra-oral skin and other related structures that related to or are caused by some of the more common systemic diseases, and hope to provide ample insight for physicians, dentists, and clinicians.

Keywords: Oral Manifestations, Haematological Disorders, Nutritional Disorders, Metabolic Disorders, Gastrointestinal Diseases.

INTRODUCTION

The oral cavity is an important anatomical location with a role in many critical physiologic processes, such as digestion, respiration, and speech. It is also unique for the presence of exposed hard tissue surrounded by mucosa. The mouth is frequently involved in conditions that affect the skin or other multiorgan diseases. In many instances, oral involvement precedes the appearance of other symptoms or lesions at other locations. This article is intended as a general overview of conditions that have oral manifestations but also involve other organ systems [1].

A) GASTROINTESTINAL DISEASES

Oral cavity is the portal of entry to the gastrointestinal tract (GIT). Lined by stratified squamous epithelium, the tissues of the mouth are often involved when individuals have conditions affecting the gastrointestinal system. These may be immune-mediated or chemically mediated processes. Some have postulated that increased dental health and oral hygiene have led to an immunological imbalance and increased propensity for autoimmunity [2].

Crohn’s Disease

It is an idiopathic disorder that can involve the entire GIT with transmural inflammation, non caseating granulomas and fissures. This disease is most common in Western countries and is slightly more prevalent among white males. Incidence is bimodal with peak in second and third decades of life and later occurring in the sixth and seventh decades. Symptoms of Crohn’s disease include intermittent attacks of diarrhoea, constipation, abdominal pain, and fever. Patients may develop mal absorption and subsequent malnutrition.

Intraoral involvement in Crohn’s disease occurs in 8-29% of patients and may precede intestinal involvement. Orofacial symptoms of Crohn’s disease include (1) diffuse labial, gingival, or mucosal swelling; (2) cobbledstoning of the buccal mucosa and gingiva; (3) aphthous stomatitis; (4) mucosal tags; and (5) angular cheilitis. Noncaseating granulomas are characteristic of orofacial Crohn disease. Labial swelling is most often a cosmetic complaint, but it can be a painful manifestation of the disease. Gingival and mucosal involvement may cause difficulty while eating. Increased dental caries and nutritional deficiencies may be related to decreased saliva production and mal absorption in the intestinal tract.

Corresponding Author:- Richa Wadhawan Email:- richawadhawan@gmail.com
manifestations can prove crucial in diagnosis and usually parallel the intestinal disease course. Oral involvement may precede systemic manifestations and symptoms. The severity of oral lesions may coincide with the severity of the systemic disease, and it may be used as a marker for intestinal impairment [3].

**Ulcerative Colitis**
Ulcerative colitis is an inflammatory condition with some similarities to Crohn’s disease. However, it is restricted to the colon and is limited to the mucosa and submucosa, sparing the muscularis. Ulcerative colitis is characterized by periods of exacerbation and remission, and generally oral lesions coincide with exacerbations of the colonic disease. Mucosal changes have been reported in some patients with ulcerative colitis. Pyostomatitis vegetans is specific oral manifestation of ulcerative colitis. Glossitis, cheilitis, halitosis, gastroesophageal reflux are some other oral manifestations. Regurgitation of gastric content reduces the pH of the oral cavity below 5.5; this acidic pH begins to dissolve enamel. pH has been noted to be significantly lower in individuals with GERD. It is most commonly seen on the palatal surfaces of the maxillary dentition. Erosion of the enamel exposes the underlying dentin, which is a softer, more yellow material. Good dental care and control of acid helps decrease the prevalence of erosion. However, once the erosion occurs, it is irreversible and can only be treated with surgical restorative procedures. Therefore, early recognition and patient education is the most effective treatment [4].

