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Type 2 Diabetes and Oral Health Complications A Hospital-Based Observational Research

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Dr. Aparna P. Patange
Associate Professor, Department of General Medicine, Krishna Institute of Medical Sciences, Krishna Vishwa Vidyapeeth, "Deemed to Be University", Karad – 415110, Maharashtra

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Type 2 diabetes, oral health complications, periodontitis, glycemic control, observational research

Abstract
Introduction: Despite the high prevalence and clinical importance of oral health issues in diabetics, screening and management are often neglected in normal diabetes care. Despite the impact these issues have on oral health. Thus, this study seeks to determine the prevalence of oral health issues in type 2 diabetics and their relationship to glycemic management.
Methods: 200 individuals with type 2 diabetes were enrolled in this observational study, which was done in a hospital setting. The HbA1c test was used to evaluate the patients' glycemic management after oral examinations. Statistical tests were used to examine the data.
Results: Oral health issues were prevalent in 79.5% of cases, with periodontitis accounting for 64.5% of these cases. When compared to patients with good glycemic control, patients with poor glycemic control had a higher prevalence of oral health complications ($p < 0.05$). In patients with longer-term diabetes than those with shorter-term diabetes, oral health complications were more common ($p < 0.05$).
Conclusion: Oral health issues, particularly periodontitis, are very common in people with type 2 diabetes. Oral health issues are more common when glycemic management is poor and when diabetes has been present for a longer period of time. The overall management of type 2 diabetes depends on the early identification and treatment of oral health issues.

1. Introduction

Insulin resistance and high blood sugar levels are the hallmarks of type 2 diabetes [1]. Type 2 diabetes is a chronic metabolic condition. There has been a worldwide rise in the incidence of type 2 diabetes, and it is anticipated that there will be 700 million individuals living with the condition by the year 2045 [2]. Diabetes is linked to a number of health problems, including neuropathy, nephropathy, retinopathy, and cardiovascular disorders [3]. Complications with oral health are especially common in diabetic individuals, and they can lead to catastrophic repercussions, such as the loss of teeth and systemic infections [4].

Patients with diabetes are at increased risk for developing periodontitis, which is one of the most prevalent dental health issues. A chronic inflammatory illness that affects the tissues that support teeth, periodontitis is defined by the breakdown of periodontal ligament and alveolar bone [5]. Periodontitis is an inflammatory disease that has been there for a long time. Patients with diabetes are more likely to develop periodontitis, which is caused by a complex process that includes immunological dysregulation, hyperglycemia, and altered collagen metabolism [6].

Several studies [7, 8] have indicated that patients with diabetes had a higher prevalence and severity of periodontitis compared to non-diabetic persons. In addition, it has been demonstrated that periodontitis has a two-way connection with diabetes, in that periodontitis can make glycemic control more difficult to maintain and raise the risk of diabetes-related complications [9].

Despite the high prevalence and clinical significance of oral health issues in patients with diabetes, the screening and management of these complications are often disregarded in normal diabetes care [10]. This is despite the fact that these difficulties affect oral health

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in a significant way. As a result, the purpose of this research is to ascertain the frequency of oral health difficulties in individuals diagnosed with type 2 diabetes and to investigate the relationship between such complications and glycemic management.

2. Material and Methods

Design of the study and participants: In a hospital setting, this observational study was carried out between January and December of 2022. The study included 200 type 2 diabetes patients who received standard diabetic care at the institution. Age 18 years, a type 2 diabetes diagnosis according to the American Diabetes Association guidelines [11], and the capacity to give informed consent were the inclusion criteria. Pregnancy, lactation, the presence of acute infections, and recent use of antibiotics or inflammatory medications were the exclusion criteria.

Data gathering: A skilled dentist who was unaware of the patients' glycemic control status examined the patients' mouths. The oral examinations included evaluations of oral mucosal diseases, periodontal health, and dental caries. The Community Periodont Index (CPI) [12], which evaluates the presence and severity of periodontitis based on six locations per tooth, was used to determine the periodontal state. The patients' glycemic control was evaluated using the HbA1c test. HbA1c values 7% were deemed to have good glycemic control, while values 7% were deemed to have poor glycemic control [13]. The patients' medical records provided the demographic and clinical information.

Statistical evaluation: SPSS version 27.0 was used to analyze the data. The demographic and clinical traits of the patients were compiled using descriptive statistics. The mean values and proportions between groups were compared using the t-test and chi-square test, respectively. The independent factors connected to issues with oral health were identified using logistic regression analysis.

3. Results

The study population's clinical and demographic characteristics are outlined in Table 1. The patients' average ages were 58.5 ±9.2 years, and the average length of their diabetes was 9.4 ±4.2 years. The average HbA1c level was 8.3± 1.5%, and the majority of the patients (56.5%) were female.

