

Prevalence Of Root Surface Caries And It's Relationship To Dental Health Practices In Enugu, Nigeria

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Abstract:

Background: Root caries is an increasing clinical problem especially in the dentate elderly population. There is clear consensus that root caries is a growing concern in oral health. Hence, there is a need to have a baseline data for understanding problem of root caries and factors which affect its prevalence.

Aims: a) To assess the prevalence of root surface caries in adults attending a tertiary health hospital in Enugu, Nigeria. b) To assess the relationship of dental health practices to root surface caries.

Materials and Methods: This cross-sectional study included 520 adults, aged 20yrs and above. 270 (51.9%) were males and 250(48.1%) were females. Structured questionnaires were administered and examination for root surface caries was done by visual-tactile method according to Banting's diagnostic convention and oral hygiene status was assessed using the simplified oral hygiene index. Data was collated and analyzed using SPSS version 20. Chi square test was used for the comparison of means and P-value was set at 0.05.

Results: The prevalence of root caries among the examined population was 18.8% (Fig-1). The prevalence of caries significantly increased with increasing age group, with a 55.2% prevalence amongst the 60years and above age group ($p=0.000$). The prevalence of root caries was significantly associated with age, oral hygiene status, use of refined carbohydrate and smoking ($p<0.05$). While association with frequency of tooth brushing and dental clinic attendance was not established in this study.

Conclusion: Root surface caries does not constitute a serious health problem in the studied population (18.8%). However, it was evident from our study that root surface caries prevalence was high in the elderly age group. The root surface caries was strongly associated with the elderly, poor oral hygiene, use of refined carbohydrate and smoking, therefore, improved oral hygiene, reduced use of refined carbohydrate and smoking to eliminate the factors predisposing to root surface caries formation is highly recommended in the study population. The findings of this study may not be generalized because the sample size was low, further studies among the elderly only, with a higher sample size and more variables are required.

Key Words: Prevalence, Root caries, Oral hygiene, Enugu

Date of Submission: 08-09-2021

Date of Acceptance: 23-09-2021

I. Introduction

Root surface caries is a soft, progressive, destructive lesion; either totally confined to the root surface or involving undermining of enamel at the cement-enamel junction but clinically indicating the lesion initiated on the root surface.¹ It is a growing concern in oral health.² It is initiated when there is periodontal attachment loss and the root surface become exposed to the oral environment.³ Individuals now retain their teeth longer in life due to wide availability of preventive and therapeutic oral care products, increased awareness of the importance of good oral hygiene as well as the current increased life expectation.^{4,5}

Interestingly, measuring the exact prevalence of root caries is challenging, as the studies^{6,7} that have been performed were focusing on certain risk groups, thus leading to a bias when comparing the data. There are also variations in occurrence of root caries from place to place.⁶

There are many factors which set off a chain of events which inevitably lead to this exposure, leaving the root surface susceptible to decay. Among these factors are: periodontal disease associated with loss of gingival attachment, coupled with xerostomia⁸, poor oral hygiene⁹, or a cariogenic diet¹⁰, nutritional status¹¹, chronic medical condition¹², physical limitation^{13,14}, multiple medication use that decreases the salivary flow,¹⁵ infrequent use of dental services¹⁶, wearing of partial dentures¹⁷, and large number of missing teeth¹⁷, smoking.¹⁸

However, there is clear consensus that root caries has become one of the main upcoming issues in dentistry⁶, yet there is dearth of literature on occurrence of root caries in Enugu, south eastern Nigeria.

Therefore, the purpose of this study was to assess the prevalence of root surface caries and its relationship to dental health practices in Enugu, Nigeria. This study will provide a baseline data for understanding, prevention and monitoring of root caries in Enugu.

II. Material And Methods

This cross-sectional study included 520 adults, aged 20yrs and above. 270 (51.9%) were males and 250(48.1%) were females. All participants were recruited at the General Out-Patient Clinic of University of Nigeria Teaching Hospital Ituku Ozalla Enugu from May 2018 to April 2019, following satisfaction of the inclusion criteria.