**B) CONNECTIVE TISSUE DISORDERS**

**Sjögren’s Syndrome**
It is the second most common autoimmune disease, affecting as many as 3% of women aged 50 years or older. The sex predilection is profound; approximately 90% of patients are female. Primary sjogren syndrome is characterized by sicca syndrome, keratoconjunctivitis sicca and xerostomia. A secondary form is associated with rheumatoid arthritis. Oral changes in Sjögren syndrome include difficulty in swallowing and eating, disturbances in taste and speech, increased dental caries and a predisposition to infection, all due to a decrease in saliva. These changes are nonspecific for Sjögren syndrome because they may occur in any condition associated with diminished saliva production. Saliva can be thick,ropy and mucinous, or it may be altogether absent. The mucosal changes typical of xerostomia include dry, red and wrinkled mucosa. The tongue may exhibit a cobblestone like appearance due to atrophy of the papillae. Candidiasis is common in persons with Sjögren syndrome. In Sjögren syndrome, lymphocytic infiltrates surround the salivary gland and lacrimal gland ducts. The inflammation and resultant epithelial hyperplasia render the ducts blocked and useless. This leads to atrophy of the acini, fibrosis and hyalinization of the gland. These changes are irreversible, although certain medications can help to maximize saliva production from the remaining functional glandular tissue. Taken together, these facts reinforce the philosophy that good oral hygiene and frequent dental visits are essential in minimizing the deleterious effects of compromised salivary flow [5].

**Kawasaki Disease**
Kawasaki disease, or mucocutaneous lymph node syndrome, is a vasculitis that affects medium and large arteries with a corresponding cutaneous lymph node syndrome. Children younger than 5 years are most commonly affected. Patients present acutely with edema, erythema of the hands and feet, fever, oral erythema and rash. The associated temperature must exceed 38.5°C (101.3°F) for 5 days to meet diagnostic criteria. For diagnosis, four of the five following criteria must also be met: (1) peripheral extremity edema, erythema, or desquamation; (2) polymorphous exanthem; (3) bilateral conjunctival injection; (4) erythema and strawberry tongue in the oral cavity; and (5) acute cervical adenopathy. Oral findings include swelling of papillae on the surface of the tongue (strawberry tongue) and intense erythema of the mucosal surfaces. Ulceration in the oral cavity is a common presenting sign in a majority of patients. The labia are cracked, cherry red, swollen, and hemorrhagic [6].

**Wegener Granulomatosis**
It is a necrotizing vasculitis of small-to-medium vessels associated with necrotizing granulomas of the upper and lower airways and necrotizing glomerulonephritis. Early diagnosis of this disease is essential in order to prevent the irreversible glomerular damage that can lead to death. Oral involvement in Wegener granulomatosis is common, and autopsy studies of patients with the disease show this site is affected in nearly all cases.

Oral lesions include ulcerations and gingival enlargement. The oral ulcerations, which occur on the buccal mucosa or palate, are the most common but least specific oral lesions. The characteristic gingival appearance of Wegener granulomatosis is a pathognomonic finding termed "strawberry gingivitis," although it is less common than other findings. The gingival take on a characteristic swollen, reddened and granular appearance. Initially, bright red-to-purple friable diffuse papule originate on the labial interdental papillae. Involvement may eventually include the lingual and palatal mucosa. Tooth and alveolar bone loss are common. Oral and skin manifestations may correlate with disease progression, thereby providing prognostic value. The discovery of oral lesions during the physical examination can direct the appropriate confirmatory tests.
Sarcoidosis

It is an idiopathic systemic disease characterized by bilateral hilar lymphadenopathy and noncaseating granulomas in the lungs. Ocular and cutaneous manifestations are common. Sarcoidosis may involve nearly any organ system; organs involved include the liver, heart, spleen, eyes, kidneys and lymph system. Oral manifestations may include multiple, nodular, painless ulcerations of the gingiva, buccal mucosa, labial mucosa and palate. Indistinct ulcerations or swellings do not aid in diagnosing sarcoidosis, but biopsy results reveal noncaseating granulomas surrounded by multinucleate giant cells along with lymphocytic infiltrate. Although less common, salivary gland involvement is a possibility, leading to tumor-like swellings. Heerfordt syndrome may arise if symptoms include parotid gland swelling, xerostomia, uveitis and facial nerve palsy. Rarely, sarcoidosis may involve the tongue, including swelling, enlargement, and ulcerations [8].

C) MULTISYSTEM CONDITION

Amyloidosis

It is the deposition of amyloid proteins in body tissues leading to tissue damage. Amyloidosis is classified as either primary or secondary. The former results from multiple myeloma or an idiopathic disease, while the latter is a sequela of a chronic or inflammatory disease process. These classifications are based on the type of fibrillar protein deposited. The primary form usually affects the skin, heart, tongue, and GI tract while the secondary form, although more common, has no cutaneous manifestations.

