

Prevalence Of Tooth Wear In Patients Attending The Department Of Periodontics, Manipal College Of Dental Sciences, Manipal

Dr. David K.*, Dr. K Mahalinga Bhat**

*Assistant Professor, Dept of Periodontics, MCODS, Mangalore,** Professor, Dept of Periodontics, MCODS, Manipal

Abstracts: Background: Tooth wear is a condition that encompasses attrition, abrasion and erosion and has a multifactorial etiology. Prevalence of tooth wear is reported to be between 5-50%. This wide range probably reflects the various parameters used in assessing of tooth wear and the difficulty in differentiating between the types of tooth wear. Diagnosing tooth wear and eliciting the etiological factors can help in the prevention and treatment of the condition. Aim and objective: To record the prevalence of tooth wear among the patients attending the Department of Periodontics, Manipal College of Dental Sciences, Manipal over a period of 3 months. Materials and methods: Patients attending the Department of Periodontics over a three month period were examined. Patient history was taken according to the proforma shown. All teeth were examined and indexed according to Tooth Wear Index given by Smith and Knight (1984)¹⁶. All patients with 20 teeth and above in their dentition were included in the study. Results: In the present study the prevalence of tooth wear was found to be 6.1% and that it was seen more among males and increased with age. Mandibular canines were the most commonly affected teeth and incisal and occlusal surfaces of the teeth being commonly affected. [David K et al NJIRM 2012; 3(2) : 136-141]

Key Words: Tooth wear, Attrition, Abrasion, Erosion.

Author for correspondence: Dr. David K, Department of Periodontics, Manipal College of Dental Sciences, Mangalore, Karnataka - 575001. E- mail: david_mahe2005@yahoo.co.in

Introduction: Tooth wear is a condition that encompasses attrition, abrasion and erosion and has a multifactorial etiology. Attrition is the loss of tooth substance due to functional and parafunctional habits and is commonly seen on the occlusal, incisal and the proximal surfaces. Abrasion is the mechanical wear of tooth surfaces due to external objects as seen due to vigorous and forceful tooth brushing which commonly affects the cervical area of the teeth. Erosion is the loss of tooth substance due to exogenous or endogenous acidic substances and can affect any surface. Abfraction, on the other hand is relatively a new term denoting the microstructural loss of tooth substance in areas of stress concentration, and is normally seen in the cervical areas. Although the three processes may occur independently they can occur in many cases collectively.

Physiological tooth wear occurs throughout an individual's life and may at times, become severe when it causes esthetic, sensitivity and functional problems. Tooth surface loss is seen more commonly nowadays and will increase due to people retaining more teeth and especially due to

changes in dietary habits and increased stress factor. Tooth wear can cause severe dentinal hypersensitivity in certain people and this may interfere with regular plaque control habits and even normal function.

Prevalence of tooth wear is reported to be between 5-50%. This wide range probably reflects the various parameters used in assessing of tooth wear and the difficulty in differentiating between the types of tooth wear. Diagnosing tooth wear and eliciting the etiological factors can help in the prevention and treatment of the condition.

The present study was designed to record the prevalence of tooth wear among the patients attending the Department of Periodontics, Manipal College of Dental Sciences, Manipal over a period of 3 months.

Material and method: Patients attending the Department of Periodontics over a three month period were examined. Patient history was taken according to the proforma shown. All teeth were examined and indexed according to Tooth Wear Index given by Smith and Knight¹⁶. All patients with

20 teeth and above in their dentition were included in the study.

Result : The prevalence study of toothwear was carried out in the Department of periodontics. 1550 patients were examined and out of that, 115 were excluded due to insufficient number of teeth. Out of the 1435 subjects included, 1002 were males and 433 were females. Males showed significantly more pathological tooth wear compared to females ($p < .001$ very highly significant). Tooth wear was seen to increase with age. (Table-1) One patient in the sample population showed increased vomiting and was associated with increased pathological wear and the difference was highly significant ($p < .001$)

Table 1: Age distribution of pathologic tooth wear

Age Group	N	Mean	Std. Deviation
≤ 15	15	.0000	.0000
16-25	364	.8709	2.457
26-35	369	4.813	5.740
36-45	339	9.870	7.818
46-55	215	13.414	9.811
56-65	108	15.861	9.250
66-75	23	15.478	11.187
≥ 75	2	44.500	2.121

