Older Adults with Better Oral Health Knowledge Tend to Experience Minimal Tooth Loss

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ABSTRACT
Tooth loss in the elderly is an oral health problem that can affect chewing function, speech ability, nutritional status, aesthetics, and quality of life. Low knowledge regarding oral health maintenance is thought to contribute to the high rate of tooth loss in the elderly. This study aims to analyze the relationship between oral health knowledge and the number of tooth losses in the elderly at the ILP Gading Integrated Health Post (*Posyandu*), Kendung Village, Kedungadem District. The study used an observational analytical design with a cross-sectional approach. The sample consisted of 45 elderly people selected using a purposive sampling technique. Knowledge data were collected through a questionnaire, while the number of tooth losses was obtained through a clinical examination using an odontogram. Data analysis was performed using the Fisher's Exact Test at a significance level of 5%. The results showed that the majority of respondents had a low level of oral health knowledge (62%) and experienced high tooth loss (82%). The Fisher's Exact Test showed a relationship between oral health knowledge and the number of tooth losses ($p = 0.001$). It was concluded that elderly people with lower oral health knowledge tended to have higher tooth losses. These findings demonstrate the importance of strengthening oral health education and promotion to increase knowledge and support the prevention of tooth loss in the elderly.
Keywords: knowledge; oral health; elderly; tooth loss

INTRODUCTION
Tooth loss is one of the most common oral health problems experienced by older adults and is known to affect mastication, speech ability, facial aesthetics, nutritional status, and overall quality of life. According to the 2018 Basic Health Research (*Riskesdas*), the prevalence of tooth loss increases markedly with age, reaching 30.6% among individuals aged ≥65 years. Preliminary observations at *Posyandu ILP* Gading (Integrated Health Post of Gading), Kendung Village, Kedungadem Subdistrict, further revealed that approximately 80% of older adults had fewer than 20 remaining teeth. Tooth loss in older adults is predominantly caused by untreated periodontal disease and dental caries, both of which progressively impair oral function and contribute to broader systemic health consequences [1–3].

One factor suspected to be associated with the high prevalence of tooth loss is the level of oral health knowledge. Adequate knowledge can shape positive oral health maintenance behaviors, such as proper toothbrushing techniques, maintaining oral hygiene, and utilizing dental health services regularly. Conversely, limited knowledge is often linked to poor oral hygiene practices, which increase the risk of tooth loss among older adults [4]. Based on this premise, the research problem addressed in this study is whether an association exists between oral health knowledge and the extent of tooth loss among older adults at *Posyandu ILP Gading*, Kendung Village, Kedungadem Subdistrict.

Several previous studies have reported associations between oral health knowledge and the quality of life of older adults, or have described oral health knowledge and tooth loss status descriptively [5–7]. However, research specifically analyzing the relationship between oral health knowledge and the number of missing teeth among older adults at the Posyandu level; particularly in Bojonegoro Regency remains limited. This gap highlights the need for further investigation to strengthen the evidence base regarding the role of knowledge as a factor associated with tooth loss in older adults.

Based on the aforementioned considerations, this study aims to analyze the relationship between oral health knowledge and the number of missing teeth among older adults at *Posyandu ILP* Gading, Kendung Village, Kedungadem Subdistrict. The findings are expected to provide scientific contributions that can serve as a foundation for developing oral health education and promotion programs for older adults, as well as inform health workers in designing preventive strategies to reduce tooth loss and improve the quality of life of the elderly population.

METHODS
The study was conducted at Posyandu ILP Gading, located in Kendung Village, Kedungadem Subdistrict, Bojonegoro Regency, during the period of December 2025 to May 2026. This setting represents a community-based health service routinely attended by older adults, making it an appropriate location for assessing oral health conditions and related behavioral determinants among the elderly population. Ethical approval for this study was obtained prior to data collection, and all procedures were carried out in accordance with established research ethics principles. Respondents were provided with detailed information regarding the purpose, procedures, benefits, and confidentiality of the study before signing the informed consent form. Participation was voluntary, and respondents were informed that they could withdraw at any time without any negative consequences.

