



An Overview of Geriatric Oral Health Research in Saudi Arabia: A Literature Review

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Abstract:

Objective: The number of older adults in Saudi Arabia is increasing and is expected to grow even more over time due to developments in the fields of disease prevention, pharmacology, and medical technology. This review aimed to generate a synopsis of existing literature regarding the oral health of older adults in the Kingdom of Saudi Arabia.

Methods: Electronic databases, including PubMed, EBSCOhost, and Google Scholar, were searched using keywords, such as "oral health," "dental care," "aged," "dental caries," "periodontitis," "mouth neoplasms," and "Saudi Arabia." All study types of geriatric populations in different settings within the Kingdom were included.

Results: A summary of available literature has been provided to illustrate topics related to the prevalence of oral health diseases, including dental caries, periodontal diseases, tooth loss, and oral cancer. Other topics related to oral health behaviors, utilization of services, perceived oral health, and oral health-related quality of life among the same population have also been described.

Conclusion: In summary, the extent of various oral health problems among older adults is high, but the available literature regarding the oral health of this vulnerable group in Saudi Arabia is scarce. Further studies are needed to explore the effectiveness of preventive and therapeutic interventions, factors related to the oral health of the elderly, and the correlation of various chronic health conditions with oral health.

Keywords: Aged, Oral health, Dental care, Dental caries, Periodontitis, Mouth neoplasms.

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1. INTRODUCTION

Increasing life expectancy is one of humanity's greatest accomplishments, but it also presents one of its greatest challenges. Older people are valuable assets who often go unnoticed yet make significant societal contributions. However, the World Health Organization (WHO) has reported that global aging can pose economic challenges and social demands for all nations [1].

According to estimates by the General Authority for Statistics in Saudi Arabia, there were 1,189,818 individuals aged 65 years or older in 2021. The aging population (65 years old or older) represents 3.5% of the total Saudi population. According to the data by the United Nations, life expectancy improved from 75.8 years in 2010 to 77.9 years in 2022 [2]. The size of this population is expected to grow progressively over time due to disease prevention strategies practiced by the country and the evolution of healthcare services.

Due to their limited ability to cope with illness, social changes, and alterations in surroundings, the health of aging adults is distinct from other age groups. The prevalence of chronic diseases increases with advancing age, affecting the quality of life and increasing the burden on health systems. Approximately 32% of aging adults in Saudi Arabia suffer from diabetes mellitus, 30% have hypertension, and 25% complain of joint disorders [3]. In addition, more than 70% of the older population in Saudi Arabia is illiterate, and more than half of them have low incomes [3]. The combination of illiteracy and low income raises the concern of adverse health outcomes [4].

The knowledge regarding the aging population in Saudi Arabia is limited. Therefore, it is essential to explore available data regarding the oral health of this vulnerable population to help dentists and other healthcare providers, policymakers, and stakeholders better serve those individuals in preventing and controlling oral diseases. Therefore, the aim of this review was to produce a synopsis of existing literature discussing the oral health of the geriatric population in Saudi Arabia. This review can assist in guiding future research to fill knowledge gaps in this area.

2. METHODS

2.1. Search Strategy

A comprehensive search was performed using PubMed, EBSCOhost, and Google Scholar to find literature relevant to the topic. The following keywords were used in the search process: "oral health," "dental care," "aged," "dental caries," "periodontitis," "mouth neoplasms," and "Saudi Arabia." A search strategy was first built in PubMed using MeSH terms and was then adopted for other databases.

2.2. Selection Criteria

All study types of geriatric populations in different settings within the Kingdom of Saudi Arabia were considered for inclusion. No specified date range or language was applied. Relevant articles were initially selected based on both title and abstract, and the most relevant and informative data and results were included. A

subsequent screening for relevance process resulted in the exclusion of irrelevant topics and duplicate articles. Full texts of potentially relevant articles were retrieved and scrutinized against the inclusion criteria. Reference lists of the selected studies were searched manually for additional relevant articles.

3. RESULTS

3.1. Oral Health Status

3.1.1. Dental Caries

Dental caries is an infectious disease that is highly prevalent across different age groups [5]. Dental caries develop due to a variety of factors, including those that are specific to the individual, family, and community, such as behavior, the physical and social environment, and access to healthcare [6]. All these factors can play roles throughout a lifetime. Higher vulnerability to systemic diseases, increasing use of medications, physical, cognitive, and sensory limitations, and alterations to diet predispose the older population to a higher risk of caries [5].

