

Awareness on management strategies to treat hyposalivation among dental professionals

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ABSTRACT

Introduction: Saliva a prime component of oral cavity essential for the good health of the oral cavity and general systemic health. The oral environment dictates the oral function as in communication, eating, clearing the oral cavity, and swallowing. The hydration of the oral cavity is maintained by saliva by its sympathetic and parasympathetic nervous regulation. While the stimulated state is present for only a few hours in relation to masticatory or gustatory stimulation with upregulation of saliva by parasympathetic stimulation, the resting state has the highest impact on teeth, reduces infection, and promotes healing and maintenance of oral mucosa. **Aim:** The aim of the study was to understand and assess the knowledge about management of hyposalivation in patients among dentists. **Materials and Methods:** A cross-sectional observational study was conducted in Saveetha Institute of Medical and Technical Science, Chennai, Tamil Nadu, India. The study population comprised undergraduate dental students from all the years (1st year, 2nd year, 3rd year, final year, and interns), staff members and private dental practitioners. A detailed questionnaire containing questions pertaining to the demographic status along with questions related to the knowledge of the participant about the management of hyposalivation in was structured. The questionnaire was distributed to the participants and the answers were registered. The results were obtained after statistical analysis and interpreted. **Results:** When participants were asked, if they were aware of diagnosing hyposalivation only 131 were aware and only 123 were aware of the medications causing hyposalivation. Only 40 were confident in diagnosing the underlying pathology causing hyposalivation. Only 164 were aware of sialogogues. Only 34 have advised sialogram and only 24 knew to interpret a sialogram. Only 81 knew other alternative methods to induce salivation. Only 174 participants were aware of salivary substitutes. Only 38 were aware of flavored chewing gums to stimulate salivary secretion. Only 136 were aware of saliva stimulating devices. **Conclusion:** The awareness about hyposalivation management among dentists is rather less and needs to improve.

KEY WORDS: Dentists, Hyposalivation management, Knowledge, Sialogogue, Xerostomia

INTRODUCTION

Saliva is a prime component of oral cavity essential for the good health of the oral cavity and general systemic health. The oral environment dictates the oral function as in communication, eating, clearing the oral cavity, and swallowing. The hydration of the oral cavity is maintained by saliva by its sympathetic and parasympathetic nervous regulation. While the stimulated state is present for only a few hours in relation to masticatory or gustatory stimulation with up-regulation of saliva by parasympathetic stimulation, the resting state has the highest impact

on teeth, reduces infection, and promotes healing and maintenance of oral mucosa.

The minor salivary glands contribute 70% of the total amount of mucin in the whole saliva while only contributing 10% of the fluid secretion. Mucin affords the mucosal barrier, lubrication, to form the salivary pellicle on teeth. Stimulated saliva is mainly from the parotids and composed of serous secretions. The secretion is increased with chewing and reduced during rest. In addition to salivary volume, texture and viscosity are critical concerns frequently not considered in the clinical setting.

Resting saliva or saliva secreted at night is composed primarily of mucinous secretion from the submandibular, sublingual, and minor salivary glands, with a limited serous component.

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Saliva is subject to diurnal variation. Reduction in saliva secretion by night results in dryness of the mouth, that gets exaggerated with time or speaking and at night, causes altered sleep patterns. Salivary glands are in a quiescent state for most of the day, with a continuous relatively low flow rate induced by autonomic activity of sympathetic and parasympathetic nervous regulation. Hence, the impact of xerostomia is worst during sleep at night.

