Prevalence of Root Caries in South Canara Population

Mithra Nidarsh Hegde¹, Mrinalini¹* and Nireeksha Shetty¹

¹Department of Conservative Dentistry and Endodontics, A B Shetty Memorial Institute of Dental Sciences, Nitte University, Mangaluru, Karnataka, India.

Authors’ contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI:10.9734/JAMMR/2018/44638

(1) Dr. Ibrahim El-Sayed M. El-Hakim, Professor, Ain Shams University, Egypt and Riyadh College of Dentistry and Pharmacy, Riyadh, Saudi Arabia.

(2) Dr. James Anthony Giglio, Adjunct Clinical Professor, Oral and Maxillofacial Surgery, School of Dentistry, Virginia Commonwealth University, Virginia, USA.

(1) Alicia Noemí Kohli Bordino, Italian University Institute of Rosario, Argentina.

(2) A. O. Ehizele, University of Benin, Nigeria.

(3) Danielle Wajngarten, São Paulo State University, Brazil.

Complete Peer review History: http://www.sciencedomain.org/review-history/27539

Received 21 September 2018
Accepted 20 November 2018
Published 01 December 2018

ABSTRACT

Aim: Aim of the present study was to determine the prevalence of root caries and associated risk factors among South Canara population.

Place of Study: Department of Conservative Dentistry and Endodontics, A.B. Shetty Memorial Institute of Dental Sciences, Deralakatte, Mangaluru and rural satellite centres.

Duration of Study: MAY 15 2018- JUNE 15 2018 (1 month).

Methodology: 2000 patients were examined for root caries using mouth mirror and explorer under good lighting facilities, followed by a questionnaire to determinethe prevalence of root caries and associated risks in South Canara Population.

Statistical Analysis: Data obtained was statistically analysed by using IBM SBSS version 24. Differences between variables were analysed by Chi-square test.

Results and Conclusion: Root caries were diagnosed in 7.4% of the patients examined. Root caries was more common in males (63.51%), in the age group of more than 60 years (56.76%) and in the rural population (62.16%). Oral hygiene and diet were also found to be closely associated with root caries. Molars were most affected and mandibular teeth were more frequently involved with root caries than teeth in the maxilla.

*Corresponding author: E-mail: mrinalinioshin@gmail.com;
1. INTRODUCTION

The life expectancy of individuals has increased over a period of time and so is their ability to retain teeth [1]. With increasing age, periodontal tissues are compromised leaving the root surface exposed and making it more susceptible to root caries [2]. The presence of root caries has been shown to be increasing over the past few years [3].

A study conducted by Hayes in 2017 showed that the prevalence of root caries was as high as 25-100% globally with the mean root caries index 9.7-38.7 [4].

Cariogenic biofilm and fermentable carbohydrates are considered to be the main etiological factor for the development of root caries [5]. The fermentable carbohydrate is converted to acid by cariogenic flora which leads to demineralisation of root surfaces. For coronal caries, the process of demineralisation begins at a pH of 5.5. Dentin demineralisation occurs at a slightly higher pH of 6.0-6.8 [2]. The initiation of root caries involves the process of demineralisation and remineralisation, and the progression occurs when environment favours demineralisation [6]. Also, unlike coronal caries, root caries is associated with demineralisation as well as collagen destruction [7]. The process of demineralisation is almost twice as rapid on the root surface as compared to enamel as root cementum contains less mineral content (65%) compared to enamel (96%) [8].

S. mutans and Lactobacillus were thought to be associated with the initiation and progression of root caries [9]. However, there is no reliable evidence that suggests that S. mutans initiates or causes the progression of root caries lesions [10]. Some studies also suggest Actinomyces species to be the main cause of root caries while other studies emphasise root caries to be caused by polymicrobial entities [11,12].

Root caries is associated with several predisposing factors with gingival recession being a prerequisite [5]. Others include poor oral hygiene, xerostomia, coronal decay, abfraction lesions, and the number of exposed root surfaces [13]. In addition, tobacco use and alcohol consumption were also associated with root caries [14]. Frequent intake of carbohydrates, low fluoride exposure, increasing age, low socioeconomic status, and decreased manual dexterity are also related to the development of root caries [2].

Root surface caries is seen in both adults and elderly populations but is more prevalent in the older age group [4,15]. It is more common in males compared to females [16]. Also, mandibular molars, being the first permanent teeth to erupt and exposed to the oral environment for the longest time period are most likely to be affected with root caries whereas mandibular anteriors were least likely to be affected [17].

Although patients with root caries complain of tooth sensitivity, pain, and diminished ability to chew, tooth loss is the most serious complication from root caries [18]. However, lack of symptoms is one of the major causes for patients not seeking treatment.

Early diagnosis is important since preventive treatment of primary root caries has a better long-term prognosis than restorative treatment. Consequently, a study of the prevalence of root caries will help to determine the availability and accessibility to oral disease prevention and control programs and help improve patient’s quality of life.

Thus, the aim of the present study was to determine the prevalence of root caries and the associated risk factors among the South Canara patient.

