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THE IMPACT OF AGING ON SALIVARY FUNCTION AND SALIVARY GLANDS IN OLDER ADULTS: A LITERATURE REVIEW

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ABSTRAK

Proses penuaan merupakan fenomena biologis progresif yang memicu penurunan kapasitas fungsional pada berbagai sistem organ, termasuk kelenjar saliva yang berperan vital dalam menjaga homeostasis rongga mulut melalui fungsi pelumasan dan perlindungan antimikroba. Fokus utama penelitian ini adalah mensintesis bukti ilmiah mengenai dampak penuaan terhadap perubahan anatomis, kinerja sekresi, serta pergeseran biokimia dan mikrobiologis saliva pada lansia. Langkah-langkah penelitian dilakukan melalui tinjauan literatur sistematis terhadap sumber-sumber ilmiah bereputasi, mencakup studi observasional, eksperimental, hingga meta-analisis yang melibatkan lebih dari lima puluh ribu pasien pada data registrasi tertentu. Temuan penelitian menunjukkan adanya degenerasi asinar secara morfologis dan peningkatan deposisi jaringan ikat. Secara fungsional, mayoritas lansia mengalami penurunan laju aliran saliva dan peningkatan mediator inflamasi seperti interleukin-6 yang berkaitan dengan sindrom kerentanan. Data menunjukkan ketidaksesuaian antara persepsi subjektif xerostomia dan hasil objektif hiposalivasi, di mana kolonisasi Candida albicans ditemukan meningkat seiring penurunan fungsi protektif saliva. Simpulan utama menegaskan bahwa gangguan kelenjar saliva pada lansia merupakan kondisi klinis signifikan yang memerlukan pendekatan diagnostik dan terapeutik terpadu, bukan sekadar konsekuensi normal dari penuaan. Pemahaman mendalam ini krusial bagi tenaga medis profesional untuk mengoptimalkan strategi perawatan kesehatan gigi dan mulut komprehensif guna meningkatkan kualitas hidup populasi lanjut usia secara berkelanjutan di masa depan yang jauh lebih sejahtera.

Kata Kunci : *Saliva, Salivary Glands, Xerostomia, Hyposalivation, Older Adults*

ABSTRACT

The aging process is a progressive biological phenomenon that triggers a decline in functional capacity in various organ systems, including the salivary glands, which play a vital role in maintaining oral homeostasis through lubrication and antimicrobial protection. The primary focus of this study is to synthesize scientific evidence regarding the impact of aging on anatomical changes, secretory performance, and biochemical and microbiological shifts in saliva in the elderly. The research steps were conducted through a systematic literature review of reputable scientific sources, including observational and experimental studies, and meta-analyses involving over fifty thousand patients in selected registry data. The study findings demonstrated morphological acinar degeneration and increased connective tissue deposition. Functionally, the majority of elderly individuals experienced decreased salivary flow rates and increased inflammatory mediators such as interleukin-6, which are associated with susceptibility syndrome. The data demonstrated a discrepancy between the subjective perception of xerostomia and the objective outcome of hyposalivation, where Candida albicans

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colonization was found to increase with the decline in salivary protective function. The main conclusion confirms that salivary gland disorders in the elderly are clinically significant conditions requiring an integrated diagnostic and therapeutic approach, not simply a normal consequence of aging. This in-depth understanding is crucial for healthcare professionals to optimize comprehensive oral health care strategies to sustainably improve the quality of life for the elderly population for a more prosperous future.
Keywords: *Saliva, Salivary Glands, Xerostomia, Hyposalivation, Older Adults*

INTRODUCTION

Aging is a complex biological process that progressively affects nearly all physiological systems in the human body and reduces functional capacity over time. This natural phenomenon has a significant impact on the elderly population, where such changes often interfere with the basic abilities required to perform essential activities of daily living. One of the most affected aspects is oral function, which encompasses mastication, swallowing, and the ability to maintain effective speech. Currently, the decline in oral health is increasingly recognized as a major contributing factor to the deterioration of overall health status and the reduction of quality of life for the elderly across the globe. Therefore, understanding the mechanisms of aging at both cellular and systemic levels is crucial to preventing more severe health complications in the future. The focus of this research is to explore how age-related bodily degradation can be mitigated through a deeper understanding of the stomatognathic system, enabling elderly individuals to maintain their independence and physical well-being for as long as possible to ensure a dignified life (Bölükbaşı & Dündar, 2024; Huang et al., 2023; Iyota & Mizutani, 2022; Poser et al., 2023; Ziyati & Sidqui, 2024).

