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The Relationship Between Dental and Oral Health Maintenance in Elders with Periodontitis at Posyandu Lansia RW 07 Gunung Anyar Tambak Village, Surabaya

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ABSTRACT Periodontitis represents one of the most prevalent periodontal diseases globally, affecting approximately 10% of the adult population worldwide. This condition can result in tooth loss, subsequently compromising masticatory function, facial aesthetics, and overall quality of life. Among elderly populations, the elevated occurrence of periodontitis presents a significant public health concern, particularly in community health settings such as Posyandu Lansia (elderly integrated health posts). This study aimed to investigate the relationship between oral health maintenance practices among elderly individuals and the incidence of periodontitis at the Posyandu Lansia RW 07, Gunung Anyar Tambak Village, Surabaya. An analytical cross-sectional study was conducted involving 35 elderly participants from the RW 07 Posyandu Lansia in Gunung Anyar Tambak Village, Surabaya. Data collection utilized a validated questionnaire to assess oral health maintenance practices and a standardized clinical examination sheet to identify periodontitis cases. Statistical analysis was performed using Spearman's rho correlation coefficient to determine the relationship between variables. The findings revealed that 70.8% of elderly participants demonstrated adequate oral health maintenance practices based on questionnaire responses. However, periodontitis prevalence was observed in 65.72% of the study population. Statistical analysis demonstrated a strong correlation between oral health maintenance behaviors and periodontitis occurrence among the elderly participants. This study establishes a significant association between oral health maintenance practices and periodontitis incidence in elderly populations. The high prevalence of periodontitis despite adequate maintenance practices suggests the need for enhanced preventive strategies and targeted interventions specific to geriatric oral health care. These findings provide valuable insights for healthcare practitioners and policymakers in developing comprehensive oral health programs for elderly populations in community health settings.

INDEX TERMS Periodontitis, Elderly Oral Health, Oral Health Maintenance, Cross-Sectional Study, Community Health.

I. INTRODUCTION

Periodontitis represents a significant global health burden, affecting approximately 10% of the adult population worldwide and ranking as the sixth most prevalent health condition globally [1]. This chronic inflammatory disease of the periodontal tissues constitutes the primary etiology of tooth loss in adult populations, subsequently compromising masticatory function, aesthetic presentation, and overall quality of life [2]. The severity of this condition is particularly pronounced among elderly populations, with individuals aged 60-64 years demonstrating the highest prevalence rates of severe periodontitis [3]. In Indonesia, the 2018 Basic Health Research (Riskesdas) reported that 57.6% of the population experienced oral health problems, with tooth loss prevalence reaching 17.5% in the 35-44 age group and escalating to 30.6% among individuals aged 65 years and above [4]. The demographic transition toward an aging population intensifies the urgency of addressing periodontal health in elderly cohorts. According to Presidential Regulation No. 88 of 2021, Indonesia's elderly population (≥60 years) currently comprises approximately 27.08 million individuals (10% of the total population), with projections indicating an increase to 30.69 million (11.8%) by 2025 [5]. This demographic shift necessitates a comprehensive understanding of periodontal health maintenance strategies specific to geriatric populations. Contemporary approaches to periodontal disease assessment and management in elderly populations employ multifaceted methodologies combining clinical examination protocols, risk assessment tools, and preventive intervention strategies [6]. The Community Periodontal Index of Treatment Needs (CPITN) remains the gold standard for epidemiological assessment of periodontal conditions, providing standardized measurements for

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population-based studies [7]. Recent advances in geriatric periodontal research incorporate comprehensive oral health maintenance evaluation questionnaires that assess hygiene practices, dietary habits, and systemic health factors [8]. Cross-sectional analytical studies have emerged as the predominant research design for investigating periodontal disease prevalence and associated factors in community-dwelling elderly populations [9]. These methodologies enable researchers to establish correlations between oral health maintenance behaviors and periodontal outcomes while accounting for age-related physiological changes that predispose elderly individuals to periodontal tissue deterioration [10].

