Original Article

Tooth Wear Among Diabetics

Prevalence of Tooth Wear among Adult Population Suffering from Diabetes Mellitus-Presenting in A Tertiary Care Hospital of Taxila Cantt; A Descriptive Study

Syeda Sameen Zehra Rizvi[1], Maimoona Siddiq[2], Aamir Rafique[1], Muhammad Uzair[1], Naila Zakria[1] and Syed Zuhair Mehdi[2]

ABSTRACT

Objective: To determine the prevalence of tooth wear in permanent dentition of adults suffering from diabetes mellitus.

Study Design: Descriptive / Cross Section Study

Place and Duration of Study: This study was conducted at the Dental College, HITEC-IMS, Taxila Cantt for a duration of 3 months, from October 2020 to December 2020.

Materials and Methods: A total of 200 patients who gave positive history of diabetes mellitus were randomly selected, informed consent was acquired from all subjects. Patients were clinically examined for tooth wear: attrition, erosion, abrasion and abfraction. Data was analyzed on SPSS version 27. Chi square test was applied for statistical significance.

Results: Out of 200 subjects, 58% were males and 42% were females, 124 individuals had presence of tooth wear and 76 subjects had no tooth wear, 33 patients were found to have good glycemic control while 86 and 81 number of individuals had moderate and poor glycemic control respectively.

Conclusion: Diabetes Mellitus is common disease in adult population and it severely effects the oral health of an individual. Tooth wear is common finding in diabetic patients due to xerostomia**.** When patient is diagnosed as diabetic, the dentist should educate the patient about the significance of hygiene maintenance and possibility of tooth wear and should carry out screening for tooth surface loss as a part of their routine clinical exam in diabetic patients.

Key Words: Tooth wear, Permanent Dentition, Diabetes Mellitus, Attrition, Abrasion, Abfraction, Erosion

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INTRODUCTION

Non-Carious Tooth Surface Loss (NCTSL) also designated as Tooth Wear (TW) is a matter of concern to all dental expert these days [1]. Tooth wear is a general term that describes the loss of hard tissues from the surface of teeth caused by factors other than dental caries, trauma or developmental disorders. (Amelogenesis Imperfecta, Dentinogenesis Imperfecta, Dentine Dysplasia)[2] It is a physiological process that occurs as the aging process continues[3,4] causing an enamel loss of between 28-30 µm per annum as proved by Van't Spijker et al. in 2009[5] but if the rate of this loss is accelerated it jeopardizes the survival of teeth and is considered as pathologic[6,7].

There are multiple factors that contributes to the etiology of tooth wear. The terms Attrition, Abrasion, Erosion and Abfraction were used by Grippo in 1991 to classify the tooth wear [8]. Attrition is the loss of tooth surface caused by tooth surface contact during occlusion or mastication. It presents in the form of wear facets on occlusal or incisal surfaces of teeth[9], parafunctional habits like bruxism, and clenching is also a well-known etiology of Attrision. Abrasion is caused by factors like tooth-brush trauma during vigorous brushing. Lesions are usually located at cervical areas of teeth[9,10] Abfraction also occurs at the cervical areas of the teeth but the possible cause of abfraction is premature occlusal contacts and lesions are narrow V-shaped notches [11]. Erosion is caused by chemical degradation of tooth surface commonly caused by ingestion of acidic foods & drinks or Gastroesophageal Reflux Disease (GERD). The most commonly affected locations are palatal aspects of

[1.] Department of Prosthodontics / Oral & Maxillofacial Surgery[2], Dental College-HITEC Institute of Medical Science, Taxila Cantt.

Correspondence: Syeda Sameen Zehra Rizvi, Senior Registrar (Prosthodontics), Dental College-HITEC Institute of Medical Science, Taxila Cantt.
Contact No: 0333-8700961
Email: syedasamn@gmail.com

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maxillary anterior teeth and cupping lesions on occlusal surfaces of posterior teeth[11]

Among various etiologies, caffeine addiction, gastroesophageal reflux, asthma, diabetes mellitus, hypertension, or other systemic diseases or syndromes that predispose to xerostomia are the most common. Increase incidence of tooth wear in the diabetic patients is due to increased intake of acid inducing foodstuff, poor lifestyle, immune-compromised state as well as due to xerostomia[12]. Excessive tooth wear leads to hypersensitivity, pulpitis and pulp necrosis and can cause serious damage to the oral health of an individual. Many times the degree of tooth wear is so severe that it causes recurrent symptoms or presents a considerable restorative challenge, then it is deemed 'pathological' tooth surface loss[13], which is a leading cause of early tooth loss among diabetic patients.

