

# Occurrence of tooth wear in controlled and uncontrolled diabetic patients - An observational study

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## ABSTRACT

Diabetes is a metabolic disorder characterized by hyperglycemia caused by an absolute or relative deficiency of insulin. Tooth wear has been established to be related to diabetes due to unknown reasons. The current study probes into the difference in tooth wear among controlled and uncontrolled diabetes. Fifty patients visiting the hematology department were grouped into Group A (controlled diabetes) and Group B (uncontrolled diabetes) depending on their random blood sugar (RBS) level. They were subjected to clinical examination, and Ganss tooth wear index was taken. The obtained blood sugar level and tooth wear index were analyzed statistically. Tooth wear was more common in male patients when compared to female patients. Tooth wear was more intense in uncontrolled diabetic patients when compared to controlled diabetic patients; however, it was not statistically significant. There is no relationship between the RBS and the tooth wear in diabetic patients. It is essential to prevent the complications of tooth wear at an early stage of detection in diabetic patients.

**Keywords:** Diabetes, tooth wear, attrition, abrasion, abfraction, erosion

## Introduction

The World Health Organization has declared diabetes it to be a pandemic.<sup>[1]</sup> Its prevalence has increased dramatically increased over the past few decades, and it is expected to triple in the next decade. Diabetes mellitus is considered a leading cause of death due to its microvascular and macrovascular complications.<sup>[2,3]</sup> Diabetes was said to be caused by pancreatic toxins such as alloxan and diazoxide. Viruses like hand, foot and mouth disease virus in cattle and mumps virus in human causes diabetes; however, this is very rare. Antibodies against insulin and  $\beta$ -cells due to autoimmunity cause diabetes. Growth hormone and long-term steroids alter the metabolism causing diabetes. It is also associated with lifestyle disease such as obesity and sometimes with pregnancy, due to placental

lactogen, which causes insulin resistance.<sup>[4]</sup>

Oral manifestation in diabetes includes fungal infection, bacterial infections, and oral lesions such as lichen planus, delayed wound healing, neurosensory oral disorders, dental caries, and tooth loss. In a study, diabetes was found to have a significant correlation with the attrition.<sup>[5]</sup> The manifestations such as dental caries are either due to increased sugar uptake or increased parotid salivary glucose. Periodontitis is due to the advance in the age or due to increased alveolar bone loss while salivary gland changes are due to nonneoplastic non-inflammatory fatty infiltration.<sup>[6]</sup>

Tooth wear can be described as the loss of tooth structure due to reasons other than dental caries, trauma, or developmental disorders.<sup>[7,8]</sup> Patients most at risk of dental wear have work and sports dehydration, caffeine addiction, gastroesophageal reflux, asthma, diabetes mellitus, hypertension, or other systemic diseases or syndromes that predispose to xerostomia. Tooth wear in the diabetic patients was due to increased intake acid inducing foodstuffs and poor lifestyle habits.<sup>[9]</sup> There are studies which describe the prevalence of tooth wear in the diabetic population;<sup>[10,11]</sup> however, there is no study that finds the difference in prevalence of tooth wear among controlled and uncontrolled diabetic patients. This will be helpful in early

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intervention of pain caused by thermal stimulation, sweet or sour food, and chronic complications resulting from reduced vertical dimension.<sup>[12]</sup>

According to a review by López-Frías *et al.* on tooth wear indices, Gnass's tooth wear index is the most simplified indices for diagnosis of tooth wear.<sup>[13,14]</sup>

The main objective of the study is to assess the relationship between the blood sugar levels and tooth wear in controlled and uncontrolled diabetic patients, thereby taking precautionary measures and prevent the complications of tooth sensitivity and infection.

## Materials and Methods

The study was conducted in the Hematology Department of Saveetha Dental College in the patient who came for routine random blood sugar (RBS) investigation. Those patients with RBS below 200 mg/dl were categorized as Group A and those patients with RBS greater than 200 mg/dl were categorized as Group B. or Group B, uncontrolled diabetics (RBS above 200 mg/dl). The patients were randomly chosen within the age group of 20–90 years. Clinical data such as other systemic disease, drug history, and the number of years of diabetic history were noted. These patients were subjected to clinical examination; simplified tooth wear index was assessed only on the occlusal, buccal, lingual, and the proximal surfaces where assessed.

Gnass tooth wear index was followed:

- 0 - No wear into dentin.
- 1 - Dentin just visible (including cupping) or dentin exposed.
- 2 - Dentin exposure >1/3 of surface.
- 3 - Exposure of pulp or secondary dentin.

The mean of the scoring was obtained.

## Results

The mean age of the uncontrolled diabetic patients was 56 with the mean history of diabetes for 6.73 years. The mean age of the controlled diabetic patients was 37 with the mean history of diabetes for 4.2 years. The mean RBS level of uncontrolled diabetic patients was 239.13 while that of controlled diabetic patients was 114.33 [Figure 1].

The mean tooth wear index of uncontrolled diabetic patients was 0.88 while that of controlled diabetic patients was 0.021. The mean of the number of missing tooth in uncontrolled diabetic patients was 5.33 while that in controlled diabetic patients was 1.5 [Figure 2]. Pearson correlation was done to correlate the tooth wear index with the RBS level, age with RBS level, and tooth wear index with age of the uncontrolled diabetic patients, but this did not show any significance ( $P > 0.5$ ). There was no correlation between the RBS and tooth

wear index in controlled or uncontrolled diabetic patients. The missing and tooth wear was elevated in the uncontrolled diabetic patients when compared to the controlled diabetic patients; however, there is no significant difference between the two groups [Figure 3].

