



International Journal of Applied Dental Sciences

ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2023; 9(1): 75-79
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www.oraljournal.com
Received: 02-10-2022
Accepted: 06-11-2022

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Xerostomia: Etiology, diagnosis, prevalence, and treatment literature review

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DOI: <https://doi.org/10.22271/oral.2023.v9.i1b.1657>

Abstract

The dilution of the quantity or quality of saliva is associated with complications that increase suffering and lead to many diseases.

Objective: To analyze the literature on xerostomia, as well as its etiology, diagnosis, prevalence, and treatment.

Methodology: A compilation of articles published in the last 5 years was carried out using the PubMed electronic database. Abstracts and full texts that included information on cracked tooth syndrome: "xerostomia", "etiology", "diagnosis", "prevalence" and "treatment" were identified.

Results: Knowing the etiology allows the dentist to detect it in time, thus avoiding the propagation of cracks and complications associated with it. Early diagnosis can be a simple restoration, if it progresses, root canal treatment and restoration are often necessary for cusp coverage. The number of cases has increased due to the little information on early diagnosis. The affected tooth's treatment and prognosis are generally difficult to determine. It depends more on the location, extension, and magnitude of the damage caused by the fissure when diagnosed and by the time of treatment.

Conclusions: Xerostomia is of multifactorial and irreversible origin, among the factors that can cause it are the use of medications, radiotherapy, Sjögren's syndrome, diabetes, depression, anemia, bulimia, genetic disorders, alcoholism, smokers, and drug addicts. Diagnostic methods include questionnaires, gum tests, and computed tomography. Prevalent in adults and women. The use of salivary substitutes is the most frequent.

Keywords: Xerostomia, etiology, diagnosis, prevalence, treatment

1. Introduction

Saliva plays an important role in the oral cavity; living with reduced salivary secretion is difficult and leads to serious health problems such as xerostomia^[1]. The dilution of its quantity or quality is associated with complications that increase suffering and lead to many diseases^[2]. The term saliva refers to the terms "whole saliva" or "mixed saliva", which are used to describe the combined fluids present in the oral cavity^[3]. The rate of salivary secretion is terminated through the collection of unstimulated and/or stimulated saliva. If the measured secretion rates are below designated thresholds, the patient is diagnosed as 'hyposalivation'^[4]. Salivary glands have dual innervation in the autonomic nervous system. Sympathetic or parasympathetic stimulation helps saliva viscosity^[5]. The viscosity of saliva varies depending on sympathetic or parasympathetic stimulation. Having an adequate volume of saliva is important to have a good quality of life-related to oral health^[6].

Xerostomia is defined as dry mouth caused by low or absent salivary secretion³ and predisposes to diseases of the oral mucosa^[7]. In addition, oral functions such as speaking, swallowing, and tasting require it^[8]. Saliva has a variety of properties, including lubrication, autolysis, repair, antimicrobial, and buffering capacity, which helps to keep the hard and soft tissues of the mouth in good condition, as well as containing proteins rich in mucin, immunoglobulin, and proline^[9].

Xerostomia is a subjective sensation that is not only related to the amount of your saliva, but also to qualitative and quantitative changes in saliva components⁸, among which the perception of dry and chapped lips, viscous and sticky saliva, stand out. Burning of the tongue,

infections of the suppurative and irritating mucosa as well as altered taste and smell, difficulty speaking, cavities, chewing disorders, and an increase in erosion. Another of the difficulties that could be found beyond the dental aspect are problems with stomach acidity and reflux ^[10]. That is why it is important to analyze the literature on xerostomia and its etiology, diagnosis, prevalence, and treatment.

The scant attention paid to this issue by general and specialized medicine compared to the ability of the treating dentist to address it.

This is intended to analyze the literature on xerostomia and its etiology, diagnosis, prevalence, and treatment.

2. Material and Methods

70 published articles on the subject were analyzed and 39 were chosen through the PubMed, SCOPUS, and Google Scholar databases, with emphasis on the last 5 years. The quality of the articles was evaluated using the PRISMA guide, i.e., identification, review, selection, and inclusion. The quality of reviews was assessed using the Measurement Tool for Assessing Systematic Reviews (AMSTAR-2). The search implementation uses the AND, OR, and NOT operators. Within the keywords used for the search "xerostomia", "etiology", "diagnosis", "prevalence" and "treatment". The keywords were used individually, as well as each one of them related to the other.

