

Original Research Article

**Dental Wear Its Prevalence and Patterns in Class I Malocclusion
(A Comparative Study)**

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Abstract

Dental wear is a physiological process that occurs normally through a variety of mechanisms and age progression. It is a loss of tooth structure during masticatory forces. The study aimed to investigate patterns of tooth wear in adult with class I malocclusion (crowding) then the normal occlusion is compared with them.

Our study sample consisted of 2 groups with an age range "18-25" years. The 1st group was (30 subject) with normal occlusion and the 2nd was (30 subject) with class I crowding. A modified version of the tooth wear index (TWI) was used to assess the amount of tooth wear.

Tooth wear was greater statistically in incisal surfaces of central incisors of the upper arch and lateral incisors of both arches in class I malocclusion group than was in group of normal occlusion. While significant tooth loss was found in the buccal surfaces of the lower 1st molar and the incisal surfaces of upper canines in normal occlusion than it was in crowding group.

It was concluded that the irregularity of the dentition in class I malocclusion subjects lead to the differences in the pattern of tooth wear in both the normal and malocclusion groups.

Key words: dental wear, wear patterns, modified tooth wear index

الخلاصة

التآكل السني هو عملية فيسيولوجية تحدث طبيعياً خلال عديد من الآليات والتقدم في العمر. هو فقدان تركيب السن من خلال قوى المضغ. الغرض من الدراسة هو لتشخيص أنماط تآكل السن عند البالغين في الصنف الأول من سوء الاطباق (تآكل الاسنان) ومن ثم الاطباق الطبيعي يقارن معهم.

عينة الدراسة تتكون من مجموعتين بمعدل عمر (18-25) سنة. المجموعة الاولى كانت تتألف من (30 شخص) ذات اطباق طبيعي والمجموعة الثانية كانت من (30 شخص) ذات الصنف الاول من سوء الاطباق. نوع معدل من مقياس تآكل السن كان قد استخدم ليفسر كمية تآكل السن. تآكل السن كان عالي احصائياً في السطوح القاطعة للقواطع المركزية في الفك العلوي وللقاطع الجانبية في كلا الفكين لذوات الصنف الاول من سوء الاطباق اذ ما قورن مع مجموعة الاطباق الطبيعي. بينما احصائياً كان هنالك تآكل سني عالي في السطوح الخدية للطواحن الاولى السفلية والسطوح القاطعة للأنياب العلوية لذوات الاطباق الطبيعي اذ ما قورن مع مجموعة التآكل السني. محصلة الدراسة انه عدم انتظام الاسنان في الاشخاص ذوات الصنف الاول من سوء الاطباق ادى الى اختلافات في هيئة تآكل السن في كلتا المجموعتين.

الكلمات المفتاحية: تآكل السن، أنماط التآكل، مقياس تآكل السن المعدل.

Introduction

In many societies, due to the decreasing occurrence of dental caries, increasing attention has focused on tooth wear from erosion, abrasion and attrition [1].

Tooth wear is a physiological process that occurs normally through a variety of mechanisms and age progression. It can be defined as the loss of tooth structure as a

result of the combined processes of attrition, erosion and abrasion rather than due to decay; these terms reflect specific etiologic factors [2]. Nearly all mammals suffered from occlusal attrition of the dentition as a general physiologic phenomenon in every civilization, and at all ages. A flat, sharply or round angled and polished surfaces and may come from excessive attrition of one tooth against the other [3] were the characteristic features of the dental wear which must be distinguished from erosion and abrasion. Smith and Knight [4], attempted to provide a solution to some problems associated with measuring wear at the individual and community levels; so the tooth wear index (TWI) was introduced. The widespread acceptance [5-7] of (TWI) and modified versions of it as a suggestion for its use in many studies. However, as it does not take into account teeth that were restored due to wear; it was described as flawed when used in an aging population [8]. The modifications matched the World Health Organization (WHO) standards, thus the index was allowed to be applicable in broad epidemiologic surveys for both of deciduous and permanent dentitions [9]. The malocclusion and masticatory forces are the primary etiologic factors for non carious lesion development as indicated by some reports [10-14], although a correlation did not find by other authors [15-18]. It is

relevant to verify the pattern of tooth wear of various occlusal relationships to help professionals to differentiate between physiologic and pathologic processes because of high prevalence of malocclusions as well as the controversies in the studies of tooth wear.

Materials And Methods

The sample has been selected randomly from the students of Babylon university, college of (medicine, dentistry and nursing) and some patients were selected randomly from the patients attended the orthodontic and oral medicine department of dentistry college of Babylon university. Out of 77 persons only 60 subjects were selected and classified into two groups:

1. Group one included 30 subjects with normal occlusion.
2. Group two included 30 subjects with class I malocclusion with crowding.

The sample was taken in terms of the following criteria:-

1. The sample was all of Iraqi Arab in origin.
2. No previous orthodontic treatment.
3. No extracted teeth up to the first molar.
4. No open bite.
5. Para functional habits and temporomandibular joint (TMJ) problems were excluded.