Ethical clearance was obtained from the UNTH Research Ethics committee and informed consent obtained from all the participants before recruitment. Structured questionnaires were administered to participants to elicit demographic information and oral hygiene practices. Interexaminer reliability was tested for the two examiners who conducted the assessments. Kappa value for Banting's Diagnostic Convention and simplified hygiene index were obtained as 0.87 and 0.89 respectively

The following criteria were used for the diagnosis of root caries and oral hygiene:

Root surface caries was identified using criteria described by Banting et al'. For identification of root caries, following criteria was for categorizing it into present or absent. 1) A discrete well-defined and discoloured soft area. 2) An explorer enters easily and displays some resistance. 3) The lesion is located either in the cemento-enamel junction or wholly on the root surface. Root surface caries was recorded on exposed buccal/labial and palatal/lingual aspects of the roots of each tooth. Root caries was dichotomized into root caries present and root caries absent.

Criteria for classifying debris¹⁹:

0 - No debris or stain present

1. Soft debris covering not more than one third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered

2. Soft debris covering more than one third, but no more than two third, of the exposed tooth surface.

3. Soft debris covering more than two thirds of the exposed tooth surface¹⁹.

Data was collated and analyzed using SPSS version 20. Chi square test was used for the comparison of means and P-value was set at 0.05.

III. Result

A total of 520 adult patients recruited into the study(male-270, 51.9%; females-250, 48.1%). Out of this, 98(male=48, female=50) had root surface caries. The overall prevalence of root caries among the examined population was 18.8% (Fig-1).

The participants were divided into 5 groups: 20–29years (104), 30–39years (125), 40–49years (98), 50–59years (88), 60years and above (105). The prevalence of caries significantly increased with increasing age group, with a 55.2% prevalence amongst the 60⁺ age group (p=0.000). This 60⁺age group also had the highest severity (Fig. 2).

Gender was not significantly associated with root surface caries. 9.61% (50/520) were females in the study population while 9.2% (48/520) were males (Table 1).

In this study group, 255(49.0%) participants brushed once daily, 202(38.8%) brushed twice daily, while others were accounted for by 63(12.1%). There was no significant association of root surface caries with frequency of tooth brushing (p=0.373).

Using the simplified Oral Hygiene Index, 218 (49.0%) participants had no debris or stains present (code 0), while 240(46.2%) had soft debris covering not more than one third of the tooth surface or presence of the extrinsic stains (code 1), 47(9.0%) had soft debris covering more than one third but not more than two third. (code 2) and 15(2.9%) had soft debris covering more than two third of the exposed tooth surface (code 3). 24 (11.0%) patients with code 0 oral hygiene status has root surface caries, while 55(22.9%) patients with code 1 status had root caries. 12(25.5%) of code 2 status and 7(46.7%) of code 3 status has root caries (Table 1). Oral hygiene status was significantly associated with the occurrence of root caries (P= 0.000). Percentage of root caries increased with increase in severity of poor oral hygiene.

Regarding the use of refined carbohydrates, 333(64.0%) patients used refined sugar regularly while 66(12.7%) did not use refined sugar. 121(23.0%) patients admitted using refined sugar occasionally. 68(20.4%) of patients using refined carbohydrates regularly had root caries while 15(22.7%) of patients who did not use refined carbohydrate had root caries. 15(12.4%) of occasional users had caries. Use of refined carbohydrate was statistically significantly associated with root caries occurrence in this study (Table 2).

Majority (94.4%) of the participants in this study did not smoke cigarette. 13(44.8%) of those who smoked cigarette had root caries while 85(17.3%) of non-cigarette smokers had root caries. There was a significant association of cigarette smoking with occurrence of root caries (P = 0.001).

Many participants (395) declared not to have attended the dental clinic, while 85(16.3%) attended occasionally. Only 40 (7.7%) have been regular attendees to the dental clinic. Out of these only 7 (17.5%) of regular attendees and 13 (15.3%) of the occasional attendees had root caries. 78(19.7%) non-dental attendees also had root caries. There was no significant association of occurrence of root caries with dental attendance in this study.