8 patients complained of gastric esophageal reflux and 54 patients gave symptoms of reflux. These two categories of patients also showed increased pathological tooth wear compared to patients without it which was statistically significant ($p < .001$). (Table-2) 23 patients were undergoing radiation therapy and showed increased pathological tooth wear ($p < .001$). (Table-2)

Oral dryness/xerostomia was present in 51 patients and it was also associated with significant pathological wear ($p < .001$). (Table-2). 40 patients gave a history of bruxism and were associated with increased pathological tooth wear. ($P < .001$). (Table-2)

Of the patients examined 7 patients gave a history of other parafunctional habits like grinding and clenching but they did not show statistically significant tooth wear compared to the remaining population. ($p = .076$). (Table-2). 83 patients were

associated with stress and tension related to family and profession and showed statistically significant increase in pathological wear scores ($p < .001$). (Table-2)

Table 2 : Patient characteristics and factors affecting tooth wear

Patient character	N	P value
Gender		
Male	1002	.001 (significant)
Female	433	
Type of diet		
Vegetarian	425	0.362
Mixed	1010	
Frequency of brushing		
Once	696	.001
More than once	739	
Type of brush used		
Soft	1304	.001
Hard	131	
Dentrifice		
Paste	1352	.001
Paste and powder	83	
Method of brushing		
Scrub	1034	.001
Horizontal	401	
Bruxism		
Absent	1395	.001
Present	40	
Grinding		
Absent	1428	.0769
Present	7	
Acidic food		
Absent	1381	.001
Present	54	
Beverage intake		
Absent	1416	.076
Present	19	
Stress/ tension		
Absent	1352	.001
Present	83	
Alcohol intake		
Absent	1354	.001
Present	80	
Personal habits		
Nil	1211	≤.001
Pan chewing	179	
Betel nut use	14	
Tobacco chewing	31	

Gastric esophageal reflux	1427	.001
Absent	8	
Present		
Radiation therapy	1412	≤.001
Absent	23	
Present		
Oral dryness	1384	≤.001
Absent	51	
Present		

54 patients gave a history of regular increased intake of acidic foods like lemon juice, orange juice and pickles. Pathological toothwear scores were statistically increased in this group ($p < .001$). (Table-2). 19 patients reported regular intake of beverages/aerated drinks but the difference in wear scores was not statistically significant. ($p = .076$) (Table-2). 170 patients reported increased consumption of yoghurt/curds and they showed increased wear scores compared to the remaining sample ($p < .001$). (Table-2)

425 patients were vegetarians and 1010 consumed a mixed diet. There was no statistically significant difference in pathological toothwear score between the two groups ($p = .362$) (Table-2). 690 patients brushed once daily, 708 twice daily and 31 patients more than once daily. Patients who brushed once daily showed less toothwear than those that brushed more number of times. ($p \geq .01$) (Table-2)

1304 patients used a soft toothbrush and 131 patients reported use of a hard toothbrush. Hard tooth brush caused more tooth wear than the soft tooth brush. ($p = .001$) (Table-2). 1352 patients used toothpaste to clean their teeth and 83 individuals used a combination of tooth powder, charcoal powder or salt to clean their teeth. The latter group showed a very highly significant increase in pathological toothwear scores ($p < .001$). (Table-2)

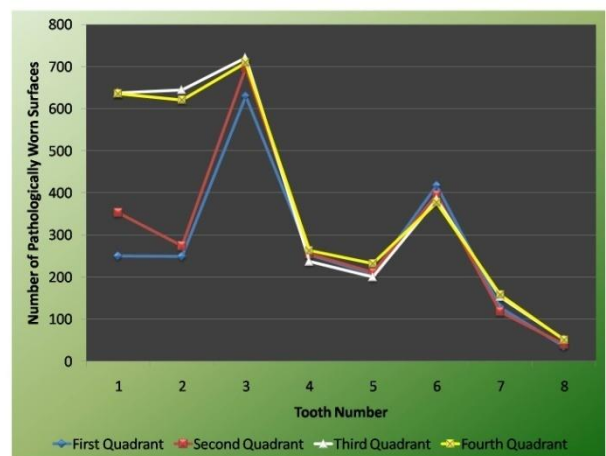
1034 patients used the scrub method to brush while 401 used the horizontal method. The group that used the horizontal technique showed increased toothwear scores ($p < .001$). (Table-2). Only 3 patients reported occupation that exposed them to acidic fumes. Compared to those not exposed to such environmental hazards their wear

values were not statistically significant. ($p = .109$) (Table-2)

