Tooth Wear Among Psychiatric Patients: Prevalence, Distribution, and Associated Factors

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Purpose: The purpose of this study was to evaluate the prevalence, distribution, and associated factors of tooth wear among psychiatric patients. ***Materials and Methods:*** Tooth wear was evaluated using the tooth wear index with scores ranging from 0 to 4. The presence of predisposing factors was recorded in 143 psychiatric patients attending the outpatient clinic at the Prince Rashed Hospital in northern Jordan. ***Results:*** The prevalence of a tooth wear score of 3 in at least one tooth was 90.9%. Patients in the age group 16 to 25 had the lowest prevalence (78.6%) of tooth wear. Increasing age was found to be a significant risk factor for the prevalence of tooth wear ($P < .005$). The occlusal/incisal surfaces were the most affected by wear, with mandibular teeth being more affected than maxillary teeth, followed by the palatal surface of the maxillary anterior teeth and then the buccal/labial surface of the mandibular teeth. The factors found to be associated with tooth wear were age, retirement and unemployment, masseter muscle pain, depression, and anxiety. ***Conclusion:*** Patients' psychiatric condition and prescribed medication may be considered factors that influence tooth wear. *Int J Prosthodont 2006;19:403–409.*

Tooth wear may progress throughout an individual's life as a normal phenomenon. The wear rate may vary between individuals depending on different factors, and its etiology is multifactorial. *Tooth wear* is a common term used to describe surface morphologic changes that include erosion, attrition, and abrasion. Indeed, differentiation between these 3 terms is not clear because of the combination of possible causes.[1–4]

Patient health has been reported to correlate with tooth wear. Gastrointestinal disturbances associated with regurgitation of gastric contents are considered risk factors for dental erosion,[5] and patients with chronic alcoholism or a history of digestive disturbances are reported to suffer from dental erosion.[2,6] Psychologic eating disorders, which include anorexia and bulimia nervosa, have also been reported to cause dental erosion.[2,7,8] Furthermore, severe tooth wear usually ascribed to bruxism has often been observed in individuals with mental retardation.[9]

The association between some medications and tooth wear is also influenced by salivary flow. Neuroleptics, tricyclic antidepressants, and antihypertensives can cause a significant reduction in the flow rate of saliva, which may subsequently influence tooth wear.[10] Psychiatric patients are usually under long-term treatments, and previous reports have shown that the average number of carious and missing teeth in these patients is higher than in the healthy population.[11] Some of the dental problems of psychiatric patients are reported to be caused directly by psychiatric medications that affect the central autonomic nervous system.[12] This study hypothesizes that the medical condition of psychiatric patients and the medications that they take may influence the rate of tooth wear. Therefore, the aim of the study was to evaluate tooth wear in psychiatric patients and to determine the prevalence, distribution, and associated factors of tooth wear in this specific group of patients.

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Table 1 Tooth Wear Index According to Smith and Knight[13]

Score*	Surface	Criterion
0	B/L/O/I	No loss of enamel surface characteristics
	C	No change of contour
1	B/L/O/I	Loss of enamel surface characteristics
	C	Minimal loss of contour
2	B/L/O	Loss of enamel exposing dentin for less than one third of the surface
	I	Loss of enamel just exposing dentin
	C	Defect less than 1 mm deep
3	B/L/O	Loss of enamel exposing dentin for more than one third of the surface
	I	Loss of enamel and substantial loss of dentin, but not exposing pulp or secondary dentin
	C	Defect 1–2 mm deep
4	B/L/O	Complete loss of enamel, pulp exposure, or exposure of secondary dentin
	I	Pulp exposure or exposure of secondary dentin
	C	Defect more than 2 mm deep, pulp exposure, or exposure of secondary dentin

*In case of doubt a lower score is given.
B = buccal or labial; L = lingual or palatal; O = occlusal; I = incisal; C = cervical.

