International Journal of Community Medicine and Public Health
Aljohani HR et al. Int J Community Med Public Health. 2025 Jan;12(1):477-481
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040
DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20243796

Review Article

An overview of oral pediatric infectious diseases

Hanan Raja Aljohani[1]*, Sara Hamed Almansour[2], Areej Solaiman Mobarki[3], Wejdan Aqeel Jaafari[4], Deema Abdullah Al-mohaya[5], Mohammed Wazir Ali[6], Bedour Omar Aldaini[6], Nermin Ahmed Nogali[7], Hatem Abduljabar Almimony[8], Majed Hussain Hafez[9], Shaeea Ali Almazariqah[10]

[1]Department of Pediatric Dentistry, King Abdullah Medical Complex, Jeddah, Saudi Arabia
[2]College of Dentistry, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia
[3]Pediatric Dentistry, Specialized Dental Center, Najran, Saudi Arabia
[4]Sabya Primary Healthcare, Ministry of Health, Jazan, Saudi Arabia
[5]College of Dentistry, King Khalid University, Riyadh, Saudi Arabia
[6]College of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia
[7]Department of Preventive and Paediatric Dentistry at the University of Greifswald, Greifswald, Germany
[8]Dental Department, Ministry of Health, Al Baha, Saudi Arabia
[9]Dental Department, King Abdulaziz University Dental Hospital, Jeddah, Saudi Arabia
[10]Pediatric Dentistry, King Fahad Armed Forces Hospital, Khamis Mushait, Saudi Arabia

Received: 27 November 2024
Accepted: 13 December 2024

***Correspondence:**
Dr. Hanan Raja Aljohani,
E-mail: hananaljohani@gmail.com

ABSTRACT

Pediatric oral infectious diseases, caused by a range of viral, bacterial, and fungal pathogens, represent a significant challenge in clinical practice. These infections, often influenced by age, immune status, and hygiene practices, can lead to pain, functional impairments, and systemic complications. Common viral infections such as herpetic gingivostomatitis, varicella-zoster virus (VZV) manifestations, and hand-foot-and-mouth disease present with characteristic oral lesions, often accompanied by systemic symptoms. Bacterial infections, including dental caries, gingivitis, and odontogenic infections, are primarily linked to microbial colonization, dietary habits, and poor oral hygiene. Advanced cases, such as necrotizing periodontal diseases, can have severe implications if not managed promptly. Fungal infections, predominantly caused by *Candida* species, occur frequently in neonates and immunocompromised children, manifesting as oral thrush or angular cheilitis, and require targeted antifungal therapy. Prevention strategies, including the use of fluoride, dietary counseling, and regular dental check-ups, play a pivotal role in reducing the incidence of these infections. Management approaches vary based on the pathogen and clinical severity, ranging from supportive care and antifungal agents to antibiotic therapy and surgical interventions in severe cases. Collaborative care between dental practitioners and other healthcare providers is essential for effective outcomes. Infection control measures within dental settings and public health initiatives, such as vaccination and oral health education, are crucial in minimizing transmission and recurrence. Addressing pediatric oral infectious diseases requires a multifaceted approach, incorporating individualized patient care, preventive measures, and public health strategies to promote optimal oral and systemic health outcomes. Continued research and innovation are vital to improving diagnostic tools and therapeutic options for managing these infections in pediatric populations.

Keywords: Pediatric oral infections, Viral oral diseases, Bacterial oral infections, Fungal oral infections, Preventive oral health

INTRODUCTION

Oral pediatric infectious diseases encompass a broad spectrum of conditions, primarily caused by viral, bacterial, and fungal pathogens, that affect the oral and maxillofacial regions in children. These infections are often associated with significant discomfort and can impair a child's ability to eat, speak, and maintain oral hygiene. The prevalence and types of these infections are influenced by various factors, including age, immune status, nutritional habits, and oral hygiene practices. Despite advancements in pediatric healthcare and oral hygiene awareness, the burden of oral infectious diseases remains substantial, particularly in developing regions where access to healthcare and preventive strategies may be limited.