According to a WHO report in 2019 [6], the estimated global average prevalence of caries in permanent teeth was 29%, with more than 2 billion cases reported. A systematic review [7] found that the global median prevalence of untreated caries in community-dwelling individuals was 49%, and the median number of missing teeth was 1.55 per older adult. Additionally, the global median prevalence of root caries was 36%. The prevalence of dental caries among older adults varied from 25% in Australia to 99% in South Africa, and the prevalence of root caries ranged from 8% in Finland to 74% in Brazil. In institutionalized aging adults, the situation was worse; the prevalence of dental caries ranged from 47% in India to 99% in Vietnam. The global mean number of decayed, missing, and filled teeth (DMFT) ranged from 6.9 in Malawi to 29.7 in South Africa [7].

In Saudi Arabia, few cross-sectional studies [8-10] have assessed dental caries in older adults. All identified studies [8-10] assessed coronal caries using WHO criteria, and two [8, 9] measured root caries. One study [8] studied a sample from residential homes, while the others [9, 10] included community-dwelling older adults.

Dental caries was detected in 50% of dentate subjects in a consecutive sample of geriatric patients [9]. The mean DMFT of a sample from community-dwelling older adults in Riyadh [9] was 24.9 ± 2.7 , and missing dentition due to dental caries was the highest across both genders and different age groups. The prevalence of root caries was 41.9%. On the other hand, the mean DMFT of a sample of older adults from Makkah [10] was 27.40 ± 7.5 , including a mean number of 1.34 ± 2.2 decayed teeth, a mean number of 25.32 ± 9.1 missing teeth due to caries, and a mean number of 0.75 ± 1.6 filled teeth.

The mean DMFT of a sample of elderly individuals from residential homes in Riyadh [8] was 18.6 ± 12.6 . The score was significantly higher among women (24.7 ± 10.0)

compared to men (17.8 ± 12.6). Missing teeth due to dental caries constituted the largest proportion of the score at 16.1 ± 13.1 , and women had a significantly higher number of missing teeth (22.8 ± 11.2) compared to men (11.9 ± 12.5). Furthermore, smokers had significantly higher DMFT of 14.20 ± 3.12 versus 11.52 ± 5.25 in non-smokers. The mean number of root caries was 2.8 ± 4.0 in men and 0.6 ± 2.0 in women.

Using Saudi Demographic and Health Survey (DHS) data from different regions in the Kingdom [11], the mean DMFT for adults 60 years old and older was 15.5 ± 9.4 . More than half of the sample (53.5%) had severe caries experience, with DMFT scores higher than 13.

For the management of root caries, dentists in Saudi Arabia prefer the restorative approach, followed by dietary modification, fluoride, and monitoring [12]. Glass ionomer cement has been the preferred restorative material by dentists for use in elderly patients. The selection of restorative material is dependent on oral hygiene, severity of the lesion, age, and tooth type [13].

3.1.2. Periodontal Health

An imbalance in plaque biofilm has been linked to periodontitis, a chronic, multifactorial, inflammatory disease that is characterized by destructive loss of tooth-supporting structures [14]. Gingival bleeding, alveolar bone loss, attachment loss, and deep periodontal pockets are the main features of periodontitis. This disease can affect an individual's mastication, confidence, and quality of life [15].

Periodontal disease affects approximately 70% of individuals aged 65 and older in the United States [16]. Studies have also identified gender-based differences, with severe periodontal disease being more prevalent among older men than women. Additionally, among those aged 65 and above, smokers exhibited higher overall levels of periodontal disease compared to non-smokers [17]. This condition is particularly concerning in older adults due to its association with root caries, tooth loss, and declining masticatory function [16].

In Saudi Arabia, four studies have evaluated the prevalence of periodontitis among older adults [8, 9, 18, 19]. One used the Community Periodontal Index for Treatment Needs (CPTIN) [18], and the others used the Community Periodontal Index (CPI) [8, 9, 19] or measure periodontitis. Two studies evaluated samples from residential homes [8, 18], and two evaluated samples from community dwellings [9, 19].

Among community-dwelling older adults [9], no subjects were classified as healthy; 1.3% had bleeding, 33.6% had calculus, 38.5% had 4–5 mm periodontal pockets, and 26.6% had at least 6 mm periodontal pockets. Zahrani [9] concluded that the severity of attachment loss increased with age. In a sample drawn from different health centers in Riyadh, periodontitis affected 61.0% of participants, with 43.4% showing shallow pocket depth and 18.1% showing deep pockets [19].

