

Management of Xerostomia: An Overview

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Introduction:

Dry mouth, or xerostomia refers to a condition in which the salivary glands in mouth do not produce adequate saliva to keep the mouth wet. Xerostomia is a term used to describe the subjective symptoms of dry mouth deriving from a lack of saliva.¹ Dry mouth is often due to the side effect of certain medications or aging issues or as a result of radiation therapy for cancer. Less often, dry mouth may be caused by a condition that directly affects the salivary glands. Saliva helps to prevent tooth decay by neutralizing acids produced by bacteria, limiting bacterial growth and washing away of food particles. Saliva also enhances the ability to taste and makes it easier to chew and swallow. In addition, enzymes in saliva aid in digestion.² (Fig1)

Symptoms include:

- Dryness or a feeling of stickiness in the mouth
- Saliva appears thick and stringy
- Bad breath
- Difficulty in chewing, speaking and swallowing
- Dry or sore throat and hoarseness of voice
- Dry or grooved tongue
- Changed sense of taste
- Problems in wearing dentures



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Etiology

Salivary glands may not work properly as the result of:

Medications:

- Hundreds of medications, including many over-the-counter drugs, produce dry mouth as a side effect. Among the more likely types to cause problems are some of the drugs used to treat depression, high blood pressure and anxiety, as well as some antihistamines, decongestants, muscle relaxants and pain medications.
- Beta-adrenergic stimulation by the bronchodilators have resulted in viscous saliva, which is of relatively low volume and wettability, leading to the symptoms of dry mouth.³

Aging:

- Many older people experience dry mouth as they age. Contributing factors include the use of certain medications, changes in the body's ability to process medication, inadequate nutrition, and having long-term health problems.

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Cancer therapy:

- Chemotherapy drugs can change the nature of saliva and the amount produced. This may be temporary, with normal salivary flow returning after treatment is completed. Radiation treatments to head and neck can damage salivary glands, causing a marked decrease in saliva production. This may be temporary or permanent, depending on the radiation dose and area treated.
- The radiation level necessary to cause severe dysfunction to gland tissue is 52 Gy. Below this threshold, the radiation damage generally has a transient and reversible duration. Routinely, Head and neck cancer patients receive a total of 50–70 Gy, the radiation dose normally used to destroy malignant cells, which very often leads to the onset of chronic xerostomia.^{4,5} The major reduction in salivation after radiotherapy is observed in the period from

the onset of radiotherapy to 3 months after completion. During radiotherapy, the first 10 days are the worst ones as a massive decrease in saliva production occurs; especially in the first week, it could reduce by 50%–60%. After this period, the flow rate is reduced by 10% of the initial conditions

Nerve damage:

- An injury or surgery that causes nerve damage to the head and neck area can result in dry mouth.

Other health conditions:

- Dry mouth can be due to certain health conditions, such as diabetes, stroke, yeast infection (thrush) or Alzheimer’s disease, or due to autoimmune diseases, such as Sjogren’s syndrome or HIV/AIDS. Snoring and breathing with mouth open also can contribute to dry mouth.

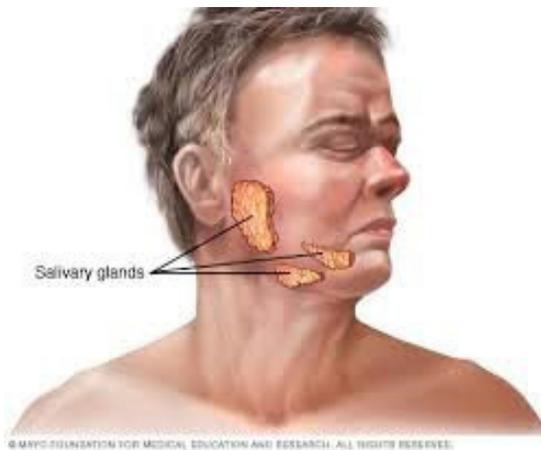


Fig 1 Salivary glands



Fig 2 Draining method to collect saliva



Fig 3 splitting method



Fig 4 saliva collection using lashley cups



Fig 5 oral salivary substitutes



Fig 6 Oral salivary substitutes

Fig 7 oral salivary substitutes

Tobacco and alcohol use:

- Drinking alcohol and smoking or chewing tobacco can increase dry mouth symptoms.

Recreational drug use:

- Methamphetamine use can cause severe dry mouth and damage to teeth, a condition also known as “meth mouth.” Marijuana also can cause dry mouth.

Complications

- Increased plaque, tooth decay and gum disease.
- Mouth sores.
- Yeast infection in the mouth (thrush).
- Sores or split skin at the corners of the mouth, or cracked lips.
- Poor nutrition from having problems with chewing and swallowing.

Diagnosis

To determine the cause of dry mouth, through medical history and all medications taking, are to be recorded followed by oral cavity examination.

Sometimes need blood tests, imaging scans of the salivary glands or tests that measure how much saliva you produce to identify the cause of the dry mouth.

