Impact of Tooth Wear on Daily Living

Mahmoud K. AL-Omiri, BDS, PhD, FDS RCS[a]/
Philip-John Lamey, BSc, BDS, DDS, MBChB, FDS RCPS, FFD RCSI, FDS RCS[b]/
Thomas Clifford, BDS, FDS RCPS, FFD RCSI[c]

Purpose: The aim of this study was to identify the effects of tooth wear on patients' quality of life and satisfaction with their dentition. ***Materials and Methods:*** Seventy-six tooth wear patients and 76 control subjects were recruited for the study. A Dental Impact on Daily Living questionnaire was used to assess the affect of tooth wear on daily living and satisfaction with the dentition. An ordinal scale was used to assess the severity of tooth wear in a patient cohort. ***Results:*** The results showed that tooth wear has a measurable impact on patients' satisfaction with their appearance, pain levels, oral comfort, general performance, and chewing and eating capacity ($P < .001$). ***Conclusion:*** Tooth wear has an impact on patients' satisfaction with their dentition regardless of tooth wear severity or personal factors. *Int J Prosthodont 2006;19:601–605.*

Tooth wear is an irreversible, multifactorial, noncarious, physiologic, pathologic, or functional loss of dental hard tissues.[1] The exact prevalence of tooth wear is difficult to establish, because different authorities employ different assessment criteria. However, it is generally recognized that the prevalence of tooth wear does rise with age.

Thus, tooth wear can be perceived as a natural consequence of aging. Some loss of tooth tissue during the course of a patient's life can be attributed to wear and tear. When the loss of tooth tissue exceeds what is perceived to be normal for a particular age group, it is considered pathologic.[2] Tooth wear has many effects on the dentition, such as dentin hypersensitivity, pulp involvement, poor esthetics, and loss of dental hard structures.[2]

[a]*Assistant Professor and Consultant, Department of Restorative Dentistry, Faculty of Dentistry, Jordan University of Science and Technology, Jordan.*
[b]*Professor and Consultant, Department of Oral Medicine and Oral Surgery, School of Dentistry, Queen's University Belfast, Northern Ireland, United Kingdom.*
[c]*Senior Lecturer and Consultant, Department of Restorative Dentistry, School of Dentistry, Queen's University Belfast, Northern Ireland, United Kingdom.*

Correspondence to: *Prof P-J Lamey, Department of Oral Medicine and Oral Surgery, School of Dentistry, Queen's University Belfast, Belfast BT12 6BP, Northern Ireland, United Kingdom. Fax: +44 02 890438 861. E-mail: p.lamey@qub.ac.uk*

Various factors, such as pain, speech, chewing ability, taste, and esthetics may affect aspects of patients' quality of life and satisfaction with their teeth.[3]

In tooth wear patients, poor appearance and inadequate function are the major causes for dissatisfaction and may motivate patients to seek treatment.[4]

Dental clinicians need an accurate perception of how patients feel about their teeth and what impact this has on their daily living. Strauss and Hunt[5] found that dental disease may influence an individual's capacity to live comfortably, be successful in employment, enjoy life, experience relationships, and possess a positive self-image.

Despite the fact that dental disease is rarely life threatening, it can still affect quality of life. Pain, fear, and difficulties with speech, esthetics, chewing, and eating can impact quality of life.[3,6] Different levels of oral status have various impacts on daily living; therefore, the clinical status and psychologic dimensions should be addressed whenever dental needs are being assessed.[3,7] The purpose of this investigation was to identify the effects of tooth wear on patients' quality of life and satisfaction with their dentition.

Materials and Methods

Ethical approval was sought and granted before the study was undertaken. Patients who agreed to participate were asked to sign an informed consent document before entering the study.

