

STUDY ON THE DENTAL ATTRITION OF THE PATIENTS WITH CRANIOMANDIBULAR DISORDERS USING AGE ESTIMATION

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I. Introduction

Craniomandibular disorders(CMD) is a collective term embracing a number of clinical problems that involve the masticatory musculature, the temporomandibular joint, or both.¹⁾ The etiology of CMD is complex and understanding is not straightforward.²⁻⁷⁾ Both central and peripheral factors appear to be important with morphofunctional such as occlusion and bruxism and psychological factors as anxiety and tension implicated as multifactorial causes.

A review of the literature indicates that several predisposing factors are responsible for the development of the CMD⁸⁾. There is gene-

ral agreement that occlusal parafunction is occlusal activity outside the realm of masticatory function and include bruxism (grinding or clenching of teeth), diet habits (chewing gum or soild food), thumb-sucking, finger-sucking, nail biting, lip biting, and abnormal jaw posturing. These activites have been related to problems of the masticatory system, such as tooth wear, muscular pain, degenerative joint conditions, TMJ disk derangement, headache, and occlusal traumatism.

Parafunctional habits of bruxism and clenching are subjects of concern for dental professionals, and it is frequent for dentists to draw strong clinical associations of CMD with bruxism. There were few previous studies concerning the functional wear according to aging. The clinical significance of this approach is to call attention to the necessity for dealing with the etiological factors as well as the symptoms in diagnosis and in treatment. The purpose of this study was to compare the dental attrition of CMD patients to that of normal subjects using age estimation applied in the field of forensic dentistry.

II. Materials and Methods

A. Subjects

Control Subjects (Asymptomatic Normals)

Control subjects were consisted of fourteen outpatients (9 men and 5 women, aged 21 to 54 years, mean age 36.8 years) without any symptoms, signs, or history of CMD were screened using a history taking and a clinical examination.

Experimental Subjects (CMD Patients)

Eighteen patients (3 men and 15 women, aged 17 to 45 years, mean age 28.6 years) were selected from a consecutive series for patients referred to the Department of Oral Medicine and Orofacial Pain Clinic, Dankook University Dental Hospital to match the following exclusion criteria:

- 1) previous occlusal equilibration therapy;
- 2) trauma, surgery, or systemic joint, muscle, or skin diseases influencing the symptoms;
- 3) pathologic conditions in TMJ, facial skeleton, or teeth in the individuals selected.

B. Methods

Reliability Test

This test was performed to evaluate the intra-examiner reliability. Ten dental students (8 men and 2 women, aged 23 to 32 years, mean age 25.3 years) were selected. Each student was graded for the severity of wear facets. Each score was measured twice, and the interval between the first and second evaluation was at least one day.

Evaluation of attrition

Each subjects was graded according to the severity of wear facets by means of Tochiara attrition classification (Table 1)⁹⁾. Dental attrition was recorded as zero when there was no attrition; 1°a, when point or linear attrition in the enamel presented; 1°b, when cord or surface attrition in the enamel presented; 1°c, when the attrition in the total enamel surface presented; 2°a, when point or linear attrition in the dentin presented; 2°b, when cord or surface attrition in the dentin presented; 3°, when the attrition in the total dentin surface presented; 4°, when all crown attrition near to cervix as described in Tochiara attrition classification. All scoring was performed by trained dental professional.

Analysis of attrition

Age estimation of individual tooth was determined by means of Tochiara attrition rate table. Age estimation of patients was performed by summing the individual tooth age and dividing it by the number of teeth evaluated. Age difference was determined by calculating to the following formula using attrition age and real age: $\text{Age Difference} = \text{Attrition Age} - \text{Patient Real Age}$

C. Statistical analysis

One-factor ANOVA was used and Scheff and Fisher's Protected Least Significant Difference (PLSD) tests for multiple comparison.

III. Result

The distribution of the experimental subjects according to diagnosis and predisposing fac-

Table 1. Classification by attrition degree.