3. Results and Discussions

3.1 Etiology

Xerostomia as a clinical manifestation has a sore throat, dysphagia, halitosis, dysgeusia, dysarthria, speech difficulties, and a burning sensation in the mouth. Extraoral there is the presence of angular cheilitis, depopulated tongue, caries, repeated oral candidiasis, and poor adaptation to dental prostheses with frequent ulcerations. Of the causative agents described, the most recognized or associated with xerostomia are diabetes, depression, anemia, bulimia, genetic disorders (Down Syndrome, Prader-Willi Syndrome), alcoholism, smokers, drug addicts, radiation, Sjögren's Syndrome, medications ^[11]. Medications are the main cause of xerostomia, including anticholinergic, sympathomimetic, antidepressant, muscle relaxant, nonsteroidal, and steroidal anti-inflammatory drugs. Some opioids, benzodiazepines, and antimigraine agents may also contribute to salivary disorders ^[12]. The second main cause is Sjögren's Syndrome, which was described in 1933 by the ophthalmologist Henrik Sjögren ^[13]. The first reports of this syndrome were in patients with arthritis since they presented dry mouth and eyes ^[14]. This is an autoimmune inflammatory disease that attacks the connective tissue with multiple systematic manifestations such as progressive loss of function of the lacrimal and salivary glands. It can affect practically any organ system, leading to extremely pleomorphic clinical manifestations ^[15]. The patient's daily activity is damaged due to the high prevalence of fatigue, depression, anxiety, and decreased physical performance ^[16]. In patients with head and neck cancer, radiation-sensitive salivary gland tissue is highly prone to damage during radiotherapy ^[17]. Irradiation with doses greater than 30G causes degeneration of the salivary gland tissue, which causes a reduction in saliva secretion, due to the destruction of the glandular parenchyma and its glandular contribution. The patient's response to radiation therapy is individual and depends on the radiation dose and treatment area. Radiotherapy contributes to short-term dryness or total lack of salivary production ^[18].

Xerostomia has a multifactorial origin and its diagnosis tends to be very complex, ignorance produces a delay in diagnosis, which in turn leads to poor treatment. There is a high prevalence in patients who have received chemotherapy, as well as the elderly since in both there is a deterioration of the salivary glands.

3.2 Diagnosis

Information on xerostomia is obtained through interviews or questionnaires, these are not limited to the evaluation of dry mouth but also talk about other complications ^[19]. They are inexpensive and can be used to make a diagnosis in the future ^[20]. They tend to be subjective, therefore, they do not always reflect the presence of xerostomia. The effectiveness of the xerostomia questionnaires, the xerostomia inventory, the summed xerostomia inventory, and the visual analog scale have been confirmed. Some of the questions that are used are: determine the presence of dry mouth (Do you feel dry mouth?), while others talk about the extent of dry mouth (How often do you feel dry mouth?), as well as investigate problems related to dry mouth (Do you have difficulty swallowing?). A comprehensive approach is to use the Xerostomia Inventory, a multi-item questionnaire developed to measure the severity of chronic xerostomia ^[21]. The chewing gum test, the Sexon test, or the spit method are some of the tests for measuring salivary flow rates. The cut-off value for a very low stimulated and unstimulated total saliva flow rate is stated to be ≤ 0.1 mL/min and ≤ 0.7 mL/min, respectively. These tests measure and do not directly assess dry mouth. Furthermore, this type of test cannot be performed in people with reduced compression, either due to dementia or oral dysfunction caused by a stroke ^[22]. One of the most common complications of patients with head and neck radiation is xerostomia, this is mainly due to damage to the parotid and submandibular glands, these being the ones that produce 80% of saliva ^[23]. There are different imaging techniques that can be used for the diagnosis of xerostomia, one of them is computed tomography with this you can see the cysts of the salivary glands. Other techniques include ultrasound and magnetic resonance ^[24]. The first is used to measure the size, inflammation, and homogeneity of the salivary glands, while the second tends to be more expensive, sensitive, and highly affected by metals ^[25].

Knowledge of the factors that cause xerostomia is very important for diagnosis since the dentist will be the guide to carry out the corresponding tests, as well as make an adequate diagnosis, investigate the cause and carry out an adequate treatment. At present there are various means of diagnosis, the most used today is chewing gum.

