

Alterations In Salivary Gland Secretion And Contemporary Treatment Alternatives

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Abstract

Saliva is a significant secretion in the preservation of oral cavity, preparation of food for chewing and swallowing, remineralization of teeth, neutralization of oral acid and simplification of speech. Decrease or increase of this secretion can cause various oral and general health problems. While hyposalivation leads to xerostomia, hypersalivation results in sialorrhea. Both of them have to be treated with proper management methods. In this review, salivary secretion alterations were identified and current treatment options were discussed.

Keywords: Hypo salivation; Xerostomia; Hyper salivation; Sialorrhea

Introduction

Saliva is a fundamental secretion in the preservation and integrity of oral cavity. It has an important role in the preparation of food for chewing and swallowing owing to its lubrication feature. Furthermore, this secretion also helps the remineralization of teeth with supplying inorganic ions (calcium, phosphate), neutralization of oral acid and simplification of speech [1-3]. Shafik et al. [4] suggested that the importance of saliva is not limited to the mouth, besides that, it supports the esophageal clearance and buffer of gastric acid.

Salivary secretion is controlled by the autonomic nervous system with receptors placed in the salivary glands [5]. And, decrease or increase of this significant element of the mouth can lead to several oral and general health problems.

Hyposalivation and Xerostomia

Hyposalivation usually cause to xerostomia (dry mouth) that can proceed from some disturbances, such as radiotherapy to the head and neck region, malnutrition, Sjögren's syndrome, renal and hepatic diseases, diabetes mellitus, AIDS, sarcoidosis, graft-versus-host disease, neurological, psychological and connective tissue disorders [3,6]. Takeuchi et al. [7] reported that aging and dental plaque score are predisposing factors of salivary flow reduction. However, various drugs are the most prevalent causes of hyposalivation [1,3]. Nguyen et al. [8] indicated that 44 of the 72 prescribed medications are associated with xerostomia.

Reduced salivary flow rate results in risk of halitosis, dental caries, burning mouth, ulcerations and candidiasis; and difficulties in retention of removable dentures, nutrition (taste alterations, chewing, swallowing) and speech [9,10]. Medication-induced hyposalivation frequently results from antidepressants, antihistamines, bronchodilators, gastrointestinal drugs, diuretics, antihypertensives, sedatives, muscle relaxants, analgesics, anti-inflammatory agents (steroids and non-steroids), anxiolytics and antipsychotics [2,11].

Treatment options

The treatment of xerostomia is to use parasympathomimetic drugs or artificial saliva. On the other hand, artificial saliva and mouthwashes have a transient effect on oral mucosa [6,9,12]. Murakami et al. [13] reported that Chinese herbs promote and induce salivary fluid secretion. Whereas, the laser photobiomodulation protocol used in the study of de Jesus et al. [14] could not improve salivary flow in the submandibular glands of hypothyroid rats. Systemic agents, such as parasympathomimetic drugs, muscarinic and adrenergic receptors

stimulate the secretion of fluid and protein from salivary glands. Ion transport to the oral tissues can also increase the salivary secretion. Systemic sialogogues; cevimeline and pilocarpine are used to improve the symptoms of xerostomia in patients with Sjögren's syndrome [12,15]. Abbasi et al. [16] compared the pilocarpine and bromhexine drugs in patients with radiotherapy-induced xerostomia and found that pilocarpine is more effective to improve dry mouth symptoms. Maruyama et al. [17] compared the effects of β_3 -adrenoseptor agonist ritobegron and anti-muscarinic agent tolterodine, and showed that ritobegron do not decrease of salivary gland secretion on overactive bladder patients.

Glutamate, which is associated with umami taste, glicopyrrolate and topical agents can be used to increase salivary gland secretion [18,19]. Acupuncture and gene therapy are also recommended for improving xerostomia [6,9]. Using of an extra-oral transcutaneous electric nerve stimulation (TENS) device over the parotid gland was reported as an effective method for increasing parotid gland salivary flow in healthy and radiation-induced xerostomia subjects [19,20]. As an alternative approach, submandibular gland transfer can be performed for an effective management of radiation-induced xerostomia in head-and-neck cancers without serious side effects [21]. Schiffman et al. [22] concluded that the improvements in secretion rate of salivary IgA in subjects by repeated taste and smell stimulation can be used for the treatment of immune deficiencies and dry mouth. In their study, sugar (taste alone) and flavor (taste and odor combined; sugar, cocoa powder and Irish cream odor) to the tongue indicated higher secretion rates of salivary IgA than the application of water in both elderly and young individuals. In addition, Otsuki et al. [23] suggested that 4-week ingestion of a chlorella-derived multicomponent supplement, which contains high levels of proteins, vitamins, minerals, and dietary fibers, increases salivary IgA secretion and can improve mucosal immune function in humans.

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Hypersalivation and Sialorrhea

Hypersalivation leads to sialorrhea which is an uncommon condition can occur with neurological disorders (amyotrophic lateral sclerosis-ALS, cerebral palsy, Parkinson disease), several infections, menorrhoea, metal poisoning, Wilson disease, Down, Angelman and fragile X syndromes, autism, gastroesophageal reflux disease, otolaryngological disorders and idiopathic paroxysmal sialorrhea. Medications, which have cholinergic effects, such as lithium, bethanecol, risperidone, nitrazepam and clozapine may lead to sialorrhea [9,11,24]. Halitosis, caries lesions, infection, calculus deposition, skin irritations of perioral region and dehydration of the body are some inevitable consequences of hypersalivation [25].

Treatment options

Various treatment options can be proposed for the management of increased salivary secretion. Methantheline, which is a muscarinic receptor blocking drug prescribed in patients with hyperhidrosis, is used to decrease salivation in dentistry. When methantheline compared with atropine, the antimuscarinic effects of methantheline were more strong than atropine according to report of Müller et al. [26]. Scopolamine, ipratropium bromide, pirenzepine, trihexyphenidyl and oxybutynin are also prescribed to manage increased salivary secretion [24,27,28]. Takeuchi et al. [28] suggested that Scopolamine Butylbromide can be an effective agent on Clozapine-induced hypersalivation.

Botulinum toxin is an advisable neurotoxin for the treatment of sialorrhea. But, this therapy has some side effects, such as dysphagia, mucus expectoration increasment and probable infection of chest [29,30]. Ultrasound-guided injection of this toxin is more beneficial for a proper management strategy [24]. When other treatment options have failed, salivary gland duct ligation is the most common surgical technique for the recovery of hypersalivation sufferers [29].

Conclusion

Both xerostomia and sialorrhea have adverse effects to sense of well-being. Clinicians must have sufficient knowledge regarding salivary flow problems to provide patients the most appropriate treatment applications for improving quality of their life. When salivary gland dysfunction have occurred due to medications, they should be altered with the consultation of related physicians.

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