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Golden Smiles: Tackling Periodontal Challenges in Geriatric Care

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Abstract

Geriodontology is the area of dentistry that focuses on diagnosing, treating, and preventing oral problems in the elderly. Advancements in medicine have led to longer life expectancy, but also an increase in comorbidities and difficulties among the elderly. Common dental issues include tooth attrition, xerostomia-induced caries, chronic periodontal disorders, and partial edentulousness. When managing these cases, it's important to consider other systemic disorders, age, and social/environmental factors. A multimodal treatment strategy and particular training for dentists are necessary for efficient and consistent maintenance regimens. This review paper discusses periodontal management for older individuals and offers future suggestions for improving oral healthcare during this stage of life.

Introduction

The WHO's Global Oral Health Status Report (2022) reveals a significant global burden of oral diseases, affecting nearly 3.5 billion people, with a notable impact on middle-income countries. Severe periodontal diseases affect about 19% of adults globally, surpassing 1 billion cases, and this prevalence rises to 23% among those aged 60 or older, highlighting the challenges faced by older populations. This review will explore the challenges faced by geriatric populations in periodontal health and strategies for improving outcomes.

Periodontal Health in Geriatric Patients

1. Epidemiology and Significance

India's demographic transition has resulted in an increase in the old population, from 56.7 million in 1991 to an estimated 137 million by 2021. WHO estimates a 300 percent rise in Asia's elderly by 2025, highlighting the need for geriatric dentistry. In the 2004-2006 National Survey of Adult Oral Health, Roberts-Thomson reported that 25% of the population between age of 35-54 years had moderate to severe periodontitis. However, 44% of individuals aged 55 to 74 had moderate or severe periodontitis, as did 61% of those aged >75 years. The WHO found that 45% of persons over 65 had CPI values of 3 or higher, with only 7% experiencing no symptoms. Periodontal disease prevalence varies by sex, with older men having a higher rate of severe periodontal disease than women. In those over 65 years old, smokers had increased rates of overall periodontal disease compared to nonsmokers. Periodontal disease can have a significant impact on overall health, particularly in elderly populations. Understanding the epidemiology of periodontal diseases in geriatric patients is crucial for developing effective prevention and treatment strategies.[1]

2. Biological and Clinical Characteristics of the Senescent Periodontium

The senescent periodontium exhibits significant changes in the gingiva, periodontal ligament, alveolar bone, and cementum. The gingiva experiences reduced collagen production due to methylation of the collagen alpha-1 gene, fewer elastic fibers, decreased keratinized gingiva, and increased collagen degradation, leading to gingival recession. The periodontal ligament shows irregular fiber structure, reduced cellular content, and increased vulnerability to biomechanical stress, contributing to tooth mobility. Additionally, the periodontal ligament fibroblasts release large amounts of pro-

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inflammatory mediators under stress, indicating lifelong wear from occlusal forces. Alveolar bone integrity declines due to an imbalance between osteoblastic and osteoclastic activity, decreased pre-osteoblasts, lower collagen-1 synthesis, and other aging factors like hormonal changes and nutritional deficiencies, leading to bone resorption. Cementum becomes acellular and irregular, with alternating resorption and reposition, though this has minimal clinical impact. Teeth may darken and exhibit fracture lines. Periodontitis increases gingival recession, which exposes the tooth root and enhances the risk of cavities. The oral mucosa's barrier function stays intact yet healing is delayed. Treatment is required for conditions such root caries, significant alveolar bone loss, dysplastic alterations in the oral mucosa, and reduced masticatory performance caused by tooth loss.[2]

3. Periodontitis: The Aging Enigma

The link between periodontitis and aging has been debated, as both involve inflammation as a key pathogenic process. Four major risk factors influence periodontal inflammation: genetic background, general inflammatory condition, environmental factors, and systemic disorders. Aging leads to overexpression of pro-inflammatory genes and downregulation of tissue development genes, increasing susceptibility to disease. Increased systemic inflammation in aging worsens periodontal disease. Environmental factors like poor oral hygiene and reduced salivary flow, due to infrequent brushing, lack of interdental care, smoking, and medications, lower oral lubrication and protective capacity raising infection risk. Systemic disorders like diabetes, cardiovascular disease, and osteoporosis impact periodontal health, while medications commonly used by older adults, such as antihypertensives, anticholinergics, psychotropics, and diuretics, reduce salivary flow and cause drug-induced gingival overgrowth. These factors add to the complexity of managing periodontal health in the elderly, emphasizing the need for a holistic approach to prevention and therapy.[3]