The most common oral manifestation of amyloidosis is macroglossia, which occurs in 20% of patients. The enlarged tongue demonstrates lateral ridging due to teeth indentation. Although pain is not usually present, enlargement, firmness, and loss of mobility are common. Grossly, the tongue may be firm and appear relatively normal or it may have yellow nodules on the lateral surface. Interference with taste has also been reported in some patients, and hyposecretion may result from amyloid deposition in the salivary glands. Submandibular swelling occurs subsequent to tongue enlargement and can lead to respiratory obstruction. Rarely, oral ulceration may present [9].

D) METABOLIC DISORDERS

Langerhans Cell Histiocytosis

Langerhans cell histiocytosis has replaced the term histiocytosis X, a condition of unknown etiology and pathogenesis characterized by abnormal proliferation of histiocytes and eosinophils. It may manifest with either localized proliferation or more extensive systemic involvement. One form, previously referred to as Letterer-Siwe disease, is most common in infants and is characterized by widespread involvement of the viscera, potentially leading to death. Oral symptoms include large ulcerations, ecchymoses, gingivitis, periodontitis and subsequent tooth loss. A more localized variant, primarily referred to as Hand-Schüller-Christian disease, is a childhood disease that consists of the triad of diabetes insipidus, lytic bone lesions, and proptosis. Oral manifestations include irregular ulcerations of the hard palate, which may be the primary manifestation of the disease. Gingival inflammation and ulcerated nodules, difficulty in chewing and foul-smelling breath also occur. The most common form of Langerhans cell histiocytosis is the eosinophilic granuloma type, which develops in young adults and demonstrates rapid, progressive alveolar bone loss with dental extrusion, producing the characteristic appearance of "floating teeth." Oral swellings or ulcerations resulting from mandibular or maxillary bone involvement are common. Oral ulcerations may develop on the gingiva, palate and floor of the mouth, along with a necrotizing gingivitis. Oral lesions may occur without underlying bone destruction. In these rare cases, ulceration of the palate or gingiva may be the primary oral sign [10].

ORAL MANIFESTATIONS OF AIDS

In the 20 years since the onset of the HIV pandemic, a number of oral and cutaneous entities have been recognized to be associated with HIV disease.

Candidiasis

Oral candidiasis is often the first presenting sign of HIV infection, and it may occur in as many as 90% of patients infected with HIV. Pseudomembranous candidiasis is the most common presentation in HIV-infected individuals. This is characterized by white or whitish-yellow papules that can be wiped from the oral mucosa to reveal erosions or erythematous mucosa. These often manifest on the buccal mucosa, palate, and vestibule, although any surface may be involved. The frequency of candidal infection increases as HIV disease progresses (i.e., as viral loads increase and CD4 lymphocyte counts decline) [11].

Herpes simplex

Immunodeficiency, as seen with HIV disease, permits reactivation of latent herpes infections. Until disproved, all perineal and orolabial ulcerations should be evaluated for HSV in patients who are infected with HIV. Compared with individuals who are immune competent, HSV infection in a patient who is HIV positive is more aggressive, prolonged, and diffuse. Although the keratinized mucosa is usually infected, HSV lesions can manifest on non keratinized surfaces in immune compromised hosts. These include the labial mucosa,
ventral tongue, floor of the mouth, buccal mucosa, and the soft palate. Herpetic lesions may extend to other areas, including the tonsillar pillars and the esophagus [12].

**Hairy Leukoplakia**

Hairy leukoplakia caused by Epstein bar virus, most commonly manifests as corrugated white plaques most commonly on the lateral portions of the tongue. These plaques can range in appearance from very thin and homogenous to a thickened, rough area that mimics hyperplastic candidiasis. Hairy leukoplakia remains the most specific manifestation of HIV disease to occur in the mouth, and its presence has prognostic implications for the progression to AIDS because patients rarely manifest the condition with CD4 counts greater than 200 cells/µL [13].

