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Knowledge, Attitudes Toward Dental Health and The Impact on Number of Funtional Teeth: A Cross-Sectional Study

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ABSTRACT The presence of at least 20 functional teeth in older adults is essential to maintain optimal mastication, phonetics, and aesthetic functions. However, tooth loss remains prevalent among the elderly, often resulting from insufficient knowledge and negative attitudes toward oral health maintenance. This study aims to investigate the relationship between knowledge and attitudes toward dental health and the number of functional teeth among elderly individuals at the Melati VI Integrated Service Post in Karanglo Village, Mojowarno District, Jombang Regency. A cross-sectional analytic design was employed, involving 52 elderly participants selected through purposive sampling. Data collection instruments included a validated questionnaire to assess knowledge and attitudes and a dental examination sheet to quantify the number of functional teeth. Data analysis utilized the chi-square test to determine the significance of associations. Findings revealed that 82.7% of respondents had poor knowledge of dental health, and 73% demonstrated moderate attitudes. Furthermore, 67.3% of participants had fewer than 20 functional teeth. Statistical analysis showed no significant correlation between knowledge and the number of functional teeth ($p = 0.193$), whereas a significant relationship was found between attitudes and the number of functional teeth ($p = 0.001$). These results suggest that while knowledge alone may not influence the preservation of functional teeth, attitudes play a crucial role in maintaining oral health in elderly populations. Interventions should focus not only on knowledge dissemination but also on fostering positive attitudes and behaviors toward routine dental care. Further research with larger sample sizes and additional behavioral variables is recommended to better understand the determinants of oral health outcomes in the elderly.

INDEX TERMS Dental health knowledge, Attitude, Functional teeth, Elderly, Oral health behavior

I. INTRODUCTION

Older adults are a demographic group that is particularly susceptible to oral health issues, including tooth loss, due to the cumulative effects of dental disease and systemic conditions. According to the Ministry of Health of the Republic of Indonesia, individuals aged 60 years and older are classified as elderly [1]. To maintain optimal oral function, elderly individuals are expected to retain at least 20 functioning teeth [2], [3]. Functional dentition plays a critical role in chewing, speaking, and maintaining facial aesthetics [4], [5]. However, global estimates show that edentulism affects 22.7% of people over 60, with over 350 million cases worldwide [6]. In Indonesia, the prevalence of total tooth loss among the elderly reaches 30.6% [7].

The primary causes of tooth loss in this population are dental caries and periodontal disease, both of which are largely preventable with timely and proper oral care [8]–[10]. Poor oral hygiene, exacerbated by limited access to dental services and a lack of awareness, contributes to disease progression. As a result, many older individuals experience impaired chewing ability, changes in dietary habits, speech difficulties, and reduced quality of life [11]–[13]. Tooth loss may also lead to temporomandibular joint disorders and facial structure changes due to alveolar bone resorption [14], [15].

Efforts to preserve oral function in older adults have focused on dental prostheses and community-based oral health promotion programs. However, many such initiatives lack sustainable impact due to poor health literacy and negative attitudes toward dental care [16]–[18]. Studies indicate that individual behavior is strongly influenced by knowledge and attitudes, which shape the motivation to maintain oral hygiene and seek dental treatment [19], [20].

Several recent studies suggest a correlation between attitudes and oral health behaviors, whereas the influence of knowledge alone appears inconsistent [21], [22]. For instance, a study by Wong [23] in Hong Kong showed that while elderly individuals may be aware of oral hygiene practices, they often lack the conviction or habit to perform them regularly. This highlights a research gap: while knowledge and attitude have been measured separately, their combined influence on the number of functional teeth in older adults is underexplored, particularly in rural Indonesian settings.

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In a preliminary survey conducted at the Melati VI Integrated Service Post in Karanglo Village, 80% of 10 elderly respondents had fewer than 20 functional teeth, despite showing awareness of basic oral hygiene. This prompted the need to investigate the underlying behavioral determinants that may contribute to functional tooth retention. This study aims to examine the relationship between knowledge and attitudes regarding dental health and their impact on the number of functional teeth among the elderly. The key contributions of this study are:

1. To provide empirical data on the association between knowledge, attitude, and oral function in a rural elderly population.
2. To identify whether attitudes have a stronger correlation with tooth retention than knowledge.
3. To inform future interventions that target both cognitive and behavioral domains for elderly oral health programs.

