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Assessment of Oral Health in Geriatric Patients Using the OHAT Evaluation Framework

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Abstract

The growing geriatric population worldwide poses a significant challenge in administering appropriate oral care. The present study evaluated the oral health status of geriatric patients using the Oral Health Assessment Tool (OHAT), a standardized evaluation tool used to measure several parameters of oral health in the elderly. The investigation was among geriatric populations living in community and institutional settings. With the OHAT model, assessments were conducted on lips, tongue, gums and tissues, saliva, natural teeth, dentures, oral cleanliness, and dental pain using a systematic approach. The research aimed to determine common oral conditions, their correlation with systemic diseases, and whether regular oral examinations were still an effective practice in managing the elderly. The results reveal a high incidence of oral issues, including dry mouth, gum inflammation, and poor denture hygiene, necessitating targeted interventions. Furthermore, the research highlights the need for routine adoption of OHAT screening as a standard protocol in geriatric care to ensure early diagnosis and improve overall quality of life. The results advocate for greater training of carers and oral health services in all aged care centers. Overall, this research emphasizes the whole-person, preventive care of older adults' oral health.

Keywords: Oral Health, Geriatric Patients, OHAT, Dental Assessment, Elderly Care, Preventive Dentistry, Oral Hygiene.

1 INTRODUCTION

The global demographic shift towards an aging population has led to an increasing focus on geriatric health, particularly oral health. Oral health plays a crucial role in the overall health of older people, affecting their nutrition, communication, and quality of life (Petersen & Yamamoto, 2005; Goyal & Shah, 2025). Aging changes, including decreased salivary secretions, tooth loss, and a higher incidence of systemic illnesses, put the elderly at greater risk from oral diseases (Gil-Montoya et al., 2015). Despite its importance, geriatric care often overlooks oral health due to limited access to dental treatment, mobility issues, and a lack of awareness among patients and caregivers (Chalmers & Pearson, 2005), (Mehra & Patel, 2024).

To address this need, valid and user-friendly assessment tools are necessary to identify early oral health status among older people. The Oral Health Assessment Tool (OHAT) is one of the standardized tools that enables medical professionals to assess oral health systematically through visual examination and non-invasive techniques (Chalmers et al., 2005). OHAT assesses eight areas: lips, tongue, gums and tissues, saliva, natural teeth, dentures, oral hygiene, and dental pain (Marchini et al., 2019). These

groups reflect the prevalent states of oral disease among the elderly and allow for early referral to dental care (MacEntee, 2006).

Several studies have established a link between oral disease and general diseases, such as cardiovascular disease, diabetes, and pulmonary infections, further emphasizing the need for integrated oral examinations in geriatric patients (Scannapieco & Shay, 2014). Institutionalized geriatric patients are especially at risk as they rely on caregivers and get minimal dental treatment (Coleman, 2002). Regular oral assessment using tools such as OHAT will fill this lacuna, encouraging preventive therapy and overall better health outcomes (Peltola et al., 2007; Sio, 2025).

This research aims to evaluate the oral health conditions of geriatric patients using the OHAT system and identify common conditions that require clinical interventions (Papalou, 2023). With this identification of the usefulness of OHAT in the general assessment of geriatric patients, systematic procedures for oral health evaluation must be implemented within aged care facilities and public health organizations (Slack-Smith et al., 2010).

Key Contribution:

1. The research yields empirical data regarding the rate of oral health issues among older adults through an agreed instrument (OHAT), according to which 60% of the sample needed high to moderate concern intervention.

2. It provides evidence for OHAT's actual use in the field in both community and institutional settings, confirming its utility as an invasive-free and caregiver-effective screening tool.

3. A regression line is presented, relating OHAT scores and age, which illustrates a statistically significant trend for poorer oral health predictably with increasing age.

4. The research proposes an architected data structure design and evaluation process, allowing for deployability with scaleability of OHAT in electronic and real-time geriatric care systems.

5. Domain-level analysis further identifies that gums, natural teeth, and saliva are the most impaired domains with definitive guidance regarding guided oral hygiene intervention among elderly individuals.