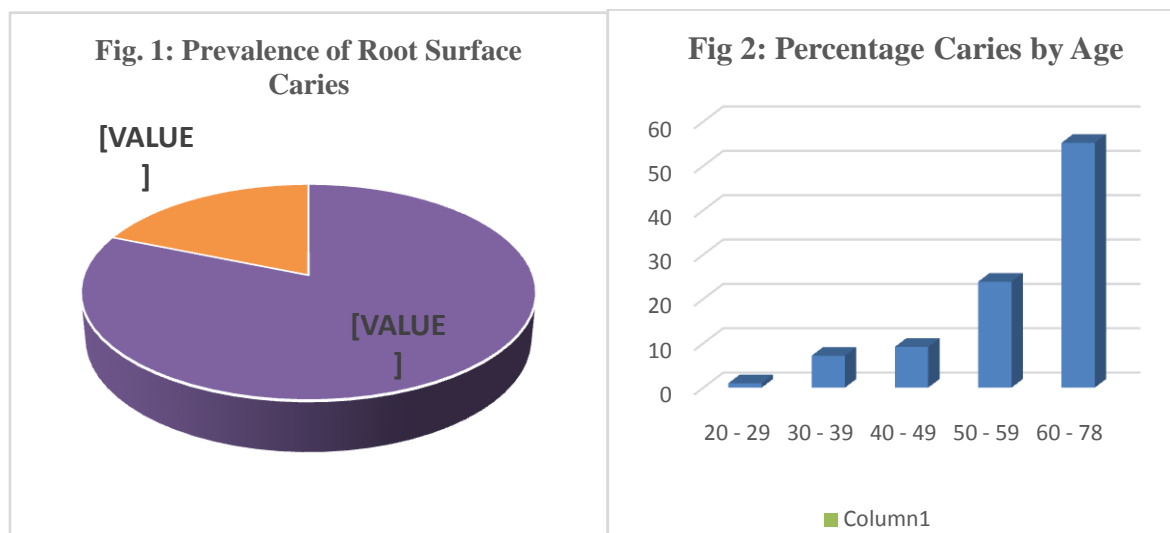


Table 1: Root Surface Caries by Sociodemographic variables and dental health practices

Variable	Score	Present n(%)	Absent n(%)	Total 520 (100%)	X ²	P-value
Age	20 – 29	1 (1.0)	103(99.0)	104(20.0)	168.389 ⁺	0.000*
	30 – 39	9 (7.2)	116(92.8)	125(24.0)		
	40 – 49	9 (9.2)	89 (87.2)	98(18.8)		
	50 – 59	21 (23.9)	67 (75.3)	88(16.9)		
	60 ⁺	58 (55.2)	47 (44.8)	105(20.2)		
Gender	Female	50 (20.0)	200(80.0)	250(48.0)	35.728 ⁺	0.100
	Male	48(17.8)	222(82.2)	270(51.9)		
Tooth brushing	< Once daily	35(13.7)	220(86.3)	255(49.0)	21.408 ⁺	0.373
	Twice daily	52(25.7)	150(74.3)	202(38.8)		
	Others	11(17.5)	52(82.5)	63 (12.1)		
Oral hygiene status	0	24 (11.0)	194(89.0)	218(41.9)	71.22 ⁺	0.000*
	1 – 2	55(22.9)	185(77.1)	240(46.2)		
	3 – 4	12(25.5)	35 (74.5)	47 (9.0)		
	5 ⁺	7 (46.7)	8 (53.8)	15 (2.9)		
Uses of refined carbohydrate	Yes	68 (20.4)	265(79.6)	333(64.0)	34.933 ⁺	0.020*
	No	15(22.7)	51(77.3)	66(12.7)		
	Occasionally	15(12.4)	106(87.6)	121(23.0)		
Smoking	Yes	13 (44.8)	16 (55.2)	29 (5.6)	32.188 ⁺	0.001*
	No	85(17.3)	406(82.7)	491(94.4)		
Dental attendance	Yes	7 (17.5)	33 (82.5)	40 (7.7)	28.304 ⁺	0.102
	No	78 (19.7)	317(80.3)	395(76.0)		
	Occasionally	13 (15.3)	72 (84.7)	85(16.3)		

