Original Article

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THE ASSOCIATION OF TOOTH WEAR, DIET AND DIETARY HABITS AMONG 18-30 YEAR OLD SUBJECTS ATTENDING A DENTAL INSTITUTE IN VIRAJPET, KARNATAKA

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ABSTRACT:

Aim: The aim of this study was to assess association of diet and dietary habits to tooth wear among adults aged 18–30 years.

Methods: Patients identified to have tooth wear were selected as cases followed by patients not having tooth wear who were selected as controls. Data collection of cases preceded that of the control group. Subjects were interviewed for collection of demographic data including age, sex and Socio economic status using a questionnaire followed by details of their diet types, dietary habits and other associated habits. After the interview of the subjects for dietary habits was completed, oral examination for tooth wear using the Simplified tooth wear index (Bardsley 2004) was conducted.

Results: Tooth wear was more likely to occur among the individuals of the case group than those belonging to the control group. The cases consumed more Fruits (OR=3.53), Aerated drinks (OR=20.55), Acidic foods (OR=6.07), Tobacco products (OR=10.91) and had a Faulty tooth brushing habit (OR=6.60) and used a hard tooth brush (OR=1.23) than those belonging to the control group.

Conclusion: Frequent consumption of aerated drinks, tobacco, acidic foods and a faulty tooth brushing habit have higher chances of developing tooth wear.

Keywords: tooth wear, dietary habits, younger adults.

INTRODUCTION:

Tooth wear is a complex, multifactorial phenomenon with the interplay of biological, mechanical, chemical and tribological factors.[1] Tooth wear is defined as loss of dental hard tissue by a chemical or mechanical process not involving bacteria. Tooth wear facets are characterized as flat, round or sharply angled and polished surfaces on the occlusal or incisal areas of the teeth and may be the result of excessive attrition of one tooth against the other. Abrasion and erosion can also contribute to the excessive wear of the occlusal and incisal surfaces.[2]

The cause of tooth wear being multifactorial, it is difficult to pinpoint a major cause for a particular condition. There is a considerable body of evidence from laboratory studies to indicate that low pH acidic foods and drinks cause erosion of enamel and dentine.[3,4] However, the clinical evidence is less convincing. The most common method of determining dietary behavior in large

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studies is through validated questionnaires.[4]

Various studies have been conducted with regard to tooth wear and their cause. They have shown 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.[5]

Hence this study was conducted to relate tooth wear specifically to diet and dietary habits. This could be accurately observed only in younger age groups as older groups report clinical findings which are affected by multiple factors apart from diet alone. So, a younger age sample was selected to examine for various kinds of tooth wear in the subjects visiting a dental institute located in Virajpet, Coorg.

AIMS & OBJECTIVES:

AIM:

The aim of this study was to assess association of diet and dietary habits with tooth wear among adults aged 18–30 years.

OBJECTIVES OF STUDY:

- To assess diet & dietary habits among adults aged 18–30 years.
- To assess tooth wear among adults aged 18-30 years.
- To assess the association of diet and dietary habits with tooth wear among adults aged 18–30 years.

MATERIALS AND METHODS:

Source of data

The study comprised of patients aged 18-30 years of age visiting the Coorg Institute of dental sciences, Virajpet.

Study Design:

A case control study was conducted to assess the association of tooth wear with diet, dietary habits among 18-30 year old subjects.

Pilot Study:

A pilot study was conducted to check for the feasibility of the study using the three indices used in literature viz. Tooth Wear Index (Smith & Knight, 1984); Tooth Wear Index Simplified (Bardsley et.al. 2004) & Exact tooth wear Index (Bartlett et.al. 2011) and to estimate the sample population of both control group and case groups. The case groups (Tooth wear) were determined as those subjects having four or more surfaces with wear and subjects at risk were determined as those who consume the food products for more than 1-3 times per day. According to the results of the pilot study, Simplified tooth wear index was found to be more feasible in this study age group.

Sample Size Estimation:

Samples were estimated based on the results of the pilot study where percentage of subjects who were exposed to the risk factors and having the disease was compared to percentage of subjects who were exposed to the risk factors but were not having the disease. A sample size of 96 per group was designated which was rounded of to 100 per group of cases and controls.

$$n = \frac{r + 1(P^*)\ (1-P^*)\ (Z_\beta + Z_{\alpha/2})^2}{\gamma\ (P_1-P_2)^2}$$

Sample Size: 200 (100= cases & 100= controls)

Inclusion Criteria:

- Adult subjects aged 18-30 years old.

