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Review

The Effect of Oral Hydration Supplements on Dry Mouth Symptoms and Oral Health

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Abstract

A prevalent condition that impacts millions of people, dry mouth or xerostomia is frequently brought on by medication, systemic illnesses, aging, or radiation therapy. Because it puts the person at risk for dental caries, periodontal disease, and issues with speech and swallowing, it can seriously harm oral health. To reduce the symptoms of xerostomia and enhance oral health, oral hydration supplements in the form of electrolyte solutions and saliva substitutes have been developed. This review of the literature discusses the efficacy of oral hydration supplements in treating dry mouth, how they work, and how they affect oral health in general. Oral hydration supplements are an effective intervention in dry-mouth patients, offering symptomatic relief and potential oral health advantages. Supplements work in multiple ways: by preserving moisture, as antimicrobial agents, and by promoting remineralization. Clinical trials suggest they may be able to increase xerostomia-associated discomfort, reduce risk for caries, and improve swallowing. But there remain concerns regarding long-term efficacy, patient variability, and product stability.

Keywords: *Xerostomia, Supplements, Oral Hydration, Saliva Substitutes, Periodontal Disease*

Introduction

Xerostomia, also known as dry mouth, is a common condition that affects millions of people worldwide. It is frequently brought on by aging systemic diseases, radiation therapy, and medication use. This disorder, which causes severe discomfort and issues with oral health, is brought on by a decrease in salivary flow or modifications in the composition of saliva. By facilitating digestion, lubricating oral tissues, neutralizing acids and inhibiting microbial growth, saliva plays a vital role in preserving oral homeostasis. People who have impaired salivary flow are more vulnerable to dental cavities, periodontal disease, oral infections, halitosis, and trouble speaking and eating (1). People at an increased risk of xerostomia and those who have impaired salivary flow are more vulnerable to dental cavities, periodontal disease, oral infections, halitosis, and trouble speaking and eating (2-5). According to studies, about 60% of adults suffer from dry mouth and rates rise sharply for those undergoing polypharmacy treatments (6-11). People with chronic diseases like diabetes (12) and autoimmune diseases like Sjögrens syndrome (13), cancer patients receiving radiation therapy, people taking antihypertensives, antidepressants, antihistamines, and the elderly are all at particularly high risk for xerostomia. Additionally, patients with cancer receiving radiation therapy for head and neck cancers frequently experience irreversible damage to their salivary glands, which exacerbates the symptoms of dry mouth (14, 15). Artificial saliva, sugar-free chewing gum and systemic sialagogues (like pilocarpine and cevimeline) are examples of traditional management techniques for xerostomia that try to increase saliva production or offer short-term relief. These methods, however, frequently fall short in addressing underlying hydration imbalances or offering sustained relief (16-18).

Oral hydration supplements have become a viable treatment option to address this limitation and promote oral health (19-23). Supplements exert their effects by various mechanisms, including stimulating saliva secretion, providing moisture-retaining agents, and simulating the natural character of saliva. There are several different forms of oral hydration supplements, such as electrolyte-based solutions, saliva substitutes, hydration lozenges, gels, and sprays containing hyaluronic acid. Key ingredients like glycerin, xylitol, mucopolysaccharides, and bioactive proteins are included in many of these products. These ingredients improve moisture retention, inhibit bacterial adhesion, and have calming effects on oral tissues. In addition, certain formulations contain calcium and phosphate ions, which help people with chronic dry mouth remineralize their enamel and guard against dental decay. The effectiveness of oral hydration supplements in reducing the symptoms of xerostomia and enhancing general oral health outcomes has been assessed in recent clinical trials (19, 24-26). The majority of products contain electrolytes, mucopolysaccharides and bioactive proteins that provide oral hydration and antimicrobial activity. Furthermore, hydration supplements raise the general quality of life for people with chronic xerostomia by improving speech function, oral discomfort reduction, and swallowing efficiency (27, 28). Oral hydration supplements offer advantages, but they also have drawbacks, including individual response variability, frequent application requirements, and possible long-term cost barriers (29). Concerns about standardization, safety, and formulation efficacy are also raised by the lack of regulatory oversight during the development of these products. By examining their mechanisms of action, clinical efficacy, and long-term effects on oral health, this literature review seeks to evaluate the function of oral hydration supplements in the treatment of xerostomia. Through a comprehensive analysis of current research, this review will highlight the benefits and drawbacks of hydration therapies and investigate potential avenues for improving patient outcomes and managing xerostomia.