Materials and Methods

Sample

Psychiatric patients who attended the outpatient psychiatric clinic at the Prince Rashed Hospital in northern Jordan and who agreed to participate in the study were referred to the dental clinic by the psychiatrist at the same hospital. Within a 6-month period, 143 patients were examined by 1 clinician who was trained to employ the tooth wear index used in this study. The inclusion criteria for patients in the study were the patient's willingness to be examined by the clinician, answer the study's questionnaire, and have at least 4 scorable teeth assessed. Patients with a history of orthodontic treatment, trauma, or fractured teeth were excluded.

Questionnaire and Clinical Examination

A questionnaire was developed that gathered information on age, gender, occupation, medical status and history, pain in masticatory muscles, number of missing teeth, habits, and frequency of intake of sour food and carbonated drinks.

The severity of tooth wear was recorded using the tooth wear index described previously by Smith and Knight.[13] A score of 0 to 4 was given to each of the 4 surfaces of each tooth (Table 1), and for doubtful cases a lower score was given. Heavily restored surfaces were not scored but recorded as restored, and missing teeth were recorded as missing in the patient chart of the tooth wear index.[13] The 4 surfaces scored were buccal/labial, lingual/palatal, occlusal/incisal, and the cervical part of the buccal surface. The intraexaminer reliability was tested by having the same examiner re-examine 10 patients after an interval of 1 week. Intraexaminer agreement was evaluated by weighted kappa statistics (0.87).

Statistical Analysis

Demographic and other characteristics of participants were recorded in frequency tables. The distribution of wear scores for different surfaces was described and compared using a 100% stacked column graph using Microsoft Office Excel 2003. To test null hypotheses about the effects of variables on the means of various groupings of a joint distribution of dependent variables (buccal/labial wear score, cervical wear score, lingual/palatal wear score, occlusal/incisal wear score), the average surface wear score for each subject was computed. The general linear model multivariate procedure provided regression analysis and analysis of variance for multiple dependent variables by the independent variables. The analyses reported in this study were done using the Statistical Package for Social Sciences version 11 (SPSS). Statistical significance refers to probabilities less than .05.

Results

Participants' Characteristics

The demographic characteristics, medical history, and smoking status of 143 patients (34.3% males and 65.7% females) with various psychologic disorders are depicted in Table 2. Their ages ranged from 16 to 55 years with an average ($\pm$ SD) of 36.1 $\pm$ 8.2. About 65% of the subjects were unemployed, 28.7% were smokers, and 88.1% were free of any chronic diseases. The majority of the patients (53.9%) had their psychologic disorder for a duration of 1 to 8 years, 29.4% of the patients had it for more than 8 years, and only 16.8% had it for less than 1 year. The number of missing teeth ranged from 0 to 24, with an average of 6.8 $\pm$ 5.9.

Prevalence of Tooth Wear

The prevalence of a tooth wear score of 3 or more in at least one tooth was 90.9% (90.4% for females and 91.8% for males). The lowest prevalence was found in the age group 16 to 25 years (78.6%). In the age group 26 to 35 years, the prevalence was 88.9%. All subjects older than 35 years had a tooth wear score of 3 or more in at least one tooth. On the other hand, the amount of subjects with a tooth wear score of 4 in at least one tooth was 9.1% (7.4% for females and 12.2% for males). Although the prevalence of tooth wear was higher in males than females, this difference was not statistically significant ($P = .344$). The prevalence of a tooth wear score of 4 in at least one tooth was 3.6%, 5.6%, 6.9%, and 22.6% in the age groups (16 to 25, 26 to 35, 36 to 45, and 46 to 55, respectively). This apparent increase in the prevalence of tooth wear with increasing age was statistically significant ($P < .005$).

Of all examined surfaces in the remaining teeth for this patient sample, 10.2% had score 0, 54.0% had score 1, 25.7% had score 2, 9.9% had score 3, and 0.2% had score 4. The percent of surfaces with a score of 3 or higher per patient ranged from 0% to 38%, with a median of 7.14%.