The primary viral infections encountered in pediatric oral health include herpes simplex virus (HSV), VZV, and coxsackievirus, each presenting distinct clinical features such as herpetic gingivostomatitis and hand-foot-mouth disease.[1] Viral infections are often self-limiting but can cause significant distress to children and caregivers. Moreover, reactivation of latent viral infections in immunocompromised children poses additional clinical challenges. Bacterial infections, including dental caries, periodontal infections, and acute necrotizing ulcerative gingivitis (ANUG), constitute another significant category, often linked to poor oral hygiene and dietary habits high in fermentable carbohydrates.[2] These infections may progress rapidly, resulting in systemic complications if left untreated. Fungal infections, particularly those caused by *Candida* species, are common in pediatric patients, especially in neonates and immunosuppressed children. Conditions such as oral thrush, often observed in infants, highlight the interplay between host immunity and microbial colonization.[3] The oral cavity, as a dynamic ecosystem, provides a niche for these microorganisms to thrive under favorable conditions, emphasizing the importance of early diagnosis and targeted management.

Preventive strategies, including routine oral hygiene practices, dietary modifications, and timely dental visits, play a pivotal role in reducing the incidence of oral infectious diseases.[4] Additionally, understanding the pathogenesis, clinical presentation, and risk factors associated with these infections is critical for devising effective treatment protocols and public health interventions. Addressing these diseases requires a multidisciplinary approach that involves pediatricians, dentists, and public health professionals. This review aims to provide an overview of the major oral pediatric infectious diseases, highlighting their etiology, clinical features, and management strategies.

REVIEW

Oral pediatric infectious diseases are a significant concern in clinical practice, with viral, bacterial, and fungal etiologies posing diverse challenges. Viral infections such as herpetic gingivostomatitis are common in children and can present with painful lesions and systemic symptoms like fever and malaise. These infections are often self-limiting, but antiviral therapy may be warranted in severe cases or immunocompromised patients.[5] Preventive measures, including hygiene education and vaccination, remain critical in reducing the incidence of viral oral infections.

Bacterial infections, particularly dental caries and gingivitis are frequently observed in pediatric populations and are strongly linked to diet and oral hygiene practices. The role of *Streptococcus mutans* in dental caries is well-established, emphasizing the importance of early preventive measures such as fluoride application and dietary counseling. Advanced cases can lead to systemic complications, underscoring the need for timely intervention.[6] Comprehensive oral health programs focusing on routine checkups and education have proven effective in mitigating bacterial infections. Fungal infections like oral candidiasis, although less common, can significantly impact neonates and immunosuppressed children. Management often involves antifungal therapy alongside addressing predisposing factors. Collaborative care between pediatricians and dentists is essential in managing these infections effectively, ensuring improved oral and systemic health outcomes.

COMMON VIRAL INFECTIONS IN PEDIATRIC DENTISTRY

Viral infections in pediatric dentistry are often encountered due to the unique immunological and behavioral attributes of children. Among the various pathogens, HSV, VZV and human papillomavirus (HPV) are the most frequently implicated. These viruses manifest in diverse clinical forms, ranging from acute infections to latent reactivations, and often impact both the oral mucosa and overall systemic health.

Herpetic gingivostomatitis, caused by HSV-1, is the most common primary viral infection in the pediatric oral cavity. Typically affecting children under six years of age, it presents as painful vesicles and ulcers on the gingiva, tongue, and lips. Systemic symptoms, including fever, irritability, and lymphadenopathy, often accompany the oral lesions.[7] Transmission occurs through direct contact with infected saliva or vesicular fluid, making it particularly common in daycare and school settings. Treatment is supportive in mild cases, with fluid intake and analgesia prioritized. In severe/immunocompromised children, antiviral agents such as acyclovir are employed to reduce symptom severity and duration.

VZV, responsible for chickenpox, frequently involves the oral cavity in its primary infection phase. Oral lesions, which manifest as small, round ulcers, may complicate eating and drinking in young children. In its reactivation phase, VZV can lead to herpes zoster, or shingles,

characterized by painful vesicular eruptions along a single dermatome, occasionally involving the trigeminal nerve and presenting intraorally.[8] Vaccination programs have significantly reduced the prevalence of VZV infections; however, breakthrough cases remain a concern, emphasizing the need for vigilant diagnosis and symptomatic management in dental practice.

Another notable viral infection is hand-foot-and-mouth disease (HFMD), caused primarily by coxsackievirus A16 and enterovirus 71. This condition is highly contagious and predominantly affects children under five years old. Oral involvement includes erythematous macules progressing to vesicles, primarily on the tongue, buccal mucosa, and soft palate. These lesions are accompanied by fever and malaise, often leading to difficulty in eating and dehydration.[9] While self-limiting, HFMD underscores the importance of infection control protocols in dental settings to prevent spread among young patients.

