

Evaluation of Tooth Wear and its Causative Risk Factors Amongst Patients Attending Dental Hospital of Karachi



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OBJECTIVE: Tooth wear is a term defined as the loss of dental hard tissue in a damaged tooth if there is no existing dental caries or trauma. Tooth wear rarely exists alone and is observed clinically and experimentally in combination. Excessive tooth wear leads to hypersensitivity and exposed dentin. Tooth wear can be classified as attrition, erosion, abrasion. The frequency of normal tooth preservation is greater than ever, thus a better prevalence of tooth wear is experiential in the population. Therefore, the objective of the present cross-sectional study was to evaluate tooth wear and its causative risk factors amongst patients attending the Dental Hospital of Karachi.

METHODOLOGY: The current study was a cross-sectional study conducted on adult patients recruited from the Out-Patient Department of Oral Diagnosis from May 2018 - December 2018. A consecutive sampling method was used and 250 adult patients aged 18-45 years were included. Tooth wear was assessed by using Smith and Knight Tooth Wear Index (TWI index). Data was entered and analyzed by using SPSS, frequency, percentages were calculated, and a chi-square test was performed to find the association between gender and risk factors.

RESULTS: The subject populations of 250 were assessed. Out of which 178 were male (71.2%) and 72 (28.8%) were female with age ranging between 18 to 48 years old. In this study, 92.4% of them were suffering from tooth wear and only 31.2% have extended to the severe stage of the tooth surface loss.

CONCLUSION: The present study concluded that there is an association between tooth wear and its risk factors.

KEYWORDS: Tooth Wear; Dental Wear; Tooth Wear Indices; Sensitivity and Specificity; Risk Factors.

HOW TO CITE: Shahab A, Wali A, Siddiqui TM, Hamed M, Aslam K. Evaluation of tooth wear and its causative risk factors amongst patients attending dental hospital of Karachi. J Pak Dent Assoc 2021;30(4):255-260.

DOI: <https://doi.org/10.25301/JPDA.304.255>

Received: 06 January 2021, Accepted: 07 August 2021

INTRODUCTION

Tooth wear is a term defined as the loss of dental hard tissue in a damaged tooth if there is no existing dental caries or trauma.¹ Tooth wear can be sub-classified as attrition, erosion, abrasion and abfraction.² Attrition is a mechanical type of wear, which results due to the grinding of teeth. Abrasion is also mechanical wear caused by oral hygiene measures and biting habits. Erosion is chemical wear that results from the ingestion of acidic foods /drinks/ gastroesophageal reflux.³⁻⁵ Abfraction is a non

carious tooth loss which is characterized by v shaped notch or wedge shaped at the cervical area of tooth.

These types of wear rarely exist alone and are observed clinically and experimentally in combination.⁶ It might be unnoticeable in its initial developmental stage but it may affect aesthetics and appearance in some patients especially if anterior teeth are involved.^{7,8} Excessive tooth wear leads to hypersensitivity and exposed dentin.⁹

The prevalence of tooth wear varies with wide-ranging values reported due to different study populations, methodologies, recording indices used.¹⁰ These studies reported that the prevalence of tooth wear varies from one population to another. It was reported 38.6% in Pakistani population¹¹, 64% in Norway^{12,13} 75% in Sweden¹⁴ and 95% in Saudi Arabia.⁷

There are many techniques to measure tooth wear both in vitro and in vivo. Techniques to quantify tooth wear in

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vitro are profilometry, microradiography, scanning electron microscopy, atom force microscopy, nano- and microhardness test, iodide permeability test.^{15,16} To measure tooth wear in vivo, many indices are used like the Eccles index of dental erosion, Smith and Knight index, and Erosion index by Lussi.¹⁷ Some of these indices measure tooth wear on every surface of each tooth, some measures selected sites and specific surfaces.¹⁷ Smith and Knight¹⁹ introduced tooth wear index (TWI) which is capable of measuring all four visible surfaces (buccal, cervical, lingual, and occlusal-incisal) of all teeth present. Except for a few studies, not much work has been done in Pakistan on this topic. Toufique H et al 2017¹⁹ in a study reported that only 10% of the patients had tooth wear whereas in the present study 92.4% of them had tooth wear. Therefore, the present cross-sectional study was done to Evaluate Tooth wear and its causative risk factors amongst Patients Attending the Dental Hospital of Karachi.

