

Review Article

Gingival and periodontal diseases in children and its management- an overview

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ABSTRACT:

Children and adolescents are exposed to a wide variety of gingival and periodontal infections. Therefore, it is becoming increasingly important to understand the health and disease of oral tissues, especially periodontal tissues, to promote good long-term oral health in adulthood. Early screening of pediatric and adolescent patients with periodontal disease is considered essential for early management to improve the prognosis of periodontal disease. Periodontal diseases lead to premature tooth loss in children and impairs their quality of life. Nonsurgical treatment, application of appropriate antimicrobial therapy, and surgical correction of defects are required to reduce disease, followed by comprehensive supportive periodontal therapy. This review addresses the current understanding, diagnosis of gingival and periodontal diseases and its management in pediatric and adolescent patients

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INTRODUCTION

The periodontium is the foundation for the dentition. The components of periodontium—the alveolar mucosa, gingiva, cementum, periodontal ligament, and alveolar bone, serve as the supporting apparatus for the teeth in function and in occlusal relationships. Periodontal diseases can present in children and adolescents in various forms, ranging from those limited to gingival tissue to those manifested by destruction of periodontium, which can lead to tooth loss in some cases. Gingivitis is common, especially around puberty. Significant loss of periodontal attachment or alveolar bone is more unusual in young patients and can result from systemic essential to the diagnosis and subsequent management of condition disease. An understanding of the aetiology and contributory risk factor is therefore. Therefore, the American Academy of Paediatric Dentistry's recommendations for children and adolescents include placing greater emphasis on the prevention, early diagnosis, and treatment of gingival and periodontal disease in children. By the establishment of excellent oral hygiene habits in children, which will carry over

to adulthood, the risk of periodontal disease is lowered.³

FEATURES OF NORMAL PERIODONTIUM

The periodontium is composed of the gingiva, alveolar mucosa, cementum, periodontal ligament, and alveolar bone.¹ The oral mucosa is the lining which separates the interior of the oral cavity from the complex underlying organs. It serves to protect these organs and to receive and transmit stimuli from environment.² The colour of the gingiva is coral pink and it has a stippled 'orange peel' surface. It is divided anatomically into marginal, attached, and interdental areas.⁴ In children it appears less dense and redder than in adults due to less keratinized epithelium with its greater vascularity.² In primary dentition interdental spacing is common, present resulting in well keratinized interdental surface. This may be the reason for lower prevalence of periodontal lesion in children because these areas are less vulnerable to development and progression of inflammatory process.²

Differences Between Periodontium of Primary and Permanent Dentition: In children gingiva is pale pink,

smooth, thick and round having keratinized saddle areas with inter dental clefts where as in adult's gingiva is coral pink with presence of stippling, knife edge with absence of interdental clefts. Periodontal ligament is wide in children and narrow in adults. Collagen bundles is less differentiated and immature in children. Alveolar bone is Less calcified, more vascular, Fewer but thick trabeculae, larger marrow spaces and cementum is thin in children as compared to adults.³

AETIOLOGY OF GINGIVAL AND PERIODONTAL DISEASES

The aetiology of periodontitis has been divided into those factors of intrinsic and extrinsic or systemic and local origin.

Systemic irregularities most commonly accused as the aetiology are nutritional deficiencies, hormonal imbalance, blood dyscrasias, diabetes mellitus, drug poisons, and psychosomatic manifestations.⁴

COMMON GINGIVAL AND PERIODONTAL DISEASES IN CHILDRENS

GINGIVAL DISEASES

Gingival Diseases Associated with Plaque⁶
Without Local Contributing Factor

PLAQUE INDUCED GINGIVITIS

Plaque is the primary cause of gingivitis. Commonly occur in children of 8-12 years of age. Clinical features- Gingival colour change and swelling is more common in children than are bleeding and increased pocket depth, long term exposure can cause plaque induced gingival enlargement.⁵

WITH LOCAL CONTRIBUTING FACTORS

Eruption Gingivitis Gingivitis associated with tooth eruption is frequent. since oral hygiene may be difficult or even unpleasant to perform.⁵ Plaque control regimen is the treatment of eruption gingivitis.³**Eruption Cyst & Hematoma** It is common for erupting teeth to be associated with a form of dentigerous cyst called an eruption cyst. It is usually translucent, fluctuant and circumscribed swelling.⁷

Gingivitis Associated with Orthodontic Appliance Access of interproximal tooth brushing is reduced considerably during fixed appliance therapy likely to induce relocation of plaque and cause inflammation.⁷

GINGIVAL DISEASES MODIFIED BY SYSTEMIC FACTORS

Associated with Endocrine System

Puberty Gingivitis The relationship between increased levels of circulating sex hormones and prevalence of gingivitis in puberty is strengthened by the observation that, during adolescent, gingivitis peaks earlier in girls (11-13 years) than in boys (13-14 years). Proportions of *P. intermedius* correlated with levels of plasma oestrogen and progesterone, and in vivo evidence is obtained indicating that these

hormones are nutrients for *P. intermedius* which is main cause of gingivitis.

