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Research Article

PREVALENCE AND FACTORS INFLUENCING TOOTH WEAR –A CROSS SECTIONAL STUDY

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Abstract

Background & Objectives: Tooth wear describes the non – carious loss of tooth tissues as a result from the interaction of 3 processes which may occur in isolation or in combination; attrition, erosion and abrasion. Unless halted, tooth wear can progress to expose dentin or may also involve pulp. In order to understand the scope of the tooth wear problem among the populations studied, the prevalence data of the problem is a must. **Materials and methods**: This cross sectional study was carried out on 1006 patients attending the dental outpatient department. All the permanent teeth were assessed for the presence of tooth wear using the "Smith and Knight tooth wear index". Data was statistically evaluated by Unpaired t test, Chi – square test. **Results:** The prevalence rate of teeth wear among the population studied was 100%. The percentage of tooth wear that had pulpal involvement was maximum in the age group 60+. The percentage of tooth wear involving the deep dentine and pulp was more in males than females. Among the various factors influencing the tooth wear was age, sex, type of dentifrice, dietary habits and presence of deleterious habits. **Conclusions:** Different degrees of tooth wear is associated with variable clinical symptoms like dentinal hypersensitivity, decreased masticatory function, tooth pulpal involvement, pain, periapical infections and complicated treatment planning. Hence with the prevalence of tooth wear and the associated factors in the population gives the scope of the problem in the population so that appropriate treatment plan and education of patients can be carried out.

Keywords: abrasion; attrition; erosion; Smith and Knight Index; teeth wear

INTRODUCTION

The loss of tooth tissues can occur due to carious and non – carious phenomena. Tooth wear describes the non – carious loss of tooth tissues as a result from the interaction of three processes which may occur in isolation or in combination; attrition, erosion and abrasion. Unless halted, tooth wear can progress to exposure of dentin, resulting in dentinal hypersensitivity and consequently reduced chewing function. The advanced cases may also involve the destruction of dentin and pulp, thus resulting in difficult and complicated treatments. Hence early diagnosis, treatment and preventive care of these lesions become an essential and important part of daily practice.

There are few studies on prevalence of teeth wear in East Asian population. In order to understand the scope of the tooth wear problem in our population, the prevalence data of the problem is a must, hence there is a need for the study to be carried out.

This information will enable the professionals to plan methods of appropriate approach in handling the tooth wear problem.

Present study is an attempt

1.To determine the prevalence of tooth wear among the population who visited the hospital.

2. To compare the prevalence of tooth wear among the gender and individuals aged 20 -70 years.

3. To determine the factors affecting the prevalence of tooth wear in the population studied.

MATERIALS AND METHODS:

This study was carried out in 1006 patients attending the dental outpatient of dept of oral diagnostics of our institute for a period of three months. The patient's age was selected between 20 - 70 years. Those patients who had carious, restored, missing, fractured tooth surfaces, mobile teeth or any developmental disturbances affecting teeth and enamel hypoplasia of teeth were not included in the study.

Procedure: All the patients fulfilling the above criteria were informed about the study being conducted and only those who agreed were enrolled in the study. Detailed case history was obtained from all the individuals included in the study using a preformed case history proforma. The proforma consisted of 3 parts. First part included the identifying data (name, age, sex, and address), second part included the occupational history, medical history, dental history, dietary history, habit history, oral hygiene methods and the third part included the general examination, extra oral and intra oral examination.

The study was performed by dividing the patients into following age groups: 20-29, 30-39, 40-49, 50-59, and 60+. Clinical examination of study subjects was carried out on the dental chair using mouth mirror, dental probes to remove the food debris and periodontal probes to measure the depth of eroded tooth surface when necessary under the operating light. The operator was seated behind and the recorder in front of the subject.

All the permanent teeth were examined for four surfaces, namely, cervical,(C), buccal (B), occlusal (O) or incisal (I) and palatal (P) or lingual (L) surfaces and the teeth wear was scored using tooth wear index (TWI) from smith and knight . (Table 1)

The scoring was done by single examiner and the intraexaminer variation was within normal limit. Whenever a doubt aroused in scoring the teeth lower scores/ numbers were assigned.