The paper consists of five main sections. The introduction highlights the importance of oral health among older people and establishes the OHAT framework as a clinical screening measure. The Literature Review integrates available research evidence on oral health screening among older people, defines gaps, and emphasizes the necessity for a standard tool such as OHAT. The Methodology describes study design, participant recruitment, OHAT scoring process, data collection workflow, system architecture, and analysis techniques. The Results and Discussion display participant demographics, OHAT score distributions, domain results, regression analysis, and practical care implications for older adults. The Conclusion and Future Work summarizes the results, highlights the

importance of early screening, and suggests future work, including technological integration, longitudinal studies, and implementation at the national policy level.

2 LITERATURE REVIEW

The oral health status of older people is closely related to their general health, mental status, and overall well-being (Javier et al., 2025). In a study based on the OHAT model, it was highlighted that long-term care facility residents with poor oral hygiene were prevalent, and most often the result of physical or mental disability, and it was highlighted that standardized oral assessment in routine care is essential (Goyal et al., 2024).

A study of older people living in residential care identified a high incidence of oral pathology, such as dry mouth and gingivitis, which was frequently being ignored by general health staff. The use of standardized oral health assessment increased problem identification, enabled earlier intervention, and facilitated multidisciplinary communication between dental and nursing staff (Martin et al., 2023).

The use of oral assessment tools in general elder care showed significant improvements in monitoring dental status and hygiene (Mahendran et al., 2024). Non-dental care providers were able to identify changes using these tools and refer patients appropriately, eventually decreasing dental emergencies and improving continuity of preventive dental care among elderly patients.

Findings support that issues related to dentures and oral health are common in older persons (Abdullah et al., 2023). Regular surveillance using the support of standardized tools like OHAT allows for early intervention and detection, particularly for disorders in which elderly individuals cannot express pain because of cognitive disability or speech impairments related to neurological disorders.

OHAT was designed to be both valid and reliable for assessing the oral health of elderly adults (Chalmers et al., 2005). It streamlines the assessment process since it works with visible clinical characteristics. Its use in residential care facilities enables the nurses to carry out timely screenings, hence filling the gap between medical and dental care in gerontological care.

Geriatric dental screening has revealed a significant correlation between oral and mental health. Demineralization of teeth, painful dentures, and diseased oral status result in loss of appetite, malnutrition, and social isolation (Patil et al., 2024). The use of standardized procedures for early detection improves care planning and geriatric health outcomes.

In nursing facilities, oral health is often not given priority, despite its profound impact on systemic disease. An intervention that educated nursing staff in the use of oral assessment tools resulted in enhanced documentation, improved hygiene, and increased referrals to dental care, demonstrating how easily oral health can be incorporated into general nursing practice (Tada et al., 2020).

Innovative hybrids of telehealth and standardized assessment tools are emerging in geriatric dental care. Virtual consultations augmented by caregivers' oral screening are increasing access to dental

consultation for older adults in underserved populations (Carter & Burke, 2023). These models optimize care delivery and reduce unnecessary travel for patients who are compromised or bedridden.

Nursing home pilot trials suggest that even minimal oral screening can significantly enhance the detection of oral pain, lesions, and plaque (Rao et al., 2022). Staff confidence in handling oral problems increased with proper training, while patient outcomes showed enhanced oral functioning and a reduction in long-term oral-related hospitalizations.

The relationship between oral and systemic health is more pronounced in older people. Oral health is related to pneumonia, cardiovascular disease, and diabetes (Shay, 2017). Systematic oral examination via OHAT can be employed to prevent complications through early dental intervention, emphasizing the importance of well-coordinated geriatric care systems.

3 METHODOLOGY

3.1 Study Design and Population

This research employed a cross-sectional observational design to assess the oral health of older participants using the OHAT (Oral Health Assessment Tool) model. The study was conducted in institutional long-term care facilities and community health centers. A sample of 100 participants aged 60 years and older was recruited via purposive sampling. Those participants who were qualified for inclusion were alert, clinically stable, and able to provide informed consent. If there was an impairment of cognition, permission was obtained from legal guardians or family members. Those with below palliative care or with acute systemic illness were excluded to assess feasibility and protect patient safety.