II. METHODS

This study employed an analytical research design with a cross-sectional approach, aimed at assessing the correlation between knowledge and attitudes about oral health and the number of functional teeth among elderly individuals. A cross-sectional design was chosen due to its effectiveness in identifying relationships between variables measured at a single point in time [29].

A. STUDY DESIGN AND POPULATION

The research was conducted at the Melati VI Integrated Service Post (Posyandu Lansia) in Karanglo Village, Mojowarno District, Jombang Regency. The total population consisted of 60 elderly individuals registered at the Posyandu. A sample size of 52 participants was determined using the Slovin formula with a 5% margin of error. Participants were selected using purposive sampling based on defined inclusion and exclusion criteria.

B. INCLUSION AND EXCLUSION CRITERIA

The inclusion criteria were: (1) elderly individuals aged 60 years and above, (2) physically and mentally capable of participating in the study, and (3) willing to provide written informed consent. Exclusion criteria included any individuals with severe cognitive impairment, speech disorders preventing communication, or those who refused to participate.

C. DATA COLLECTIONS INSTRUMENT

Both the knowledge and attitude questionnaires were pre-tested for validity and reliability. Validity was established using content validation by dental health experts, while internal consistency reliability was measured using Cronbach's alpha ($\alpha > 0.70$) [30]. Three main instruments were used to collect data:

1. Knowledge Questionnaire: This consisted of 20 multiple-choice questions assessing general knowledge about dental health, causes and prevention of tooth loss, oral hygiene practices, and awareness of functional teeth.
2. Attitude Questionnaire: A validated 24-item Likert scale assessed participants' beliefs and attitudes toward oral health, brushing behavior, dental visits, and dietary practices.
3. Clinical Dental Examination Sheet: Used to assess the number of functional teeth per participant. Functional teeth were defined as teeth present and capable of mastication without pain or significant mobility.

D. ETHICAL CONSIDERATIONS

This study received ethical approval from the Health Research Ethics Committee of the Surabaya Health Polytechnic, with approval number No.EA/2429/KEPK-Poltekkes_Sby/V/2024. Prior to data collection, all participants were clearly informed about the research objectives, procedures, potential risks and benefits, as well as their right to refuse or withdraw from the study at any time without any consequences. Informed consent was obtained from all respondents, ensuring their voluntary participation. The confidentiality and anonymity of participant data were strictly maintained throughout the research process.

E. DATA COLLECTION PROCEDURES

Data collection was carried out during scheduled visits at the Posyandu in September 2024. Upon obtaining permission from the facility and providing briefings to Posyandu managers, researchers engaged with the participants individually. Respondents completed the questionnaires with the assistance of trained enumerators when needed. Dental examinations were conducted by certified dental practitioners using disposable gloves, sterilized mirrors, and adequate lighting. The number of functional teeth was documented directly on the examination sheet. All participants were treated respectfully and received a small token of appreciation after completing the study procedures.

F. DATA ANALYSIS

All data were entered and processed using SPSS version 26. Descriptive statistics were used to summarize demographic variables, knowledge scores, attitude scores, and the number of functional teeth. The results were presented in frequency distributions and percentages. To determine associations between independent variables (knowledge and attitudes) and the dependent variable (number of functional teeth), a Chi-square test was used, with a significance threshold of $\rho < 0.05$. The following hypotheses were tested:

1. H0: There is no relationship between knowledge or attitude regarding dental health and the number of functional teeth.
2. H1: There is a significant relationship between knowledge or attitude regarding dental health and the number of functional teeth.

III. RESULTS

Based on the results of research on 52 elderly respondents who met the inclusion criteria with the following characteristics: According to TABLE 1, the age distribution of the elderly population at the Melati VI integrated service post, Karanglo Village, Jombang is mostly in the range of 60-69 years, consisting of 32 people (61.5%). Most of the elderly are women, accounting for 39 people (75%). In addition, the educational attainment of the elderly population is especially

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at the primary school level, with 34 people (65%) having completed this level of education. The prevalence of dental problems in this elderly population can be affected by their age and educational background. Given that most individuals are between the ages of 60-69 and have only an elementary school education, there may be a need for a customized dental health education program. Additionally, a higher proportion of women in this group may indicate potential gender differences

TABLE 1
Distribution of Age, Gender and last educational status of Elderly at Melati VI Integrated Service Post, Karanglo Village, Jombang in 2024