The values thus obtained were subjected to appropriate statistical analysis.

The following statistical tests were carried out

1. Unpaired‘t’ test
2. Karl Pearson correlation coefficient
3. Multiple linear regression
4. Chi – square test

RESULTS

This cross sectional study involved 1006 patients attending the dental outpatient department of Oral diagnostics. The teeth wear scores of these patients were recorded using the smith and knight tooth wear index, and the results showed following observations.

The maximum study subjects belonged to the age group 20 -29 years (42.84%) (figure 1) and total of 546 males and 460 females participating. (figure 2).

The prevalence rate of teeth wear among the population studied was 100% irrespective of the age group or the gender. Considering tooth surfaces, a total number of 76,880 tooth surface was examined, out of which 29,271 surfaces had tooth wear and the prevalence rate with respect to these surfaces was 38.07%. Of these surfaces with teeth wear, 2068 surfaces (7.6%) occurred in enamel (score1), 1437 surfaces (4.91%) occurred in shallow dentine (score 2), 106 surfaces (0.36%) occurred in deeper dentine (score 3) and 102 surfaces (0.35%) had pulpal involvement.

Specifically when comparing the overall teeth surface (Occlusal + Buccal + lingual), the prevalence of teeth wear that occurred in enamel (score 1) was highest in age group 30 -39 years (35.7%). Prevalence of tooth wear that occurred in dentin (score 2) and deep dentine (score 3) was highest in the age group 50 – 59 years ,31.4% and 5% respectively. Teeth wear that had pulpal involvement (score 4) was maximum in age group 60+ (5.8%). A chi-square test of significance clearly showed that there was an association between age groups and teeth wear (chi-square=436.0069, df=16, p=0.0000, S) at 5% level of significance. (Table 2)

Considering the gender distribution, females had shallow teeth wear of 34.4% (score1) and 23.7% respectively (score 2) greater than males (33.6% and 23.5% respectively). While males had deeper wear of 1.9% (score3) and 2.1% (score4) respectively than in females (1.5% and 1.1% respectively). A chi-square test of statistical significance clearly showed that there was an association between the gender and the teeth wear (Chi – square=11.7401, df=4, p=0.01371, S) at 5% level of significance. (Table 2)

A statistically significant positive correlation between the teeth wear and the age was found in the study (figure 3). Posteriors (15.12) showed statistically significant more teeth wear than anteriors (13.73) (Table 3).

The factors affecting the prevalence of tooth wear was determined to be age, sex, occupation, medical history, dental history, personal history, brushing methods, types of dentifrice, use of mouth wash, use of dental floss, oral habits, parafunctional habits, intraoral examination. Among these factors the one that influenced the tooth wear and that had statistical significance was age,

sex, personal history, type of dentifrice, and oral habits (table 4). Karl Pearson correlation coefficient showed a positive correlation of the factors; age, types of dentifrice, and oral habits with the tooth wear (table 5).