+ Likelihood of Chi-square

*Statistically Significant

Table 2: Distribution of Root Surface Caries

Variables	Root Surface Caries Distribution (%)						X	P
	1 N=51	2 N=22	3 N=16	>3 N=9	None N= 422			
Tooth brushing: < once daily twice daily Others	16 (31.4)	11 (50.0)	5 (31.2)	3 (33.3)	220 (52.1)	21.408 ⁺	0.373	
	28 (54.9)	10 (45.5)	9 (56.3)	5 (55.6)	150 (33.5)			
	7 (13.7)	1 (4.5)	2 (12.5)	1 (11.1)	52 (12.3)			
Oral hygiene status 0	18 (35.3)	5 (22.7)	0 (0)	1 (11.1)	194 (46.0)			

1 – 2	30 (58.8)	13 (59.1)	6 (37.5)	6 (66.7)	185 (43.8)	71.22 ⁺	0.000*
3 – 4	2 (3.9)	4 (18.2)	4 (25.0)	2 (22.2)	35 (8.3)		
5 ⁺	1 (2.0)	0 (0)	6 (37.5)	0 (0)	8 (1.9)		
Uses of refined carbohydrate						34.933 ⁺	0.020*
Yes	41 (80.1)	9 (40.9)	12 (75.0)	6 (66.7)	265 (62.8)		
No	3 (5.9)	6 (27.3)	4 (25.0)	2 (22.2)	51 (12.1)		
Occasionally	7 (13.7)	7 (31.8)	0 (0)	1 (11.1)	106 (25.1)		
Smoking						32.188 ⁺	0.001*
Yes	5 (9.8)	4 (18.2)	4 (25.0)	0 (0)	16 (3.8)		
No	46 (90.1)	18 (81.8)	12 (17.0)	9 (100)	406 (96.2)		
Dental attendance						28.304 ⁺	0.102
Yes	2 (3.9)	5 (22.7)	0 (0)	0 (0)	33 (7.8)		
No	46 (90.2)	12 (54.5)	13 (81.3)	7 (77.8)	317 (75.1)		
Occasionally	3 (5.9)	5 (22.7)	3 (18.7)	2 (22.2)	72 (17.0)		

+ Likelihood of Chi-square

*Statistically Significant

IV. Discussion

Root surface caries has been and continued to be a major problem for the geriatric population. Therefore, management of root caries in older patients is predicted to be one of the greatest challenges facing the dental profession in the future⁴. The prevalence of root surface caries was found to be 18.8% in this study. This compares favourably with the findings of 18.6% by Saura-Moreno¹⁰ among the 35 – 44years old Spanish adults, 11.6% prevalence by previous study in Ile-Ife, Nigeria²⁰ and 11.1% reported by Mamai-Homata et al²¹ amongst 35-44-year-old Greek population. It differs from the wide range of 25-100% prevalence^{6,18} previously reported. This may be because this study was conducted among the entire range of adult population and not just the elderly. Though, considering only the participants aged 60 years and above, the prevalence was found to be 55.2% and this is similar to the findings of 48.8%, 52% and 43.9% amongst the elderly in India¹⁸, England²², and China¹⁶ respectively, though still lower than 89.7% and 78% prevalence found in the older adults of Sri Lanka²³ and Brazil²⁴.

In our study we found that roots caries prevalence significantly increased with advancing age. Similar reports of increased risk of roots caries with age is seen in the older individuals attending a rural health center in India¹⁸ and with the elderly people of three different English communities in UK²². However no statistical association between roots caries and age was found by Udoye and Olusile al²⁰ and Kumara Rajah and Radha¹⁵. This increasing prevalence with age was considered by Soniet al²⁵ not to be due to aging but might be a product of general deterioration in the oral health which often accompanies growing old. They also considered physical incapability, psychological impairment and less motivation as the main reasons for root caries development as age advances.

