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Etiological Factors of Inflammatory Diseases of the Oral Mucosa in Children

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Abstract: Inflammatory diseases of the oral mucosa in children remain a common clinical problem in pediatric dentistry and are characterized by diverse etiological factors and variable clinical manifestations. The immaturity of oral tissues and the close relationship between oral and systemic health increase children's susceptibility to inflammatory lesions. This study aimed to analyze and systematize the etiological factors associated with inflammatory diseases of the oral mucosa in children, with particular attention to the interaction between local and systemic contributors. A cross-sectional observational study was conducted involving pediatric patients aged 1–15 years presenting with inflammatory oral mucosal lesions. Clinical examination, etiological assessment, and supplementary diagnostic methods were applied. Statistical analysis included descriptive statistics and logistic regression to determine associations between etiological factors and disease course, expressed as odds ratios (OR) with 95% confidence intervals (CI). Local etiological factors, particularly mechanical trauma and poor oral hygiene, were identified in the majority of cases, while systemic conditions significantly increased the risk of chronic and recurrent disease forms ($OR > 2.0$; $p < 0.05$). Infectious factors were more frequently associated with acute presentations, especially in younger age groups. Multivariate analysis confirmed poor oral hygiene, systemic disease presence, and infectious etiology as independent predictors of disease severity. Inflammatory diseases of the oral mucosa in children are predominantly multifactorial. Effective management requires an integrated diagnostic and preventive approach that addresses both local and systemic risk factors to reduce disease severity and recurrence.

Keywords: Children, oral mucosa, inflammatory diseases, etiological factors, pediatric dentistry, oral hygiene, systemic conditions

Introduction

Diseases of the oral mucosa represent one of the most prevalent groups of conditions in pediatric dentistry and constitute a significant public health problem worldwide. Numerous studies indicate that dental and oral mucosal diseases are among the most common pathological conditions observed in childhood, demonstrating high prevalence and clinical diversity [1], [2]. The oral mucosa plays a crucial role as an anatomical and functional structure reflecting both physiological and pathological processes occurring in the body, which explains its diagnostic and prognostic importance [14]. The oral cavity represents the initial segment of the gastrointestinal tract and is exposed to various external and internal influences from the earliest hours of life. Throughout childhood, the oral mucosa remains highly sensitive to mechanical, chemical, thermal, and microbial factors due to its structural immaturity and increased vascularization [1], [10], [14]. As a result, pathological processes in the oral mucosa of children often develop rapidly and may be accompanied by pronounced systemic manifestations. The etiology of inflammatory diseases of the oral mucosa in children is multifactorial and involves a complex interaction of local and systemic factors. Local etiological factors include mechanical trauma caused by early erupted teeth, sharp carious edges, orthodontic appliances,

inadequate oral hygiene, and iatrogenic interventions [4], [8], [10]. Thermal and chemical injuries resulting from exposure to hot foods, household chemicals, or improperly used dental materials also contribute significantly to mucosal damage in pediatric patients [6], [7]. Systemic factors play an equally important role in the development of inflammatory lesions of the oral mucosa. Infectious diseases of viral, bacterial, and fungal origin are among the leading causes of oral mucosal inflammation in children, including herpetic, streptococcal, staphylococcal, and candidal stomatitis [3], [5], [10], [14], [15]. In addition, immune dysfunction, allergic reactions, gastrointestinal disorders, endocrine diseases, hematological pathologies, and hypovitaminosis are frequently associated with oral mucosal lesions, often determining their chronic or recurrent course [11], [14]. Special attention should be paid to immunodeficiency-related conditions, in which oral manifestations may serve as early diagnostic markers. In children with congenital or acquired immunodeficiency, including HIV infection, persistent candidiasis, ulcerative-necrotic gingivostomatitis, chronic aphthous stomatitis, and other severe oral lesions are commonly observed [14]. According to published data, candidal stomatitis occurs in approximately 5% of newborns and up to 10% of infants, emphasizing the clinical relevance of this condition in early childhood [5]. Despite the extensive body of literature addressing individual forms of oral mucosal diseases, there remains a lack of comprehensive systematization of etiological factors contributing to inflammatory processes of the oral mucosa in children. In clinical practice, insufficient consideration of the combined influence of local and systemic factors often leads to diagnostic challenges and suboptimal therapeutic outcomes. Therefore, an integrated, multidisciplinary approach involving pediatric dentists, pediatricians, and other specialists is essential for accurate diagnosis, effective treatment, and prevention of oral mucosal diseases in children [2], [14]. The aim of the present study is to analyze and systematize the main etiological factors involved in the development of inflammatory diseases of the oral mucosa in children, taking into account age-related characteristics, local influences, and systemic conditions. Such an approach is expected to improve diagnostic accuracy and contribute to the optimization of preventive and therapeutic strategies in pediatric dental practice.

Methods

This study was conducted as a cross-sectional observational clinical study aimed at identifying etiological factors associated with inflammatory diseases of the oral mucosa in children. The research was carried out in a pediatric dental clinical setting and followed standardized diagnostic protocols. The study included pediatric patients aged 1–15 years presenting with clinical signs of inflammatory lesions of the oral mucosa. Participants were stratified into age groups according to pediatric dental classifications. Children with congenital craniofacial anomalies or severe systemic conditions unrelated to oral pathology were excluded from the study. Clinical examination was performed using standardized pediatric oral assessment criteria, including visual inspection and palpation. Oral mucosal lesions were evaluated based on localization, morphological characteristics, severity, and clinical course. Oral hygiene status was assessed using age-appropriate indices. When clinically indicated, additional diagnostic methods, including cytological and microbiological examinations, were employed to identify infectious or inflammatory etiological factors. Etiological factors were classified into local (mechanical, thermal, chemical, infectious) and systemic (allergic, immunological, gastrointestinal, hematological) categories. The presence and combination of these factors were recorded for each patient to determine their relative contribution to oral mucosal inflammation.