Table 1: Criteria used for the measurement of dental wear, according to the modified (TWI)

Permanent teeth scores	Criteria	Description
0	no evidence of wear (Normal)	No loss of surface features
1	tooth wear into enamel (Incipient)	A smooth glazed shiny appearance of enamel due to tooth loss, dentine is not involved
2	tooth wear into dentine (Moderate)	enamel was Extensively losed with dentine involvement. Dentine was Exposed.

3	tooth wear into pulp or secondary dentin (Severe)	Secondary dentine or pulp exposure due to extensive loss of enamel and dentine
4	tooth wear leading to restoration(Restored)	Tooth wear lead to restoration
9	Cannot be assessed	Caries was extensive, large restoration, fractured tooth and missing tooth

Scoring was done according to tooth wear index by Smith and Knight [4]modified by As the modifications matched the World Health Organization standards [9], thus allowing the index to be applicable in broad epidemiologic surveys for both of deciduous and permanent dentitions. Because the modified tooth wear index does not differentiate the depth of dentin involvement, as does the original tooth wear index;so the modifications made

Sales Peres et al.[7]for each surface of all teeth in the mouth. calibration easier. Moreover, a code is given for each tooth had been restored as a result of wear (code 4) and another code for teeth been not assessed (code 9). The amount of permanent tooth wear is scored by numbers(table, 1).Mann Whitney test was used to compare each 2 groups for the frequency and severity of wear on each surface of each group of teeth.



Figure 1:Incipient wear Moderate wear Sever wear

Results

In total, 2880 dental surface were evaluated. Of these (61.8 %;35.5%;1.6 %;1.1%) were scored(0; 1; 2; and 9), respectively. Severe lesions were not found.

Dental wear in crowding group was greater significantly in incisal surfaces of central incisors of the upper arch (**Mean of scores=0.867 for right side and 0.883for left side, $P < 0.05$**), of lateral incisors of the lower arch(**Mean of scores=0.805 for right side and 0.781 for left side**) and of mandibular lateral incisors(**Mean of scores=0.898 for right side and 0.890for left side**), (table, 2) than it was in the normal occlusion group. While it was greater statistically in the buccal surface of mandibular 1st molars and in the incisal surfaces of maxillary

canines (**Mean of scores=0.20 for right side and 0.18 for left side, $P=0.00$**)(**Mean of scores=0.776, $P < 0.05$**) respectively, dealing with the normal occlusion than it was found in crowding group (tables 3 and 4).

Discussion

In order to study the patterns of tooth wear it is necessary to use simple and standardized diagnostic criteria so that any patterns in tooth wear can be monitored[19-21].

A modified version of the universally used Tooth Wear Index (TWI) was used in our study. The modified TWI achieves greater intra- and interexaminer agreement as it does not differentiate the depth of dentin involvement, as is the case for the original TWI [4,7].

The examination of teeth and evaluation of wear scores in this study were done clinically in patient mouths and not on study models to overcome standardized study models because the quality of study models should be generally uniform and substandard casts should be excluded [22,23].

Both Janson et al.[20] and Oltramari et al.[21] in separate studies, investigated the tooth wear patterns and its prevalence in dental casts of adolescents (13-17 years old) with class II division 1 and with class II division 2 malocclusion, respectively.

Generally, the means of scores in this study were slightly more than in those two previous studies, this may be due to sample size, ethnic factors, and age of the subjects because the teeth wear increases with age [10,16,24,25]. An association between some occlusal factors and greater tooth wear was suggested by some reports in the literature [3,10,16,20,21].

An important note must be mentioned about a finding encountered throughout this study results, which is the attrition of certain surfaces more than the opposing ones. This may be attributed to the difference in texture of tooth structure between the mandibular and maxillary teeth. The more dental wear in the maxillary and mandibular incisal surfaces of incisors in class I crowding subjects may be due to irregularities and disarrangement of these teeth leading to differences in force distribution around the crowded teeth, adding to that the less surface area incisally of the affected teeth; hence, tooth wear with time will be occur, (table 2).

The normal occlusion group differs from class I with crowding in that greater tooth

wear was found on the incisal surfaces of the maxillary canines, compared with the corresponding surfaces of the malocclusion group (table 3), this probably occurred because of the immediate lateral guidance is established during lateral mandibular excursions as a result of normal anteroposterior relationship [26]. Since these teeth; during lateral mandibular functional movements, disclude the posterior teeth, it logical seems to be that they have greater wear, this finding came to be in accordance with Janson et al.[20] and Oltramari et al. [21]. Since these teeth also do not disclude the posterior teeth as frequently as in normal occlusion because of interferences of the posterior teeth as a result of unfavorable positioning of the canines in class I crowding as in many of their cases it was coming with buccal malposition [26, 27]. Thus, the incisal surfaces of the maxillary canines had less dental wear in the crowding group.