Distribution of Tooth Wear Scores

The distributions of tooth wear scores for all examined tooth surfaces are shown in Figs 1 to 4. Most of the lingual/palatal surfaces of the premolars and molars had a tooth wear score of 1. Score 2 was predominant mainly in the palatal surfaces of the maxillary anterior teeth. For buccal/labial surfaces, the most common tooth wear score was 1. Fewer than 20% of these surfaces had score 2, and this was more common in the mandibular teeth than in the maxillary teeth. Score 0 was common in cervical surfaces, especially for incisors. The cervical surface of the first molars had the highest wear, followed by that of the second molars.

Occlusal surfaces were most commonly affected by wear. The occlusal surfaces of the first molars were greatly affected by wear, followed by the incisal edges of the central incisors. More than 90% of these surfaces had a score of 2 or higher. The least affected teeth were the third molars. Mandibular teeth seemed to be more affected than maxillary teeth.

Factors Associated with Tooth Wear Scores

The factors significantly associated with tooth wear of the different tooth surfaces after adjusting for all possible variables in the model are presented in Table 3. Increased age was significantly and linearly associated with increased wear of all tooth surfaces. Occupation was significantly associated with wear of the occlusal and lingual surfaces only. Wear of the occlusal and lingual tooth surfaces was the highest in retired patients, followed by unemployed patients. There were significant differences in the wear of the occlusal and buccal surfaces between different psychiatric patients, with the highest tooth wear in patients with depression or anxiety. The frequency of intake of carbonated drinks was associated with wear of the occlusal surfaces, and tooth wear was highest among those who drank 3 cans or more per day. However, there was no significant linear trend in increased tooth wear with the frequency of intake of carbonated drinks. Increased number of missing teeth was significantly associated with increased tooth wear on buccal, cervical, and palatal surfaces. Pain in the masseter muscle was significantly associated with increased tooth wear of all surfaces except the cervical and lingual/ palatal surfaces. The variables in Table 2 explain about 53%, 45.5%, 34.9%, and 60.1% of the variability of average tooth wear of the occlusal, buccal/labial, lingual/palatal, and cervical surfaces, respectively.

Table 2 Demographic Characteristics, Medical History, and Smoking Status of 143 Patients with Various Psychologic Disorders

Variable	Frequency (%)
Gender	
Male	49 (34.3)
Female	94 (65.7)
Age (y)	
16–25	29 (20.3)
26–35	54 (37.7)
36–45	29 (20.3)
46–55	31 (21.7)
Occupation	
Unemployed	93 (65.0)
Retired	18 (12.6)
Military	19 (13.3)
Others	13 (9.1)
Smoking	
No	92 (71.3)
Yes	37 (28.7)
Psychiatric condition	
Depression or anxiety	32 (22.4)
Schizophrenia	22 (15.4)
Bipolar disorder	16 (11.2)
Other	37 (25.9)
Unknown	36 (25.2)
Duration of psychiatric conditions (y)	
<1	24 (16.8)
1–4	52 (36.4)
5–8	25 (17.5)
>8	42 (29.4)
Chronic diseases	
No	126 (88.1)
Yes	17 (11.9)

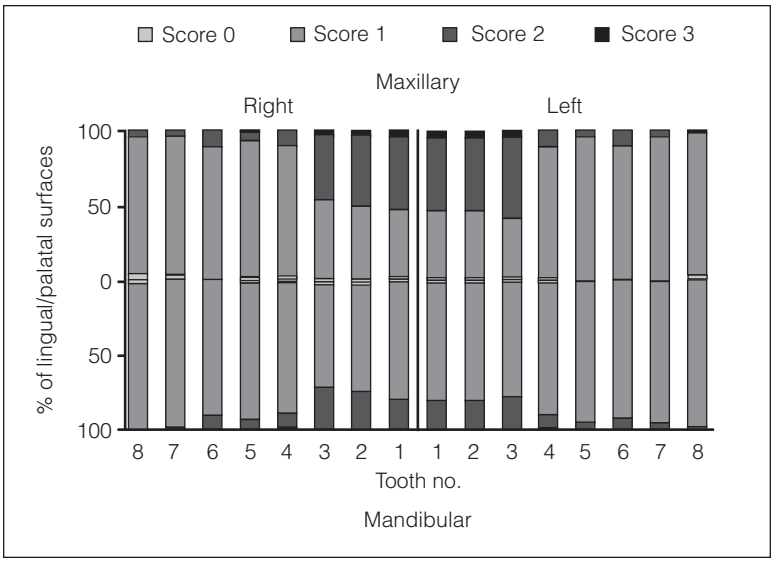

Fig 1 Distribution of tooth wear scores for palatal/lingual surfaces among psychiatric patients.

