

Prevalence of Wasting Conditions of Teeth among Adult Rural Population in Ambala District – A Cross-sectional Study

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Abstract

Background: Wasting conditions of teeth are very common in India. Nowadays, this is very much prevalent among rural adult population in Ambala District. **Methodology:** The present study was done to assess the prevalence of wasting conditions of teeth among rural population above 18 years in Ambala District. A total of 697 subjects were examined. Two stage sampling technique was employed. At the first stage, a village was selected from sampling frame using simple random technique. In the second stage, using systematic random sampling technique, houses were selected from the list of houses obtained from head of the respective village. Clinical assessments were done using modified Smith and Knight Index. **Results:** The subjects showed a tooth wear prevalence of 30.6%. Tooth wear was more pronounced among males 57.4% as compared to females 42.6%. Majority of subjects with tooth wear (27.8%) were present in the age group of 31–40 years. Among the 213 subjects who had tooth wear, 6.6% had deep bite and 43.2% had bruxism with $P = 0.00$. **Conclusion:** Total prevalence of tooth wear accounted to be 30.6%. The study highlighted the various adverse habits which prevailed among the study subjects which lead to tooth wear and needs further research.

Keywords: Attrition, Abrasion, Erosion, Abfraction, Wasting disorders.

INTRODUCTION

Non-caries loss of tooth structure is considered as the fourth dimension risk factor for esthetic, function, and longevity of human dentition after acute trauma, caries, and periodontal disease.^[1]

Different forms of chronic destructive processes other than caries affecting the teeth and leading to an irreversible loss of tooth structure from the external surface are described in the literature. They are referred to as abrasion, attrition, abfraction, and erosion.^[2] This results from either attrition (mechanical tooth to tooth contact) or erosion (progressive effect of acid) or abrasion (abnormal repetitive mechanical wear other than tooth to tooth contact) or their combination.^[1]

The clinical term dental abrasion is used to describe the pathological wearing out of dental hard tissue through abnormal mechanical processes involving foreign objects or substances repeatedly introduced in the mouth and contacting the teeth.^[2] Although the clinical appearance of these lesions

varies, they frequently appear to be wedge-shaped defects having a bright surface, normal hardness and color, and a sharp border. They may be caused by a hard toothbrush, excessive brushing pressure, and abrasive toothpaste.^[3] The result is direct or indirect pulp involvement. Tooth brush abrasion is seen at the cervical third of the tooth.^[4]

Dental attrition is described as the physiological wearing out of dental hard tissue as a result of tooth-to-tooth contact with no foreign substance intervening. Such contact occurs when grinding the teeth, for example, during swallowing, speech, and when lifting heavy things, and the resulting wear involves

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the occlusal and incisal surfaces of teeth. Proximal surfaces are also worn by attrition during mastication.^[2] The individual degree of attrition is chiefly associated with age. Clinically, this loss of substance mostly leads to the formation of facets.^[5]

The term abfraction is used to describe a special form of wedge-shaped defect at the cemento-enamel junction of a tooth.^[2] Dental abfractions are typically wedge shaped (or V-shaped) with sharp line angles, but occlusal abfractions have also been observed as circular invaginations.^[6] Abfraction is said to take place when excessive cyclic, non-axial tooth loading leads to cusp flexure, and concentration of stresses in the vulnerable cervical region of teeth.^[7]

Dental erosion is described as the physical result of a pathologic, chronic, localized, painless loss of dental hard tissue chemically etched away from the tooth surface by acid, and/or chelation without bacterial involvement.^[2] Tooth erosion is classified as idiopathic, extrinsic or intrinsic, implying that, according to the case history, the acids producing tooth destruction may be of unknown, exogenous or endogenous origin.^[8]

The presence of tooth wear might become more noticeable in future, due to the current substantial decline in dental caries and universal increase in longevity of life. This occurrence could be due to increased dental awareness and people becoming more interested in keeping their dentition healthy for a longer time. An understanding of the multifactorial nature of tooth wear and its risk factors is important in the patient's diagnostic protocol and management strategy.^[3] The prevalence of wasting diseases is not well documented and measures of tooth wear have been rarely reported. In addition, it is often difficult to compare the outcomes of different epidemiological studies on tooth wear due to the difference in examination standards, including scoring systems, samples, and groups examined. Intact hard dental tissues, including enamel, dentin, and cementum, are critical for the integrity of the dentition, and the loss of these tissues can have significant consequences on oral health with considerable effect on quality of life.^[8]

Ambala is a district placed on the northern most part of Haryana state which comes under known fluoride belt and endemic goiter belt of India. High endemic fluoride and low iodine poses known threats on the growth and development of the hard tissues of the body.^[9]

As such study is not reported in the Ambala district an attempt which has been made to study the prevalence and wasting diseases among population in Ambala District. Hence, the aim of the study was to assess the prevalence of wasting conditions of teeth among adult rural population of Ambala district.