HPV is another pathogen of growing concern in pediatric dentistry, particularly with its association with benign oral warts and papillomas. While these lesions are often asymptomatic, they can be distressing to patients and caregivers due to their appearance. HPV infections in children are usually transmitted through vertical transmission or direct contact. Though rare, certain high-risk strains have been linked to oral squamous cell carcinoma, highlighting the importance of early detection and referral for suspicious lesions.[10] Preventive measures, including vaccination against HPV, offer a promising avenue for reducing the burden of these infections. The unique challenges posed by these viral infections in children necessitate a proactive approach from dental professionals. Identifying early signs, understanding transmission dynamics, and adopting evidence-based management strategies are integral to ensuring optimal oral health outcomes in pediatric patients. Additionally, awareness campaigns and collaborative efforts with pediatricians can further enhance preventive measures against these infections.

BACTERIAL ORAL INFECTIONS AND THEIR CLINICAL MANIFESTATIONS

Bacterial infections in the pediatric oral cavity are predominantly influenced by microbial colonization, oral hygiene practices, and dietary habits. These infections can range from superficial conditions, such as dental caries, to more severe forms, including periodontal diseases and odontogenic infections. Understanding the pathogenesis and clinical manifestations of these infections is crucial for timely diagnosis and management.

Dental caries, one of the most prevalent bacterial infections in children, is primarily caused by *Streptococcus mutans* and *Lactobacillus* species. These bacteria thrive in acidic environments created by the metabolism of dietary sugars, leading to demineralization of tooth enamel and the formation of cavities.[11] Early caries often appear as white spot lesions on enamel surfaces, which progress to cavitated lesions if untreated. Pain, tooth sensitivity, and eventual tooth loss are common clinical outcomes, significantly affecting a child's quality of life. Preventive measures, such as fluoride application and dietary counseling, are vital in controlling the spread of caries.

Periodontal infections, including gingivitis and periodontitis, are also prevalent in pediatric populations, often arising from inadequate oral hygiene. Gingivitis, characterized by erythema, swelling, and bleeding of the gums, is frequently caused by *Porphyromonas gingivalis* and *Prevotella intermedia*. When untreated, gingivitis can progress to periodontitis, where the supporting structures of the teeth, including the alveolar bone, are affected.[12] Pediatric periodontitis is relatively rare compared to adult forms but can occur in children with systemic conditions such as diabetes or immunodeficiencies. Dental practitioners play a critical role in educating caregivers about the importance of oral hygiene to prevent periodontal infections.

Odontogenic infections, which originate in the teeth or surrounding tissues, are another critical category of bacterial oral infections in children. These infections can result from untreated carious lesions or trauma leading to pulp necrosis and subsequent bacterial invasion. Common pathogens include *Staphylococcus aureus* and *Streptococcus pyogenes*. Clinically, these infections often present as localized swelling, pain, and purulent discharge, with potential complications including facial cellulitis and Ludwig's angina in severe cases.[13,14] Prompt dental intervention, such as drainage and antibiotic therapy, is essential to manage these conditions effectively.

Necrotizing periodontal diseases, including ANUG, represent a severe manifestation of bacterial infections, primarily observed in malnourished or immunosuppressed children. ANUG is caused by a mixed microbial flora, including *Fusobacterium* species and spirochetes like *Treponema denticola*. It is characterized by painful ulceration of the gingival margins, necrosis, and a characteristic foul odor. The condition can rapidly progress to systemic involvement if not addressed promptly.[15] Management often includes meticulous oral hygiene, systemic antibiotics, and addressing underlying predisposing factors. The diversity and complexity of bacterial oral infections in children underscore the need for a comprehensive approach to pediatric oral health. Early identification, preventive strategies, and appropriate management are critical in mitigating the impact of these infections on children's overall health and well-being.

FUNGAL INFECTIONS IN THE PEDIATRIC ORAL CAVITY

Fungal infections in the pediatric oral cavity are less common than bacterial or viral infections but can significantly impact children's oral and systemic health, particularly in those with compromised immunity. The

most prevalent fungal infection is oral candidiasis, caused by *Candida albicans*, though other *Candida* species can also be implicated. These infections often reflect a delicate imbalance between the host immune system and fungal overgrowth.