Exclusion Criteria:

- Subjects who are not willing to participate.
- Subjects who have known history of chronic gastric regurgitation or similar conditions.
- Subjects who are undergoing orthodontic treatment.

Study Procedure:

Patients visiting the department of Oral medicine and radiology of Coorg Institute of Dental Sciences were examined by a preliminary examiner who diagnosed whether the patient had tooth wear or not. Patients identified to have tooth wear were selected as cases followed by patients not having tooth wear who were selected as controls. Data collection of cases preceded that of the control group.

Subjects were interviewed for collection of demographic data including age, sex, Socio economic status (measured by Kuppuswamy Socio economic scale, 2014) using a questionnaire followed by details of their diet types, dietary habits and other associated habits.

The dietary habits and oral hygiene practices considered for this study were Fruits, Aerated drinks, Acidic foods, Tobacco products, Faulty brushing and hard brush usage. Subjects were deemed to have a particular habit if they were consuming that food for more than 1- 3 times per day or more. A subject was deemed to have faulty brushing habits if he/she was using hard tooth brush or followed horizontal brushing technique.

After the interview of the subjects for dietary habits was completed, oral examination for tooth wear using the Simplified tooth wear index (*Bardsley et.al. 2004*) was conducted.

Simplified tooth wear index (Bardsley et.al. 2004):

This index considered the buccal, palatal and incisal surfaces of the six anterior teeth (both upper and lower jaws) and occlusal surfaces of four first molars in every subject.

Thus, a total of 40 surfaces were examined in each subject. A subject having presence of tooth wear in at least 4 tooth surfaces (10% of examined tooth

surfaces) were considered as cases while those having tooth wear in less than 4 tooth surfaces were considered as controls. Data collection of cases preceded that of the control group.

Data Analysis:

Descriptive statistics for demographic data was tabulated. The percentage exposure to diet and dietary habits were calculated among cases and controls, and Odds ratio values were calculated for each of the habits. Simple odds ratio values represented risk of developing tooth wear among cases in comparison to controls.

RESULTS:

Distribution of subjects in case and control groups:

The study sample included 102 subjects deemed as cases and 100 subjects deemed as controls. There were 64 males and 38 female subjects among the cases selected, while there were 52 males and 48 female subjects in the 100 controls selected [Table 1].

Among the cases, almost 83% belonged to higher social classes (upper and upper middle social classes) while only 10% belonged to middle class and 6% belonged to lower middle class. On the other hand, the control group was more diverse in distribution with 57% belonging to upper social classes, 34% to middle class and 9% belonged to lower middle social class [Table 2].

Assessments of Diet and dietary habits in study subjects:

Diet and dietary habits were assessed using questionnaire. Most of the study subjects had mixed diet while only 1 subject had vegetarian diet in each of case and control groups [Table 3].

Table 4 shows the distribution of case and control groups in relation to the exposure of subjects to various dietary habits. 15.69% of the cases frequently consumed fruits while only 5% of controls consumed such fruits. 51.9% of the cases consumed aerated drinks on a regular basis in contrast to only 5% of control group. 31.3% of cases consumed acidic foods frequently while only 7% of controls did the same. 45.1% of cases consumed tobacco frequently as compared to only 7% of the controls. Presence of faulty tooth brushing habits was prevalent in 60.78% of the cases while only 19% of controls showed the same. Usage of hard brush was similar in both cases and controls (4.9% and 4% in cases and controls respectively).

Table 5 shows the number of cases and controls exposed to multiple dietary and hygiene habits. 4 subjects among cases frequently consumed fruits and aerated drinks while 5 cases were found to consume both fruits and acidic foods. 12 subjects among cases were exposed to both aerated drinks and acidic foods; while 38 subjects from the case group were consuming aerated drinks along with tobacco products; tobacco consumption in combination with acidic

food consumption was also seen among 8 subjects in cases. Presence of hygiene habits of faulty tooth brushing along with usage of hard tooth brush was seen in 4 subjects of the case group.

In comparison, subjects from control group who were exposed to multiple dietary and hygiene habits was significantly lesser. 2 subjects of control group had exposure to fruits and aerated drinks while only 1 subject had exposure to acidic foods and tobacco. Subjects who were having faulty tooth brushing habits and usage of hard tooth brush were also only 2 in number.