**Kaposi Sarcoma**

KS is the most common malignancy in patients who are HIV positive. Prior to the introduction of HAART, KS occurred in nearly 15% of patients with AIDS, but this has decreased dramatically in the age of HAART. Intraorally, KS appears as brown, bluish, purple, or red patches or papules on the hard palate, mucosa, and gingiva. The initial lesions are flat macules or patches on the mucosal surface, but, over time, they become nodular and often ulcerate and bleed. KS can also manifest on the skin, with lymph node enlargement, and in the salivary glands [14].

**Cytomegalovirus**

Cytomegalovirus (CMV) is a double-stranded DNA virus that is fairly common in the general population, with approximately 60% of people being seropositive but asymptomatic. Symptomatic disease does not usually occur unless the patient has undergone organ or bone marrow transplantation, has HIV disease, or is immunocompromised in some other way. In patients who are immunocompromised, the infection rarely manifests intraorally. However, when it does, CMV produces deep, penetrating oral ulcerations on the lips, tongue, pharynx, or any mucosal site having a punched-out look with rolled, erythematous borders [15].

**Human Papillomavirus**

As with the human herpes viruses, human papilloma virus infections are more common in individuals with HIV disease. The papillomas or condylomas appear on the gingiva and sometimes the lips and labial mucosa; they are soft pink masses with a characteristic papillary surface texture [16].

**Aphthous like Ulcerations**

In immune competent individuals, these ulcerations usually affect only the non keratinized surfaces of the oral cavity. However, in immune compromised hosts, these ulcerations can appear anywhere. Although three forms of recurrent aphthous ulcerations are recognized (ie, minor, major, herpetiform), the major form is more common in persons with HIV disease. The appearance of these lesions in an HIV-infected patient is a reliable indicator of severe immunodeficiency and disease progression [17].

**ORAL MANIFESTATIONS OF ENDOCRINAL DISORDERS**

**Diabetes**

Shrimali et al. observed hyposalivation as the most common oral manifestation, seen in 68%, followed by halitosis in 52%, periodontitis in 32%, burning mouth sensation in 32%, candidiasis and taste alteration in 28% of cases with controlled DM. In the same study, subjects with uncontrolled DM also presented with these manifestations, with hyposalivation seen in 84%, followed by halitosis in 76%, periodontitis in 48%, taste alteration in 44%, candidiasis in 36%, and burning mouth sensation in 24% [18].

**Addison’s disease (Hypoadrenocorticism):** It occurs due to insufficient production of adrenal corticosteroid hormones due to destruction of the adrenal cortex. Oral signs include diffuse or patchy brown macular pigmentation of the oral mucosa caused by excess melanin production. Oral signs often precede skin hyperpigmentation [19].

**E). HEMATOLOGICAL DISORDERS**

**Anemias**

It is a condition in which there is a deficiency of red cells or of haemoglobin in the blood, resulting in pallor and weariness. There are various oral manifestations of different types of anaemia.

**Pernicious Anaemia**

It is due to deficiency of intrinsic factor namely mucoprotein in stomach. The intrinsic factor is necessary for absorption of vitamin B₁₂ which is essential for erythropoiesis. Oral manifestations include pallor mucosa. The tongue is inflamed and beefy red in colour either entirely or partly. Small shallow ulcers like aphthous ulcers can be seen. The papilla undergoes atrophy with loss of papillae and becomes smooth or bald glossitis with glossopyrosis and glossodynia. This is called Hunter glossitis or Moeller’s glossitis [20].

**Aplastic Anemia**

It is caused by lack of bone marrow activity, reduction of red blood cell count, white blood cell count and platelets which causes pancytopenia. Oral manifestations include pale & atrophic oral mucosa; smooth, bald and sore tongue, angular stomatitis, bleeding from the gingiva due to deficiency of platelets [21].
Thalassemia

This is a type of anemia where the haemoglobin of RBC is affected and this is more of racial disease affecting Italian, Greek, Syrian and American in nature. This is hereditary disease – a congenital defect of globin synthesis resulting in formation of unstable haemoglobin. Oral manifestations include an unusual prominence of the premaxilla irregularly arranged maxillary teeth and pale oral mucosa color [22].