2. MATERIALS AND METHODS

This study was conducted on 2000 patients over a period of one month from May 15, 2018, to June 15 2018, of which 1122 were examined at the out-patient section of Department of Conservative Dentistry and Endodontics and 878 were examined in 5 Rural Health Centres of A.B. Shetty Memorial Institute of Dental Sciences, Nitte University, Deralakatte, Mangaluru. Permission to conduct the study was sought from the relevant authorities. Informed consents were obtained. Failure to consent did not affect patient’s treatment and confidentiality of the information given was assured. Patients were examined for root caries after proper isolation of the teeth. A questionnaire was used to gather information on the patient’s general information, medical history, and oral hygiene habits. The
assessment consisted of a visual examination using a standard mouth mirror, a sharp-ended explorer, and supplementary lighting from a dental operatory lamp. Patient age, sex, the location of examination, existing oral habits and oral hygiene practices were recorded. Patients were selected on the basis of inclusion and exclusion criteria. Data were recorded on prepared survey form based on the WHO Oral Health Assessment Form 2013 [Annexure 1] [19]. Inclusion and Exclusion criteria were developed.

2.1 Inclusion Criteria
- Age group: 15-30 years
  31-45 years
  46-60 years
  >60 yrs

2.2 Exclusion Criteria
- Edentulous patient
- Patient undergoing orthodontic treatment.
- Patients who were unable to complete the questionnaire

2.3 Questionnaire

Name:
Age group: 1. 15-30 years 2. 30-45 years 3. 45-60 years 4. >60 years
Gender: 1. Male 2. Female
Time of sugar intake: 1. With meal 2. In between meal
Frequency of brushing/day: 1. Occasionally 2. Once daily 3. Twice daily
Brushing Duration: 1. ≥2 mins 2. ≤ 2 mins
Type of toothpaste: 1. Fluoridated 2. Non-fluoridated

Presence of root caries:

3. RESULTS (Table 1)

Of the 2000 patients examined 1100 (55%) were male and 900 (45%) were female, while 430 subjects were from urban areas, 692 from periurban areas and 878 were from rural areas.

The prevalence of root caries was noted to be 7.4% (148 out of 2000 subjects).

4.05% of individuals presented with root caries among 15-30 years of the age group, 10.81% in 31-45 years group, and 28.38% in 46-60 group. At 56.76% patients over 60 years old had the highest prevalence of root caries. Root caries was observed more among males (63.51%) compared to females (36.49%). Urban populations showed prevalence of 13.51% root caries, periurban 24.32% and in the rural population, root caries was highest with the prevalence of 62.16%.

Prevalence of root caries was observed to be more among vegetarians (43.24%) followed by non-vegetarians (33.78%) and least in pescatarians (22.97%). Subjects consuming sugar with meals presented with 37.84% root caries and those eating carbohydrates in between meals had 62.16% root caries.

Subjects who brushed for more than 2 minutes showed 33.78% root caries and less than 2 minutes showed 66.72% root caries. Also participants who used soft bristle brush had 12.16% root caries, those employing medium bristle brushes had 28.38% root caries and using a hard bristle brush presented with the highest prevalence of root caries (59.46%). Root caries was more prevalent among those using non-fluoridated toothpaste(66.22%) as compared to those using fluoridated toothpaste(33.72%). Subjects using floss as an adjunct presented with 16.22% root caries, mouthwash 10.80%, other interdental aids 6.76% and none had 66.22% root caries. Root caries was more prevalent in patients who were not using any other oral hygiene aids (66.22%).

Root caries was seen to be more prevalent in molar teeth. Incisor teeth showed a prevalence of 22.97% root caries, canines 5.41%, premolars 18.91% and molars 54.71%. Maxillary teeth showed a prevalence of 32.43% root caries whereas 67.57% teeth were affected in the mandibular arch.

4. DISCUSSION

Root caries significantly influences the oral health in the elderly population throughout the world [1]. It not only affects the quality of life but
## Table 1. Association between the study variables and presence of root caries

