

Association of Root Caries with Oral Habits in Older Individuals Attending a Rural Health Centre of a Dental Hospital in India

JAYANNA VINAYAKA BHARATEESH¹, GANGANNA KOKILA²

ABSTRACT

Background: Many risk factors can compromise an older adult's systemic health. Among the oral ailments in the elderly, root caries is a significant one which causes tooth loss in them. Hence, there is a need to have a baseline data for understanding problem of root caries in elderly population and factors which affect its prevalence.

Aims: a) To assess the prevalence of root caries in older individuals in a rural health centre in India. b) To assess the relationship of oral habits with root caries.

Materials and Methods: The study included 210 elderly dentate and consenting individuals (123-females, 87-males) aged 55 to 75 y and above. Demographic and health behaviour data were collected through personal interviews. The subjects were examined for root caries. Statistical analyses of the data

were done using chi-square and multiple logistic regression analysis.

Results: Out of all, 94.76% of elderly patients examined had gingival recession in one or more teeth. The prevalence of root caries was 41.9%. The prevalence of root caries was significantly associated with age, perceived dryness of mouth, smoking, smoking and tobacco chewing and tobacco chewing only ($p < 0.05$). There was significantly higher root caries in the age group of 75 years and above (OR-3.67).

Conclusion: It was evident from our study that root caries prevalence was high in elderly population. Age, root surfaces with recession, deleterious oral habits such as smoking, tobacco chewing, and dryness of mouth had a definite effect on the prevalence of root caries.

Keywords: Aged, Gingival recession, Habits, Prevalence, Root caries, Tooth loss

INTRODUCTION

Demographic ageing, a global phenomenon has hit Indian shores as well. The combination of increased birthrate and declining mortality during the twentieth century has resulted in large increase in elderly population [1]. India's 60 and older population is expected to encompass 323 million people by mid of 21st century. This profound shift in the share of older Indians brings with it a variety of social, economic and health care policy challenges [2]. Many risk factors can compromise an older adult's systemic health such as socio-demographic variables, nutrition/diet and weakened immune system [3]. Dental practitioners face a unique challenge of providing specialized dental care to the elderly population. Among the oral ailments which are observed by dental practitioners in elderly, root caries is a significant one. Tooth loss is chief oral health-related negative variable to quality of life in elderly and root caries is the major cause of tooth loss in them [4]. It has been reported, about a third of older population bears most of the root caries burden [5].

Hazen et al., defined root caries as "a soft, irregular progressive lesion that is found anywhere on the root surface that has lost connective tissue attachment and is exposed to the oral environment" [6]. In recent years with increasing oral health awareness and advanced treatment modalities more people retain their natural teeth into old age. With the old age there is susceptibility to periodontal problems, leading to gingival recession and root surfaces getting exposed to oral environment making them vulnerable to root caries [7]. Any caries-prone patient having gingival recession can develop root caries. However, elderly persons are vulnerable to root caries due to several associated medical conditions and uses of medications which reduce salivary flow leading to dry mouth.

Studies regarding prevalence of root caries in Indian population are sparse. Hence, there is a need to have a baseline data for understanding problem of root caries in elderly population and factors

which affect its prevalence. The present study was conducted to assess the prevalence of root caries in older individuals attending rural health centre of a dental hospital in India. An attempt was made to assess the relationship between oral habits and root caries.

MATERIALS AND METHODS

The study included 210 elderly dentate and consenting individuals (123-females, 87-males) attending a rural health centre of a dental hospital situated in Tumkur, South Karnataka, India. The age of the study group ranged from 55 y to 75 y and above. Demographic and health behaviour data were collected through personal interviews using a structured and validated questionnaire.

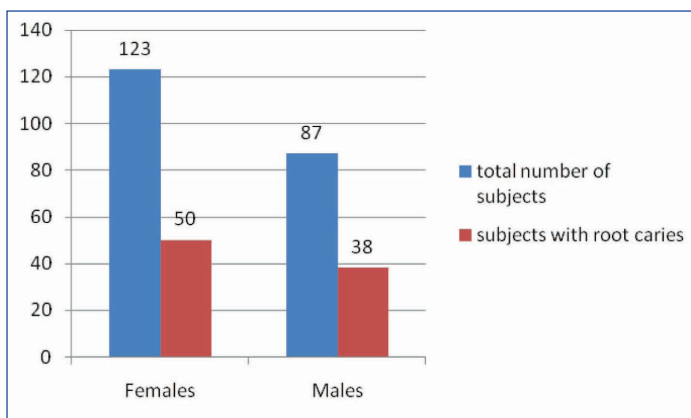
The subjects were examined for root caries using mouth mirror and exploratory probe on dental chair by a single examiner. Intraexaminer reliability was tested for the index and the kappa value obtained was 0.89. Presence of root caries lesions was recorded in a full mouth design, excluding the third molars. Root caries was assessed using Root caries index (RCI) by Katz [8].