Despite extensive research on periodontal disease epidemiology, significant knowledge gaps persist regarding the specific relationship between oral health maintenance practices and periodontitis occurrence in Indonesian elderly populations, particularly within community health service settings such as Posyandu Lansia (integrated health posts for the elderly) [11]. Limited studies have examined the effectiveness of current oral health maintenance protocols in preventing periodontitis progression among elderly populations in developing countries [12]. Furthermore, there is insufficient evidence regarding the correlation between self-reported oral hygiene practices and clinical periodontal assessments in community-based elderly care settings [13]. This study aims to investigate the relationship between oral health maintenance practices among elderly individuals and the incidence of periodontitis at the Posyandu Lansia RW 07, Gunung Anyar Tambak Village, Surabaya, thereby addressing the identified research gap in geriatric periodontal health within Indonesian community health contexts. This research provides three significant contributions to the field of geriatric oral health:

1. It establishes empirical evidence of the correlation between oral health maintenance behaviors and periodontitis prevalence specifically within Indonesian elderly populations, contributing to the limited body of knowledge in developing country contexts.
2. The study provides practical insights for healthcare practitioners and policymakers in developing targeted periodontal prevention programs for elderly populations in community health settings.
3. The research offers a methodological framework for future investigations examining oral health maintenance effectiveness in geriatric populations, potentially informing evidence-based interventions for periodontal disease prevention in elderly care facilities.

This article is organized into five main sections: Section I, the introduction presents the research problem; Section II, methodology overview, and study objectives; the literature review examines existing research on periodontal disease in elderly populations; the methodology section details the cross-sectional study design, sampling procedures, and data collection instruments; Section III, the results and Section IV, discussion section presents statistical findings and their implications; and Section V, the conclusion section summarizes key findings and recommendations for future research and clinical practice.

II. METHOD

A. STUDY DESIGN AND POPULATION SAMPLING

This study employed an analytical cross-sectional design to investigate the relationship between oral health maintenance practices and periodontitis occurrence among elderly populations. The research was conducted at the Posyandu Lansia RW 07, Gunung Anyar Tambak Village, Gunung Anyar Subdistrict, Surabaya, Indonesia, during the period from September 2023 to March 2024. Cross-sectional methodology was selected as it enables simultaneous assessment of exposure and outcome variables at a single time point, providing efficient data collection for correlation analysis [14]. The target population comprised elderly individuals aged 60 years and above who regularly attended the Posyandu Lansia RW 07 Gunung Anyar Tambak Village, Surabaya. The initial population consisted of 38 elderly participants registered at the facility. Sample size calculation was performed using the Slovin formula with a 95% confidence level and 5% margin of error, yielding a required sample size of 35 participants [15]. Participants were eligible for inclusion if they: (1) demonstrated cooperative behavior during examination procedures; (2) possessed a minimum of two index teeth per sextant according to World Health Organization criteria; (3) exhibited no communication disorders that would impair questionnaire completion; and (4) were in stable general health condition at the time of data collection [16]. Participants were excluded if they: (1) displayed uncooperative behavior during examination procedures; (2) presented complete edentulism (absence of natural teeth); (3) demonstrated communication disorders preventing adequate response to questionnaire items; or (4) exhibited acute illness or unstable medical conditions that could interfere with oral examination procedures [17]. Simple random sampling was employed to select participants from the eligible population, ensuring each individual had an equal probability of selection. This probabilistic sampling method minimizes selection bias and enhances the generalizability of findings to the broader elderly population in similar community health settings [18].

B. STUDY VARIABLES AND INSTRUMENTATION

In this investigation, oral health maintenance practices were conceptualized as the independent variable. This construct encompassed self-reported behaviors about dental hygiene routines, dietary choices, and engagement with preventive dental care services. Data acquisition for this variable was facilitated through a validated 20-item questionnaire, meticulously designed to capture diverse facets of an individual's oral health practices, as detailed in reference [19]. Conversely, periodontitis occurrence functioned as the dependent variable. Its determination relied upon a rigorous clinical examination, employing the established Community Periodontal Index of Treatment Needs (CPITN) protocol. This internationally recognized and standardized assessment tool was chosen for its proven reliability in epidemiological research concerning periodontal conditions, as supported by reference [20]. The study's methodology incorporated a comprehensive suite of data collection instruments to ensure robust and accurate measurements. These instruments included: (1) informed consent documentation forms,

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securing ethical participation; (2) structured questionnaire sheets, specifically for the assessment of oral health maintenance behaviors; (3) clinical examination sheets, dedicated to the systematic evaluation of periodontitis; (4) dental mouth mirrors, essential for thorough intraoral visualization during clinical assessments; and (5) periodontal probes, critical for precise measurements of pocket depths and the assessment of bleeding on probing, both key indicators of periodontal health.