Review

About dry mouth and its consequences

Xerostomia, or more commonly known as dry mouth, is caused by the decrease in salivary secretions or alterations of salivary constituents (1). Saliva plays a crucial role in oral health and has the function of acid neutralization, food particle

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removal, and provision of essential minerals for enamel remineralization (30, 31). Decreased production of saliva increases the risk of halitosis (bad breath), dental caries, infections in the mouth, and dysphagia/mastication (chewing) problems, all of which have a detrimental effect on nutrition and general quality of life (32-34). Xerostomia can have social and psychological implications as well as those on oral health. Chronic mouth dryness can lead to difficulty in speaking in a normal way, which will make people shy and anxious when they are with other people. Also, inappropriate saliva can inhibit the initial breakdown of food that can lead to gastrointestinal discomfort. Effective management of xerostomia is important given these far-reaching impacts. The prevalence of xerostomia is particularly frequent among the elderly, head and neck cancer patients who are treated with radiation, and drug-treated patients such as those taking antihypertensives, antidepressants, and antihistamines. These effects significantly impact day-to-day life and overall well-being, highlighting
the necessity for adequate management strategies (35).

How oral hydration supplements work

Oral hydration supplements work by either simulating natural saliva or inducing salivary secretion, so they help to preserve oral moisture and promote oral health (36, 37). To effectively manage xerostomia, these supplements are crucial because they promote hydration, lubrication, and antimicrobial protection. In general, they fall into the following categories: Electrolyte-based solution: The minerals calcium, potassium, sodium, and magnesium found in electrolyte-based solutions help maintain moisture in the oral cavity, control pH levels, and promote enamel remineralization. To improve their lubricating qualities, these solutions are frequently made with osmotic agents like glycerin and mucopolysaccharides. Mechanism of Action: Electrolytes keep the mouth hydrated by drawing and holding onto moisture in the oral tissues, which lessens discomfort and dryness. In certain formulations, buffering agents are also included (e.g. G. phosphate bicarbonate) to counteract acids and shield enamel (38). Benefits: Prevents dehydration-related oral health problems like burning mouth syndrome and mucosal irritation, preserves mineral balance, and improves the consistency of salivary flow.

Saliva substitutes: These use proteins and enzymes such as lactoperoxidase and lysozyme to simulate natural saliva and improve oral health and antibacterial activity (28, 39-41). The way these replacements work is by covering the oral mucosa, which acts as a barrier to keep out bacteria and mechanical irritation (42). Some also contain calcium phosphate and fluoride, which promote enamel repair and help to stop demineralization. Benefits include preventing opportunistic infections in people with decreased saliva production, strengthening enamel, and reducing oral discomfort (43, 44). Clinical Uses: Frequently administered to patients receiving palliative care, those suffering from xerostomia brought on by medication, and those suffering from autoimmune diseases such as rheumatoid arthritis and lupus (45, 46).

Hydration Gels and Lozenges: These gels and lozenges create a layer on the oral mucosa to provide long-lasting relief due to the hydrating qualities of ingredients like xylitol, carboxymethylcellulose, and aloe vera (47-49). Active ingredients like xylitol promote saliva stimulation and prevent bacterial growth while the gel-like consistency guarantees sustained hydration. Aloe vera and betaine reduce dryness and irritation by having calming and anti-inflammatory qualities. Benefits include long-lasting moisture retention, antimicrobial properties, and barrier protection against mucosal damage and ulcers.

Hyaluronic Acid-Based Sprays: It has been demonstrated that hyaluronic acid improves tissue hydration and lowers inflammation, which helps patients with chronic xerostomia by easing their symptoms (50-53). Mechanism of Action: HA forms a hydration shield over oral tissues by binding to water molecules. Additionally, it promotes collagen synthesis and epithelial renewal, enhancing the integrity of mucous membranes. Benefits: Promotes quicker healing of ulcers and

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inflammation associated with xerostomia, lowers oral irritation and hydrates deep tissue. Clinical Applications: Suggested for patients with atrophic glossitis, oral lichen planus post-radiation mucositis and chronic dry mouth.