The following criteria were used for diagnosis of recession and root caries

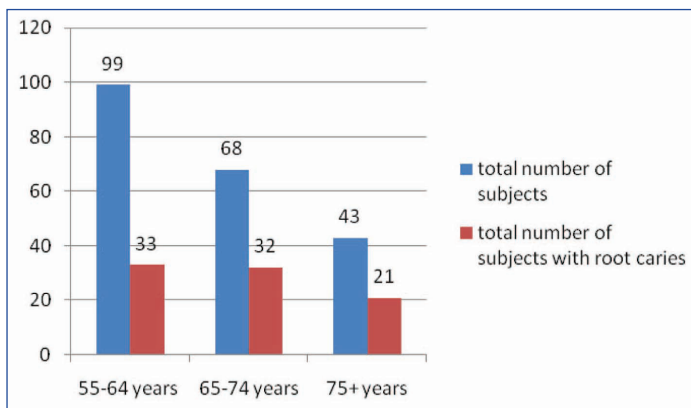
- Recession was considered to be present when the cemento-enamel junction was visible.
- Root surface was considered carious when it was well defined, darkened, discolored and allowed easy penetration with an explorer.

STATISTICAL ANALYSES

Statistical analyses of the data were done using chi-square test in SPSS 10 for categorical variables; multiple logistic regression analysis was done to determine the independent effect of each variable.



[Table/Fig-1]: Root caries occurrence in the study population



[Table/Fig-2]: Root caries occurrence in different age groups

RESULTS

A total of 210 dentate elderly patients (123-females, 87-males) with age range from 55 y to 75 y and above (mean age 61.7±7.6y) were examined to assess the prevalence of root caries. Among these 199 (94.76%) had gingival recession in one or more teeth exposing root surface. The prevalence of root caries among the examined elderly population was 41.9% (88 people), out of which 50 (40.6%) were females and 38 (43.6%) were males [Table/Fig-1].

Data showed there was difference in prevalence of root caries among different age groups [Table/Fig-2]. The prevalence of root caries in age group of 55-64 y was 33.3% (mean 0.6), in age group of 65-74 y it was 47% (mean 1.3) and in age group of 75 y and above it was found to be 48.8% (mean 3.9).

It was found that there was association between different variables and prevalence of root caries. The prevalence of root caries was significantly associated with age, perceived dryness of mouth, smoking, smoking and tobacco chewing and tobacco chewing only ($p < 0.05$) [Table/Fig-3]. The result of multiple logistic regressions shows significantly higher root caries in the age group of 75 y and above (OR-3.67). Older individuals having dry mouth, smoker's, persons with both smoking and tobacco chewing habit as well as only tobacco chewers present with a higher prevalence of root caries.

DISCUSSION

Though edentulousness is a major problem in older population, dentate older individuals have their share of problems too in the form of root caries, which decreases functional ability of their remaining teeth.

In our study prevalence of root caries was found to be 41.9% which is similar to reports in older adults of Japan (39%) and China ((43.9%) [9]. In contrast, studies done in Sri Lanka and Brazil report a much higher prevalence of root caries in older adults with 89.7% and 78% prevalence respectively [10, 11].

Independent variables		N	Root caries present	Percentage of respondents with RCI>0(n=210)	OR
Age	55-64	99	33	33.33	3.67
	65-74	68	32	47.05	
	75 & above	43	21	48.85*	
Sex	Male	87	38	43.67	1.13
	Female	123	50	40.65*	
Perceived dryness of mouth	Yes	123	82	66.6	2.24
	No	87	41	47.1*	
Smoking (Males only)	Yes	35	22	62.8	3.84
	No	52	16	30.7*	
Smoking and tobacco chewing (Males only)	Yes	28	17	60.0	3.19
	No	59	19	32.2*	
Tobacco chewing (Males and females)	Yes	69	45	65.2	4.73
	No	141	39	27.6*	

[Table/Fig-3]: Logistic regression analysis results for root caries with RCI>0 among older individuals., * $p < 0.05$, OR-Odds Ratio

In the present study it was observed that prevalence of root caries was around 48.8% in elderly population in the age group of 75 y and above. This finding was found to be similar to studies done in England and Greece where the prevalence of root caries was around 52% and 40% respectively in this age group of elderly population [12,13]. In our study, we found root caries prevalence increased with advancing age. Similar report of increased risk of root caries with age is seen with elderly people of three different English communities in U.K and community dwelling elders in New England [12,14]. A study conducted on coronal and root decay in older adults of Canada, concluded that gingival recession was one factor consistently associated with root caries and confirmed that root caries cannot occur without apical migration of periodontal attachment [15]. In our study we found 94.76% of the study population had recession in one or more teeth. However, Ritter et al., [16]. considers gingival recession to be sine qua non factor for root caries and hence investigators may not use it as an explanatory variable. Further, they feel gingival recession is omnipresent in older adults, and it should not be considered a significant predictor of root caries.

