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Elderly Knowledge about Oral Health and the Impact on Periodontitis

Nur Choiriyah, Ida Chairanna Mahirawatie, I.G.A. Kusuma Astuti N.P

Depaterment of Dental Health, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

Corresponding author: Luditha Dia Anggraeni Author (e-mail: nurchoiriyah1234@gmail.com).

ABSTRACT Periodontitis remains a major cause of tooth loss among the elderly, significantly affecting masticatory function, aesthetics, and overall quality of life. Despite its high prevalence, limited awareness and misconceptions about oral health among older adults may contribute to delayed prevention and treatment. Therefore, this study aimed to analyze the relationship between elderly knowledge of oral health and the incidence of periodontitis at the Kemuning Integrated Health Post, Rejosopinggir Village, Jombang Regency. This research employed an analytic observational design with a cross-sectional approach. A total of 32 elderly participants aged ≥60 years were selected using random sampling. Data were collected through a structured questionnaire to assess oral health knowledge and clinical examination using the Russell Periodontal Index to determine periodontal status. Statistical analysis was performed using the chi-square test with a significance level of 0.05. The findings revealed that the majority of respondents had poor knowledge of oral health (78.1%), and most participants exhibited severe periodontal conditions, with an average Russell Periodontal Index score of 3.55. However, the chi-square test indicated no statistically significant relationship between oral health knowledge and the occurrence of periodontitis ($p = 0.396 > 0.05$). These results suggest that knowledge alone is insufficient to influence periodontal health outcomes. In conclusion, although poor oral health knowledge is prevalent among the elderly, it does not significantly correlate with the incidence of periodontitis in this population. Other factors, such as behavioral habits, access to healthcare services, systemic conditions, and socioeconomic status, may play a more dominant role. Comprehensive and practical oral health interventions are therefore recommended to improve periodontal health among the elderly.

INDEX TERMS Oral Health Knowledge, Periodontitis, Elderly, Cross-Sectional Study, Russell Periodontal Index

I. INTRODUCTION

The global increase in the elderly population has become a major public health concern, particularly due to the rising prevalence of chronic diseases, including oral health disorders such as periodontitis. Periodontitis is a chronic inflammatory disease affecting the supporting structures of the teeth and is a leading cause of tooth loss among older adults [1], [2]. Epidemiological evidence indicates that periodontal disease affects a significant proportion of individuals aged 60 years and above, making it one of the most prevalent oral health problems worldwide [3]. Moreover, periodontitis has been shown to negatively impact oral health-related quality of life by impairing chewing ability, aesthetics, and social interaction [4], [5]. Despite its preventable nature, its high prevalence suggests the involvement of multiple contributing factors beyond clinical conditions.

Recent studies have emphasized the importance of oral health knowledge as a determinant of preventive behavior. Adequate knowledge is associated with improved oral hygiene practices, including regular tooth brushing, plaque control, and utilization of dental services [6]. Knowledge also influences individual awareness and attitudes toward oral health maintenance [7]. In addition, modern clinical assessment methods such as the Russell Periodontal Index are widely used to objectively measure periodontal status in both clinical and community settings [8]. Other epidemiological approaches, including post-pandemic surveillance studies, have also been used to monitor periodontal disease trends [9]. Contemporary research further recognizes that periodontitis is a multifactorial disease influenced by systemic conditions such as diabetes mellitus [10], behavioral factors such as smoking [11], and socioeconomic determinants including education level [12] and access to healthcare services [13]. These state-of-the-art approaches demonstrate that periodontal disease is not solely a clinical issue but also a complex interaction of biological, behavioral, and social factors.

However, findings regarding the relationship between oral health knowledge and periodontitis remain inconsistent. Some studies report a significant association between higher knowledge levels and better periodontal health outcomes [14]. Health promotion interventions have also shown that increased knowledge can lead to improved oral hygiene behavior [15]. Conversely, other studies indicate that knowledge does not significantly influence periodontal status [16], and clinical severity may not be directly associated with educational level alone [17]. These

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inconsistencies suggest that behavioral change is influenced by multiple factors beyond knowledge. Additional determinants, such as general health literacy and public understanding of oral health, also contribute to these outcomes [18].