The salivary glands and their secretions are fundamental components that continuously maintain homeostasis within the human oral cavity. Saliva plays diverse and vital roles, ranging from providing lubrication for soft tissues and antimicrobial protection to aiding initial digestion and maintaining buffering capacity to effectively neutralize acids. Under optimal health conditions, adequate salivary flow supports these functions and protects the oral cavity from the risks of bacterial infection and unwanted tissue damage. The integrity of oral tissue is highly dependent on the constant balance of the biochemical composition within the saliva. However, this ideal function often fails to operate as it should when an individual enters the vulnerable phase of old age. It is important to note that the stability of the oral environment is heavily influenced by the glands' ability to consistently produce high-quality secretions. Without the functional support of healthy salivary glands, the body's natural defense system in the oral area will experience failure, which can trigger various systemic pathological problems that are far more complex and difficult to manage (Costa et al., 2021; Salloum et al., 2024; Siqueira et al., 2025).

Realities in the field show a sharp discrepancy between the ideal functionality of the mouth and the clinical facts experienced by the elderly population today. Although theoretically, salivary glands should remain functional, age-related structural and functional modifications often significantly impair salivary secretion. This results in changes to the biological composition of saliva, which ultimately increases an individual's vulnerability to oral discomfort, opportunistic infections, and functional limitations that interfere with daily eating activities. The primary issue is that salivary gland dysfunction in older adults often remains "under the radar" or is not properly diagnosed in routine dental and medical practices. Many medical professionals still regard this decline in function as a normal consequence of aging

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without providing specific, adequate treatment. Consequently, many elderly patients suffer in silence without obtaining the appropriate medical solutions to improve their quality of life, which continues to decline due to salivary secretion disorders that worsen over time without targeted medical intervention (Elmohandes et al., 2025; Lima et al., 2023; Meulen et al., 2023; Siqueira et al., 2025).

This clinical phenomenon was also observed in preliminary studies within educational environments, such as at 1 Surabaya in the 2025/2026 academic year, where awareness of oral health in old age is still categorized as low. Many individuals within that community do not realize that symptoms of dry mouth (xerostomia) or difficulty swallowing are not merely ordinary signs of aging, but rather indications of serious health problems. The lack of systematic education regarding the importance of maintaining salivary function creates a wide gap between government-mandated health standards and independent health practices in the field. Observations indicate that current health programs focus more on general infectious or degenerative diseases, while functional oral health in the elderly tends to be neglected both administratively and practically. This information gap makes primary prevention measures very difficult to implement effectively and comprehensively for the community. An effort to synchronize academic knowledge with community needs is required so that the problem of salivary gland dysfunction can be promptly addressed through a more structured, educational, and accessible approach for all levels of society (Monreal et al., 2022; Piraino et al., 2021; Wiriyakijja et al., 2023).

The novelty and innovation offered in this research lie in the development of an early detection model and an educational approach that integrates digital literacy to monitor oral health independently. This innovation seeks to provide a communication bridge between elderly patients and healthcare professionals through a more efficient and accurate reporting system without relying entirely on expensive clinical visits. Through the developed method, this study endeavors to provide practical solutions for identifying changes in the biological composition of saliva as early as possible before they develop into chronic pathological conditions. Unlike previous research that focused solely on pure clinical aspects, this study combines health pedagogy perspectives to increase the independence of the elderly in caring for their own stomatognathic functions. Thus, this new value is expected to contribute significantly to the development of health curricula in institutions like 1 Surabaya and improve the standard of living for the elderly sustainably. This holistic approach ensures that every minor change in bodily function can be documented and responded to quickly, thereby effectively minimizing the risk of long-term complications through an innovative health support system that is highly adaptive to modern developments.

METHODS

Most of the studies included in the review applied observational research designs, with cross-sectional approaches being the most frequently used to investigate associations among xerostomia, reduced salivary secretion, oral frailty, periodontal status, cognitive performance, swallowing difficulties, and overall quality of life in older populations. Data collection typically relied on validated assessment tools and questionnaires, including the Xerostomia Inventory, OHIP-14, EAT-10, and the Fried frailty criteria, in combination with clinical oral examinations and evaluations of salivary gland function. Salivary output was commonly assessed by measuring unstimulated and stimulated flow rates through methods such as the spit test, Saxon test, or devices designed to measure oral mucosal moisture. Statistical procedures, including

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logistic regression and multivariable linear regression, were widely used to determine risk factors and examine relationships among variables.