As we age, immune system weakens and fewer antimicrobial immunoglobulins are produced and found in saliva [17]. Pharmacological agents with xerostomic side effects, Sjögren's syndrome and therapeutic radiation to the head and neck region lowers salivary flow rate to pathological levels which elevates patient's risk of caries [18]. Physical inability to maintain good oral hygiene, gingival recession may increase the susceptibility of elderly population for increased prevalence of root caries [19]. The present study indicates that nearly 60% of elderly population examined suffered from xerostomia and is one of the significant risk factors for developing root caries. Though the study does not take into consideration diabetes as one of the predisposing factor for root caries, studies on Indian population with type -2 diabetes suffering with periodontal disease have shown a positive correlation [20].

62.8% of the older individuals in the present study had deleterious habits and there is a significant correlation of root caries occurrence with deleterious habits. This is similar to studies conducted in Sri Lanka and China on older individuals [10,21]. We found the prevalence of root caries was more among tobacco chewers and smokers. This finding is in agreement with results of study done in U.S.A which showed that in addition to its established role as a carcinogen, chewing tobacco may be a risk factor in development of root-surface caries [22]. A ten year cross sectional study done in an elderly group of Swedish individuals showed among other factors

the daily number of cigarettes used and root caries incidence had a Positive correlation [23].

It was found that the use of smokeless tobacco increased the prevalence of gingival recession with associated attachment loss, cervical abrasion and root caries [24].

Many risk factors associated with the occurrence of root caries have been identified and these include oral, medical, mental, behavioural and psychosocial conditions [25].

Various studies have shown a positive correlation between tobacco and dental caries, one of the main reasons quoted seems to be the presence of high amount of various sugars and sweeteners added during the commercial manufacture of smokeless tobacco products, the same may old good for smoking tobacco since many cigarette manufacturers use sugar as a flavoring, casing and humectants to enhance the taste and make it less harsh on the throat [26,27].

Though there are ample number of studies done on root caries, only a few are done on Indian elderly population in rural areas, the present study which is done in a rural set up sheds light on the increased prevalence of root caries and its association with oral habits.

CONCLUSION

It was evident from our study that root caries prevalence (41.9%) was high in elderly population. Age, root surfaces with recession, deleterious oral habits such as smoking, tobacco chewing, and dryness of mouth had a definite effect on prevalence of root caries. As the occurrence of root caries is influenced by many factors, it becomes imperative to identify risk factors at the individual level. Older individuals should be motivated to improve and maintain a diligent oral health regime. Appropriate fluoride supplements can be used for remineralization of incipient lesions. Older individuals with deleterious habits such as smoking, chewing tobacco should be counseled to quit the habits in view of his/her general and oral health.

Though the findings of this study are positive it may not be generalized because the sample size was low, further studies with a higher sample size and variables are required.

