

REVIEW

Root Caries - A Problem of Growing Age

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Article Info

Received: October 12, 2010

Review Completed: November 16, 2010

Accepted: December 13, 2010

Available Online: April, 2011

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ABSTRACT:

Root caries is now considered a major dental public health problem for the middle aged and elderly. Root caries is related to a subject's dental health behaviour, normally constant, this association produces a greater effect among older people. The older a person is, the longer he/she has been exposed to risk factors, and the greater their outcomes have been. The aetiology of root caries is multifactorial of which microbiological factor plays a critical role. The elderly are usually more vulnerable to root caries because of several medical conditions. Many older patients use medications that reduce salivary flow and cause them to have dry mouth. Root caries can be diagnosed by a dentist during regular dental examination. Treatment of root caries generally requires the placement of a restoration or crown. A number of studies have been conducted on the prevalence and factors associated with root caries, yet our knowledge of this disease process remain limited. The fact that too little is known about this disease in the face of an increasing proportion of the population at risk, should provide the stimulus for further research and development related to the recognition, etiology, treatment and prevention of root caries.

Key words: *Root caries, dry mouth, elderly, dental caries, oral hygiene.*

INTRODUCTION

Root surface caries has affected mankind for centuries but little attention has been paid to this condition until recently, probably due to the extent of the effort in dealing with coronal caries.¹

Root caries lesions were defined as soft, progressive, destructive lesions, either totally confined to the root surface or involving undermining of enamel at the cemento-enamel junction but clinically indicating the lesion initiated on the root surface (Katz, 1980).²

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Root caries is now been considered as a major dental public problem for the elderly. There are three main inter-related arguments supporting this statement. Firstly, life expectancies at both birth and age 65 have been increasing markedly in industrialised societies. Secondly, there is ample evidence showing that periodontal disease increases with age due to its cumulative nature. Thus most old adults may have some gingival recession and alveolar bone loss, which shall predispose the person to suffer from root caries. The final argument states that the observed improvement in oral health is causing the elderly to experience a higher retention of teeth,

which implies an increased number of exposed root surfaces susceptible to caries.³ The dental health status of the elderly is improving due to the provision of specialist dental care, the wider availability of dental health education, growing dental awareness and the widespread use of fluoride-containing toothpastes. Therefore the number of elderly retaining some or most of their natural teeth is significantly greater than only a few years ago and will continue to grow in the coming decades.⁴ While root caries is related to a subject's dental health behaviour, normally constant from year to year, this association produces a greater effect among older people. The older a person is, the longer he/she has been exposed to risk factors, and the greater their outcome has been. For example, the use of sugar in coffee or tea, combined with irregular check-ups, doubled the risk of root caries for the oldest subjects compared with middle-aged subjects.⁵

Globally, proportion of the population over 65 years of age who are dentates is increasing. The prevalence of root caries lesions was reported by various studies as ranging from 36% to 67%^{6,7,8,9,10} Hellyer (1990) reported the prevalence of 88.4% in people aged 55 years and above¹¹. Imazato S (1990) reported that 39% of the subjects had one or more decayed roots.

Within a person (i. e., within a mouth) there is a characteristic pattern of root caries attack which is influenced by several factors including the number and type of natural teeth remaining and the propensity of the root surfaces of those teeth to exhibit gingival recession. Old age people usually have several teeth missing which limits the study of the pattern of root caries in a person but many of the teeth which are missing may actually be those most susceptible to root caries. Indeed, they may be missing as a consequence of root caries, even though most tooth loss in adults has traditionally been attributed to advanced periodontal disease. Katz et al have shown that, like enamel caries, root caries tends to primarily affect mandibular molars with a

decreasing susceptibility for premolars and incisors. In the maxillary arch the anterior teeth have higher root caries rates than the mandibular teeth. Although the rate of gingival recession was similar for each tooth type, the widely variable root caries rates suggest that specific intra-oral factors, as yet undefined, may determine the pattern of root caries attack. Considerable controversy has arisen regarding the tooth root surfaces most frequently affected by caries. The evidence suggests that either facial or interproximal surfaces are primarily affected followed by lingual surfaces.¹²

RISK FACTORS¹³

Risk factors associated with the high prevalence of root caries among older adults include:

- Decrease salivary flow or xerostomia,
- Exposure of root surfaces due to periodontal (gingival) disease,
- Chronic medical conditions,
- Radiation treatment for head and neck cancer,
- Physical limitations,
- Diminished manual dexterity due to stroke, arthritis, or Parkinson's disease,
- Cognitive deficits due to mental illness, depression, Alzheimer's disease or dementia, Sjögren's syndrome (an autoimmune disease),
- Diabetes,
- Poor oral hygiene,
- Multiple medication use,
- Changes in dietary habits.
- Previous root caries experience, either in the form of filled surfaces or decayed untreated lesions is also a potent risk factor for the development of new lesions.
- Removable partial dentures are important independent risk indicator for root caries.¹⁴

The aetiology of root caries is multifactorial of which microbiological factor plays a critical role. The microbiological nature of the associated plaque bio-film is different from that associated with crown caries (supragingival plaque) even though plaque associated with root caries is technically still a supragingival plaque. The microbiology of this bio-film has been the subject of numerous investigations over the years, however, only recently have the problems associated with sampling of the infected underlying dentine been identified and addressed. While there is ample evidence to imply a strong association between mutans group of streptococci and coronal caries, similar data on microbiological agents in root caries is poorly understood.¹⁵

The bacterial flora of root caries was more diverse than previously reported, and found that the previously mentioned species (viz. *Actinomyces viscosus* / *naeslundii* and *Lactobacilli*) played less of a role.

