



## Prevalence of Tooth Wear Due to Dietary Factors in South Canara Population

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### Authors' contributions

This work was carried out in collaboration between both authors. Author MNH designed the study, wrote the protocol and wrote the first draft of the manuscript. Author Nireeksha managed the literature searches, analyses of the survey performed. Both authors read and approved the final manuscript.

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### ABSTRACT

**Aims:** The aim of the study was to determine the prevalence of tooth wear due to dietary factors in South Canara population.

**Place and Duration of Study:** Department of Conservative Dentistry and Endodontics, A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte Mangalore and the rural satellite centers.

**Duration of the Study:** June 2014 - July 2014 (1 Month).

**Methodology:** 2000 patients were evaluated using diagnostic instruments for presence of attrition, erosion, abrasion and abfraction, followed by the questionnaire which evaluated the prevalence of tooth wear due dietary factors in South Canara Population. Collected data were statistically analyzed using the "Statistical Package for the Social Sciences" (SPSSv16.0) software.

**Statistical Analysis:** Data obtained was statistical analyzed using Statistical Package for the Social Sciences (SPSSv16.0). Differences between variables were analyzed using Pearsons Chi-square test.

**Results:** Total prevalence of tooth wear in the study population is 58.7% out of which attrition (18.9%), abrasion (25.1%) erosion (3.8%) and abfraction (10.9%) was observed. A significant

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increase of tooth wear in males (85.45%) was observed. In the present study prevalence of tooth wear was significant in age group of 56-65 years (68.9%) whereas attrition (57.40%) in age group >=66 and abrasion (47.42%) was significantly more in age group of 56-65 years respectively. Erosion is significantly high in age group of 26-35 years (7.2%), abfraction in age group of 36-45 years (10.3%). Nonvegetarians (32%) showed increased tooth wear with urban population having the highest prevalence (74.9%) and alcohol consumption being a major cause for erosion (57.33%). Tooth wear is an irreversible, non carious, destructive process, which results in a functional loss of dental hard tissue. Dietary factor is one of the etiologies of tooth wear, the role of acidic foods and drinks are probably important for the progression of tooth wear.

**Conclusion:** The response to this current study conducted to evaluate the prevalence of tooth wear due to dietary factors in south canara population stated that tooth wear was more prevalent in males and most affected age group was 56-65 years. Non-vegetarians showed increased tooth wear and alcohol consumption being one of the major cause for erosion.

*Keywords: Attrition; abrasion; erosion; abfraction; diet.*

## 1. INTRODUCTION

Tooth wear is an irreversible, non carious, destructive process, which results in a functional loss of tooth surface, mainly caused by acids in our diet, grinding of teeth, regurgitation of stomach acids and lifestyle factors. The loss of tooth enamel can eventually cause tooth sensitivity and affect the appearance and function of teeth [1].

Non-cariou lesions can be categorized into four type's .i.e attrition, abrasion, erosion and abfraction. The wearing of tooth substance as a result of tooth to tooth contact during normal or Para functional masticatory activity is attrition and the pathological wear of tooth substance through bio-mechanical frictional processes, e.g. tooth brushing is abrasion. The loss of tooth substance by acid dissolution of either an intrinsic or extrinsic origin, e.g. gastric acid or dietary acids is called erosion. The pathologic loss of tooth substance caused by bio-mechanical loading forces (flexure of the tooth), leading to fatigue of the enamel and dentine at a location away from the point of loading is abfraction [2].

Dietary factor is one of the etiology of tooth wear, the role of acidic foods and drinks is probably important to the progression of tooth wear [3]. Since the critical pH of dental enamel is approximately 5.5, any solution with a lower pH value may cause tooth loss, particularly if the attack is of long duration and repeated over time. The cause of tooth wear being multifactorial it is difficult to pinpoint a major cause for a particular condition [4].