It is for these reasons, xerostomia and hyposalivation, both of which are common conditions that can greatly impact the quality of life as well as oral and general systemic health. However, when saliva stimulation is not sufficient, diagnosis is based on testing if the salivary flow rate increases after stimulation. Stimulation is possible only if functional tissue is present. When stimulation is not possible saliva substitutes is the answer

Functions: Saliva serves various purposes like surface wetting, diluting, clearing, facilitating taste and bolus formation. Lubrication with mucin to aid in speech, swallowing and prosthetic function. Mucin along with wetting action serves as a barrier. Saliva also provides mucosal protection through growth factors and hydration facilitating regeneration and repair. It provides an antimicrobial effect through acquired and innate immunity.^[1] It maintains dental hard tissues by maintaining pH, remineralization, diluting, and clearing. Other actions include initiation of digestion, comfort, speech, and swallowing.

Lack of adequate saliva leads to dry mouth (xerostomia, dysphasia, dysphonia, odynophagia, altered taste,^[2] burning sensation, and difficulties in wearing dentures).^[3] Local diseases due to inadequate salivary flow are demineralization of dental tissues, erosion, dental hypersensitive, halitosis, atrophy, and red oral mucosa, traumatic mucosal ulceration, cracked lips, angular cheilitis, and shift in the microbial contents to candidal infections. Systemic disturbances such as pharyngitis, laryngitis, acid reflux, dietary accommodations, and infections can occur. Impairment in quality of life can also happen.^[4]

Hyposalivation and xerostomia occur due to various reasons related to medication intake^[5,6] diabetes mellitus, autoimmune diseases such as Sjögren's syndrome,^[7] connective tissue disease (e.g., systemic lupus erythematosus), graft versus host disease (allogeneic hematopoietic stem cell transplantation), and radiotherapy.

On the other hand, excessive mucin is another problem, for the patient to manage and may be of increased concern at night, thereby affecting sleep.

Mucolytic drugs help in thinning the mucin in this type of salivary gland dysfunctions.

It is pertinent at this juncture, to mention, that hyposalivation is a common symptom in most ailing patients, either as part of the pathology or as part of therapy. General dentists should be aware of the problem and therefore its management in the best interest of society.

This study aims to scale the level of awareness of hyposalivation and its management among dental professionals.

MATERIALS AND METHODS

A cross-sectional observational study was conducted in Saveetha Institute of Medical and technical Science, Chennai, Tamil Nadu, India. The study population comprised undergraduate dental students from all the years (1st year, 2nd year, 3rd year, final year, and interns), staff members and private dental practitioners. Ethical clearance was obtained for the study from the Institutional Ethical Committee. Written informed consent in English and vernacular language was obtained from each participant, and the confidentiality of the participant was maintained throughout the study. Only participants who were present and who gave written informed consent were included in the study.

A detailed questionnaire containing questions pertaining to the demographic status along with questions related to the knowledge of the participant about the management of hyposalivation was structured. The questionnaire was distributed to the participants and the answers were registered. The results were obtained after statistical analysis and interpreted.

The questions were:

1. Are you aware of diagnosing hyposalivation in patients?
Yes/No/Not sure
2. Are you aware of the medicines causing hyposalivation as a side effect?
Yes/No/Not sure
3. Are you aware of the usage of sialogogues?
Yes/No/Not sure
4. Are you confident of diagnosing the underlying pathology causing hyposalivation?
Yes/No/Not sure
5. Have you advised a sialogram?
Yes/No/Not sure
6. Are you confident interpreting a sialogram?
Yes/No/Not sure
7. Are you aware of alternative methods to induce salivation?
Yes/No/Not sure

8. Are you aware of salivary substitutes?
Yes/No/Not sure
9. Are you aware of flavored chewing gums?
Yes/No/Not sure
10. Are you aware of saliva stimulating devices?
Yes/No/Not sure.

RESULTS

A total of 200 participants attended the questionnaire.

When they were asked if they can diagnose hyposalivation in patients 131 said yes, 50 said no, and 19 were not sure.

When they were asked if they were aware of the medication that could lead to hyposalivation as a side effect 123 said yes, 70 said no, and 7 were not sure.

When they were asked if they were aware of sialogogues 164 said yes, 30 said no, and 6 were not sure.

When they were asked if they were confident to diagnose the underlying pathology causing hyposalivation 40 said yes, 151 said no, and 9 were not sure.