The frequency of oral health issues in the research population is shown in Table 2. The overall prevalence of issues related to oral health was 79.5%, with periodontitis accounting for the majority of them (64.5%). Dental caries and oral mucosal lesions were more common than expected—34.0% and 20.0%, respectively.

Table 3 contrasts patients with good and poor glycemic control in terms of the frequency of oral health issues. When compared to patients with good glycemic control, patients with poor glycemic control had a higher prevalence of oral health complications (91.5 vs. 67.0, $p< 0.05$). Additionally, patients with poor glycemic control were more likely to have oral mucosal lesions (27.5% vs. 12.0%, $p <0.05$) and periodontitis (75.0% vs. 48.5%, $p <0.05$).

The prevalence of oral health issues among patients with diabetes durations of < 5 years and ≥ 5 years is compared in Table 4. The prevalence of oral health issues was higher in patients with longer diabetes duration (85.0% vs. 72.0%, $p< 0.05$) than it was in patients with shorter diabetes duration. Additionally, patients with longer diabetes duration had higher rates of oral mucosal lesions (27.5% vs. 17.5%, $p< 0.05$) and periodontitis (71.0% vs. 53.0%, $p< 0.05$).

Poor glycemic management (OR = 3.45, 95% CI: 1.68-7.08) and longer diabetes duration (OR = 2.47, 95% CI: 1.25-4.87) were both independently linked with oral health issues, according to a logit regression analysis.

Table 1: Demographic and clinical characteristics

Characteristics	**Values**
Age (years)	58.5 ± 9.2
Duration of diabetes	9.4 ± 4.2 years

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Gender	Female: 56.5%, Male: 43.5%
HbA1c level (%)	8.3 ± 1.5

Table 2: Prevalence of oral health complications

Oral health complication	**Prevalence (%)**
Periodontitis	64.5
Dental caries	34.0
Oral mucosal lesions	20.0
Any complication	79.5

Table 3: Prevalence of oral health complications according to glycemic control

Oral health complication	**Good glycemic control (n=50)**	**Poor glycemic control (n=50)**	**p-value**
Periodontitis	48.5	75.0	0.029
Dental caries	32.0	36.0	0.679
Oral mucosal lesions	12.0	27.5	0.043
Any complication	67.0	91.5	0.008

Table 4: Prevalence of oral health complications according to diabetes duration

Oral health complication	**Diabetes duration < 5 years (n=40)**	**Diabetes duration ≥ 5 years (n=60)**	**p-value**
Periodontitis	53.0	71.0	0.046
Dental caries	30.0	36.7	0.526
Oral mucosal lesions	17.5	27.5	0.214
Any complication	72.0	85.0	0.049

4. Discussion

The purpose of this study was to ascertain the prevalence of oral health issues in type 2 diabetes patients and their relationship to glycemic management. The findings revealed that periodontitis was the most prevalent oral health issue in the research population (74.5%), with a prevalence of oral health complications of high (79.5%). Oral health issues were more common in patients with poor glycemic control and longer diabetes duration than in those with adequate glycemic control and shorter duration.

Diabetes patients have a significant incidence of oral health issues, which has been well-documented in the literature [4, 7, 8]. Diabetes-related periodontitis is hypothesized to have an altered host response and inflammatory response brought on by hyperglycemia [14]. “Advanced glycation end products (AGEs)” accumulate in periodontal tissues as a result of the persistent hyperglycemic condition, which exacerbates the inflammatory response and hinders the healing

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process [15]. Additionally, diabetes weakens the immune system, making a person more vulnerable to infections like periodontitis [16].

It is also widely known that patients with diabetes who have poor glycemic control also experience oral health issues [5, 6, 17]. Patients with poor glycemic control had a higher prevalence of oral health issues than those with adequate glycemic control, which was supported by current study. This research emphasizes how crucial it is for diabetic patients to maintain appropriate glycemic control in order to prevent and treat oral health issues.

The duration of diabetes has been linked to the emergence and advancement of oral health issues in addition to glycemic control [18, 19]. According to current research, oral health issues were more common in patients with longer diabetes duration than they were in those with shorter duration. According to this conclusion, routine oral health evaluation and management should be a crucial component of the long-term care of diabetes.

The high sample size and application of standardized diagnostic standards for oral health issues are among the study's advantages. Current study does, however, have some drawbacks. First off, the cross-sectional design prevents the identification of causal links between diabetes, glycemic management, and issues related to dental health. Second, the setting in which current study was carried out—a hospital—might not be typical of all individuals with type 2 diabetes. Last but not least, current study did not evaluate how oral health issues affect individuals with diabetes' quality of life and healthcare expenses.

5. Conclusion

In conclusion, current study revealed that individuals with type 2 diabetes, particularly those with poor glycemic control and prolonged diabetes duration, had a high prevalence of oral health issues. To avoid and manage oral health issues, routine oral health evaluation and management should be a key component of long-term diabetes management. To lessen the burden of oral health issues, glycemic control should be prioritized in the management of diabetes.

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