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Childhood Gingival Diseases- A review

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Abstract

Children and adolescents are susceptible to a variety of gingival infections. Children and teenagers virtually invariably develop gingivitis of varying degrees of severity, according to epidemiological study. Children's periodontitis typically receives little treatment due to the short duration of the primary teeth. As part of their routine dental checkup, children must have a periodontal examination because an early diagnosis is essential for a successful course of treatment.

Additionally, several systemic illnesses in children might cause devastating periodontal disease. In fact, severe periodontitis may be the first sign of a more serious condition. A general practitioner should assess children who have severe periodontitis to rule out the presence of any systemic illnesses, especially if the condition is chronic.

Keywords: Children, Gingivitis, Gingival enlargement

Introduction

Numerous gingival diseases can affect children and progress to harm the periodontium in adults. The majority of periodontal problems' effects on adult health begin earlier in childhood. Dental practitioners have a crucial role to play in the early detection and diagnosis of gingival and periodontal disorders to deliver the best results from therapy.[1]

Anatomical Considerations

Between childhood and adulthood, the periodontal structures alter significantly.[2]

The associated gingiva is wider over the primary and permanent molars, less over the cuspids, and more so over the area around the incisors. With ageing, the attached gingiva gets wider. Additionally, the contact points between deciduous teeth are not as tightly sealed

as those between the permanent dentition, creating a favourable environment for bacterial development and raising the interdental region's susceptibility.

Periodontium In Children[3] [Table/Fig- 1,2]

It is yet unclear how these structural differences affect the aetiology of paediatric periodontal disease. The function of the interdental canal, as defined by Cohen, is another topic of debate in the aetiology of periodontal disease in children (1959).

Physiologic Gingival Changes Associated With Tooth Eruption

Changes in the gingiva brought on by the eruption of the permanent teeth take place during the transitional stage of the dentition's development.[4]

Pre-eruption bulge: Before the crown is visible, the gingiva has a solid protrusion that is somewhat blanched and indicates the shape of the underlying crown.

Formation of gingival margin: The marginal gingiva and sulcus form to create the gingival edge as the crown emerges in the oral mucosa. Throughout the eruption phase, the gingival edge is edematous, rounded, and slightly reddish.

Normal prominence of gingival margin: It is typical for the marginal gingiva around permanent teeth to be noticeable throughout the mixed dentition era, especially in the maxillary anterior region. The gingiva is still linked to the crown at this stage of tooth eruption, and it is noticeable when compared to the majority of underlying enamel. [Table/Fig-3].

Epidemiology

In affluent nations, the frequency of gingivitis among children aged 6 to 11 was approximately 73%. Ages 6 to 11.5 see an increase in this rate.

Numerous studies have shown that gingivitis is much more prevalent throughout adolescence.

Estimates of the prevalence of gingivitis range from 50% to 99%, and they seem to increase during adolescence.

Gingivitis is less common in girls than in males, which is probably related to how clean their mouths are.

Classification of Gingival Diseases[6]

A. Gingival Diseases Associated with Plaque

I. Without Local Contributing Factor

Plaque - Induced Gingivitis

The primary cause of gingivitis is plaque. Dental plaque appears to form more rapidly in children aged 8 to 12 years than in adults [Table 1].

Clinical Features

- The plaque-induced inflammatory lesion is usually confined to the marginal aspects of the gingiva and with time, progresses to other tissues of the periodontium.
- A fiery red surface discoloration is often superimposed on underlying chronic changes.
- Gingival color change and swelling appear to be more common expressions of gingivitis in children than are bleeding and increased pocket depth.[7]

Clinical Appearance	Histologic Appearance
Reddish in colour	Thinner epithelium, a lesser degree of cornification, and greater vascularity
Lack of stippling	Shorter and flatter papillae from the lamina propria.
Rounded and rolled gingival margins	Hyperemia and edema that accompanies eruption. Pronounced cervical ridge of the crown in deciduous teeth
Greater sulcular depth. The mean gingival sulcus depth for the primary dentition	At an early age the junctional epithelium presumably originates from the reduced enamel epithelium as a consequence of the character of its former stratum intermedium, a

is 2.1 mm ± 0.2 mm.	readiness to split up, a probe can easily be inserted deep into the marginal crevice area intruding into the tissue proper and simulating an eruption pocket.