80 patients reported regular alcohol intake and was associated with increased pathological tooth wear ($p < .001$). (Table-2). 179 patients had pan chewing habit, 14 had betel nut chewing habits and 31 chewed tobacco products on a daily basis. All these personal habits were associated with increased pathological toothwear. (Table-2)

In 1435 patients 1,836,54 surfaces were examined of which 8426 were missing and 4092 were restored. A total of 1,711,36 surfaces were scored. 14635 surfaces showed toothwear (score 1-4) and 10481 surfaces showed pathological tooth wear (scores 2-4). The prevalence of tooth wear was 8% and that of pathological toothwear was 6.1%. The teeth most commonly affected by pathological tooth wear was the lower canines (left mandibular canine 681 pathologically worn surfaces and right mandibular canine 663 pathologically worn surfaces) and the least affected teeth were the third molars followed by the second molars (third molars total of 35 pathologically worn surfaces) (Graph-1).

Graph 1: Pathologically Worn Teeth Distribution

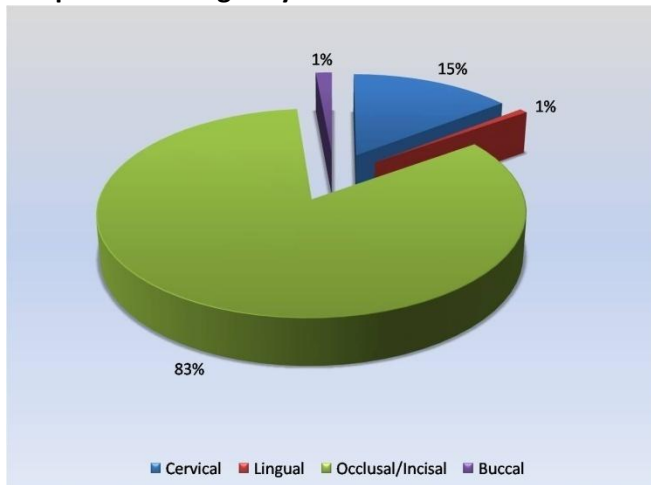


The occlusal and incisal surfaces were the most affected surfaces with pathological wear (87% of total affected) followed by cervical (14%), buccal (1.4%) and lingual surfaces (.7%). (Graph-2)

Discussion: The present sample examined for tooth wear, consisted of patients attending the

Department of Periodontics, Manipal College of Dental Sciences, Manipal.

Graph 2: Pathologically Worn Surface Prevalence



In the present sample, males showed higher pathological tooth wear than females. Increased muscle mass and muscular strength seen in males in general, results in higher magnitude of bite forces as it has been also observed in earlier studies⁷. It was also shown by the same author that increased muscle mass and strength could also contribute to the increased wear seen in males.

Pathological tooth wear was seen to increase with age as shown previously⁴ reflecting the fact that tooth wear was an age related phenomenon. As age increases canine guidance is replaced by group function due to wear of the canines. This change causes increase in wear in the posterior region¹. Anterior guidance can reduce the risk of posterior attrition but increase the chances of anterior attrition¹⁰. Reflection of the similar features was observed in the sample studied. It was also seen that surfaces of occlusal contact increases with time. After a point in life wear facets develops in which a portion of its surface is used by occlusal contact in maximal intercuspation. The rest of the facet surface is engaged in function during interocclusal contact movements. As wear occurs interocclusal space reduces which leads to engagement of other points of the occlusal surface.

Patients who had gastric esophageal reflux disease showed increase in tooth wear scores. Tooth wear in such a population is due to the regurgitation of the gastric acidic contents into the oral cavity^{6,12}.