3.2 Ethical Considerations and Consent

Before data collection was initiated, ethical clearance was obtained from the Institutional Ethics Committee. The participants were informed about the purpose, procedure, risks, and confidentiality of the study. Written informed consent was obtained from each participant or their designated representative. The study strictly adhered to ethics, ensuring participant anonymity and data confidentiality throughout the research process.

3.3 OHAT Framework for Oral Health Evaluation

The OHAT tool was used as the key assessment instrument due to its validity and simplicity in application in non-dental environments. The measurement is used to assess the oral condition of a patient by examining and comparing eight different aspects: lips, tongue, gums and tissues, saliva, natural teeth, dentures, oral hygiene, and dental pain. All regions are graded on a three-point scale, where 0 indicates a healthy status, 1 shows changes, and 2 indicates an unhealthy status or immediate consideration. The total OHAT score was then calculated for all subjects to categorize their overall oral health status.

The OHAT total score S is derived from the sum of the eight domain scores and can be mathematically expressed as:

$$S = \sum_{i=1}^{8} d_i \qquad Eq(1)$$

In Eq. (1), where d_i represents the score of the ith domain.

In Eq. (2), based on the value of S, participants were categorized into three oral health status levels:

$$Health\ Status = \begin{cases} Healthy\ if\ 0 \leq S \leq 3 \\ Moderate\ Concern\ if 4 \leq S \leq 6 \\ High\ Concern\ if\ 7 \leq S \leq 16 \end{cases} \qquad \text{Eq (2)}$$

This classification system provided a systematic method for prioritizing patients who require dental care, ensuring the early identification of oral health risks.

3.4 Workflow and Assessment Process

The assessment process was structured to ensure consistency, reliability, and reproducibility. As illustrated in Figure 1, the workflow begins with the selection of eligible participants, followed by the collection of demographic information and consent. Subsequently, healthcare staff, including nurses and aides, received training in the OHAT assessment protocol to standardize the evaluation process. Oral examinations were then conducted under adequate lighting, using gloves, tongue depressors, and disposable mouth mirrors. The OHAT scores were recorded immediately and entered into a digital log sheet.