METHODOLOGY

In this house to house cross-sectional study, adults (above 18 years of age) were included in the study. This was a 7 months long cross-sectional study which was conducted in accordance with STROBE guidelines.^[10] Ethical clearance

was obtained from the Institutional Review Board (Project no. 366(15) – Institutional ethical committee- Project no. 519).

The examiner was calibrated in the department of public health dentistry by the department Faculty before final study to ensure uniform interpretation, understanding, and applicability of codes and criteria. The calibration was done on 20 subjects who were validated by subject expert. Inter-examiner consistency was assessed by kappa statistic (0.81).

A pilot study was conducted on 50 subjects in Adhoya village of Ambala district before the main study to assess the feasibility of the study and to finalize the format. The subjects of the pilot study were not included in the main sample size. Subjects who gave written consent and not wearing complete dentures were included in the study.

The sample size estimation was done using Online OpenEpi, Version 3. The sample was calculated to be 697.

The study was carried out using a self-designed closed ended interviewer administered questionnaire, which consisted of two parts – The first part consisted of: Demographic details, information regarding body mass index, and information related to subject's oral hygiene practices. The second part consisted of clinical assessment of wasting disease which was done using modified Smith and Knight Index.^[11]

It has been used in the present study to collect variables regarding wasting disease of teeth. The modifications made calibration easier and resulted in higher degrees of reproducibility, as the modified version of the tooth wear index (TWI). Type III dental examination was conducted making the subject to sit facing the sunlight. Sterilized mouth mirrors, tweezers, and explorer were used.^[12] After examination, the required data were entered on the structured format by recording assistant. All the instruments were autoclaved before each study visit. For classification of BMI, the WHO guidelines and for occupation National Classification of Occupations – 2004^[13] were followed. The data so collected was entered on SPSS Software Version 25.0 (Chicago, USA).

RESULTS

The study was conducted to assess the prevalence of wasting conditions of teeth among 697 rural adult populations in Ambala district.

Among the 213 subjects who had wasting disease: 13.6% were present in the age group 21–30 years, 19.1% were present in the age group 31–40 years, 42.4% were present in the age group 41–50 years, 55.2% were present in the age group 51–60 years, and 76.2% were present in the age group >60 years. The difference between the different age groups with wasting disease was statistically significant ($P < 0.000$); 66.2% were male and 33.8% female. The difference between the gender and wasting disease was statistically significant ($P < 0.002$); 26.7% used toothbrush, 37.0% used finger, and 75.5% used neem stick. The difference between the type of cleaning and wasting

disease was statistically significant ($P < 0.002$); 61.8% did not use tooth brush, 31.6% used hard, 26.9% used medium, and 20.6% used soft tooth brush. The difference between the type of tooth brush and wasting disease was statistically significant ($P < 0.000$); 75.5% did not use any material, 25.3% (151) used tooth paste, and 49.0% (25) used tooth powder. Difference was statistically significant ($P < 0.000$); 61.8% did not use tooth brush, 25.3% used vertical method of tooth brushing, 32.6% used horizontal method of tooth cleaning, and 12.3% used circular method of tooth cleaning. Difference was statistically significant ($P < 0.000$); 6.6% had deep bite ($P < 0.000$) and 43.2% had bruxism ($P < 0.000$); 4.3% had carbonated drinks ($P < 0.002$), 1% did swimming ($P < 0.731$), and 1.0% had consumed vitamin C supplement ($P < 0.033$) (Table 1).

Among the 66,912 surfaces examined: 91.1% did not present tooth wear, 2.5% had score 1, 0.01% had score 2, and 6.3% had score 9. None of the surfaces has score 3 and 4; 92.1% had

no evidence of tooth wear on buccal surface, 87.7% had no evidence of tooth wear on occlusal/incisal surface and 93.7% had no evidence of tooth wear on palatal surface; 91.3% had score 0 on incisors, 96.1% had score 0 on canines, 92.3% had score 0 on premolars, and 88.5% had score 0 on molars. About 6.8% had score 1 on incisors, 0.9% had score 1 on canines, 1.5% had score 1 on premolars, and 0.9% had score 1 on molars. About 0.04% had score 2 on incisors and score 2 was absent in canines, premolars, and molars. About 1.8% had score 9 on incisors, 3.0% had score 9 on canines, 6.2% had score 9 on premolars, and 10.6% had score 9 on molars. None of the surfaces had score 3 and score 4 on incisors, canines, premolars, and molars (Table 2).