		Frequency (n)	Percentage (%)
Gender			
	Woman	39	75
	Man	13	25
Age			
	60-69	32	61,5
	70-79	17	32,7
	80-89	2	3,9
	>90	1	1,9
Last Education			
	Elementary School	34	65
	Junior High School	2	4
	Senior Hight School	7	13
	Associate Degree/Bachelor	3	6

TABLE 2
Frequency Distribution of Dental and Oral Health Knowledge Levels for the Elderly at Melati VI Integrated Service Post, Karanglo Village, Jombang 2024

Level of Dental and Oral Health Knowledge	Frequency (n)	Percentage (%)
Good	0	0
Enough	9	17,3
Poor	43	82,7
Total	52	100

TABLE 3
Frequency Distribution of Dental and Oral Health Attitude Levels for the Elderly at Melati VI Integrated Service Post, Karanglo Village, Jombang 2024

Level of Dental and Oral Attitude Knowledge	Frequency (n)	Percentage (%)
High	4	8
Medium	38	73
Low	10	19
Total	52	100

in oral health care access or habits, which require further investigation.

Based on TABLE 2 obtained from the analysis of the results of filling out the questionnaire, it shows that the level of knowledge of dental and oral health of the elderly at Melati VI Integrated Service Post, Karanglo Village, Jombang in 2024 tends to be in the poor category, with a total of 43 elderly (82.7%).

Based on TABLE 3 obtained from the analysis of the results of filling out the questionnaire, it shows that the level of oral health attitudes of the elderly at Melati VI Integrated Service Post, Karanglo Village, Jombang in 2024 tends to be in the medium category, with a total of 38 elderly (73%). TABLE 4, derived from the analysis of the examination results regarding the number of functioning teeth, indicates that the elderly population at the Melati VI Integrated Service Post in Karanglo Village, Jombang, predominantly exhibits fewer than 20 functioning teeth, with 35 elderly individuals (32.7%) falling into this category. The prevalence of fewer than 20 functioning teeth is most pronounced among women aged 60-69 years, comprising 13 elderly individuals (37.1%).) This significant prevalence of elderly individuals with fewer than 20 functioning teeth highlights a critical oral health issue within the community. The disproportionate impact on women aged 60-69 years suggests a potential need for targeted interventions and dental health programs for this demographic. These findings underscore the importance of comprehensive geriatric dental care and preventive measures

TABLE 4
Distribution of the Number of Functioning Teeth by Age and Gender in the Elderly at Melati VI Integrated Service Post, Karanglo Village, Jombang 2024

Age	< 20 Functioning teeth		> 20 Functioning teeth	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Woman				
60-69 Years	13	37,1	13	76
70-79 Years	9	25,7	1	6
80-89 Years	1	3	1	6
≥ 90 Years	0	0	1	6
Man				
60-69 Years	5	14,2	1	6
70-79 Years	7	20	0	0
80-89 Years	0	0	0	0
≥ 90 Years	0	0	0	0
Total	35	100	17	100

TABLE 5
The Relationship Between Knowledge About Dental and Oral Health with the Number of Functioning Teeth at Melati VI Integrated Service Post, Karanglo Village, Jombang 2024

Level of Dental and Oral Health Knowledge	< 20 Functioning teeth		> 20 Functioning teeth		Sig.
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
Good	0	0	0	0	0.193
Enough	5	14,3	4	23,5	
Poor	30	85,7	13	76,5	
Total	35	100	17	100	

TABLE 6
The Relationship Between Attitudes About Dental and Oral Health with the Number of Functioning Teeth at Melati VI Integrated Service Post, Karanglo Village, Jombang 2024

Level of Dental and Oral Health Attitude	< 20 Functioning teeth		> 20 Functioning teeth		Sig.
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
High	0	0	4	23,5	0.001
Medium	32	91,4	7	41,2	
Low	3	8,6	6	35,3	
Total	35	100	17	100	

to maintain oral function and overall quality of life among the elderly population in Karanglo Village.

Based on TABLE 5 obtained from the chi-square test analysis, it is found that there is no significant relationship between oral health knowledge and the number of functioning teeth in the elderly at the Melati VI Integrated Service Post, Karanglo Village, Jombang in 2024, with the significance

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value of ρ value between the two variables is ρ = 0.193 (ρ > 0.05).

Based on TABLE 6 obtained from the chi-square test analysis, it is found that there is a significant relationship between oral health attitudes and the number of functioning teeth in the elderly at Posyandu Melati VI, Karanglo Village, Jombang in 2024, with the significance value of ρ value between the two variables is ρ = 0.001 (ρ < 0.05).