Tooth wear can be hastened by the excessive force of mastication, poor quality of enamel,

grinding habits and diet [5]. The first clinical manifestation of attrition may be the appearance of a small polished facet on a cusp tip or ridge or a slight flattening in the cuspal edge. Abrasion manifests easily has v shaped or wedge shaped ditch of the root surface of the cemento enamel junction in teeth with some gingival recession. Erosion is caused by acids which may be extrinsic or intrinsic in origin. Extrinsic cause is mainly due to acidic media i.e, food stuffs or due to acidic media examples of external sources are acidic beverages, foods, medications or environmental acids. It can be seen that most citrus fruits and fruit juices have a very low ph including the carbonated drinks. Intrinsic factors for erosion are gastric acids regurgitated into the esophagus and mouth. Gastric acids with ph levels less than 1, reach the oral cavity and come in contact with the teeth in conditions such as gastro esophageal reflex disease. Abfraction is one in which each bite and the occlusal force causes teeth to flex though little, thus the constant flexing causes enamel to break from the crown, usually on the buccal surface [6].

The prevalence of Tooth wear is increasing, the reason is not yet established if the increase is due to increased awareness among patients and dental health care professionals, or result of changes in diet and life styles or combination of factors [7,8].

Various studies have been conducted with regard to tooth wear and their cause. They have shown a significant variances in relation to age, gender, sex, dietary intake and the pattern of tooth wear in different geographical locations. In India cultural habits and eating patterns differ from region to region and while considering diet as a factor for tooth wear the literature data available is scarce. The present survey was

carried out to investigate the prevalence of tooth wear due to dietary factors in South Canara population.

## 2. MATERIALS AND METHODS

This study is a cross sectional study conducted among 2000 subjects in a duration of 1 month during the period of June-July 2014. Out of which 1,200 subjects were from the OPD of Conservative Dentistry and Endodontics and 843 from 5 Rural Satellite Centres of A. B. Shetty Memorial Institute of Dental Sciences, Deralakatte Mangalore. Tooth wear due to dietary factors was assessed using a structured questionnaire based on WHO oral health survey 2013. The Questionnaire was designated to evaluate the prevalence of tooth wear with dietary habits.

Written consent of the patient was obtained. Ethical approval was obtained from the institutional ethical committee. Patients were examined to assess the prevalence of tooth wear. One expert dentist examined all the patients. All the examinations were carried out by the operator in front of the subjects and the assistant seated behind to record the findings. Clinical Oral examination was done on the dental chair under good illumination using sterile diagnostic instruments mouth mirror, straight probe and tweezers. Clear history of possible etiological factors such as dietary factors, habits, medical history was recorded. Intra oral examination proceeded in an orderly manner from one tooth to adjacent tooth starting from upper right quadrant to lower left quadrant in a clockwise direction. Each tooth was examined for the presence of attrition, erosion, abrasion and

abfraction according to their clinical appearance [9].

### 2.1 Inclusion Criteria

- Subjects in age group of 15 yrs - 66 yrs.

#### 2.1.1 Exclusion criteria

- Subjects with edentulous arch
- Subjects undergoing orthodontic treatment.

### 2.2 Statistical Analysis

Data obtained was statistical analyzed using Statistical Package for the Social Sciences (SPSSv16.0). Differences between variables were analyzed using Pearson's Chi-square test value < 0.001 was considered to be significant.

## 3. RESULTS

### 3.1 Profile of Patients

Out of 2000 patients examined, 957 subjects belonged to urban strata, 200 subjects belonged to semi urban whereas 843 subjects belonged to rural location (Table 1).

Males formed 55 % of the study population whereas females were 45% (Table 2).

Prevalence of tooth wear was significant in age group of 56-65 years whereas attrition (57.40%) in age group  $\geq 66$  and abrasion (47.42%) was significantly more in age group of 56-65years. Erosion is seen more in age group of 26-35 years (7.2%), abfraction in age group of 36-45 years (10.3%) (Table 3).