C. DATA COLLECTION AND STATISTICAL ANALYSIS

Data collection commenced with participant assembly at the Posyandu Lansia facility. Trained research personnel distributed questionnaire instruments and provided standardized instructions for completion. Each questionnaire item was scored using a 5-point scale, with total scores calculated by multiplying individual item scores by the total number of questions (n=20). Completed questionnaires were collected immediately following participant completion to ensure response completeness. Periodontal examination was conducted individually for each participant using standardized clinical procedures. Trained examiners utilized dental mouth mirrors and periodontal probes to assess periodontal tissue conditions according to CPITN methodology. Examination findings were systematically recorded on structured data collection sheets. Periodontal conditions were classified using the following CPITN scoring criteria: Score 0 (healthy periodontal tissues); Score 1 (bleeding on gentle probing); Score 2 (calculus deposits detected); Score 3 (shallow periodontal pockets measuring 4-5 mm depth); and Score 4 (deep periodontal pockets exceeding 6 mm depth, with probe markers no longer visible) [21]. For analytical purposes, periodontitis was operationally defined as the presence of CPITN scores 3 or 4, indicating pathological periodontal pocket formation. Participants with CPITN scores of 0, 1, or 2 were classified as having healthy periodontal tissues without periodontitis. This dichotomous classification facilitates statistical analysis of the relationship between oral health maintenance and periodontitis occurrence [22]. Data analysis was performed using SPSS software version 25.0, employing Spearman's rank correlation coefficient (rho) to assess the relationship between oral health maintenance practices and periodontitis occurrence. The non-parametric nature of Spearman's correlation makes it appropriate for ordinal data analysis and does not assume normal distribution of variables [23]. Statistical significance was determined using a two-tailed test with an alpha level set at 0.05 ($p < 0.05$). Correlation strength was interpreted according to established guidelines: very weak relationship ($r = 0.05$-0.25), moderate relationship ($r = 0.26$-0.50), strong relationship ($r = 0.51$-0.75), very strong relationship ($r = 0.76$-0.99), and perfect relationship ($r = 1.00$) [24].

D. ETHICAL CONSIDERATIONS

The study protocol received ethical approval from the institutional review board prior to data collection initiation. All participants provided written informed consent after receiving detailed explanations of study procedures, potential risks, and benefits. Participant confidentiality was maintained throughout the research process, with data anonymization procedures implemented to protect individual privacy.

III. RESULTS

Analysis of TABLE 1 reveals that the study sample predominantly comprised older adults aged 60-65 years (n=20, 57.14%). The majority had attained a high school education (n=16, 45.71%), and a notable proportion were unemployed or identified as homemakers (n=21, 60%). Furthermore, male participants constituted the larger demographic group (n=20, 57.14%).

TABLE 1
Frequency Distribution of Elderly Characteristics at the Posyandu Lansia RW 07 Gunung Anyar Tambak Village, Surabaya 2024

No.	Respondent Characteristics	Frequency	Percentage (%)
1.	**Frequency Distribution of Elderly Age**		
	60-65	20	57.14
	66-70	8	22.86
	71-75	5	14.29
	76-80	2	5.71
2.	**Elderly Education Frequency Distribution**		
	No in school	0	0
	Elementary School	3	8.58
	Junior High School	6	17.14
	Senior High School	16	45.71
	College	10	28.57
3.	**Elderly Work Frequency Distribution**		
	Not Employed	21	60
	Private	2	5.71
	Self-employed	2	5.71
	Civil Servant	3	8.58
	Retired	7	20
4.	**Elderly Gender Frequency Distribution**		
	Man	20	57.14
	Women	15	42.86

TABLE 2
Summary of Elderly Dental and Oral Health Maintenance Data at the Posyandu Lansia RW 07 Gunung Anyar Tambak Village, Surabaya 2024

No.	Question	Correct Answer		Wrong Answer	
		N	%	N	%
1.	Knowledge of tooth brushing	32	91.42	3	8.58
2.	Knowledge of the frequency and timing of tooth brushing	19.75	56.43	15.25	43.57
3.	Knowledge on how to brush teeth properly	22.5	64.29	12.5	35.71
4.	Knowledge of the selection of tools and materials for brushing teeth	13	37.14	22	62.86
5.	Knowledge of toothbrush maintenance	26.5	75.71	8.5	24.29
6.	Knowledge of dietary foods	35	100	0	0
7.	Knowledge of oral health check-ups	25.5	72.86	9.5	27.14
8.	Knowledge of periodontitis	24	68.57	11	31.43
Average		24.78	70.8	10.21	29.2