Table 1 Etiologic Factors in the Tooth Wear Group

Factor	No. of subjects (%)
Parafunction and grinding	53 (69.7)
Gastrointestinal problems	46 (60.5)
Loss of other teeth	7 (9.2)
Diet	34 (44.7)
Foreign objects	15 (19.7)
Eating disorders	4 (5.3)
Alcoholism	2 (2.6)
Tooth brushing	1 (1.3)
Environmental	1 (1.3)

Seventy-six consecutive tooth wear patients who had been referred to a tooth wear clinic at the Department of Restorative Dentistry, Queen's University Belfast, were recruited for this study.

Each patient was required to complete the Tooth Wear Assessment Questionnaire.[8] The assessment included dental and medical history, possible etiologic factors of tooth wear, diet, saliva, habits, and patient's complaints, as well as personal information, including name, age, sex, education, occupation, address, marital status, height, and weight.

Patients were then clinically examined by 1 operator, who had previously been calibrated to assess the severity of tooth wear, which was recorded on an ordinal scale[9,10] from 1 to 4, where 1 is mild enamel wear and 4 indicates severe wear involving secondary dentin. The clinician had been calibrated in a pilot study in which subjects were independently examined by 2 operators, both trained in using the tooth wear index. The results showed good agreement on wear status.

Assessment of patient satisfaction was carried out using the Dental Impact on Daily Living Questionnaire (DIDL).[3,11] The DIDL measures the impact and proportional importance of each dimension (weight of the dimension) to the patient. The DIDL consists of 36 items grouped into 5 scales: comfort, appearance, pain, performance, and eating restriction, and the impact of each item is scored. A weight for each dimension is calculated on an individual basis by dividing the summed responses of that dimension by the total possible scale score. To construct an overall score, scores within each dimension are first calculated by multiplying the summed dimension responses by the dimension weight. Weighted dimension scores are then summed to give a DIDL score.

Seventy-six control subjects with tooth wear that was considered within normal limits for their particular age group were recruited for the study. They matched the study sample by age, sex, and level of education.

All control subjects were clinically assessed to rule out existing oral and dental diseases, especially tooth wear. Only those who had no current active dental disease or tooth wear were recruited into the control group.

The DIDL questionnaire and its scale were used to assess dental satisfaction in the control group.

The Pearson correlation, *t* test, analysis of variance (ANOVA), and linear regression analysis were used to evaluate the data. All data analysis was carried out using the SPSS computer software version 10.0 (SPSS).

Results

Seventy-six tooth wear patients were recruited for the study: 49 men (64.5%) and 27 women (35.5%), Seventy-six control subjects were also recruited and matched the tooth wear group by gender. Ages of the patients ranged from 18 to 50 years (mean: 34.6; SD: 9.7). Ages of the control subjects ranged from 18 to 50 years (mean: 33; SD: 10). Tooth wear patients had an average of 25 remaining teeth, while controls had an average of 28 remaining teeth.

Levels of patient education ranged from primary to tertiary education, with 3 patients (3.9%) having received primary education (up to age 16 years), 59 patients (77.6%) having received secondary education (up to level A), and 14 (18.4%) having received tertiary education (university or college). Levels of control subjects' education matched those of the tooth wear patients group.

The severity of tooth wear was coded from 0 to 4 to show the degree of tooth wear. Results showed that 2 patients (2.6%) had grades 0 to 1 (mild), 42 patients (55.3%) had grade 2 (moderate), and 32 patients (42.1%) had grades 3 to 4 (severe).

The diagnosis of tooth wear was based on medical and dietary history and on clinical presentation. The etiology of tooth wear varied from patient to patient, and some patients had more than one etiologic factor involved (Table 1).

All types of tooth wear were found among the study population. Erosion was involved in 64 subjects (84.2%) and was the only type of wear in 16 subjects (21.1%). Abrasion was involved in 15 subjects (19.7%), while abfraction was present in 8 subjects (10.5%), but neither was found to be the only type of tooth wear in any case. Attrition was seen in 60 subjects (78.9%) and was the only cause of tooth wear in 12 subjects (15.8%).

Forty-eight subjects (63.2%) had evidence of both erosion and attrition.

