Introduction
Epidemiologic studies indicate that gingivitis of varying severity is nearly universal in children and adolescents. These include gingivitis, localized or generalized aggressive periodontitis (a.k.a., early onset periodontitis) and periodontal diseases associated with systemic disorders. The effects of periodontal diseases observed in adults have earlier inception in life period. Gingival diseases in a child may progress to jeopardize the periodontium in adulthood. Therefore, periodontal diseases must be prevented and diagnosed early in the life. This paper reviews the most common periodontal diseases affecting children: chronic gingivitis (or dental plaque-induced gingival diseases) and aggressive periodontitis. In addition, systemic diseases that affect the periodontium in young children and necrotizing periodontal diseases are addressed. The prevalence, diagnostic characteristics, microbiology, host-related factors, and therapeutic management of each of these disease entities are discussed.

Key words: Periodontal disease, Children, Pedodontics, Aggressive periodontitis, Chronic gingivitis

Abstract
Periodontal diseases are among the most frequent diseases affecting children and adolescents. These include gingivitis, localized or generalized aggressive periodontitis (a.k.a., early onset periodontitis) and periodontal diseases associated with systemic disorders. The effects of periodontal diseases observed in adults have earlier inception in life period. Gingival diseases in a child may progress to jeopardize the periodontium in adulthood. Therefore, periodontal diseases must be prevented and diagnosed early in the life. This paper reviews the most common periodontal diseases affecting children: chronic gingivitis (or dental plaque-induced gingival diseases) and aggressive periodontitis. In addition, systemic diseases that affect the periodontium in young children and necrotizing periodontal diseases are addressed. The prevalence, diagnostic characteristics, microbiology, host-related factors, and therapeutic management of each of these disease entities are discussed.

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Introduction
Epidemiologic studies indicate that gingivitis of varying severity is nearly universal in children and adolescents. These studies also indicate that the prevalence of destructive forms of periodontal disease is lower in young individuals than in adults. Gingivitis is defined as an inflammation of the gingiva. The gingiva is all soft tissue surrounding the tooth coronal to the crest of alveolar bone and to a varying extent lateral to the bone, extending to the mucogingival junction. On the other hand, the definition of periodontium includes cementum, periodontal ligament, alveolar bone, and the gingiva; and periodontitis includes loss of attachment of periodontal tissues from the tooth and net loss of alveolar bone height.

The majority of periodontal diseases can be classified as either gingivitis or periodontitis which occur as a result of the presence of bacterial plaque or calculus on supra-gingival or sub gingival tooth surfaces. It is generally accepted that periodontal diseases begin as gingivitis, which progresses, only in some individuals, to periodontitis.

The 1999 International Workshop for a Classification of Periodontal Diseases and Conditions classified periodontal disease in children as follows: Dental plaque-induced gingival diseases; aggressive periodontitis (previously known as ‘prepubertal’ or ‘early onset periodontitis’); chronic periodontitis; periodontitis as a manifestation of a systemic disease; and necrotizing periodontal diseases. Most of the literature reports of severe periodontal destruction in children are associated with systemic diseases such as hypophosphatasia, cyclic neutropenia, agranulocytosis, histiocytosis X, leukocyte adhesion deficiency, Papillon-Lefèvre syndrome and leukemia. Although destructive forms of periodontal disease in infants are relatively uncommon, children and adolescents may manifest any form of periodontitis. However, it has been shown that aggressive periodontitis may be more common in children and adolescents, while chronic periodontitis is more frequent in adults.

Epidemiologic surveys indicate that loss of periodontal attachment and supporting bone at one or more sites can be found in 1% to 9% of 5 to 11 year-olds and anywhere from 1% to 46% of 12 to 15 year-olds. The relatively wide variation in these prevalence figures is probably due to differences in the populations surveyed and the criteria and the methods used for establishing the diagnosis of periodontitis.

Bimstein stressed the importance of prevention, early diagnosis and early treatment of periodontal diseases in children and adolescents because (1) the prevalence of and severity of periodontal diseases are high; (2) incipient periodontal diseases in children may develop into advanced periodontal diseases in adults; (3) there is association between periodontal and systemic diseases; (4) patients, families, or populations at risk may be identified and included in special prevention or treatment programs; and (5) prevention and treatment of most periodontal diseases are relatively simple and very effective, providing lifetime benefits.