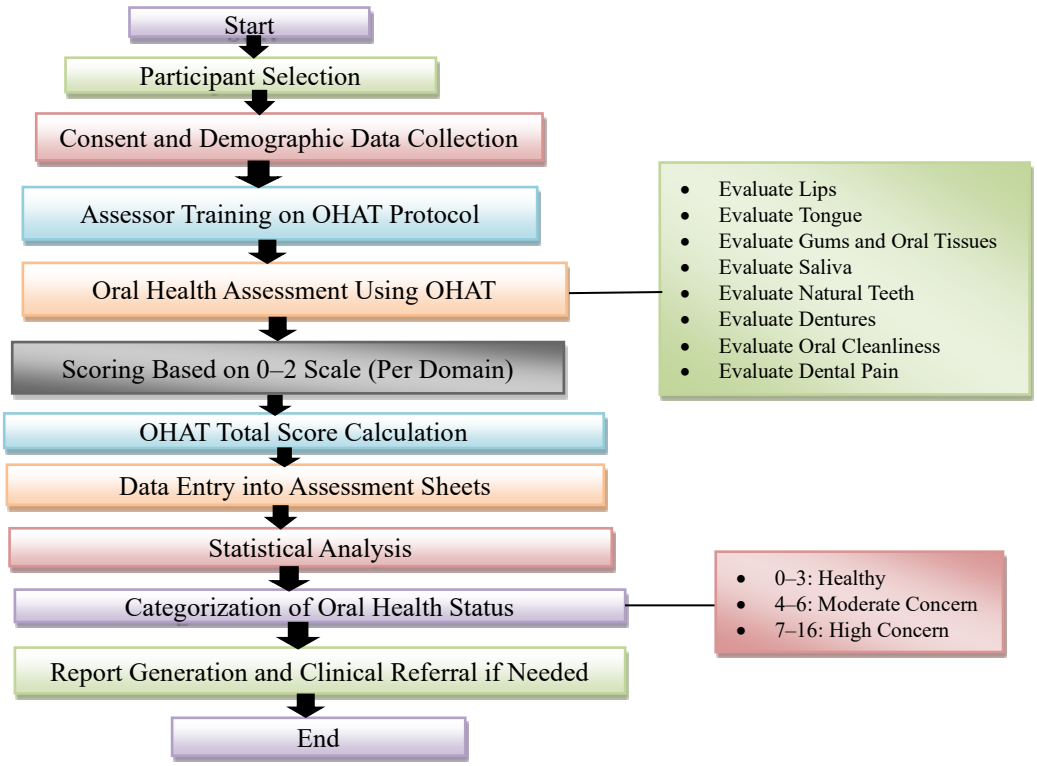

Figure 1: Workflow of Geriatric Oral Health Assessment Using the OHAT Framework

This flowchart outlines an organized sequence of steps, starting with participant recruitment and progressing through assessment and analysis. It helps make the evaluation systematic and brings about timely determination and management of oral diseases among older persons.

3.5 System Architecture for Data Handling and Reporting

To facilitate improved scalability and digitization, a multi-layer system architecture was developed to manage the assessment process efficiently. As illustrated in Figure 2, the system is segmented into five functional layers: input, assessment, data, processing, and output. First-time patient data and consent are obtained in the input layer. The assessment layer comprises the user carrying out the OHAT evaluation through the usage of a guided interface. Results from the assessments are stored within the data layer and are passed to the processing layer for scoring calculation and health status determination. The output layer ultimately produces oral health reports and notifies health practitioners if referral or follow-up is necessary.

This design is modular, allowing for straightforward integration with electronic medical records or mobile health systems. It can undertake real-time scoring, reporting, and flagging of risk on large-scale geriatric care operations.