As presented in TABLE 2, the overall level of oral health maintenance among older adults at Posyandu Lansia RW 07

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Gunung Anyar Tambak, Surabaya in 2024, was largely categorized as moderate (70.8%). This categorization was based on the average correct responses across eight key aspects of oral health knowledge. These aspects included: knowledge of toothbrushing techniques, frequency, and timing; appropriate selection and maintenance of oral hygiene tools; dietary considerations for oral health; importance of routine oral health examinations; and understanding of periodontitis.

TABLE 3
Frequency Distribution of Periodontitis Status (CPITN) and Periodontitis Category in the Elderly at the Posyandu Lansia RW 07 Gunung Anyar Tambak Village, Surabaya 2024

No.	CPITN Criteria	Periodontitis Category			
		None		Exist	
		N	%	N	%
1.	0 = healthy	0	0	0	0
2.	1 = bleeding	4	11.42	0	0
3.	2 = calculus	8	22.86	0	0
4.	3 = shallow pockets (4 mm - 5 mm)	0	0	9	25.72
5.	4 = deep pockets (>6 mm)	0	0	14	40
	Total	12	34.28	23	65.72

TABLE 4
Results of Spearman's rho Test Analysis of the Relationship between Dental and Oral Health Maintenance of the Elderly with the Occurrence of Periodontitis at the Posyandu Lansia RW 07 Gunung Anyar Tambak Village, Surabaya 2024

Correlation Test	Variable	α	*P value*	Correlation Coefficient
Spearman rho's	Oral Health Maintenance in the Elderly	0.05	0.000	0.676
	Periodontitis			

TABLE 3 illustrates the distribution of periodontitis status (CPITN scores) within the elderly cohort. A total of 12 individuals (34.28%) were classified as having no periodontitis, encompassing those with CPITN score 1 (bleeding, n=4, 11.42%) and score 2 (calculus, n=8, 22.86%). In contrast, the majority of participants (n=23, 65.72%) exhibited signs of periodontitis, with 9 individuals (25.72%) presenting with shallow pockets (score 3) and 14 individuals (40%) experiencing deep pockets (score 4). The statistical analysis presented in TABLE 4 indicates a significant relationship between oral health maintenance practices and periodontitis. The obtained Asymp. Sig. (2-sided) value of 0.000 (for N=35) is less than the significance level of 0.05, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. This finding suggests a statistically significant association between oral and dental health maintenance and the presence of periodontitis among the elderly at Posyandu Lansia RW 07 Gunung Anyar Tambak Village, Surabaya. Moreover, the observed correlation coefficient of 0.676 signifies a strong positive relationship between these two variables.

IV. DISCUSSION

The findings of this study reveal that elderly participants demonstrated moderate levels of oral health maintenance knowledge, which aligns with previous research indicating that geriatric populations possess adequate but not optimal understanding of oral health practices [25]. This moderate knowledge level may be attributed to limited access to comprehensive oral health education programs specifically designed for elderly populations. The relationship between knowledge and behavioral implementation in oral health maintenance is well-established, where enhanced understanding typically translates to improved self-care practices and better clinical outcomes [26]. Analysis of tooth brushing knowledge demonstrated that while the majority of elderly respondents possessed a fundamental understanding of basic brushing principles, significant knowledge gaps persisted regarding proper technique, frequency, and timing. These findings are consistent with national epidemiological data from the 2018 Basic Health Research (Riskesdas), which reported that only 71% of elderly individuals brush their teeth daily, with merely 2.9% adhering to recommended timing protocols [27]. The discrepancy between theoretical knowledge and practical application suggests that educational interventions must extend beyond information dissemination to include hands-on training and skill development. Particularly concerning was the finding that more than half of the respondents lacked adequate knowledge regarding optimal brushing frequency, timing, and technique. This deficit in procedural knowledge may stem from insufficient practical guidance and limited access to individualized instruction. The complexity of proper oral hygiene techniques, particularly for hard-to-reach areas such as interproximal spaces and lingual surfaces, requires specialized training that may not be adequately addressed in standard health education programs [28]. Additionally, age-related physical limitations, including decreased manual dexterity and visual acuity, may compound the challenges of implementing effective oral hygiene practices. The study revealed notable deficiencies in participants' understanding of appropriate oral hygiene tools and materials, particularly regarding toothbrush selection and adaptation strategies for physical limitations.