### Questionnaire

Name						
Age group	15-25 Y	26-35 Y	36-45 Y	46-55 Y	56-65 Y	$\geq 66$ Y
Sex						
Location						
Address						
Occupation						
Medical History						
Para functional habit						
Diet	Vegetarian		Non-vegetarian		Pescetarians	
	Beverages					
	Acidic food consumption					
Brushing technique						
Materials used for brushing						
Habits	Alcohol consumption/Tobacco chewing/Smoking					

**Table 1. Total number of subjects in the study population**

Location	Subjects
Urban	957 (47.85%)
Rural	843 (42.15%)
Semiurban	200 (10%)

tooth wear in male (85.45%) subjects was observed.

In the present study non vegetarians had increased tooth wear compared to vegetarians and pescetarians. Non vegetarians showed (32%) prevalence of tooth wear, pescetarians (2%) and vegetarians showed (18.3%) respectively (Table 5).

**Table 2. Total number of subjects in the study population**

Gender	Subjects
Males	1100 (55%)
Females	900 (45%)

In the present study the prevalence of attrition (27.6%), abrasion (31.6%), erosion (3.9%) and abfraction (11.8%) was significantly more in urban population (Table 6).

In the present study 28.1% of males and 5.1% of females showed attrition, 37.2% of males and 7.05% of females showed abrasion, 5.8% of males and 0.8% of females showed erosion, 16.9% of males and 0.95 % of females reported with abfraction (Table 4). A significant increase of

Alcohol consumption, frequency of acidic food intake and gastric regurgitation were analyzed separately with erosion, 428 subjects reported of alcohol consumption out of which 43(57.33%) had erosion, showing alcohol consumption being a major cause for erosion (Table 7).

**Table 3. Prevalence of tooth wear in relation to age group**

Age group	Attrition	Abrasion	Erosion	Abfraction	Total
15-25 Y	4 (3.2%)	8 (6.3%)	9 (7.08%)	0	21 (16.66%)
26-35 Y	25 (5.0%)	34 (6.8%)	36 (7.2%)	23 (11.4%)	118 (22.95%)
36-45 Y	27 (4.4%)	81 (13.1%)	17 (2.7%)	27 (10.3%)	152 (23.75%)
46-55 Y	28 (7.5%)	104 (27.8%)	5 (1.3%)	18 (12.0%)	155 (37.62%)
56-65 Y	67 (38.28%)	83 (47.42%)	6 (3.42%)	19 (10.85%)	175 (68.89%)
>=66 Y	31 (57.40%)	16 (29.62%)	3 (5.55%)	4 (7.40%)	54 (47.42%)

**Table 4. Prevalence of tooth wear in relation to gender**

Gender	Attrition	Abrasion	Erosion	Abfraction	Total
Male	337 (28.1%)	446 (37.2%)	69 (5.8%)	88 (16.9%)	940 (85.45%)
Female	41 (5.1%)	56 (7.0%)	6 (0.8%)	3 (0.9%)	106 (11.77%)

**Table 5. Prevalence of tooth wear in relation to dietary intake**

Diet	Attrition	Abrasion	Erosion	Abfraction	Total
Non vegetarian	283 (35.9%)	281 (35.7%)	35 (4.4%)	41 (11.9%)	640 (32%)
Pescetarian	11 (7.6%)	19 (13.1%)	6 (4.1%)	4 (6.65)	40 (2%)
Vegetarian	84 (7.9)	202 (19%)	34 (3.2%)	46 (10.6%)	366 (18.3%)

**Table 6. Prevalence of tooth wear in relation to geographic location**

Location	Attrition	Abrasion	Erosion	Abfraction	Total
Urban	290 (27.6%)	331 (31.6%)	41 (3.9%)	52 (11.8%)	714 (74.9%)
Rural	67 (8.8%)	139 (18.2%)	28 (3.7%)	27 (8.3%)	261 (39%)
Semiurban	20 (10.8%)	31 (16.8%)	6 (3.2%)	12 (16.9%)	69 (47.7%)

**Table 7. Prevalence of erosion in relation to reasons**

Reasons	Erosion
Frequent acidic food	20 (26.66%)
Gastric regurgitation	12 (16%)
Alcohol consumption	43 (57.33%)

#### 4. DISCUSSION

Tooth wear, is a multi-factorial process and usually involves the interaction of chemical and physical agents [10]. The present study was conducted on patients with different dietary habits in south canara population.