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

MATERIALS AND METHODS

This study was conducted at OPD of Dental College (HITEC-IMS) Taxilla-Cantt, for a duration of three months, from 1st October 2020 to 31st-December-2020, after approval from ethical review board with letter number: Dental/HITEC/IRC/2/4. Total number of 200 patients were randomly selected from OPD who gave positive history of Diabetes Mellitus. Informed consent was taken from all subjects, fasting blood sugar (FBS) was acquired from all patients from laboratory of same hospital, and patients were called next morning for complete dental examination and assessment with laboratory report of FBS. Subjects included in the study were males and females, between age range of 35 -75 years with at least 6 functional occlusal units present in the oral cavity, patients having multiple types of tooth wear are also included. The Exclusion Criteria encompassed as, Patients affected by any developmental dental anomaly like Amelogenesis Imperfecta, Dentinogenesis Imperfecta, Hypodontia, Microdontia. Those who suffered from Dental Fluorosis, having multiple grossly carious teeth, patients with chronic systemic illness other than diabetes like renal failure, tumor patients, and irradiated patients were also not included in this study.

Patient's bio data, medical history of systemic illnesses, history of diabetes along with disease duration, history of parafunctional habits of bruxism /night grinding, aggressive brushing, habit of carbonated drinks and acidic food intake was acquired. Clinical examination was performed for any signs of Non-Carious Tooth surface loss (tooth wear). Diagnosis of types of tooth wear was made by careful clinical examination. Tooth wear types were documented as Attrition, Erosion, Abrasion and Abfraction All patients were examined by single examiner to overcome any bias for ambiguity in diagnosis of type of tooth wear present. All tooth surfaces buccal, labial, lingual, palatal and cervical margins were carefully examined bilaterally. History and examination findings were documented for each patient in dedicated pro-forma specially designed for this study. Fasting blood sugar for every subject was acquired and values in mg/dl were documented.

Diagnostic criteria for attrition was presence of matching wear facets on occlusal and incisal surfaces, shiny facets on amalgam restorations or fracture of cusps or restorations. Erosion was diagnosed as bilateral concave defects with a smooth and glazed surface that are free from any plaque deposits. Abrasion was diagnosed as cervical lesions that are more wide than deep and frequently effects the canine and premolar, with a strong history of vigorous tooth brushing. Abfraction was diagnosed as deep V shaped notches on cervical aspect of teeth and in association with premature occlusal contacts. All forms of tooth surface loss were noted in pre designed proforma.

Fasting Blood Sugar (FBS) levels upto 130 mg/dl were termed as "good glycemic control", 131 to 200mg/dl as "moderate glycemic control", above 200 mg/dl is mentioned as "poor glycemic control". Tooth wear present/not present was noted, type of tooth wear as attrition, abrasion, erosion and abfraction was documented, and data collected was analyzed using SPSS version 27. Gender distribution, mean age range and prevalence of tooth wear was calculated. Association of tooth wear with degree of diabetic control was analyzed using chi square test. Relation of glycemic control with isolated type of tooth wear and multiple types of tooth wear present in single individual is also analyzed using chi-square test.

RESULTS

A total number of 200 known diabetic patients, 116 males and 84 female patients i.e. 58 % and 42% respectively were studied. Table 2 mentions the mean age is 54.6 years, which reveals the fact that diabetes is a middle age disease among Pakistani population, minimum age was 35 year and maximum age was 74 years.

Table No.1: Gender Distribution

	Frequency	Percent
Males	116	58.0
Females	84	42.0
Total	200	100.0

Table No.2: Age of Patient

	N	Minimum	Maximum	Mean	Std. Deviation
Age of patient	200	35.00	74.00	54.6750	8.44012

Table 3: Mentions the prevalence of tooth wear among diabetic individuals as high as 62%. Out of all 200 subjects 124 had clinically diagnosed Tooth Wear, and 76 subjects had no tooth wear.
60 patients had single type of tooth wear present while 64 individuals had multiple types of tooth wear.

Table No.3: Prevalence of Tooth Wear in Diabetic Patients

Diabetic patients	Tooth Wear	
N=200	Present	Not present
	124 (62%)	76 (38%)

Table 4: mentions frequency of Tooth Wear. Attrition is most prevalent type of tooth wear, present in 86 subjects, followed by Erosion, Abrasion and Abfraction present in 59, 30 and 14 subjects respectively.