Grade 0		0°	No Attrition
Grade 1	Enamel	1° a	Point or Linear Attrition
Grade 2		1° b	Cord or Surface Attrition
Grade 3		1° c	All Enamel Surface Attrition
Grade 4	Dentin	2° a	Point or Linear Attrition
Grade 5		2° b	Cord or Surface Attrition
Grade 6		3°	All Dentin Surface Attrition
Grade 7		4°	All Crown Attrition near to cervix

Table 2. Distribution of the experimental subjects respect to diagnosis

Diagnosis	Case
ADD c red	5
ADD s red	5
LMS on LPM	4
Retrodiscitis	2
Osteoarthritis	1
Capsulitis	1

LMS on LPM : Local muscle soreness on lateral pterygoid muscle

ADD s red. : Anterior disc dislocation without reduction

ADD c red. : Anterior disc dislocation with reduction

Table 3. Means, standard deviations, correlation coefficient and p-value significant level between first and second evaluations for reliability test.

First Evaluation	4.14±3.79
Second Evaluation	3.96±2.87
Correlation	.98
P-Value	<.0001

tors are illustrated in table 2. The prevalence of at least one oral parafunction habit is 77%.

Table 4. Mean and standard deviations of age difference of upper teeth.

	Experimental	Control	P-Value
U1	2.20±10.06	-8.04± 9.29	0.0002
U2	4.68±10.62	-0.46± 6.26	0.0393
U3	8.66±13.57	10.11± 9.54	0.6384
U4	9.72±16.26	0.64±11.09	0.0157
U5	17.37±18.79	3.42± 8.71	0.0015
U6	8.35±10.73	3.25± 9.46	0.1333
U7	7.67±12.45	0.88± 8.77	0.0729

The mean and standard deviations of two evaluations for reliability test and correlation coefficient and p-value significant level between first and second evaluations are shown in table 3. Evaluation method used in this study have previously been analyzed for intra-examiner reliability, which were found to be correlation coefficients of intra-examiner reliability is statistically significant in first and second evaluation.

The mean and standard deviations of age difference of upper teeth are given in Table 4 shows that attritions of central incisor, lateral incisor, first premolar and second premolar

were significantly increased in CMD group. Of special interest is the there was no significant differences in canine but control group is higher than CMD group.

The mean and standard deviation of age difference of lower teeth are given in Table 5. Table 5 shows that attritions of central incisors, lateral incisor, first premolar and second premolar were significantly increased in CMD group.

The mean and standard deviations of age difference of total teeth are given in Table 6. There are significant differences between control and experimental group. This mean that CMD patients have a higher dental attrition by parafunctional wear.

IV. Discussion

A barrier to previous objective evaluation of occlusal features as factors in CMD has been the difficulty in constructing mathematical models and considering functional wear according to aging. This study sets age estimation of forensic dentistry which quantify the severity of dental attrition. Age was controlled to control for the effects of functional wear.

The term bruxism is defined as "the parafunctional grinding of teeth."¹⁰ and it is here specified as the clenching and/or grinding of teeth when the patients is neither masticating nor swallowing. If left untreated, bruxism can lead to attrition of tooth surface, loss of vertical dimension of occlusion, increased muscle tonus, and adaptive changes in the temporomandibular joint¹¹. The damage to masticatory structure is related to the duration and magnitude of force applied during the parafunctional activity¹². There is reason to believe that bruxism is the commonest and most important of the functional disturbances¹³. The

strain on the masticatory system may be more forceful and sustained longer than during normal function¹⁴. In the absence of bruxism there is greater tolerance to every type of malocclusion including overclosure; furthermore, adaptation is easier. Clinically it is common to postulate a connection between attrition and CMD symptoms in presenting patients and for occlusal signs of bruxism to be part of CMD etiology. Dental attrition is considered the most visible sign of functional wear and possibly bruxism.

There was many study performed on relation dental attrition and CMD but it was remain controversial. Negative correlation was found between dental attrition and the sign of CMD.¹⁵⁻¹⁹ Severe dental attrition was found to have a very positive correlation to CMD symptoms.²⁰⁻²² De Laat²³ found no correlation between attrition and clicking but muscle tenderness was present to a significantly higher degree in subjects with dental attrition. He was explained by the fact that prolonged muscle hyperactivity can results in muscle tenderness and dental attrition can be an indication of parafunctional habits.