This research employed a quantitative approach using an observational analytic method with a cross-sectional design. The cross-sectional framework enabled the researchers to examine the relationship between oral health knowledge and the extent of tooth loss at a single point in time, without manipulating variables or intervening in the natural conditions of the respondents.

The study population consisted of 50 older adults aged 60–70 years who were registered and actively participating in Posyandu ILP Gading activities. A total of 45 respondents were selected as the study sample using purposive sampling. This non-probability sampling technique was applied to ensure that participants met the predetermined inclusion criteria, which included older adults who were willing to sign the informed consent form, able to complete the questionnaire, and capable of undergoing oral health examinations. Respondents with acute medical conditions that hindered oral cavity assessment or those with severe communication difficulties without a companion were excluded from the study.

The independent variable in this study was oral health knowledge among older adults, while the dependent variable was the number of missing teeth. Oral health knowledge was measured using a structured questionnaire consisting of systematically arranged items that had undergone validity and reliability testing. The number of missing teeth was assessed through clinical examination using an odontogram sheet, allowing for accurate documentation of tooth loss patterns. Data collection was carried out by three trained enumerators who had received prior instruction to ensure uniformity in administering questionnaires and conducting oral examinations.

The collected data were processed through several stages, including editing, coding, scoring, and tabulation. Univariate analysis was performed to describe respondent characteristics and distribution of variables. Bivariate analysis was conducted using Fisher's Exact Test with a significance level of 5% to determine the association between oral health knowledge and the number of missing teeth among older adults. This statistical test was selected due to the categorical nature of the variables and the relatively small sample size.

RESULTS

A total of 45 elderly respondents participated in this study. The analysis focused on describing the distribution of oral health knowledge and the extent of tooth loss, followed by an examination of the relationship between these two variables.

Based on Table 1, the findings showed that the majority of respondents had a low level of oral health knowledge. Specifically, 62% of the elderly demonstrated insufficient understanding of oral hygiene practices, the importance of routine dental care, and the role of oral health in maintaining overall well-being. Meanwhile, 38% of respondents exhibited a higher level of knowledge, indicating awareness of basic oral health maintenance and preventive measures.

Based Table 2, clinical examinations using odontograms revealed that most respondents experienced substantial tooth loss. A total of 82% of the elderly had lost more than 20 teeth, indicating severe impairment of oral function. Only 18% retained a greater number of natural teeth, suggesting better oral health status. The high prevalence of tooth loss reflects long-term exposure to untreated dental caries, periodontal disease, and limited access to preventive dental services.

The relationship between oral health knowledge and the number of missing teeth was analyzed using Fisher's Exact Test at a significance level of 5%. Based on Table 3, the statistical test yielded a p-value of 0.001, indicating a significant association between the two variables. Elderly individuals with lower levels of oral health knowledge were more likely to experience higher tooth loss compared to those with better knowledge.

Table 1. Distribution of oral health knowledge among elderly

Knowledge	Frequency	Percentage
Low	28	62.0
High	17	38.0

Table 2. Distribution of tooth loss among elderly

Tooth loss	Frequency	Percentage
High tooth loss (>20 missing teeth)	37	82.0
Low tooth loss (≤20 missing teeth)	8	18.0

Table 3. Association between oral health knowledge and tooth loss (Fisher's Exact test)

Knowledge	Tooth loss		p-value
	High	Low	
Low	26	2	0.001
High	11	6	
Total	37	8	

These results suggest that inadequate understanding of oral health maintenance contributes to poor oral hygiene practices, delayed treatment-seeking behavior, and increased susceptibility to dental diseases that ultimately lead to tooth loss. Conversely, respondents with higher knowledge tended to retain more natural teeth, reflecting the positive influence of awareness on oral health outcomes.

Overall, the study demonstrates that oral health knowledge plays an important role in determining the extent of tooth loss among the elderly. The significant association found in this research highlights the need for strengthened oral health education and promotion programs, particularly in community-based elderly care settings such as Posyandu. Improving knowledge may support better oral hygiene practices, encourage routine dental visits, and ultimately reduce the burden of tooth loss in older adults.

