Age and Ageing 1996;25:409–412

Review: Xerostomia: A Symptom which acts like a Disease

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Summary

This review considers the changes in salivary glands associated with ageing and concludes that there is no evidence to show that xerostomia is likely to result from the ageing process alone. The four main factors causing xerostomia are presented and it can be seen that the condition is a side-effect of diseases and the drugs used to treat these diseases. As xerostomia has a significant effect on a person's quality of life, a multifaceted approach to treating xerostomia is presented. All health care workers should be sensitive to those complaining of dry mouth and help them to seek care.

Saliva is one of the most complex but versatile and important body fluids and contains a number of systems which serve a wide spectrum of physiological needs. Saliva is required to swallow food, to speak and to protect the oral mucosa and the teeth from infection. This fluid contains a variety of electrolytes, peptides, glycoproteins, and lipids which have:

(a) antimicrobial properties to kill bacteria and viruses,
(b) mucins to coat and protect the mucosa from trauma and dehydration,
(c) buffers to maintain pH levels in spite of the daily use of acidic and basic foods and fluids,
(d) calcium and phosphates which protect the teeth and prevent demineralization and dissolution of the teeth within the oral cavity [1–3].

A loss or reduction of saliva results in significant problems such as caries, periodontal diseases, difficulties with denture wearing, eating, talking, altered taste sensation, as well as higher risks of candidiasis and mucositis, which result in an overall reduction in the quality of life [4–7].

Sreebny [8] has defined xerostomia as the 'subjective feeling of oral dryness' and it is the result of salivary gland hypofunction. This symptom is more common in ageing populations, but is not caused by ageing. It has been shown to be related to some specific drugs and diseases or therapies [9–16]. The prevalence of xerostomia varies from 13 to 28% in most older populations (Table I) and increases up to 60% in patients living in long-term care facilities [12–17].

The rate of salivary secretion is related to incidence of disease and the rate of secretion is further diminished with an increase in the number of diseases. Although reduced salivary flow is an age-related change, xerostomia is not likely to occur unless the patient's health is compromised by diseases and the drugs used to treat these diseases [18, 19]. The older the patients, the more likely they are to have some form of disease or to be taking medications which might have a xerostomic potential [12–18].

Mason and Glenn [20] have stated that as the secretion of saliva is regulated by the autonomic nervous system and is subject to reflex stimulation from physical and psychic causes, then xerostomia may result from four basic causes:

A. Factors affecting the salivary centre:

1. Emotions—fear, excitement, stress
2. Depression
3. Organic disease, e.g. brain tumour, Parkinson's disease
4. Drugs, e.g. levodopa, morphine.

Of these factors [21–26], depression is the most important, for its incidence increases greatly in ill and dependent old people.

B. Factors affecting the autonomic outflow pathway:

1. Encephalitis
2. Brain tumours
3. Stroke
4. Neurosurgical operations
5. Drugs.

There are over 400 drugs which older people take to control some of the diseases they have acquired, which have anticholinergic properties and dry out the mouth [27–32]. The most common groups are: antidepressants,

Table I. Prevalence of xerostomia

Reference	No.	Age (years)	Population	Percentage with hypofunction		
				Men	Women	All
12	1148	70	Ind	16.0	25.0	21.0
13	154	64+	Int	52.0	27.0	42.0
14	259	60+	Ind	27.3	28.3	27.7
15	157	86.6 ± 5.6	Int	—	—	61.0
16	149	71–99	Int	37.0	60.0	48.6
17	907	63 ± 8	Ind	13.8	20.7	17.7

Ind = independent or community living. Int = institutionalized or nursing-home population.

antihistamines, antiparkinsonian drugs, diuretics, antipsychotics, antihypertensives, anticholinergics, and antineoplastic agents.

Drug-related changes vary in intensity from person to person [4, 32]. In dentate persons, the caries risk—especially root surface caries—will depend upon the duration of administration of the drug, the person's susceptibility to caries, the degree of dietary alteration, the severity of the xerostomia the drugs produce, as well as the effectiveness of the person's oral hygiene regimen. Root surface caries is decay which occurs on the exposed roots of the teeth after periodontal disease or gum disease has caused bone loss and exposure of the root surfaces to the oral environment. These root surfaces are at a higher risk to become decayed because their chemical structure has less mineral contents than enamel. The consequences are that these lesions can be very hard to restore adequately and can result in loss of the natural teeth. For elderly people, neuromuscular co-ordination becomes a major factor in the ability to maintain an adequate level of oral hygiene. If oral side-effects are noticed, it may be possible for a dentist to ask the patient's physician either to adjust the drug dosages, to modify the drug schedules, to change drugs, or to treat the induced xerostomia jointly [4].

C. Factors affecting salivary gland function:

1. Sjögren's syndrome [32–34]
2. Obstruction and infection
3. Tumours
4. Stroke
5. Alzheimer's disease [33, 35]
6. Irradiation
7. Excision.

There are various diseases where the glands are directly affected by the disease process. These include the collagen diseases which are often associated with rheumatoid arthritis. The most common of these diseases is Sjögren's syndrome [32–34].