When they were asked if they had advised for a sialogram 34 said yes, 163 said no, and 3 were not sure.

When they were asked if they were confident to interpret a sialogram 24 said yes, 174 said no, and 4 were not sure.

When they were asked if they were aware of the alternative methods to induce salivation 81 said yes, 114 said no, and 5 were not sure.

When they were asked if they were aware of salivary substitutes 174 said yes, 24 said no, and 2 were not sure.

When they were asked if they were aware of flavored chewing gums 38 said yes, 159 said no, and 3 were not sure.

When they were asked if they were aware of saliva stimulating devices 136 said no and 4 were not sure.

DISCUSSION

When participants were asked if they were aware of diagnosing hyposalivation only 131 were aware and only 123 were aware of the medications causing hyposalivation. Only 40 were confident in diagnosing the underlying pathology causing hyposalivation. Only 164 were aware of sialogogues. Only 34 have advanced sialogram and only 24 knew to interpret a sialogram. Only 81 knew other alternative methods to

induce salivation. Only 174 participants were aware of salivary substitutes. Only 38 were aware of flavored chewing gums to stimulate salivary secretion. Only 136 were aware of saliva stimulating devices.

The majority of the salivary substitutes are based on carboxymethylcellulose,^[8] hydroxyethylcellulose,^[9] polyglycerylmethacrylate,^[10] hydroxypropyl methylcellulose^[11] or animal mucin,^[12,13] although preparations based on glycerol,^[14] canola oil,^[12] olive oil, linseed extract,^[15] oxygenated glycerol triester(s),^[16] propylene,^[17] and xanthan gum^[18,19] have been developed. Some of these preparations contain fluoride although it is not known if this has any genuine anti-caries effect. The majority are pH neutral, but some are acidic, but unproven risk, to increase dental erosion. Moisturizing oral gels are available olive oil and betaine or whey extract and aloe vera. These agents are usually applied on a regular basis to the oral mucosa, although they may also be delivered through an intraoral device.^[20] Regardless of the mode of delivery, the gels may lessen symptoms of xerostomia,^[21] Gums of various types (e.g., containing xylitol/sorbitol) can lessen symptoms of xerostomia, presumably due to a topical (gustatory) or a mechanoreceptive/proprioceptive (masticatory) action, although there is no consistent evidence that the gums are notably better than salivary substitutes and cause a significant increase in salivary flow.^[21] This may be due to the fact that gums are effective only if there is remaining salivary functional tissue.

Toothpaste as part of a mouth care system with gels and mouthwashes may subjectively improve xerostomia and symptoms allied to oral dryness but do not improve salivary gland function.^[20] Aside from fluoride some of the mouth rinses and gels contain supposed antimicrobial agents, oxidase, lactoperoxidase, lactoferrin and lysozyme lactoperoxidase, lactoferrin, lysozymes, and immunoglobulins.^[22]

Mouthwash based on linseed oil may reduce levels, but does not change the constituents of intraoral supragingival plaque.^[15,23]

The present literature indicates that no one topical agent is better than another^[24] and there are no data as to the long-term compliance of patients provided with such agents.

Pilocarpine

it is a cholinergic parasympathomimetic agent by direct stimulation of salivary muscarinic receptors on the acinar cell surface. The drug in the presence of a remnant healthy salivary tissue is a very potent secretagogue.

Pilocarpine has been shown to be effective in relieving complaints of dry mouth in both conditions, with acceptable side effects, at oral doses of 5–7.5 mg given

3 or 4 times daily. Some of the side effects though generally mild, it commonly includes sweating, warmth or flushing, particularly on face and neck. Associated ill effects of the drug include nausea, vomiting, excessive sweating, vasodilatation, hypotension, bradycardia, and increased urinary frequency.^[25] Contraindications to the use of pilocarpine, which requires a physician's consent before prescribing include asthma, acute iritis, glaucoma, chronic bronchitis or another type of chronic obstructive pulmonary disease, kidney stones, gallstones, gallbladder, heart, or liver disease.