The aim of this paper is to review the most common periodontal diseases affecting children: chronic gingivitis and aggressive periodontitis. In addition, systemic diseases that affect the periodontium and necrotizing periodontal diseases found in young children will be discussed.
I) Chronic Gingivitis
Chronic gingivitis is the most common periodontal infection among children, and adolescents. These may include plaque-induced chronic gingivitis (the most prevalent form), steroid hormone related gingivitis, drug-influenced gingival overgrowth, and others. The initial clinical findings in gingivitis include redness and swelling of marginal gingiva, and bleeding upon probing. As the condition persists, tissues that were initially edematous may become more fibrotic. Probing depths may increase if significant hypertrophy or hyperplasia of the gingiva occurs. Although the microbiology of this disease has not been completely characterized, increased subgingival levels of Actinomyces sp., Capnocytophaga sp., Leptotrichia sp., and Selenomonas sp. have been found in experimental gingivitis in children when compared to gingivitis in adults. These species may therefore be important in its etiology and pathogenesis.

Matsson performed a 21-day experimental gingivitis study comparing 6 children, aged 4 to 5 years, with 6 dental students, aged 23 to 29 years.

II) Aggressive Periodontitis
The primary features of aggressive periodontitis include a history of rapid attachment and bone loss with familial aggregation. Secondary features include phagocyte abnormalities and a hyperresponsive macrophage phenotype. Aggressive periodontitis can be localized or generalized. Localized aggressive periodontitis (LAgP) patients have interproximal attachment loss on at least two permanent first molars and incisors, with attachment loss on no more than two teeth other than first molars and incisors.

Generalized aggressive periodontitis (GAgP) patients exhibit generalized interproximal attachment loss including at least three teeth that are not first molars and incisors. LAgP occurs in children and adolescents without clinical evidence of systemic disease and is characterized by the severe loss of alveolar bone around permanent teeth. Reported estimates of the prevalence of LAgP in geographically diverse adolescent populations range from 0.1% to 15%.

Bacteria of probable etiologic importance include highly virulent strains of Actinobacillus actinomycetemcomitans in combination with Bacteroides like species. A variety of functional defects have been reported in neutrophils from patients with LAgP. These include anomalies of chemotaxis, phagocytosis, bactericidal activity, superoxide production, FCyRIIB (CD16) expression, leukotriene B4 generation and Ca2+-channel and second messenger activation.

GAgP, often considered to be a disease of adolescents and young adults, can begin at any age and often affects the entire dentition. Individuals with GAgP exhibit marked periodontal inflammation and have heavy accumulations of plaque and calculus. Subgingival sites from affected teeth harbor high percentages of non-motile, facultatively anaerobic, Gram-negative rods including Porphyromonas gingivalis.

Successful treatment of aggressive periodontitis depends on early diagnosis, directing therapy against the infecting microorganisms and providing an environment for healing that is free of infection. The majority of reports suggest that the use of antibiotics is usually beneficial in the treatment of LAgP. Metronidazole in combination with amoxicillin has also been utilized, especially where tetracycline-resistant A. actinomycetemcomitans are present. In GAgP patients who have failed to respond to standard periodontal therapy, laboratory tests of plaque samples may identify periodontal pathogens that are resistant to antibiotics typically used to treat periodontitis.

It has been suggested that follow-up tests after additional antibiotic or other therapy is provided may be helpful in confirming elimination of targeted pathogenic organisms.

III) Chronic Periodontitis
Chronic periodontitis is most prevalent in adults, but can occur in children and adolescents. It can be localized (less
than 30% of the dentition affected) or generalized (greater than 30% of the dentition affected) and is characterized by a slow to moderate rate of progression that may include periods of rapid destruction. Furthermore, the severity of disease can be mild (1 to 2 mm clinical attachment loss), moderate (3 to 4 mm clinical attachment loss), or severe (≥ 5 mm clinical attachment loss). Children and young adults with this form of disease were previously studied along with patients having localized aggressive periodontitis and generalized aggressive periodontitis. Therefore, published data are lacking for this group.