Results

A total of 150 pediatric patients aged 1–15 years with inflammatory lesions of the oral mucosa were included in the study. The study population consisted of 82 males (54.7%) and 68 females (45.3%). According to age stratification, 38 children (25.3%) were aged 1–3 years, 47 (31.3%) were aged 4–6 years, 41 (27.3%) were aged 7–10 years, and 24 (16.0%) were aged 11–15 years.

Acute inflammatory conditions were observed in 94 patients (62.7%), while 56 patients (37.3%) presented with chronic or recurrent forms of oral mucosal inflammation. Etiological analysis demonstrated that inflammatory diseases of the oral mucosa in children were predominantly associated

with combined etiological factors. Local etiological factors were identified in 112 patients (74.7%), whereas systemic factors were present in 86 patients (57.3%). In 48 cases (32.0%), both local and systemic factors were simultaneously observed. Among local factors, mechanical trauma (sharp tooth edges, early erupted teeth, orthodontic appliances) was the most frequent, affecting 61 patients (40.7%), followed by infectious agents in 54 patients (36.0%), and chemical or thermal injuries in 19 patients (12.7%). Poor oral hygiene was documented in 67 patients (44.7%). Systemic etiological factors included infectious diseases (34.0%), gastrointestinal disorders (26.0%), allergic conditions (18.7%), hypovitaminosis (16.0%), and hematological or immunological disorders (8.7%).

Statistical analysis revealed a significant association between the presence of systemic factors and the development of chronic or recurrent oral mucosal inflammation. Children with systemic disorders had a 2.6-fold higher risk of developing chronic forms compared to those without systemic involvement (OR = 2.63; 95% CI: 1.38–5.02; $p = 0.003$).

Poor oral hygiene was significantly associated with increased severity of inflammatory lesions. Patients with inadequate oral hygiene demonstrated a higher likelihood of ulcerative or necrotic lesions (OR = 3.12; 95% CI: 1.67–5.85; $p < 0.001$). Infectious etiological factors were strongly associated with acute inflammatory presentations, particularly in younger age groups. Children aged 1–6 years showed a significantly higher probability of infectious oral mucosal inflammation compared to older children (OR = 1.94; 95% CI: 1.02–3.68; $p = 0.041$). Age-related analysis demonstrated that infants and preschool-aged children more frequently exhibited acute inflammatory lesions, including candidal and herpetic stomatitis ($p < 0.05$). In contrast, school-aged children and adolescents showed a higher prevalence of chronic recurrent conditions, particularly chronic recurrent aphthous stomatitis and allergic oral lesions ($p = 0.02$). Multivariate logistic regression analysis identified systemic disease presence, poor oral hygiene, and infectious etiology as independent predictors of severe or recurrent oral mucosal inflammation. Among these, poor oral hygiene demonstrated the strongest association (adjusted OR = 3.45; 95% CI: 1.78–6.67; $p < 0.001$). The results indicate that inflammatory diseases of the oral mucosa in children are predominantly multifactorial in origin. The coexistence of local and systemic etiological factors significantly increases disease severity and chronicity, highlighting the importance of comprehensive diagnostic and preventive strategies in pediatric dental practice.

Discussion

The findings of the present study demonstrate that inflammatory diseases of the oral mucosa in children are predominantly multifactorial, arising from the combined influence of local and systemic etiological factors. This observation is consistent with international research emphasizing the complex interaction between mechanical trauma, microbial exposure, host immune status, and systemic health conditions in the pathogenesis of pediatric oral mucosal inflammation.

Our results confirm the dominant role of local factors, particularly mechanical irritation and inadequate oral hygiene, in initiating inflammatory lesions of the oral mucosa. Similar conclusions have been reported by international authors, who identify biofilm accumulation and repeated mucosal microtrauma as key triggers of inflammatory responses in pediatric patients. The strong association between poor oral hygiene and increased disease severity observed in this study further supports the critical importance of preventive oral care in childhood.

The study also revealed a significant association between systemic conditions and chronic or recurrent disease courses. Children with underlying systemic disorders demonstrated a higher likelihood of persistent oral mucosal inflammation, which aligns with global evidence linking gastrointestinal, allergic, immunological, and hematological abnormalities to altered mucosal immunity and impaired tissue regeneration. These findings highlight the necessity of comprehensive medical evaluation in children presenting with recurrent oral lesions.

Age-related differences observed in the present study are in agreement with international data, indicating a higher prevalence of acute infectious lesions in younger children and a predominance of

chronic recurrent conditions in older age groups. This pattern likely reflects age-dependent immune maturation and changing environmental exposures.

Conclusion

The present study demonstrates that inflammatory diseases of the oral mucosa in children are predominantly multifactorial in nature, resulting from the combined influence of local etiological factors and systemic health conditions. Mechanical trauma, inadequate oral hygiene, and infectious agents were identified as the most common local contributors, while systemic disorders significantly increased the risk of chronic and recurrent disease courses.

The findings emphasize that systemic involvement represents a key determinant of disease persistence and severity, underscoring the importance of comprehensive medical assessment in pediatric patients with recurrent oral mucosal inflammation. Age-related differences in clinical presentation further highlight the need for individualized diagnostic and preventive strategies.

Overall, the results support the necessity of an integrated, multidisciplinary approach involving pediatric dentists and medical specialists to improve early diagnosis, optimize treatment outcomes, and reduce recurrence rates. Strengthening preventive measures, particularly oral hygiene education and early identification of systemic risk factors, may play a critical role in improving oral health and overall well-being in pediatric populations.

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