In this study using age estimation, there were statistically significant CMD patients group have a higher dental attrition tendency than non-patients group except upper canine, and especially attrition of incisors and premolars were highered. It was reported that there was no attrition on premolar in previous age estimation study, they were explained by the fact that special characteristic morphology and location of lingual cusp of mandibular premolar and no significant difference between right & left^{24,25}. Of special interest is the there was no significant differences in upper canine but control group is higher than CMD group. According to these results, it was assumed

Table 5. Mean and standard deviations of age difference of lower teeth.

	Experimental	Control	P-Value
L1	-2.13 ± 8.39	-9.52 ± 12.40	0.0102
L2	-2.31 ± 7.14	-7.13 ± 8.44	0.0248
L3	5.53 ± 12.76	4.21 ± 6.57	0.6248
L4	11.45 ± 16.53	1.41 ± 8.84	0.0066
L5	9.03 ± 12.62	-0.33 ± 6.99	0.0021
L6	3.33 ± 6.71	0.00 ± 10.11	0.2838
L7	6.00 ± 8.97	0.00 ± 11.73	0.1036

Table 6. Mean and standard deviations of total age difference.

Experimental	6.76 ± 9.27
Control	-0.59 ± 5.97

p < .0005

that CMD patient has no occlusal relationship guided by canine guidance for posterior disocclusion and then could be seen the attrition of premolar was higher. In the other study, canine guidance compared to first molar guidance splint, they could not be seen the difference with the two guidance patterns.²⁶⁾

It was reported that although several significant correlations exist between occlusal parameters and signs and symptoms of CMD in the material presented, the occlusal relationships alone cannot possibly be responsible for the etiology of CMD. The examination of the selected set of occlusal factors does not appear to have a predictive value in determining whether a patient will show a particular sign or symptom.

If, further studies are carried out with more uniform methods of examination and evaluation, it might be possible to identify and agree upon those specific characteristics of dental

attrition detrimental to the health of the stomatognathic system.

V. Conclusion

Clinical evaluations of tooth attrition were performed with 18 CMD patients referred to the Department of Oral Medicine, Dental Hospital, Dankook University and 14 outpatients as a control group. Age difference was determined by using age estimation and the real age of each subject.

As a results, attrition of incisors & premolars was significantly increased in CMD group.

It is concluded that attrition of teeth were significantly increased and oral parafunctional habit was higher in CMD patients.

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국문초록

연령감정을 이용한 두개하악장애환자의 치아 교모도에 관한 연구

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두개하악장애는 저작근, 측두하악관절 및 그와 관련된 구조물의 많은 임상적인 문제를 포함하는 포괄적인 용어이다. 두개하악장애의 원인은 다양하고 종종 다인성이며 위험을 증가시키는 여러가지 소인들이 존재한다.

이같이나 이악물기 같은 이상기능습관은 흔하며 또한 임상적으로 많은 관련이 있는 것으로 사료된다. 그러나 이전의 연구에서는 연령증가에 따른 기능적 마모를 고려한 치아교모에 관한 연구가 시행되지 않고 단순한 교모도의 평가비교만이 시행되었다. 본 연구는 법치의학적 연령감정에서 널리 사용되고 있는 치아교모도를 이용한 연령감정법을 이용하여 두개하악장애환자의 치아교모도에 관한 연구를 시행하였다. 연령은 기능적마모에 따른 정도를 평가하기 위해서 고려되었다.

단국대학교 치과병원 구강내과에서 두개하악장애로 진단된 환자 18명과 대조군으로 외래환자 14명을 대상으로 하였다. 연령차는 연령감정법의 추정연령과 환자의 실제나이의 차이를 구해서 비교분석하였다.

이상의 결과로 두개하악장애환자의 중절치, 측절치, 제1소구치, 제2소구치의 치아교모도가 정상군보다 유의성 있게 높았다.