Furthermore, there is still limited research focusing on elderly populations in community-based settings, particularly in integrated health service posts (Posyandu). Most previous studies have been conducted in clinical or hospital environments, which may not fully represent real community conditions [19]. In addition, local evidence in Indonesia remains limited, particularly studies that combine knowledge assessment and clinical periodontal examination [20]. Behavioral factors such as smoking habits and lifestyle also continue to influence periodontal health outcomes [21]. Moreover, the impact of periodontal disease on quality of life further emphasizes the need for comprehensive approaches in elderly care [22].

Therefore, this study aims to analyze the relationship between elderly knowledge of oral health and the incidence of periodontitis in a community-based setting, specifically at the Kemuning Integrated Health Post, Rejosopinggir Village, Jombang Regency.

This study provides several contributions. First, it presents empirical data on oral health knowledge and periodontal status among the elderly in a local Indonesian context. Second, it evaluates the relationship between knowledge and periodontitis using standardized clinical measurements. Third, it contributes to a broader understanding of non-clinical determinants influencing periodontal health, which can support the development of more effective oral health promotion strategies.

The remainder of this article is structured as follows. Section II describes the research methodology. Section III presents the results. Section IV discusses the findings in relation to previous studies. Finally, Section V concludes the study and provides recommendations for future research.

II. METHODS

A. STUDY DESIGN

This study employed an analytic observational design using a cross-sectional approach. The cross-sectional method was selected to assess the relationship between oral health knowledge and the incidence of periodontitis at a single point in time without intervention [23]. This design is widely used in epidemiological studies to identify associations between variables and to describe the prevalence of health conditions in a defined population [24]. The study was non-experimental in nature, as no treatment or manipulation was applied to the participants.

B. STUDY SETTING AND POPULATION

The research was conducted at the Kemuning Integrated Health Service Post (Posyandu), located in Rejosopinggir Village, Jombang Regency, East Java, Indonesia. The study population consisted of all elderly individuals registered at the Posyandu. The target population included individuals aged 60 years and above, consistent with the definition of elderly populations in public health research [25]. The accessible population comprised 32 elderly individuals who met the study criteria. Due to the relatively small population size, all eligible participants were included in the study. A simple random sampling technique was initially considered; however, total sampling was ultimately applied to ensure complete representation of the available population [26].

C. INCLUSION AND EXCLUSION CRITERIA

The inclusion criteria for this study were: (1) individuals aged ≥60 years, (2) registered members of the Kemuning Posyandu, (3) able to communicate effectively, and (4) willing to participate by providing informed consent. Exclusion criteria included: (1) individuals with severe cognitive or communication impairments, (2) those who were uncooperative during data collection, and (3) individuals who were absent during the examination period. These criteria were established to ensure the validity and reliability of both questionnaire responses and clinical assessments [27].

D. VARIABLES AND OPERATIONAL DEFINITIONS

The independent variable in this study was the level of oral health knowledge among the elderly, while the dependent variable was the incidence and severity of periodontitis. Oral health knowledge was defined as the respondents' understanding of dental and periodontal health, including causes, symptoms, prevention, and treatment. Periodontitis was defined as the presence of inflammation and destruction of periodontal tissues, measured clinically using a standardized index. Knowledge levels were categorized into three groups based on questionnaire scores: good (76–100%), fair (56–75%), and poor (≤55%). Periodontal status was assessed using the Russell Periodontal Index (PI), which classifies periodontal conditions into healthy, mild, moderate, severe, and very severe categories based on clinical findings [28].

E. DATA COLLECTION PROCEDURES

Data collection was conducted in two stages: questionnaire administration and clinical examination. First, respondents completed a structured questionnaire designed to assess their knowledge of oral and dental health. The questionnaire consisted of multiple-choice items covering key aspects of periodontal disease, including symptoms, risk factors, and preventive practices. The instrument had been reviewed for content validity prior to use. Second, clinical examinations were performed to assess periodontal status using the Russell Periodontal Index. The examination was conducted by trained personnel using standard dental instruments under appropriate lighting conditions. Each participant's periodontal condition was recorded based on established scoring criteria, ensuring consistency and reproducibility of measurements [29].