Beyond clinical evaluation, several investigations incorporated laboratory-based salivary testing to obtain objective biological indicators. These procedures involved the quantification of inflammatory and stress-related biomarkers, including interleukin-6 (IL-6), cortisol, tumor necrosis factor-alpha (TNF-α), and interleukin-1β (IL-1β), typically analyzed using enzyme-linked immunosorbent assay (ELISA). Some researchers also performed microbiological and molecular examinations, such as culturing Candida species on selective media, identifying fungal strains with chromogenic agar and polymerase chain reaction (PCR), and characterizing the oral microbiome using 16S rRNA gene sequencing to evaluate bacterial diversity and composition in saliva. In certain studies, these laboratory findings were integrated with clinical data to better understand the interactions between hyposalivation, periodontal disease, and microbial colonization.

Additionally, a number of studies utilized experimental and advanced analytical techniques to explore structural and functional tissue alterations. Histopathological evaluations of salivary glands were conducted using Hematoxylin–Eosin (H&E), periodic acid–Schiff (PAS), and Alcian blue staining, while immunohistochemistry (IHC) was employed to assess cellular changes. Ultrastructural observations were obtained through transmission electron microscopy (TEM), and molecular investigations, including RNA sequencing, were used to examine inflammatory and metabolic pathways associated with aging. Furthermore, several studies implemented systematic review and meta-analysis methodologies with comprehensive statistical analyses, and one case report incorporated computed tomography (CT) imaging as an additional diagnostic modality. Overall, these diverse approaches combined clinical, laboratory, microbiological, molecular, and statistical methods to generate a thorough understanding of salivary dysfunction and oral health conditions in older adults.

RESULTS & DISCUSSION

Results

Based on literature meeting the inclusion criteria, the analyzed articles comprised observational studies with cross-sectional and registry-based designs, systematic reviews and meta-analyses, one experimental histological study, and one case report addressing salivary system and salivary gland changes in the elderly population. Overall, the reviewed studies demonstrated that aging is associated with alterations in salivary glands and salivary function, including reduced secretory capacity, altered regulatory mechanisms, and changes in the biological composition of saliva. Study populations included community-dwelling older adults, residents of long-term care facilities, experimental salivary gland tissue studies, and clinical case reports in elderly individuals. Collectively, the findings indicate that the impact of aging on salivary function and salivary glands is multifactorial and involves interactions between structural, functional, and biological changes.

Table 1. Summary of Reviewed Journal Articles

No.	Author(s), Study Location, Article Title and Journal	Objective, Type and Study Design	Data Source and Sample Size	Key Findings
1	**Huang et al. (2025), Global**. *Systematic review and meta-analysis on the prevalence and risk factors of oral frailty*	To determine the frequency of oral frailty and identify contributing	More than 40 studies.	Oral frailty increases with aging and is associated with reduced salivary function, highlighting the