Figure 1: Distribution of respondents by age groups

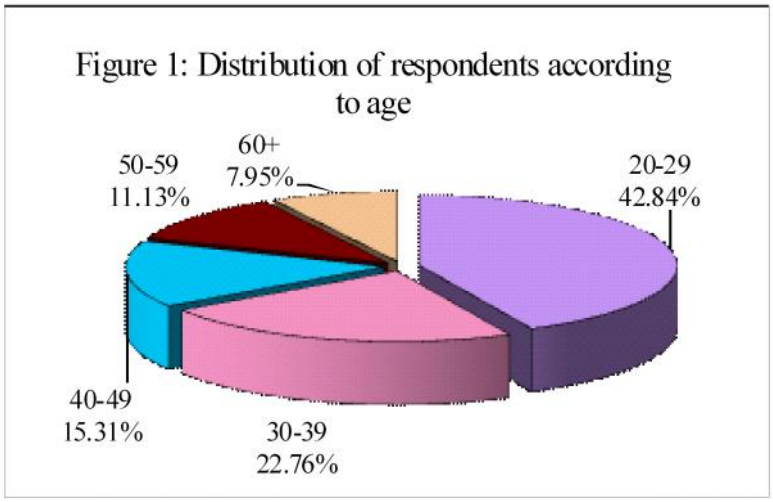

Figure 2: Distribution of respondents by gender

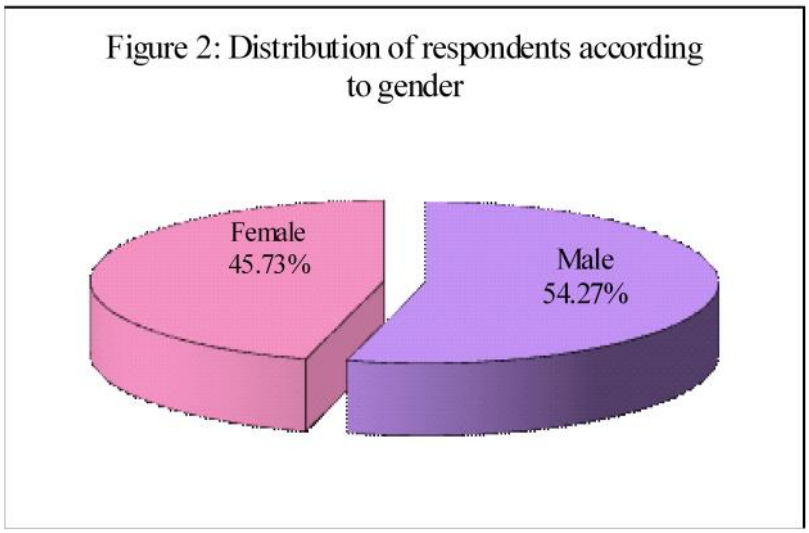

Figure 3: Correlation between teeth wear and age

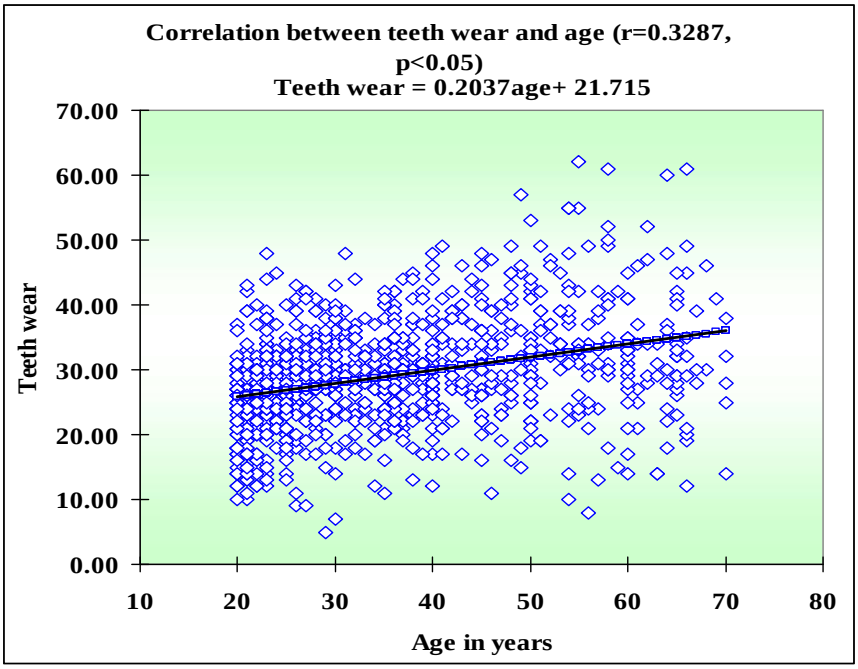

Table 1: TOOTH WEAR INDEX (TWI) from Smith and knight

Sore 0 – there is no loss of enamel surface characteristics on B/L/O/I and no change in contour on C.

Score 1 – there is loss of enamel characteristics on B/L/O/I and minimal loss of contour on C

Score 2 – there is loss of enamel exposing dentin for less than 1/3 of the surface on B/L/O/I and defect less than 1 mm deep on C.