In a study on older adults in residential homes [18], 8.2% had healthy periodontium, 24% had bleeding, 48% had calculus, 18% had 4–5 mm pockets, and 1.2% had at

least 6 mm pockets. Al-Sinaidi [18] found that a significantly higher percentage of women maintained routine oral hygiene compared to men (31.1% and 5.9%, respectively). One in four elderly subjects perceived a need for periodontal treatment [18]. Similarly, Al-Shehri [8] observed that 8.4% of older adults in residential homes had healthy periodontium, 18.1% had bleeding on probing, 42.2% had calculus, 18.1% had shallow pockets, and 1.2% had deep pockets.

3.1.3. Oral Cancer

Al-Shehri [20] reviewed Saudi cancer registry data from 2015. The data revealed that 75% of oral cancer cases occurred in individuals over 50 years old. Oral cancer represents 1.8% of all cancer cases in the country. Additionally, the number of oral cancer cases increased over time from 109 in 1994 to 175 cases in 2015, with a peak of 211 cases in 2014 [20]. Age-specific incidence data showed a correlation between age and oral cancer, with more than 75% of cases diagnosed after age 50.

A study by Qannam [21] aimed to characterize soft-tissue biopsies from patients over age 60 who had been diagnosed in a teaching hospital over a 30-year period. Data from histopathological records revealed that most (69.3%) of the samples were taken from individuals between 60 and 69 years old. Reactive lesions constituted the largest proportion of all oral lesions (41.1%), among which irrational fibroma was the most common (46%). Reactive lesions were more common in 60- to 74-year-old individuals, while malignant lesions were higher among those 75 years or older. Squamous cell carcinoma was the most common malignant oral lesion, representing 84.6% of all oral malignancies.

3.1.4. Tooth Loss and Prosthetic Replacement

Tooth loss is a sign of the severity of dental disease. It may be due to dental caries [22] or periodontal disease [23]. Tooth loss can affect an individual's quality of life [24] and can negatively influence psychology, social communication, speech, nutrition, and many other aspects of daily life.

In Saudi Arabia, only 20.8% of elderly individuals under 75 years old and 6.7% of those above 75 years old had 20 or more remaining teeth [8]. The average number of missing teeth was 16.1 ± 13.1 [8, 18]. Women had a significantly higher number of missing teeth compared to men (22.8 ± 11.1 and 11.9 ± 12.5 , respectively) [8, 18].

DHS data [11] indicated that 10.6% of the elderly population were edentulous. In addition, 23.6% had fewer than 20 teeth, and 65.8% had 20 or more teeth. Only 62% of edentulous subjects wore complete dentures, and 27% of those who had fewer than 20 teeth wore partial dentures. Data [11] revealed that denture-wearing edentate seniors had more difficulty consuming protein, carbohydrates, fiber, fat, and calories compared to dentate people.

The number of missing teeth was associated with frailty in a study conducted in Al-Madina, Saudi Arabia [25]. Among those in the sample studied, 46.1% had 20 or

fewer teeth. Older adults who had functional dentitions (21 or more teeth) exhibited a significantly lower frailty index and frailty phenotype. After adjusting for socio-demographic and nutritional factors, having 21 or more teeth decreased the frailty index (RR 0.78, 95% CI 0.70–0.87, $p < 0.001$) compared to having fewer than 21 teeth. Furthermore, participants with functional dentitions had lower odds of a frailty phenotype (OR 0.36, 95% CI 0.13–0.56, $p < 0.001$).

The number of missing teeth was associated with a decline in the cognitive abilities of elderly individuals in a study on subjects 60 years old or older in Saudi Arabia [19]. In this study, the cognition state was graded using the Montreal Cognitive Assessment (MoCA). Cognitive decline was higher with an increasing number of missing teeth, as presented by a significantly negative correlation between the MoCA and the number of missing teeth ($r = -0.39$, $p < 0.001$). However, periodontitis was not correlated with cognitive decline ($r = -0.11$, $p = 0.344$).

An additional study [26] assessed the prosthetic status and treatment needs of a sample of adults 60 years or older. Approximately 63.6% and 74.5% of the samples required any type of prosthesis for the upper and lower arches, respectively. Further details regarding the percentages for each type of prosthesis used were provided in the study. It was reported that this high unmet need for prosthetic treatment among older adults in Saudi Arabia may result from low levels of knowledge, financial factors, and a lack of availability of dental services [26].