4. Systemic Health and Periodontal Disease

Geriatric patients often have multiple chronic conditions, including cardiovascular disease, osteoporosis, rheumatoid arthritis, respiratory diseases, cognitive impairment, Alzheimer's disease, and diabetes mellitus which are interlinked with periodontal health. Systemic diseases in the elderly exacerbate periodontal destruction through microbiological dysbiosis and excessive immune reactions. Periodontitis increases systemic inflammation via periodontal pockets, affecting distant organs directly or by triggering local inflammation. Oral bacteria promote atherosclerosis, leading to coronary heart disease (CHD) and stroke, with periodontitis contributing to plaque formation and instability. Diabetes mellitus (DM) and periodontal disease have a bidirectional relationship; DM increases susceptibility to infections and inflammation, while periodontal disease impairs glycemic control through systemic inflammation and advanced glycation end products (AGEs). Alzheimer's disease (AD) is linked to periodontal disease via systemic inflammation and bacterial invasion, with periodontal pathogens contributing to amyloid-β accumulation in the brain. Additionally, aspiration of periodontal pathogens can cause pneumonia in hospitalized and elderly patients, with improved oral care reducing pneumonia incidence in nursing homes. Effective management of these interactions requires specific modifications to clinical protocols to address the complex relationship between systemic diseases and periodontal health in the elderly.[4]

5. Inflammaging and Immunosenescence

Inflammaging and immunosenescence significantly contribute to periodontitis in the elderly. Inflammaging is characterized by elevated inflammatory markers such as IL-6, TNFα, and CRP, which rise with age even without acute inflammation, leading to chronic systemic inflammation. This state exacerbates age-related diseases like periodontal disease. Immunosenescence involves reduced immune function, with declines in naïve T-cells, increased memory T-cells, and impaired neutrophil and antibody activity, increasing susceptibility to infections. Elevated pro-inflammatory cytokines

and impaired neutrophils raise bacterial load, while bone resorption outpaces formation, causing alveolar bone loss. Delayed healing and reduced cellular turnover in periodontal tissues worsen the condition. Together, inflammaging and immunosenescence create a favorable environment for periodontitis, necessitating tailored preventive and therapeutic strategies for the elderly.[2]

6. Challenges in Management

Managing periodontal health in geriatric patients involves addressing a range of challenges:

Polypharmacy:

Polypharmacy, the concurrent use of multiple medications, is common among elderly patients. While these medications are often necessary to manage chronic conditions, they can have adverse effects on oral health. Many drugs cause xerostomia, which decreases salivary flow and raises the risk of plaque accumulation and periodontal disease. Medications such as antihypertensives, antidepressants, and diuretics are known to cause dry mouth. In addition, some medications can affect gingival tissues directly, leading to gingival hyperplasia which can further complicate oral hygiene and exacerbate periodontal issues.[5]

Cognitive Decline:

Cognitive decline, including conditions like dementia and Alzheimer's disease, poses significant challenges for periodontal management in geriatric patients. As cognitive function deteriorates, patients may struggle to perform routine oral hygiene tasks such as brushing and flossing. They may also forget to attend dental appointments or fail to recognize the importance of oral health. Caregivers often need to step in to provide assistance, but they may not be adequately trained in oral hygiene practices. Additionally, cognitive decline can lead to behavioral changes that make dental visits more challenging, requiring the use of specialized techniques to manage patient anxiety and ensure cooperation during treatment.

Limited Mobility:

Limited mobility is another major challenge in managing periodontal health in elderly patients. Conditions such as arthritis, stroke, or general frailty can make it difficult for patients to perform effective oral hygiene or to travel to dental appointments. Limited mobility may also affect the patient's ability to sit comfortably in a dental chair for extended periods, complicating treatment procedures. Home-based care strategies, such as the use of electric toothbrushes, floss holders, and other adaptive devices, can help improve oral hygiene for these patients. Additionally, mobile dental services or domiciliary care, where dental professionals provide care in the patient's home or care facility, can be beneficial.[6]

Barriers to Dental Care for Older Adults:

Older adults face several barriers to dental care. Cost is a major issue, especially for those on low pensions, with some studies showing up to 29% of elderly living alone struggle with financial constraints. Access problems arise due to physical disabilities, travel issues, or a lack of local services. Dental fear is common, with anxiety about procedures often leading to lower utilization of services. Carers, including medical professionals and family members, often lack basic oral hygiene knowledge, which affects the quality of care. Dentists may also face challenges, including age-related biases, lack of confidence in treating older patients, and issues with accessibility and remuneration for home visits. Addressing these barriers is crucial for improving dental care for the elderly.[7]

