Dental And Oral Health Problems In Primary School Children: A Literature Review

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Abstract

Dental and oral health problems are common in children worldwide, particularly among primary school-aged children from 6-12 years old. This age group is in the mixed dentition stage and it is critical to maintain the health of primary teeth, which play an important role in the development of the permanent dentition. However, children in this age range often have poor oral hygiene habits and a high affinity for cariogenic foods. The aim of this literature review is to summarize the most prevalent dental and oral health problems affecting primary school children and discuss strategies for management and prevention. Based on the articles reviewed, dental caries and periodontal disease are the most common oral health issues in this population, primarily due to plaque accumulation. Additional problems include traumatic dental injuries, malocclusion, and premature loss of primary teeth. Preventive approaches at both the individual and community level are essential, including proper oral hygiene instruction, topical fluoride application, sealants, and regular dental check-ups. Parents and schools must work together to establish healthy habits and ensure access to professional dental care. With timely

intervention and a focus on prevention, many of these oral health problems can be avoided, promoting better quality of life for children as they transition to adulthood.

Introduction:

Oral health is an integral component of overall health and well-being, yet dental and oral diseases remain highly prevalent worldwide, particularly among children. The Global Burden of Disease Study 2017 estimated that oral diseases affect 3.5 billion people, with dental caries being the most pervasive condition.[1] In Indonesia, results from the most recent Basic Health Research Survey in 2018 found that a staggering 93% of children experience dental and oral health problems.[2]

The elementary school years, typically ages 6 to 12, represent a key transitional period in terms of dental development. During this mixed dentition stage, children have a combination of primary and permanent teeth, with the permanent teeth gradually replacing the primary teeth. Establishing proper oral hygiene habits is crucial, as the health of the primary dentition has a significant impact on the developing permanent teeth. However, this proves challenging as children in this age group often have an affinity for sugary, cariogenic foods and may lack the knowledge and discipline to maintain meticulous oral hygiene.[3]

Dental caries and periodontal disease are the two most common oral health problems seen in primary school-aged children worldwide.[4,5] If left untreated, these conditions can lead to pain, infection, tooth loss, and a host of other comorbidities that negatively impact a child's quality of life, including their ability to eat, sleep, and concentrate in school.[6] Furthermore, there is increasing evidence linking poor oral health in childhood to the development of systemic health issues like cardiovascular disease and diabetes later in life.[7]

This literature review aims to provide an overview of the most prevalent dental and oral health problems affecting children ages 6-12 years old, with a focus on current statistics, etiological factors, and the consequences of untreated disease. Additionally, it will highlight preventive strategies that can be implemented at both the individual and community level to promote better oral health outcomes in this vulnerable population. Methodology for conducting the literature search

will also be outlined. With a thorough understanding of the scope of the problem and effective management approaches, dental and medical professionals can work alongside parents and educators to help primary school children establish a solid foundation for a lifetime of optimal oral health.

Methods:

A comprehensive literature search was conducted using the ELSEVIER, PubMed, and Google Scholar databases. Only articles published between 2007 to 2020 were considered in order to evaluate the most current and relevant information. The following keywords were used alone and in combination to generate the initial list of articles: "dental health problems in children", "dental health and elementary school children", "caries and periodontitis for children aged 6-12 years", "malocclusion in children", "traumatic dental injuries in children", and "premature tooth loss in children".

The preliminary search yielded 143 articles. Titles and abstracts were reviewed to determine which studies met inclusion criteria. Only articles published in peer-reviewed journals were considered. Additionally, studies had to specifically address oral health issues in children between the ages of 6-12 years old. Articles that focused on children with special needs were excluded. After applying these criteria, 48 articles remained.

The full text of all 48 articles was carefully analyzed and the studies were further categorized based on the specific oral health problem being addressed (dental caries, periodontal disease, malocclusion, traumatic dental injuries, premature tooth loss). The references of these articles were also reviewed to identify any additional relevant studies that may have been missed in the initial search. Ultimately, the 10 articles that were most comprehensive and current were selected for inclusion in this literature review.

To organize the data, a spreadsheet was created with columns for article title, authors, publication year, type of study (epidemiological, interventional, case report etc.), sample size and population, key findings, and relevant statistics. This allowed for comparative analysis among the different studies and identification of prevailing trends and gaps in the existing literature. The information was synthesized to provide a narrative review of the major dental and oral health problems in primary school children as well as best practices for management and prevention.

