PERIODONTAL DISEASE AND DIABETES IN UZBEKISTAN'S PUBLIC HEALTH CONTEXT

Mamlakatkhon M. Yusupova - senior lecturer
Central Asian Medical University (Fergana, Uzbekistan)
yusupovamamlakat11@gmail.com

Abstract. *This paper examines the bidirectional link between diabetes and periodontal disease amid Uzbekistan's growing burden of non-communicable diseases. Using national and international evidence, it applies a syndemic framework to reconceptualize these conditions as biologically and socially interconnected. While nutrition and infectious disease control have improved, oral complications of diabetes remain overlooked in national care strategies. The study advocates for screening, interdisciplinary training, and oral health integration into chronic disease policy.*

Keywords: *Diabetes mellitus; Periodontitis; Oral-systemic link; Uzbekistan; Chronic disease.*

Introduction

Relevance. Uzbekistan's health system is undergoing a rapid epidemiological transition. While major gains in maternal and child nutrition have reduced stunting and wasting among children under five to 10.8% and 1.8%, respectively-well below regional averages-non-communicable diseases (NCDs), particularly type 2 diabetes and obesity, are increasing. Adult diabetes prevalence is estimated at 6.3-7%, with many cases diagnosed only after complications arise, while obesity affects 21.8% of women and 16.1% of men [1]. Despite this growing burden, a critical yet underacknowledged domain persists in national health discourse: the bidirectional relationship between diabetes mellitus and oral health, particularly periodontal disease. This paper addresses that gap by examining diabetes and periodontitis through a syndemic lens, drawing on robust meta-analyses and empirical Uzbek research. These conditions are not isolated comorbidities, but mutually reinforcing pathologies shaped by shared biological, behavioral, and structural mechanisms. While global literature affirms that untreated periodontitis impairs glycemic control and vice versa, Uzbekistan's policies-despite reform efforts under PQ-102 and PQ-4295 -have yet to formally integrate dental monitoring into diabetes care. This study argues for oral health inclusion as a strategic component of NCD policy and care delivery.

Objective. This study investigates the bidirectional link between diabetes mellitus and periodontal disease within Uzbekistan's evolving non-communicable disease landscape. The primary aim is to highlight the overlooked role of oral-systemic health in chronic disease care and propose policy-level integration of oral health into diabetes management strategies.

Materials and Methods. The analysis adopts a narrative synthesis approach, drawing on peer-reviewed meta-analyses, national policy documents, and empirical studies from Uzbekistan. It incorporates clinical, epidemiological, and structural health system data to frame diabetes and periodontitis as syndemically linked conditions. The proposed model contextualizes global best practices within Uzbekistan's transitional health policy framework. **Diabetes Mellitus and Oral Health in Uzbekistan.** The intersection of diabetes mellitus and oral disease is under-explored in Uzbekistan's medical literature, despite evidence of their bidirectional pathophysiology and public health significance. Recent local research provides an emerging foundation, though it varies in depth and rigor. Abdusalomov and Abdusalomov analyzed the relationship between diabetes and oral health, revealing that diabetic patients face a heightened risk of oral complications, such as periodontal disease and opportunistic infections, due to immune impairment from chronic hyperglycemia. Their review confirms the bidirectional link between diabetes and periodontitis: hyperglycemia disrupts healing and immune function, while periodontal inflammation increases systemic cytokines, impairing insulin sensitivity. They also noted that changes in salivary