Score 3 – there is loss of enamel exposing dentin for more than 1/3 of the surface on B/L/O/I and defect 1-2 mm deep on C.

Score 4 – there is complete loss of enamel or pulp exposure on B/L/O/I and defect more than 2 mm deep on C.

Table 2: Comparison of prevalence of tooth surface wear with age groups and gender

	0	%	1	%	2	%	3	%	4	%	Total
Age groups											
20-29	1100	47.7	787	34.1	407	17.7	9	0.4	2	0.1	2305
30-39	545	40.5	480	35.7	304	22.6	11	0.8	6	0.4	1346
40-49	332	33.3	347	34.8	278	27.9	20	2.0	19	1.9	996
50-59	231	27.4	265	31.5	264	31.4	42	5.0	40	4.8	842
60+	172	28.5	189	31.3	184	30.5	24	4.0	35	5.8	604
Gender											
Male	1307	38.9	1130	33.6	790	23.5	65	1.9	72	2.1	3364
Female	1073	39.3	938	34.4	647	23.7	41	1.5	30	1.1	2729

Table 3: Comparison of anterior and posterior teeth surface wear

	Mean	Std.Dev.	t-value	p-value
Anterior	13.7336	4.2500	-6.4118	0.0000*
Posterior	15.1203	5.3844		

Table 4: Linear regression analyses of teeth wear surfaces by different factors

Independent variables	Regression coefficient	Std. Err.	t-value	p-value
Constant	26.8017	1.2611	6.2900	0.0000*
Age	0.2032	0.0183	11.1200	**0.0000***
Sex	-2.6903	0.4955	-5.4300	**0.0000***
Occupation	-0.5756	0.6873	-0.8400	0.4030
Medical history	0.4904	0.7458	0.6600	0.5110
Dental history	-0.5684	2.6735	-0.2100	0.8320
Personal history	2.1237	0.7324	2.9000	**0.0040***
Brushing methods	-0.2313	0.2525	-0.9200	0.3600
Types of dentifrice	1.4043	0.6642	2.1100	**0.0350***
Use of mouth wash	-1.2190	2.6932	-1.5700	0.1180
Use of dental floss/tooth fix	-0.8993	1.8739	-0.4800	0.6310
Oral habits	2.4700	0.5313	4.6500	**0.0000***
Parafunctional habits	0.3891	2.9362	0.1300	0.8950
Intraoral examination	-1.6367	1.9011	-0.8600	0.3890
R-squared = 0.1857, Adj R-squared = 0.1742, Root MSE = 7.5026, F(14, 991) = 16.14, p=0.0000*				

Table 5: Correlation among all independent variables with teeth wear by Karl Pearson's correlation coefficient method

Independent variables	r-value	t-value	p-value
Age	0.3317	11.1423	0.0000*
Sex	-0.1753	-5.6427	0.0000*
Occupation	-0.0318	-1.0075	0.3139
Medical history	0.0498	1.5802	0.1144
Dental history	-0.0094	-0.2964	0.7670
Personal history	0.0439	1.3915	0.1644
Method of ingestion	-0.0117	-0.3696	0.7117
Brushing methods	-0.0269	-0.8541	0.3933
Types of dentifrice	0.1364	4.3626	0.0000*
Use of mouth wash	-0.0324	-1.0275	0.3045
Use of dental floss/tooth fix	0.0049	0.1546	0.8772
Oral habits	0.2032	6.5771	0.0000*
Parafunctional habits	0.0277	0.8769	0.3807
Intraoral examination	-0.0537	-1.7047	0.0886

DISCUSSION

This study involves 1006 patients who attended department of oral diagnostics for routine examinations that constituted for general population attending the clinics. The large sample size was included so that the range of error will be smaller in prevalence estimation [1, 2]. Very few studies are reported with sample size over 1000 in general population [2, 3, 4, 5]. The prevalence of tooth wear studies in East Asian population are considerably sparse compared to the European prevalence studies [2, 3, 4, 6]. Majority of the prevalence study are conducted on children and adolescent population [6, 7, 8, 9].