Oral candidiasis in infants, commonly referred to as oral thrush, is characterized by creamy white plaques on the oral mucosa, tongue, and palate that can be easily wiped off, leaving an erythematous base. This condition is often seen in neonates due to their immature immune system and can also be associated with antibiotic use, which disrupts normal oral flora.[16] Affected infants may experience discomfort during feeding, causing distress for both the child and caregivers. Antifungal agents like nystatin or fluconazole are typically effective for treatment, though recurrence is not uncommon without addressing underlying factors. In older children, fungal infections can occur secondary to systemic conditions such as diabetes mellitus or immunosuppressive therapies, including chemotherapy or corticosteroids. Chronic hyperplastic candidiasis is a less common presentation but is associated with thickened white plaques that cannot be scraped away and may require biopsy to rule out malignant transformation.[17] Pediatric dental practitioners must maintain a high index of suspicion for such presentations, especially in children with systemic illnesses.

Angular cheilitis, another manifestation of *Candida* infection, often presents as painful erythema and fissuring at the corners of the mouth. While *Candida* species are frequently implicated, the condition can be multifactorial, with bacterial co-infection or nutritional deficiencies, such as iron or vitamin B12, also contributing. Effective management includes antifungal therapy, addressing nutritional deficiencies, and improving oral hygiene practices.[18] Fungal infections are not confined to the oral mucosa but can also involve dental appliances and prostheses, particularly in children undergoing orthodontic treatment. *Candida* colonization on dental devices creates a reservoir for recurrent infections and can exacerbate conditions like denture stomatitis. The use of antifungal mouth rinses and regular cleaning of dental appliances are critical in managing and preventing these infections.[19] The interplay of host, pathogen, and environmental factors in fungal infections underscores the importance of individualized care. Pediatric dental practitioners must consider not only the clinical presentation but also the broader systemic and local predisposing factors that contribute to fungal overgrowth.

PREVENTIVE STRATEGIES AND MANAGEMENT APPROACHES

Effective prevention and management of oral infectious diseases in children require a combination of education, clinical interventions, and tailored treatment plans. Early recognition of risk factors, along with a focus on preventive measures, is critical to reducing the burden of oral infections in pediatric populations. One of the cornerstones of prevention is educating parents and caregivers about proper oral hygiene practices. Regular brushing with fluoride toothpaste and flossing are essential for maintaining oral health. Fluoride has been shown to strengthen enamel and inhibit bacterial acid production, making it a key agent in preventing dental caries.[20] Pediatric dentists often emphasize the importance of parental supervision during toothbrushing, especially in younger children, to ensure proper technique and coverage. Dietary counseling also plays a pivotal role in prevention. High consumption of sugary and acidic foods is directly linked to the development of caries and other bacterial infections. Encouraging a balanced diet rich in fruits, vegetables, and dairy products not only supports oral health but also promotes overall well-being. Limiting the frequency of snacking and introducing water as the primary beverage can further minimize the risk of infections.[21]

For children at higher risk of developing infections, such as those with systemic conditions or undergoing immunosuppressive therapy, regular dental check-ups are indispensable. Sealants, which create a physical barrier on the occlusal surfaces of teeth, are particularly effective in preventing caries in children with deep pits and fissures. Sealant application is a simple and non-invasive procedure that significantly reduces the risk of decay over time.[22] In addition to prevention, prompt and effective management of oral infections is crucial. For viral infections, such as herpetic gingivostomatitis, supportive care involving hydration and pain management is often sufficient. In more severe cases, antiviral medications may be prescribed to reduce the severity and duration of symptoms. Similarly, bacterial infections like periodontitis and ANUG require targeted antibiotic therapy along with debridement to remove plaque and calculus.

Fungal infections, such as oral candidiasis, are managed with antifungal agents like nystatin or fluconazole. It is equally important to address underlying factors, such as the use of inhaled corticosteroids or poorly fitting dental appliances, to prevent recurrence. Oral rinses and probiotics may also be beneficial as adjunctive treatments.[23] Infection control measures in dental settings are critical to preventing the spread of infectious diseases. Strict adherence to sterilization protocols, use of personal protective equipment, and minimizing aerosol generation during procedures are key strategies in ensuring patient safety. Public health initiatives, such as school-based oral health programs and vaccination campaigns, can further enhance prevention efforts at a population level.