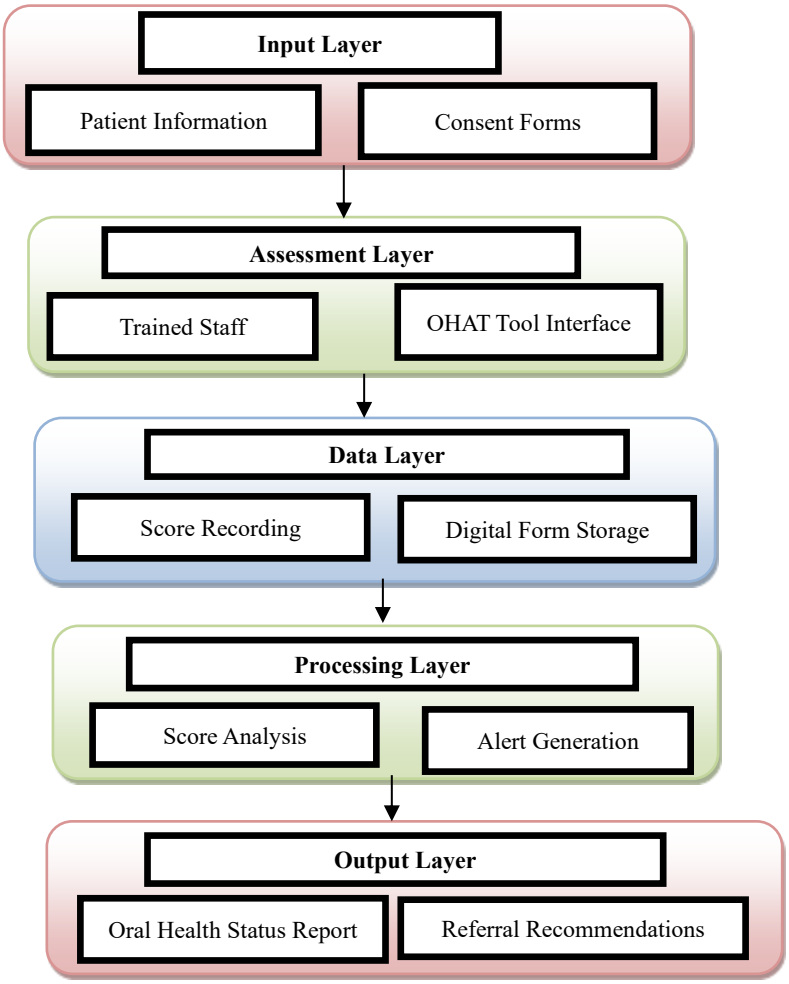

Figure 2: System Architecture for OHAT-Based Geriatric Oral Health Evaluation and Reporting

3.6 Training and Calibration of Assessors

To reduce inter-rater variability and obtain real scores, the testers all underwent a workshop training session led by dentists. Training comprised visual recognition of oral conditions, interpretation of the OHAT domain, and simulated tests. Calibration exercises were employed to generate inter-observer agreement, and randomly selected individuals were re-examined for confirmation.

3.7 Data Analysis

The data collected were statistically analyzed using SPSS version 25.0. Descriptive statistics, including mean, standard deviation, and frequency distribution, were used to present participant details and oral health status. Statistical associations were determined between OHAT scores and variables such as age, sex, residential type, and denture wear using the chi-square test. Statistical significance was taken at a cut-off point of $p < 0.05$.

4 RESULT AND DISCUSSION

4.1 Participant Characteristics and OHAT Score Distribution

The oral condition of 100 aged subjects, aged 60 years and above, was evaluated using the OHAT assessment tool. The participants' mean overall OHAT score was 5.2 ± 2.8, indicating a generally moderate concern regarding the oral condition of the population being studied. The participants were classified into three groups based on the overall total OHAT score: Healthy (0–3), Moderate Concern (4–6), and High Concern (7–16). Forty of the sample were classified under the Healthy category and constitute 40% of the population. Thirty-five (35%) of the subjects belonged to the Moderate Concern category, while 25 (25%) belonged to the High Concern category.

In greater detail, the demographic analysis of subjects by age and score distribution is presented in Table 1. The sample consisted of 45% of subjects aged 60–69 years, followed by 35% aged 70–79 years, and 20% over 80 years. Sex distribution was nearly equal, with a slight female preponderance (52%). Regarding residency, 60 individuals were from community-based settings and 40 from institutional care. These patterns of population created even coverage of older populations in various settings of care.

Table 1: Demographic Distribution and OHAT Score Categories

Variable	Category	Frequency (n)	Percentage (%)
Age Group	60–69 years	45	45
	70–79 years	35	35
	80+ years	20	20
Sex	Male	48	48
	Female	52	52
Residence	Community-based	60	60
	Institutional Care	40	40
OHAT Category	Healthy (0–3)	40	40
	Moderate Concern (4–6)	35	35
	High Concern (7–16)	25	25

4.2 Domain-Wise Analysis and Graphical Representation

Distribution of OHAT score categories is again presented in Figure 3 as a bar graph. The number of participants is represented on the vertical axis, and the three OHAT categories are plotted on the horizontal axis. The bar chart indicates that 40 participants were in the Healthy category, 35 in the Moderate Concern category, and 25 in the High Concern category. This suggests that a high percentage of older people suffer from oral pathologies, which may be emphasized. While the "Healthy" classification is the most common, the 60% combined figure of moderate concern and high concern classifications suggests a definite need for preventive and restorative oralhealth care among geriatric populations.

