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Review Article

Olive Oil, Oil Pulling and Dental Health

RE Carlson[1] and JA von Fraunhofer[2]*

[1]*Executive Director, Research and Analytical Sciences, D. Gary Young Research Institute, Lehi, UT, USA*
[2]*Professor Emeritus, University of Maryland, Baltimore, MD, USA*

***Corresponding Author**: JA von Fraunhofer, Professor Emeritus, University of Maryland, Baltimore, MD, USA.

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Abstract

The causative factors in dental caries and periodontal disease are briefly reviewed. The significance of the Mediterranean diet and olive oil in the prevention of oral disease is also discussed. The beneficial effects of the ancient Ayurvedic practice of oil pulling on oral health are reviewed. The available evidence indicates that oil pulling may be effective in reducing or preventing dental caries, limiting gingivitis and periodontal disease as well as reducing halitosis for patients adopting this practice.

Keywords: *Olive Oil; Oil Pulling; Dental Health*

Introduction

The most prevalent pathology afflicting mankind is dental disease, notably dental caries and, to a lesser degree, periodontal disease [1,2]. Epidemiological, animal and human studies have clearly established an association between the amount and frequency of free sugar intake and dental caries. Although other fermentable carbohydrates may contribute to caries, the consumption of starchy staple foods and fresh fruit is accompanied by low levels of dental caries. When free sugar consumption is < 15 - 20 kg/yr., i.e. approximately 6 - 10% of the total energy intake, the prevalence of dental caries is low.

Fluoride has reduced but not eliminated dental caries although its presence in toothpastes is an important preventive agent against dental caries. Toothbrushing without fluorides has little effect on caries and it appears that additional fluoride to that currently available in toothpaste does not appear to affect oral health and caries for most adults. Overall, the optimal approach to reducing the prevalence of caries is to reduce the frequency of sugar intake in the diet.

Dental caries is associated primarily with the acidogenic and aciduric[1] properties of the *mutans Streptococci*. When these and other cariogenic oral streptococci colonize and accumulate on the tooth surface, they appear to have the ability to synthesize extracellular glucan from sucrose, the latter being the most important dietary contributing cause of caries [3]. Accordingly, both the frequency of consumption and total amount of sugars is important in the etiology of caries. *Mutans Streptococcal* glucans are synthesized by glucosyltransferase enzymes (GTFs) and these are both of central importance to adhesive interactions with *Streptococcus mutans* and essential in the expression of the virulence of these bacteria. Since the GTFs synthesize soluble and insoluble glucans from sucrose, they contribute to

[1]Aciduric bacteria thrive in a relatively acidic environment, i.e. where the pH level is well below 7.

the polysaccharide composition of dental plaque. Consequently, these glucans can enhance the pathogenic potential of dental plaque by promoting the accumulation of cariogenic streptococci on the teeth.

It follows from this that there is considerable interest in developing therapeutic agents that inhibit GTFs. In particular, there is growing interest in the ability of fatty acids, notably those in olive oil, to reduce the development dental caries by functioning as GTF inhibitors [3]. This subject is discussed further below.

Finally, dental erosion rates appear to be increasing with the primary etiology being the acids, notably citric acid, in foods and beverages [4,5] but also, to a far lesser extent, from regurgitation.

The continued and, in some regions, increasing prevalence of dental caries has led to studies seeking alternative approaches to maintaining oral health. In particular, for the past 10 or so years, the traditional practice of oil pulling (or oil swishing) has been revisited in several countries, as discussed below.

Olive oil and dental caries

A recent study [6] reported that improvements in the physical activity of 17,777 Spanish athletes were associated with self-reported enhanced oral health. This improvement was ascribed to the Mediterranean diet, which is based on a combination of complex carbohydrates, fruits, vegetables, legumes, nuts, seafood, olive oil and dairy products [7]. Interestingly, it has been established that an increase in fruit consumption is associated with an improvement in periodontal health [8].

