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Research Article

PREVALENCE OF NON- CARIOUS LESIONS IN SOUTH CANARA POPULATION: A CROSS-SECTIONAL STUDY

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ABSTRACT
The objective of this study was to evaluate the prevalence of non-carious lesions in South Canara population and factors responsible for the same. 2000 patients were evaluated using diagnostic instruments for the presence of attrition, abrasion, erosion and abfraction, followed by questionnaire, to evaluate most common factors associated with these lesions in South Canara population. Collected data were statistically analyzed using the "Statistical Package for the Social Sciences" (SPSSv16.0) software. The prevalence of attrition, abrasion, erosion and abfraction in South Canara Population was found to be 18.3 %, 27.9 %, 1.8 % and 5.2 %, respectively and it was more prevalent in 40-60 years of age group. Right handed patients had maximum prevalence of abrasive lesion on the left quadrants. Main aetiology for erosive lesions was found to be alcohol intake. It can be concluded from the present survey that; the age group that was most affected by non-carious lesion was between 40-60 years. There was no significant effect of gender on the prevalence rate of these lesions except for erosive lesions. (p-0.000) Also, no significant effect of location and diet was found on the prevalence rate except for the abrasive lesions (location, p-0.000 and diet, p-0.001).
Keyword: Attrition, abrasion, erosion and abfraction

INTRODUCTION

Non-carious lesions are defined as abnormalities occurring on the surfaces of teeth that do not fall under the category of dental cavities.[1] They may include enamel hypoplasia, attrition, erosion, abrasion, or tooth fractures. This type of tooth wear / tooth surface loss (TSL) is one of the commonly occurring regressive changes and is considered as a physiological phenomenon, especially of opposing tooth surfaces and proximal tooth surfaces. Under certain circumstances it is pathological, when the wearing of the teeth is excessive.[2] Grippo in 1991 hypothesized the proposed causes of non-carious lesions into four categories - attrition, abrasion, erosion and abfraction. Attrition - the wearing of tooth substance as a result of tooth to tooth contact during normal or para functional masticatory activity. Abrasion - the pathological wear of tooth substance through bio-mechanical frictional processes, e.g. tooth brushing. Erosion - the loss of tooth substance by acid dissolution of either an intrinsic or extrinsic origin, e.g. gastric acid or dietary acids. The word ''abfraction'' was derived from the Latin ''to break away''. It is 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.[3] Tooth surface loss (TSL) aetiology is known to be multi factorial, yielding various patterns of wear that commonly occur simultaneously and complicating analysis and management even further. Diet, foreign objects, bruxism, para functional activity, environment, occupation, medicaments, gastrointestinal problems, and acid regurgitation are among the most common aetiological factors that lead to tooth surface loss (TSL).[4] South Canara, is a coastal district in the state of Karnataka in India, has an area 4,866 square kilometers, and a population density of 390 persons per square kilometer. According to the 2011 census South Canara has a population of 2,083,625. Limited data has been collected for non-carious lesions from previous studies and many patients are not aware about their present tooth condition. The studies conducted before in same population, compared the prevalence rate of attrition, abrasion and erosion according to gender, type of diet and frequency of diet.[2] But however the previous study did not measure the abfraction prevalence and other factors such as brushing frequency; brushing type, presence of opposite restoration or prosthesis etc. were not co-related with the non-carious lesions. Thus the objective of this present cross-sectional study was to determine the prevalence, the common causes and aggravating factors of non-carious lesions of urban and rural patients of South Canara population.

MATERIALS AND METHODS

The survey procedures were in accordance with ethical standards, and every subject was given a written informed consent before participating in the present study. The study was conducted over a period of 2 months in the year 2012. The participants included in the current survey were randomly selected from outpatient department of Conservative Dentistry and Endodontics of A.B. Shetty Memorial Institute of Dental Sciences and the satellite centers. Subjects with less than four teeth in mouth, root-filled teeth, crowned teeth, teeth with orthodontic appliances, abutment teeth for dentures and bridge work were not included in the study. A total of 2000 patients were examined by a single clinician, under good illumination, using simple diagnostic instruments like mouth mirror, straight probe and tweezers for tooth wear related lesions like attrition, abrasion, erosion and abfraction. The patients were stratified by gender (male/female), age groups (< 20 years/20-40 years/40-60 years/> 60 years) and diet (vegetarian / non.vegetarian). Data

was collected based on structured questionnaire, which was used to record the brushing habits, alcohol and acidic food intake, gastro-intestinal problems and associated dentinal hypersensitivity etc. Data obtained was filled in M S excel spreadsheet and statistical analysis was done using the Statistical Package for the Social Sciences (SPSSv16.0). Differences between variables were analyzed using Chi-square test.

