

Diabetes Mellitus (Type 2) and Pregnancy as Risk Factors for Periodontitis: A Cross-Sectional Study

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ABSTRACT

Background: Diabetes mellitus (DM) and pregnancy are known risk factors for periodontitis, but their combined effect remains understudied. This study evaluates the association between Type 2 DM, pregnancy, and periodontitis incidence.

Methods: 120 pregnant women (40 with prediabetes, 40 with controlled diabetes, and 40 with uncontrolled diabetes) participated in a cross-sectional study. Ramfjord's Periodontal Disease Index and Silness and L oe's Plaque Index were used to evaluate periodontal health. HbA1c readings were used to confirm the presence of diabetes. IBM SPSS version 21 was used for statistical analysis.

Results: Periodontitis prevalence was 40% in prediabetics, 60% in controlled diabetics, and 60% in uncontrolled diabetics. Severe periodontitis (Stage 3) was highest (30%) in uncontrolled diabetics. Poor oral hygiene correlated with worsening glycemic control.

Conclusion: Women with Type 2 diabetes who are pregnant are more likely to develop periodontitis, which worsens with inadequate glycemic control. Pregnant women with diabetes should prioritize oral health measures.

Keywords: *Pregnancy and periodontitis, Diabetes mellitus, Risk factor, glycemic control and periodontitis.*

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1. INTRODUCTION

Periodontitis is influenced by systemic illnesses such as diabetes mellitus (DM) [1] and hormonal alterations during pregnancy [2]. Type 2 DM impairs periodontal destruction due to diminished immune response and amplified inflammation [3-5]. Pregnancy further complicates oral health due to hormonal instabilities that increase gingival vulnerability to inflammation [6-8].

While previous studies have studied DM and periodontitis individually [9-11], limited research scrutinizes their combined effect in pregnant women [12]. This study explores the association between Type 2 DM (including prediabetes), pregnancy, and periodontitis incidence, postulating that worsening glycemic control relates to increased periodontal disease severity [13-15].

2. MATERIALS AND METHODS:

Study Design & Participants: A cross-sectional study was carried out on 120 pregnant women (aged 25–50 years) visiting OB-GYN clinics in Belgaum district, Karnataka, between June 2025 to August 2025 [16]. A total of 250 samples were screened with questionnaire to select the sample size required(120) and Participants were categorized based on HbA1c levels [17] as Prediabetic (n=40): HbA1c 5.7–6.0% [18], Controlled diabetic (n=40): HbA1c 6.1–7.0% [19], and Uncontrolled diabetic (n=40): HbA1c >7.0% [20].

Exclusion Criteria: Non-diabetic pregnant women, smokers, Type 1 diabetics, and those with other systemic diseases affecting periodontitis risk [21-23].

Periodontal Examination: The following diagnostic methods were used to analyze the data.

- Plaque buildup: Silness and L oe's Plaque Index [24]

- Periodontal status: Ramfjord's Periodontal Disease Index (probing depth, clinical attachment loss using a Williams probe) [25]

- Diagnosis: Periodontitis staging (Stage 1–3) based on AAP/EFP 2017 classification [26]

Statistical Analysis: Descriptive statistics for demographics and oral hygiene status. Chi-square test to compare periodontitis incidence across diabetic groups [27]. $P < 0.05$ is considered statistically significant (IBM SPSS v21) [28].

3. RESULTS:

a) Periodontitis Incidence by Diabetic Status

Group	Periodontitis (%)	Stage 1 (%)	Stage 2 (%)	Stage 3 (%)	Gingivitis Only (%)	Healthy Gingiva (%)
Prediabetic	40% (n=16)	25% (n=10)	15% (n=06)	0% (n=00)	50% (n=20)	10% (n=04)
Controlled DM	60% (n=24)	35% (n=14)	15% (n=06)	10% (n=04)	30% (n=12)	10% (n=04)
Uncontrolled DM	60% (n=24)	20% (n=08)	30% (n=12)	10% (n=04)	30% (n=12)	10% (n=04)

b) Oral Hygiene Status:

Group	Good	Moderate	Poor
Prediabetics	60% (n=24)	20% (n=08)	20% (n=08)
Controlled diabetics	50% (n=20)	20% (n=08)	30% (n=12)
Uncontrolled diabetics	40% (n=16)	20% (n=08)	40% (n=16)

Statistical Significance: Periodontitis incidence was significantly higher in diabetic groups ($P < 0.05$) [29]. Uncontrolled diabetics had significantly more Stage 3 periodontitis ($P < 0.01$) [30].

4. DISCUSSION

The study confirms that pregnant women with Type 2 DM have a higher periodontitis risk, with severity worsening alongside poor glycemic control [1, 12, 16]. Uncontrolled diabetics exhibited the highest Stage 2 periodontitis prevalence (30%) and Stage 3 (10%), suggesting a dose-dependent relationship between hyperglycemia and periodontal destruction [3, 20, 26].

This study demonstrates a clear association between Type 2 DM, pregnancy, and periodontitis severity, with uncontrolled diabetics ($HbA1c > 7\%$) exhibiting the highest prevalence of Stage 2 periodontitis (30%) and Stage 3 (10%). These findings align with the bidirectional relationship proposed by Loe (1993) [1] and Preshaw et al. (2012) [7], where hyperglycemia exacerbates periodontal inflammation, while periodontal disease impairs glycemic control. Elevated HbA1c levels in uncontrolled diabetics ($> 7\%$) likely amplify pro-inflammatory cytokines (e.g., IL-6, TNF- α) [5, 12], exacerbating gingival inflammation and attachment loss. This mirrors findings by Graves et al. (2020) [16], who linked poor glycemic control to upregulated MMP-9 activity, which drives collagen degradation in periodontal tissues.

A dose-dependent trend in which HBA1C levels are correlated with progressive periodontitis was observed. This supports the hypothesis that periodontal tissue destruction is accelerated using mechanisms such as advanced glycation of final accumulation (age) [3]. The altered neurotrophic functions are used to accelerate periodontal tissue destruction [16].

Hormonal shifts during pregnancy (e.g., elevated progesterone) increase gingival vascular permeability [6], but our data suggest diabetes worsens this effect. For example, prediabetic women had lower periodontitis rates (40%) than diabetics (60%), indicating glycemic levels may activate significant periodontal damage [19].

Poor oral hygiene further exacerbates periodontal disease, emphasizing the need for integrated diabetes-periodontal care

in antenatal programs [5, 15, 23]. These findings align with previous studies linking DM to increased periodontal inflammation due to altered host response and collagen metabolism [9, 11, 25]. Despite similar periodontitis prevalence in controlled/uncontrolled diabetics (60%), the latter had 3 times more Stage 3 periodontitis. This matches D'Aiuto et al. (2007) [10], where poor oral hygiene in diabetics enhanced attachment loss, independent of HbA1c. Our data showed 40% of uncontrolled diabetics had poor oral hygiene vs. 20% of prediabetics, emphasizing the need for hygiene interventions in this group [23].

While our results agree with Borgnakke et al. (2013) [9] on DM-periodontitis links, we uniquely identified pregnancy as an additive risk, with even prediabetics showing 40% periodontitis vs. 10–15% in non-pregnant prediabetics [30]. This aligns with Gürsoy et al. (2019) [15], who attributed this to pregnancy-induced immune modulation.

5. CONCLUSION

This study emphasizes Type 2 DM and pregnancy as major risk factors for periodontitis, with disease severity linked with glycemic control [17, 22, 28]. Preventive oral health strategies should be incorporated into diabetic pregnancy management to moderate periodontal problems [7, 14, 30].

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