Table No.4: Frequency of Tooth Wear

Number of patient with tooth wear=124	Type of tooth wear			
	Attrition	Erosion	Abrasion	Abfrac-tion
	86	59	30	14
	69.3%	47.5%	24.1%	11.2%

Table 5: mentions that 33 patients had good glycemic control mean FBS up to 130 mg/dl, 86 had moderate glycemic control with FBS from range of 131 mg/dl to 200 mg/dl, and 81 patients had FBS more than 200 mg/dl i.e. poor glycemic control.

Table No.5: Glycemic Control and Presence of Tooth Wear

Glycemic Control	Tooth Wear		
	present	not present	
Good=33	7	26	P= 0.001
Moderate=86	52	34	
Poor=81	65	16	
Total=200	124	76	

Table No.6: Frequency of Isolated Type of Tooth Wear & Multiple Types of Tooth Wear Present in Single Subject

Glycemic control	Tooth Wear		
	Patients having isolated type of tooth wear present	Patients having multiple type of tooth wear present	P= .927
Good	3	4	
Moderate	26	26	
Severe	31	34	
Total= 124	Total= 60	Total= 64	

DISCUSSION

Out of 81 individuals with poor glycemic control 65 subjects had clinically diagnosed Tooth Wear, while moderate glycemic control group had 52 out of 86 having tooth wear, good glycemic control group had only 7 subjects with Tooth Wear out of 33 individuals. P value of 0.001 is statistically significant for the relation glycemic control and presence of tooth wear. Thus patients having poor glycemic control has prevalence of tooth wear.
Table 6: mentions the frequency of individuals having single type of Tooth Wear and those having multiple (two or more) types, p value of .927 is not statistically significant, thus no relation of glycemic control with single or multiple type of tooth wear is evident from this study.
Nowadays, the connection between oral and systemic diseases has become an important topic for research. So far there is no published data which discusses the incidence or prevalence of Tooth Wear in the diabetic population of Pakistan. Diabetes is one of the most common non-communicable disease found in adults [14] with the prevalence of type 2 diabetes mellitus in Pakistan was 13.50% in 1999, 7.18% in 2002; 9.52% in 2004; 8.74% in 2007, 19.21% in 2009, 10.85% in 2010; 10.95% in 2011[15]. Dental practitioners should be aware of the prevalence and severity of tooth wear in diabetic population to prevent the potential complications. It is therefore worthwhile to investigate the prevalence and severity of tooth wear among diabetic patients in Pakistan.[14]
In a study done in Thailand that included 179 patients with the age ranging from 35–74 years, the most prevalent type of tooth wear in the subjects was attrition (99.4%). The prevalence of erosion, abrasion, and abfraction were 64.8%, 31.3%, and 7.3%, respectively [13.] In the current study, the prevalence of attrition was 69.3%%, erosion was 47.5%, abrasion was 24.1%, and abfraction was 11.2%
In another study conducted in Chennai, India on diabetic patients in 2017, tooth wear was more prevalent in patients with poorly controlled diabetes [13]. The result was similar to our investigation but the previous study makes use of Random Blood Sugar Levels(RBS) as compared to FBS in current study.
The data, both from our study as well as from the previous studies, shows that tooth wear is an important dental public health problem in diabetic patients. The reason could be due to the xerostomia, change in dietary patterns, increased quantity of citrus foods consumption, improper brushing techniques, and parafunctional habits [16,17] but the exact cause of the increased intensity of tooth wear in the diabetic patients is still unknown.

Emphasis is being laid on improving oral hygiene and routine clinical examination of diabetic patients not only to prevent the possible complications such as pulpal pain, sensitivity, loss of occlusal vertical dimension and temporomandibular joint disorders[18,19] but also time consuming and complex rehabilitation procedures can be avoided [20].

CONCLUSION

There is a high prevalence of tooth wear among diabetic patients especially with poor control. Need of the hour is to create awareness regarding this growing problem and its preventive and management strategies in diabetic patients so a healthy dentition can be preserved throughout the lifespan of the population. The role of prevention is vital in maintaining the integrity of the teeth and to avoid treating those worn teeth in diabetic patients.

Author's Contribution:

Concept & Design of Study:	Syeda Sameen Zehra Rizvi
Drafting:	Maimoona Siddiq, Aamir Rafique
Data Analysis:	Muhammad Uzair, Naila Zakria, Syed Zuhair Mehdi
Revisiting Critically:	Syeda Sameen Zehra Rizvi, Maimoona Siddiq
Final Approval of version:	Syeda Sameen Zehra Rizvi

Conflict of Interest: The study has no conflict of interest to declare by any author.

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