composition, including reduced antimicrobial capacity and higher glucose levels, can lead to oral candidiasis, indicating that oral symptoms may signal poorly controlled diabetes. Sa'dullaeva and Qalandarov presented a comprehensive yet superficial overview of diabetes [1,2]. While they accurately outlined diagnostic thresholds and pharmacological options, they neglected the behavioral, structural, and systemic aspects of diabetes care in Uzbekistan. Their analysis lacks localized prevalence data and patient adherence profiles, limiting its applicability for policy and interdisciplinary care. Nishonov and Islomova identified key factors driving rising diabetes rates among Uzbek adults aged 40–60, including sedentary lifestyle, obesity, and poor diet [2]. They project 642 million diabetes cases globally by 2040, emphasizing Uzbekistan's public health crisis. However, they omit oral health and lack national data to support the claimed 15% diabetes prevalence, which undermines the study's analytical rigor despite its useful context. Murodova and Kenjayev address the rising diabetes burden, projecting 1.31 billion cases by 2050 [3]. They emphasize early diagnosis and glycemic control but overlook oral health and rely on outdated sources. The article's relevance is limited by its failure to discuss innovations in diabetes care, such as GLP-1 receptor agonists and SGLT2 inhibitors, and to critique Uzbekistan's healthcare delivery.Tosharova and Maxmudova provided a structured overview of pharmacologic management and prevention according to global standards [4]. However, they overlook patient-centered factors like adherence, education, and health equity, which are vital in the Uzbek context. Their omission of oral-systemic health integration also leaves a gap in diabetes discourse. Dusmuradova and Yakubova highlighted that the immunomodulatory treatment significantly improved pediatric gingivitis outcomes in orthodontic patients[5]. Their randomized design supports the findings (70% improvement vs. 7% in controls) and emphasizes the relevance of immune modulation in oral diseases for immunocompromised populations, such as diabetics. These studies reveal a fragmented awareness of the systemic aspects of diabetes in Uzbekistan. Only Abdusalomov and Abdusalomov addressed the dental-diabetes connection [6], while most treat diabetes as an isolated condition with limited interdisciplinary care. This gap underscores the need for comprehensive policy and research frameworks that integrate oral health and involve dental professionals in chronic disease management (see Figure 1).

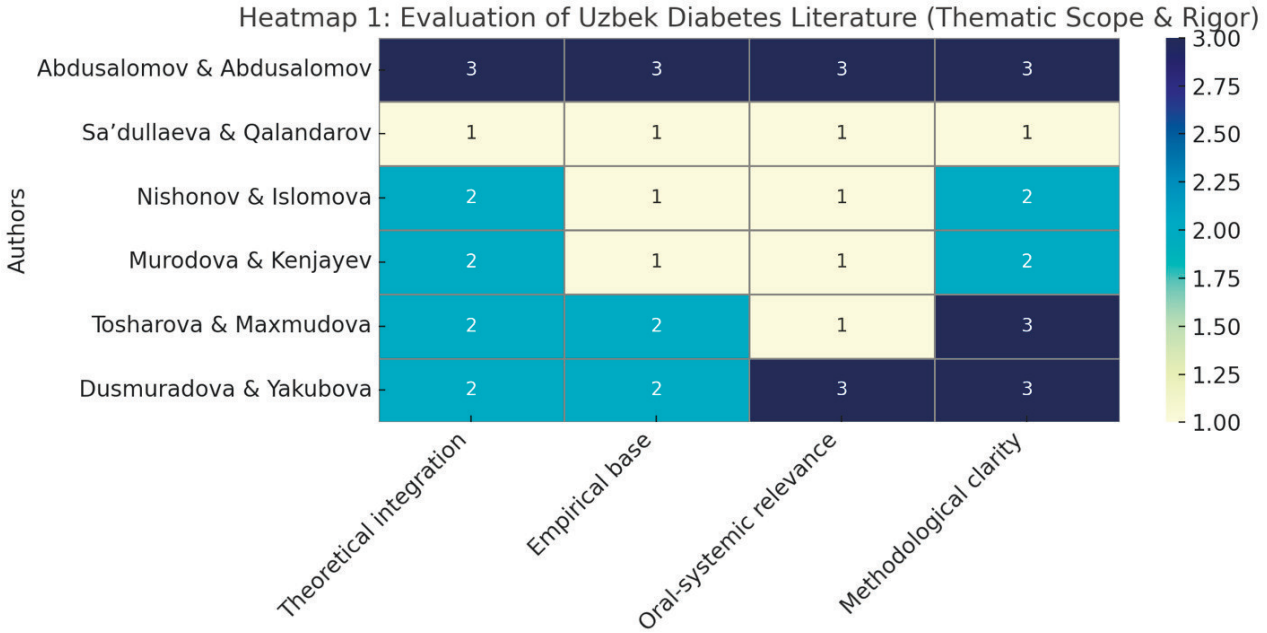

Fig. 1. Evaluation of Uzbek Diabetes Literature (Thematic Scope & Rigor).

