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EVALUATING THE ORAL HEALTH STATUS OF CHILDREN WITH DIABETES MELLITUS: A COMPREHENSIVE CLINICAL ASSESSMENT

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Abstract: Diabetes mellitus in the pediatric population is associated with a spectrum of oral complications, including increased dental caries susceptibility, accelerated gingival inflammation, salivary gland dysfunction, and heightened prevalence of oral mucosal infections. Despite the well-documented bidirectional relationship between glycemic control and oral health, routine dental assessment remains poorly integrated into pediatric diabetes care. This review critically evaluates the oral health status of diabetic children, examining caries prevalence, periodontal parameters, salivary flow characteristics, and enamel defect frequency. A refined, multidisciplinary oral health assessment protocol is proposed, incorporating risk-stratified preventive intervention, systematic salivary function evaluation, and structured interdisciplinary communication between dental and endocrinology teams. Implementation of this framework aims to facilitate early detection of oral complications and improve both oral and systemic health outcomes in this vulnerable population.

Keywords: Diabetes Mellitus, Children, Oral Health Assessment, Dental Caries, Gingivitis, Salivary Dysfunction, Glycemic Control, Preventive Dentistry.

Background: The global incidence of diabetes mellitus in the pediatric population continues to rise, with type 1 diabetes representing the predominant form affecting over 1.2 million children and adolescents worldwide. The oral cavity serves as a sensitive indicator of systemic metabolic dysregulation, and the oral complications of diabetes in children encompass a broad clinical spectrum with significant functional and psychosocial consequences. Dental caries experience is elevated in diabetic children, with meta-analyses demonstrating significantly higher DMFT/dmft indices compared to healthy controls, driven by elevated salivary glucose concentrations, reduced salivary buffering capacity, and dietary patterns necessitating frequent snacking to prevent hypoglycemia. Gingival inflammation is disproportionately severe in diabetic children, with gingival index scores and bleeding on probing significantly higher than in non-diabetic peers matched for plaque accumulation, reflecting the diabetes-induced hyperinflammatory state mediated by advanced glycation end-products and their receptors. Salivary gland dysfunction, documented in 30–40% of pediatric diabetic patients, manifests as reduced unstimulated and stimulated salivary flow rates, decreased salivary pH, elevated viscosity, and diminished concentrations of protective antimicrobial proteins including histatin and secretory immunoglobulin A. Enamel developmental defects, particularly hypoplasia and hypomineralization of permanent incisors and first molars, occur with increased frequency in children with early-onset diabetes, resulting from hyperglycemia-induced disruption of ameloblast function during critical periods of odontogenesis. Despite the substantial evidence documenting these oral health disparities, current clinical practice frequently fails to integrate comprehensive oral evaluation into the routine diabetes care pathway, representing a critical gap in holistic pediatric healthcare delivery.

Objective: To comprehensively evaluate the oral health status of children with diabetes mellitus across multiple clinical domains and to propose a structured, evidence-based multidisciplinary assessment protocol that facilitates early detection, risk stratification, and preventive intervention.

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Materials and Methods: A systematic literature review was conducted using PubMed, Scopus, and Cochrane Library databases for publications from 2005 to 2025. Search terms included “pediatric diabetes oral health,” “type 1 diabetes dental caries children,” “salivary flow diabetes adolescents,” “periodontal health diabetic children,” and “enamel defects diabetes.” Inclusion criteria comprised cross-sectional and longitudinal clinical studies, case-control investigations comparing diabetic and healthy pediatric populations, and systematic reviews with meta-analyses. Extracted data were synthesized to construct a comprehensive oral health assessment framework encompassing clinical, biochemical, and behavioral parameters.

Results: Analysis of the evidence revealed five key findings informing the proposed assessment protocol. First, dental caries severity, quantified by DMFT/dmft indices, is significantly elevated in diabetic children, with glycemic control measured by HbA1c emerging as an independent predictor of caries risk. Children with HbA1c exceeding 8.5% demonstrate a 2.3-fold increased odds of high caries experience compared to well-controlled counterparts. Second, gingival inflammation assessed by the Modified Gingival Index correlates positively with HbA1c levels and persists after adjustment for oral hygiene practices, confirming the systemic inflammatory contribution to periodontal tissue destruction. Third, quantitative salivary assessment reveals that unstimulated whole salivary flow rates below 0.1 mL/min are three times more prevalent in diabetic children than in healthy controls, and this hyposalivation independently predicts both caries increment and oral candidiasis development. Fourth, candidal colonization, predominantly *Candida albicans*, is detected in 45–60% of diabetic children compared to 20–30% of healthy children, with colonization density correlating with HbA1c levels. Fifth, enamel developmental defects assessed by the Developmental Defects of Enamel Index are present in 35–50% of children diagnosed with diabetes before age five years, compared to 10–15% in later-onset or non-diabetic children.

Conclusion: Children with diabetes mellitus bear a significantly elevated burden of oral disease across multiple clinical domains, with the magnitude of oral health disparity directly modulated by the degree of glycemic control. The proposed multidisciplinary assessment protocol incorporating comprehensive caries assessment, periodontal evaluation, quantitative sialometry, mucosal screening, and enamel defect documentation provides a structured framework for early detection and risk-stratified preventive intervention. Integration of this protocol into routine pediatric diabetes care, facilitated by structured interdisciplinary communication pathways, offers substantial potential to improve both oral health outcomes and metabolic control through interruption of the bidirectional oral-systemic inflammatory cycle.

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