ASSOCIATED WITH BLOOD DYSCRASIAS

Leukaemia It is a malignant disease caused by the proliferation of the WBC forming tissues, especially those in the bone marrow. Diffuse gingival enlargement is seen, an oversized extension of the marginal gingiva, or a discrete tumour like interproximal mass. It is moderately firm in consistency, but there is a tendency toward friability and haemorrhage, occurring either spontaneously or on slight irritation.²⁰

ASSOCIATED WITH NUTRITIONAL DEFICIENCY SCORBUTIC GINGIVITIS

“Scorbutic gingivitis” results when poor oral hygiene is combined with severe vitamin C deficiency. However, it is characterized by ulcerative gingivitis, fetid odour, rapid development of periodontal pocket, and tooth loss. painful gingival swelling, gingival edema, and haemorrhage on slight provocation is commonly present⁸

Modified by Medication

Drug Influenced Gingival Enlargement is a well-recognized unwanted effect of a number of drugs. The most frequently implicated are phenoytin, cyclosporine and nifedipine.

NON-PLAQUE INDUCED GINGIVAL DISEASES

VIRAL

Acute herpetic gingivostomatitis or Primary herpetic gingivostomatitis is defined as acute periodontal disease caused by herpes simplex virus type I. Its clinical presentation is characterized by painful gingivitis and blisters that form primarily on the Dorsum of the tongue, hard palate, and gingiva.⁷

FUNGAL

Linear Gingival Erythema

It is characterized by 2-3mm marginal band of intense erythema in free gingiva extending to attached gingiva as focal or diffuse erythema It may be localized to one or two teeth but it is more commonly a generalized gingival disease.

CANDIDIASIS

It occurs from an overgrowth of candida albicans, usually after a course of antibiotics or as a result of congenital or acquired immunodeficiencies.⁷

BACTERIAL ACUTE NECROTIZING ULCERATIVE GINGIVITIS

Trench Mouth or Vincent infection is an acute inflammation of the gums caused primarily by a special type of bacteria called *Borrelia vincentii*. Risk factors include poor oral hygiene, stress, reduced host resistance, and HIV infection. ANUG is characterized by punched-out interdental papilla that is covered with a grayish-white pseudo membrane, which may extend

to cover marginal gingiva.¹³ Patients are usually suffering from strong continuous pain and fetid odour as a result of bacterial reaction's end products, bacterial toxins, and tissue necrosis.³

CONGENITAL ANOMALIES CONGENITAL

Congenital Epulis of new-born is a rare gingival tumour that occurs along the alveolar ridge. Clinically it presents as a smooth well-defined erythematous masses arising from gum pad.

Congenital Gum Synechiae It is characterized by congenital adhesions between different parts of oral cavity cause difficulty in breathing.⁷

GINGIVAL DISEASES ASSOCIATED WITH HEREDITY

Benign, non-inflammatory, familial fibrotic enlargements such as hereditary gingival fibromatosis, appears non-haemorrhagic, firm, progressing slowly upon eruption of permanent dentition.⁹

FOREIGN BODY REACTION

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

Gingivitis associated with mononucleosis and chicken pox.

Figure 1



WEGENERS GRANULOMATOSIS

The gingival tissues exhibit erythema and enlargement band are typically described as Strawberry gums.

KINDLERS SYNDROME

It may also present with oral lesions that are clinically consistent with desquamative gingivitis.

