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### Xerostomia-Current Concepts Of Aetiology And Its Management

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**Abstract:** *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. Xerostomia is a subjective complaint, often referred to as reduced salivary flow. Decreased salivary flow and alterations in salivary composition cause a clinically significant oral imbalance manifested as increased susceptibility to dental caries, oral candidiasis, altered taste sensation and many other problems. This article reviews the current concepts of etiology and its management.*

#### Introduction:

Saliva is a most valuable oral fluid that is often taken for granted. It is critical to the preservation and maintenance of oral health, yet receives little attention until quality and quantity is diminished. Xerostomia is defined as the dryness of the mouth from the lack of normal secretions (GPT8)<sup>2</sup>. This is a result of salivary gland hypofunction. It is the subjective symptom or sensation of the dry mouth; it reportedly affects about 14 to 40% of all the adults<sup>3,4</sup>. 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<sup>5-12</sup>. An individual with Xerostomia complains of burning mouth, difficulty in speaking and swallowing and hoarseness of voice. Dentures that ordinarily rehabilitate the edentulous patient are poorly tolerated in such patients. Since there is an

increase in the longevity, we have a much larger population of older individuals. Hence it becomes even more important to understand the problems associated with dry mouth and their treatment to improve the patients oropharyngeal health and quality of life.

#### Etiology of Xerostomia:

Xerostomia is a symptom which is more commonly seen in ageing populations, but it is not caused by ageing. Though salivary functions remain intact in healthy older people yet a plethora of systemic diseases, medications, and head and neck radiotherapy causes Xerostomia in elderly patients<sup>13</sup>. The older the patients the more likely they are to have some form of disease or to be taking medications which might be having

xerostomic potential because of their anticholinergic properties. The most common groups are antidepressants, antihistamines, antiparkinsonian drugs, diuretics, anti-psychotics, antihypertensives, anticholinergics and antineoplastic agents. As stated by Mason and Glenn<sup>14</sup> salivary secretion is regulated by autonomic nervous system and is subjected to reflex stimulation from physical and psychic causes, then Xerostomia may result from the following causes as summarized in the table below (Table-1)

**Table no-1 Etiology of Xerostomia**

a. Factors affecting the salivary center	<ol style="list-style-type: none"> <li>1. Emotions like fear, excitement, stress</li> <li>2. Organic diseases like brain tumour and Parkinson's disease.</li> <li>3. Drugs like Levodopa and Morphine</li> </ol>
b. Factors affecting the autonomic outflow pathway	<ol style="list-style-type: none"> <li>1. Encephalitis</li> <li>2. Stroke</li> <li>3. Neurosurgical operations</li> </ol>
c. Factors affecting the salivary gland functions	<ol style="list-style-type: none"> <li>1. Sjogren's syndrome</li> <li>2. Obstruction and infection of salivary ducts</li> <li>3. Tumours</li> <li>4. Irradiation</li> <li>5. Excision of salivary glands</li> </ol>
d. Factors affecting the fluid and electrolyte balance	<ol style="list-style-type: none"> <li>1. Vomiting</li> <li>2. Diarrhoea</li> <li>3. Sweating or haemorrhage</li> <li>4. Polyuria of diabetes</li> </ol>

**Normal salivary flow rates:**

The average daily flow of whole saliva varies in health between 1 to 1.5 litres. A salivary flow rate varies considerably every hour in a day depending

on the demand or the current physiologic status of the patient<sup>15</sup>. The unstimulated salivary flow rate is about 0.3ml/min, whereas the flow rate during sleep is 0.1 ml/min; during eating or chewing, it increases upto 4.0-5.0 ml/min<sup>16</sup>. Any unstimulated salivary flow rate below 0.1 ml/min is considered hypofunction. Stimulated flow rate is, at maximum, 7 ml/min. stimulated saliva is reported to contribute as much as 80-90% of the average daily production<sup>17</sup>.

**Clinical features of Xerostomia:**

Saliva is very much needed to maintain oral health and create appropriate ecological balance, and renders many functions in the oral and gastrointestinal environment. Saliva aids in the swallowing, phonetics, digestion and taste. However, when salivary hypofunction or Xerostomia occurs there is an alteration in the oral and extra-oral environments transiently or permanently causing discomfort, inconvenience and substantial diminution of quality of life. Studies have documented speech difficulties; alterations in the taste sensation; swallowing difficulties; increased caries susceptibility; atrophic, fissured, and inflamed tongue and decreased dietary intake of food causing nutritional problems<sup>18</sup>.

