

Date: 7<sup>th</sup>February-2026

**HISTOLOGICAL FEATURES OF PARODONTAL TISSUE ALTERATIONS IN CHILDREN WITH TYPE 1 DIABETES MELLITUS AND HYPERTROPHIC GINGIVITIS**

**Avazova Sh.A.**  
Alfraganus university



**Background.** Type 1 diabetes mellitus (T1DM) is associated with systemic metabolic disturbances, impaired immune response, and microvascular dysfunction, which negatively affect parodontal tissues. In pediatric patients, diabetes contributes to the development of inflammatory and degenerative changes in gingival tissues, leading to increased susceptibility to parodontal diseases, including hypertrophic gingivitis. Histological evaluation allows identification of structural alterations at the cellular and tissue levels.

**Aim.** To investigate histopathological changes in gingival tissues of children with type 1 diabetes mellitus using biopsy material obtained during surgical treatment of hypertrophic gingivitis.

**Materials and Methods.** The study included gingival biopsy samples obtained from 28 children aged 7–15 years during gingivectomy procedures. The main group consisted of 14 children diagnosed with T1DM, and the control group included 14 systemically healthy children with hypertrophic gingivitis.

Tissue specimens were fixed in 10% neutral buffered formalin, embedded in paraffin, and sectioned into 4–5  $\mu\text{m}$  thick slices. Sections were stained with hematoxylin and eosin and examined using light microscopy at magnifications  $\times 100$ ,  $\times 200$ , and  $\times 400$ . Morphological assessment included epithelial thickness, inflammatory cell infiltration, connective tissue integrity, and vascular morphology.

**Results.** Histological analysis revealed pronounced structural alterations in the parodontal tissues of children with T1DM.

Epithelial hyperplasia and acanthosis were observed in 78.6% of cases, while epithelial edema and vacuolar degeneration of epithelial cells were detected in 71.4% of specimens. Areas of epithelial thinning and focal disruption of epithelial integrity were identified in 42.9% of cases.

The connective tissue showed marked inflammatory infiltration composed mainly of lymphocytes and plasma cells in 92.8% of samples. Moderate to severe stromal edema was observed in 85.7% of cases, while fragmentation and loosening of collagen fibers were detected in 64.3% of specimens.

Microvascular abnormalities were identified in the majority of diabetic patients, including thickened capillary walls (78.6%), vascular congestion (71.4%), and endothelial cell swelling (57.1%). These findings are consistent with diabetic microangiopathy.

Additionally, delayed connective tissue maturation and proliferation of immature granulation tissue were observed in 50.0% of cases, indicating impaired regenerative potential.

Date: 7<sup>th</sup>February-2026

Comparative analysis demonstrated that the severity of inflammatory and vascular changes was significantly higher in the diabetic group compared to controls ( $p < 0.05$ ).

**Conclusion.** Type 1 diabetes mellitus in children is associated with significant histopathological changes in parodontal tissues, including epithelial degeneration, chronic inflammatory infiltration, connective tissue disorganization, and microvascular damage.

These alterations impair tissue repair and contribute to the progression of parodontal inflammation. Histological evaluation confirms that T1DM is an important risk factor for parodontal tissue pathology in pediatric patients and highlights the need for early parodontal monitoring and preventive care.

#### REFERENCES:

1. Preshaw PM, Alba AL, Herrera D, et al. Periodontitis and diabetes: a two-way relationship. *Diabetologia*. 2021;64(12):2623-2636. doi:10.1007/s00125-021-05579-9
2. Dicembrini I, Serni L, Monami M, Mannucci E. Type 1 diabetes and periodontal disease: review of the literature. *Diabetes Res Clin Pract*. 2022;186:109807. doi:10.1016/j.diabres.2022.109807
3. Lalla E, Papapanou PN. Diabetes mellitus and periodontal diseases: an update. *Nat Rev Endocrinol*. 2021;17(7):409-420. doi:10.1038/s41574-021-00495-6
4. Rapone B, Ferrara E, Corsalini M, et al. Periodontal microbiological and histopathological changes associated with diabetes mellitus. *J Pers Med*. 2021;11(9):870. doi:10.3390/jpm11090870
5. Nazir MA, AlGhamdi L, AlKadi M, et al. The burden of diabetes, its oral complications and their prevention and management. *Open Access Maced J Med Sci*. 2022;10(F):194-199. doi:10.3889/oamjms.2022.8400