PERIODONTITIS

The main features of periodontitis are as follows:
Continuous destruction of periodontal ligament and alveolar bone
Enlarged probing depth formation, recession or both

DETECTION OF PERIODONTAL DISEASES IN YOUNGER AGE GROUPS

Basic periodontal examination in primary dental care - Although basic periodontal examination has been advocated for screening adults for periodontal disease, it is now the generally accepted method for screening for periodontal disease in young people. There are no guidelines for However, as described by Clerehugh and his colleagues, a simplified under-18 screening system can be applied quickly and easily in practice.^{10,11}

CLASSIFICATION OF GINGIVAL DISEASES⁵

Table 1 – Classification of gingival and periodontal diseases

Dental Plaque–Induced Gingival Diseases These diseases may occur on a periodontium with or without attachment loss that is stable and not progressing. I. Gingivitis associated with dental plaque only Without local contributing factors With local contributing factors
II. Gingival diseases modified by systemic factors A. Associated with endocrine system Puberty-associated gingivitis Menstrual cycle–associated gingivitis Pregnancy associated Gingivitis Pyogenic granuloma 4. Diabetes mellitus–associated gingivitis B. Associated with blood dyscrasias Leukemia-associated gingivitis Other
III. Gingival diseases modified by medications A. Drug-influenced gingival diseases Drug-influenced gingival enlargements

Drug-influenced gingivitis Oral contraceptive-associated gingivitis Other
Non-Plaque-Induced Gingival Lesions I. Gingival diseases of specific bacterial origin Neisseria gonorrhoeae Treponema pallidum Streptococcus species Other
II. Gingival diseases of viral origin A. Herpes virus infections Primary herpetic gingivostomatitis Recurrent oral herpes Varicella zoster B. Other
III. Gingival diseases of fungal origin Candida species infections: generalized gingival candidiasis Linear gingival erythema Histoplasmosis Other
IV. Gingival lesions of genetic origin Hereditary gingival fibromatosis Other
V. Gingival manifestations of systemic conditions A. Mucocutaneous lesions Lichen planus Pemphigoid Pemphigus vulgaris Erythema multiforme Lupus erythematosus Drug induced Other B. Allergic reactions Dental restorative materials Mercury Nickel Acrylic Other Reactions attributable to the following: Toothpastes or dentifrices Mouth rinses or mouthwashes c. Chewing gum additives d. Foods and additives 3. Other
VI. Traumatic lesions (factitious, iatrogenic, or accidental) Chemical injury Physical injury Thermal injury
VII. Foreign body reactions
VIII. Not otherwise specified

Table 2: Basic Periodontal Examination

BPE code	Criteria
0	Healthy periodontal tissue No bleeding with gentle probing
1	Bleeding with careful probing Black band remains completely visible above the gingival margin
2	Supragingival and/or subgingival calculus and/or other plaque-retaining factors. Black band remains completely visible at gingival

	margin
3	Shallow pocket (4mm or 5mm) Partially visible black band in deepest pocket of index tooth
4	Deep pockets (6mm or more) Black straps hidden in pockets
*	Furcation involvement Recession + probing depth = 7 mm or greater

AGGRESSIVE PERIODONTITIS

Mostly affects systemically healthy individuals aged less than 30 years. According to consensus report of the 1999 International Workshop, following common and secondary features is present in aggressive periodontitis.⁸

COMMON FEATURES

Clinically healthy other than periodontitis also, bone destruction with rapid loss of attachment levels
 Familial aggregation of diseased individuals
 Secondary Features
 Quantity of microbial deposits is not consistent with the severity of periodontal destruction.
 Elevated proportions of *A. actinomycetemcomitans* and the levels of *P. gingivitis* may also be affected.
 Abnormalities in function of phagocytes
 Hyper-responsive macrophages, producing increased prostaglandin E2 and interleukin-1 β .
 Progression of attachment and bone loss may be self-limiting.
 Aggressive periodontitis may be further classified into localized and generalized form with following specific

FEATURES

Localized form is Circumpubertal onset. It is localized to first molar or incisor disease with proximal attachment loss on at least two permanent teeth
 Generalized interproximal loss of attachment affecting at least three teeth excluding first molars and incisors is seen in Generalized form.¹²

CHRONIC PERIODONTITIS

A significant number of adolescents manifest attachment loss of 1 mm or more, consistently in initial stages of chronic periodontitis.⁷
 Periodontopathogens present in the subgingival microflora of teenagers with incipient chronic periodontitis are namely *Porphyromonas gingivalis*, *Aggregatibacter actinomycetemcomitans* and *Prevotella intermedia*.⁴
 A 3 years longitudinal study in adolescents shows that *Tannerella forsythia* has been associated with clinical attachment loss.¹³

PERIODONTITIS AS MANIFESTATION OF SYSTEMIC DISEASES

These include insulin-dependent diabetes mellitus (IDDM), Papillon-Lefevre syndrome, hypophosphatasia, neutropenia, Chediak-Higashi syndrome, leukemia, histiocytosis X, acralgia, acquired immunodeficiency syndrome. (AIDS), Down's syndrome, and leukocyte adhesion deficiency. In young children, there is an association between juvenile diabetes and periodontal disease. The disease

occurs in local and systemic forms. In local form, affected areas show rapid bone loss and minimal gingivitis. In the generalized form, there is rapid bone loss and marked gingivitis around almost all teeth.⁹

NECROTIZING PERIODONTAL DISEASES

Factors that predispose children to Necrotizing Periodontal Disease include viral infections (including HIV), malnutrition, emotional stress, sleep deprivation, and various systemic diseases. Treatment includes mechanical debridement, oral hygiene instructions, and careful follow-up, with metronidazole and penicillin suggested as the drugs of choice.