IV. DISCUSSION

A. KNOWLEDGE OF DENTAL AND ORAL HEALTH AMONG THE ELDERLY

The findings of this study reveal that the majority of elderly individuals at the Melati VI Integrated Service Post in Karanglo Village demonstrated low levels of knowledge regarding oral health. Specifically, 82.7% of participants were categorized as having poor knowledge. This was evident from the questionnaire responses, where many elderly respondents were unable to identify the causes and consequences of tooth loss, nor understand appropriate treatment strategies. For instance, misconceptions such as treating cavities solely with analgesics were common. This aligns with previous findings by Ramadhan et al. [36], who noted that pain management often replaces proper dental care among older adults due to accessibility or financial constraints. Furthermore, the study identified a knowledge gap regarding the use of adjunctive oral hygiene tools such as dental floss and mouthwash. Most elderly participants considered brushing teeth alone to be sufficient, indicating a lack of comprehensive awareness. These results support earlier research by Febrianti et al. [37], which emphasized that elderly populations often lack knowledge about preventative measures beyond basic toothbrushing.

Another concerning outcome was the infrequent use of dental services among participants, which correlates with poor oral health literacy. Most respondents only sought dental care during acute episodes of pain, rather than for routine preventive purposes. This behavior is in line with research by Wong [38], who found that older adults often delay dental visits unless experiencing significant discomfort. Such practices may reflect both knowledge deficiencies and limited access to affordable dental care. The lack of health education programs targeting older adults at the Posyandu contributes to this low knowledge level. As proposed by Mahirawatie et al. [39], structured educational interventions using visual or video media can effectively improve understanding of dental disease and encourage proper oral hygiene behavior in aging populations. In sum, these findings suggest that knowledge alone, although critical, is insufficient if not coupled with continuous education and access to dental care. Improving knowledge must be a priority in geriatric oral health programs, especially in rural communities.

B. ATTITUDES TOWARD DENTAL AND ORAL HEALTH AMONG THE ELDERLY

Attitude is a psychological construct that significantly influences behavior. In this study, the majority of elderly respondents demonstrated moderate attitudes toward dental health. They acknowledged the importance of brushing teeth and limiting sugary foods but lacked awareness of the correct brushing times, particularly brushing before bed. As supported by Nugroho et al. [40], inadequate brushing practices, especially at night, increase plaque formation due to reduced salivary flow during sleep. Additionally, only a minority of participants knew about or used dental floss, reflecting a gap between attitudes and behaviors. Similar patterns were reported by Chisnoiu et al. [41], where rural residents showed moderate oral health attitudes but minimal floss usage due to unawareness of its benefits. The reliance on toothbrushes alone may limit the effectiveness of oral hygiene practices, contributing to plaque retention and subsequent periodontal disease.

Another indicator of limited attitude-based behavioral change is the low rate of preventive dental visits. Most elderly participants were reluctant to undergo routine check-ups, citing the absence of symptoms as a reason. This was contrary to findings by Nzabonimana et al. [42], who reported that adults who recognized the importance of regular dental visits had significantly better oral hygiene outcomes. Preventive visits can aid in early detection and treatment of caries and periodontal issues, thereby preserving functional teeth. The present findings indicate that while some elderly individuals show concern for oral health, their practices do not always reflect this. This discrepancy may stem from misconceptions, cultural norms, or fear of dental procedures. Nora et al. [43] noted that elderly individuals with negative past dental experiences or lack of trust in care providers often avoid professional treatment. Overall, the results emphasize the need for health promotion strategies that go beyond imparting knowledge and target attitudinal change. Dental education should incorporate behavior change models and community engagement to foster positive oral health practices among older adults.

C. NUMBER OF FUNCTIONING TEETH AND ITS CORRELATION WITH KNOWLEDGE AND ATTITUDES

The clinical data obtained in this study demonstrated that 67.3% of elderly participants had fewer than 20 functional teeth. This is consistent with previous national data indicating that approximately 30.6% of Indonesian elderly experience significant tooth loss [5]. Loss of functional teeth is commonly attributed to untreated caries and periodontal disease conditions often linked to behavioral and educational factors. This study did not find a statistically significant relationship between knowledge of oral health and the number of functional teeth (p = 0.193). This supports the findings of Rosa et al. [44], who also concluded that knowledge alone does not guarantee better oral outcomes among the elderly. Conversely, some individuals with poor knowledge retained a high number of functional teeth, possibly due to favorable genetic factors, access to early dental care, or habitual practices developed in younger years. Furthermore, other studies, such as that by Sijabat et al. [45], contradict this finding by asserting a strong link between knowledge and oral hygiene, suggesting that contextual factors play a role in moderating the impact of knowledge.