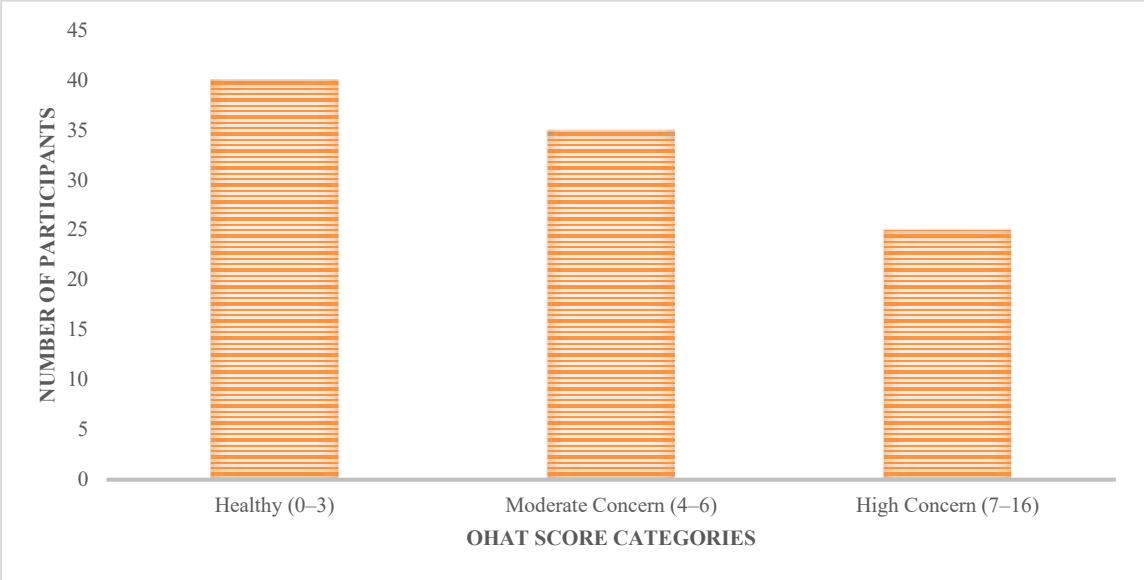

Figure 3: Distribution of Geriatric Participants by OHAT Health Status

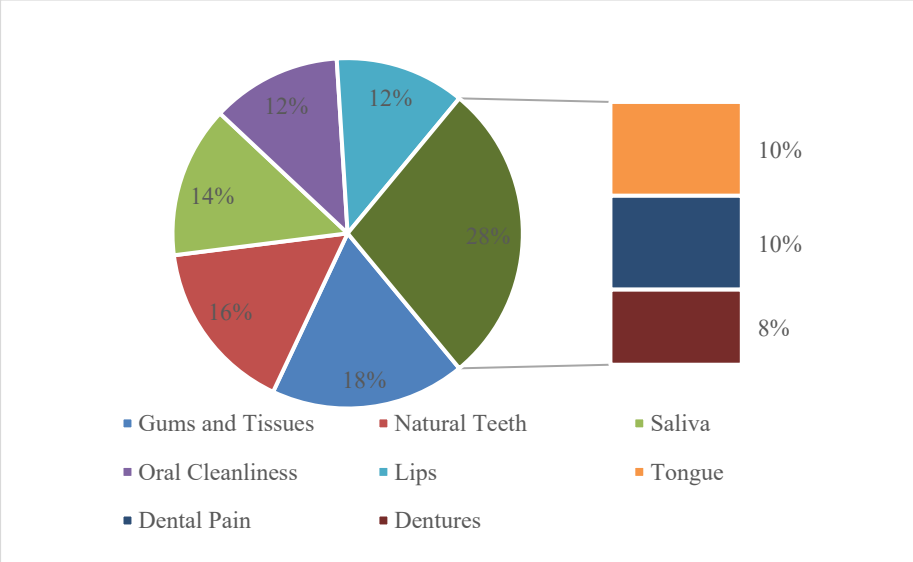

Figure 4: Proportion of Issues Across OHAT Oral Health Domains

To gain a clearer understanding of the regions most impacted by oral health issues, Figure 4 presents a pie chart of the relative frequency of problems at the domain level. 18% of all reported issues involved

gums and tissues, followed by natural teeth at 16%, saliva at 14%, oral cleanliness and lips at 12%, tongue and pain caused by teeth at 10% each, and problems with dentures at 8%. This specialty-focused visualization highlights the fact that issues related to gums and teeth are more prevalent and potentially more detrimental to the overall health of geriatric patients. These also bring forward a demand for oral hygiene practices directed specifically towards periodontal health and dentures.