Diagnosis of Salivary gland hypofunction requires measurement of salivary flow, after which the flow rate is compared against a reference value or threshold; those with a salivary flow rate below that particular reference value are deemed to have Salivary gland hypofunction.³

Sialometry: Measuring the saliva flow rate is termed as sialometry. The unstimulated salivary flow rate (USFR) or the stimulated salivary flow rate (SSFR) is measured to determine the xerostomia condition. Normal stimulated salivary flow rate -1.5-2.0 ml/min and unstimulated flow rate -0.3-0.4ml/min. A diagnosis of hyposalivation is made when the stimulated salivary flow rate is $\leq 0.5-0.7$ ml/min and unstimulated salivary flow rate is ≤ 0.1 ml/min.²

The four methods for collecting whole saliva are termed the ‘drain’, ‘spit’, ‘suction’ and ‘swab’ methods. All require the collection of saliva over a predetermined time (usually 3 or 4 minutes), after which its volume is determined and a per-minute flow rate calculated by

dividing the volume by the collection time.⁶ (Fig 2 - 4)

If stimulated salivary flow rate is to be determined, it is necessary to stimulate flow using either gustatory or masticatory stimuli. An example of the former is a 2% solution of citric acid; this can be either dropped directly or applied on blotting paper to the dorsum of the tongue. Examples of masticatory stimuli are paraffin wax or pre-softened polyvinyl acetate gum; these have a neutral taste and are chewed in order to stimulate salivary flow. Another important consideration when measuring salivary flow is the time of day when it is done.

Dawes’ seminal work four decades ago highlighted the existence of diurnal variation in flow. He studied eight people over periods ranging from 4 to 26 days and demonstrated circadian rhythms in salivary flow rate (and composition). He observed that the highest USFR occurred in the late afternoon, and the lowest during the dead of night. Thus, if the stability of a patient’s salivary flow is to be monitored over time, each measurement should be done at approximately the same time of day.⁷

Treatment:

Managing dry mouth among older people involves making an appropriate diagnosis, relieving the symptoms, managing problems with dentures, preventing dental caries and soft-tissue involvement, and monitoring (and where necessary amending) the use of medications. Symptom relief is paramount, given what is known about the effects on quality of life. Symptomatic relief can be obtained simply and cheaply by using a small, inexpensive atomizer bottle filled with water; this can be readily kept on hand for symptomatic use by the sufferer. There are also a number of proprietary products on the market for relieving dry mouth.

Sialagogues have shown mixed results, but they may be appropriate for some patients. Dry mouth can affect denture retention, and the absence of saliva can exacerbate a denture’s effects upon the mucosa in older wearers of complete dentures. Such patients may need denture adhesives to assist in prosthesis retention. Partial dentures add another complication; not only can there be retention problems, but the remaining natural teeth may be at greater risk. Loss of a key abutment tooth can be problematic. Preventing dental caries is a key concern,

given current understanding that the disease continues unabated in older people and is even more active among older residents of nursing homes

Although the long-held assumption that older people taking xerogenic medications are at higher caries risk has been largely debunked it is wise to be prudent and assume that an older person taking many medications is at even higher risk than he/she would be without those. Key measures are the twice-daily use of fluoride toothpaste and the avoidance of non-milk extrinsic sugars (such as sugar added to tea or coffee).

Change medications that cause dry mouth: Monitoring medication use is an important strategy. All health professionals treating older people should continually review and question medication regimens, particularly those which are longstanding. General medical practitioners should be encouraged to routinely ask older patients about dry mouth. Enquiries about dry mouth could be included in the standard medical histories for older people admitted to hospital. Dentists need to work more closely with general practitioners and community pharmacists in order to raise awareness.

Prescribe medication that stimulates saliva: Pilocarpine (Salagen) or cevimeline (Evoxac) to stimulate saliva production. Pilocarpine a cholinergic parasympathomimetic drug appeared to be partially significant in additional secretion of saliva in patients with reduced salivary gland parenchyma as it increases the salivary flow mainly by stimulation of minor salivary glands because they are more resistant to and recover more effectively from radiation damage than parotid and submaxillary gland. Pilocarpine is administered in the form of mouth wash (1mg / ml, 5ml per dose four times daily) or tablet form (5mg, 3 times per day). Cevimeline is a parasympathomimetic agent that act as an agonist at the muscarinic acetylcholine receptors M1 and M3. It is used in treatment of dry mouth associated with Sjogren's syndrome⁵

- *Salivary substitutes:* Mouth rinses, artificial saliva or moisturizers to lubricate your mouth. Mouthwashes based on carboxymethyl cellulose, glycerin and mucin designed for dry mouth, salivary substitutes ideally should acts as protective coating for oral mucosa, maintains

normal oral flora and capable remineralizing decalcified enamel. (Fig 5-7)^{5,8}

- *Salivary gland protective agents:* Amifostine a salivary gland protective agent moderately improves the subjective symptoms by acting as free radical scavenger limiting the damage to acinar cells within salivary glands it is not used in xerostomia associated with radiation therapy as the reduced flow in radiation therapy is mainly associate with loss of salivary parenchyma secondary to fibrosis and loss of microvasculature so the usage of this drug is persuasive⁵
- *Stem cell transplantation and enhancement:* Salivary gland containing the acinar cells myoepithelial cells and intercalated ducts cells primitive glandular stem cells obtained from ductal elements help in regeneration of cell population. Salivary gland tissue can be secured from the patient before the radiation therapy and can be transplanted after the treatment.⁵

Conclusion:

Dry mouth is commonly observed in older individuals. Dry mouth is mainly associated by intake of various drugs daily to maintain systemic health in older people. Management of xerostomia is challenging and requires multidisciplinary approach.

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