RESULTS

The prevalence of attrition, abrasion, erosion and abfraction from 2000 patients examined was found to be 18.3 % (368/2000), 27.9 % (558/2000), 1.8 % (36/2000) and 5.2 % (103/2000) respectively. (Table 1) Most commonly affected age for attrition, erosion and abfraction was found to be 42 years (14.7 %), 41 years (10.8 %) and 42 years (44.4 %), respectively. In case of abrasion maximum number of patients were of 40 and 42 years of age (12.5 %), followed by 41 and 50 years of age (10 %). Overall age group affected with these wasting diseases was found to be 40-60 years. (Table 1 and Figure 1) Most of the patients with non-carious lesions had associated symptoms of dentinal hypersensitivity ($p < 0.001$). We found no difference in prevalence rate of non-carious lesions with respect to urban or rural population, except for abrasive lesions, which was more prevalent in urban population ($p < 0.001$) (Table 1). There was no difference in prevalence rate of attrition with respect to type of diet (p-0.255). Male patients had more attrition compared to female patients. (p-0.008) Most patients with attrition, had associated malocclusion (49.15 %), while very less patients had bruxism (25.60 %); opposite prosthesis (20.48) or had undergone orthodontic treatment (4.78 %). Out of 27.9 % of population with abrasion, maximum no. of patients use toothpaste (15.5 %); 13.1 % of patients brush once daily, while 14.4 % of patients brush twice daily whereas, 16 % of patients use medium bristled brush. 2nd and 3rd quadrants were the most common simultaneously affected by abrasive lesions (9.2 %) whereas, just singly affected most common one was the 2nd quadrant (7.3 %). This shows the prevalence of abrasion in left sided quadrants. Moreover maximum no. of patients who were positive for abrasion were using right hand for brushing (24.7 %) and their method of brushing was mainly horizontal (22.7 %). (Figure 2) We also found more prevalence of abrasion in non-vegetarians (p-0.001), as compared to vegetarians. Abrasive lesions were almost equally distributed among male (14.9 %) and female (13 %) patients (Table 1). The possible aetiology for erosive lesions found in South Canara population may be due to alcohol intake (66.67 % of population consumes alcohol, out of total number of patients with erosive lesions). While, there were very less patients, having frequent acidic food intake (25 %) or GI regurgitation (8.33 %). We found no difference with respect to the type of diet, among the patients with erosive and abfraction lesions. When gender was compared, significant amount of correlation was found between male population and the prevalence of erosion ($p < 0.001$), while in case of abfraction, the results were insignificant (p-0.864) (Table 1).

DISCUSSION

Tooth wear, also known as non- carious lesion, is a multi factorial process and usually involves the interaction of chemical and physical agents.[5] In the present study 40-60 years of patients had significantly high prevalence rate of these non- carious lesions. The tendency for prevalence to increase with age, is in accordance to the studies done by Hina Ahmed *et al*, Bader *et al*., Naveen *et al*, Pollman *et al*., Oilo *et al* and Telles *et al*.[6-10] There was no difference in prevalence rates between male and female population for abrasion, attrition, and abfraction, which is similar to the other studies done by Bergstron J and Lavstedt, Randentz, Naveen *et al*.[7,11,12] Females in South Canara exhibit lesser erosive lesions because of the fact that they are more health conscious and tend to avoid alcoholic and acidic drinks. These results are not in agreement with previous study done in the same population[2]; which showed more prevalence of attrition, abrasion, and erosion in male population. In the current study the prevalence of attrition, abrasion and erosion was 18.3 % (368/2000), 27.9 % (558/2000), 1.8 % (36/2000) respectively, which is very less than that reported in 2008 year, which stated the prevalence rate of attrition, abrasion and erosion to be 56.5 %, 31 % and 10 % respectively. This variation may be due to difference in number of participants in both surveys. Maximum number of patients with abrasion was due to brushing by horizontal method (22.7 %) and using medium bristle toothbrush and toothpaste (15.5 %). So, the abrasive lesions can be the combined effect of brushing method and toothbrush bristle size. This study is partially in accordance to the study done by Dzakovich *et al*.[13]