4.3 Regression Analysis of Age and OHAT Score

For the analysis of the correlation between age and oral health, simple linear regression was employed, which revealed a positive correlation between age and the composite OHAT score. The regression equation based on the data is as follows:

$$OHAT\ Score = 2.3 + 0.8 \times (Age\ in\ Decades) \qquad \text{Eq (3)}$$

This formula suggests that every extra decade of life adds about 0.8 to the OHAT score from an underlying level of 2.3. This trend confirms that oral conditions do worsen with advancing years, highlighting the need for early and frequent examination and intervention. The ability to forecast this model provides analytical insight into the clinical findings and affirms the suggestion that age is a major predictor of oral health deterioration among older people.

4.4 Interpretation and Implications

The results of this study indicate a common requirement for regular oral health evaluation in older adults. Despite the presence of a subgroup of participants with optimal oral health, the majority had conditions necessitating prevention or clinical treatment. The domain-by-domain analysis underscores the importance of periodontal therapy and denture cleanliness, which are often not included in standard health evaluations but are of significant relevance in terms of comfort, nutrition, and overall well-being. The graphical illustrations presented in Figures 3 and 4 not only make the data more readable but also offer actionable advice to clinicians and policymakers.

Regression analysis also robustly validates that oral health deteriorates predictably with age, and therefore, a planned, scalable infrastructure for screening is needed. The application of the OHAT instrument, especially when supplemented with an architecture like the one in this study's methodology, can help close the gap between dentists and primary care physicians. It would lead to elderly patients receiving timely referral and appropriate treatment based on objective data from screening. This type of coordinated strategy is crucial for enhancing health equity and improving the quality of life for older adults.

5 CONCLUSION

The results of this research bring to the forefront the key position of organized oral health examinations in the care of older adults. In using the OHAT (Oral Health Assessment Tool) instrument to test a representative sample of the elderly, the research identified that a large percentage of the study

population, 60%, had moderate to severe oral disease. These findings highlight the susceptibility of older adults to a high prevalence of oral conditions, particularly those related to periodontal status, natural tooth integrity, salivary function, and oral hygiene. The utility of the OHAT tool was found not only in screening overt oral conditions but also in producing clinically relevant statements that can inform referral and treatment. In addition, the study found a positive progressive trend with rising OHAT scores, an indicator of oral health risk escalating with age. The trend demonstrates that age-focused intervention methods are warranted. The potential for implementation in scalable formats for institutional and community care providers was also shown by the inclusion of a computer system architecture, as planned in the design, with real-time data gathering, monitoring, and early intervention capabilities. Generally, the OHAT model has proved to be an effective, non-surgical, and systematic approach for application by generalist health clinicians that is not dependent on dental practice, facilitating the delivery of geriatric care at scale.

Future studies should aim to advance the OHAT system by incorporating emerging technologies, such as mobile health applications, artificial intelligence-based evaluation tools, and tele-dentistry platforms. Additionally, longitudinal studies must assess how frequently OHAT-based assessments affect the oral and systemic health outcomes in older persons over the long term. Furthermore, evaluating the effect of caregiver training on frequency rating scores, as well as incorporating patient self-assessment traits, may provide more insight into the instrument's utilization across various settings. Additional research that incorporates biometric markers, nutritional status, and systemic comorbidities to OHAT scores would enable the construction of predictive models that could forecast patient deterioration and decrease emergency dental appointments. This reach into more diverse and larger populations, such as rural and underserved populations, will also contribute to the generalizability of the results. Additionally, policy-led research should determine the feasibility of incorporating OHAT screenings into routine geriatric health practice at the regional or national levels. Together, these next steps will not only enhance the evidence base for OHAT as a screening model but also facilitate the construction of an integrated, preventive model of oral healthcare for the aging international community.

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