## Discussion

Various types of tooth wear include attrition, erosion, abfraction, and abrasion.<sup>[15]</sup> Attrition is defined as the loss of tooth structure due to contact between the opposing tooth characterized by welldefined wear facets.<sup>[15]</sup> It is caused by coarse diet and parafunctional habits such as bruxism, opposing porcelain teeth, or lack of posterior support.<sup>[16]</sup> Erosion is described as etching of tooth structure due to the action of an acid or acidic food such as pickled vinegar, Vitamin C, iron preparation, aspirin, and soft drinks.<sup>[17]</sup> Abfraction also called cervical stress lesion causing a wedge-shaped defect at the cementenamel junction of the tooth.<sup>[18,19]</sup> Abrasion describes the tooth wear lost due to an external source such as frequent brushing and force of brushing.<sup>[20]</sup>

In a study done in Thailand including 179 patients within the age group of 35–74 years, the most prevalent type of tooth wear was attrition (99.4%). The prevalence of erosion, abrasion, and abfraction were 64.8%, 31.3%, and 7.3%, respectively.<sup>[11]</sup> In another study by de Carvalho Sales-Peres *et al.* done in patients with eating disorders, the first permanent molar was found to have a significant tooth wear when compared to other tooth.<sup>[21]</sup> In the current study, the prevalence of attrition was 93.6%, erosion was 52%, abrasion was 37.7%, and abfraction was not present in the study population.

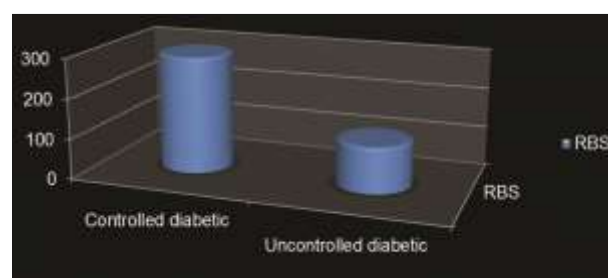


Figure 1: The mean random blood sugar in the controlled and uncontrolled diabetic patients

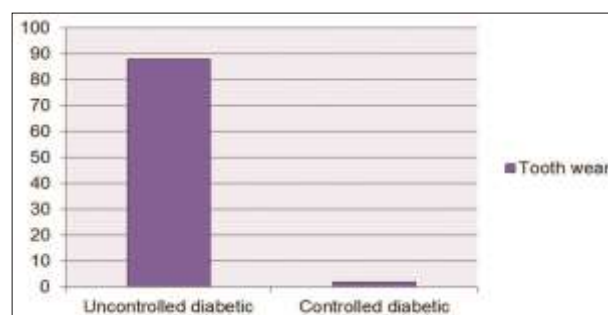
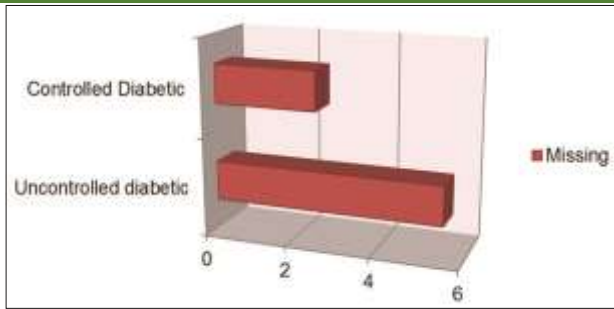


Figure 2: Bar graph showing the tooth wear in controlled and uncontrolled diabetic patients



**Figure 3:** Bar graph showing mean of the missing tooth in the controlled and uncontrolled diabetic patients

The prevalence of tooth wear was more in males (73%) than in females (64%). In accordance with the current study, previous studies also showed a similar increased prevalence of tooth wear in males.<sup>[22-24]</sup> This can be explained by increased bite force in males than in females.<sup>[25]</sup> In a study by Bhatnagar and Gnanasundararn in 2009 done in diabetic patients from Chennai population, the first molar showed to have significant tooth wear; however, this was explained by the common period of development of tooth germ of the first molar and the epithelial cells of pancreas.<sup>[10]</sup> In the current study, the prevalence of attrition in the upper and lower molars was found to be more common. In subjects with both the maxillary and mandibular posteriors teeth were missing, attrition was seen in the anterior teeth. This is explained by the reduced vertical dimension to be the cause of the attrition.

The most common complaint caused due to tooth wear is hypersensitivity and associated poor appearance, despite the presence of advanced tooth wear; patients do not complain of pain due to secondary dentin deposition.<sup>[26,27]</sup> Severe loss of tooth causes the loss of vertical dimension and can cause temporomandibular disorders.<sup>[28,29]</sup> This should be intervened at an early stage.

The exact reason behind the increased intensity of tooth wear in the diabetic patients is unknown. It is essential to prevent the possible complications such as pulpal pain and temporomandibular joint pain.<sup>[28,29]</sup>

A previous study says that a weak statistically significant correlation exists between loss of posterior support and severity of wear as well as increased anterior tooth wear.<sup>[29,30]</sup> Although there is more tooth wear and missing tooth in uncontrolled diabetic patients when compared to controlled diabetic patients, there is no significant difference between them. The increased prevalence of tooth wear in uncontrolled diabetic patients might be explained by the marked difference in the mean age of the two groups.

The current study has proved males to have more tooth wear when compared to females. It also states that there is a rise in the tooth wear in uncontrolled diabetic patients than in controlled diabetic patients. This rise in tooth wear is more related to progressive age rather than diabetic status.

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