DISCUSSION

The findings of this study indicate that most older adults at Posyandu ILP Gading possessed low levels of oral health knowledge, while the majority also experienced high levels of tooth loss. This pattern suggests that the respondents' understanding of the causes, prevention strategies, and importance of maintaining oral and dental health remains suboptimal. Limited knowledge may negatively influence oral hygiene behaviors, including toothbrushing practices, maintenance of oral cleanliness, and routine dental check-ups. As a result, dental caries and periodontal disease often remain undetected or untreated at early stages, increasing the likelihood of extensive tooth loss in later life.

These findings support the Antecedent–Behavior–Consequences (ABC) theory proposed by [8], which posits that knowledge functions as an antecedent influencing the formation of health behaviors, while tooth loss represents a consequence of those behaviors. Older adults with better knowledge tend to be more aware of the importance of maintaining oral hygiene, reducing risk factors, and utilizing dental health services regularly. Conversely, limited knowledge may hinder the development of preventive behaviors, thereby increasing the probability of tooth loss.

The results of this study are consistent with findings reported by [5], which demonstrated that oral health knowledge is associated with oral health status and quality of life among older adults. That study emphasized that individuals with higher levels of knowledge tend to exhibit greater awareness and more consistent oral hygiene practices, enabling them to maintain chewing function, communication ability, and social interaction. Similarly, [9] reported that higher knowledge levels were associated with better oral hygiene behaviors and improved oral health outcomes among older adults.

Bivariate analysis revealed a significant association between oral health knowledge and tooth loss among older adults ($p = 0.001$). Respondents with lower knowledge levels were more frequently found in the group with high tooth loss, whereas those with better knowledge tended to have fewer missing teeth. These findings indicate that knowledge plays an important role in maintaining oral health in later life.

Conceptually, adequate knowledge enhances the ability of older adults to recognize early signs of oral disease [10-14], understand the importance of proper toothbrushing techniques, adopt healthier dietary patterns, and seek regular dental examinations. Such behaviors facilitate early detection and management of caries and periodontal disease, thereby preventing tooth loss. In contrast, limited knowledge may lead some older adults to perceive tooth loss as a natural part of aging, resulting in delayed treatment-seeking behavior and increased risk of advanced dental damage.

Nevertheless, tooth loss is a multifactorial condition [15-8]. Knowledge alone does not fully determine oral health outcomes; it interacts with other factors such as age, systemic diseases, smoking habits, dietary patterns, socioeconomic status, and access to dental care. Therefore, although this study identified a significant association between knowledge and tooth loss, effective prevention requires a comprehensive approach that integrates health education, routine dental examinations, and improved access to dental services for older adults.

The findings of this study contribute to the scientific evidence supporting the importance of improving oral health knowledge as part of promotive and preventive strategies to reduce tooth loss among older adults. Practically, the results may serve as a foundation for developing continuous oral health education programs at *Posyandu ILP* Gading, complemented by routine dental examinations and family involvement to support oral hygiene practices among the elderly.

This study has several limitations that should be considered when interpreting the findings. First, the use of purposive sampling and the relatively small sample size may limit the generalizability of the results to broader elderly populations [19-21]. Second, knowledge and behavior were assessed using self-reported questionnaires, which may be subject to recall bias or social desirability bias [22-26]. Third, the cross-sectional design restricts causal inference, as the observed associations cannot establish temporal or cause-and-effect relationships [. Future research should consider employing probability sampling techniques, expanding the study area, and incorporating additional variables such as dietary habits, systemic health conditions, and access to dental care to obtain a more comprehensive understanding of factors influencing tooth loss among older adults.