DISCUSSION

The present study was a cross-sectional study to assess the prevalence of wasting conditions of teeth among rural population above 18 years in Ambala district. A total of 697 subjects were examined in the study. There is an enormous amount of the literature present assessing the tooth wear with wide prevalence rate which may be attributed to the differences in diagnostic criteria and indices used, as well as varying socioeconomic, cultural, and geographical factors that could influence the outcome of prevalence data.

In the present study, modified Smith and Knight TWI^[11] is used to collect information regarding wasting conditions of teeth. The modified version includes a code for teeth that have been restored due to wear (code 4), and another code for teeth that cannot be assessed (code 9).^[14]

Results of the subjects who had wasting disease revealed that 13.6% were present in the age group 21–30 years, 19.1% were present in the age group 31–40 years, 42.4% were present in the age group 41–50 years, and 55.2% were present in the age group 51–60 years which are less than the results reported by Saxena *et al.*, in which nearly 23% of subjects had wasting disease in the age group of 18–28 years, 47% had wasting disease in the age group of 29–38 years, 84% had wasting disease in the age group of 39–48 years, and 93% had wasting disease in the age group of 49–58 years.^[15] It is a well-recognized trend that increased longevity of life due to enhancement in medical facilities has led to increased proportion of aging and elderly people in the community. These two factors have combined to produce a substantial increase in the numbers of aging and elderly patients with some retained teeth which can cause tooth wear as it is a macroscopically irreversible process that accumulates with age.

In the present study, 35.3% of males had wasting disease and 24.2% of females had wasting disease which is due changes in dietary patterns between the two genders. The study is similar with the study done by Milosevic *et al.* on 14 year school children in the year 1994, where higher prevalence of exposed dentine was more in males mainly incisally, compared with females living in Liverpool.^[16] Similar finding was also seen in a study done by Dugmore and Rock in Leicestershire done

Table 1: Comparison of wasting disease with various variables

Variable	Wasting Disease		P-value
	Absent n (%)	Present n (%)	
Age			
≤20	20 (100)	0 (0)	0.000*
21–30	152 (86.4)	24 (13.6)	
31–40	157 (80.9)	37 (19.1)	
41–50	98 (57.6)	72 (42.4)	
51–60	52 (44.8)	64 (55.2)	
≥60	5 (23.8)	16 (76.2)	
Gender			
Male	259 (64.8)	141 (35.3)	0.002*
Female	225 (75.8)	72 (24.2)	
Type of cleaning			
Toothbrush	455 (73.3)	166 (26.7)	0.000*
Finger	17 (63.0)	12 (37.0)	
Neem Stick	12 (24.5)	37 (75.5)	
Type of tooth brush			
Any other	29 (38.2)	47 (61.8)	0.000*
Hard	130 (68.4)	60 (31.6)	
Medium	198 (73.1)	73 (26.9)	
Soft	127 (79.4)	33 (20.6)	
Material used			
Neem Stick	12 (24.5)	37 (75.5)	0.000*
Tooth paste	446 (74.7)	151 (25.3)	
Tooth powder	26 (51.0)	25 (49.0)	
Brushing technique			
None	29 (38.2)	47 (61.8)	0.000*
Vertical	254 (74.7)	86 (25.3)	
Horizontal	151 (67.4)	73 (32.6)	
Circular	50 (87.7)	7 (12.3)	
Deep bite	199 (93.4)	14 (6.6)	0.000*
Bruxism	121 (56.8)	92 (43.2)	0.000*
Carbonated drinks	204 (95.8)	9 (4.2)	0.002*
Swimming	211 (99.0)	2 (1.0)	0.731
Vitamin C	211 (99.0)	2 (1.0)	0.033*

