### REVIEW

### R. M. Davies

# The rational use of oral care products in the elderly

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Abstract This review examines the evidence of the effectiveness of oral care products in preventing and controlling dental caries and periodontal disease in the ageing population. The strength of evidence is indicated using the following hierarchy: Type 1 (systematic reviews), Type 2 (randomised controlled trials), Type 3 (observational studies) and Type 4 (traditional reviews). Most of the evidence to support the effectiveness of fluoride products is extrapolated from studies involving children and adolescents. The few studies that have been performed in older adults suggest that fluoride toothpaste and, in the case of high caries risk individuals, the adjunctive use of other fluoride delivery systems, may be effective in preventing coronal and root caries. Some dentifrices containing triclosan have been shown to improve plaque control and gingival health and one, which contains triclosan/copolymer, reduces the progression of periodontitis in adults and high-risk individuals. Powered toothbrushes with an oscillation-rotation action are more effective in reducing plaque and improving gingival health than manual toothbrushes.

**Keywords** Elderly · Prevention · Caries · Periodontal disease · Oral care products

### Introduction

Dental caries and destructive forms of periodontal disease pose a threat to the natural dentitions of the increasing ageing populations throughout Europe. In the recent Adult Dental Health Survey, 54% of dentate population in the UK aged 65+ had coronal caries with an average of 2.2 teeth affected and 29% had root caries with an average

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R. M. Davies (💌) Dental Health Unit, Manchester Science Park, Lloyd Street North, Manchester, M15 6SH, UK e-mail: robin.davies@man.ac.uk Tel.: +44-161-2324703 of 2.3 teeth affected [1]. In the same survey, 54% of those aged 65+ had loss of attachment (LOA) of 4–6 mm, 24% had LOA 6–9 mm and 7% had LOA >9 mm [2]. These levels of disease are likely to be similar in other European countries and it is appropriate, therefore, to consider the evidence for the effectiveness of oral care products in preventing and controlling these two diseases.

Evidence-based dentistry is assuming increasing importance and for this reason the strength of evidence to support the effectiveness of oral care products will be graded on a four point scale: Type 1 (systematic reviews), Type 2 (randomised clinical trials) ["RCT"], Type 3 (observational studies) and Type 4 (traditional reviews).

### **Coronal and root caries**

There is no doubt that fluoride is effective in reducing caries and products containing this can be either self applied or delivered by a dental professional in various ways. However, it is important to emphasise that most studies of fluoride products have involved children and adolescents; very few have been conducted in adults or the elderly. Thus, the recommendations made are, in the main, extrapolated from studies performed in young people.

### Fluoride toothpaste

A recent Cochrane Review (Type 1) concluded that fluoride toothpastes reduced caries in the permanent dentition of children and adolescents by 24% when compared with a non-fluoride dentifrice [3]. An RCT (Type 2) involving 810 adults aged 54+ years reported that a dentifrice containing 1100 ppm F had reduced coronal caries by 41% and root caries by 67% when compared with a non-fluoride dentifrice [4].

The effectiveness of fluoride toothpastes is influenced by a number of factors, namely frequency of application, fluoride concentration and rinsing behaviour.

### Frequency of application

The recommendation to brush twice a day with a fluoride toothpaste is supported by observational studies (Type 3). For example, in the Adult Dental Health Survey, among dentate adults who claimed to brush at least twice a day only 35% had primary caries compared with 63% of those who brushed less than once a day [5].

### Fluoride concentration

Numerous randomised controlled clinical trials (Type 2) in young people demonstrate that the effectiveness of fluoride toothpastes is concentration dependent [6]; in general for every increase in concentration of 500 ppm F, there is a further 6–7% reduction in caries [7]. In Europe, toothpastes containing a maximum of 1500 ppm F are on sale as cosmetic products. Formulations with higher concentrations such as 2800 ppm F, which has been recently launched in the UK, is a prescription only medicine specifically targeted at high caries risk adults.

A recent RCT (Type 2) demonstrated that 57% of adults with one or more root caries lesions who had, for 6 months, used a dentifrice containing 5000 ppm F had reversal of root caries compared with 29% of those who had used a dentifrice containing 1100 ppm F [8].

### Rinsing behaviour

Rinsing with large volumes of water after brushing with fluoride toothpaste should be discouraged since doing so reduces effectiveness [9] (Type 3).

Twice daily brushing with a fluoride toothpaste remains the cornerstone of all attempts to prevent and control dental caries but additional fluoride may be delivered as an adjunct to those considered to be at high caries risk.