METHODOLOGY

The current study was a cross-sectional study conducted on adult patients recruited from the Out-Patient Department of Oral Diagnosis from May 2018 - December 2018. Patients were examined for the presence of tooth surface loss by using the Tooth Wear Index (TWI). The Ethical Review Board (ERB) DC/ERB/2018/010), Baqai Dental College, gave ethical approval to proceed with this study. Patients with the complaint of tooth surface loss aged 18-45 years were included in the study. A consecutive sampling technique was used and 250 adult patients were selected for the study. Open Epi version 3.01 software was used to calculate the sample size. Keeping a 20% prevalence rate with a 95% confidence interval with a 5% error, n=250 sample size was calculated based on the prevalence tooth wear reported by Daly et al.²⁰

Oral and Dental examinations were performed using the dental chair with a sterile mouth mirror and dental probe after signing a written consent by the patient. The chief examiner examined the patients while the dental chair assistant recorded the readings. A structured questionnaire prepared by those skilled in the restorative subject was used, which included etiological aspects of parafunctional habits, oral hygiene measures, eating habits, and clinical history. Tooth wear was assessed by using Smith and Knight Tooth Wear Index (TWI index).¹⁸ The surfaces were designated as cervical surface (C), buccal surface (B), the lingual surface (L) or palatal surface (P) Incisal surface (I) or, occlusal surface (O). Patients who reported having symptoms of sensitivity were further assessed by a blast of air from the air-water syringe for 3 sec at a distance of 1cm from the tooth surface.

Any uncomfortable feeling aroused by the blast was recorded on the clinical form according to different tooth surfaces.²¹ Data was entered and analyzed for Descriptive analysis (frequency and percentages). A Chi-square test was performed to assess the association between gender and its etiological factors by using IBM SPSS version 20.

RESULTS

The subject populations of 250 adult patients were assessed for tooth surface loss by using the Tooth wear index. According to Smith and Knight TWI, 2010¹⁸ reported that 7.6% scored 0, 11.6% scored 1, 24.4% scored 2, 25.2% scored 3 and 31.2% scored 4. Out of which 178 were male (71.2%) and 72 (28.8%) were females aged 18 to 48 years old. Table 1 showed the Demographic profile.

In table 2, association of gender with etiological factors is mentioned which shows insignificant association that is 42 (23.6%) males and 17 (23.6%) females reported sensitivity, followed by 20 (11.2) males and 9 (12.5%) females with poor previous tooth aesthetics. (p = 0.535), 33 (18.5%) of males and 19 (26.4%) females reported a history of scaling. (p = 0.110). A significant association was seen when 89

Table 1: Demographic profile

Tooth wear	n (%)
Total patients examined	250
Male	178(71.2%)
Female	72(28.8%)
Age	
18-28 years	66(26.4%)
29-39 years	82(32.8%)
40-50 years	102(40.8%)
Total patients examined with Smith & Knight Tooth Wear index	
Score 0	19(7.6%)
Score 1	29(11.6%)
Score 2	61(24.4%)
Score 3	63(25.2%)
Score 4	78(31.2%)