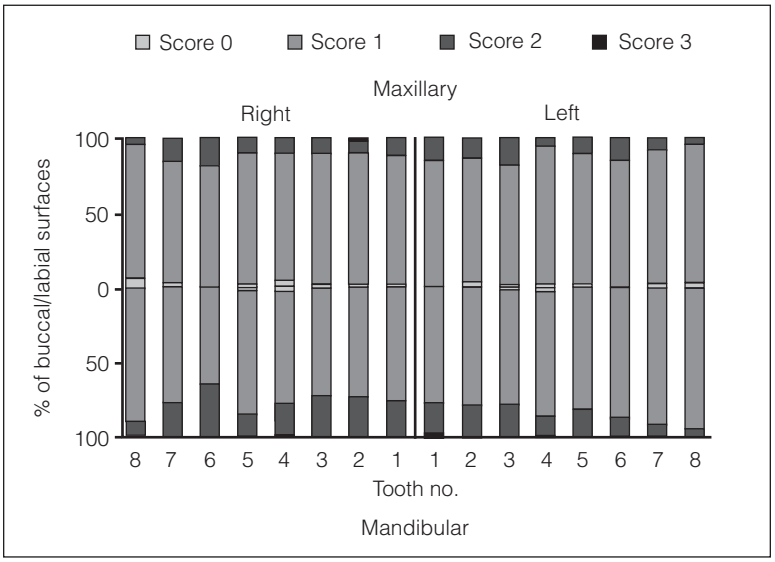

Fig 2 Distribution of tooth wear scores for buccal/labial surfaces among psychiatric patients.

Discussion

The patient sample was drawn from psychiatric patients who attended the outpatient clinic and were referred to the dental clinic for examination despite their psychiatric diagnosis. The tooth wear index used in this study is an established index previously employed in many studies.[1,2,13,14] The numerous indices used to evaluate the extent of tooth wear referred to tooth surface loss as attrition, erosion, or abrasion, and most referred to the wear of only one surface of the tooth.[15–19] This study's index recorded the degree of tooth wear without necessarily being able to diagnose its cause or combined causes. Furthermore, the index evaluated the wear of 4 surfaces of the tooth: buccal/labial, lingual/palatal, occlusal/incisal, and cervical. Patients' responses to queries regarding oral hygiene habits were inconsistent and unclear. The majority did not brush their teeth, while others brushed irregularly. This factor was excluded from the present study. The age group of this sample of the study ranged from 16 to 55 years with an average of 36 years, and it was found that the prevalence of a tooth wear score of 3 or more in at least one tooth was 91%, which may show that most of the individuals included in this study have a high rate of tooth wear in relation to their age group. The association between tooth wear and psychiatric condition has been reported and was related either to eating disorders (anorexic or bulimic behavior)[8] or to medication taken by the patient that caused a reduction in salivary flow rate, which may in turn influence tooth wear rate.[10] In the present study, none of the patients were diagnosed with eating disorders. This observation cannot be generalized for the general population in Jordan, since the hospital's location permitted only patients with medical insurance to attend.