Evidence on the effects of oral hydration supplements

Decreased symptoms of dry mouth

Oral hydration supplements have been shown, in several clinical studies, to be extremely successful treatment for the symptoms of xerostomia. In line with a 2019 randomized controlled study, patients who ingested salvia substitutes experienced subjectively improved dry mouth symptoms and enhanced swallowing ability than patients who were administered placebo treatment (54). Enzyme-containing saliva substitutes considerably alleviated discomfort and enhanced oral health in another investigation (55-57).

The effect on periodontal condition and dental caries

One of the major risk indicators for periodontal infection and dental cavities is xerostomia of prolonged duration. Research suggests that oral rehydration preparations with xylitol reduce the incidence of plaque development by preventing bacterial adhesion along with reducing dryness (58-60). Calcium and phosphate ion supplements also play a role in demineralizing enamel that might slow caries growth in xerostomia patients.

Speech and swallowing function enhancement

Since saliva is necessary for lubrication, bolus formation and vocal articulation, patients with severe xerostomia frequently experience dysphagia (difficulty swallowing) and speech impairment (33, 61). The quality of life can be severely impacted by a lack of saliva because it can cause vocal strain, malnourishment, dehydration, and choking hazards. By hydrating oral tissues, improving bolus transit, and lessening dry throat, electrolyte oral rehydration solutions increase swallowing efficiency. According to studies, these solutions improve swallowing function by 30 to 50 percent, particularly in cases of radiation-induced xerostomia and neurogenic dysphagia. With ingredients like xylitol, aloe vera and carboxymethylcellulose, hydration lozenges and gels provide longer-lasting relief while lowering the risk of aspiration and simplifying food intake (62). Dry mouth increases friction in the mouth and throat, which results in hoarseness, slurred pronunciation, and vocal fatigue when speaking. Hydration supplements help people with high vocal demands like teachers and public speakers by improving articulation, voice clarity, and endurance (63). Hyaluronic acid sprays improve speech comfort, lessen inflammation, and relax vocal cords even more.

Effect on oral health and quality of life of an individual

Oral moisturizers provide much more than just transient relief of symptoms, and this also really affects patients' quality of life. Well-managed patients with xerostomia report healthier eating ability, improved communication ability, and less social anxiety regarding speaking or eating in front of others. In addition to the prevention of oral infections, efficient hydration remedies promote general hygienic oral health and well-being. However, over time, treatment fatigue could lessen adherence to drug treatment, most probably given variable efficacy of products used and the extensive number of applications a day. Future studies should concentrate on developing such hydration formulations which are more long-lasting and economical in terms of providing relief, user-friendly, impending enhancement of oral health and patient satisfaction**.**

Limitations

There are potential disadvantages despite oral hydration supplements having value. Commercial remedies tend to afford relief only transiently and in need of more than occasional applications. In addition, everybody responds differently to hydration supplements, a few patients might experience little to no effect. Availability and pricing can also limit use, especially with the elderly or those with extended medical care. Limited standardized formulations and regulation in the

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manufacturing of oral hydration supplements is also an area of concern. Artificial sweeteners and preservatives in certain products may be irritating to sensitive individuals or provoke allergic reactions. Greater clinical trials need to be utilized to determine safety and efficacy while optimizing formulations with extended activity in future trials.

Recommendations and future directions

Long-Term Formulations Development: Experiments need to target the development of slow-release hydration agents that can moisturize sustainably. Patient-Specific Therapeutic Regimens: Biotechnology advancement may make possible the preparation of hydration treatments adjusted to a given patients' oral fluid chemistry and underlying pathology. Combination with Other Xerostomia Treatment: Oral probiotics or sialagogues taken systemically may be in a position to complement better the function of hydration supplementation. Regulatory Standardization: Product quality and consumer safety would have to be improved by establishing precise regulations for the production and supply of oral hydration supplements.

Conclusion

Oral hydration supplements are an effective intervention in dry-mouth patients, offering symptomatic relief and potential oral health advantages. Supplements work in multiple ways: by preserving moisture, as antimicrobial agents, and by promoting remineralization. Clinical trials suggest they may be able to increase xerostomia-associated discomfort, reduce risk for caries, and improve swallowing. But there remain concerns regarding long-term efficacy, patient variability, and product stability.

Disclosures

Author contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Non-applicable.

Consent for publications

Not applicable.

Data availability

All data is provided within the manuscript.

Conflict of interest

The authors declare no competing interest.

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