Table 1: Clinical and histological correlations in childhood gingiva

Gingiva	The connective tissue has comparatively less well-developed net of collagen fibres than in adults. The surface of the col was said to be covered by an odontogenically-derived epithelium that is atrophic, (four cell-layers thick) and has a diminished proliferative activity. The replacement of the odontogenically-derived epithelium by ingrowing oral epithelium was considered essential for a healthy periodontium.
Periodontal Ligament	It is wider, has fewer and less dense fibres per unit area and has increased hydration with a greater blood and lymph supply than in adults. During eruption the principal fibres are parallel to the long axis of the teeth. The bundle arrangement occurs after the teeth encounter their functional antagonists.
Cementum	It is often thinner and less dense than of adults. It shows a tendency to hyperplasia of cementoid apical to the epithelial attachment. Before the tooth reaches the occlusal plane, a cellular cementum is formed.
Alveolar Bone	The lamina dura is thinner; there are fewer trabecular and larger marrow spaces. There is a smaller amount of calcification greater blood and lymph supply and the alveolar crest appears flatter.

Table 2: Tooth supporting structures and its features in childhood

The Oragranulocyte Migration rate (OMR) is low when compared with the rate in adults. The propensity for gingival bleeding, crevicular fluid production, and leukocytes are less in adults.[9] Inflammation of the gingiva is most severe in 14–16-year-olds.

With Local Contributing Factor

Eruption Cyst & Hematoma

Teeth that are erupting frequently have an eruption cyst, a type of dentigerous cyst. The edema is typically transparent, erratic, and confined10. When blood is present in a cystic cavity, the swelling appears as a purple or deep blue fluctuant and, when it is confined, is known as an eruption hematoma.

Eruption Gingivitis

Together with tooth emergence, gingivitis is commonly present. However, gingivitis is not brought on by tooth eruption. In areas where primary teeth are erupting and permanent teeth are replacing them, there may be a higher risk of plaque formation since maintaining excellent dental hygiene may be difficult or even uncomfortable.[11] The inflammatory changes, which draw attention to the inherent prominence of the gingival margin, give the impression of a prominent gingival expansion.

Gingivitis Associated with Orthodontic Appliance

Interproximal tooth brushing is substantially more difficult to access during fixed appliance therapy. The problem is made worse when teeth are banded rather than bonded. Plaque deposits that were previously located supragingivally shift toward a subgingival position during tipping motion. Contrarily, physical motion is less likely to be the source of a migration of supragingival plaque. Therefore, gingival changes may

manifest within 1-2 months of the appliance's implantation and are frequently transient.[12]

Other Factors

Excessive overjet and overbite, nasal obstruction, mouth breathing, loose, partially exfoliated deciduous teeth, crooked teeth, and carious teeth are major causes of gingivitis.

B. Gingival Diseases Modified by Systemic Factors

I. Associated with Endocrine System

Puberty Gingivitis

When a child hits puberty, there is an increase in gingival sensitivity but not in plaque buildup. The cytoplasm of gingival cells has particular high affinity, low-capacity receptors for both oestrogen and testosterone. The basal and spinous layers of the epithelium also have oestrogen receptors in addition to the fibroblasts and endothelial cells of the small capillaries in connective tissue. Therefore, it appears that a number of steroid hormones have the gingiva as a target organ. The discovery that gingivitis peaks earlier in females (11–13 years) than in boys during adolescence supports the association between the incidence of gingivitis during puberty and high circulating sex hormone levels (13-14 years).[13] Evidence from in vivo tests and P. intermedius proportions corresponding to plasma oestrogen and progesterone levels.[14]

II. Associated with Blood Dyscrasias

Leukemia

The development of WBC-forming tissues, particularly those in the bone marrow, causes this malignant disease. It can be acute or chronic and affect granulocytes (myeloid), lymphocytes, or monocytes. Acute forms of leukaemia usually affected people under the age of 20. The majority of children under 10 years old who develop acute lymphoblastic leukaemia do so. It has been proposed that etiologic relevance for radiation injury, chemical injury, genetic factors, such as Down's syndrome, immunological insufficiency, and viral infections.

