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RESEARCH ARTICLE

INCIDENCE OF CERVICAL CARIES AMONG THE ADULTS OF SOUTH CANARA, INDIA IN RELATION TO THE DIETARY STATUS – AN EPIDEMIOLOGICAL STUDY

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Abstract

Cervical caries also termed as “root caries” is a lesion located on the root surface of a tooth, usually close to or below the gingival margin and is a multifactor disease. Diet being one of the key factors in caries progression, the purpose of the study was to investigate the incidence of cervical caries in hospital attending patients and its relation to diet. 197 subjects visiting the Department of Oral Medicine and Radiology in A. B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangalore were included in the survey. A questionnaire including subject’s demographic details, oral health and dietary status was used as the survey tool. The study was an attempt to compare the incidence of root caries among the vegetarian and mixed diet. Among the 197 cases, 100 vegetarians and 97 mixed diet followers were analyzed. Chi-square and two sample independent ‘t’ tests showed statistically significant differences between the two groups. The study revealed that the percentage of root caries was higher among the vegan diet (45%) compared to the mixed diet (26%). The study was a small effort towards understanding factors associated with root caries and also possible role of protein rich non vegetarian (or mixed) dietary habit in prevention of caries.

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INTRODUCTION

The prevalence rate of cervical caries in adults (43 - 63%) and the incidence has increased due to several possibilities of risk indicators for caries (Beck, 1990). Cervical caries is a multifactor disease with the production and progression of root caries attributed to various clinical and behavioral risk factors. These risks related to the caries could be defined in a number of ways, starting from the socioeconomic status of the individual, flow rate of saliva, presence or absence of dentures etc. Incidence of root decay is well known to be significantly increasing due to factors such as poor oral hygiene, xerostomia (resulted from different diseases and medications), diet high in refined carbohydrates, poor general health, low socioeconomic status and less dental care. Diet plays the role of a very important factor in progression or prevention of caries as certain types of food may greatly increase the bacterial load that forms the plaque bringing about tooth decay (Leake, 2001). Back in time, the elderly population with cervical caries always had their teeth extracted and replaced with removable prostheses. At present, it is becoming a new area of focused research in dentistry, as more people are living to an advanced age and retaining their natural teeth (Gati and Vieira, 2011). Therefore the impact of diet in dental disease is potentially increasingly relevant. India is unique in the entire world, in concern with the dietary habit of population. Due to various religious reasons, many people in India are dependent on vegetarian diet throughout their entire life. Hence, this could be considered as an opportunity to study the effect of vegetarian and non vegetarian diet (mixed diet) over the incidence of caries (Khan et al., 2008). Epidemiological method has been used as an informative research tool in

many of the earlier reported studies to understand the factors responsible for root caries. Scientists have recommended that the burden of root caries prevalence in developing nations can be controlled by proper planning and implementing oral health programs to those at the risk of cervical caries (Ismail et al., 1997). So the present study aims to analyze the incidence of cervical caries and its relation to dietary factors in hospital attending patients of South Canara that may help to plan strategies for preventing the development and progression of cervical caries in greater risk population.

MATERIALS AND METHODS

The study comprised of 197 cases from the patients attending the Department of Oral Medicine & Radiology in A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangalore. Ethical approval was taken for the study from the Institutional ethical committee. All the study subjects volunteered to participate in the study and verbal informed consent was taken from the participants prior to the study. Healthy subjects more than 30 years of age, with no systemic disease, not under any medication and without tobacco smoking and pan chewing habits were included in the study. Dental examination was performed with the help of a mirror and probe. The examination of patients involved the sequential assessment of teeth beginning from 1 to 28. All exposed and accessible surface were examined for the root caries and the root caries index was calculated. A questionnaire was used to collect data that included questions pertaining to subject's demographic details, personal habits, oral hygiene, to classify the respondents into vegetarian or mixed diet and to examine the root caries status.

The data obtained were statistically analyzed using SPSS version 16.0 and the results were tabulated and depicted pictorially. Descriptive were reported as Mean (SD) for continuous variables and frequency (%) for categorical variables. Chi-square test was used to find an association between root caries and dietary patterns. Two sample independent t tests were used for comparison of caries status among study patterns according to diet history. A p value < 0.05 was considered statistically significant.

RESULTS

Of the 197 respondents involved in the survey, 93 were males and 104 were females. The age distribution skewed towards middle age groups with 81% of the study population ranging between 30 to 50 years and 19% being > 50 years. 37% of the participants had primary education, 42% had secondary school education, 1% fell into the intermediate, 15% of them were graduates and 5% were post graduates. Thus the subjects represented a broad range of education levels. Oral hygiene was measured in terms of frequency of brushing tooth. 69% brushed their teeth once in a day, 30% brushed twice a day and 1% brushed more than twice a day. Distribution of the respondents according to the dietary practices revealed 49.2% of the population consuming mixed diet and 50.8% consuming vegetarian diet (table 1). The frequency of consumption of vegetarian and non-vegetarian food in a mixed diet is presented in table 2. Mean root caries index (RCI) of the population was found to be 11.31 ± 2.34 . Number of exposed root surfaces was 1.20 ± 0.10 . A statistically significant difference ($p < 0.05$) was observed in the root caries contour, width, gingival margin and length ($p < 0.001$) among the vegetarian and mixed dietary habits (table 3). Association between dietary habits and visual tactile specifications such as root caries colour ($p = 0.009$); texture ($p < 0.001$) were significant. No association was found between vegetarian and mixed dietary habits and root caries plaque (table 4).