In contrast, this study revealed a significant relationship between attitude and the number of functional teeth (p = 0.001). Elderly individuals with positive attitudes toward oral care were more likely to maintain more than 20 functioning

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teeth. This is consistent with the work of Nora et al. [43] and Aulia et al. [46], who found that attitude is a strong predictor of oral hygiene practices, including regular brushing, dietary control, and dental visits. These results imply that behavior-oriented programs focusing on attitude transformation may be more effective than knowledge-based interventions alone. Although knowledge provides the cognitive basis for understanding, attitude dictates action and habit formation, which are essential for long-term oral health maintenance.

D. LIMITATIONS AND IMPLICATIONS

One limitation of this study is the relatively small sample size (n = 52), which may limit generalizability. Additionally, the use of self-reported questionnaires may introduce bias, as participants may overestimate their knowledge or provide socially desirable responses regarding their attitudes. Future research should incorporate objective measures such as clinical indices and behavioral observations to validate self-reported data. Moreover, this study focused solely on knowledge and attitude variables. Other potential predictors, such as socioeconomic status, access to dental services, dietary patterns, and comorbidities, were not evaluated. Including these variables in future models may offer a more comprehensive understanding of factors influencing functional dentition in older adults.

Despite these limitations, the findings provide valuable insights for public health policy and clinical practice. Dental health promotion strategies should prioritize attitude change through targeted education, peer influence, and reinforcement models. Community-based outreach programs can serve as platforms for delivering these interventions, especially in underserved areas. The results also support integrating routine dental check-ups into primary care services for the elderly. Policies encouraging periodic screening and subsidized dental treatments can help address disparities in oral health outcomes. Additionally, training community health workers to deliver culturally sensitive oral health education may enhance program effectiveness.

V. CONCLUSSION

This study aimed to analyze the relationship between knowledge and attitudes regarding dental and oral health and their impact on the number of functional teeth in the elderly population at Posyandu Melati VI, Karanglo Village, Mojowarno District, Jombang Regency in 2024. The findings demonstrated that 82.7% of the elderly had poor knowledge of oral health, and 73% exhibited moderate attitudes toward dental care. Furthermore, 67.3% of respondents had fewer than 20 functional teeth. Statistical analysis using the Chi-square test revealed that knowledge level was not significantly associated with the number of functional teeth ($\rho = 0.193$), while attitude showed a significant positive correlation ($\rho = 0.001$). These results highlight that although knowledge forms the foundation for awareness, it does not directly translate into improved oral health outcomes without corresponding behavioral changes. On the other hand, a positive attitude appears to influence habits such as regular brushing and seeking dental care, which contributes to better preservation of functional teeth. This indicates the need for public health initiatives that not only educate but also foster behaviorally oriented interventions tailored to the elderly. Community-based dental health programs should emphasize behavior change communication strategies, promoting proper oral hygiene practices such as brushing teeth at least twice a day (after breakfast and before bedtime), limiting the intake of sugary and sticky foods, and attending biannual dental check-ups. These practices are vital for maintaining at least 20 functional teeth, thereby supporting essential oral functions like chewing, speaking, and facial aesthetics. Future research should involve larger and more diverse populations and explore other behavioral and systemic factors such as socioeconomic status, access to dental services, and systemic diseases that may influence tooth retention in older adults. Furthermore, a longitudinal design is recommended to assess causality and behavioral changes over time. Expanding the research framework to include interventional studies would also help validate strategies for improving oral health outcomes in aging populations.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Tharienna Zalfa Haidee was responsible for conceptualizing the study, conducting the literature review, and collecting the data. Imam Sarwo Edi supervised the research process, contributed to the methodological design, and guided the data analysis. Agus Marjianto contributed to the interpretation of results, critical revision of the manuscript, and final approval for publication. All authors contributed to writing and reviewing the manuscript and agreed to be accountable for all aspects of the work.

DECLARATIONS

ETHICAL APPROVAL

This study was approved by the Health Research Ethics Committee of the Surabaya Health Polytechnic (No.EA/2429/KEPK-Poltekkes_Sby/V/2024). Written informed consent was obtained from all participants.

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants

COMPETING INTERESTS

The authors declare no competing interests.

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