Megaloblastic Anaemias

Megaloblastic anaemias are a subgroup of macrocytic anaemias, in which distinctive morphologic abnormalities occur in red cell precursors in bone marrow, namely megaloblastic erythropoiesis. Of the many causes of megaloblastic anaemia, the most common are disorders resulting from cobalamin or folate deficiency. The presence of oral signs and symptoms, including glossitis, angular cheilitis, recurrent oral ulcer, oral candidiasis, diffuse erythematous mucositis and pale oral mucosa [23].

Iron Deficiency Anemia

This anemia is mainly caused due to inadequate dietary intake of iron, faulty absorption of iron and increased requirement for iron. The Plummer Vinson syndrome is a form of anaemia with iron deficiency. It is characterized by dysphagia, koilonychia and atrophic glossitis. In iron deficiency anaemia cracks or fissure at the corners of mouth, a lemon tinted pallor of skin, smooth, red painful tongue with atrophy of filiform papilla and fungi form papilla & dysphagia. The mucous membrane appears pale; glossitis and angular stomatitis are encountered in these patients [24].

POLYCYTHEMIA VERA

Oral Manifestations: A purplish red discoloration of the oral mucosa is visible on the tongue, cheeks, and lips. The gingiva is red and may bleed spontaneously. Petechiae and ecchymoses are observed in patients with platelet abnormalities. Varicosities in the ventral tongue, a frequent normal finding, are exaggerated in cases of polycythemia.

Cyclic Neutropenia: Oral lesions are common in cyclic neutropenia and may be the major clinical manifestation of the disease. The two most common oral manifestations are oral mucosal ulcers and periodontal disease. The oral ulcers recur with each new bout of neutropenia and resemble large deep scarring ulcers seen in major aphthous stomatitis. The periodontal manifestations range from marginal gingivitis to rapidly advancing periodontal bone loss caused by bacterial infection of the dental supporting structures [25].

Leukemia: Leukemia represents several types of malignancies of hematopoietic stem cell derivation. One type of stem cell proliferates in the bone marrow and eventually overflows into the peripheral blood. Oral findings include petechial hemorrhages of the posterior hard palate and the soft palate along with spontaneous gingival hemorrhage. Ulceration of oral mucosa is present as a result of impaired host immune capability to combat normal flora. Gingiva is usually the most affected due to the presence of abundant bacteria around the teeth. Ulcers are deep, punched out lesions with a gray-white necrotic base. Oral candidiasis may be present and herpetic infections may involve any area of mucosa rather than just the keratinized mucosa as seen in immunocompetent individuals. Boggy swellings may be present and represent infiltrates of leukemic cells. This is seen in myelomonocytic leukemia and may cause diffuse gingival enlargement [26].

F) NUTRITIONAL DISORDERS

Vitamin A Deficiency: The oral mucosa is similarly affected with dryness & atrophy. The lips are often described as “retreating”, since the mucosal surface contracts back into the mouth. Angular cheilitis is also common.

Vitamin B12 Deficiency: The oral mucosa is a favored site for manifestations of riboflavin shortage. Angular cheilitis is a classic sign but this presentation is not specific and may be initially misleading. Initially the tongue is swollen, but after a period of time it becomes dark red and atrophic. Sore throat and swelling with erythema of the oral mucosa may also be present.

Vitamin B3 (Niacin) Deficiency: Oral manifestations of niacin deficiency have been described as stomatitis and glossitis. The tongue appears red, smooth and raw. At first it is swollen but later becomes darker red and atrophic. Patients may complain of burning mouth or burning tongue. Erosions and aphthous-like ulcers may appear on the tongue and gingiva. Patients with early pellagra may exhibit increased salivary flow, resulting in drooling and more marked angular cheilitis. Later salivary flow decreases and there may be chronic salivary gland swelling.

Vitamin B6 Deficiency: Oral manifestations of pyridoxine deficiency include cheilitis and glossitis (similar to pellagra).

Vitamin C Deficiency: Vitamin C is an essential cofactor in collagen synthesis. Oral findings include generalized gingival swelling with spontaneous hemorrhage, ulceration, tooth mobility and increased severity of periodontal infection and periodontal bone loss (scurbutic gingivitis). The teeth may exfoliate. Palatal hemorrhage is seen, but the tongue is not usually involved in scurvy. In children development of bones and teeth is affected.
since osteoid and dentin are dependent on vitamin C. In adults, bleeding into the dental pulp along with degeneration of odontoblasts and resorption of dentin may be seen.