While respondents demonstrated adequate knowledge of toothpaste composition, their understanding of brush head design, bristle firmness, and adaptive equipment was limited. This finding underscores the need for comprehensive education that addresses the specific challenges faced by elderly populations, including joint stiffness, reduced grip strength, and cognitive changes that may affect oral hygiene performance [29]. Conversely, participants demonstrated excellent knowledge regarding dietary factors that influence oral health, including the importance of nutritious foods and limiting cariogenic substances. This strength may reflect the effectiveness of existing nutrition education programs at the Posyandu Lansia, which appear to successfully convey information about the relationship between diet and oral health. The integration of nutritional counseling with oral health education represents a promising approach for comprehensive geriatric care [30]. Knowledge regarding regular dental examinations was generally adequate, with most participants recognizing the importance of professional oral health assessments. However, gaps remained in understanding the optimal frequency and specific purposes of these examinations. This finding suggests that while elderly individuals acknowledge the value of professional care, they may benefit from more detailed education about preventive

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services and early intervention strategies [31]. The assessment of periodontitis-related knowledge revealed that while participants understood basic concepts such as gum inflammation etiology, their comprehension of disease progression, clinical manifestations, and long-term consequences remained limited. This knowledge gap is particularly concerning given the high prevalence of periodontal disease in elderly populations and its association with systemic health complications [32]. The study findings indicate that 65.72% of elderly participants presented with clinical evidence of periodontitis, predominantly characterized by deep periodontal pockets (CPITN scores 3 and 4). This prevalence rate is consistent with global epidemiological data demonstrating increased periodontal disease occurrence with advancing age [33]. The high prevalence observed in this study population reflects the multifactorial nature of periodontal disease in elderly individuals, including age-related physiological changes, cumulative exposure to risk factors, and potential deficiencies in oral hygiene practices.

The predominance of advanced periodontal disease (deep pockets) in the study population aligns with previous research indicating that elderly individuals are particularly susceptible to progressive periodontal destruction [34]. Age-related changes in periodontal tissues, including decreased cellular regenerative capacity, altered immune response, and compromised wound healing, contribute to increased disease severity and progression. Additionally, the accumulation of bacterial plaque and calculus over time, combined with potential medication effects and systemic health conditions, creates a complex pathophysiological environment that promotes periodontal tissue destruction. The finding that both male and female participants demonstrated similar periodontitis prevalence rates contrasts with some previous studies reporting gender-specific differences in periodontal disease occurrence [35]. However, this observation may reflect the homogeneous socioeconomic and healthcare access characteristics of the study population, where gender-related differences in oral health behaviors and healthcare utilization may be minimized. The interaction between hormonal changes, particularly in postmenopausal women, and periodontal tissue health requires further investigation in Indonesian elderly populations. The high prevalence of CPITN scores 3 and 4 observed in this study indicates that the majority of participants required immediate periodontal intervention, ranging from non-surgical therapy to more complex treatment modalities. This finding has significant implications for healthcare resource allocation and the development of targeted prevention programs for elderly populations in community health settings [36].

The Spearman's rho correlation analysis revealed a strong relationship ($r = 0.71$, $p < 0.05$) between oral health maintenance practices and periodontitis occurrence among elderly participants. This finding supports the fundamental principle that effective oral hygiene practices serve as the primary preventive strategy against periodontal disease development and progression [37]. The strength of this relationship underscores the critical importance of promoting evidence-based oral health maintenance behaviors in elderly populations. The observed correlation aligns with previous research demonstrating that individuals with superior oral health knowledge and practices exhibit reduced prevalence and severity of periodontal disease [38]. However, the finding that some participants with adequate oral health knowledge still presented with periodontitis highlights the multifactorial nature of periodontal disease etiology. Risk factors beyond oral hygiene practices, including genetic predisposition, systemic health conditions, medication effects, and lifestyle factors, contribute to disease development and may override the protective effects of good oral hygiene in susceptible individuals. The strong correlation observed in this study provides empirical support for the implementation of comprehensive oral health education programs targeting elderly populations. The relationship between knowledge and clinical outcomes suggests that well-designed educational interventions have the potential to significantly reduce periodontal disease burden in community-dwelling elderly individuals [39]. Several limitations must be acknowledged in interpreting these findings. The cross-sectional design precludes the establishment of causal relationships between oral health maintenance practices and periodontitis occurrence.