Global Evidence on the Diabetes-Periodontal Disease Link. Recent research has confirmed the bidirectional relationship between diabetes mellitus and periodontal disease, revealing shared

pathways that drive disease progression. Stöhr et al. conducted a meta-analysis of 15 cohort studies, finding that periodontitis increases diabetes risk by 26% (SRR = 1.26, 95% CI 1.12–1.41), while diabetes raises periodontitis risk by 24% (SRR = 1.24, 95% CI 1.13–1.37). Their rigorous methodology, including validated periodontal indices and the QUIPS tool, supports th

e conclusion that systemic inflammation is a key factor. Hyperglycemia promotes IL-1β and CRP production, while periodontal pathogens exacerbate insulin resistance through TNF-α release, highlighting the importance of mutual screening and integrative care. Zhang et al. show that behavioral and systemic inequities worsen the link between diabetes and oral health [7]. Analyzing NHANES data from 2011 to 2016, they found diabetic adults were 39% more likely to have periodontal disease and 14% less likely to seek preventive dental care, with lower rates of daily interproximal cleaning. These disparities reveal socioeconomic and policy gaps, suggesting that addressing diabetes-related oral health necessitates structural reforms in access and education, not just clinical solutions.

Jensen et al. found that children with type 1 diabetes are at increased risk for early periodontal issues [8,9]. A cross-sectional study showed that elevated HbA1c levels correlated with bleeding on probing, gingival inflammation, and deeper periodontal pockets. Subgingival microbiome shifts confirmed localized dysbiosis in poorly controlled diabetics. The 25–54% rise in inflammatory markers per 1% HbA1c increment underscores the importance of early glycemic control for oral and systemic health. Physiological reviews offer valuable insights. Ahmad and Haque noted that oxidative stress, AGE-RAGE signaling, and cytokine cascades (e.g., TNF-α, IL-1β) damage periodontal tissues in diabetics [9]. They found that up to 68% of diabetics have periodontitis, and periodontal therapy can lead to modest HbA1c improvements, supporting integrative interventions. Aging populations face significant challenges. Chan et al. report that diabetes accelerates periodontitis progression by 86% in older adults, linked to salivary dysfunction and immune delay [10]. Comorbid conditions like xerostomia, candidiasis, and peri-implantitis complicate oral rehabilitation, highlighting the need for geriatric dental care models that consider metabolic fragility.

Population-level clinic data support these findings. Relvas et al. found that diabetes increases periodontitis odds by over eightfold (OR = 8.325), even after adjusting for hygiene behaviors [11]. In their Portuguese cohort, 78.2% of diabetic patients had periodontitis, compared to 45.6% of non-diabetics. Brushing and flossing showed strong protective effects (ORs ~0.25), underscoring the significance of modifiable behaviors alongside systemic pathology. Nibali et al. identify periodontitis as the of diabetes, linking oral and gut dysbiosis, oxidative stress, arterial stiffness, and endothelial dysfunction [12]. They find that periodontal inflammation increases HbA1c by 0.4–0.66%, with higher peri-implant failure rates in diabetics, especially those with poor glycemic control. Their review highlights the importance of metabolic monitoring during oral surgery and prosthodontics.