**Diagnosis:**

Diagnosis can be based on the evidence obtained from the patient's history, an examination of the oral cavity, and /or sialometry, a simple procedure that measures the flow rate of saliva<sup>19</sup>. In women the lipstick sign where the lipstick adheres to the front teeth may be a useful indicator of Xerostomia. Salivary gland hypofunction can be predicted when the following four signs are concurrently identified on examination: dryness of lips, dryness of buccal mucosa, absence of salivary production during gland palpation, and decayed/missing/filled teeth (i.e, DMFT) score<sup>20</sup>. Several clinical tests can be utilized to ascertain the function of the salivary glands. In sialometry,

collection devices are placed over parotid or submandibular/sublingual duct orifices and saliva is stimulated with citric acid. The normal flow rate for stimulated saliva is 1 to 2 ml/min. The flow rate less than 0.1ml/min are typically considered xerostomic, although reduced flow rate may not always be associated with complaints of dryness<sup>21</sup>. Sialography is an imaging technique that may be useful in identifying salivary gland stones and masses. Salivary scintigraphy can be useful in assessing salivary gland function. Biopsies of minor salivary glands may be useful in the diagnosis of Sjogren's syndrome, HIV-salivary gland diseases, sarcoidosis, amyloidosis, and graft versus- host diseases while biopsies of major salivary gland is considered in cases of suspected malignancies.

**Management of Xerostomia:**

The treatment for dry mouth is challenging both for the clinician and the patient because often the symptoms cannot be eliminated but only controlled to some degree. Management mainly includes identification of the underlying cause. If the cause is fluid loss, then stopping the loss and increasing the fluid in the diet will eliminate the problem. If the cause is a medication, then it may be possible to modify the drug scheduling, adjust doses or to change a medication to a similar one which may not be so drying. Ultimately the goal of the intervention should be relief of the symptoms that adversely affect a patient's quality of life. Thus, the most effective intervention for reduced salivary function is its prevention. Therefore a multifaceted approach has better chances of success.

**Caries prevention:**

Low sugar diet, topical fluoride application and antimicrobial mouth rinses are critical to prevent dental caries<sup>22</sup>. Plenty of fluids should be consumed by the patient together with the maintenance of meticulous oral hygiene. Supplements containing sodium fluoride,

acidulated phosphate flouride or sodium monofluorophosphate are available for professional application and home use. Use of fluoride containing varnishes that provide prolonged fluoride exposure have also been advocated. In case of active caries the lesion should be controlled and properly restored.

**Saliva stimulation and substitution:**

In cases where salivary gland tissue still remains, it may be possible to use cholinergics to simulate salivary glands to produce more saliva<sup>23</sup>. Patient may also get some relief by chewing a sugarless candy or sugarless gum. But these drugs are contraindicated in patients with systemic conditions like uncontrolled asthma, narrow angle glaucoma or iritis. These patients have no other alternative than a salivary substitute. Levine et al<sup>24</sup> stated that the ideal artificial salivary substitute should be long lasting, capable of providing lubrication to dry and protect oral tissues, and able to inhibit the colonization of cariogenic bacteria. To date an ideal substitute has not been marketed. These substitutes range from readily available compounds like milk<sup>24</sup> to commercially available substitutes such as artificial saliva which may be mucin or carboxymethyl based (table 2 and 3), salinum (containing linseed oil), luborant (based on lactose peroxidase) and others. Glandosane is a salivary substitute with an acidic pH indicated for complete denture wearers.

**Table no-2 Composition of Mucin based salivary substitutes:**

Mucin	35.00 g
Potassium chloride	1.20 g
Sodium chloride	0.85 g
Di-potassium hydrogen orthophosphate	0.35 g
Magnesium chloride	0.05 g
Calcium chloride	0.20 g
Xylitol	20.00 g
Water to make a total of	1 litre

**Table no-3 Composition of Carboxymethyl based salivary substitutes**

Sodium carboxymethylcellulose	10.00 g
Potassium chloride	0.62 g
Sodium chloride	0.87 g
Magnesium chloride	0.06 g
Calcium chloride	0.17 g
Di-potassium hydrogen orthophosphate	0.80 g
Potassium di-hydrogen orthophosphate	0.30 g
Sodium fluoride	0.0044 g
Sorbitol	29.95 g
Compound tartrazine solution	0.1 ml
Methyl p-hydroxybenzoate	1.00 g
Spirit of lemon	5.0 ml
Water to make a total of	1 litre

**Prosthodontic management of Xerostomia patients:**

Prosthodontists are often the primary care givers in the management of Xerostomia. Dental management of these patients begins with thorough patient education. To compensate for intra oral dryness, patient may stop chewing solid foods and prefer liquid and semi-liquid diet rich in fermentable carbohydrates. Because decreased mastication worsens the condition, patients should undergo nutritional counseling to limit the harmful effects of reactionary diet modifications. Patients should be reminded to chew, because periodontal mechanoreceptors and mechanical stimulation of tongue and oral mucosa are vital stimuli for salivation<sup>17,26</sup>.