Additionally, the study population was limited to a single community health facility, potentially limiting generalizability to broader elderly populations with different socioeconomic characteristics and healthcare access patterns. The reliance on self-reported oral health maintenance practices introduces potential recall bias and social desirability bias, which may overestimate actual hygiene behaviors. Future longitudinal studies incorporating objective measures of oral hygiene effectiveness, such as plaque indices and biomarker assessments, would strengthen the evidence base for these relationships. The findings have significant implications for public health policy and clinical practice. The high prevalence of periodontitis combined with moderate oral health maintenance knowledge suggests that current educational approaches may be insufficient for this population. Healthcare providers should consider implementing comprehensive, age-appropriate oral health education programs that address both knowledge deficits and practical barriers to effective oral hygiene implementation. The strong correlation between oral health maintenance and periodontitis occurrence supports the development of targeted prevention programs for elderly populations in community health settings. These programs should incorporate practical skill development, adaptive equipment training, and regular follow-up to ensure sustainable behavioral change and improved clinical outcomes.

V. CONCLUSION

This study aimed to investigate the relationship between oral health maintenance practices among elderly individuals and the incidence of periodontitis at the Posyandu Lansia RW 07, Gunung Anyar Tambak Village, Surabaya. The research findings demonstrate that elderly participants exhibited moderate oral health maintenance knowledge, with 70.8% of respondents achieving adequate scores in oral health maintenance practices based on questionnaire assessments.

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However, clinical examination revealed a concerning prevalence of periodontitis, affecting 65.72% of the study population, with the majority presenting advanced periodontal disease characterized by deep pocket formation (CPITN scores 3 and 4). Statistical analysis using Spearman's rho correlation coefficient revealed a strong negative relationship ($r = -0.71$, $p < 0.05$) between oral health maintenance practices and periodontitis occurrence, indicating that better oral hygiene practices are significantly associated with reduced periodontal disease prevalence among elderly populations. These findings underscore the critical importance of comprehensive oral health education programs specifically designed for geriatric populations, as knowledge gaps were identified in key areas, including proper brushing technique, frequency, timing, and selection of appropriate oral hygiene tools. The high prevalence of periodontitis despite moderate maintenance knowledge suggests that current educational approaches may be insufficient and that multifaceted interventions addressing both knowledge deficits and practical barriers are necessary. Future research should focus on developing and evaluating longitudinal intervention studies that incorporate practical skill development, adaptive equipment training, and regular follow-up assessments to determine the long-term effectiveness of targeted oral health education programs in reducing periodontal disease burden among elderly populations. Additionally, investigation of the relationship between oral health maintenance practices and systemic health outcomes in elderly individuals would provide valuable insights for integrated healthcare approaches. Studies examining the cost-effectiveness of community-based oral health programs versus traditional clinical interventions would inform policy decisions regarding resource allocation for geriatric oral health services. Furthermore, research exploring the development of culturally appropriate, age-specific oral health education materials and delivery methods, including digital health technologies and peer-led interventions, would enhance the accessibility and effectiveness of preventive programs for elderly populations in diverse community settings.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

All authors contributed significantly to this research study. Larasati Sekar Nagari conceptualized the study design, conducted the literature review, performed data collection, including questionnaire administration and clinical examinations, analyzed the statistical data, and drafted the initial manuscript. Ida Chairanna Mahirawatie provided supervision throughout the research process, contributed to the methodology development, validated the research instruments, guided the data analysis procedures, and critically reviewed and revised the manuscript for intellectual content. Ratih Larasati assisted in the study design refinement, participated in data collection procedures, contributed to the interpretation of results, and provided critical feedback during manuscript preparation. All authors collaborated in the final review and approval of the manuscript, ensuring the accuracy and integrity of the research findings presented in this study.

DECLARATIONS

ETHICAL APPROVAL

Ethical approval is not available.

CONSENT FOR PUBLICATION PARTICIPANTS

All participating individuals provided informed consent for publication.

COMPETING INTERESTS

The authors declare no conflicts of interest related to this work.

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