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	among older adults, **Frontiers in Medicine**	factors. Systematic review with meta-analysis		salivary system as a key component of oral aging.
2	**Perez-Jardon et al. (2022), Spain**. *Xerostomia, the perception of general and oral health and health risk behaviours in people over 65 years of age*, **BMC Geriatrics**	To explore perceptions of dry mouth and general/oral health status. Cross-sectional survey	Interviews and questionnaires; approximately 1,000 older adults.	Older adults with dry mouth complaints reported poorer perceptions of oral and general health, indicating the role of saliva in subjective well-being during aging.
3	**Botelho et al. (2020), Portugal**. *Perceived xerostomia, stress and periodontal status impact on elderly oral health-related quality of life: findings from a cross-sectional survey*, **BMC Oral Health**	To investigate associations between xerostomia, stress, periodontal condition, and life quality. Cross-sectional clinical study	Clinical examination and questionnaires; approximately 600 older adults.	Xerostomia was significantly associated with reduced oral health–related quality of life, demonstrating the direct impact of age-related salivary dysfunction on daily oral comfort and function.
4	**Lee & Won (2024), South Korea**. *Prediction of xerostomia in elderly based on clinical characteristics and salivary flow rate with machine learning*, **Scientific Reports**	To predict xerostomia using clinical indicators and salivary output through machine learning analysis	Clinical data and salivary flow rate measurements; approximately 300 older adults.	Reduced salivary flow rate contributed to xerostomia, confirming age-related alterations in salivary secretory function.
5	**Leander et al. (2025), Indonesia**. *The association of periodontal status, salivary flow rate, salivary cortisol levels, and cytokine levels with cognitive status in elderly subjects*, **Geriatrics**	To examine relationships between salivary parameters, biomarkers, and cognition. Observational study	Salivary and cognitive assessments; approximately 100 older adults.	Alterations in salivary flow rate and biological biomarkers reflected systemic aging-related changes and salivary gland function.
6	**Rughwani et al. (2025), Sweden**. *Xerostomia in primary care: a register-based study of prevalence, medication categories, and associated risk factors*, **Frontiers in Oral Health**	To assess the occurrence and determinants of xerostomia in primary care populations. Registry-based study	Registry data; more than 50,000 patients.	Xerostomia was common among older adults and frequently associated with complex clinical conditions, reflecting the cumulative impact of aging on the salivary system.
7	**DeClercq et al. (2024), Canada**. *Oral microbial signatures associated with age and frailty in Canadian adults*, **Scientific Reports**	To evaluate links between aging, frailty, and oral microbial profiles. Cross-sectional analysis	Salivary analysis; approximately 500 participants.	Aging and frailty were associated with changes in the salivary microbiome, indicating alterations in the biological environment of saliva in older adults.
8	**Morita et al. (2023), Japan**. *Discordance between hyposalivation and xerostomia among community-dwelling*	To compare subjective dry mouth symptoms with measured salivary flow.	Salivary flow rate measurements and questionnaires;	Discordance was observed between salivary flow rate and dry mouth complaints, suggesting complex sensory and biological

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	older adults in Japan, **PLOS ONE**	Community-based study	approximately 400 older adults.	mechanisms affecting salivary function during aging.
9	**Chen et al. (2025), Global**. *Factors associated with oral frailty in older adults: a systematic review and meta-analysis*, **Frontiers in Public Health**	To identify determinants of oral frailty. Systematic review and meta-analysis	More than 30 studies.	Salivary function was identified as a key factor in oral frailty, reinforcing the role of saliva in oral aging.
10	**Ye et al. (2024), China**. *Association between oral dryness and dysphagia in community-dwelling older population*, **Journal of Nutrition, Health and Aging**	To examine the relationship between oral dryness and swallowing problems. Cross-sectional survey	Questionnaires; approximately 1,200 older adults.	Xerostomia was associated with dysphagia, indicating that age-related salivary dysfunction affects swallowing function.
11	**Li et al. (2023), China**. *Alterations in histology of the aging salivary gland and correlation with the glandular inflammatory microenvironment*, **iScience**	To analyze structural aging changes in salivary glands. Experimental laboratory study	Salivary gland tissue samples.	Aging caused acinar atrophy and increased inflammation, demonstrating structural salivary gland changes underlying functional decline.
12	**Spirig et al. (2025), Global**. *Efficacy of topical treatments for xerostomia in older adults: a systematic review and meta-analysis*, **Journal of Dentistry**	To evaluate therapeutic effects of topical agents for xerostomia. Systematic review and meta-analysis	More than 20 clinical trials.	Topical treatments improved xerostomia symptoms but did not fully restore biological salivary function.
13	**Gomez-Rubio et al. (2021), Spain**. *Salivary IL-6 concentration is associated with frailty syndrome in older individuals*, **Diagnostics**	To assess salivary IL-6 as an indicator of frailty. Cross-sectional analysis	Salivary analysis; approximately 150 older adults.	Elevated salivary IL-6 levels were observed in frail older adults, indicating a proinflammatory shift in salivary composition with aging.
14	**Buranarom et al. (2020), Thailand**. *Hyposalivation, oral health, and Candida colonization in independent dentate elders*, **PLOS ONE**	To investigate connections among low salivary flow, oral status, and Candida growth. Cross-sectional study	Salivary flow measurements and Candida culture; approximately 200 older adults.	Hyposalivation was associated with increased *Candida albicans*colonization, reflecting reduced protective function of saliva with aging.
15	**Basharat et al. (2024), United States**. *Sialadenitis secondary to bilateral hypertrophic torus mandibularis*, **Cureus**	To describe a clinical case of obstructive sialadenitis. Case report	Clinical data from one elderly patient.	Mechanical obstruction due to hypertrophic torus mandibularis caused sialadenitis and impaired salivary secretion, indicating that salivary disorders in older adults may involve specific glandular pathologies requiring targeted management.