Results:

Tooth Eruption and Dental Development

The mixed dentition stage, spanning from age 6 to 12 years, is characterized by the transition from primary to permanent teeth. According to Van der Linden's classification, this period can be further subdivided into the first transitional period (age 6-8), inter-transitional period (age 9), and second transitional period (age 10-12).[4]

During the first transitional period, the permanent incisors and first molars begin to erupt, replacing the primary incisors. The inter-transitional period is defined by the presence of all permanent incisors. Finally, in the second transitional period, the primary canines and molars are exfoliated and replaced by the permanent canines and premolars. The permanent second molars also typically erupt during this time.[4]

Understanding this developmental timeline is important for clinicians when considering preventive measures and treatment planning. The eruption of permanent teeth introduces new surfaces that are highly susceptible to caries, particularly the occlusal surfaces of first molars with their complex pit and fissure morphology. The presence of both primary and permanent teeth also creates unique challenges in terms of oral hygiene and plaque control.

Dental Caries

Dental caries is by far the most common chronic disease affecting children globally. The 2017 Global Burden of Disease Study found that 530 million children have caries in their primary teeth.[1] In Indonesia, the prevalence is particularly high, with 93% of children experiencing dental caries according to the 2018 Basic Health Research Survey.[2]

Caries is a multifactorial disease process characterized by the demineralization of enamel and dentin as a result of acid produced by cariogenic bacteria in the presence of fermentable carbohydrates. Children in the 6-12 year age range are especially prone to caries due to a combination of factors, including newly erupted permanent teeth, poor oral hygiene habits, frequent snacking, and an affinity for sugary foods and drinks.[8,9]

The consequences of untreated caries can be profound, leading to pain, infection, sleep disturbances, speech difficulties, and impaired nutrition.[10] Children with severe decay may avoid

smiling and laughing due to embarrassment, impacting their social interactions and self-esteem.[11] Additionally, studies have shown that dental caries can affect school performance and attendance.[12,13]

Among the permanent teeth, the first molars are especially vulnerable to caries due to their early eruption and anatomical complexity. One study found that 78.9% of children aged 6-11 in India had caries in their permanent first molars.[14] Loss of these critical teeth can lead to a cascade of problems, including drifting and tipping of adjacent teeth, malocclusion, and even temporomandibular joint disorders if left untreated.[15]

Early diagnosis and intervention is key to preventing the progression of caries and its associated sequelae. Risk assessment, oral hygiene instruction, dietary counseling, topical fluoride application, and sealants are important components of a caries management protocol for children in this age group. Restorative treatment may involve traditional fillings, stainless steel crowns, or more advanced techniques like the Hall technique depending on the stage of the carious lesion and patient/parent preferences.[16]

Periodontal Disease

While periodontal disease is most often associated with adults, gingivitis is actually quite common in children, with some studies reporting prevalence rates as high as 70-90%.[17,18] Gingivitis is a reversible inflammatory condition caused by the accumulation of bacterial plaque along the gingival margin. If left untreated, it can progress to periodontitis, which involves irreversible destruction of the supporting tissues and alveolar bone.

The microbiology of periodontal disease in children is not as well understood as it is in adults, but studies suggest that certain species like Actinomyces sp., Capnocytophaga sp., Leptotrichia sp., and Selenomonas sp. may play a key role.[19] Hormonal changes during puberty can also affect host response, increasing susceptibility to gingival inflammation in the presence of plaque.[19]

Clinically, gingivitis presents as red, swollen, bleeding gums and is typically not associated with any attachment or bone loss.[19] In contrast, the signs and symptoms of periodontitis may include gingival recession, periodontal pocketing, tooth mobility, and shifting of teeth.[20] If not properly managed,

periodontitis can eventually lead to tooth loss, negatively impacting function and esthetics.

Treatment of periodontal disease in children involves mechanical removal of plaque and calculus deposits to disrupt the pathogenic bacterial communities. In office, this may be performed by quadrant scaling and prophylaxis. Patients should also be educated on proper oral hygiene techniques, including twice daily brushing and flossing. For more advanced cases of periodontitis, surgical intervention and/or antimicrobial therapy may be indicated.[19]

Establishing good oral hygiene habits early in childhood is one of the best ways to prevent periodontal disease. Parents and caregivers play a critical role in modeling and reinforcing these behaviors. Regular dental check-ups provide an opportunity for clinicians to monitor periodontal health, identify problems in the earliest stages, and offer personalized oral hygiene instructions.