CONCLUSION

Oral pediatric infectious diseases are a multifaceted challenge requiring a blend of preventive strategies, timely diagnosis, and effective management. Addressing these infections through education, clinical interventions, and public health measures can significantly enhance oral health outcomes in children. Collaboration between dental

professionals, caregivers, and healthcare providers is essential to achieving sustainable improvements. Continued research and innovation will further advance the prevention and treatment of these conditions, ensuring better oral health for future generations.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Neville BW, Damm DD, Allen CM, Chi AC. Oral and Maxillofacial Pathology-E-Book: Oral and Maxillofacial Pathology-E-Book. Elsevier Health Sci; 2015.
2. Featherstone JD. Prevention and reversal of dental caries: role of low level fluoride. Comm Dentistr Oral Epidemiol. 1999;27(1):31-40.
3. Paquette DW. The periodontal infection-systemic disease link: a review of the truth or myth. J Int Academy Periodontol. 2002;4(3):101-9.
4. Scardina GA, Messina P. Good oral health and diet. J Biomed Biotechnol. 2012;2012:720692.
5. Arendorf T, Walker D. The prevalence and intra-oral distribution of Candida albicans in man. Arch Oral Biol. 1980;25(1):1-10.
6. Loesche WJ. Role of Streptococcus mutans in human dental decay. Microbiological Rev. 1986;50(4):353-80.
7. Whitley RJ, Kimberlin DW, Roizman B. Herpes simplex viruses. Clin Infect Dis. 1998:541-53.
8. Shah S, Singaraju S, Einstein A, Sharma A. Herpes zoster: A clinicocytopathological insight. J Oral Maxillof Pathol. 2016;20(3):547.
9. Ooi MH, Wong SC, Podin Y, Winnie A, Syvia DS, Anand M, et al. Human enterovirus 71 disease in Sarawak, Malaysia: a prospective clinical, virological, and molecular epidemiological study. Clin Infect Dis. 2007;44(5):646-56.
10. Syrjänen S. Human papillomavirus infections and oral tumors. Med Microbiol Immunol. 2003;192:123-8.
11. Tanzer JM, Livingston J, Thompson AM. The microbiology of primary dental caries in humans. J Dental Educat. 2001;65(10):1028-37.
12. Albandar JM, Tinoco E. Global epidemiology of periodontal diseases in children and young persons. Periodontology 2000. 2002;29(1):153-76.
13. Brook I. Microbiology and management of endodontic infections in children. J Clin Pediatr Dentistr. 2004;28(1):13-7.
14. Sandor G, Low D, Judd P, Davidson R. Antimicrobial treatment options in the management of odontogenic infections. J Canad Dental Assoc. 1998;64(7):508-15.
15. Pozhitkov AE, Leroux BG, Randolph TW, Beikler T, Flemmig TF, Noble PA. Towards microbiome transplant as a therapy for periodontitis: an exploratory study of periodontitis microbial signature contrasted by oral health, caries and edentulism. BMC Oral Health. 2015;15:1-11.
16. Calderone RA, Clancy CJ. Candida and candidiasis. Am Society Microbiol Press, 2011.
17. McIntyre GT. Oral candidosis. Dental Update. 2001;28(3):132-9.
18. Malik NA. Textbook of oral and maxillofacial surgery. JP Medical Ltd. 2012.
19. Coulthwaite L, Verran J. Potential pathogenic aspects of denture plaque. Brit J Biomed Sci. 2007;64(4):180-9.
20. Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Database Syst Rev. 2013;2013(7):CD002279.
21. Celik F, Uysal I. Nutrition and the Prevention of Dental Diseases. Int J Basic Clin Studies. 2012;1(1):43-53.
22. Forss H, Walsh T, Hiiri A, Nordblad A, Mäkelä M, Hv W. Sealants for preventing dental decay in the permanent teeth. Cochrane Database Syst Rev. 2013;3:CD001830.
23. Wilson W, Taubert KA, Gewitz M, Peter BL, Larry MB, Matthew L, et al. Prevention of infective endocarditis: guidelines from the American heart association: a guideline from the American heart association rheumatic fever, endocarditis, and Kawasaki disease committee, council on cardiovascular disease in the young, and the council on clinical cardiology, council on cardiovascular surgery and anesthesia, and the quality of care and outcomes research interdisciplinary working group. Circulation. 2007;116(15):1736-54.

Cite this article as: Aljohani HR, Almansour SH, Mobarki AS, Jaafari WA, Al-mohaya DA, Ali MW, et al. An overview of oral pediatric infectious diseases. Int J Community Med Public Health 2025;12:477-81.