CONCLUSION

The findings of this study indicate that oral health knowledge is significantly associated with the number of missing teeth among older adults at Posyandu ILP Gading, Kendung Village, Kedungadem Subdistrict. These results confirm the study objective, showing that elderly individuals with lower levels of oral health knowledge tend to experience higher tooth loss. This finding reinforces the role of knowledge as an important factor in shaping oral health maintenance behaviors and supports promotive and preventive efforts aimed at preserving oral health in later life. Practically, the results provide a foundation for health workers to develop continuous oral health education programs at the Posyandu level to strengthen knowledge and encourage better oral hygiene practices among the elderly.

Ethical consideration, competing interest and source of funding

-The ethical approval: This study had obtained ethical approval from the Health Research Ethics Commission of Poltekkes Kemenkes Surabaya, number: EA/2198/KEPK-Poltekkes_sby/II/2023.
-There is no conflict of interest related to this publication.
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REFERENCES

1. Kemenkes RI. Laporan Provinsi Jawa Timur RISKESDAS 2018. Jakarta: Kementerian Kesehatan Republik Indonesia; 2018.
2. Cortellini P, Stalpers G, Mollo A, Tonetti MS. Periodontal regeneration versus extraction and dental implant or prosthetic replacement of teeth severely compromised by attachment loss to the apex: A randomized controlled clinical trial reporting 10-year outcomes, survival analysis and mean cumulative cost of recurrence. Journal of Clinical Periodontology. 2020;47(6):768–776.
3. Fatmasari D, Satuti E, Wiyatini I. Relationship between number and region of tooth loss with the quality of life in the elderly. ODONTO: Dental Journal. 2022;9(1):34–39.
4. Icmiawati R, Edi IS, Ayu IG, Astuti K, Putri N. The relationship between dental and oral health knowledge and the incidence of tooth loss in the elderly. Jurnal Kesehatan. 2025;7(2):146-150.
5. Ahza L, Budiman JA, Asia RA. Hubungan pengetahuan kesehatan gigi dan mulut terhadap kualitas hidup lanjut usia (Kajian pelayanan kesehatan di puskesmas). Jurnal Kedokteran Gigi dan Kesehatan. 2024;2(1):40-47.
6. Febrianti ET, Putri IGAKAN, Marjianto A, Isnanto. Pengetahuan lansia tentang kehilangan gigi di Puskesmas Wisma Indah Bojonegoro. Indonesian Journal of Health and Medical. 2022;2(4):560–568.
7. Sopianah Y, Rahayu C, Kusmana A, Robbihi HI. Buku saku menjaga kesehatan gigi dan mulut pada lansia. Tasikmalaya: Perkumpulan Rumah Cemerlang Indonesia; 2023.
8. Mahendra R, Santoso B, Lestari D. Application of ABC theory in health behavior modification: Oral hygiene in the elderly. Jurnal Ilmu Kesehatan Masyarakat, 2019;13(2):101-110.
9. Sari M, Jannah NF. Gambaran pengetahuan kesehatan gigi mulut, perilaku kesehatan gigi mulut, dan status gigi lansia di Panti Wreda Surakarta. Jurnal Surya Masyarakat. 2021;3(2):86–94.
10. Yu S, Huang S, Song S, Lin J, Liu F. Impact of oral health literacy on oral health behaviors and outcomes among the older adults: A scoping review. BMC Geriatrics. 2024 Oct 22;24(1):858-62.
11. Petersen PE, Yamamoto T. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. Community Dentistry and Oral Epidemiology. 2005 Apr;33(2):81-92.
12. Lopes AB, De Marchi RJ, Fajreldin V, León S, Danke K, Werlinger F, Gamonal J. Factors influencing oral health literacy in older people: A life-course perspective. Gerodontology. 2026 Mar 13;26(1):62-8.
13. Schensul J, Reisine S, Grady J, Li J. Improving oral health in older adults and people with disabilities: Protocol for a community-based clinical trial (Good Oral Health). JMIR Research Protocols. 2019 Dec 18;8(12):e14555.
14. Kwon SR, Lee S, Oyoyo U, Wiafe S, De Guia S, Pedersen C, Martinez K, Rivas J, Chavez D, Rogers T. Oral health knowledge and oral health related quality of life of older adults. Clinical and Experimental Dental Research. 2021 Apr;7(2):211-8.
15. Song S, Xie W, Huang S, He J, Chen L, Liu F. Examining the link between tooth loss and multiple health outcomes: a comprehensive synthesis of evidence from meta-analyses. Frontiers in Public Health. 2026 Aug 12;14:1857651.
16. Cimões R, Pinho RC, Gurgel BC, Borges SB, MARCANTONIO E, Marcantonio CC, Melo MA, Piattelli A, Shibli JA. Impact of tooth loss due to periodontal disease on the prognosis of rehabilitation. Brazilian Oral Research. 2021 Sep 24;35(Supp 2):e101.
17. Silva Junior MF, Batista MJ, de Sousa MD. Risk factors for tooth loss in adults: A population-based prospective cohort study. PLoS One. 2019 Jul 22;14(7):e0219240.
18. Tenani CF, Silva Junior MF, Lino CM, Sousa MD, Batista MJ. The role of health literacy as a factor associated with tooth loss. Revista de Saude Publica. 2021 Dec 17;55:116.
19. Nugroho HSW. Cangkir Santi-65: Homogenitas dalam sampling [Internet]. Facebook. 2025 Nov 27 [cited 2026 Jan 3]. Available from: https://www.facebook.com/photo?fbid=1958206021407201&set=a.116364538924701