F. DATA ANALYSIS

Data were analyzed using statistical software. Descriptive analysis was conducted to summarize respondent characteristics, knowledge levels, and periodontal status using frequencies and percentages. Inferential analysis was performed using the chi-square test to evaluate the relationship between oral health knowledge and the incidence of periodontitis. A significance level of 0.05 was

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used to determine statistical significance. If the p-value was less than 0.05, the alternative hypothesis (H1) was accepted, indicating a significant relationship between variables. Conversely, if the p-value was greater than 0.05, the null hypothesis (H0) was accepted, indicating no significant relationship [30].

G. ETHICAL CONSIDERATIONS

This study was conducted in accordance with ethical standards for human research. Ethical approval was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Surabaya (No. EA/3738/KEPK-Poltekkes_Sby/V/2025). All participants were informed about the purpose, procedures, and potential risks of the study prior to participation. Written informed consent was obtained from each respondent. Confidentiality and anonymity of participant data were strictly maintained throughout the study process.

III. RESULT

The results of the study are shown in the table from the answers to the questionnaire of 32 elderly people in Posyandu Kemuning, Rejosopinggir village, Jombang district to see the relationship between elderly knowledge about oral health with periodontitis.

TABLE 1
Respondent Characteristics

Elderly Age	Frequency (n)	Percentage (%)
60 - 65	15	46,9
66 - 70	13	40,7
71 - 75	1	3,1
76 - 80	2	6,2
80 - 85	1	3,1
Total	32	100
Education	**Frequency (n)**	**Percentage (%)**
ELEMENTARY SCHOOL	27	84,4
JUNIOR HIGH SCHOOL	0	0
HIGH SCHOOL	0	0
College	0	0
Not in school	5	15,6
Total	32	100

According to the data in TABLE 1, it is known that the majority of the elderly in this study were at the age of 60-65 years as many as 15 elderly people (46.9%). While the education of the elderly is mostly elementary school graduates (SD) as many as 27 elderly people (84.4%). In TABLE 2, it is known that the majority of respondents' answers regarding oral health and periodontitis are in the poor category, as many as 25 elderly people (78.11%), while in the good category there are none (0%).

TABLE 3 shows that the clinical state of periodontal tissue in the elderly at the Kemuning Elderly Posyandu in Rejosopinggir village, Jombang district is in the severe category of 22 elderly (68.7%), while the healthy and mild categories are 1 elderly (3.1%). The average Russell Periodontal Index score was **3.55**. This shows that in general, the periodontal condition of the elderly in the Posyandu is in the severe category.

Based on TABLE 4, the Asimp.Sig (2-sided) value is 0.396 (>0.05), so H1 is rejected and H0 is accepted. This means that there is no relationship between the elderly's knowledge about oral health and the incidence of periodontitis at the Kemuning Elderly Posyandu, Rejosopinggir Village, Jombang Regency.

TABLE 2
Frequency Distribution of Respondents' Knowledge About Dental and Oral Health with Periodontitis at the Kemuning Elderly Posyandu, Rejosopinggir Village, Jombang Regency in 2024

Level of Knowledge oral and dental health	Number (n)	Percentage (%)
Good (76-100%)	0	0
Fair (56-75%)	7	21,9
Less (≤ 55%)	25	78,1
Total	100	100

TABLE 3
Frequency Distribution of *Individual Russel Periodontal Index* Assessment in the Elderly at the Kemuning Elderly Posyandu, Rejosopinggit Village, Jombang Regency, 2024

Clinical Condition	Number (n)	Percentage (%)	*Russell Periodontal Index* Score
Healthy	1	3,1	0 - 0,2
Mild	1	3,1	0.3 - 0,9
Moderate	3	9,4	1,0 - 1,9
Severe	22	68,7	2,0 - 4,9
Very severe	5	15,7	5,0 - 8,0
Total	32	100	