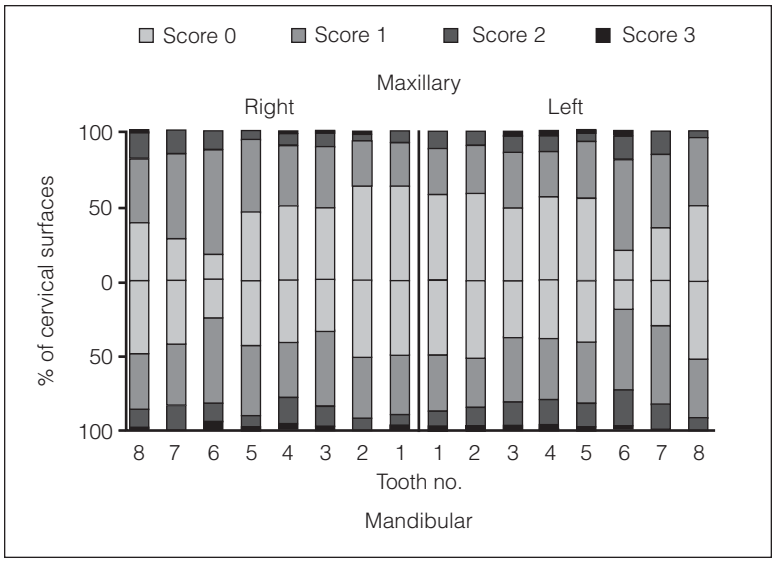

Fig 3 Distribution of tooth wear scores for cervical surfaces among psychiatric patients.

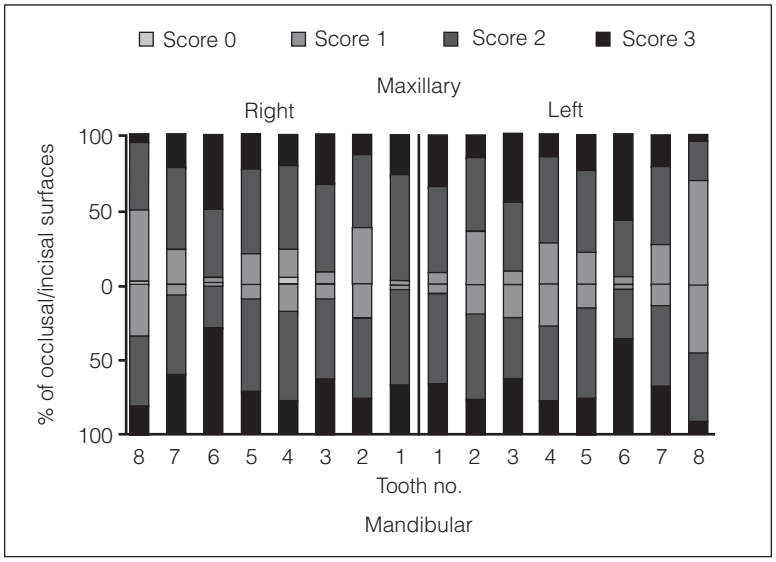

Fig 4 Distribution of tooth wear scores for occlusal/incisal surfaces among psychiatric patients.

Table 3 Factors Associated with Wear of the Tooth Surfaces in the Adjusted Model

Factor*	Buccal/labial	Cervical	Occlusal/incisal	Lingual/palatal
Age	.011	< .005	< .005	.026
Occupation	.216	.086	.026	.012
Psychiatric condition	.002	.329	< .005	.388
Frequency of intake of carbonated drinks	.995	.931	.031	.622
No. of missing teeth	.001	< .005	.255	.028
Pain in the masseter muscle	.020	.154	.001	.072
R^2	0.455	0.601	0.530	0.349

*Other studied variables were assessed but were not significantly associated with tooth wear.

The tendency for men to have more tooth wear than women is in agreement with a previous report by Smith and Robb,[1] who observed the same findings in 1,007 dental patients. The significant increase in tooth wear with an increase in patients' age matches previously reported data.[1,14,20]

In the present study, occlusal surfaces of first molars were found to be the most affected by wear, followed by the incisal edges of the central incisors. The explanation for the severity of tooth wear on occlusal surfaces when compared to other surfaces could be related to the fact that the main cause of tooth surface loss is attrition, which may be related to contact parafunction (grinding and clenching of the teeth) in this group of patients. Moreover, such findings have also been documented in nonpsychiatric patients. Chuajedong et al[14] found that occlusal surfaces of the teeth were the most affected by wear, and the greatest degree of wear was found in the first molar. The authors related this to the fact that the first molar is the first permanent tooth that erupts in the mouth, although Smith and Robb[1] reported that the incisal edge of the incisors had the most severe wear in their study. Furthermore, the present study shows that the mandibular teeth were more affected than the maxillary teeth, and this could be related to the nature of the occlusal relationship and the dynamic movement of the mandible during functional and parafunctional activity.

