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Herbal therapeutics

Natural remedies for the dry mouth associated with non-functioning salivary glands



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ABSTRACT

Persistent xerostomia may be encountered in a substantial number of patients particularly head and neck cancer patients who received radiation, and patients with Sjogren's syndrome. Unfortunately many of these patients have lost all salivary function due to the irreversible destruction of salivary gland parenchyma. Management of this problem becomes palliative and requires the administration of salivary substitutes. This review considers the evidence regarding natural salivary substitutes that may be used to relieve severe dry mouth associated with irreversible damage of salivary glands.

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1. Introduction

Dry mouth is the subjective sensation of oral dryness (Kanehira et al., 2011). In most cases, dry mouth is strongly correlated with the quantitative reduction of salivary flow (Nederfors et al., 2002). Usually this symptom develops when salivary flow is reduced by more than 50% (Dawes, 1987).

Dry mouth can either be transient or persistent and can be attributed to various causes such as drugs, salivary gland disease, severe haemorrhage and also psychological factors. Common causes of persistent dryness include Sjogren's syndrome, and previous radiotherapy to the head and neck region,

while rarer causes comprise HIV-associated salivary gland disease, hepatitis C virus, and sarcoidosis (Porter et al., 2004). According to some researchers, the majority of Sjogren's syndrome patients and patients who have received radiation therapy for head and neck cancer suffer from dry mouth (Fox, 2007; Shiboski et al., 2007). Further, increased life expectancy and continuing advances in the management of chronic diseases have contributed to prolonging life, thereby increasing the number of dry mouth patients (Porter et al., 2004; Thelin et al., 2008).

The importance of saliva is represented by its various vital functions; it has an antimicrobial activity, is necessary for lubricating teeth and oral mucosa, provides buffering

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and mineralisation of teeth and also facilitates taste sensation (Samarawickrama, 2002). Consequently, patients with dry mouth are prone to dental caries (Samarawickrama, 2002) and oral infections (van der Reijden et al., 1996) like oral candidiasis (Greenspan, 1996). They are also intolerant to dentures and have difficulty chewing, swallowing and speaking (Samarawickrama, 2002). Other symptoms associated with dry mouth include a burning sensation in the mouth, mainly experienced on the tongue (Johansson et al., 1994).

The literature reveals additional problems associated with dry mouth such as an adverse impact on the quality of life leading to increased incidence of depression (Stevenson et al., 2004) and withdrawal from social life due to impairment of the important functions of speech and eating (Rostron et al., 2002; Strombeck et al., 2000).

Management of dry mouth should address the causative factors and the approach taken is dependent on whether there is still functional parenchyma in the salivary glands. Therefore, the clinician can choose to use a salivary stimulant alone or in conjunction with salivary substitutes. Salivary stimulants are ineffective when salivary parenchyma is damaged and there is no residual function left, making salivary substitutes a more reasonable approach. For this reason, moisturising agents have been recommended in cases of compromised and unresponsive salivary gland parenchyma (Gil-Montoya et al., 2008).

The aim of this short review is to discuss the different types of natural remedies that have been investigated so far for the management of dry mouth. It also aims to explain the role that these remedies can play in alleviating the problem of dry mouth associated with irreversibly and severely damaged salivary glands.

2. Literature search

A literature search was conducted in MEDLINE/PubMed database using the following combinations: saliva substitutes and Sjogren's, saliva substitutes and radiotherapy, saliva substitutes and natural, vegetable oil and dry mouth, linseed and dry mouth, marshmallow root and dry mouth, herbal and dry mouth, polysaccharide and dry mouth, aloe vera and stomatitis, aloe vera and mouth, olive oil and dentine, botanical extracts and dry skin, aloe vera and mouth rinse, castor oil and eye drops, milk and saliva substitutes, clove oil and mouth, olive oil and dry mouth, yam and mouth.

The above search generated 325 articles that were imported in a single database through reference manager software (End-Note X6). Duplicate references were eliminated resulting in 299 references, and after removal of non-English literature, there were 263 references in the database.

Titles and abstracts were screened for relevance. Articles that investigated the following aspects were excluded: artificial salivary substitutes only, natural remedies used as salivary stimulants like citric acid, salivary substitutes based on animal mucin, diseases other than dry mouth. After removal of irrelevant references, 39 references were included.

3. Salivary substitutes

Salivary substitutes may be synthetic or natural. A preferable substitute should be safe, edible, capable of protecting teeth and oral mucosa, durable, reasonably inexpensive and possess the wetting and lubricating characteristics of saliva. Synthetic substitutes are available on the market and some of these contain fluoride and have a neutral pH. However, many others cause mineral loss (Samarawickrama, 2002) due to their acidic properties. Synthetic substitutes generally have a short duration of action (Samarawickrama, 2002), with the average being about 15 min. For this reason, they may not be cost-effective for many patients. Mucin-based salivary substitutes have been recommended in the treatment of radiation-induced xerostomia (Hahnel et al., 2009), and Sjogren's syndrome patients (van der Reijden et al., 1996). However, these salivary substitutes are unavailable in some parts of the world. There may also be religious or other restrictions in consuming salivary substitutes that contain porcine or bovine mucin (Hahnel et al., 2009).

In order to overcome these disadvantages, a number of natural salivary substitutes have been recommended; examples include water, milk and vegetable oils (Meurman and Gronroos, 2010).

4. Natural salivary substitutes

Water is the most popular home remedy for dry mouth (Cassolato and Turnbull, 2003). By moisturising the oral mucosa, it reduces discomfort and facilitates speech and swallowing (Cassolato and Turnbull, 2003). A study conducted on salivary substitute use among patients with radiation-induced salivary gland hypofunction concluded that a substantial number of patients discontinued the use of salivary substitutes and replaced them with frequent sips of water (Epstein and Stevenson-Moore, 1992). Nevertheless, some scientists believe that water is not efficient in moisturising and lubricating the oral mucosa and teeth (Vissink et al., 1986) because oral mucosa quickly becomes dry again. Lack of mucin and buffering agents makes water insufficient to provide sustained relief of the symptoms of dry mouth (Frost, 2002).

Milk, on the other hand, appears to have a number of physical and chemical properties that qualify it to be a good salivary substitute (Herod, 1994). Milk is effective in moisturising and lubricating the oral mucosa (Herod, 1994). It has phosphoproteins that are adsorbed by enamel and the calcium and phosphate content of milk is high. The buffering capacity of milk reduces enamel solubility and contributes to its remineralisation (Herod, 1994). Furthermore, the use of fluoridated milk has been shown to have an anti-caries potential (Malinowski et al., 2012; Lippert et al., 2012). Pratten et al. (2000) found the caries-prevention role of milk to be effective in rats. Interestingly, the same authors found that, when fluoride was added, efficacy in caries-prevention increased by 40–50%. A potential drawback of milk as a salivary substitute is the "sticky" feeling that it leaves in the mouth.

Vegetable oils have also been used as salivary substitutes. Walizer and Ephraim (1996) reported that vegetable oil was comparable to a commercial synthetic saliva substitute in the

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