TABLE 4
Results of *Chi-Square* Test Analysis of the Relationship between Elderly Knowledge About Dental and Oral Health With Periodontitis at the Kemuning Elderly Posyandu, Rejosopinggir Village, Jombang Regency in 2024

Elderly Knowledge	Healthy Tissue	Gingivitis Mild	Gingivitis Moderate	Gingivitis Severe	Severe Periodontitis	Total	*P value*
Good	0	0	0	0	0	0	0,396
Fair	0	0	0	7	0	7	
Less	1	1	3	15	5	25	
Total	1	1	3	22	5	32	

IV. DISCUSSION

A. Elderly Knowledge of Oral Health

The findings of this study indicate that the majority of elderly participants possessed a low level of knowledge regarding oral and dental health, particularly in relation to periodontal disease. This result suggests that awareness of the causes, symptoms, and prevention of periodontitis remains inadequate among the study population. A considerable proportion of respondents demonstrated misconceptions, especially regarding early signs such as gingival bleeding and changes in gum condition, which are often perceived as normal aspects of aging rather than indicators of disease.

From an interpretative perspective, this limited knowledge may be influenced by the low educational background of the respondents, as most participants had only completed primary education. Educational attainment has been consistently associated with health literacy and the ability to understand health-related information [31]. Individuals with limited formal education may experience difficulties in comprehending preventive health messages, thereby affecting their capacity to adopt appropriate oral hygiene practices.

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These findings are consistent with previous studies reporting that elderly populations often exhibit inadequate knowledge of oral health, which can contribute to poor oral hygiene behavior [32]. Similarly, research by Rahmawati et al. [33] demonstrated that a lack of knowledge is strongly associated with misconceptions about periodontal disease, leading to delayed treatment-seeking behavior. However, some studies suggest that knowledge alone does not always translate into improved oral health practices, as behavioral change is influenced by additional factors such as motivation, accessibility, and cultural beliefs [34].

The implications of these findings highlight the need for targeted health education interventions that are adapted to the cognitive and educational levels of the elderly. Educational programs should emphasize practical and easily understandable approaches, such as demonstrations of proper tooth brushing techniques and routine dental care practices. Moreover, integrating oral health promotion into community-based programs such as Posyandu may enhance knowledge dissemination and improve awareness among elderly populations.

B. Periodontal Status of the Elderly

The clinical examination results revealed that most respondents were categorized as having severe periodontal conditions, with a high average score on the Russell Periodontal Index. This finding indicates a substantial burden of periodontal disease among the elderly population studied. The high prevalence of severe periodontitis suggests that the disease has progressed over a prolonged period without adequate preventive or therapeutic intervention.

Several contributing factors may explain this condition. First, poor oral hygiene practices, including infrequent tooth brushing and improper brushing techniques, can lead to plaque accumulation and subsequent periodontal inflammation. Second, lifestyle factors such as smoking have been identified as significant risk factors for periodontal disease progression, as they impair immune response and reduce blood flow to gingival tissues [35]. Third, systemic conditions such as diabetes mellitus may exacerbate periodontal destruction by altering inflammatory responses and tissue healing processes [36].

These results are in agreement with previous studies indicating that periodontal disease is highly prevalent among elderly individuals, particularly those with limited access to dental care and poor health behaviors [37]. Additionally, the findings support the concept that periodontal disease is multifactorial in nature, involving interactions between biological, behavioral, and environmental determinants.

However, this study also reveals that only a small proportion of respondents exhibited healthy or mild periodontal conditions, suggesting that preventive measures are not being effectively implemented. This highlights a critical gap in oral healthcare services, particularly in community-based settings. The limited availability of dental services and the lack of routine dental check-ups every six months may contribute to the progression of periodontal disease.

From a practical standpoint, these findings emphasize the importance of early detection and preventive care in reducing the severity of periodontal disease. Community health programs should prioritize regular oral health screenings and promote access to affordable dental services. In addition, collaboration between healthcare providers and community organizations is essential to improve oral health outcomes among the elderly.