3.3 Prevalence

According to a systematic review of epidemiological studies on dry mouth, the overall prevalence of salivary gland hypofunction is 20% ^[4] and xerostomia is 23%, with rates of each being higher among women. older people ^[26]. In 2019, researchers concluded that there is a prevalence of xerostomia in ages 50 to 80 years, especially in women ^[27]. One of the diseases that can cause the absence or deficiency of saliva are patients with systemic lupus erythematosus (15-36%), rheumatoid arthritis (20-32%), as well as limited and progressive systemic sclerosis (11-24%), less frequently with multiple sclerosis and with autoimmune hepatitis and thyroiditis ^[28]. According to studies carried out on New Zealand adults, it is scarce, since there is a prevalence of 13% (95% CI 12%, 15%) ^[5], which means between 600,000 and

750,000. In a study carried out in 2017, we mention that 68.3% of the elderly had xerostomia [29] and in a survey of the same year conducted with 566 individuals, they observed that 42.4% of them were taking medications and 17.92% reported having dry mouth [30]. According to a study carried out in 2021, there is an association between self-reported xerostomia and the presence of the chronic disease diabetes mellitus. There is a 3.59 greater chance that older individuals using ongoing medication for this condition will have xerostomia or dry mouth. In the present study, medication and xerostomia were related. The elderly who used continuous medication for the gastrointestinal tract was 2.14 times more likely to have xerostomia (28.6%) [31]. Another study carried out in 2018 mentioned that stress plays an important role in salivary secretion, thus concluding that this is related to dry mouth [32]. A systematic review and meta-analysis conducted in 2020 showed that 1,627 patients had a 52.7% prevalence of olfactory dysfunction and 1,390 patients had a 43.9% prevalence of taste changes [33]. Oral sequelae due to COVID-19 were reported in a study that these patients had dry mouth and taste changes in 46.3% and 47.2% of COVID-19 patients (n = 108), respectively [34].

There is a high prevalence rate in the elderly mainly due to the deterioration of the salivary glands, as well as the frequent consumption of drugs and systematic diseases. There is also talk that there is a high predominance in women than in men, as well as patients who have presented stress and COVID since most of these presented dry mouth.

3.4 Treatment

In almost the majority of patients, the main objective of therapy is to improve the quality of life through the treatment of symptoms, restore lost functions, and prevent and correct the possible consequences of the lack of natural saliva [35]. Several drugs are used to stimulate saliva, among which parasympathomimetics stand out, such as pilocarpine, cevimeline, and bethanechol, these are generally used with patients who have received radiotherapy. Other drugs used for xerostomia are bromhexine and nizatidine [36]. A method used to reduce saliva is the use of artificial saliva, which is made up of mucins, lysozyme, and lactoferrin [37]. These compositions are mainly based on rheology modifiers such as xatana and guar gums, carboxymethyl cellulose, electrolytes, and sweeteners. Several studies indicate that the use of saliva substitutes for cancer patients is good as they reduce the symptoms of dryness. According to studies carried out, there is subjective information about their effectiveness. A non-Newtonian fluid tells us that the viscosity varies depending on the shear rate, one of these is natural saliva. Substitutes based on carboxymethylcellulose or glycerol are Newtonian fluids, whose viscosity is usually higher than that of natural saliva [3]. A new alternative for patients with no saliva is acupuncture, it stimulates the sympathetic and parasympathetic nervous system through neuronal activation, which causes the release of neuropeptides having anti-inflammatory properties and nutritional effects on the salivary glands and increases blood flow in the acini [1]. There is little relevant and high-quality information on the relationship between acupuncture and xerostomia [38]. Mechanical stimulation of saliva is achieved by chewing sugar-free gum containing xylitol and sorbitol with an antimicrobial effect [39].

There are various treatments for xerostomia, depending on the factor that caused it, generally the one currently used to be saliva substitutes since they are easily accessible. Instead, new alternatives have been discovered, such as acupuncture,

although there is still no scientific evidence or more comprehensive studies to support them.

4. Conclusions

At present, xerostomia has been increasing and is more frequent, it is usually of multifactorial and irreversible origin. Various factors can cause this problem such as the use of medications, radiation therapy, Sjögren's syndrome, as well as diabetes, depression, anemia, bulimia, genetic disorders, alcoholism, smokers, and drug addicts. There are various means of diagnosis such as questionnaires, chewing gum tests, and other more advanced ones such as computed tomography. It is more prevalent in adults, such as women. Its management is mainly symptomatic based on general measures, use of saliva substitutes, and sialogogues associated with good oral hygiene with periodic check-ups with a dentist to detect complications in time. Alternative therapies such as acupuncture and electrostimulation do not have sufficient evidence to be recommended for routine use.

5. Acknowledgement

Not available

6. Author's Contribution

Not available

7. Conflict of Interest

Not available

8. Financial Support

Not available

9. References

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How to Cite This Article

Diego ATO, Miguel ORV, Patricia GP. Xerostomia: Etiology, diagnosis, prevalence, and treatment literature review. *International Journal of Applied Dental Sciences.* 2023;9(1):75-79.

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