Another study [27] was performed to assess the prosthetic status and treatment needs of adults at or above 35 years old. Results for older adults (65 years or older) were also detailed in this study. It was found that among this age group, various types of prostheses, including single-unit, multi-unit, combination, or full denture, were necessary in 65.4% of older adults for the upper arch and 63% for the lower arch.

In addition, a descriptive longitudinal study was conducted to assess the nutritional and psychosocial effects of wearing removable dentures among a sample of elderly subjects in Jeddah, Saudi Arabia [28]. Before wearing dentures, 39.6% skipped meals regularly, and only 11.3% were satisfied with their nutrition and weight. Approximately 59.8% of the participants noticed an increase in their food consumption after wearing dentures, and 78.3% reported the ability to eat hard food after wearing dentures compared to 11.8% before wearing them. Approximately 64.3% were concerned about others' judgment regarding tooth loss before obtaining dentures, and 86.7% had experienced difficulties in pronouncing certain syllables. However, after wearing dentures, 72.7% noticed improvements in their self-confidence, and 81.5% were satisfied with their smile.

3.2. Health Behaviors

Self-efficacy is the personal ability to perform a behavior that influences an individual's ability to adopt healthy behaviors. The purpose of the Geriatric Self-Efficacy Scale for Oral Health (GSEOH) is to assess the

oral health self-efficacy of older adults [29]. The scale's domains consist of oral function, oral hygiene habits, and dental visits.

A study [30] was conducted to assess geriatric oral health self-efficacy and associated factors. Approximately 50% of subjects reported "good" or "rather good" oral functions, and approximately two-thirds rated "good" or "rather good" oral hygiene habits. For dental visits, participants were positive toward regular dental visits. GSEOH scores were significantly lower among unemployed subjects than those who were employed ($B = -0.13$, $p = 0.006$). The scores were also significantly lower among those who had no dental visit in the previous 12 months ($B = -0.15$, $p = 0.002$) and among those who were edentulous ($B = -0.15$, $p = 0.001$). The self-efficacy of subjects aged 65 to 75 years was lower compared to those who were above 75 years old ($B = -0.23$, $p = 0.000$).

3.3. Dental Services

Seeking dental care is influenced by multiple factors, including both intrinsic and extrinsic ones. Dental services are essential to reduce complications and lower healthcare costs. Income, education level, fear, traditional beliefs, race and ethnicity, marital status, social groups, transportation, and physical health are some factors associated with dental care utilization [31].

In a previous study [32], a high percentage (77.6%) of elderly subjects reported visiting health professionals, including general dentists, specialists, dental students, and medical practitioners, for their oral health problems, while fewer used home remedies (10.9%) or over-the-counter medications (11.4%) to control their complaints [32]. The selection of healthcare providers was dependent on accessibility, quality of care, the nature of the complaint, cost, and previous experience [32].

A different study, including a sample of older adults from community dwellings and residential homes [33], found that 62.6% had not visited a dentist within the previous year. Access to dental care within the previous year was more common among older adults in residential homes (53.4%) than community dwellers (33%), and it was also higher among high-income (45.1%) and married participants (43.4%). However, there was no significant difference in access to dental care according to age or education level. Participants who tended to brush their teeth regularly were more likely to visit a dentist than their counterparts (60.2%). Utilization of dental services was not related to systemic disease, physical disability, psychological diseases, or the use of medications. When participants were asked to report the barriers to their access to dental care, the absence of perceived dental need (70.2%) was the most frequent, followed by the absence of dental insurance (64.5%), high prices (61.3%), distance (44.2%), and dental fear (35.5%).

3.4. Perceived Oral Health

In a study in AlJouf, Saudi Arabia [32], a large proportion of older adults complained of missing teeth (78.7%), periodontal disease (74.2%), dental caries or pain

(66.8%), xerostomia (57.2%), tooth sensitivity (46.9%), tooth fracture (40.8%), facial pain (28.7%), and soft-tissue lesions (18.6%). Men were more likely to complain about missing teeth and periodontal disease compared to women, whereas women were more likely to complain of xerostomia and facial pain.

Another study in Al-Madina, Saudi Arabia [25], reported that 48.6% of older adults rated their oral health as excellent to good and that 51.4% rated it as fair to poor. Perceived fair-to-poor oral health was associated with a higher frailty index as compared to perceived excellent-to-good oral health (RR 1.3, 95% CI 1.17-1.45, $p < 0.001$) after adjusting for socio-demographic factors.