Comorbid symptoms like xerostomia have quantitative support. Adolfsson et al. reported a 43.6% prevalence of dry mouth among Swedish adults, primarily linked to diabetes and polypharmacy. Xerostomia was not age-dependent but was associated with taking five or more medications, seen in 71.2% of diabetic patients. Păunică et al. confirmed that diabetes worsens periodontal damage through AGEs, immune dysfunction, and microvascular changes [25]. They found that periodontal treatment can lower HbA1c by 0.4–1% and recommend integrative strategies like microbiome modulation and behavioral counseling, while noting that genetic causality is suggestive but not conclusive. Expert consensus supports that periodontal therapy reduces HbA1c by 0.27–0.6% and lowers risks of nephropathy, retinopathy, and cardiovascular complications in diabetics, as shown in the EFP-WONCA report by Herrera et al. [13]. Their call for systemic integration is backed by mechanistic and outcome-based evidence.

Oral signs can be early diagnostic tools. In a large Pakistani cohort, Shahbaz et al. found classic symptoms in undiagnosed diabetic patients: periodontitis (85.9%), xerostomia (84.7%), thick saliva (87.1%), and fissured tongue (91.8%) [14]. This strong statistical association supports oral screening

for early detection. Reviews indicate that Porphyromonas gingivalis causes dysbiosis and immune disruption in diabetic patients, accelerating alveolar bone loss and systemic cytokine release [15]. Genetic factors like IL-1β polymorphisms and IL-6 hypomethylation may worsen disease severity (see Figure 2). Fungal complications warrant attention. Shahabudin et al. [16] and Tiwari and Dangore-Khasbage found that diabetes-related immunosuppression promotes Candida albicans overgrowth [17]. Oral candidiasis is common in denture wearers and elderly diabetics, often misdiagnosed as leukoplakia or other lesions, revealing a diagnostic gap in recognizing oral-systemic comorbidities. These international studies prove that the diabetes-periodontitis link is biologically robust, clinically significant, and modifiable. They advocate for integrating dental services into diabetes care and public health policy, a practice not yet fully realized in Uzbekistan.

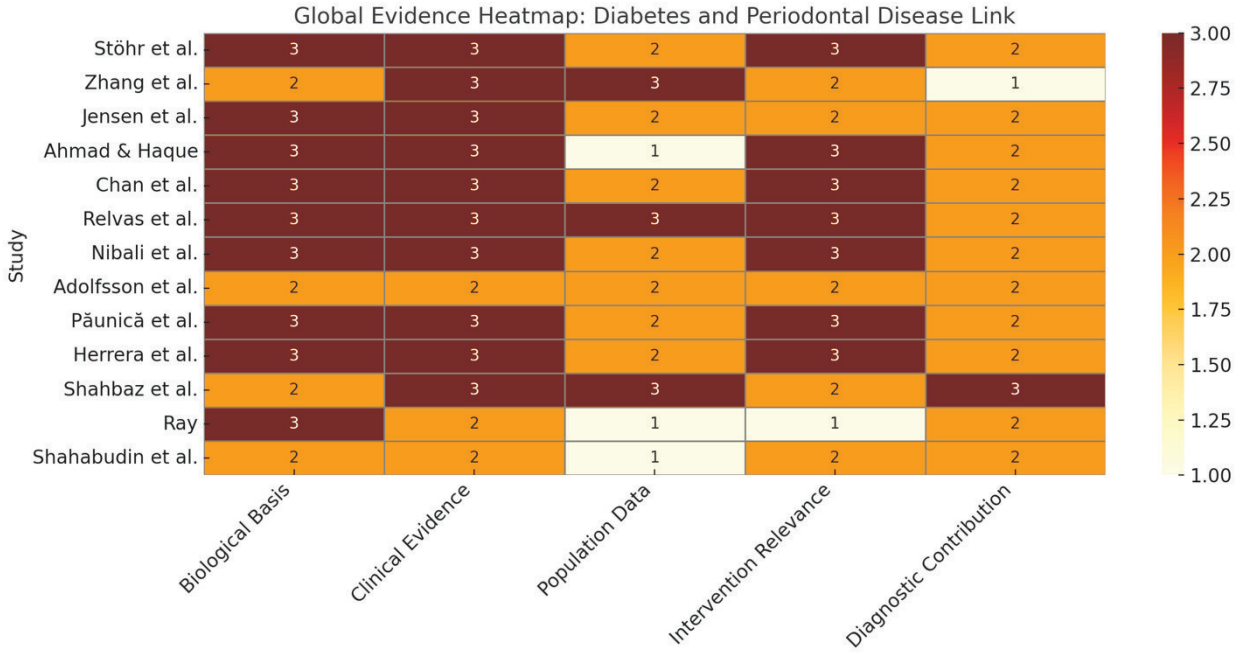

Fig. 2. Global Evidence Heatmap: Diabetes and Periodontal Disease Link.