20. Andrade C. The inconvenient truth about convenience and purposive samples. Indian Journal of Psychological Medicine. 2021 Jan;43(1):86-8.
21. Nugroho HSW. Cangkir Santi-53: Statistik dan parameter [Internet]. Facebook. 2025 Nov 14 [cited 2026 Jan 3]. Available from: https://www.facebook.com/reel/1359657295657215
22. Grimmond J, Brown SD, Hawkins GE. A solution to the pervasive problem of response bias in self-reports. Proceedings of the National Academy of Sciences. 2025 Jan 21;122(3):e2412807122.
23. Giromini L, Young G, Sellbom M. Assessing negative response bias using self-report measures: New articles, new issues. Psychological Injury and Law. 2022 Mar;15(1):1-21.
24. Akbulut Y. Beyond self-reports: Addressing bias and improving data quality in educational research. Journal of Measurement and Evaluation in Education and Psychology. 2025 Jun 6;16(2):115-23.
25. Hill NL, Mogle J, Whitaker EB, Gilmore-Bykovskyi A, Bhargava S, Bhang IY, Sweeder L, Tiwari PA, Van Haitsma K. Sources of response bias in cognitive self-report items:"Which memory are you talking about?". The Gerontologist. 2019 Oct;59(5):912-24.
26. Van Berkel N, Goncalves J, Hosio S, Sarsenbayeva Z, Velloso E, Kostakos V. Overcoming compliance bias in self-report studies: A cross-study analysis. International Journal of Human-Computer Studies. 2020 Feb 1;134:1-2.
27. Nugroho HSW. Cangkir Santi 35: Skenario riset cross-sectional [Internet]. Facebook. 2025 Oct 31 [cited 2026 Jan 3]. Available from: https://www.facebook.com/reel/1145642817757929
28. Nugroho HSW. Cangkir Santi 36: Riset cross-sectional: Numerik [Internet]. Facebook. 2025 Nov 1 [cited 2026 Jan 3]. Available from: https://www.facebook.com/reel/4276554659332370
29. Wang X, Cheng Z. Cross-sectional studies: strengths, weaknesses, and recommendations. Chest. 2020 Jul 1;158(1):S65-71.
30. Baumeister SE, Kocher T, Papapanou PN, Holtfreter B, Demmer RT. Cross-sectional studies: strengths, limitations, and methodological considerations. Journal of Periodontal Research. 2026 Jan 5;26(1):82-8.
31. Maier C, Thatcher JB, Grover V, Dwivedi YK. Cross-sectional research: A critical perspective, use cases, and recommendations for IS research. International Journal of Information Management. 2023 Jun 1;70:102625.