3.5. Oral Health-related Quality of Life (OHRQoL)

OHRQoL among the aging population has been measured by various studies using the Geriatric Oral Health Assessment Index (GOHAI) and Oral Health Impact Profile (OHIP). The GOHAI includes physical function, pain and discomfort, and psychosocial function. The tool has been translated into different languages, including Arabic, and validated previously [34]. Higher scores for the GOHAI indicate a better quality of life. The OHIP [35] has been used to evaluate the impact of oral illness on quality of life and measure the effects of clinical interventions. Individuals with higher OHIP scores have poorer OHRQoL.

A study [36] comparing OHRQoL between hospitalized and non-hospitalized older adults found no statistically significant difference in GOHAI between those groups (28.95 ± 5.8 and 28.45 ± 4.5 , respectively). However, it was reported that the GOHAI was significantly correlated with DMFT ($r = 0.29$, $p = 0.003$) and plaque index ($r = -0.39$, $p < 0.001$).

Another study [10] observed that GOHAI scores were better among those who were married (44.82 ± 7.2), were non-smokers (44.13 ± 8.1), were highly educated (50.70 ± 7.8), brushed twice a day (47.80 ± 6.7), and used floss (47.82 ± 8.2). Furthermore, GOHAI was positively correlated with the number of teeth filled ($r = 0.23$, $p < 0.001$) and inversely correlated with the number of decayed teeth ($r = -0.13$, $p = 0.004$) and age ($r = -0.35$, $p < 0.001$).

The mean GOHAI score for older adults reported in Hafar Al-Batin, Saudi Arabia [37], was 27.68 ± 0.5 . The GOHAI scores indicated better OHRQoL among males at 28.29 ± 0.6 and those of older age (75 years old and older) at 30.65 ± 1.7 [37]. GOHAI scores were significantly correlated with prosthesis-related pain ($r = -0.22$, $p = 0.008$), ulcers ($r = -0.23$, $p = 0.004$), and bad breath ($r = -0.26$, $p = 0.001$).

OHRQoL has been associated with nutritional status among older adults (60 years or older in Saudi Arabia) [38, 39]. Using the Mini Nutritional Assessment (MNA) scale, authors in one study [38] indicated that subjects who were malnourished or at risk of malnutrition had significantly lower GOHAI scores compared to participants with normal nutritional status (38.3 ± 8.8 , 40.5 ± 8.7 , and 46.6 ± 7.5 , respectively, $p < 0.001$). In addition, subjects who had high

OHIP-5 scores (above the median) were at nearly triple the risk of malnutrition relative to low OHIP-5 scores (less than or equal to the median) after accounting for demographical factors (OR 2.57, 95% CI 1.53-4.31) [39].

Furthermore, general health has been associated with OHRQoL [39]. Using a 36-item Short Form Survey (SF-36), investigators have illustrated the relationship between OHIP-5 and physical functioning (OR 0.98, 95% CI 0.97-0.99), energy and fatigue (OR 0.97, 95% CI 0.96-0.99), emotional well-being (OR 0.98, 95% CI 0.96-0.99), social functioning (OR 0.97, 95% CI 0.96-0.98), pain (OR 0.97, 95% CI 0.96-0.98), and general health (OR 0.97, 95% CI 0.94-0.99) domains.

A study in Al-Madinah, Saudi Arabia [40], assessed the association between OHRQoL and hyposalivation in the aging population. Approximately two out of three (64%) subjects had been diagnosed with hyposalivation, as their saliva flow rates were 0.9 mL/min or lower. The total mean OHIP-14 score was 6.09 ± 7.7 . Subjects with low salivary rates exhibited higher OHIP scores across all domains in comparison to those with normal flow rates, but this trend did not reach statistical significance. Subjects with low salivary pH had significantly higher social disability scores compared to those with normal salivary pH (0.70 ± 1.2 and 0.24 ± 0.6 , respectively, $p = 0.02$). The mean DMFT score was significantly higher among the low-salivary-rate group compared to the normal-salivary-flow-rate group (18.94 ± 10.4 and 14.14 ± 9.1 , respectively, $p = 0.01$).

4. DISCUSSION

To address critical knowledge gaps, enhance the standards of oral health care, and advance the oral health of both individuals and populations, robust research is essential. Such research has the potential to enhance evidence-based clinical practice and motivate the establishment of new, effective oral health policies and strategies.