Table 1: The prevalence of Non-Carious Lesions with respect to Age Group. Gender, Location, Diet and Hypersensitivity

Non-Carious Lesions		Attrition			Abrasion			Erosion			Abfraction		
		n	%	p	n	%	p	n	%	p	n	%	p
Total		368	**18.3**		558	**27.9**		36	**1.8%**		103	**5.2**	
Age Group	**<20**	18	0.89	**0.000**	48	2.4	**0.000**	0	0	**0.000**	5	0.26	**0.000**
	20-40	155	7.70		230	11.5		7	0.35		50	2.52	
	40-60	193	9.59		276	13.8		29	1.45		48	2.42	
	>60	2	0.12		4	0.2		0	0		0	0	
Gender	**Male**	219	10.9	**0.008**	298	14.9	**0.931**	30	1.5	**0.000**	54	2.73	**0.864**
	Female	149	7.4		260	13		6	0.3		49	2.47	
Location	**Urban**	186	9.25	**0.012**	362	18.1	**0.000**	28	1.4	**0.009**	68	3.4	**0.043**
	rural	182	9.05		196	9.8		8	0.4		35	1.8	
Diet	**Vegetarian**	84	4.1	**0.255**	112	5.6	**0.001**	16	0.8	**0.007**	36	1.81	**0.019**
	Non-Veg.	284	14.2		446	22.3		20	1		67	3.39	
Hyper-sensitivity	**Present**	309	15.36	**0.000**	422	21.1	**0.000**	36	1.8	**0.000**	85	4.3	**0.000**
	Absent	59	2.94		136	6.8		0	0		18	2.47	

n–denotes total number of patients; % -denotes frequency; p – denotes statistic value by using Chi-square test