Table 2: Association of gender with etiological factors

Variables	Male	Female	p-value
Does patient complaint of			
• Dentin sensitivity	42(23.6%)	17(23.6%)	0.53
• Tooth fracture	8(4.5%)	4(5.6%)	
• Poor masticatory function	12(6.7%)	2(2.8%)	
• Poor esthetics of anterior teeth	20(11.2%)	9(12.5%)	
• All	96(53.9%)	39(54.2%)	
• No complaint	0	1(1.4%)	
Dental history of			
• Porcelain veneers	11(6.2%)	0	0.11
• Bleaching	2(1.1%)	1(1.4%)	
• Scaling	33(18.5%)	19(26.4%)	
• No history	132(74.2%)	52(72.2%)	
Functional/ social history			
• Bruxism/clenching	15(8.4%)	4(5.6%)	<0.00
• Pipe smoking	25(14%)	4(5.6%)	
• Betel nut /pan chewing	89(50%)	24(33.3%)	
• No history	49(27.5%)	40(55.6%)	
Brushing technique			
• Vertical	7(9.7%)	7(9.7%)	0.13
• Horizontal	121(68%)	52(72.2%)	
• Circular	7(3.9%)	1(1.4%)	
• Combination	43(24.2%)	12(16.7%)	
Bristles stiffness			
• Hard	18(10.1%)	7(9.7%)	0.23
• Medium	76(42.7%)	27(37.5%)	
• Soft	40(22.5%)	25(34.7%)	
• No brushing	44(24.7%)	13(18.1%)	
How much force you apply while brushing teeth			
• Mild	18(10.1%)	7(9.7%)	0.105
• Moderate	76(42.7%)	25(34.7%)	
• Aggressive	40(22.5%)	27(26.8%)	
• Not accessed	44(24.7%)	13(18.1%)	
How much time you spent brushing of teeth			
• 30 sec	1(0.6%)	2(1.2%)	0.349
• 1 min	14(7.9%)	9(12.5%)	
• 2 min	68(38.2%)	29(40.3%)	
• 3 min	51(28.7%)	19(26.4%)	

Table 3: Association between Age and Dentinal sensitivity

Age	Dentinal sensitivity		p-value
	No	%	
18-28	16	27.1%	0.10
29-39	21	35.6%	
40-50	22	37.3%	

(50%) of males and 24 (33.3%) of women had a history of pan/ betel nut chewing, (p<0.001). No significant association was reported regarding toothbrush technique and 121 (68%) men and 52 (72.2%) women used horizontal brush technique (p = 0.136)

Regarding tooth wear and dentin sensitivity, it was found that dentinal sensitivity increased with the age group. This difference was not found to be statistically significant. (p=0.10) Table 3.

It was found that tooth wear increased with age group. For the age group, 18-28, 29-39 and 40-50 scores 2 and 4,

Table 4: Association between age and tooth wear index

Age	Smith & Knight tooth wear index					p-value
	Score 0	Score 1	Score 2	Score 3	Score 4	
18-28	11(16.7%)	11(16.7%)	19(28.2%)	12(18.2%)	13(19.7%)	<0.00
29-39	6(7.3%)	8(9.8%)	23(28%)	23(28%)	22(26.8%)	
40-50	2(2%)	10(9.8%)	19(18.6%)	28(27.5%)	43(42.2%)	

2 and 3, 3 and 4 were prevalent respectively. The difference was statistically significant (p=0.000) Table 4.

DISCUSSION

The present study was done to evaluate tooth surface loss in patients attending the Out-Patient Department of Baqai Dental College. In this study, 92.4% of them reported tooth wear and only 31.2% has extended to severe stage of the tooth wear and men reported severe tooth wear than women did.

A study done in the Dutch population reported that tooth surface loss was a common condition amongst the adult population.²² In this present study, 7.6% of participants reported no tooth surface loss and 92.4% of them reported tooth wear however, only 31.2% had reached to severe stage of tooth wear. Toufique H et al. in 2017¹⁹ reported dissimilar results that only 10% of participants had tooth wear while 90% did not have tooth wear in their study. A study by Van't Spijker²³ reported the frequency of patients with tooth surface loss was increased to 3 % at the age of 20 years, 17% increased at 70 years of age.