Diabetes-Periodontitis Link in Uzbekistan's Health Transition. Uzbekistan is at a critical point in public health. While it has made strides in maternal and child nutrition, the nation now faces rising non-communicable diseases (NCDs), especially diabetes and obesity. The Global Nutrition Report (2023) shows that undernutrition indicators, such as stunting (10.8%) and wasting (1.8%), are below the regional average, thanks to investments in early-life health [1]. However, adult obesity rates are concerning, with 21.8% of women and 16.1% of men affected, indicating a metabolic crisis, and diabetes prevalence is estimated at 6.3–7%. Diagnoses often occur after complications arise, limiting early intervention. This situation, marked by nutritional gains and emerging metabolic vulnerabilities, requires an integrated approach to connect oral and systemic disease surveillance, especially as the link between diabetes and periodontitis becomes clearer.

Periodontitis, as noted by DaryoUz (2021), is a chronic inflammatory disorder of the supporting tooth structures, driven by microbial biofilm and immune dysregulation [18]. In diabetics, hyperglycemia worsens periodontal tissue breakdown through increased cytokine activity, oxidative stress, and impaired neutrophil function, creating a feedback loop: diabetes accelerates periodontal destruction, while periodontal inflammation deteriorates glycemic control via elevated markers like TNF-α and IL-1β. This bidirectional relationship is well-supported by evidence. Stöhr et al. found in a meta-analysis of 15 cohort studies that periodontitis raises diabetes risk by 26%, while diabetes increases periodontitis risk by 24%. In Uzbekistan, late-stage diabetes diagnoses are common, and

preventive dental care is fragmented. Abdusalomov and Abdusalomov note that diabetic patients face increased vulnerability to oral complications, such as periodontitis and salivary gland dysfunction, with integrated medical-dental frameworks largely absent. Their findings support Ahmad and Haque and Nibali et al., who consider periodontitis a “sixth complication” of diabetes due to shared immune and metabolic dysfunction. This leads to poorer oral health and increased diabetic morbidity, particularly in older adults, where immune senescence and polypharmacy exacerbate periodontal risk.

Sociobehavioral factors worsen this risk. Zhang et al. found that even in high-resource settings, diabetics often avoid preventive dental care and interproximal cleaning due to behavioral inertia, cost barriers, and poor provider coordination. In Uzbekistan, despite increased healthcare investment [19], oral health remains disconnected from general practice. While there has been a decline in infectious disease incidence and a slight improvement in diabetes prevalence (from 21.4 to 18.3 per 100,000), significant structural issues persist: limited periodontal screening in polyclinics, inadequate training for family doctors on oral-systemic links, and no dental surveillance in diabetes registries.

The theoretical model emerging from this empirical base illustrates syndemic interaction, where diseases cluster and reinforce each other amid social vulnerabilities. In Uzbekistan, diabetes and periodontitis co-exist and exacerbate one another, influenced by factors like dietary changes, tobacco use, and delayed access to care. Nishonov and Islomova attributed rising diabetes rates to poor lifestyle habits and stress, but they overlook the dental aspect, revealing a gap in national health analysis. Furthermore, Păunică et al and Herrera et al note that even modest periodontal treatment can lower HbA1c by up to 1%, a clinical improvement comparable to pharmacological intensification.