Satisfaction Scores in the Study Sample

Total satisfaction scores of the DIDL questionnaire showed that 35.5% of tooth wear patients were dissatisfied with their teeth and scored below 0, 53.9% were relatively satisfied and scored between 0 and

Table 2 Scores of Individual Satisfaction Dimensions in the Study Sample

	Dissatisfied (%)		In between (%)		Satisfied (%)	
Dimension	Patients	Control	Patients	Control	Patients	Control
Appearance	76.3	10.5	5.3	3.9	18.4	85.5
Pain	23.7	5.3	7.9	3.9	68.4	90.8
Oral comfort	21.1	2.6	14.5	1.3	64.5	96.1
General performance	18.4	3.9	3.9	0	77.6	96.1
Eating and chewing	26.3	5.3	13.2	2.6	60.5	92.1

Table 3 Correlations Between Satisfaction Scores and Personal Factors in the Study Sample

	Age		Gender		Education	
Dimension	Patient	Control	Patient	Control	Patient	Control
Total satisfaction						
Pearson correlation coefficient	−0.123	−0.316	−0.160	−0.127	−0.045	−0.192
P (2-tailed)	NS	.005	NS	NS	NS	NS
Appearance						
Pearson correlation coefficient	−0.001	−0.341	0.057	−0.360	0.051	−0.058
P (2-tailed)	NS	.003	NS	.001	NS	NS
Pain						
Pearson correlation coefficient	−0.093	−0.087	−0.132	−0.063	−0.135	−0.147
P (2-tailed)	NS	NS	NS	NS	NS	NS
Oral comfort						
Pearson correlation coefficient	−0.044	−0.066	0.077	−0.018	−0.028	−0.283
P (2-tailed)	NS	NS	NS	NS	NS	.013
General performance						
Pearson correlation coefficient	−0.078	−0.208	−0.176	−0.132	−0.057	0.215
P (2-tailed)	NS	NS	NS	NS	NS	NS
Eating						
Pearson correlation coefficient	−0.236	−0.309	−0.134	0.032	−0.059	−0.097
P (2-tailed)	.04	.007	NS	NS	NS	NS

NS = not significant.

0.69, and 10.5% were totally satisfied with their teeth. The highest total satisfaction score was +1, while the lowest total satisfaction score was −0.6419 (mean: 0.202; SD: 0.39).

In the control group, it was found that 3.9% of the control subjects were dissatisfied with their teeth and scored below 0, 25% were relatively satisfied and scored between 0 and 0.69, and 71.1% were totally satisfied with their teeth. The highest total satisfaction score was +1, while the lowest total satisfaction score was −0.1552 (mean: 0.7556; SD: 0.28).

Table 2 summarizes the satisfaction with each dimension of the DIDL questionnaire in both the study and control groups. It demonstrates that levels of satisfaction with each dimension were higher in the control group.

Within-Group Correlations in the Study Sample

Age, gender, and education level of the study group patients were correlated to the total satisfaction scores as well as to individual scores of each dimension of the questionnaire. Among these factors, only age was found to have a significant negative correlation to satisfaction with eating ($P = .04$) (Table 3).

In the control group, age was found to have a significant negative correlation to the total satisfaction score ($P = .005$), the appearance dimension satisfaction score ($P = .003$), and the eating dimension satisfaction score ($P = .007$).

Women were found to have lower scores for the satisfaction with appearance dimension ($P = .001$). The higher the level of education, the lower the scores for the satisfaction with oral comfort dimension ($P = .013$) (Table 3).

There was no correlation between any satisfaction score and wear severity, except for a significant negative correlation between total satisfaction scores and tooth wear severity ($P = .048$). There was no correlation between tooth wear severity and personal factors, except for a significant positive correlation ($P = .02$) between education and tooth wear severity (Table 4).

Table 4 Correlations Between Wear Severity and Satisfaction Scores and Personal Factors

	Tooth wear severity	
	Pearson correlation coefficient	*P*
Age	0.208	NS
Gender	−0.135	NS
Education	0.252	.028
Total satisfaction	−0.228	.048
Appearance	0.043	NS
Pain	−0.156	NS
Oral comfort	−0.150	NS
General performance	−0.086	NS
Eating and chewing	−0.204	NS

NS = not significant.