Analysis of exposure to each dietary habit among cases and controls:

Analysis of exposure to each dietary habit among cases and controls showed that people with abnormal dietary or oral hygiene habits were more likely to develop tooth wear. Tooth wear was more likely to occur among the individuals who consumed Fruits (OR=3.53), Aerated drinks (OR=20.55), Acidic foods (OR=6.07), Tobacco products (OR=10.91) and had a Faulty tooth brushing habit (OR=6.60) and used a hard tooth brush (OR=1.23) [Table-5].

Individuals consuming aerated drinks (OR=20.55) were at more than 20 times greater risk of developing tooth wear than others; while those consuming tobacco products (OR=10.91) were at almost 11 times more risk of developing tooth wear. Acidic foods (OR=6.07) and fruits (OR=3.53) were also associated with development of tooth wear as assessed in this study. Apart from diet, habits like faulty tooth brushing (OR=6.60) and usage of hard tooth brush were also strongly associated with development of tooth wear (OR=1.23) [Tables 9 & 10].

DISCUSSION:

This case control study was conducted among 202 subjects to assess the association of diet and dietary habits with tooth wear in adults aged 18–30 years attending Coorg Institute of Dental Sciences, Virajpet.

The present study did not consider age groups older than 30 years of age. As tooth wear is multi factorial and chronic in nature, presence of tooth wear in an older individual can be attributed to various reasons. Since area of interest of the study was association of tooth wear with diet and dietary habits only, the older age groups were excluded to relate existing tooth wear among the subjects to diet only.

Distribution of study subjects showed more number of males than females (64 males and 38 females) were having tooth wear. This population distribution was similar to Mithra N. Hegde et.al[5] whose study also had more number of males (n=1100) than females (n=900) with tooth wear; however this was a descriptive study conducted among a much larger sample; hence findings may not be comparable exactly. But none of the studies in literature showed that one gender had more prominent tooth wear than the other.

Results of the study showed that subjects consuming aerated drinks, acidic foods or fruits were at highest risk of developing tooth wear. These results were similar to those reported by Bo Liu et al [8]who stated that subjects consuming acidic foods and drinks were at a slightly higher risk to develop tooth wear. Bartlett et al [4] and Zero et al [14]also reported similar findings in their study that tooth wear was statistically significantly associated to acidic foods and drinks. Christopher Okunseri et al [3] also reported that consumption of fruit drinks and aerated drinks was found to be significantly associated with the severity of tooth wear, but not prevalence of tooth wear. However A. Milosevic et al [6] reported that aerated drinks were not significantly associated with tooth wear as their study group included 14 year olds and tooth wear among those children was not prominent.

Another dietary habit that showed high association with tooth wear was consumption of tobacco. Results of the present study showed that individuals who consumed tobacco were almost 10 times more likely to develop tooth wear. Although none of the studies reported association of smoking with tooth wear, it has been well documented that chewing of tobacco causes significant amount of tooth wear. These findings were in accordance to results published by Smith BG et al [13], Zero et al [14] and Deshpande et al [15] who reported strong association of tooth wear with tobacco consumption.

Faulty tooth brushing habits were also found to be strongly associated with tooth wear. This was in accordance to findings of DA Brandini et al [16] who reported the use of medium and hard toothbrushes and greater force applied during tooth brushing might contribute to the development and/or aggravation of tooth wear especially cervical abrasions. Bharadwaj et al [17] and Naveen S Yadav et al [18] also reported statistical significance of association of tooth wear with variations in habit of oral hygiene care like material used and mode of brushing and duration of brushing, etc.

Results showed that people with abnormal dietary and brushing habits were more likely to develop tooth wear. Tooth wear was more likely to occur among the individuals who consumed Fruits, Aerated drinks, Acidic foods, Tobacco products and had a Faulty tooth brushing habit and used a hard tooth brush.

The overall findings of the study were also similar to those by Addy et al [19] who reported that tooth brushing, with or without toothpaste and an acidic diet, are strongly associated with tooth wear and dentine hypersensitivity, and also suggests that dentine hypersensitivity is a tooth wear phenomenon.

The present study measured only the dietary habits like acidic foods or drinks but not types of diet of the subjects like vegetarians and non vegetarians. Many studies reported that

non-vegetarians or people with mixed diet were more likely to develop tooth wear than pure vegetarians. This had to probably do with the texture of food consumed, hardness of meat, intrinsic acidic nature of meat and other such factors which in turn lead to wearing of the teeth. This factor was not considered in the present study as most of the study subjects had a mixed diet and there were no significant number of pure vegetarians among the selected subjects.

However, the sample for this study was indicative of population in a semi-urban locality like Coorg only and does not relate to more urban population where tooth wear is more prevalent. The diet habits also vary widely across a diverse country like India with differing diets and habits across different states and regions. Hence the findings of the study cannot be extended to the whole country.