Neglecting oral health has consequences beyond metabolic dysregulation. Ermakova[20], highlights that untreated periodontitis can increase cardiovascular risk, compromise digestion, and raise miscarriage risk, supported by Relvas et al., who found that 81.6% of diabetic periodontitis cases were severe. In Uzbekistan, where maternal and under-five mortality rates have declined but NCD morbidity is rising, oral health represents a silent threat and an opportunity for cross-sectoral prevention.

Pediatric findings support this framework. Jensen et al. found that glycemic control correlates with subgingival microbial shifts and periodontal inflammation in children. However, Dusmuradova and Yakubova noted that local research on pediatric gingivitis is limited in mechanistic depth and long-term follow-up. Additionally, oral fungal infections, especially candidiasis, are increasingly recognized in diabetics due to systemic immunosuppression (e.g., but are rarely screened in primary care. In sum, evidence shows that the diabetes–periodontitis relationship is clinically actionable, biologically inseparable, and overlooked in Uzbekistan. Addressing this requires rethinking chronic disease management to include oral health as a diagnostic tool and therapeutic target.

Table 1

Key Dimensions in the Diabetes–Periodontitis Nexus (Uzbekistan Context).

	Key Theme	Core Insight
0	Nutrition & NCD Transition	Nutritional gains coexist with rising obesity and diabetes
1	Periodontal Disease in Diabetics	Diabetes worsens periodontal inflammation and vice versa
2	Evidence of Bidirectional Link	Meta-analyses show mutual disease amplification
3	Healthcare Fragmentation	Dental care not integrated into diabetes policy
4	Sociobehavioral Risks	Behavioral and access barriers persist in care-seeking
5	Syndemic Model Implications	Diabetes and periodontitis cluster under social vulnerabilities
6	Pediatric and Geriatric Dimensions	Children and elderly face higher oral health risks
7	Neglected Comorbidities	Fungal and cardiovascular risks linked to untreated periodontitis
8	Call for Integrated Policy	Oral health must be embedded in chronic disease frameworks

Discussion and Implications. This study emphasizes the link between diabetes mellitus and periodontal disease, a critical yet often overlooked aspect of Uzbekistan's non-communicable disease landscape. Integrating oral health into chronic disease frameworks challenges the separation of dental and medical care. Despite progress in maternal-child health and a decline in type 2 diabetes,

Uzbekistan's health system treats oral health as peripheral, neglecting its connection to diabetes. This analysis presents diabetes and periodontitis as mutually reinforcing conditions influenced by biological, social, behavioral, and structural factors. It positions periodontitis as a key component of systemic disease management. The shared pathways of inflammation, microbial dysbiosis, and immune dysfunction between gingival tissues and glycemic regulation link dentistry and internal medicine, which is currently lacking in Uzbek healthcare. Reforms are needed, including integrating periodontal screening into diabetes care for family polyclinics and medical brigades. Dental examinations should be included in diabetes registries and screening algorithms for middle-aged and elderly populations. Training practitioners on oral-systemic connections and emphasizing referrals and co-management of periodontal disease in diabetic patients is essential. Public health campaigns should highlight the oral signs of diabetes and hygiene. Encouraging preventive dental visits through insurance could improve glycemic control, reduce complications, and lower costs through earlier detection, especially as Uzbekistan develops its medical tourism sector. Future research should conduct longitudinal studies to track outcomes, assess integrated care models, and explore markers of disease co-progression. Reason: The revised text improves clarity and readability while maintaining the original meaning. The shortened version condenses the information further for brevity.