Patients with history of increased vomiting showed increased tooth wear. The acidic vomitus entering the oral cavity is acidic due to the presence of gastric acid which contains hydrochloric acid. Following the episodes of vomiting vigorous brushing may cause further loss of the softened enamel and dentin. Other factors affecting the tooth wear in these patients are the frequency of vomiting episodes, duration of disease, and amount of saliva available to neutralize the acid. Saliva can play a role in neutralizing the destructive effects of gastric acid. Patients who reported increased consumption of citrus fruits and juices and pickles showed increase tooth wear due to the nature of these substances to make the oral environment acidic. This could be due to the acidic content of citrus fruits and the acidic preservatives (vinegar) present in pickles which may increase the erosive potential within the oral cavity. Beverages and aerated drinks were consumed regularly by a few patients but they did not show increased wear as compared to the remaining population. This may be due to the inter individual variability in the salivary buffering capacity and the way the drinks are consumed⁹. It was also stated in one study that the method of drinking was related to the tooth wear caused by beverages². It was seen that the longer the drink was kept in the oral cavity the greater was the wear associated. Very few patients mentioned of an occupation which exposed them to chemical/acid fumes. Although the wear was not statistically significant it is known that certain occupations can expose the dentition to acid fumes which can increase erosive wear in the dentition¹¹. The softened enamel /dentin can further wear away by other factors like mastication, parafunctional habits and vigorous oral hygiene methods.

Patients who regularly consumed alcohol showed increase tooth wear. Alcohol itself has an erosive potential and alcoholics may be associated with increased vomiting¹² and salivary gland changes that may cause xerostomia. People consuming alcohol may be associated with fat deposition in the salivary glands especially the parotid gland. Alcoholism can also cause severe gastritis which may also be associated with increased gastric reflux and vomiting. This in turn can expose the dental hard tissues to acidic gastric fluids¹³. These

may explain the increase in tooth wear in such a population.

51 patients who reported oral dryness were associated with increased wear. Other authors observed similar findings^{17,14}. Saliva helps in lubrication and plays a role in physiological buffering required in the oral cavity against acidic challenge. Hence in decreased salivary flow tooth wear due to erosion can be increased as the oral environment can be exposed to various acidic foods. With its buffering capacity and its ability to form a protective salivary pellicle, saliva can control dental decalcification. This physiological protection fails when there is inadequate saliva to prevent demineralization. The time frame in which the enamel is lost depends on the extent of salivary loss, the duration of exposure to the decreased saliva, masticatory stresses, dietary acids and oral hygiene practices. Softened demineralized enamel, which normally is thin along the gingival tooth surfaces, is thinned further by abfraction and toothbrush abrasion⁸. Patients undergoing radiation therapy also showed increase wear tendency. This may be due to the presence of oral dryness/xerostomia in these patients.

Patients with a history of bruxism were associated with increased pathological wear. Patients that gave a history of grinding habit did not show any significant increase in wear scores. This may be due to variation in bite force with lesser force causing lesser wear⁷ and can also be due to the lesser number of cases reporting this symptom in the present study. Patients who complained of stress, anxiety and tension in family and work place showed increased tooth wear. This probably could be due to increased parafunctional habits that cause incisal and occlusal wear. It was reported that accelerating tooth wear may be an objective sign of tension /stress /anxiety⁵.

Patients who brushed with increased frequency showed increased wear rates than patients brushing once a day¹⁵. Patients using a hard /stiff brush showed increase in pathological wear than those using a soft brush. Patients using tooth paste along with charcoal powder and salt showed increased wear rates. Finger brushing using indigenous substitutes as dentifrice results in a

wider area of tooth wear. The wear in such cases was due to the highly abrasive potential of charcoal and salt. This was reported more in elderly people who followed such old costumes. Horizontal brushing method was associated with high wear rates compared to those employing the scrub method. Similar observations were reported previously³. The fact that improper brushing technique can result in increased cervical wear can be the cause of increased pathological wear scores in these patients. Moreover in patients consuming acidic food and drinks such oral hygiene habits can aggravate the tooth wear ie a combination of erosion and abrasion can be seen.

Individuals with pan chewing, betel nut chewing, and tobacco powder chewing showed increased wear rates. Pan chewing is very common in different parts of India and is associated at times soft tissue changes and hard tissue changes in the form of severe occlusal and incisal attrition. Younger individuals resort to the packet forms of 'pan masala' which can also cause tooth wear depending on the frequency of consumption.