IV) Periodontitis as manifestation of systemic diseases
These may include insulin dependent diabetes mellitus (IDDM), Papillon-Lefèvre syndrome, hypophosphatasia, neutropenia, Chédiak-Higashi syndrome, leukemias, histiocytosis X, acrodermatitis, acquired immunodeficiency syndrome (AIDS), Down syndrome, and leukocyte adhesion deficiency. Cianciola et al. studied the association between juvenile diabetes and periodontal diseases in young children.24 Children were found to have overt periodontitis often localized to first molars and incisors, although periodontitis was also found in a generalized pattern. Affected subgingival sites harbored A. actinomyctematum and Capnocytophaga sp. Oral manifestations of leukemias in children are gingival hemorrhage, petechiae, lymphadenopathy, gingival hyperplasia or hypertrophy, and gingival pallor.

Children with AIDS may develop an atypical form of acute necrotizing ulcerative gingivitis (ANUG) however, no reports of prepubertal pediatric AIDS patients presenting with alveolar bone loss exist. Due to a defective immune system, rampant and precocious periodontal disease is prevalent among children with down syndrome.25 In Down's syndrome, the amount of periodontal destruction has been shown to be positively correlated with the severity of the neutrophil chemotaxis defect.

Periodontitis as a manifestation of systemic disease in children is a rare disease that often begins between the time of eruption of the primary teeth up to the age of 4 or 5. The disease occurs in localized and generalized forms. In the localized form, affected sites exhibit rapid bone loss and minimal gingival inflammation. In the generalized form, there is rapid bone loss around nearly all teeth and marked gingival inflammation. Neutrophils from some children with a clinical diagnosis of periodontitis as a manifestation of systemic disease have abnormalities in a cell surface glycoprotein (LFA-1, leukocyte functional antigen 1, also known as CD11, and Mac-1). The neutrophils in these patients having LAD (leukocyte adhesion deficiency) are likely to have a decreased ability to move from the circulation to sites of inflammation and infection. Affected sites harbor elevated percentages of putative periodontal pathogens such as A. actinomyctematum, Prevotella intermedia, Eikenella corrodens, and Capnocytophaga sputigena.5

Treatment of periodontitis as a manifestation of systemic disease in children is similar to the treatment of localized and generalized aggressive periodontitis in the permanent dentition and has been reported to include surgical or nonsurgical mechanical debridement and antimicrobial therapy.

V) Necrotizing periodontal diseases
The two most significant findings used in the diagnosis of necrotizing periodontal diseases (NPD) are the presence of interproximal necrosis and ulceration and the rapid onset of gingival pain. Patients with NPD can often be febrile. Necrotizing ulcerative periodontitis sites harbor high levels of spirochetes and P. intermedia, and invasion of the tissues by spirochetes has been shown to occur.

Factors that predispose children to NPD include viral infections (including HIV), malnutrition, emotional stress, lack of sleep, and a variety of systemic diseases.26 Treatment involves mechanical debridement, oral hygiene instruction, and careful follow-up. Debridement with ultrasonics has been shown to be particularly effective and results in a rapid decrease in symptoms. If the patient is febrile, antibiotics may be an important adjunct to therapy. Metronidazole and penicillin have been suggested as drugs of choice.

Conclusion
Periodontal diseases are among the most frequent diseases affecting children and adolescents. Dental clinicians must be aware of the prevalence, diagnostic characteristics, microbiology, host-related factors, and therapeutic management of each of these disease entities. It is well known that the primary etiology of periodontal diseases is bacterial plaque. However, patients affected by early onset periodontitis (or aggressive periodontitis) often present with impaired immune function, mainly neutrophil dysfunction. Therefore, it is important when managing periodontal diseases in young individuals, the dentist should rule out systemic diseases that can affect host defense mechanisms. It is believed that the best approach to manage periodontal diseases is prevention, followed by early detection and treatment. To achieve this, profound knowledge about periodontics and pedodontics as well as intimate periodontal-pedodontics interactions are essential.

References