Aerobic Gram-positive cocci (*Staphylococcus* spp. and *Streptococcus* spp.) as well as anaerobic ones (*Peptostreptococcus* spp.), and *Candida albicans* were reported by one study to occur most frequently in root caries lesion in middle-aged and older adults. More recently, culture independent studies have focused either on single species such as *S. mutans* and *Actinomyces naeslundii* or on the analysis of microbial derived organic acids. Several other studies have investigated advanced dentinal lesions from coronal caries with molecular methods, but they were not designed to study root caries in particular. Overall, the present understanding of the microflora of root caries is limited compared to other infectious oral diseases.¹⁶

The clinical investigators who studied root caries provided clinical descriptions of the signs and symptoms of root caries lesions. The most commonly used clinical signs to describe root caries utilized visual (colour, contour, surface cavitation) and tactile (surface texture) specifications. There are no reported

clinical symptoms of root caries although pain may be present in advanced lesions.¹³ This may be one of the reasons why the middle aged and older adults have advanced root caries lesions but do not report for their treatment.

MANAGEMENT OF ROOT CARIES

Prevention of occurrence of root caries may be difficult because root caries often arises in older people who are otherwise also having problems in maintaining good levels of oral hygiene. In addition, older people are frequently taking medication which depresses salivary flow and this xerostomia makes dental caries more likely to occur. Tranquillizers, antidepressants, antihypertensives and diuretics all have a xerostomic effect. The feeling of a dry mouth may be alleviated by sucking sweets or taking frequent drinks, many of which are cariogenic. Finally, retirement, bereavement, or illness may result in dietary changes which may favour caries.¹⁷

Maintenance or improvement of oral hygiene is the first step towards prevention. Specific measures like use of powered toothbrushes and chemical plaque control measures may be advocated. Addition of fluorides to daily use oral hygiene aids like toothpastes and use of chlorhexidine gluconate have also shown promising results.^{18,19} Primordial prevention of root caries lies in the prevention of gingival and periodontal disease.

Older subjects should undergo regular screening for root caries as there are no or almost negligible symptoms which shall create environment for carious lesions to go unnoticed and hence jeopardize the oral health of the individual.

Root surfaces being softer, use of force while probing should be avoided or at least minimized. Antiseptics, and/or remineralizing products with calcium phosphopeptide-amorphous calcium Phosphate (CPP-ACP) also show a ray of hope in the management of root caries. Regimens to stimulate salivary flow, such as chewing gum with or without

the inclusion of active ingredients (e.g., chlorhexidine, xylitol, CPP-ACP), sucking sugarless candies, sucking buffered citric/fruit acid tablets, using systemic cholinergic medications (e.g., pilocarpine/ cimeviline, with monitoring of adverse effects) prescribing saliva substitutes, such as gels, sprays and liquids, with placement around dentures as well as on teeth and oral soft tissues are among those possible ways which can alleviate xerostomia and hence prevent root caries.

A "maturation" effect may occur once a root surface has been exposed to the oral environment for a period of time rendering the root less susceptible to caries. This would be secondary to the effects of preventive measures i. e., if root lesions do not occur within a period of time after the root is exposed to the oral environment, it may never occur.²⁰

From a public health viewpoint, it is of major importance to know whether root caries is a disease entity basically different from coronal caries. Hence, if the caries process is essentially the same on coronal and root surfaces, it should be expected to respond to the same preventive measures in a similar way regardless to its topography on the tooth.²¹

Treatment strategies for root caries rely on the clinical examination and are determined by the size, type, extent & location of the lesion, aesthetic requirements as well as the physical & mental condition of the patient. The clinical success rate depends on the degree of recession and the defect.²²

Grafting of gingival recessions is indicated when there is lack of attached gingiva and when gingival recession is aesthetically objectionable. So, it can be used as measure for primordial prevention of root caries. Even the presence of cervical caries at the site has been found as not compromising the treatment outcome.²³

Resin-modified glass ionomer cement and resin composite materials appear to be better choices in a long-term scenario because of their lower solubility when compared with conventional glass ionomers.²³

Ozone therapy can be considered as an alternative management strategy for root caries. Use of 10% sodium hypochlorite (oxidant) on demineralised root dentine lesions has been shown to improve their potential to remineralise since sodium hypochlorite is a non-specific proteolytic agent. Studies have shown that when root dentine samples were treated with sodium hypochlorite, the permeability of fluoride ions increased. Removal of organic materials from dentine lesions was an acceptable approach to enhance remineralisation.^{24, 25, 26, 27, 28, 29, 30}

The management of root caries in elderly subjects is compounded by several factors. Various preventive as well as treatment strategies, as mentioned, are available to manage root caries. Their use in such a tender age as of elderly is required to be rational and applied with care.

SUMMARY

In summary, current literature suggests that people are living longer, retaining their teeth for greater time and having more root surfaces exposed, thus increasing the risk of root caries. In addressing these arguments, however, some researchers have argued that the decrease in mortality and likewise increase in tooth retention were due to improvements in the social environment and positive oral health behaviours. Thus, older adults may not have more root caries in the future. The present study focuses on few of these issues and suggests a need for further studies in this subject.

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