7.Periodontal Care for Geriatric Patients

In older individuals, poor oral hygiene poses a substantial risk to periodontal health. The aging body can be compared to a "minefield" of threats to periodontal health, with periodontal inflammation potentially causing a "cascade" of systemic health disorders. These issues, however, can be reduced by maintaining excellent dental hygiene, which is critical for healthy aging. Adapted home care routines, such as employing ergonomic toothbrushes, floss holders, or electronic brushes, can improve oral health in the elderly, especially those with impairments or impaired dexterity. Regular dental appointments

and periodontal treatments help older people keep their teeth longer. Dental practitioners should analyze physical and psychological limitations before recommending oral hygiene equipment, as well as thoroughly evaluate systemic diseases and medications before adjusting preventative tactics. Reduced salivary flow in the elderly increases the risk of periodontal infection and caries, hence chlorhexidine rinses and fluorides are strongly advised for improved plaque control and infection resistance. Medical and dental practitioners should work together to emphasize the importance of oral hygiene and its impact on general health, with a focus on encouraging and educating elderly patients.[4]

Non-surgical periodontal therapy:

The primary goal of non-surgical periodontal therapy is to eradicate the biofilm that causes infection. Traditional methods involve manual or ultrasonic instruments, while a newer, minimally invasive technique, air polishing, is especially effective for elderly patients. Air polishing reduces chair-side time, cleans difficult-to-reach areas like implants, and preserves more tooth structure. Systemic medications can cause modifications in the periodontium, with gingival overgrowth being the most common. Managing this involves removing bacterial load, performing gingivectomy, and possibly adjusting medications in consultation with a physician. For periodontitis, scaling and root planing are standard treatments. In cases with pockets deeper than 5mm, local drug delivery systems (e.g., tetracycline fibers, chlorhexidine chips) are beneficial. For pockets over 7mm, subgingival irrigation systems can further reduce bleeding and pocket depth. Recently MCOI device, which is similar to water flossers, has been designed for elderly patients to help manage oral health effectively, either independently or with caregiver assistance. This device is engineered to reduce oral bacterial load, even in subgingival areas, making it a valuable tool for elderly oral care.[8]

Surgical periodontal therapy:

The goal of surgical periodontal therapy is to eliminate residual periodontal disease after non-surgical treatment or to restore tooth substance in crown or root caries and shattered teeth. Resective therapy, which involves reducing soft tissue depth and altering supporting and non-supporting bone, can be used to achieve a morphologically appropriate form of periodontal tissues with bleeding during probing. Regenerative therapy can cure pathological periodontal pockets by regenerating the periodontal attachment and lowering soft tissue depth. Periodontal plastic surgery treats soft tissue abnormalities. Root coverage is frequently impossible in elderly patients because gingival recession is caused by the loss of interproximal supporting tissue. The crown lengthening treatment is commonly used to restore tooth structure. Choose minimally invasive surgical methods, especially for elderly patients. Two studies compared surgical and nonsurgical periodontal treatment outcomes for moderately advanced or advanced periodontitis in older and "younger" patients. Results were comparable, with surgical treatment resulting in less bleeding on probing in the older population.[9,10]

Supportive periodontal therapy:

Disease prevention in elderly individuals is crucial. Primary prevention focuses on preventing disease whereas secondary prevention aims to prevent disease recurrence, with supportive periodontal therapy beginning only after successful therapeutic outcomes. Maintaining good oral hygiene is essential and can be achieved through diligent instruction in oral hygiene measures. However, elderly individuals may face challenges with manual dexterity, so special oral health aids like electric toothbrushes, wide-handle manual toothbrushes, and floss-holding devices can be beneficial. Mouthwashes can also serve as adjunctive methods. For those with cognitive impairment, oral hygiene instructions need to be simplified and reinforced. Caregiver education is vital, especially in aged care homes, where staff must be well-trained. Maintenance appointments should be tailored to the health and cognitive conditions of geriatric patients.

Conclusion

Periodontal health in geriatric and pediatric populations presents unique challenges

that require specialized approaches within the field of periodontology. For geriatric patients, managing age-related changes and comorbid conditions is essential, while for pediatric patients, the focus should be on prevention, early intervention, and education. Through comprehensive assessment, interdisciplinary care, and tailored treatment plans, periodontists can significantly improve the periodontal health and overall well-being of these special populations. Understanding and addressing the specific needs of geriatric and pediatric patients is crucial for promoting periodontal health across the lifespan. Continued research, education, and collaboration among healthcare providers will enhance the ability to provide effective care and improve the quality of life for these vulnerable populations.

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