**Complete dentures:**

Complete denture construction is very challenging in case of patients with dry mouth. Special care should be taken at each step in the fabricating a denture with decent retention and stability. As the mucosa and lips are friable and easily traumatized lips should be coated with petroleum jelly to help in retracting and getting access to oral cavity. The operator's gloved fingers should be wet to prevent sticking them to mucosa. A mouth mirror should be used instead of fingers to facilitate insertion of

tray in patients with circumoral scarring in cases of chronic angular cheilitis and underlying connective tissue disorders. Zinc-oxide eugenol paste routinely used to make impression may irritate the dry mucosa. Therefore it should be avoided and impression materials which are least traumatic and well tolerated by dry oral mucosa like the silicone materials are used. Metal denture bases are used as they have good wetting property and can closely adapt to the oral tissues contributing to better retention<sup>27,28</sup>. Non-anatomic acrylic resin teeth are preferred and arranged in the neutral zone. Although there is inadequate scientific evidence regarding the use of denture adhesives in general, their use to enhance the retention of well-made prosthesis is acceptable and at times is necessary. Best results can be obtained by wetting the mouth with a sip of water and spraying the salivary substitute on the intaglio surface of denture before placing it in mouth. However, this effect is relatively for a short time. To circumvent this problem slow releasing devices called salivary reservoirs have been incorporated in the denture but this prosthesis have demonstrated short comings like food accumulation, and short release time of wetting agents. These patients should be recalled for follow up regularly to assess and suitably treat any form of mucosal ulceration or denture stomatitis.

**Reservoir Bite Guards:**

These are a simple form of salivary reservoirs which can be worn by dentate, partially dentate and even patients with complete dentures<sup>29</sup>. It is a modified bite guard with bilateral reservoirs. They were constructed from double layer of polyvinyl acetate with bilateral inverted pear shaped reservoirs.

**Treatment of oral candidiasis:**

Candidiasis is the most common complication in denture patients with dry mouth and is treated with topical antifungal agents in the form of oral rinses, ointments and lozenges. Prescription of systemic antifungal agents is done in case of

active infection and immune-compromised individuals. The use of antifungal agents mixed with denture materials is also proposed in the treatment of denture stomatitis patients and research is still in progress in this field.

#### **Removable partial dentures:**

Partial dentures should be planned in such a way that they take most of the support from the tooth with minimum tissue coverage. Conventional gingivally approaching clasp should be avoided because they stand away from tissue and are likely to stand away from cheeks. A modified de van clasp following the end of the flange and a well contoured and adapted half encircling clasp may minimize this problem. A combination approach using anterior saddle restored with a bridge and implants and posterior saddle with denture will minimize the size of the connector and the number of gingival margins that must be covered<sup>30</sup>.

#### **Fixed partial dentures:**

In dry oral environments full coverage retainers and easily cleanable pontics and connectors are advised. Margins of the prepared tooth are kept supra-gingival to maintain adequate oral hygiene.

#### **Dental implants:**

A very few case reports are available regarding the use of dental implants in the treatment of patients with Xerostomia. These case reports say that the patients can be treated successfully with osseointegrated dental implants resulting in enhanced patient comfort<sup>31</sup>. Susceptibility of xerostomic patients treated with dental implants to peri-implantitis cannot be determined as there are no clinical trials are performed to assess this relation. However, when implants are considered as a viable treatment option, the operator should adhere to the following guidelines<sup>32</sup>: prior to implant placement the underlying cause of Xerostomia should be diagnosed and appropriately treated; any oral bacterial infections such as periodontitis, dental caries and fungal infections like oral candidiasis should be

thoroughly treated prior to implant placement; after implant placement maintenance intervals should be shortened to prevent development of peri-implantitis due to increased plaque formation in these patients.

**Conclusion:** Saliva is an oral fluid that plays a multitude of functions in preserving the integrity of oral tissues and in maintaining overall health of the oral cavity. Xerostomia or dry mouth may have many deleterious effects on the oropharyngeal health of the patient. Therefore the clinician should be able to diagnose the condition. There is no single treatment modality suitable for treating this condition but a combination of them should be able to provide a preventive and interventional treatment to reduce its impact on the patient's quality of life.