**Folic Acid Deficiency:** Folic acid deficiency is seen in patients taking methotrexate (cancer therapy and psoriasis therapy) and related folic acid inhibitors. It is also seen in patients with sprue and chronic liver disease. Oral findings include cheilitis, angular cheilitis, ulcers, and glossitis.

**Zinc Deficiency:** Zinc deficiency can arise from an inherited inability to absorb the mineral (acrodermatitis enteropathica) or from a nutritional deficiency. An acquired form of zinc deficiency is most common in patients with Crohn’s disease. Oral features include crusting, scaling rash of the lips as well as ulcers, erosions and fissures [27].

G) RENAL DISORDERS

Chronic renal failure is an irreversible deterioration in renal function, which classically develops over a period of years due to reduction in functional nephrons. Several studies show that uremic patients have higher rates of decayed, missing, and filled teeth, loss of attachment and periapical and mucosal lesions than the general population. The consequences of poor oral health may be more severe in chronic renal patients because of advanced age, common comorbidities such as diabetes, concurrent medications, and a state of immune dysfunction that may increase the risk for systemic consequences of periodontitis and other oral and dental pathologic conditions. Symptoms of xerostomia can arise in many individuals receiving haemodialysis, due to restricted fluid intake, as well as side effects of drug therapy. This predisposes the patient to dental caries, gingival inflammation and difficulties with speech. In addition, xerostomia may lead to infections such as candidiasis and acute suppurativesialadenitis. A wide range of oral mucosal lesions occur in individuals receiving dialysis and allografts, particularly white patches and/or ulcerations. Oral mucosal macules and nodules of unknown etiology have been described in 14% of individuals receiving hemodialysis [28].

**Malodor**

Uremic patients may have an ammonia–like oral odor. In some instances, chronic renal disease can give rise to altered taste sensation. These patients report a metallic taste or the sensation of an enlarged tongue. Because of their immune compromised state, hemodialysis patients and allograft recipients have increased susceptibility to candidal infections, such as pseudo membranous, erythematous and chronic atrophic candidiasis.

**Uremic stomatitis**

Patients with acute or chronic renal failure exhibit markedly elevated levels of urea and other nitrogenous waste products in the blood stream. Rarely patients may develop oral lesions secondary to renal failure. The lesions are painful and although the etiology is unclear some investigators suggest that urease, an enzyme produced by oral microflora, may degrade urea secreted in the saliva. The end product is free ammonia, which is thought to damage the oral mucosa. Most cases have been reported in patients with acute renal failure. Uremic stomatitis may manifest as white, red or grey areas of the oral mucosa. The onset is sudden, with white plaques distributed on the buccal mucosa, tongue, and floor of mouth. Patients may complain of unpleasant taste, pain or a burning sensation and the clinician may detect an odor of ammonia or urine on the patient’s breath. Clinically the lesions may resemble oral hairy leukoplakia. Renal dialysis usually clears the oral lesions but the process may take 2 to 3 weeks. Treatment with diluted hydrogen peroxide may help to clear the lesions and viscous lidocaine may be used to temporarily relieve pain [29,30].

**Eating Disorders**

Eating disorders are psychopathological conditions where patient demonstrates abnormal, distorted or chaotic eating behaviours and diet patterns which can
deteriorate an individual’s physical and emotional wellbeing. Manifestations of eating disorder range from disruption of normal lifestyle to generalised weakness to even life threatening complications. Oral health care providers can be the first to notice the presence of previously undiagnosed eating disorders from the typical oral manifestations of the condition and instigate the multidisciplinary treatment required. However, there is a general lack of knowledge and awareness about the role of oral health care practitioners in the diagnosis, intervention and treatment of affected patients. This article reviews the recent literature on eating disorders and their subsequent oral manifestations (TABLE 1). Manifestations have been summarized to enable oral healthcare professionals with diagnosis, treatment and rehabilitation of these disorders [31].