Clinical features

- Gingiva looks as glazed, spongy, bloated tissue that is reddish-purple in colour and bleeding. The gingival mucosa may grow diffusely, the marginal gingiva may extend excessively, or there may be a distinct interproximal mass that resembles a tumour.
- Although it has a somewhat firm consistency, it has a propensity for friability and haemorrhaging, which can happen either spontaneously or in response to a small irritation.[15]
- Splenomegaly, hepatomegaly, purpura, cervical lymphadenopathy, lethargy, malaise, sore throat, fever, and petechiae.

III. Associated with Nutritional Deficiency

Scorbutic Gingivitis

Lack of vitamin C results in gingival connective tissue edoema, collagen deterioration, and haemorrhaging. The papillae and marginal tissues are typically the only areas affected. 16 The surface of gingiva is shiny, smooth, and bluish. It is soft and friable. bleeding that either occurs spontaneously or after a small stimulation. Infarcts formed in the gingival capillaries result in surface necrosis with pseudomembrane development and necrosis.[9]

C. Modified by Medication

Drug Influenced Gingival Enlargement

Gingival overgrowth is a well-known unintended side effect of many medications. The drugs phenoytin, cyclosporine, and nefidipine are most usually blamed for this. In order to encroach upon the labial tissues, interdental papillae first become nodular and then enlarge more widely. The front of the mouth is most

frequently and seriously affected. In people who practise proper oral hygiene, enlarged gingiva is pink, firm, and stippled. It may be necessary to alter or switch the anticonvulsant therapy when it is resistant to long-term treatment[17].

Non-Plaque Induced Gingival Diseases

A. Viral

Acute Herpetic Gingivostomatitis.

Causative Organism	Herpes simplex virus (HSV) type 1
Occurrence	Infants and children younger than 6 years of age, but it is also seen in adolescents and adults
Clinical features	Diffuse erythematous, shiny involvement of the gingiva and the adjacent oral mucosa. Varying degrees of edema, gingival bleeding, and Discrete spherical grey vesicles which rupture and form painful small ulcers with a red, elevated, halo-like margin and a depressed yellowish or greyish white central portion are also seen. It occurs occasionally without overt vesiculation.[18]
Recurrence	On provocation (exposure to sunlight, fever, colds, mechanical stretching of the lip)

Table 3: Various characteristics of ANUG

B. Fungal

Linear Gingival Erythema

It can be identified by a ring of acute erythema that is 2-3 mm broad, localised or diffuse, and that extends from the free gingiva to the connected gingiva. It may also extend past the mucogingival border into the alveolar mucosa. Although it may only affect one or two teeth, a generalised gingival disease is more common.[18]

Candidiasis

It occurs from an overgrowth of *candida albicans*, usually after a course of antibiotics or as a result of congenital or acquired immunodeficiencies.[10]

C. Bacterial

Acute Necrotizing Ulcerative Gingivitis

In developing countries, the prevalence of ANUG is higher than in industrialized countries, and the disease frequently occurs in children. In India, 54-68% of the cases occurred in children below 10 years of age.[19]

Clinical Characteristics

- Punched-out appearance due to ulcerated and necrotic papillae and gingival margins.
- Ulcers are covered by a yellowish-white or greyish slough termed pseudomembrane.
- Removal of the slough results in bleeding and underlying tissue becomes exposed.
- A foetor ex ore is often associated, but can vary in intensity.
- Extensive gingival necrosis often coincides with loss of crestal alveolar bone.
- The involved papillae are separated into facial and lingual portion with an interposed necrotic depression.
- Swelling of lymph nodes and increased bleeding tendency are often present.
- Fever and malaise is not consistent.

The oral hygiene in these patients is usually poor.

The variable flora consisted of a heterogeneous array of bacterial types although the characteristic bacterial flora of spirochetes and fusobacteria has been isolated from the necrotic lesions in several studies. Young age is one of the predisposing factors of ANUG.[20]

D. Congenital Anomalies

Congenital Epulis

Along the alveolar ridge, Congenital Epulis of Newborn, a rare gingival tumour, develops. It frequently lacks any further congenital malformations or concomitant oral issues. In terms of appearance, it resembles a well defined, smooth, erythematous mass that protrudes from the gum pad. Large enough to cause the top lip to rise. Unaffected and usually apparent on an MRI are unerupted teeth.[21]