#### **References:**

1. Garrett JR. The proper role of nerves in salivary secretion: a review. *J Dent Res* 1987;66:387-97.
2. The glossary of prosthodontics terms. *J Prosthet Dent* 2005; 94:10-92.
3. Saliva: its role in health and disease. Working Group 10 of the Commission on Oral Health, Research and Epidemiology (CORE). *Int Dent J* 1992;42:287-304.
4. Johnson G, Barentin I, Westphal P. Mouth dryness among patients in long term hospitals. *Gerodontology* 1984;3:197-203.
5. Narhi TO. Prevalence of subjective feelings of dry mouth in the elderly. *J Dent Res* 1994;73:20-5.
6. Heft MW, Baum BJ. Unstimulated and stimulated parotid salivary flow rate in individuals of different ages. *J Dent Res* 1984;63:1182-5.
7. VVu AJ, Atkinson JC, Fox PC, Baum B, Ship JA. Crosssectional and longitudinal analyses of stimulated parotid salivary constituents in healthy, different-aged subjects. *J Gerontol Med Sci* 1993;48:M219-24.
8. Osterberg T, Landahl S, Hedegard B. Salivary flow, saliva pH and buffering capacity in 70-year-old men and women: correlation to dental

- health, dryness in the mouth, disease and drug treatment. *J Oral Rehabil* 1984;11:157-70.
9. Johnson G, Barenthin I, Westphal P. Mouth dryness among patients in long term hospitals. *Gerodontology* 1984;3:197-203.
  10. Ben-Aryeh H, Miron D, Berdicevsky I, Szargel R, Gutman, D. Xerostomia in the elderly: prevalence, diagnosis, complications and treatment. *Gerodontology* 1985;4:77-88.
  11. Handelman SL, Baric JM, Saunders RH, Espeland MA. Hyposalivatory drug use, whole stimulated salivary flow and mouth dryness in older, long term care residents. *Spec Care Dent* 1989;9:12-18.
  12. Thorselius I, Emilson CG, Osteberg T. Salivary conditions and drug consumption in older age groups of elderly Swedish individuals. *Gerodontics* 1988;4:66-70.
  13. Michael D. Turner and Jonathan A. Ship. Dry mouth and its Effects on the oral health of elderly people. *JADA* 2007, Vol. 138:15-20.
  14. Mason DK, Glen AIM. The aetiology of xerostomia (dry mouth). *Dent Mag Oral Top* 1967;84:235-8.
  15. Ganong W.F, Review of Medical Physiology, 21 st Ed, San Fransisco, Mc-Graw Hill.
  16. Porter S.R et al, An update of the etiology and management of xerostomia. *Journal of Oral Surgery, Oral medicine, Oral pathology* 2004;97:28-46.
  17. Humphrey P.S, Williamson T.R, A review of saliva: Normal composition, flow and function. *J Prosthet Dent* 2001;85:162-9.
  18. Burket's Oral medicine 11<sup>th</sup> edition, page no 192-193.
  19. Deborah Greenspan. Xerostomia: Diagnosis and management. *Oncology* 1996; 10(Suppl):7-11.
  20. Navazesh M, Christensen C, Brightman V. Clinical criteria for the diagnosis of salivary gland hypofunction. *J Dent Res.* 1992;71:1363-1369.
  21. Valdez IH Fox PC. Diagnosis and management of salivary dysfunction. *Crit Rev Oral Biol Med* 1993;4:271-7.
  22. Ship JA. Diagnosing, managing, and preventing salivary gland disorders. *Oral Dis* 2002;8(2):77-89.
  23. Fox PC, van der Ven PF, Baum BJ, Mandel ID. Pilocarpine for the treatment of xerostomia associated with salivary gland dysfunction. *Oral Surg Oral Med Oral Pathol* 1986;61:243-8.
  24. Levine MJ, Aguirre A, Hatton MN, Tabak LA. Artificial salivas: present and future. *J Dent Res* 1987;66:693-8.
  25. Narhi TO, Meurman JH, Ainamo A. Xerostomia and hyposalivation: causes, consequences and treatment in the elderly. *Drugs Aging* 1999;15:103-16.
  26. Sreebny LM. Saliva in health and disease: an appraisal and update. *Int Dent J* 2000;50:140-61.
  27. Lloyd PM. Complete-denture therapy for the geriatric patient. *Dent Clin North Am.* 1996;40:239-254.
  28. Hummel SK, Marker VA, Buschang P, et al. A pilot study to evaluate different palate materials for maxillary complete dentures with xerostomic patients. *J Prosthodont.* 1999;8:10-17.
  29. Pankhurst CL, Dunne SM, Rogers JO. Restorative dentistry in the patient with dry mouth: part two: problems and solutions. *Dent Update* 1996;23(3):110-14.
  30. Joseph J Massad, David R Cagna. Removable prosthodontic therapy and xerostomia. Treatment considerations. *Dent Today* 2002;21(Issue 6),80-87.
  31. Payne AG, Lownie JF, Van Der Linden WJ. Implant supported prostheses in patients with Sjogren's syndrome a clinical report on three patients. *Int J Oral Maxillofac implants* 1997;12:679-85.
  32. Beikler T, Flemming TF. Implants in the medically compromised patient. *Crit Rev Oral Biol Med* 2003;14(4):305-16.