Table 1: Distribution of the study subjects by dietary habits

Vegetarian	Mixed
49.2%	50.8%

The number of subjects (n=197) in the study, consuming vegetarian and mixed diet represented in terms of percentage

Table 2: Distribution of the study subjects according to mixed diet

Frequency of food consumption	Vegetarian diet	Non vegetarian diet
1 time in a month	9 (9.3%)	4 (4.1%)
2-3 times in a month	9(9.3%)	1 (1%)
1 time in week	9(9.3%)	0 (0%)
2 times /week	15 (15.5%)	4 (4.1%)
3-4 times/ week	27 (27.8%)	13 (13.4%)
5-6 times/week	12 (12.4%)	40 (41.2%)

1 time in a day	5 (5.2%)	13 (13.4%)
2 or more times in a day	11 (11.2%)	22 (22.8%)

Frequency distribution of subjects consuming vegetarian and non vegetarian food in a mixed diet

Table 3: Two sample independent test for dietary habits and caries status

Caries status	Vegetarian diet	Mixed diet	P value
Decayed	2.24 ± 1.7*	1.63 ± 0.8*	0.001
Filled	1.87 ± 1.6	1.5 ± 0.5	0.074
Root caries length	1.30 ± 0.5*	1.06 ± 0.2*	< 0.001
Root caries contour	1.16 ± 0.4*	1.00 ± 0.0*	0.001
Root caries width	1.14 ± 0.4*	1.00 ± 0.3*	0.004
Root caries gingival margin	1.24 ± 0.5*	1.08 ± 0.2*	0.001

*Caries status measured in terms of decayed and filled root caries surface, length, contour, width and gingival margin represented as Mean ± standard deviation. Two sample independent 't' test was applied to check for the statistically significant differences between root caries in the vegetarian and mixed diet. * p value <0.05 was considered to be statistically significant.*

Table 4: Differences in root caries colour, texture and plaque between vegetarian and mixed diet

Visual tactile specifications		Vegetarian diet	Mixed diet	P value
Root caries colour	Yellow	60%	53.6%	0.009
	Light brown	10%	25.8%	
	Dark brown	30%	20.6%	
Root caries texture	Soft	67%	92.8%	<0.001
	Leathery	17%	5.1%	
	Hard	16%	2.1%	
Root caries Plaque	Visible	54%	44%	0.237
	Not visible	46%	53%	

*Chi-square statistic applied to visual tactile specifications of root caries between vegetarian and mixed diet. * p value <0.05 was considered to be statistically significant.*

DISCUSSION

Root caries is a multifactor disease. Oral hygiene, xerostomia, diet, poor general health, low socioeconomic status and less dental care is known to play a significant role in increasing the incidence of root decay. Poor health in the gingival area is usually related to these conditions and may result in dental caries (Leake, 2001). This survey was an attempt to compare the incidence of root caries among the vegetarian and mixed diet. The study involved 197 cases of which 100 vegetarians and 97 mixed diet followers were analyzed. Chi-square and two sample independent t tests showed statistically significant differences between the two groups. The study revealed that the percentage of root caries was higher among the vegan diet (45%) compared to the mixed diet (26%). The mean root caries index (RCI) was found to be 11.31 ± 2.34. Significant association was found between dietary status and visual tactile specifications such as root caries contour, length and width, gingival margin with a p value < 0.05 and were highly significant for root caries length with a p value <0.001. Significant association was found between root caries colour (p < 0.05); texture (p < 0.001) and dietary status. No association was found between root caries plaque formation and dietary status.

Vegetarian diet is relatively low in protein, long-chain n-3 fatty acids, retinol, vitamin B12, saturated fat, Ca, Zn and usually rich in carbohydrates, carotenoids, n-6 fatty acids, dietary fiber, folic acid, vitamin E, vitamin C and Mg (Key et al., 2006). A study on the relationship between the root caries and diet has shown that the contributing factors for the increase in the rate of root caries were sugar intake, malnutrition and poor oral hygiene. Also subjects high on diet in complex carbohydrate exhibit a high prevalence of root caries. Those who were caries-free consumed more foods containing crude fiber, calcium, magnesium, phosphorus and protein whereas those who had developed root caries consumed significantly more refined sugar, sucrose, glucose and fructose (Papas et al., 1995). Variability in food intake and the high amount of "hidden sugars" in the diet makes assessment difficult. Also retentiveness of food in the mouth and eating occasions play a role in the caries description and quantification. Eating patterns were

of greater concern than specific foods when investigating diet and cariogenicity relationships as revealed in a classical Vipeholm study. Increased incidence of caries among the vegetarian diet may be due to the fermentation of sugar to acid by acidogenic bacteria. This is followed by decalcification of dental enamel. However the buffering action of saliva neutralizes the acid produced and the dental caries is prevented (Bardow et al., 2000). If fermentable carbohydrate is not added to the saliva, fermentation is replaced by putrefaction, acidity gets replaced by alkalinity, and so decalcification is usually not observed. Putrefaction is the result of protein consumption. Sea food forms the major portion of non-vegetarian diet in these study subjects from South Canara, located in the southern west coast of India. It has been reported that people who eat proteinaceous foods in their diet are relatively free from root caries as the amount of acid produced in the mouth is less, when compared to the sugar intake which makes it one of the reasons for decrease in the incidence of root caries among the population that consume mixed diet (Miller, 1890). Therefore, the probable reason for decreased caries prevalence in the population on mixed diet could be attributed to the higher intake of sea food, rich in fluoride (Hegde et al., 2014).

CONCLUSION

Epidemiology of any disease is a very helpful tool to assess the actual status of the disease among population. This survey is a small effort towards understanding factors associated with root caries and also the importance of consuming protein rich non vegetarian (or mixed) diet in prevention of caries.

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