There was no significant association between gender and roots caries occurrence. This agrees with the study of Udoye and Olusile²⁰, but differs from the reports of Saura Moreno¹⁰ that higher root caries prevalence was associated with male gender.

The relationship between frequency of tooth brushing and root caries was not proven in this study, though it contrasts with the finding of some previous studies^{10,15}, where lower frequency of tooth brushing was associated with high root caries prevalence.

Poor oral hygiene was significantly related to increase roots caries in this study. This is in agreement with some previous findings^{15,20}. Maintenance or improvements of oral hygiene is the first step towards prevention of roots caries. Gati and Vieira⁹ had reported that physical inability to maintain good oral hygiene and gingival recession increases the susceptibility of elderly population to increased prevalence of root caries.

The relationship between intake of refined carbohydrates and occurrence of root caries was proven in this study. Though contrasts with the finding of Udoye and Olusile²⁰ amongst Nigerians, this agrees with the report of Saura Moreno et al¹⁰, that use of refined carbohydrates is a predictor of root surface caries. The habit of “snacking between meals” and root caries association is a logical and expected one, as it is associated with crown caries. The frequency of starches and sugar intake, and their permanence in the mouth environment, are considered more important than the sugar intake amount²¹. The consumption of soft drinks and sugary drinks is increasing in developing countries, and nowadays, it could be an important factor for enamel erosion, making the cervical area more susceptible to these type of lesions.

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 attachment¹³. In our study many of the older population had recession in one or more teeth. However, Ritter et al.¹⁷, 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.

The prevalence of root caries was more among the tobacco smokers, and the results were found to be statistically significant. This finding was in agreement with studies done by Bharateesh and Kokila¹⁸. Robertson²⁶ considered that the use of smokeless tobacco increased the prevalence of gingival recession with associated attachment loss, cervical abrasion and root caries.

Non-dental attendance was related to increased occurrence of root caries, though not statistically significant. This agrees with the finding at Ile-Ife²⁰. In Enugu, generally, the dental seeking habit of most inhabitants is poor²⁷.

V. Conclusion

Root surface caries does not constitute a serious health problem in the studied population (18.8%). It was evident from our study that root surface caries prevalence was high in the elderly age group (59.2%). The root surface caries was strongly associated with the elderly, poor oral hygiene status and smoking in this study, therefore, improved oral hygiene and reduced smoking to eliminate the factors predisposing to root surface caries formation is highly recommended in the study population. The findings of this study may not be generalized because the sample size was low, further studies among the elderly only, with a higher sample size and variables are required.