Cevimeline

The drug is a cholinergic agonist that binds with M3 muscarinic receptors on salivary and other exocrine glands.^[26] The studies with randomized controlled trial generally show that therapy with cevimeline, 30 mg 3 times daily, provides substantive relief of xerostomia symptoms in patients.^[27-30] The drug was generally well tolerated, with expected adverse events resulting from its muscarinic agonist action, such as sweating, cephalgia, nausea and dyspepsia, sinusitis, infections of the upper respiratory system, rhinitis, and diarrhea.^[31]

However, the various contraindications of the drug include narrow-angle glaucoma, acute iritis of the eye, and asthmatic patients. It can alter the conduction of the heart and therefore heart rate, adequate precautions need to be taken in patients with cardiovascular disease, asthma, bronchitis, chronic obstructive pulmonary disease, Parkinson's disease, urinary or bladder obstruction, gallbladder disease, gastrointestinal ulcers, lactation, or a history of adverse reaction to other cholinergic agonists. Cevimeline may induce visual impairment with decreased visual acuity, especially at night, and impaired depth perception.

Acupuncture: in particular, in electro-acupuncture has been reported to increase the release of neuropeptides into saliva, such as calcitonin gene-related peptide, neuropeptide Y, and vasoactive intestinal peptide, compared to baseline.^[32] Acupuncture is administered concurrently with radiotherapy to prevent xerostomia.^[33]

In alternative medicine, a comparison against the standard treatment is lacking. Its benefits, adverse effects and health economics should be related to standard treatments, for example, saliva substitutes and mechanical (paraffin chew), chemical (pilocarpine, cevimeline), or electrical (Saliwell GenNarino) stimulation of salivary responses.

Electrostimulation

Human experiments showed that the application of an electrical current on the skin covering the parotid gland area and on the oral mucosa augmented salivary

secretion.^[34-36] A recent development is a device aimed at stimulating salivation by the application of electrical excitation in the area of the lower third molar. The electrodes located on the surface of the device contact the oral mucosal surface which is 1–5 mm away from the lingual nerve. The rationale of the therapeutic potential lies with the stimulation imparted to the efferent trigeminal fibers running through the lingual nerve, which subsequently drive the submandibular and sublingual glands to secrete more saliva. However, reflex salivation by all salivary glands can be potentially evoked, as well, if the current excites the afferent fibers that relay to the superior salivary nucleus through the chorda tympani and the VII cranial nerve. The outcome is overall increased secretion by all salivary glands.

Biological Therapy: The primary drug of the current biological agents being used in the treatment of SS-induced hyposalivation is CD20-targeting rituximab. CD20 is a B cell marker present on the cell surface from late pro-B-cells to memory B cells. Chimeric anti-CD20 antibodies deplete B cells, which are expected to be beneficial in B cell-mediated autoimmune diseases. However, the survival of CD20-lymphoid progenitors leads to the waning of the effects and reconstitution of the B cells. Therefore, in the current therapeutic regimens, the two initial infusions are followed by repeat infusions at intervals of 6 months–3 years. Survival of the antibody-producing CD20-plasma cells explains the relatively few infectious complications.

Recognizing that the exocrinopathy of SS is driven by an autoimmune inflammatory infiltrate, another therapeutic approach has been to modify the inflammatory cytokine pathway, specifically targeting tumor necrosis factor alpha.

Gene therapies were developed to treat inherited genetic deficiencies by delivering genetically engineered genes in viral or non-viral vectors into the body to replace the defective gene and its product. The advantage of this approach is that the gland is encapsulated (assuring confinement of the gene construct and its product) and surgically accessible and vector delivery is minimally invasive and easy.^[37,38]

CONCLUSION

The awareness about hyposalivation management among dentists is rather less and needs to improve.

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