REFERENCES

1. Abdusalomov, S., & Abdusalomov, S. (2024). Qandli diabetda og‘iz bo‘shlig‘idagi o‘zgarishlar. *Mp*, *2*(3), 7–12.
2. Ahmad, R., & Haque, M. (2021). Oral Health Messiers: Diabetes Mellitus Relevance. *Diabetes, Metabolic Syndrome and Obesity*, *14*, 3001–3015.
3. Adolfsson, A. et al. (2022). Prevalence of dry mouth in adult patients in primary health care. *Acta Odontologica Scandinavica*, *80*(8), 605–610.
4. Dusmuradova, X.O., & Yakubova, F.X. (2025, February). Ortodontik moslamalari bo’lgan bolalarda milk yallig’lanishi holatida immunomodulatorlarning samarali ta’siri. In *International Conference on Economics, Finance, Banking and Management* (pp. 114-117).
5. DaryoUz. (2021, September 26). *Paradontit: milklarning yallig‘lanish kasalligini qanday aniqlash mumkin?* https://daryo.uz/2021/09/26/paradontit
6. Ermakova, V. (2022, October 23). *What happens to our health if we don’t treat our teeth in time?* Novy Ochag. https://www.novochag.ru/health/zdorovye/chto-proishodit
7. Global Nutrition Report. (2023). *2023 Global Nutrition Report: The state of global nutrition*. Development Initiatives. https://globalnutritionreport.org/reports/2023
8. Gazeta.uz. (2023, April 4). *Incidence of tuberculosis, hepatitis B and diabetes has decreased in Uzbekistan - PMTI*. https://www.gazeta.uz/en/2023/04/04/health-indicators/
9. Herrera, D. et al., (2023). Association between periodontal diseases and cardiovascular diseases, diabetes and respiratory diseases: Consensus report of the Joint Workshop by the European Federation of Periodontology (EFP) and the European arm of the World Organization of Family Doctors (WONCA Europe). *Journal of Clinical Periodontology*, 50(6), 819–841.
10. International Diabetes Federation. (2021). *IDF Diabetes Atlas* (10th ed.). Brussels, Belgium: International Diabetes Federation. https://diabetesatlas.org/
11. Jensen, E.D. et al. (2021). Early markers of periodontal disease and altered oral microbiota are associated with glycemic control in children with type 1 diabetes. *Pediatricdiabetes*, *22*(3),pp.474-481. https://doi.org/10.1111/pedi.13170
12. LexUz. (2022, January 26). *O‘zbekiston Respublikasi Prezidentining qarori: "Endokrinologiya xizmatini takomillashtirish va ko‘lamini kengaytirish chora-tadbirlari to‘g‘risida", PQ-102-son*. https://lex.uz/uz/docs/-5838968

13. LexUz. (2019, April 19). *O‘zbekiston Respublikasi Prezidentining qarori: "2019 — 2021-yillarda respublika aholisiga endokrinologiya yordami ko‘rsatishni takomillashtirish bo‘yicha milliy dasturni tasdiqlash to‘g‘risida", PQ-4295-son*. https://lex.uz/ru/docs/-4295527

14. Lalla, E., & Papapanou, P.N. (2011). Diabetes mellitus and periodontitis: A tale of two common interrelated diseases. *Nature Reviews Endocrinology*, 7(12), 738–748.

15. Mealey, B.L., & Ocampo, G.L. (2007). Diabetes mellitus and periodontal disease. *Periodontology 2000*, 44(1), 127–153. https://doi.org/10.1111/j.1600-0757.2006.00193.x

16. Murodova, F., & Kenjayev, Y. (2025). Qandli diabetning kelib chiqish va davolash usullari. *Journal of Science-Innovative Research in Uzbekistan*, *3*(3), 23–27.

17. Nibali, L. et al. (2022). Periodontitis and implant complications in diabetes. *Periodontology 2000*, *90*(1), 88-105.

18. Nishonov, B., & Islomova, N. (2024). O'rta yoshlilarda qandli diabetning tarqalishi. *Prospects and Main Trends in Modern Science, 2*(17), 26-31.

19. Păunică, I., Giurgiu, M., Dumitriu, A. S., Păunică, S., Pantea Stoian, A. M., Martu, M.-A., & Serafinceanu, C. (2023). The Bidirectional Relationship between Periodontal Disease and Diabetes Mellitus-A Review. *Diagnostics*, *13*(4), 681.

20. Ray, R.R. (2023). Periodontitis: an oral disease with severe consequences. *Applied biochemistry and biotechnology*, *195*(1), 17-32. https://doi.org/10.1007/s12010-022-04127-9