References

- [1]. Griffin SO, Griffin PM, Swann JL, Zlobin N. Estimating rates of new root caries in older adults. *J Dent Res.* 2004; 83:634-38
- [2]. Walls A. Aging-a call to arms! *J Dent Res.* 2017;96:721-722
- [3]. Shay K. Root caries in the older patients: significance, prevention and treatment. *Dent clin North Am.* 1997; 41:763-794.
- [4]. Amaechi BT, Phillips TS, Evans V, Ugwokaegbe CP, Luong MN, Okoye LO, Meyer F, Enax J. The Potential of Hydroxyapatite Toothpaste to Prevent Root Caries: A pH-Cycling Study. *Clinical, Cosmetic and Investigational Dentistry* 2021;13: 315-324
- [5]. Fure S. Ten-year cross-sectional and incidence study of coronal and root caries and some related factors in elderly Swedish individuals. *Gerodontology.* 2004; 21(3):130-140.
- [6]. Hayes M, Burke F, Allen PF. Incidence, Prevalence and Global Distribution of Root Caries. In: Carrilho MRO, editor. *Root Caries: From Prevalence to Therapy.* Karger; 2017;26:1-8
- [7]. Banting DW, Papas A, Clark DC, Proskin HM. Effectiveness of 10% chlorhexidine varnish treatment on dental caries incidence in adult with dry mouth. *Gerodontol.* 2001; 17(2): 2-11.
- [8]. Kassebaum N, Bernabé E, Dahiya M, Bhandari B, Murray C, Marcenes W. Global burden of untreated caries *J. Dent. Res.* 2015;94: 650-658
- [9]. Gati D, Vieira AR. Elderly at greater risk for root caries: a look at the multifactorial risks with emphasis on genetic susceptibility. *Int J Dent.* 2011:647168.
- [10]. Saura-Moreno C, Cortés-Arcas MV, Fernández-Meseguer A, Calvo-Bonacho E, Llodra-Calvo JC. Root caries analysis in working population of 35-44 years of age (Spain). *Med Oral Patol Oral Cir Bucal.* 2017;22 (5):527-35.
- [11]. Sheiham A, Steel JG, Marcenes W, Bates CJ, Prentice A, Lowe C, Finch S, Walls AWG. The relationship between dental status and haematological and biochemical measures of nutritional status among older people. A national survey of older people in Great Britain.
- [12]. Yoshihara A, Hanada N, Miyazak M. Association between serum albumin and root caries in community dwelling older adults.
- [13]. Locker D. Incidence of root caries in an older Canadian population. *Community Dent Oral Epidemiol.* 1996; 24: 37-40.
- [14]. Shimazaki Y, Soh I, Sailo T, Yamashita Y, Koga T, Miyazaki H, Takeheva T. Influence of dentition status on physical disability, mental impairment and mortality in institutionalized elderly people. *J Dent Res.* 2001; 80: 340-345.
- [15]. Kumara-Raja B, Radha G. Prevalence of root caries among elders living in residential homes of Bengaluru city, India. *J ClinExp Dent.* 2016;8 (3):260-7.
- [16]. Imazato S, Ikebe K, Nokubi T, Ebisu S, Walls AWG, Prevalence of root caries in a selected population of older adults in Japan. *J Oral Rehabil.* 2006; 33:137-143.
- [17]. Ritter, D.A. Shugars, J.D. Bader JD. Root caries risk indicators: a systematic review of risk models *Community Dent. Oral Epidemiol.* 2010;38: 383-397
- [18]. Bharateesh JV, Kokila G. Association of root caries with oral habits in older individuals attending a rural health centre of a dental hospital in India. *J ClinDiagn Res.* 2014;8:ZC80-2.
- [19]. World Health Organisation. *Oral Health Surveys. Basic Methods.* 5th edition. 2013:36 – 42.
- [20]. Udoye CI, Olusile OA. Root Surface Caries Occurrence, Oral hygiene status and Habits in a selected suburban population, Ile-Ife, Nigeria. *Nigerian Journal of Health and Biomedical Sciences.* 2006; 66-71
- [21]. 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.

- [22]. 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.
- [23]. Kularatne S, Ekanayake L. Root surface caries in older individuals from Sri Lanka. *Caries Res.* 2007;41(4):252-56.
- [24]. Watanabe MG. Root caries prevalence in a group of Brazilian adult dental patients. *Braz Dent J.* 2003;14(3):153-56.
- [25]. Soni S, Mehta M, M AD, P R, Pallavi, Kadanakuppe S, Nagashree B V. Root caries among type 2 diabetes mellitus patient visiting a hospital. *Spec Care Dentist.* 2014;34:273-7.
- [26]. Robertson PB. Oral effects of smokeless tobacco use by professional baseball players. *ADR.* 1997;11(3):307-12.
- [27]. Okoye LO, Ekwueme OC. Prevalence of dental caries in a Nigerian Rural Community: A Preliminary Local Survey. *Annals of Medical and Health Sciences Research* 2011; 1(2):187 – 192.

Linda O. Okoye, et. al. "Prevalence Of Root Surface Caries And It's Relationship To Dental Health Practices In Enugu, Nigeria." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(09), 2021, pp. 14-19.