*Statistically significant at $P < 0.05$ level

Table 2: Severity of wasting disease with different surfaces and tooth

n (%)	Tooth wear severity					
	0	1	2	3	4	9
Surfaces	61,004 (91.1)	1680 (2.5)	8 (0.01)	0 (0.0)	0 (0.0)	4220 (6.3)
Buccal	20,523 (92.1)	391 (1.7)	0 (0.0)	0 (0.0)	0 (0.0)	1390 (6.2)
Occlusal/Incisal	19,568 (87.7)	1255 (5.6)	8 (0.1)	0 (0.0)	0 (0.0)	1473 (6.6)
Lingual/Palatal	20,913 (93.7)	34 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	1357 (6.1)
Incisors	15,281 (91.3)	1143 (6.8)	8 (0.04)	0 (0.0)	0 (0.0)	296 (1.8)
Canines	8044 (96.1)	76 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	244 (3.0)
Premolars	15,450 (92.3)	246 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)	1032 (6.2)
Molars	22,229 (88.5)	215 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	2648 (10.6)

on 12 year old children in 2004, where 63.9% males had tooth wear as compared to females which are 55.3%.^[17] The result was in contrast with the finding of de Carvalho Sales-Peres *et al.* who did a study on 12 year old Brazilian children in 2008, where he found no significant differences in the prevalence and severity of dental wear between males and females.^[11]

Taking oral hygiene practices into consideration, in the present study, subjects who brushed their teeth with medium bristle tooth brush had 27% prevalence of tooth wear and subjects who brushed their teeth with hard bristle tooth brush had 32% prevalence of tooth wear which is less than the study done by Kumar *et al.* where nearly 70% of the subjects who used medium or hard bristle tooth brush reported tooth wear.^[8] Similar king of finding was seen by Smith *et al.*, in 2008, who did a study on group of patients attending a university hospital in Trinidad, where 156 patients with a mean age of 40.6 years were examined.^[13] There was significant correlation of non-carious cervical lesion in patients who brushed more than once a day or used a medium or hard tooth brush.

Tooth wear seen according to method of cleaning in this study was found to be more in those subjects who cleaned their teeth horizontally. Nearly 33% of the subjects who used horizontal method of tooth brushing reported tooth wear, which is less than the findings by Ahmed *et al.* who did a study on the patients reporting to the Aga Khan University to find out the factors associated with non-carious cervical lesion, in which he found that almost 70.2%, who used to brush their teeth horizontally, reported with tooth wear.^[18] As horizontal brushing causes excessive lateral pressure which, in turn, can lead to “V”-shaped non-capitated lesions on the cervical portion of the tooth.

Among 213 subjects who had wasting disease, 75.5% of the subjects who used neem stick had tooth wear, 25.3% of the subjects who used tooth paste had tooth wear, and 49.0% of subjects who used tooth powder had wasting disease. This is in accordance with the literature findings by Addy who assumed that tooth brush alone has no or little effect on enamel and dentine.^[19]

Subjects who had wasting disease, 6.6% of the subjects had deep bite, and 43.2% of the subjects had bruxism. This was similar to the findings reported by da Silva *et al.*, where he

found that pathological tooth wear is associated with bruxism, which appears in turn to be influenced by psychosocial factors.^[20]

Taking into account the distribution of total number of surfaces involved according to tooth wear severity, in this study, a total of 66,912 dental surfaces were evaluated. Among these surfaces evaluated, 91.1% did not present tooth wear, 2.5% had score 1, 0.02% had score 2, and 6.3% had score 9. None of the surfaces were having score 3 and score 4. The findings were almost similar to the findings by de Carvalho Sales-Peres *et al.*, in which 24,780 dental surfaces were evaluated. Among these surfaces, 73.10% did not present tooth wear, 24.10% had incipient lesions, 2.46% had moderate lesions, and 0.34% had been restored. No severe lesions were detected.^[11]

The present study showed that prevalence of tooth wear in incisors was highest, that is, 6.84% followed by premolars which accounted 1.5%, molars 0.9%, and then canine 0.9% which was in contrast with the study done by de Carvalho Sales-Peres *et al.* who did a study on 12-year-old Brazilian students which showed that wear was present in 53.22% of the incisors, 50.51% of canines, 10.17% of premolars, and 10.85% of molars.^[11]

CONCLUSION

Tooth wear has become an increasing problem in the modern era. In dentistry, tooth wear needs constant attention because more juices and acidic drinks are consumed now than in the past. In addition to other factors, this increased consumption of these drinks along with several other factors such as improper brushing technique; bruxism has led to an increase in the loss of dental hard tissues, which is a growing concern in the dental field. Globally, the prevalence of dental wear has increased manifold.

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