Comparison Between the Groups

Using ANOVA, the total satisfaction scores and individual dimension satisfaction scores were significantly different between the groups.

The tooth wear group showed less satisfaction with their dentition than the control group. Total satisfaction, appearance, pain, oral comfort, and eating satisfaction scores were found to be significantly different between groups ($P < .001$). The general performance satisfaction scores also showed a significant difference ($P = .001$) (Table 5).

Discussion

This study examined the impact of tooth wear on daily living in a cohort of patients referred for specialist advice. There are no similar studies reported in the literature. The results supported the multifactorial nature of tooth wear and showed erosion to be the most prevalent factor, affecting 84% of subjects. This finding is in agreement with the literature.[1,2,8,9] It is difficult to isolate the cause of tooth wear, as more than one process is often involved and the clinical picture can be distorted. A good medical and social history is essential in diagnosis, and a structured interview as used in this study is also essential. The overall prevalence of tooth wear in the general population is difficult to quantify, and there is no single accepted figure in the literature. This is a result of the use of small sample sizes and different methodologies for measuring tooth wear.

This study did not aim to evaluate prevalence, but rather used a cohort of patients referred to a dedicated tooth wear clinic for the purpose of diagnosis and treatment planning. As such, patients were aware that they had a problem with their teeth, and by the nature of being referred they were perceived to have pathologic tooth wear. Prior to the study, the impact of tooth wear on quality of life had not been assessed. A control population was drawn from regular dental patients diagnosed as having no tooth wear greater than that expected of their particular age group.

The male-to-female ratio for the sample of tooth wear patients was 1.8:1. This is higher than that reported by Smith and Robb,[12] but is in broad agreement with a study by Burnett et al,[13] which was carried out in the same location and may reflect a different attendance/referral pattern in this geographical area, or may indicate lifestyle differences between genders.

A socio-dental instrument, the Dental Impact of Daily Living questionnaire, was used in this study, because unlike other socio-dental indicators, it assesses the dental impact on daily living, the relative importance that respondents attribute to each dimension, and oral status. Additionally, as impacts seldom occur separately, a single impact score is given to assess total oral impact. Since there are important links between quality of life and clinical oral status, the significant impacts should be used to assess needs. Instruments such as the Oral Health Impact Profile (OHIP) do not weight dimension scores and then combine the weighted scores into a single score, as does the DIDL. Both the DIDL and OHIP allow a respondent to indicate whether a problem is entirely internal or if it has interpersonal or social impacts. The instrument has been tested for validity and reliability.[14]

Within the study group, age had a significant negative correlation with satisfaction with eating ($P = .04$), while in the control group, age had a significant negative correlation with total satisfaction, satisfaction with appearance, and satisfaction with eating ($P = .005$, .003, and .007, respectively) (Table 3).

It was found that the older the subject, the less satisfied he or she was, and this may be because personal values increase with age and become more difficult to satisfy.

Gender in the control group was found to be significantly correlated with satisfaction scores of the appearance dimension ($P = .001$). In the tooth wear group, there was generally a high dissatisfaction with appearance, and no gender difference was demonstrated.

Many cases showed more than one pattern of tooth wear, and this is reflected in the multifactorial etiology underlying this problem. Parafunction, gastrointestinal problems, and diet were found to be the most common etiologic factors, which reflects stressful modern lifestyles and eating and drinking habits (Table 1). The presence of these etiologic factors explains why many cases displayed attrition and erosion. These findings support the results published by many other researchers.[1,2,8,9]

Approximately 36% of the tooth wear patients were dissatisfied with their teeth in general, whereas only 3.9% of the control subjects were dissatisfied with

Table 5 Comparison of Satisfaction Scores Between Groups (ANOVA)