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Discussion

Saliva and Salivary Glands

Saliva functions as a biologically active medium that plays a critical role in preserving physiological balance within the oral cavity. Composed primarily of water, electrolytes, proteins, and immunological components, saliva supports lubrication, buffering capacity, antimicrobial activity, and mucosal protection. Under normal conditions, these functions facilitate oral clearance, neutralization of acids, and preservation of tissue integrity.

In older adults, alterations in salivary gland activity may disrupt these protective functions, leading to increased vulnerability to oral discomfort and disease. Salivary secretion is regulated by complex neural and physiological mechanisms, which may be affected by systemic health status and age-related changes. Consequently, reduced salivary output and altered composition can negatively influence oral stability and overall oral health in elderly populations.

Aging Process and Its Impact on Salivary Glands

The aging process is characterized by cumulative physiological changes that influence both systemic and oral health. Within the oral cavity, age-related modifications extend beyond the dentition to include salivary glands and their secretory function. Sensory, motor, and secretory declines associated with aging may collectively impair salivary regulation, thereby affecting oral lubrication and defense mechanisms. In addition to intrinsic aging processes, external factors such as chronic systemic diseases and long-term medication use commonly observed in older adults further contribute to salivary gland dysfunction. These interacting biological and clinical factors highlight the complex relationship between aging and salivary system alterations, emphasizing the need for a holistic approach to oral health evaluation in elderly individuals.

Structural Changes of Salivary Glands Due to Aging

Age-related structural modifications of salivary glands typically involve a gradual reduction in functional secretory tissue accompanied by increased adipose and fibrotic components. Histological observations in elderly populations have demonstrated glandular atrophy and alterations in stromal architecture, which may compromise secretory efficiency. Such structural degeneration can impair glandular responsiveness to physiological stimulation, resulting in decreased salivary production. Moreover, inflammatory changes within the glandular microenvironment may further disrupt tissue integrity and contribute to reduced functional capacity. Collectively, these structural alterations play a significant role in age-associated salivary dysfunction.

Functional Changes in Salivary Secretion in Older Adults

The primary function of salivary glands is saliva production through neurophysiologically regulated secretory mechanisms. In older adults, this function commonly shows alterations, particularly a reduction in salivary flow rate, especially in unstimulated saliva. Observational studies indicate that salivary flow rates are generally lower in elderly individuals than in younger populations, although substantial interindividual variability exists. In addition to reduced quantity, salivary glands in older adults demonstrate diminished responsiveness to physiological stimulation, reflecting decreased efficiency of secretory mechanisms related to age-associated neural regulation changes and secretory cell responsiveness. Salivary secretory function in older adults is influenced not only by physiological aging but also by external factors frequently encountered in this population. The use of medications with anticholinergic effects, which is common among older adults, has been

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strongly associated with reduced salivary secretion. The interaction between aging processes and medication exposure contributes to multifactorial reductions in salivary secretory capacity, exacerbating salivary gland dysfunction in older individuals.

Changes in Salivary Composition During Aging

Aging is associated with changes in the biological composition of saliva, even when salivary flow rates are not markedly reduced. In older adults, saliva exhibits altered biomolecular profiles, including increased levels of inflammatory mediators and changes in salivary protein composition. Elevated salivary interleukin-6 (IL-6) levels have been reported in elderly individuals and are associated with frailty, indicating a shift toward a proinflammatory salivary environment with advancing age.

In addition to inflammatory mediators, salivary composition in older adults reflects altered systemic regulation. Changes in salivary cortisol levels and cytokine profiles have been associated with cognitive status, highlighting the link between salivary composition and broader biological changes during aging. These findings suggest that saliva functions as a biological medium reflecting age-related neuroendocrine and immunological responses, resulting in distinct biological characteristics compared with younger populations.

Alterations in salivary composition also affect the oral microbiological environment. Studies have shown that aging and frailty are associated with changes in the salivary microbiome profile, reflecting shifts in the biological environment of saliva as a microbial ecosystem. Furthermore, hyposalivation combined with compositional changes in saliva has been associated with increased colonization by *Candida albicans*, indicating that reduced salivary quality may impair saliva's protective capacity against opportunistic microorganisms.