This study helps to associate tooth wear with the risk factors like acidic diet or faulty tooth brushing but does not help identify causal association, which can be established only through longitudinal studies. Hence more long term research with larger samples is indicated to establish the associations of tooth wear with diet and dietary habits.

Recommendations: Therefore, to back the findings of the present study the following recommendations can be made:

1. Need to improve oral health knowledge regarding balanced and healthy diet and oral hygiene practices among younger age groups of the community.

2. Need to create awareness about tooth wear especially in younger age groups as it is preventable.

3. Need to conduct longitudinal studies on larger samples to identify strength of association of tooth wear with dietary and oral hygiene habits.

4. Need to reduce consumption of tobacco products to prevent incidence of not only tooth wear but also other chronic diseases like cancer, heart diseases etc.

CONCLUSION

Tooth wear was more likely to occur among the individuals of the case group than those belonging to the control group. Subjects in the case group consumed more Fruits (OR=3.53), Aerated drinks (OR=20.55), Acidic foods (OR=6.07), Tobacco products (OR=10.91) and had a Faulty tooth brushing habit (OR=6.60) and used a hard tooth brush (OR=1.23) than those belonging to the control group.

This study helps to associate tooth wear with the risk factors like acidic diet or faulty tooth brushing but does not help identify causal association, which can be established only through longitudinal studies. Hence more long term research with larger samples is indicated to establish the causation of

tooth wear due to faulty diet and dietary habits.

REFERENCES:

1. Lee, L. H. He, K. Lyons & M. V. Swain; Tooth wear and wear investigations in dentistry; Journal of Oral Rehabilitation 2012 39; 217–225.
2. Cunha-Cruz J, Pashova H, Packard JD, Zhou L, Hilton TJ; Tooth wear: prevalence and associated factors in general practice patients; Community Dent Oral Epidemiol 2010; 38: 228–234.
3. Christopher Okunseri; May C. M.Wong; David T.W. Yau; Colman McGrath; Aniko Szabo: The relationship between consumption of beverages and tooth wear among adults in the United States; Journal of Public Health Dentistry 2015; 1-8: doi: 10.1111/jphd.12096.
4. The association of tooth wear, diet and dietary habits in adults aged 18–30 years old D.W. Bartlett, J. Fares, S. Shirodaria, K. Chiu, N. Ahmada, M. Sherriff. Journal Of Dentistry 39 (2011) 811 – 816.
5. Prevalence of Tooth Wear Due to Dietary Factors in South Canara Population: Mithra N. Hegde and Nireeksha: BJMMR, 9(3): 1-6, 2015.
6. Milosevic et al: Tooth wear and dental erosion and their relationship with diet and habit; British Dental Journal Volume 197 No. 8 October 23 2004.
7. N.B. Saerah et al: Prevalence of Tooth Wear among 16-Year-Old Secondary School Children in Kota Bharu Kelantan: Archives of Orofacial Sciences 2006; 1: 21-28.
8. Bo Liu, Min Zhan, Yongjin Chen and Yueling Yao: Tooth wear in aging people: an investigation of the prevalence and the influential factors of incisal/occlusal tooth wear in northwest China: BMC Oral Health 2014, 14:65.
9. Elma Pinto Vieira et al: Relationship of Tooth Wear to Chronological Age among Indigenous Amazon Populations; PLOS ONE; doi:10.1371/journal.pone.0116138; January 20, 2015.
10. P. Wetselaar et al: The tooth wear evaluation system: a modular clinical guideline for the diagnosis and management planning of worn dentitions: Journal of Oral Rehabilitation 2015. doi: 10.1111/joor.12340.
11. Viivi Alaraudanjoki et al: Association of erosive tooth wear and dental caries in Northern Finland Birth Cohort 1966 – an epidemiological cross-sectional study; BMC Oral Health (2017) 17:6; doi 10.1186/s12903-016-0232-x.
12. Kan Sun et al: Tooth wear: a cross-sectional investigation of the prevalence and risk factors in Beijing, China; BDJ Open (2017) 3, 16012; doi:10.1038/bdjopen.2016.12.
13. Smith BG, Robb ND The prevalence of toothwear in 1007 dental

patients. J Oral Rehabil. 1996 Apr;23(4):232-9.