### **Fluoride rinses**

A Cochrane Review [10] concluded that fluoride rinses reduce caries in the permanent dentition of children and adolescents by 26% (Type 1). Three RCTs have evaluated fluoride rinses in older adults. In 1987 it was reported (Type 2) that a daily rinse with 0.05% NaF had reduced the increment in root caries from 0.34 to 0.17 when compared with a placebo [11]. However, this significant reduction was only observed on mesial/distal tooth surfaces in a subgroup of participants who were 45-65 years old (Type 2). Another RCT involved 164 adults, aged 60+ years living in a non-fluoridated area. They were all supplied with toothpaste containing 1500 ppm F; one group was requested to rinse twice a day with 10 ml of a 0.05% NaF solution in addition to brushing [12]. After 2 years the caries increments in the rinse group were 0.3 (coronal) and 0.4 (root) in the test group compared with 1.0 and 1.4, respectively, in the control. They also reported that 67% of those in the rinsing group developed no new carious lesions compared with 16% in the control (Type 2).

The third RCT involved individuals aged 60+ years living in a fluoridated area and focused on root caries lesions [13]. Over a period of 4 years one group used a rinse containing 0.05% NaF once a day whilst the control used a placebo rinse. The increment in root caries after 4 years was 0.26 in the fluoride rinse group compared with 0.91 in the control (Type 2). The fluoride rinse group also had significantly more reversals (1.53) than the control group (1.11).

## Fluoride gels

A Cochrane Review (Type 1) recently reported that fluoride gels produced a 21% reduction in caries in children and adolescents when compared with a placebo [14]. In the study reported previously [12], the group which had a biannual application of a gel containing 12,300 ppm F had a root caries increment of 0.27 compared with 0.91 in the control (Type 2).

### **Fluoride varnishes**

A recent Cochrane Review (Type 1) concluded that fluoride varnish reduced caries in the permanent dentition of children and adolescents by 46% [15]. An RCT [16] involving 44 adults who had exposed root surfaces following periodontal surgery reported that the group who had Duraphat varnish applied once every 3 months as part of a maintenance programme had a root caries increment of 0.67 compared with 1.53 in the control group (Type 2). Eleven percent of root caries lesions had hardened in the fluoride group compared with 3% in the control group.

### **Chlorhexidine varnishes**

In the RCT reported previously [16], one group had a chlorhexidine varnish containing 40% chlorhexidine applied every 3 months to exposed root surfaces. After 1 year the root caries increment per patient was 0.75 compared with 1.53 the control group; 15% of lesions had hardened compared with 3% in the control group.

In summary there is strong evidence to support the effectiveness of fluoride toothpaste, rinses, gels and varnishes in reducing caries in children and adolescents. In contrast, very few RCTs have been performed in adults and the elderly. What evidence there is suggests that fluoride products can be effective in preventing coronal caries and reversing root caries lesions in the elderly. Further studies are required to confirm their effectiveness.

### **Periodontal disease**

Although 67% of adults in the UK aged 65+ claimed to brush their teeth twice a day, 78% had visible plaque with an average of 44% of teeth affected [2]. In this age group 52% of dentate adults had moderate periodontal disease (pockets 4–6 mm) and 15% had severe disease (pockets >6 mm). Clearly there is a need to improve the effectiveness of plaque control in this age group and consequently their periodontal status. Various agents have been added to oral care products in an effort to enhance mechanical cleaning.

### **Mouthrinses**

Mouthrinses, containing either 0.12 or 0.2% chlorhexidine digluconate, are very effective in reducing plaque and improving gingival health. Their effectiveness, either as an adjunct to mechanical oral hygiene procedures or when used alone, has been extensively documented [17] in RCTs (Type 2) but, in most instances, their long-term use is precluded by the development of extrinsic tooth stain.

### **Dentifrices**

More recently, the broad-spectrum antibacterial agent triclosan has been shown to provide improved levels of plaque control and gingival health in various dentifrices. The most commonly available formulations are: 0.3% triclosan, 2% copolymer and sodium fluoride (Colgate), 0.3% triclosan, 0.75% zinc citrate and sodium monofluorophosphate (Unilever) and 0.28% triclosan, 5.0% pyrophosphate and sodium fluoride( Procter & Gamble). Clinical trials (Type 2) involving adults have demonstrated that all these products provide the user with a more effective level of plaque control and an improved level of gingival health when compared with a fluoride control dentifrice [18, 19, 20]. Relevant to the increasing elderly population is the ability of the triclosan/copolymer dentifrice (Colgate Total) to reduce the further progression of tissue destruction in "at risk" patients [21] and adults [22].

### **Powered toothbrushes**

Numerous clinical trials have evaluated the effectiveness of different manual and powered toothbrushes to improve plaque removal and gingival health. A recent Cochrane Review (Type 1) concluded, following a systematic review of 29 studies involving 2547 participants, that powered toothbrushes with a rotation-oscillation action are more effective than manual brushes [23]. Toothbrushes with this mode of action reduced plaque by 7% and gingival bleeding by 17% when compared with manual brushes.

#### Summary

It is important to promote the independence and quality of life of the increasing ageing population, to which oral health makes an important contribution. The ageing population deserve the benefits of preventive advice and interventions to enable them to maintain a functional and comfortable dentition. It is disappointing to find that in the UK only 52% of those aged 65–74 and 31% of those aged 75+ could recall receiving any advice on tooth-brushing or gum care [5].

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