**Chronic Liver Disease**

Chronic liver disease impacts many systems of the body. The coagulation pathway is one such system. The liver synthesizes many of the clotting factors necessary for hemostasis. In addition, vitamin K, a fat-soluble vitamin, requires proper liver function to be adequately absorbed from the intestines. Poor oral hygiene, excessive consumption of carbonated drinks, sweets, caffeinated drinks or sports drinks for stamina.

<table>
<thead>
<tr>
<th>Oral Tissue</th>
<th>Manifestation</th>
<th>Causes</th>
</tr>
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<tbody>
<tr>
<td>Dentition</td>
<td>Enamel erosion, perimolysis (dental erosion on the palatal surfaces of teeth), sensitivity</td>
<td>Vomiting, salivary gland manifestations of ED affecting salivary flow rate, buffering capacity and pH of saliva resulting in erosion. Poor oral hygiene, excessive consumption of carbonated drinks, sweets, caffeinated drinks or sports drinks for stamina.</td>
</tr>
<tr>
<td>Oral mucosa</td>
<td>Mucosal atrophy, glossitis, oral ulcerations, erythematous lesions of soft palate &amp; pharynx Candidiasis Angular cheilitis</td>
<td>Nutritional deficiency including iron &amp; vitamin deficiency Trauma caused by inserting foreign objects into the oral cavity to induce vomiting. Opportunistic infection by <em>Candida albicans</em> due to nutritional deficiencies, salivary dysfunction, secondary infection of mucosal lesions induced by trauma. Nutritional deficiency, candidal infection or concomitant candidal and staphylococcal flora.</td>
</tr>
<tr>
<td>Periodontal and gingival tissues</td>
<td>Gingivitis, periodontitis, scurvy, advanced periodontitis in young individuals</td>
<td>Poor oral hygiene, vitamin C deficiency</td>
</tr>
<tr>
<td>Salivary glands</td>
<td>Sialadenosis, non inflammatory enlargement of salivary gland Hyposalivation, xerostomia, altered salivary flow rate, buffering capacity, pH and composition of saliva. Necrotising sialometaplasia</td>
<td>Peripheral autonomic neuropathy. Side effects of drugs such as anti-depressants, vomiting, nutritional deficiency.</td>
</tr>
<tr>
<td>Alveolar bone</td>
<td>Osteopenia , osteoporosis</td>
<td>Nutritional deficiency, infection of dental or periodontal origin causing quicker alveolar bone loss.</td>
</tr>
<tr>
<td>Tongue</td>
<td>Glossodynia, taste impairment, dysgeusia, hyposgeusia, burning sensation</td>
<td>Trace metal deficiencies particularly zinc, somatoform disturbances and mucosal atrophy.</td>
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</table>

Liver disease, the resultant impaired hemostasis can be manifested in the mouth as petechiae or excessive gingival bleeding with minor trauma. This is especially suggestive if it occurs in the absence of inflammation. Therefore, special care must be taken during any type of surgery, oral or otherwise; severe hemorrhage can ensue as a result of the paucity of clotting factors. The only manifestation of advanced liver disease visible in the oral mucosa is jaundice, which is the yellow pigmentation that results from the deposition of bilirubin in the submucosa. Jaundice may occur following disorders in bilirubin metabolism, production, or secretion. When jaundice is due to chronic liver disease, the yellow color reflects a direct relation to liver function. Jaundice manifests at serum levels greater than 2.5-3 mg/dL or 2-3 times baseline. Because they are thinner, the mucosae on the soft palate and in the sublingual region are often first to reveal a yellow hue. With time, the yellow changes can be visible at any mucosal site. Because of its high rate of progression to chronic hepatitis (50%) and cirrhosis, hepatitis C is the leading infectious cause of chronic liver disease worldwide. The association between hepatitis C and oral lichen planus is controversial [33].
CONCLUSION
Many systemic diseases have oral manifestations. The oral cavity might well be thought of as the window to the body because oral manifestations accompany many systemic diseases. These oral manifestations must be properly recognized if the patient is to receive appropriate diagnosis and referral for treatment. Although few systemic diseases have strictly pathognomonic lesions of the oral mucosa, a careful examination of the oral cavity can often lend important clues to making a diagnosis. The diagnosis of oral manifestations of systemic diseases is vital in dentist's perspective. Thus knowledge on the systemic diseases is important in day to day clinical practice for the dentist.

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