MANAGEMENT OF PERIODONTAL DISEASE IN PEDIATRIC AND ADOLESCENT PATIENTS

14 MOTIVATION

It has been shown that professional support to patients and parents in the form of preventive/educational programs improves patient motivation, leading to improved levels of oral health.¹²

PLAQUE CONTROL

Tooth brushing Scrub technique of tooth-brushing technique has been found to be effective in children but the modified Bass technique and can be taught to adolescents with dexterity.⁸
 Children less than 3 years of age should use toothpaste containing no less than 1000 ppm fluoride. It is recommended that tooth brushing is carried out twice a day with fluoridated toothpaste.¹²

TOOTHBRUSH TYPE

An appropriately sized toothbrush should be recommended for children and adolescents a small headed toothbrush which has soft round-ended filaments
 If further oral-hygiene measures are needed, short periods of chlorhexidine gel or rinse may be used, including gels combined with fluoride that aid in dental-caries prevention.¹⁵

NONSURGICAL PERIODONTAL THERAPY

Microbial plaque load being significantly reduced after scaling and root planning bring down the level of inflammatory cytokines thereby reducing inflammation, bleeding on probing, and probing depths in Chronic Periodontitis and Aggressive periodontitis.^{16,17}
 One stage full mouth disinfection protocol including scaling and root planning, brushing with 1% chlorhexidine for 1 min, mouth rinsing with 0.2% chlorhexidine for 2 min, and irrigation of periodontal pockets with 1% chlorhexidine, within 2

appointments in a 24 h time span followed by daily rinsing with chlorhexidine was found to result in better response in clinical outcomes in cases of Aggressive Periodontitis.¹⁴

SYSTEMIC ANTIMICROBIAL THERAPY

Antibiotics are commonly administered for a period between 7 and 14 days for severe Chronic periodontitis and Aggressive Periodontitis depending on the regimen. The dosage may be adjusted according to the child's weight and age.

If you weigh more than 40 kg, tetracycline 250 mg four times daily and doxycycline 100 mg od may accumulate in the crevicular fluid and be inhibit the growth of *A. actinomycetemcomitans*, exhibit anti-collagenase effect, which can inhibit tissue destruction and aid in bone regeneration.

Tetracyclines cause tooth discoloration therefore are not recommended in children of < 8 years.

For adults and people over 40 kg, metronidazole and amoxicillin 250-500 mg 3 times daily for 8 days is suitable for most cases of severe periodontitis.

SURGICAL THERAPY

Surgical treatment is performed to facilitate access to the affected area and the use of instruments to remove tissue affected by *A. actinomycetemcomitans*. Osseous grafting with debridement when performed with systemic antimicrobials in cases of Localized Aggressive Periodontitis provided better results in osseous defect resolution as compared to when graft with debridement was used or when debridement alone was performed. With defect morphology being favourable, Guided Tissue Regeneration has shown good results in the treatment of Localized Aggressive Periodontitis as compared to when osseous grafting is performed. Surgical outcomes to cases of Generalized Aggressive Periodontitis have been attributed variable to poor prognosis, poor compliance, and undetected system

MAINTENANCE

An increased risk of recurrence after treatment should be considered in patients with a history of aggressive periodontitis. This is due to the residual depth of periodontal disease and increased inflammatory response to plaque. A periodontal examination should be performed at each visit. Qualitative chairside diagnostic tools to predict the risk of future loss of attachment in severe cases of chronic and progressive periodontitis include using chairside tests such as ELISA to detect *A. actinomycetemcomitans*, *P. gingivalis*, and *P. intermedia*.

CONCLUSION

Regardless of age, periodontal disease is known to develop in everyone from children to the elderly. A myth persists among us that periodontal disease only

develops in adulthood, but this review article highlights the fact that periodontal disease can also develop in childhood. Inadequate knowledge or neglect of childhood periodontal disease puts adult periodontal tissue at risk. This article further emphasizes the need for patient education, parental counselling, and regular gingival examinations to maintain good oral hygiene during childhood.

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