The existing literature indicates that the level of oral diseases, including dental caries, periodontal disease, and tooth loss, is significantly high. In addition, a significant percentage of older adults appear to have experienced difficulty accessing dental care due to a lack of awareness and financial constraints. These two issues may have led to the disparity seen in OHRQoL among this vulnerable age group. Therefore, preventive and therapeutic solutions are needed to minimize the social, functional, and financial burdens of these diseases.

Although there is interest in understanding the oral health of older adults, data collection has been fragmented and conducted over various periods. This lack of reliable and standardized data collection methods has represented a significant hinderance to identifying the oral health status of older adults across the Kingdom of Saudi Arabia. It is necessary to continuously monitor the status of oral health among older adults to meet their needs. Large-scale studies using representative samples with sufficient internal and external validity are also recommended.

The lack of longitudinal studies has made it difficult to evaluate the progression of oral diseases and the effective-

ness of interventions among older adults in Saudi Arabia, and studies assessing preventive measures among this age group are therefore recommended as well. For example, the use of atraumatic restorative treatment (ART) for older adults could present an attractive alternative to conventional treatment in non-clinical settings. The 5-year survival rate from such a technique for older adults has been evaluated previously in the literature [41]. ART produced comparable results to conventional treatment by presenting a cumulative probability of survival of 85% as opposed to 79% from conventional treatment (p 0.81) [41]. In addition, the use of silver diamine fluoride (SDF) for the management of root caries among the elderly was evaluated in three randomized clinical trials in Hong Kong [42]. SDF was effective in preventing and arresting root caries with no serious adverse effects. Furthermore, SDF was used to manage gingivitis and plaque accumulation in older adults in residential homes in the United States [43]. An SDF level of 38% was found to be effective in reducing the gingival index (GI) and plaque index (PI) compared to placebo at all time points after the third week for 7 weeks. The intra-group comparison also demonstrated a significant decline in the GI and PI in the SDF group [43]. Replicating such results while attempting to reduce the risk of bias would be beneficial to confirm the success of the use of SDF and ART among homebound older adults in Saudi Arabia.

The body of literature linking oral health to systemic health problems, such as diabetes, cardiovascular disease, and cognitive decline, is enormous [44, 45]. Oral health status among the elderly population could be used to predict poor general health [46]. Yet, specific studies on older adults in Saudi Arabia are lacking despite the extensive spread of chronic diseases in the region.

Future research could address multiple facets that require attention. For example, understanding how cultural and religious practices can affect oral health in this age group could assist in culturally sensitive interventions. Moreover, further understanding of individual, social, and environmental factors influencing disease levels among this population is necessary to establish suitable interventions that address social determinants of health.

CONCLUSION

Within the limitations of existing studies, the status of oral health among older adults in Saudi Arabia is alarming. A high prevalence of oral diseases, including dental caries, periodontal disease, and tooth loss, has been observed. Additionally, barriers to dental care access, such as financial constraints, lack of awareness, and limited availability of services, contribute to disparities in oral health-related quality of life (OHRQoL) among this vulnerable population.

Addressing these challenges requires collaboration between healthcare professionals, policymakers, and researchers. By enhancing oral health services, raising awareness, and implementing targeted interventions, it is possible to improve the overall well-being and quality of life of the elderly population in Saudi Arabia.

CLINICAL SIGNIFICANCE

Reliable and standardized data collection methods that could provide a high level of certainty regarding the oral health status of older adults across the Kingdom are scarce. Therefore, it is necessary to continuously monitor the status of oral health among older adults to meet their needs. Additional studies are necessary to expand the body of literature in this field and to better understand factors that can amplify oral problems in this age group. Furthermore, preventive and therapeutic regional strategies are essential to address oral health problems in older adults.

AUTHOR'S CONTRIBUTIONS

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation. The author reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

WHO	= World Health Organization
MeSH	= Medical Subject Headings
DMFT	= Decayed, Missing, and Filled Teeth
DHS	= Demographic and Health Survey
CPI	= Community Periodontal Index
CPTIN	= Community Periodontal Index for Treatment Needs
PI	= Plaque Index
GI	= Gingival Index
OHRQoL	= Oral Health-Related Quality of Life
GSEOH	= Geriatric Self-Efficacy Scale for Oral Health
GOHAI	= Geriatric Oral Health Assessment Index
OHIP	= Oral Health Impact Profile
ART	= Atraumatic Restorative Treatment
SDF	= Silver Diamine Fluoride
RR	= Relative Risk
OR	= Odds Ratio
CI	= Confidence Interval
p	= p -value
r	= Correlation Coefficient
B	= Regression Coefficient

CONSENT FOR PUBLICATION

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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