Retirement and unemployment were also significantly associated with tooth wear for the occlusal and lingual surfaces. Although retirement is usually age related, retired patients investigated in the present study were largely middle aged and had retired early because of their medical condition. It could be speculated that retired and unemployed patients had high tooth wear scores because of stress-generated parafunction from a feeling of unused time, which may also aggravate their psychiatric condition.

The results also showed that psychiatric patients with depression and anxiety revealed the highest degree of tooth wear, and this was clearly seen on the occlusal and buccal surfaces of the teeth. In neuropsychiatry, signs of jaw clenching may be a useful objective marker for detecting or substantiating a self-report of current subjective emotional distress.[21] Consequently, an association between tooth wear and anxiety could be related to the grinding and clenching of the teeth. It has been reported that accelerating tooth wear may be an objective clinical sign of long-lasting anxiety.[21] The high score of tooth wear in patients diagnosed with depression could be related to antidepressant medications that are frequently prescribed for patients and associated with a significant number of adverse orofacial reactions.[22,23] The latter may also be associated with salivary gland dysfunction induced by the antidepressant medications.[24] Although saliva may have an effect on tooth wear, its influence could not be ascertained since salivary analyses were not carried out in the present study. Interestingly, certain groups of antidepressant medications, such as selective serotonin reuptake inhibitors and atypical antidepressants, may result in development of movement disorders that include clenching or bruxing.[24-26] This may occur because these medications increase extrapyramidal levels of serotonin, thereby inhibiting dopaminergic pathways that control movements.[27] The correlation between tooth wear and bruxism or clenching has been reported previously.[2,15,28]

The results of the present study also showed a significant association between the number of missing teeth and the degree of tooth wear of the buccal, palatal, and cervical surfaces ($P = .001$, $P = .0028$, $P < .005$, respectively), but not with the occlusal surface ($P = .255$). Smith and Robb[1] found no significant relationship between the number of missing posterior teeth and the wear of anterior teeth. However, Chuajedong et al[14] reported that tooth wear correlated positively with the number of missing teeth. A possible explanation for the results of the present study is that the absence of some teeth, particularly posterior teeth, may modify the occlusal relationship and lead to an increase of overbite. More contact with buccal and palatal surfaces may then occur, resulting in the exposure of such surfaces to more tooth-to-tooth contact. Greater lateral forces on such surfaces may also be created, thus stressing the cervical area of the teeth, where abfraction may occur.[29,30]

The association between tooth wear and masseter muscle pain suggests that parafunctional activity with induced palpable masseter tenderness should be considered as a possible objective physical sign of persisting fear circuitry activation or posttraumatic stress disorder.[22] It is reasonable to suggest that tooth wear is multifactorial in origin, and that in the case of psychiatric patients, tooth wear should be thoroughly investigated.

It must be acknowledged that a number of shortcomings are present in the design of this study. The absence of a matched control group of nonpsychiatric patients precludes drawing conclusions beyond those recorded for this particular group of selected patients. Furthermore, the lack of very specific stratification for the different types of psychiatric conditions in the relatively small number of study patients permits only general correlations. Nonetheless, the clinical observations for this specific group of psychiatric patients emphasize the dental clinician's role in looking for possible dental sequelae in such individuals.

Conclusion

Within the limits of this study's design, it appears that the prevalence of tooth wear in psychiatric patients may show significant differences. Patients with depression and anxiety revealed the highest degree of tooth wear. The study suggests that the illness itself and/or the medication taken may influence the rate of tooth wear.

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