The present study according to Smith and Knight TWI, 2010¹⁸ reported that 7.6% scored 0, 11.6% scored 1, 24.4% scored 2, 25.2% scored 3 and 31.2% scored 4. R Wirdatul et al²⁴ in a study reported different values, 17.4% surfaces had tooth wear; 80% scored 1, 18% scored 2 and 2% scored 3. Oral habits are repetitive behaviors within the oral range, leading to loss of dental structure, such as eating habits, brushing techniques, bruxism, functional habits, and regurgitation. The effect depends on the nature, manifestation, and duration of the habit. The role of acids in food and

beverages can be important in the development of tooth wear. Laboratory studies have shown that low acid foods and beverages cause erosion of enamel and dentin which may lead to dentin sensitivity.²⁵⁻²⁷

Dentinal hypersensitivity (DH) is a common symptom which affects 8-57% of adult and is associated with the oral hygiene.²⁸ The present study reported an association of tooth wear with dentin hypersensitivity and age groups. Deshpande S²⁹ in a study reported that there is a connection between grades of tooth wear with dentin sensitivity. Ayer A et al³⁰ in a study reported that dentin hypersensitivity is associated with tooth surface loss. Idon P et al³¹ in a study reported an association of dentin hypersensitivity with tooth surface loss. Kehua Q et al.²¹ in a study reported that there is an association between dentin hypersensitivity and age groups. Ali K et al.³² find abnormal tightening and bruxism with a significant relationship with tooth surface loss. The present study reported that only 7.6% experienced tooth surface loss due to tightening/ bruxism, while 45.2% experienced tooth surface loss due to chewing pan. As tooth surface loss is multifactorial, therefore the abrasive effect of tooth brushing can cause a tooth surface loss. The present study reported that people using a brush with medium bristles (41.2%) in horizontal technique (69.2) % with medium force (40.4) % tend to have more tooth surface loss which shows a correlation with the study reported by Ahmed et al³² that brushing with moderate type of brush (48.4) % shows relevant tooth surface loss. Another study reported by Mushtaq et al.³³ also observed a substantial association between participants using different types of toothbrushes and hard tissue abrasive lesions was reported ($p < 0.05$). The cause of these injuries is important to prevent further injuries and to prevent existing injuries. Enamel reduced by acids (erosion), may be scrubbed away with tooth brushing (abrasion) and damaged away by chewing or tooth grinding.²⁵

Males in the present study were more liable to have tooth surface loss possibly due to majority of males assessed as compared to females and this result was similar to other various studies.^{7,34,35} The factors which result in more tooth surface loss in males were mainly due to age, biting force, reduced tendency for malocclusion, more muscle mass, decreased occlusal tactile sensitivity.^{36,37}

Generally, patients are more concerned about their esthetics and wish that their age process could be delayed and evidence revealed that tooth wear is related to the aging process.²⁸ The present study reported that tooth wear increase with increasing age. Deshpande S²⁸ and Meshramkar R³⁸ et al. in a study also reported similar results.

Proper steps need to be taken for immediate action, as they are essential to restore the form and function of teeth. Dental wear is a preventive and curable condition. To avoid

the problem of getting worse in the future, we must try to fight the problem from its early stages. One of the methods to prevent and cure the condition is to increase awareness among practitioners and to develop general public prevention programs among individuals. The present study has some limitations, which include that it was a single centre study, there were more male participants, and lacks the inclusion of other demographic variables. Evaluation of tooth wear should be added as a component of regular dental checkups amongst patients attending dental hospitals.

CONCLUSIONS

Recognizing the multifactorial nature of the condition is the first step in managing it, as a misunderstanding, it can lead to inadequate management and the ultimate failure of rehabilitation therapy. The present study concluded that tooth surface loss is associated with its etiological factors and was observed more in males when compared to females. However, steps should be taken to increase awareness among people regarding their teeth and the management of several conditions.

CONFLICT OF INTEREST

None to declare

ETHICS APPROVAL /DISCLOSURE

The study Titled "A cross-sectional study: Evaluation of Tooth wear and its causative risk factors amongst Patients Attending Dental Hospital of Karachi." is approved by the Ethical Review Board of Baqai Dental College under the reference # BDC/ERB/2018/010.

AUTHORS CONTRIBUTIONS

AS contributed in writing and tabulating research paper **AW** analyzed and interpreted the patients' data **TMS** provided overall supervision **MH** and **KA** contributed to the collection of patients' data.

ACKNOWLEDGMENTS

Thanks to the institution for supporting the study.

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