Conclusion: In the present study the prevalence of tooth wear was found to be 6.1% and that it was seen more among males and increased with age. Mandibular canines were the most commonly affected teeth and incisal and occlusal surfaces of the teeth being commonly affected. The etiological factors that contributed to tooth wear were: Gastric esophageal reflux disease, symptoms of reflux and increased vomiting, Xerostomia and radiation therapy to head and neck region, parafunctional habits, stress/tension, Consumption of acidic diet and citrus fruit juices, Increased frequency of brushing and horizontal method of tooth brushing, The use of charcoal powder and salt to clean teeth, Regular alcohol consumption, Betel nut/pan/tobacco chewing habits.

Within the limits of the present study it may be concluded that tooth wear in an Indian population is related to age, gastroesophageal reflux, parafunction, certain dietary patterns, personnel habits and oral hygiene practices. Understanding these mechanisms, their interactions and their dental manifestations will enable dentists to diagnose the complex etiology of previously

enigmatic tooth surface lesions in a differential manner. Furthermore, considering the multifactorial etiology of tooth wear a dentist will be able to institute proper prevention and treatment methods and communicate more effectively with their patients

REFERENCES:

1. Aleem A ,Haneef S , Ridwaan O and Anders J. Prevalence of occlusal tooth wear and its relationship to lateral and protrusive contacts in a young Indian population. *Act Odontol Scan* 1994;52;191-197
2. Bartlett DW, Coward PY, Nikkah C, Wilson RF. The prevalence of tooth wear in a cluster sample of adolescent schoolchildren and its relationship with potential explanatory factors. *Br Dent J*. 1998 Feb 14;184(3):125-9
3. Bergström J, Lavstedt S. An epidemiologic approach to toothbrushing and dental abrasion. *Community Dent Oral Epidemiol* 1979; 7:57-64
4. Borcic J, Anic I, Urek MM, Ferreri S The prevalence of non-carious cervical lesions in permanent dentition. *J Oral Rehabil*. 2004 Feb;31(2):117-23
5. Bracha HS ,Ralstrom TC ,William AE , Yamashita JM ,Bracha AS.The clenching grinding spectrum and fear circuitary disorders;clinical insights from the neuroscience/paleoanthropology interface. *CNS Spectr* 2005 ;10 311-318
6. Howden GF. Erosion as the representing symptom in hiatus hernia: a case report. *Br Dent J* 1971; 131:455-6.
7. Johansson A et al. An investigation of some factors associated with occlusal tooth wear in a selected high wear sample *J Dent Res* 1993 101;407-415
8. Louis Mandel .An unusual pattern of dental damage with salivary gland aplasia., *J Am Dent Assoc* 2006;137:984-9.
9. Moazzez R, Bartlett D, Anggiansah .Dental erosion, gastro-oesophageal reflux disease and saliva: how are they related? *A.J Dent*. 2004 Aug; 32(6):489-94.
10. Nico HJC ,Arie VS. Tooth wear and occlusion.Friends or foes? *Int J Prosthodont* 2007;20;348-350
11. Peterson PE ,Gormsen C. Oral condition among German battery factory workers.*Community Dent Oral Epidemiol* 1991;19;104-106
12. Rafeek RN, Marchan S, Eder A, Smith WA. Tooth surface loss in adult subjects attending a university dental clinic in Trinidad. *Int Dent J*. 2006 Aug; 56(4):181-6.
13. Robb ND and Smith BGN. Prevalence of pathological tooth wear in patients with chronic alcoholism.*B Dent J* 1990 169 267
14. Ryberg M ,Moller C , Ericsson T .Saliva composition and caries development in asthmatic patients treated with beta adrenoceptor agonists.4 year follow up.*Scan J Dent Res* 1991;99;212-218
15. Sangnes G, Gjermo P (1976). Prevalence of oral soft and hard tissue lesions related to mechanical toothcleansing procedures. *Community Dent Oral Epidemiol* 4:77-83
16. Smith BGN, Knight JK.An index for measuring the wear of teeth.*Br Dent J* 1985; 159; 144-148.
17. Young WG , Khan F ,Brandt R. Syndromes of salivary dysfunction predisposes to tooth wear.*Oral Surg Oral Path Oral Med Oral rad Endo*.2001 92;38-48