Salivary gland tumours are relatively uncommon, comprising only about 3% of the oral tumours. The parotid glands are the most common site, with pleomorphic adenoma being the most common tumour [36, 37]. However, the effects of treatment of any tumours of the oral cavity by therapeutic radiation can result in progressive atrophy and fibrous changes in the salivary glands with an associated severe xerostomia. The glands most affected are those within the primary beam and those not shielded from secondary radiation [38, 39].

The salivary production not only is reduced, but becomes very viscous and stringy. The mucosal tissue becomes susceptible to candidal invasion. If teeth are present and if the patient is not taught extremely careful hygiene measures and topical fluorides are not used daily, radiation caries will occur very quickly. These carious teeth cannot be extracted without the danger of osteoradionecrosis [38–40].

Table II. Saliva stimulation

Rx: 5% citric acid in glycerine
Disp: 30 ml
Sig: 5–6 drops under the tongue
4 times daily (pH of this mix is less than 2)

Salix* is a buffered citric acid tablet which can be sucked 3–4 times/day

Rx: Ophthalmic pilocarpine 4%
Disp: 40 ml
Sig: 2 drops on the tongue and swallow
4 times daily (2 mg/drop)

Maximum dose 4 times daily
Contra-indication: cardiac arrhythmia, bronchial asthma, hypersecretory gastrointestinal disease

Rx: Salagen 5 mg
Disp: 100 tablets
Sig: swallow 1 tablet tid
Salagen is a 5 mg pilocarpine hydrochloride tablet

*Salix SST
Scandinavian pure + natural
Perkasie, PA 18944, USA

D. Factors affecting fluid or electrolyte balance:

If not enough fluids are drunk, the salivary glands will not produce saliva, so the mouth will be dry and there will be a reduced ability to flush away bacteria and viruses. An adult needs 6 to 8 glasses of fluid per day. Any condition which creates a loss of fluid—such as vomiting, diarrhoea, sweating or haemorrhage—will cause xerostomia, as will the polyuria of diabetes [41, 42]. Other disease states or deficiencies create alterations in salivary composition and may reflect biochemical changes and electrolyte balance in the person's blood, plasma, or serum levels. Therefore, a xerostomia of non-definable cause may be a symptom of an undiagnosed systemic disease. Such a patient requires detailed medical evaluation.

Treatment of xerostomia

The treatment for dry mouth is frustrating both for the patient and the clinician because often the symptoms cannot be eliminated but only controlled to some degree. If the cause is fluid loss, then stopping the loss and increasing fluid in the diet will eliminate the problem. If the cause is a medication, then it may be possible to modify drug scheduling, adjust doses or to change a medication to a similar one which may not be so drying. If none of these alternatives is available then the only treatment is palliative care. In cases where salivary gland still remains, it may be possible to use cholinergics to stimulate the salivary glands to produce more saliva [43]. The patient also may get some relief by chewing a sugarless candy or sugarless gum. A possibility where no salivary gland activity exists is for the patient to use commercial artificial salivas. These often help only for a short period of time. Therefore, a multifaceted approach has a better chance of success [43–45].

Dietary: Patients should be advised to avoid: dry and bulky foods, spicy or acidic foods, alcoholic beverages, carbonated beverages, and tobacco. A high fluid intake should be encouraged unless it is medically contra-indicated.

Environmental: Maintenance of optimal air humidification in the home is useful, especially during sleep, as is using vaseline to protect the lips.

Dental: A visit to the dentist to make sure that all sharp cusps of teeth or irregular fillings are smoothed and that dentures are checked and adjusted for any irritations they may be causing is advised.

Saliva stimulation: Cholinergic drugs such as pilocarpine may be tried, unless medically contra-indicated (Table II). Drug therapy may be effective if the cause of the xerostomia is related to an underlying disease or metabolic state for which there is no specific therapy, such as previous radiation to the salivary glands, autoimmune diseases, and side-effects of drug therapy. Pilocarpine should be withdrawn if there is no response.

Temporary palliation: Mouthwashes are useful to alleviate oral discomfort.

There are numerous artificial saliva products currently marketed for non-prescription use by patients, but most are only effective for less than an hour. The most successful has been a moisturizing gel (Oral Balance T.M.—Laclede, Gardena CA 90248, USA) containing lactoperoxidase and a glucose oxidase inhibitory system. The other commonly used system which seems to give relief is a mucin-containing solution (Saliva Orthana—A/S Orthana Kemisk Fabrik, Denmark DK-2770). Most products have been developed to mimic the chemical and physical characteristics of natural saliva. Carboxymethylcellulose is used to give artificial salivas a vicosity similar to natural saliva. All products contain calcium and phosphate ions and some also contain 2 ppm fluoride. There is no clinical evidence to indicate that these low fluoride concentrations are effective in the remineralization of tooth surfaces. Most artificial salivas are sweetened with sorbitol, a sugar alcohol considered to be non-cariogenic. However, for patients who constantly use these products in the absence of normal salivary flow, sorbitol can become a problem. Sorbitol and the other sugar alcohols can cause gastro-intestinal discomfort as they have a tendency to absorb water. Xerostomic individuals with recently developed rampant caries should have a professionally designed topical fluoride programme developed for them to protect their teeth from decay [46].

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Received in revised form 23 February 1996