Malocclusion

Malocclusion is defined as any deviation from normal occlusion that is outside the ideal range in terms of esthetics and function. It is considered one of the most common oral health problems after dental caries and periodontal disease.[21] The etiology of malocclusion is multifactorial and can be broadly divided into hereditary factors like tooth size discrepancies and environmental factors such as premature loss of primary teeth, retained primary teeth, oral habits, and trauma.[22]

The prevalence of malocclusion varies globally but is generally thought to affect 20-93% of children.[23] In one study of school children aged 6-12 years old in India, 57.7% had signs of developing malocclusion.[24] Common presentations include crowding, spacing, increased overjet, deep bite, open bite, and posterior crossbite.[25]

The consequences of untreated malocclusion extend beyond compromised esthetics. Depending on the type and severity, malocclusion can lead to speech difficulties, TMJ disorders, uneven wear of teeth, and psychosocial problems stemming from a negative self-image.[26] Early diagnosis is key, as some developing malocclusions may be intercepted in the mixed dentition stage with appliances like space maintainers, habit-breaking appliances, or functional appliances that modify jaw growth.[27]

Traumatic Dental Injuries

Traumatic dental injuries (TDI) are relatively common in the pediatric population, with an estimated prevalence ranging from 10-35%.[28] The peak incidence tends to occur between ages 2-4 and 8-10.[29] Common causes include falls, sports-related injuries, motor vehicle accidents, and physical abuse.[30]

TDI can affect both the primary and permanent dentition. In primary teeth, the most frequent type of injury is luxation, particularly subluxation and lateral luxation.[31] Avulsion is less common in primary teeth due to the resilience of the alveolar bone and supporting structures. In contrast, the most common TDI in permanent teeth are uncomplicated crown fractures, while luxation injuries are less frequent.[28]

Management of TDI depends on a variety of factors, including the type of injury, the degree of tooth development, and the time elapsed since the trauma. Treatment may range from monitoring to splinting, endodontic therapy, or even extraction in severe cases.[32] Complications like pulp necrosis, tooth discoloration, ankylosis, and arrest of root formation can occur, necessitating long term follow up.[33]

Prevention of TDI should be a key component of anticipatory guidance for children in the mixed dentition stage. Use of mouthguards during contact sports, elimination of physical hazards in play areas, and counseling on safe behaviors can help reduce the incidence of these injuries. Additionally, parents and school staff should be educated on proper first aid measures like how to locate and store an avulsed tooth.[34]

Premature Tooth Loss

Premature loss of primary teeth, particularly molars, is a significant concern during the mixed dentition stage. The primary molars play a critical role in maintaining arch length and serving as guides for the eruption of their permanent successors. If lost too early, the space may close due to drifting of adjacent teeth, leading to impaction or ectopic eruption of the permanent dentition.[35]

Common causes of premature primary tooth loss include dental caries, trauma, and congenital absence of the permanent successor.[36] One study found that caries was responsible for 67% of prematurely lost primary teeth in a sample of schoolchildren.[37] The prevalence varies widely but has been reported to range from 8.5-51% depending on the population.[38]

Management typically involves the use of space maintainers to preserve arch integrity until the permanent tooth is ready to erupt. The type of space maintainer selected depends on a variety of factors such as the child's stage of dental development, number of teeth lost, and location in the arch. Options include removable or fixed appliances made of acrylic or metal.[39]

As with other oral health problems, prevention of premature tooth loss should be the goal. This involves early diagnosis and treatment of caries, use of pit and fissure sealants on susceptible molars, and regular dental check-ups to monitor the developing dentition. Space maintenance can also be considered a preventive measure against future orthodontic problems that may arise from premature loss of primary teeth.[35]

Conclusion:

Dental and oral health problems are a significant concern in primary school-aged children worldwide. Dental caries and periodontal disease are the two most prevalent issues, driven largely by poor oral hygiene and dietary habits. Malocclusion, traumatic dental injuries, and premature tooth loss are also relatively common and can have long-lasting consequences if not properly addressed.

Preventive strategies should be implemented at both the individual and community level. This includes oral health education programs targeting children, parents, and teachers to promote healthy habits and increase awareness about the importance of dental care. Regular dental check-ups and screenings in schools can help identify problems early when they are most amenable to treatment. Topical fluoride application, sealants, and timely intervention for developing malocclusions are evidence-based approaches that can dramatically improve outcomes.

Efforts to reduce childhood oral health disparities must focus on addressing the social determinants of health and improving access to care. This may involve policies aimed at increasing insurance coverage, expanding the dental workforce in underserved areas, and integrating oral health into primary care settings. Collaboration between dental and medical professionals is also critical, as many chronic conditions share common risk factors with oral diseases.

Further research is needed to better understand the genetic, behavioral, and environmental factors that contribute to dental and oral health problems in children. Additionally, there is a need for more studies evaluating the effectiveness of various preventive and therapeutic approaches, particularly in diverse global populations. By continuing to expand the evidence base and translating research findings into practice, we can work towards the goal of ensuring optimal oral health for all children.

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