It has also been suggested that lipids such as vegetable oils can impart hydrophobic characteristics to the tooth surface which would impede bacterial colonization and, eventually, decrease caries susceptibility [9]. It has also been reported that the oleic acid and other phenolic compounds in olive oil enhances fluoride inhibition of extracellular polysaccharide formation by *Streptococcus mutans* and participates in preventing biofilm formation [10,11]. It follows from this that olive oil may be effective in preventing dental caries and periodontitis.

Oil pulling

Oil pulling (or oil swishing) is a traditional folk remedy practiced in ancient India, notably in Ayurvedic medicine, that was believed to cure more than 30 systemic diseases when practiced regularly [12-14]. Oil pulling is predominantly performed with refined sunflower, sesame, coconut and olive oils [15]. The recommended practice is that the oil is sipped, sucked between the teeth and then swished around the mouth for 10 - 15 minutes in the early morning hours.

Over the past decade or so, there has been an increasing interest in adopting this ancient practice to improve oral hygiene and prevent a variety of dental diseases, table 1 [12-16]. This trend is due to an increased reluctance to rely on modern medicinal and oral hygiene products, possibly because of perceived adverse side-effects and unpleasant tastes but also because oil pulling also offers beneficial effects on overall health.

Prevention of dental caries
Improved oral hygiene
Decreased oral microbial counts
Inhibited plaque adhesion to teeth and soft tissues
Reduced gingivitis
Reduced halitosis
Tooth whitening effect
Reduced xerostomia
Strengthening of oral musculature and jaws

Table 1: *Claimed oral health benefits of oil pulling [12-16].*

An early review of the literature from 1992-2011 [12] commented that whereas research suggests that oil pulling may have certain advantages over commercially available products in minimizing various oral conditions, there does not appear to be sufficient scientific evidence to support its effectiveness. More recent research, however, suggests that there is increasing evidence for oil pulling to be beneficial to oral health although the precise mechanism involved is unclear.

It is well-established that coconut and olive oils exhibit anti-microbial properties against a wide variety of micro-organisms [17-19]. The anti-microbial action together with the viscosity of the oil would not only inhibit bacterial adhesion and co-aggregation and diminish plaque accumulation but also exert bacteriostatic/bactericidal effects against oral bacteria and pathogenic micro-organisms. The net result would be lowered caries susceptibility, reduced gingivitis and periodontitis as well as improved oral hygiene, thereby supporting the oral health claims for oil pulling in the more recent scientific literature [13-16].

Halitosis is caused by volatile sulfur compounds such as hydrogen sulfide, methyl mercaptan and dimethyl sulfide produced by proteolytic peptide degradation of epithelial cells and oral microorganisms, notably Gram-negative bacteria. The latter are also a causative agent in gingivitis and periodontitis. Consequently, it is not unexpected that oil pulling with its anti-bacterial action and possible solvent action for glossal sulfur compounds would be effective against halitosis, as reported in an early pilot study of oil pulling and halitosis [20].

Finally, a randomized controlled study was performed in which the gingivae were massaged with oil (sesame oil, olive oil or coconut oil) or chlorhexidine gel for 10 min/day to assess their antimicrobial activity against the oral pathogens responsible for causing dental caries [21]. It was found that there was a significant reduction in the values of *S. mutans* count, *Lactobacillus* count, plaque scores and gingival scores, this reduction being comparable among all the oil groups and comparable to that of the "gold standard" chlorhexidine group.

Conclusion

The more recent literature indicates that oil pulling and gingival massage with edible oils both have a beneficial effect on oral health and provide support for the claims listed in table 1. Further, although limited, research studies offer support for the ancient Ayurvedic practice of oil pulling and/or gingival massage with oil in maintaining oral hygiene and preventing dental caries and periodontal problems. However, it is questionable whether oil pulling has sufficient gustatory appeal for widespread acceptance and adoption.

Nevertheless, the available data do suggest that incorporating the bioactive components of olive oil in dentifrices or mouthwashes might be an interesting new approach to maintaining oral health and protecting against dental caries and periodontal disease.

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