	Sum of squares	*df*	Mean square	F	*P*
Total satisfaction					
Between groups	11.640	1	11.640	100.569	.000
Within groups	17.361	150	.116		
Total	29.000	151			
Appearance					
Between groups	67.112	1	67.112	131.118	.000
Within groups	76.776	150	.512		
Total	143.888	151			
Pain					
Between groups	6.322	1	6.322	13.136	.000
Within groups	72.197	150	.481		
Total	78.520	151			
Comfort					
Between groups	9.500	1	9.500	24.013	.000
Within groups	59.342	150	.396		
Total	68.842	151			
General performance					
Between groups	4.112	1	4.112	10.656	.001
Within groups	57.882	150	.386		
Total	61.993	151			
Eating					
Between groups	10.526	1	10.526	21.398	.000
Within groups	73.789	150	.492		
Total	84.316	151			

their teeth. Dissatisfaction in the control group subjects could be the result of gender, personality profile, or a previous oral disease episode (eg, temporomandibular joint disorder or periodontal problems) that was treated before recruitment into the study.

In comparing the 2 groups, it can be seen that the tooth wear patients did have different levels of satisfaction than those in the control group.

In tooth wear patients, personal factors were shown not to affect satisfaction with the dentition, except for the finding that age affected satisfaction with eating.

Tooth wear has certain effects on patients' satisfaction with their dentition. In comparison to control subjects, tooth wear patients were found to have higher levels of dissatisfaction with appearance, pain, oral comfort, general performance, chewing and eating, and the dentition in general. This finding may be relevant in formulating a treatment plan, as merely replacing lost tooth substance in an effort to restore appearance may not be sufficient to satisfy patient needs.

Conclusions

Tooth wear has definitive effects on patients' satisfaction with different aspects of their dentition, such as appearance, pain, oral comfort, general performance, and eating capacity. This will affect the quality of life of patients.

For that reason, it is essential to provide tooth wear patients with appropriate management to avoid the negative effects of tooth wear on quality of life.

References

1. Kelleher M, Bishop K. Tooth surface loss: An overview. Br Dent J 1999;186:61–66.
2. Kidd EAM, Smith BGN. Tooth wear histories: A sensitive issue. Dent Update 1993;20:174–178.
3. Leao A, Sheiham A. Relation between clinical dental status and subjective impacts on daily living. J Dent Res 1995;74:1408–1413.
4. Hemmings KW, Howlett JA, Woodley NJ, Griffiths BM. Partial dentures for patients with advanced tooth wear. Dent Update 1995;22:52–59.
5. Strauss RP, Hunt RJ. Understanding the value of teeth to older adults: Influences on the quality of life. J Am Dent Assoc 1993;124:105–110.
6. Locker D, Slade G. Oral health and the quality of life among older adults: The oral health impact profile. J Can Dent Assoc 1993;59:830–838.
7. Cushing AM, Sheiham A, Maizels J. Developing socio-dental indicators—The social impact of dental disease. Community Dent Health 1986;3:3–17.
8. El-Swiah JM. An Investigation of Aspects of Tooth Wear in Selected Populations [thesis]. Belfast: Queen's University Belfast, 2001.
9. Carlsson GE, Johansson A, Lundqvist S. Occlusal wear. A follow-up study of 18 subjects with extensively worn dentitions. Acta Odontol Scand 1985;43:83–90.
10. Smith BGN, Knight JK. An index for measuring the wear of teeth. Br Dent J 1984;156:435–438.
11. Leao A. The Development of Measures of Dental Impacts on Daily Living [thesis]. London: London University, 1993.
12. Smith BGN, Robb ND. The prevalence of tooth wear in 1,007 dental patients. J Oral Rehabil 1996;23:232–239.
13. Burnett CA, Hussey DL, Clifford TJ. Presentation, diagnosis and initial management of patients referred to a hospital tooth wear clinic. Eur J Prosthodont Restorative Dent 2001;9:5–7.
14. Leao A, Sheiham A. The development of a socio-dental measure of dental impacts on daily living. Community Dent Health 1996;13:22–26.