C. Relationship Between Knowledge and Periodontitis

The statistical analysis in this study demonstrated that there was no significant relationship between the level of oral health knowledge and the incidence of periodontitis among the elderly participants. This finding suggests that knowledge alone may not be a sufficient determinant of periodontal health status. Although knowledge is an important component of health behavior, it does not necessarily lead to behavioral change or improved clinical outcomes.

This result is consistent with several previous studies that have reported no significant association between knowledge and periodontal disease [34], [38]. These studies argue that other factors, such as habitual behavior, socioeconomic status, and access to healthcare, play a more dominant role in determining oral health outcomes. For instance, individuals with adequate knowledge may still fail to practice proper oral hygiene due to lack of motivation, financial constraints, or limited access to dental services.

Conversely, some studies have found a positive relationship between knowledge and periodontal health, suggesting that individuals with higher knowledge levels are more likely to engage in preventive behaviors [32]. The discrepancy between these findings may be attributed to differences in study populations, research settings, and measurement methods. In community-based settings such as Posyandu, external factors such as limited healthcare infrastructure and social support may weaken the influence of knowledge on health outcomes.

This study has several limitations that should be considered when interpreting the results. First, the cross-sectional design limits the ability to establish causal relationships between variables. Second, the relatively small sample size may reduce the generalizability of the findings. Third, potential confounding variables, such as income level, dietary habits, and frequency of dental visits, were not fully controlled. These limitations suggest the need for further research using larger sample sizes and longitudinal designs to better understand the determinants of periodontal disease.

Despite these limitations, the findings of this study provide important implications for public health practice. Interventions aimed at improving oral health among the elderly should adopt a comprehensive approach that goes beyond knowledge enhancement. Programs should address behavioral change, improve access to healthcare services, and consider socioeconomic factors. In addition, integrating oral health education into existing community health programs may enhance the effectiveness of interventions and promote sustainable improvements in oral health outcomes.

V. CONCLUSION

This study aimed to analyze the relationship between elderly knowledge of oral health and the incidence of periodontitis in a community-based setting at the Kemuning Integrated Health Service Post, Rejosopinggir Village, Jombang

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Regency. The findings revealed that the majority of participants demonstrated a low level of oral health knowledge, with 78.1% categorized as having poor knowledge and none achieving a good knowledge level. In terms of clinical outcomes, periodontal examination using the Russell Periodontal Index indicated that most respondents were in the severe category, with 68.7% classified as severe and 15.7% as very severe, resulting in an average index score of 3.55. These results highlight a substantial burden of periodontal disease among the elderly population studied. However, statistical analysis using the chi-square test showed no significant relationship between oral health knowledge and the incidence of periodontitis ($p = 0.396 > 0.05$), indicating that knowledge alone does not significantly influence periodontal health status. This suggests that other contributing factors, such as oral hygiene behavior, access to dental care, lifestyle habits, and systemic health conditions, may play a more dominant role in determining periodontal outcomes. Based on these findings, future research is recommended to adopt longitudinal or experimental designs with larger sample sizes to better explore causal relationships and control for potential confounding variables. Additionally, further studies should incorporate broader determinants, including socioeconomic status, behavioral patterns, and healthcare accessibility, to provide a more comprehensive understanding of periodontal disease among the elderly. From a practical perspective, the development of integrated and community-based oral health interventions that combine education, behavioral modification, and improved access to dental services is essential to effectively reduce the prevalence and severity of periodontitis in aging populations.

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DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request. Due to ethical and privacy considerations, participant data are not publicly available.

AUTHOR CONTRIBUTION

All authors contributed significantly to this research. Conceptualization and study design were performed by the first and second authors. Data collection and analysis were conducted by the first author. The second and third authors contributed to data interpretation and manuscript review. All authors read and approved the final manuscript.

DECLARATIONS

ETHICAL APPROVAL

This study has obtained ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Surabaya (No. EA/3738/KEPK-Poltekkes_Sby/V/2025). Informed consent was obtained from all participants prior to data collection.

CONSENT FOR PUBLICATION PARTICIPANTS

Not applicable.

COMPETING INTERESTS

The authors declare that they have no competing interests related to this study.

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