Congenital Gum Synechiae

It is characterized by congenital adhesions between different parts of oral cavity. It is rare type of disease. It causes difficulty in breathing and respiration soon after birth.[22]

E. Trauma

Abrasion, idiopathic trauma, habits like nail biting and abrasive foods	Traumatic lesions
Fixed anterior margin of the acrylic plate of a removable appliance	Transient Gingival Hyperplasia
Chronic irritation during orthodontic treatment	Localized, acute inflammatory reaction
Improper brushing technique	Mucogingival defects like recession

Table 4: Gingival changes due to trauma

F. Gingival Diseases Associated with Heredity

Hereditary gingival fibromatosis is one example of a benign, non-inflammatory, familial fibrotic growth that appears non-hemorrhagic, hard, and progresses gradually.[23] However, a layer of gingival irritation may be present, which could increase the expansion.

Hereditary gingival fibromatosis can be carried through chromosomal abnormalities, malformation syndromes, and even a straightforward mendelian trait. Even though the disease's specific genes have not been identified, genetic testing demonstrates the existence of two different gene loci on chromosome 2P.[24]

G. Foreign Body Reaction

Though it is not very common, it can happen during amalgam tattooing etc.

H. Gingival Manifestations Of Systemic Conditions

Gingival Lesions Associated With Chicken Pox

Varicella herpes virus primarily affects individuals under the age of 15 years. In the oral cavity small ulcers may develop in any area of the mouth, however, lesions are found most often on the palate, gingiva and buccal mucosa[18,25] [Table/Fig-14].

Gingival Lesions Associated With Mononucleosis

The Epstein-Barr virus causes mononucleosis, which typically affects children and young adults.[26] Young adults are most likely to experience clinical symptoms, which frequently include fatigue, malaise, headache, fever, sore throat, swollen tonsils, and lymphadenopathy.[27,28] Gingival haemorrhage, petechiae of the soft palate, ulceration of the gingiva, and buccal mucosa are a few changes to the oral cavity (White, 1998). Palatal petechiae typically appear prior to the onset of systemic symptoms.[29]

Soft Tissue Lesions Associated with Herpangina

Herpangina and coxsackie group A viruses are related. frequently observed in young kids. Clinically, it comprises of a large number of tiny vesicles that develop into tiny ulcers that are confined on a grey base and have inflamed periphery.[29] The tongue, buccal mucosa, posterior pharyngeal wall, hard and soft palates, and other areas may develop ulcers. The ulcers usually don't hurt and disappear in a few days to a week.

Soft Tissue Lesions Associated with Hand, Foot and Mouth Disease:

Most incidences of hand, foot, and mouth disease affect kids between the ages of 6 months and 5 years. Coxsackie group A and B may both contribute to this illness. Clinically, it is similar to herpangina, but it makes eating difficult because of a sore mouth.[28] The majority of the time, this illness is self-limiting and will go away in 1-2 weeks.

Wegeners Granulomatosis: It is a systemic disease that initially present with striking alterations that are confined to the gingival diseases. Classically, the gingival tissues exhibit erythema and enlargement band are typically described as Strawberry gums.[29]

Kindlers Syndrome

Cutaneous neonatal bullae, poikiloderma, photosensitivity and acral atrophy are present in this condition. It may also present with oral lesions that are clinically consistent with desquamative gingivitis.[29]

Conclusion

It has been found that gingival illnesses can affect persons of all ages, including young children and the elderly. We have a common idea that gum illnesses exclusively affect adults, however this review study contends that gingival abnormalities can also begin in childhood. Adult periodontium would be in danger from either a lack of comprehension of childhood gingival disorders or from ignoring them. In order to maintain a child's oral cavity's cleanliness and health, this article emphasises the significance of pedodontic gingival examinations, parent counselling, and patient education.

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Legend Figure

Figure 1: Physiologic gingival changes associated with tooth eruption

Figure 2: Plaque - induced gingivitis

Figure 3: Eruption cyst

Figure 4: Eruption hematoma

Figure 5: Leukemia - associated Gingivitis

Figure 6: Drug influenced gingival enlargement

Figure 7: Linear gingival erythema

Figure 8: Acute necrotising ulcerative gingivitis

Figure 9: Hereditary gingival fibromatosis

Figure 10: Ulcers associated with chicken pox