The buccal surfaces of mandibular first molars had tooth wear more than the class I malocclusion (table 4), this may be due to the subjects with crowding had narrower arches than the normal occlusion (Raymond et al., 1983; Timothy et al., 2008) so the maxillary first molars did not probably overlap the mandibular molars. Thus, there is less wear in the buccal surface of mandibular first molar because all of the tooth loss located in areas of occlusal contact [19]. It was concluded that dental wear can be affect any one of permanent teeth to ascertain degree in both groups; but mostly be of anterior teeth including canines due to physical and mechanical factors.

Table 2: intergroup anterior dental wear comparisons (normal occlusion and class I crowding) (Mann-Whitneytest).

Tooth	Normal occlusion		Class I crowding		P
	Mean of scores	SD	Mean of scores	SD	
Incisal surface					
Maxillary teeth					
Central /right	0.729	0.521	0.867	0.341	0.01*
Central /left	0.741	0.492	0.883	0.323	0.00*
Lateral /right	0.529	0.526	0.805	0.398	0.00*
Lateral /left	0.552	0.500	0.781	0.415	0.00*
Mandibular Teeth					
Central /right	0.859	0.515	0.945	0.228	0.07
Central /left	0.859	0.383	0.938	0.243	0.06
Lateral /right	0.765	0.427	0.898	0.303	0.01*
Lateral /left	0.729	0.447	0.890	0.313	0.00*
Palatal surfaces					
Maxillary teeth					
Central /right	0.471	0.547	0.438	0.585	0.52
Central /left	0.459	1.249	0.430	0.584	0.44
Lateral /right	0.271	0.473	0.297	0.4587	0.58
Lateral /left	0.306	0.464	0.304	0.462	0.98
Labial surfaces					
Mandibular teeth					
Central /right	0.059	0.237	0.094	0.293	0.35
Central /left	0.059	0.237	0.086	0.281	0.46
Lateral /right	0.024	0.152	0.055	0.228	0.27
Lateral /left	0.024	0.152	0.063	0.243	0.19

Table 3: Intergroup canine dental-wear comparisons (normal occlusion and class I crowding) (Mann-Whitney test).

Tooth	Normal occlusion		Class I (crowding)		P
	Mean of scores	SD	Mean of scores	SD	
Incisal surfaces					
Maxillary teeth					
Canine /right	0.776	0.542	0.539	0.613	0.002*
Canine / left	0.776	0.542	0.523	0.588	0.001*
Mandibular teeth					
Canine /right	0.882	0.521	0.789	0.512	0.789
Canine / left	0.894	0.535	0.789	0.556	0.789
Palatal surfaces					
Maxillary teeth					
Canine /right	0.165	0.373	0.094	0.293	0.122
Canine / left	0.177	0.383	0.094	0.293	0.076
Labial surfaces					
Mandibular teeth					
Canine /right	0.071	0.258	0.125	0.332	0.202
Canine / left	0.071	0.258	0.125	0.332	0.202

Table 4: Intergroup posterior dental wear comparisons (normal occlusion and class I crowding) (Mann-Whitney test).

Tooth	Normal occlusion		Class I (crowding)		P
	Mean of scores	SD	Mean of scores	SD	
Occlusal surface					
Maxillary teeth					
First premolar /right	0.377	0.617	0.312	0.465	0.813
First premolar/left	0.388	0.537	0.297	0.458	0.255
Second premolar /right	0.176	0.383	0.141	0.349	0.480
Second premolar /left	0.176	0.413	0.141	0.349	0.608
First molar /right	0.905	0.294	0.906	0.292	0.993
First molar/left	0.894	0.309	0.906	0.292	0.772
Mandibular teeth					
First premolar /right	0.294	0.458	0.305	0.462	0.869
First premolar/left	0.294	0.458	0.305	0.462	0.869
Second premolar /right	0.129	0.337	0.094	0.293	0.413
Second premolar /left	0.118	0.359	0.094	0.293	0.752
First molar /right	0.976	0.152	0.929	0.257	0.132
First molar/left	0.976	0.152	0.937	0.243	0.189
Palatal surfaces					
Maxillary teeth					
First premolar /right	0.000	0.000	0.000	0.000	1.000
First premolar/left	0.000	0.000	0.000	0.000	1.000
Second premolar /right	0.000	0.000	0.000	0.000	1.000
Second premolar /left	0.012	0.108	0.000	0.000	0.220
First molar /right	0.012	0.108	0.000	0.000	0.220
First molar/left	0.012	0.108	0.000	0.000	0.220
Buccal surfaces					
Mandibular teeth					
First premolar /right	0.047	0.213	0.086	0.281	0.279
First premolar/left	0.047	0.213	0.094	0.293	0.207
Second premolar /right	0.047	0.213	0.031	0.175	0.553
Second premolar /left	0.035	0.186	0.031	0.175	0.872
First molar /right	0.200	0.402	0.000	0.000	0.001*
First molar/left	0.188	0.393	0.000	0.000	0.001*

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