REFERENCES

- [1] Rajan SI, Sarma PS, Mishra US. Demography of Indian Ageing, 2001-2051. *J Aging Soc Policy*. 2003;15(2-3):11-30.
- [2] Population Reference Bureau [Internet]. India's Aging Population. Issue 25, March 2012. Available from: <http://www.prb.org/Publications/Reports/2012/india-older-population.aspx> (last accessed on 31st October 2014).
- [3] Shah N, Sundaram KR. Impact of socio-demographic variables, oral hygiene practices, oral habits and diet on dental caries experience of Indian elderly: a community-based study. *Gerodontology*. 2004;21(1):43-50.
- [4] Saunders RH, Meyerowitz C. Dental caries in older adults. *Dent Clin North Am*. 2005;49(2):293-308.
- [5] Griffin SO, Griffin PM, Swann JL, Zlobin N. Estimating rates of new root caries in older adults. *J Dent Res*. 2004;83:634-38.
- [6] Sivapathasundaram B, Raghu AR. Dental Caries. In: Rajendran R, Sivapathasundaram B. (eds.) *Shafers Text Book of Oral Pathology*. 5th ed. New Delhi, India. Elsevier; 2006. P. 568-658.
- [7] Randa E Shaker. Diagnosis, prevention and treatment of root caries. *Saudi Dental Journal*. 2004;16(2):84-86.
- [8] Katz RV. Assessing root caries in populations: the evolution of the root caries index. *J Public Health Dent*. 1980;40(1):7-16.
- [9] Imazato S, Ikebe K, Nokubi T, Ebisu S, Walls AW. Prevalence of root caries in a selected population of older adults in Japan. *J Oral Rehabil*. 2006;33(2):137-43.
- [10] Kularatne S, Ekanayake L. Root surface caries in older individuals from Sri Lanka. *Caries Res*. 2007;41(4):252-56.
- [11] Watanabe MG. Root caries prevalence in a group of Brazilian adult dental patients. *Braz Dent J*. 2003;14(3):153-56.
- [12] Joshi A, Douglass CW, Jette A, Feldman H. The distribution of root caries in community-dwelling elders in New England. *Public Health Dent*. 1994;54(1):15-23.
- [13] Mamai-Homata E, Topitsoglou V, Oulis C, Margaritis V, Polychronopoulou A. Risk indicators of coronal and root caries in Greek middle aged adults and senior citizens. *BMC Public Health*. 2012;12:484.
- [14] Steele JG, Walls AW, Ayatollahi SM, Murray JJ. Major clinical findings from a dental survey of elderly people in three different English communities. *Br Dent J*. 1996;180(1):17-23.
- [15] Locker D, Leake JL. Coronal and root decay experience in older adults in Ontario, Canada. *J Public Health Dent*. 1993;53(3):158-64.
- [16] Ritter AV, Shugars DA, Bader JD. Root caries risk indicators: a systematic review of risk models. *Community Dent Oral Epidemiol*. 2010;38(5):383-97.
- [17] Taub DD, Murphy WJ, Longo DL. Rejuvenation of the aging thymus: growth hormone-mediated and ghrelin-mediated signaling pathways. *Curr Opin Pharmacol*. 2010;10(4):408-24.
- [18] Närhi TO, Meurman JH, Ainamo A. Xerostomia and hyposalivation: causes, consequences and treatment in the elderly. *Drugs Aging*. 1999;15(2):103-16.
- [19] Gati D, Vieira AR. Elderly at greater risk for root caries: a look at the multifactorial risks with emphasis on genetics susceptibility. *Int J Dent*. 2011;2011:647168.
- [20] Sugandhini soni, mohit Mehta. Root caries among type 2 diabetes mellitus patient visiting a hospital. *Spec Care Dentist*. 2014;20(10):1-5.
- [21] Du M, Jiang H, Tai B, Zhou Y, Wu B, Bian Z. Root caries patterns and risk factors of middle-aged and elderly people in China. *Community Dent Oral Epidemiol*. 2009;37(3):260-66.
- [22] Tomar SL, Winn DM. Chewing tobacco use and dental caries among US men. *J Am Dent Assoc*. 1999;130(11):1601-10.
- [23] Solveig Fure. Ten years cross sectional and incidence study of coronal and root caries and some related factors in elderly Swedish individuals. *Gerodontology*. 2004;21(3):130-40.
- [24] PB Robertson. Oral effects of smokeless tobacco use by professional base ball players. *ADR*. 1997;11(3):307-12.
- [25] D Galan, Edward lynch. Epidemiology of root caries. *Gerodontology*. 1993;10(2):59-71.
- [26] Deborah M Winn. Tobacco Use and Oral Disease. *Journal of dental education*. 2001;65(4):306-12.
- [27] Sajith vellapally, Z denek fiala. Influence of tobacco use in dental caries development. *Cent Eur J Public Health*. 2007;15(3):116-21.

PARTICULARS OF CONTRIBUTORS:

1. Professor and Head, Department of Public Health Dentistry, Sri Siddhartha Dental College, Sri Siddhartha Academy of Higher Education, Tumkur, India.
2. Professor, Department of Oral Pathology, Sri Siddhartha Dental College, Sri Siddhartha Academy of Higher Education, Tumkur, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Bharateesh. J.V,
Professor and Head, Department of Public Health Dentistry, Sri Siddhartha Dental College,
Sri Siddhartha Academy of Higher Education, Tumkur-572107, India
Phone : +919886671940, E-mail : bharteshmids1973@yahoo.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Feb 02, 2014**
Date of Peer Review: **Jul 17, 2014**
Date of Acceptance: **Sep 17, 2014**
Date of Publishing: **Nov 20, 2014**