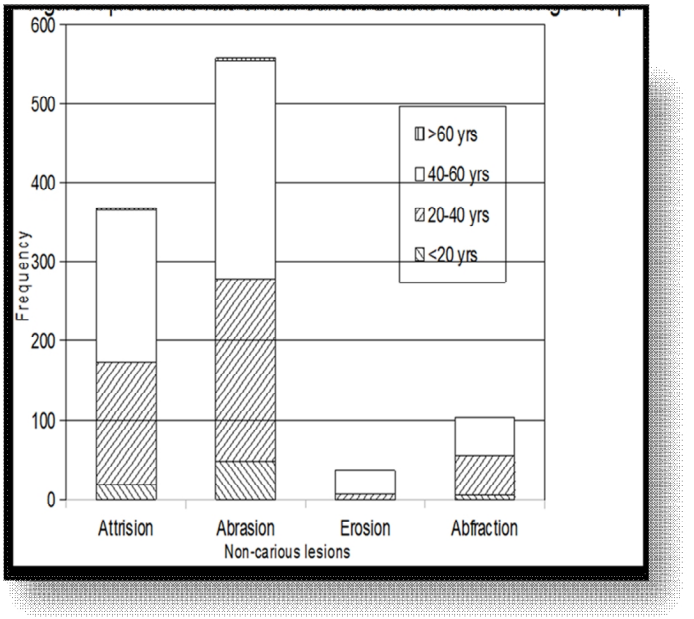

Figure 1: Prevalence of Non-Carious Lesions in different Age group

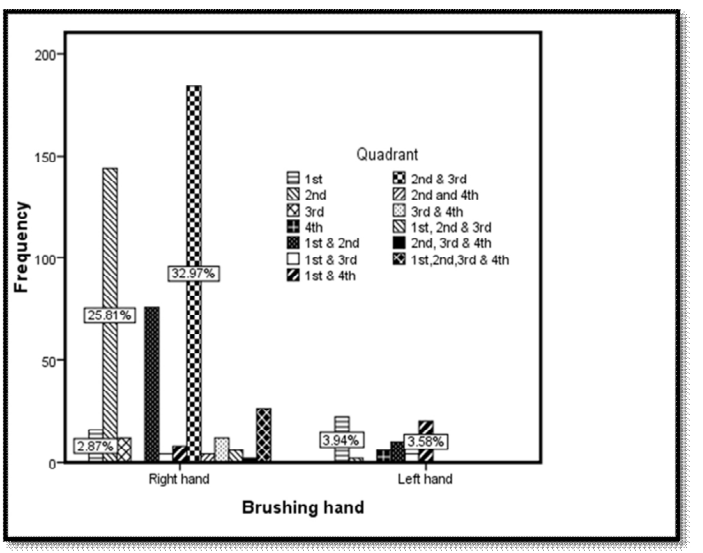

Figure 2: Correlation between Right/Left handed brushing habit and the quadrant affected with Abrasive Lesions

In the present survey, we found no statistical difference between abrasion and frequency of brushing. Studies have shown significantly higher prevalence of abrasion in patients who brush twice daily than those who brush less frequently.[12] This variation may be because of other possible local variables, such as dietary differences and habitual excessive use of dentifrices. Furthermore, Hina Ahmed *et al*[6] found no significant difference between lesion and type of brush used. The majority of patients with abrasive lesions were right handed (24.7 %) and most commonly affected quadrants were maxillary and mandibular left quadrants. So right handed patients had left sided abrasive lesions. This is not in co - ordinance with the studies done by Hina Ahmed *et al*[6] in which majority (89.5 %, n = 85) of the patients were right handed, but no significant association was observed of it with site specificity (p = 0.392). The high occlusal forces, mainly due to para functional habits and immature contacts usually lead to occlusal tooth wear – attrition.[4,6,14,15] But, we found no correlation of bruxism or opposite prosthesis with attrition. There was a noticeable amount of correlation between presence of malocclusion and presence of wear facets. It can be due to immature contacts and unbalanced occlusal forces leading to wear of tooth. The maximum percentage of population with erosive lesions was due to alcohol intake, whereas acidic food intake and GI regurgitation constricted to the lesser percentage of erosive lesions. Maximum studies showed acidic food and drink as a commonest factor for erosion.[4,16-18] Tooth hypersensitivity was also one of the symptoms of the patients with non carious lesions, which can be due to enamel loss, followed by exposure of dentinal tubules to the environmental aggravating factors such as, temperature and pressure changes. Lussi *et al*[18] also reported high prevalence of tooth hypersensitivity of the Swiss adults with non carious lesions, while other studies reported less prevalence of dentin hypersensitivity with non carious lesions.[19,20] This pronounced variance of data may be due to

the different types of assessment used in the studies. In the present study we used questionnaire to gain the required information, instead of using blast of air from an air-water syringe and subjective participant response. This study was limited to the patients of urban and rural canters of South Canara population. It was based on random selection of 2000 patients, followed by grouping into gender, diet and age – group. There was not equal number of negative or positive control. Also the factors which were omitted in the study were the amount of pressure applied for brushing, pH of oral environment, any developmental disturbances of teeth, medication, the biological factors, such as saliva, tooth composition and structure, occlusion and behavioural factor. Further investigations and continuous follow-up may allow the mapping of the relationship of biological factors with the occurrence of tooth wear. The knowledge of the characteristics and etiologic factors of non-carious lesions assists the dentists in selecting the appropriate treatment and improving the long term prognosis.

CONCLUSION

Non-carious lesions are a frequent challenge in clinical dental practice, given the variety of opinions regarding their aetiology, diagnosis, and treatment. It can be concluded from the present survey that; the age group that was most affected by non-carious lesion was between 40-60 years. There was no significant effect of gender on the prevalence rate of these lesions except for erosive lesions. (p-0.000) Also, no significant effect of location and diet was found on the prevalence rate except for the abrasive lesions (Location, p-0.000 and diet, p-0.001). The main etiologic factor for attrition was malocclusion, for abrasion, it was method of brushing and the brushing hand, while that for erosion was alcohol consumption.

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