This study shows a significant increase in tooth wear in an age group of 56-65 years out of which attrition (57.40%) in age group  $\geq 66$  and abrasion (69.9%) was significantly more in age group of 56-65 years respectively. Erosion is seen more in age group of 26-35 years (7.2%), abfraction in age group of 36-45 years (10.3%) (Table 3). This is justified in similar studies conducted by Bartlett et al. [3] which reported that prevalence of tooth wear increases with age. The increase in tooth wear with age may be due to the accumulative effect duration of etiological factors overtime resulted in increased severity and tooth surface loss [11].

In the present study there was a significant increase in tooth wear in males in comparison to females, 28.1% of males and 5.1% of females showed attrition, 37.2% of males and 7.05% of females showed abrasion, 5.8% of males and 0.8% of females showed erosion, 16.9% of males and 0.95% of females reported with abfraction, a significant increase of tooth wear in male (85.45%) subjects was observed (Table 4). Hedge et al. [12] also showed similar results were prevalence of tooth wear was found to be more in males than in females. A similar study conducted by Bader K et al. [13] demonstrated increased tooth wear in males than females. This could be due to heavy masticatory forces in males. Females care more about their oral health, thus allowing early detection and prevention programs.

This study showed increased tooth wear in Non vegetarians compared to vegetarians and pescetarians. Nonvegetarians showed (32%) prevalence of tooth wear, pescetarians (2%) and vegetarians showed (18.3%) respectively. (Table 5) which is justified in studies conducted by Hedge et al. [12] and Bader K et al. [13] were tooth wear is more in subjects taking non vegetarian diet compared to vegetarians, whereas Bartlett et al. [3] showed no correlation between tooth wear and dietary intake. The vegetarians had a significantly higher degree of tooth wear than the non-vegetarians in a study conducted by Sherfudhin H et al. [14] which suggested that the Indian vegetarian diet may

produce certain effects on the oral health because vegetarians had a significantly higher tendency towards crowding in the maxillary arch, numerically higher DMFT, and greater number of cervical buccal defects. The prevalence of attrition (27.6%), abrasion (31.6%), erosion (3.9%) and abfraction (11.8%) was significantly more in urban population (Table 6).

In the present study alcohol consumption, frequency of acidic food intake and gastric regurgitation were also analyzed separately with erosion, 428 subjects reported of alcohol consumption out of which 43 (57.33%) had erosion. (Table 7), which is justified by studies conducted by Hedge et al. [12] Bartlett et al. [3] Robb ND et al. [4] Bader K et al. [13] showed alcohol consumption and acid food intake were associated with tooth wear. This study showed (18.9%) prevalence of attrition, (25.1%) abrasion, (3.8%) erosion, (10.9%) abfraction (Table 8).

**Table 8. Prevalence of tooth wear in tooth wear in the study population**

Tooth wear	Prevalence
Attrition	378 (18.9%)
Abrasion	502 (25.1%)
Erosion	75 (3.8%)
Abfraction	91 (10.9%)

#### 5. CONCLUSION

The loss of tooth structure resulting from abrasion, erosion, and/or other non-cariogenic factors has been a common observation by dental practitioners. The lesions are unsightly, develop areas of sensitivity, and are clinically difficult to treat. The specific cause of this entity has always been an area of conflict. This current study shows dietary factors and their relation with tooth wear, thus it can be concluded that tooth wear was more common in males and the most affected age group was 56-65 Years. Incidence of tooth wear was found to be more in subjects who consumed non-vegetarian diet and alcohol Consumption was shown to be major cause for erosion.

#### CLINICAL IMPLICATION

Tooth wear is an accumulative and continuous process which is irreversible and multifactorial in nature. Efforts should be made by the dentists to increase the awareness about tooth wear, for early diagnosis and prevention are vital for the well being of the patient.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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