In the present study the prevalence of the adult population was determined. It was observed that the prevalence of tooth wear in this study was 100% with atleast one of the tooth surfaces involved in teeth wear. Similar findings were seen in study conducted by Fares J et al [4] in university students, but a new tooth wear index was used , the exact tooth wear index.

In this study the males (54.3%) contributed to the majority of subjects unlike the study on Malaysian population by Daly RWR et al [10] where 51.9% of females accounted for majority of

subject individuals and so is the European study by Bartlett et al [7] with 70% females being major study subjects. Prevalence rate of teeth surface wear of this study was 38.07%which is considerably higher than the studies reported prior with rates of 32.8% [7] and 17.4% [10] respectively. This study also confirms that some amount of tooth wear in enamel is universal in all the teeth and subject like others studies [3, 4, 7, 10].

The difference in prevalence data may be due to the difference in dietary habits, geographic location, type of methods and index used to determine the wear. The prevalence of tooth surface wear in dentin was 4.91% which was slightly lower than the numbers of the study in 18 – 30 year old individuals [7].The prevalence of severe tooth surface wear affected 0.36 %(deeper dentin) and 0.35% (pulpal involvement) of the participants respectively than the European population which was higher [3]

The results of this study like other studies and systematic reviews [2, 4, 8] showed that the teeth wear increased with age linearly. With general trend of wear being more in males [2, 8] ,in this study like other few studies [4] showed that males had significantly more deeper wear in dentine than females. This could be because of the adverse habits in males of study population in whom it is a significant habit and the biting force difference between males and females.

The wear with respect to anterior and posterior teeth, posterior teeth experienced greater wear than anteriors irrespective of the levels and surfaces of wear unlike others studies [2,6,7] where anterior teeth had more wear (on incisors and canines) than posterior teeth(molars, premolars). The reason may be attributed to the use of posteriors more than the anteriors in this group of population during various habits including oral and adverse habits.

Among the age groups, we observed that younger age groups showed lesser levels of wear and the older age groups higher levels. This is for the fact that the longer the tooth in the mouth, the higher is its function and deeper is the wear of teeth. In addition to the prevalence, we also found the etiologic factors affecting the teeth wear in the study population. The main etiologic agents affecting the teeth wear was dietary habits, dentifrice used, and deleterious habits.

Significant number of individuals took carbonated acidic soft drinks or beverage like tea, citrus fruits. Mostly all of them swallowed the drink without swishing it in mouth. There is robust evidence that carbonated soft drinks, citrus fruits caused large amount of teeth wear. [3, 7]

The study group also showed that majority of individuals had horizontal method of brushing habit using a dentifrice which also accounted for a significant amount of wear percentage. Tooth wear is influenced by the technique of brushing, frequency and type of tooth brush used [11].

Males and females who had the habit of gutka chewing, tobacco, betel nut or pan chewing or any such adverse habits showed large amounts of wear. Concomitant studies have showed the deleterious effects of betel nut , gutka , pan chewing, or tobacco chewing are associated not only with oral mucosa but also with tooth wear [12,13] .

Linear regression analysis showed that age, sex, dietary history, type of dentifrice and deleterious habits were individual risk factors for teeth wear.

CLINICAL IMPLICATIONS:

Different degrees of tooth wear is associated with variable clinical symptoms like dentinal hypersensitivity, decreased masticatory function, tooth pulpal involvement, pain, periapical infections and complicated treatment planning.

Hence with the prevalence of tooth wear and the associated factors in the population gives the scope of the problem in the population so that appropriate treatment plan and education of patients can be carried out.

CONCLUSION

The results of this study confirms that minimal amount of tooth wear in enamel is universal. This study also adds to our knowledge of the prevalence of tooth wear in the population studied and the significant etiologic factors, of which deleterious chewing habits like gutka, tobacco, betel nut or pan not only cause lesions in oral mucosa but also caused significant amount of wear in the teeth and affects its longevity as well.

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