<table>
<thead>
<tr>
<th></th>
<th>Presence of root caries</th>
<th>Total</th>
<th>Chi square test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absent</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>94</td>
<td>1006</td>
<td>1100</td>
</tr>
<tr>
<td>Female</td>
<td>54</td>
<td>846</td>
<td>900</td>
</tr>
<tr>
<td><strong>Age group (in years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-30</td>
<td>6</td>
<td>370</td>
<td>376</td>
</tr>
<tr>
<td>30-45</td>
<td>16</td>
<td>734</td>
<td>750</td>
</tr>
<tr>
<td>45-60</td>
<td>42</td>
<td>556</td>
<td>598</td>
</tr>
<tr>
<td>Above 60</td>
<td>84</td>
<td>192</td>
<td>276</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>20</td>
<td>410</td>
<td>430</td>
</tr>
<tr>
<td>Periurban</td>
<td>36</td>
<td>656</td>
<td>692</td>
</tr>
<tr>
<td>Rural</td>
<td>92</td>
<td>786</td>
<td>878</td>
</tr>
<tr>
<td><strong>Diet type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetarians</td>
<td>64</td>
<td>522</td>
<td>586</td>
</tr>
<tr>
<td>Non-vegetarians</td>
<td>50</td>
<td>1218</td>
<td>1268</td>
</tr>
<tr>
<td>Pescatarians</td>
<td>34</td>
<td>112</td>
<td>146</td>
</tr>
<tr>
<td><strong>Time of sugar intake</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With meal</td>
<td>56</td>
<td>968</td>
<td>1024</td>
</tr>
<tr>
<td>In between meal</td>
<td>92</td>
<td>884</td>
<td>976</td>
</tr>
<tr>
<td><strong>Bristle type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft bristle</td>
<td>18</td>
<td>974</td>
<td>992</td>
</tr>
<tr>
<td>Medium bristle</td>
<td>42</td>
<td>800</td>
<td>842</td>
</tr>
<tr>
<td>Hard bristle</td>
<td>88</td>
<td>78</td>
<td>166</td>
</tr>
<tr>
<td><strong>Brushing duration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 2 minutes</td>
<td>50</td>
<td>1112</td>
<td>1162</td>
</tr>
<tr>
<td>Less than 2 minutes</td>
<td>98</td>
<td>740</td>
<td>838</td>
</tr>
<tr>
<td><strong>Type of toothpaste</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoridated</td>
<td>50</td>
<td>1468</td>
<td>1518</td>
</tr>
<tr>
<td>Non-fluoridated</td>
<td>98</td>
<td>384</td>
<td>482</td>
</tr>
<tr>
<td><strong>Oral hygiene aids</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No other oral hygiene aids</td>
<td>24</td>
<td>172</td>
<td>196</td>
</tr>
<tr>
<td>Mouthwash</td>
<td>10</td>
<td>92</td>
<td>102</td>
</tr>
<tr>
<td>Floss</td>
<td>16</td>
<td>132</td>
<td>148</td>
</tr>
<tr>
<td>Other interdental aids</td>
<td>98</td>
<td>1456</td>
<td>1554</td>
</tr>
</tbody>
</table>

*p<0.05 statistically significant, p>0.05 Non Significant, NS
The prevalence of root caries was found to be more in males (63.51%) than females. This result was in contrast to the study conducted by Marlivia in a group of Brazilian adult dental patients that showed females had more root caries (18.6%) than males (13.4%) [25]. However, a study conducted by Heinrich, Kunzel, and Heinrich showed root caries to be more prevalent among male individuals compared to females [16]. Differences can be attributed to several factors such as oral hygiene practices, diet, general health and also an awareness and consciousness regarding dental health.

As life expectancy has increased so has the need to retain teeth [1]. With advancing age periodontal breakdown takes place leaving root surfaces denuded and in direct contact with the cariogenic environment that ultimately results in dental decay [2]. This fact could be one of the reasons for an increase in the prevalence of root caries in older individuals. The prevalence of root caries in the present survey among patients over 60 years was noted to be the highest among the study groups (56.76%). Similar findings were seen in the study conducted by Fure in Sweden and Jiang et al in China [17,26]. Inability to practice proper oral hygiene due to a decrease in manual dexterity in the elderly population could be another reason for an increasing incidence of root caries in older patients [2]. This study showed an increase in the prevalence of root caries in the rural population compared to the urban and semi-urban populations. A study conducted in 2017 on Dakshina Kannada population by Mithra N Hegde et al. showed a similar result [27]. This can be due to their limited access to oral health care and unawareness regarding oral hygiene practices.

Pescatarians presented with fewer root caries compared to vegetarians and other non-vegetarians as fish is rich in fluoride and proteins that are responsible for reducing caries [2,28].

Patients with the habit of sugar intake in between meals have a high percentage rate of root caries (62.16%). Those that employed hard bristle brush had more root caries as hard bristles can traumatise gingiva and ultimately cause a gingival recession. Once the root surface is exposed, in the presence of cariogenic
environment the process of demineralisation can begin. Groups that showed with irregular brushing habits brushed for less than a 2 min duration, used non-fluoridated toothpaste and did not use any other oral hygiene aids had a higher incidence of root caries [2]. Also, molars were observed to be the most susceptible to root caries most likely because they are the first teeth to erupt and longer be exposed to the oral environment. Similar results were seen in multiple other patient studies conducted by other researchers, [18,29,30].

5. CONCLUSION

Our study showed an increase in the prevalence of root caries in males, patients in the older age group (>60 years), and in the rural population. A relationship between dietary habits and oral hygiene practices and the development of root caries was also found to exist. Moreover, it was found that molar teeth are most susceptible to root caries and that the mandibular teeth have a higher incidence of root caries than teeth in the maxilla.

CONSENT

Informed consents were obtained.

ETHICAL APPROVAL

Permission to conduct the study was sought from the relevant authorities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES


© 2018 Hegde et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history/27539