14. Zero DT. Etiology of dental erosion–extrinsic factors. European Journal of Oral Sciences 1996;104:162–77.
15. Deshpande S (2015) Investigation of Tooth Wear and its Associated Etiologies in Adult Patients Visiting Dental Institute in India. Dentistry 5: 271. doi:10.4172/2161-1122.1000271.
16. Brandini & Others: Association between Noncarious Cervical Lesions and Toothbrushing: Operative Dentistry, 2011, 36-6, 581-589; DOI: 10.2341/10-152-S.
17. Bhardwaj et al: Tooth brushing behaviours and dental abrasion; Journal of Cranio-Maxillary Diseases / Vol 3 / Issue 2 / July 2014; doi:10.4103/2278-9588.138219.
18. Yadav NS, Saxena V, Reddy R, Deshpande N, Deshpande A, Kovvuru SK. Alliance of Oral Hygiene Practices and Abrasion Among Urban and Rural Residents of Central India. J Contemp Dent Pract 2012; 13(1): 55-60.
19. Addy M et al: Tooth brushing, tooth wear and dentine hypersensitivity--are they associated? J Ir Dent Assoc. 2006 spring; 51(5):226-31.

TABLES:

Table-1: Distribution of cases and controls based on gender

Tooth wear	Males (%)	Females (%)
Present (Cases; n=102)	64 (62.74%)	38 (37.26%)
Absent (Controls n=100)	52 (52%)	48 (48%)

Table-2: Distribution of study subjects based on Socio economic Status

Social class	Cases (%)	Controls (%)
Upper	34 (33.4%)	11 (11%)
Upper middle	52 (50.9%)	46 (46%)
Middle	10 (9.8%)	34 (34%)
Lower Middle	6 (5.9%)	9 (9%)

Table-3: Distribution of study subjects based on diet type

Tooth wear	Vegetarian (%)	Mixed (%)
Present (Cases; n=102)	1 (0.9%)	101 (99.2%)
Absent (Controls n=100)	1 (1%)	99 (99%)

Table-4: Exposure to Dietary/ hygiene habit among Cases and Controls

Dietary/hygiene habit	Cases (n=102)	Controls (n=100)
Fruits	15.69 (n=16)	5 (n=5)
Aerated drinks	51.9 (n=53)	5 (n=5)
Acidic foods	31.3 (n=32)	7 (n=7)
Tobacco products	45.1 (n=46)	7 (n=7)
Faulty tooth brushing	60.78 (n=62)	19 (n=19)
Hard brush usage	4.9 (n=5)	4 (n=4)

Table-5: Exposure to multiple Dietary and hygiene habits among Cases and Controls

Dietary/hygiene habit	No. of Cases	No. of Controls
Fruits and aerated drinks	4	2
Fruits and acidic foods	5	0
Acidic foods and aerated drinks	12	0
Aerated drinks and Tobacco products	38	0
Acidic foods and tobacco	8	1
Faulty tooth brushing and Hard brush usage	4	2

Table 6: Analysis of exposure to each dietary habit among cases and controls:

Table 6a: Analysis of exposure to Consumption of Fruits among cases and controls

	Consumption of Fruits		Odds ratio
	Yes	No	
CASES Tooth wear present (n=102)	16	86	3.53
CONTROLS Tooth wear absent (n=100)	5	95	

Table 6b: Analysis of exposure to Consumption of aerated drinks among cases and controls:

	Consumption of aerated drinks		Odds ratio
	Yes	No	
CASES Tooth wear present (n=102)	53	49	20.55
CONTROLS Tooth wear absent (n=100)	5	95	

Table 6c: Analysis of exposure to consumption of acidic foods among cases and controls:

	Consumption of acidic foods		Odds ratio
	Yes	No	
CASES Tooth wear present (n=102)	32	70	6.07
CONTROLS Tooth wear absent (n=100)	7	93	

Table 6d: Analysis of exposure to Consumption of tobacco among cases and controls

	Consumption of tobacco		Odds ratio
	Yes	No	
CASES Tooth wear present (n=102)	46	56	10.91
CONTROLS Tooth wear absent (n=100)	7	93	

Table 6e: Analysis of presence of Faulty tooth-brushing habit among cases and control

	Presence of Faulty tooth-brushing habit		Odds ratio
	Yes	No	
CASES Tooth wear present (n=102)	62	40	6.60
CONTROLS Tooth wear absent (n=100)	19	81	

Table 6f: Analysis of Use of hard tooth brush among cases and controls

	Use of hard tooth brush		Odds ratio
	Yes	No	
CASES Tooth wear present (n=102)	5	4	1.23
CONTROLS Tooth wear absent (n=100)	97	96	