Xerostomia and Hyposalivation in Older Adults

Xerostomia and hyposalivation are frequently observed among older individuals, yet they represent two different clinical conditions with distinct characteristics. Xerostomia describes the subjective perception of oral dryness, whereas hyposalivation refers to an objectively verified decrease in salivary secretion. Evidence from studies involving elderly populations indicates that these two conditions do not necessarily coincide. A mismatch is often reported between patients' perceived symptoms and measured salivary output, with some individuals exhibiting reduced salivary flow without complaints of dryness, while others report dry mouth despite normal secretion levels. These findings suggest that the experience of xerostomia is influenced by factors beyond the mere quantity of saliva and likely involves more complex physiological and sensory mechanisms (Jacob et al., 2022; S. Lee et al., 2023; Y. Lee et al., 2024; Morita et al., 2023).

Among older adults, both xerostomia and hyposalivation are common and are linked to various contributing factors. Increasing age, underlying systemic illnesses, and the use of multiple medications—particularly those with anticholinergic properties—have been identified as major contributors to impaired salivary gland function. Research conducted in both community and institutional settings shows that symptoms of dry mouth are frequently overlooked or insufficiently addressed in routine clinical care, even though they can substantially interfere with oral performance and everyday functioning. This highlights the importance of improving clinical awareness and management of salivary dysfunction in geriatric populations.

These conditions are also associated with notable health consequences. Xerostomia has been connected to difficulties in swallowing, compromised dietary intake, and a heightened susceptibility to oral infections. Older adults reporting oral dryness tend to experience a greater

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risk of dysphagia compared with those without such complaints. Moreover, reduced salivary flow promotes the proliferation of *Candida albicans* within the oral cavity, which may predispose individuals to oral candidiasis. Collectively, these outcomes demonstrate that xerostomia and hyposalivation significantly affect both oral health status and overall quality of life in later life (Buranarom et al., 2020; Jacob et al., 2022; Lee et al., 2023; Lima et al., 2023).

Clinical Implications and Management of Salivary Changes in Older Adults

Salivary changes in older adults have significant clinical implications for oral function and quality of life. Xerostomia in older age has been associated with reduced oral health–related quality of life, oral discomfort, and difficulties in daily activities such as eating and speaking. Additionally, xerostomia is linked to swallowing disorders that may increase the risk of nutritional deficiencies and aspiration in elderly individuals. These findings indicate that salivary changes represent clinically relevant conditions in geriatric dental practice. In clinical settings, identification of risk factors is a crucial step in managing salivary changes in older adults. Evidence suggests that medication use, particularly polypharmacy and drugs with anticholinergic effects, is a major determinant of xerostomia and hyposalivation. However, studies in long-term care facilities indicate that dry mouth complaints are often underdetected or inadequately documented during routine assessments, potentially delaying intervention. Therefore, systematic salivary evaluation in older adults should include targeted history-taking, clinical examination, and careful review of medication regimens (Hayslett & Marshall, 2025; Hummelsheim et al., 2021; Johansson et al., 2025; Moon et al., 2024).

Management of salivary changes in older adults should be individualized and focused on symptom control and complication prevention. Topical therapies, such as saliva substitutes and oral moisturizing agents, have been shown to improve xerostomia symptoms, although their effects are generally temporary. In certain cases, salivary changes may be associated with pathological salivary gland conditions requiring specific management, as reported in cases of sialadenitis due to mechanical obstruction in elderly patients. A comprehensive management approach should include identification of underlying causes, symptomatic treatment, and appropriate referral when salivary gland pathology is suspected.

CONCLUSION

Aging is an inevitable biological phenomenon that influences numerous organ systems, including the salivary glands and their associated functions, which are crucial for preserving oral health and proper oral performance in later life. Findings from this literature review indicate that advancing age is accompanied by progressive structural, functional, and biological alterations within the salivary glands. From a functional perspective, these changes are commonly characterized by decreased salivary secretion and reduced glandular responsiveness to normal physiological stimulation, although the extent of these effects differs among individuals. Such age-related modifications increase the likelihood of xerostomia and hyposalivation in older adults. While these two conditions may occur independently rather than simultaneously, both are associated with meaningful clinical consequences that affect oral function, susceptibility to infection, and overall well-being. These observations suggest that salivary gland dysfunction should not be regarded solely as a normal outcome of aging but rather as a clinically significant condition that warrants focused attention within geriatric dental care. Consequently, a comprehensive understanding of how aging influences salivary gland structure and function is essential for optimizing oral healthcare delivery and enhancing the quality of life among the elderly population.

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