

## Knowledge of Oral and Dental Health as a Risk Factor for Pulp Disease Among the Elderly

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### ABSTRACT

Pulp disease is one of the most common oral health problems among the elderly. In recent years, cases of pulp disease among older adults have shown a consistent increase. This condition indicates the need to explore contributing factors, particularly the level of knowledge regarding oral and dental health, which may influence the occurrence and progression of pulp disease in this population. This study aimed to determine the relationship between knowledge of oral and dental health and the incidence of pulp disease among the elderly at Wonosalam Primary Health Center, Jombang Regency. This study employed a cross-sectional design conducted at Wonosalam Primary Health Center, Jombang Regency. The study population consisted of elderly participants selected as research respondents. Data were collected using a structured questionnaire to assess the level of knowledge regarding oral and dental health. The association between knowledge and pulp disease was analyzed using the Chi-Square test. The analysis demonstrated a statistically significant relationship between knowledge of oral and dental health and the occurrence of pulp disease among the elderly ( $p = 0.03$ ). Participants with lower levels of knowledge were more likely to experience pulp disease compared to those with better knowledge. As conclusion, knowledge of oral and dental health is significantly associated with pulp disease among the elderly. Improving educational and preventive efforts targeting older adults is essential to enhance awareness and reduce the risk of pulp disease.

**Keywords:** knowledge; elderly; pulp disease; oral and dental health

### INTRODUCTION

Pulp disease is a common oral health problem among the elderly population, particularly in the form of inflammation known as reversible pulpitis. Reversible pulpitis refers to inflammation of the dental pulp tissue that may result from dental procedures, impression processes, restorative treatments, or periodontal disease. The most frequently reported symptom is dentin hypersensitivity, characterized by sharp pain in response to sudden stimuli that subsides once the stimulus is removed. Clinically and radiographically, this condition is often difficult to diagnose because the periapical area generally appears normal and percussion tests are typically negative unless occlusal trauma is present [1].

Over the past three years, cases of pulp disease have shown the highest proportion among oral health problems in the elderly, with a consistent upward trend from 2021 to 2023 at Wonosalam Primary Health Center, Jombang Regency, East Java. Pulp tissue itself is a loose connective tissue containing blood vessels and nerves, with essential dentinogenic, defensive, sensory, and nutritive functions that play a crucial role in maintaining tooth vitality [2]. Damage or inflammation of this tissue can therefore significantly compromise overall oral health, especially in older adults.

Oral health problems in the community are becoming increasingly complex and are often neglected, including pulp infections that frequently occur in the elderly. This situation is closely related to limited awareness and inadequate knowledge regarding proper oral and dental care. Knowledge is formed through sensory processes and individual perception, which vary from person to person; thus, the level of knowledge strongly influences health behavior [3]. Insufficient knowledge may lead to poor oral hygiene practices [4-6], such as irregular tooth brushing, improper brushing techniques, and excessive consumption of sugary foods and beverages, all of which increase the risk of dental caries and subsequent pulp involvement.

Advancing age is associated with physiological changes and a gradual decline in biological functions, including those related to oral health. In the elderly, the increasing incidence of pulp disease represents a significant concern. Poor oral health in this age group may also contribute to broader health complications, including malnutrition, cardiovascular disease, diabetes, and respiratory disorders [7-9].

Considering the high prevalence of pulp disease and the important role of knowledge in maintaining oral health, it is necessary to investigate the relationship between knowledge of oral and dental health and the occurrence of pulp disease among the elderly at Wonosalam Primary Health Center. This study is expected to provide scientific evidence regarding the association between oral health knowledge and pulp disease in older adults. Practically, the findings may serve as a reference for health professionals in strengthening promotive and preventive oral health programs for the elderly and enhancing their awareness of the importance of maintaining oral hygiene to prevent pulp disease.

Based on the background, this study aimed to determine and analyze the correlation between the level of knowledge of oral and dental health among the elderly and the occurrence of pulp disease at Wonosalam Primary Health Center, Jombang Regency.

### METHODS

This study was conducted in the working area of Wonosalam Primary Health Center, Jombang Regency, from October 2024 to March 2025. The research employed a quantitative approach using a cross-sectional design to examine the relationship between knowledge of oral and dental health and the occurrence of pulp disease among the elderly at a single point in time [10]. The study population consisted of all elderly individuals registered in the service area of Wonosalam Primary Health Center. The research sample included 30 elderly participants who met the predetermined inclusion criteria and were selected using purposive sampling. This sampling technique was applied to ensure that respondents fulfilled specific characteristics relevant to the objectives of the study.

The independent variable in this study was the level of knowledge regarding oral and dental health, while the dependent variable was the occurrence of pulp disease. Knowledge was measured using a structured questionnaire designed to assess participants' understanding of oral hygiene practices, causes of dental caries, and prevention of pulp-related conditions. The questionnaire responses were categorized into levels of knowledge based on predefined scoring criteria. The occurrence of pulp disease was assessed through direct clinical examination conducted face-to-face with each respondent to identify signs and symptoms consistent with pulp pathology.

Data analysis was performed using the Chi-Square statistical test with the assistance of the latest version of SPSS software [11-13]. The level of significance was set at 5% to determine whether there was a statistically significant association between knowledge of oral and dental health and the incidence of pulp disease among the elderly.

### RESULTS

Based on Table 1, the distribution of respondents by gender shows that among the 30 elderly participants, the majority were female (53.3%). This finding indicates that female participants were slightly more represented than males in this study.

As shown in Table 2, the majority of elderly respondents had a poor level of knowledge regarding oral health, comprising 28 individuals (93.3%). Only 2 respondents (6.7%) were categorized as having good knowledge, and none fell into the fair category. These results indicate that overall knowledge of oral health among the elderly at the study site remains low.

Table 3 demonstrates that the study assessed several aspects of oral health knowledge, including correct brushing techniques, brushing frequency, appropriate toothpaste use, dietary factors affecting oral health, the impact of cold food and beverages, the importance of routine dental examinations, and actions to be taken when dental problems arise. The overall average percentage of correct responses across all indicators was 25.1%, indicating that oral health literacy among the elderly respondents was generally low.

Table 1. Distribution of respondents by gender

Gender	Frequency	Percentage
Male	14	46.7
Female	16	53.3

Table 2. Level of knowledge of the elderly on oral health

Knowledge	Knowledge	Knowledge
Good (76–100)	Good (76–100)	Good (76–100)
Fair (57–75)	Fair (57–75)	Fair (57–75)
Poor (<65)	Poor (<65)	Poor (<65)

Table 3. Recapitulation of oral health knowledge indicators among the elderly at Wonosalam Primary Health Center, Jombang Regency, 2025

No	Indicator	Correct (f)	Correct (%)	Incorrect (f)	Incorrect (%)
1	Knowledge of proper tooth brushing techniques	6	20	24	80
2	Knowledge of post-brushing actions and brushing frequency	4	24.4	23	75.6
3	Knowledge of appropriate toothpaste use	8	27	22	73
4	Knowledge of foods that can damage teeth and mouth	10	32.5	20	67.5
5	Knowledge of the effects of consuming cold food and drinks	7	23.3	23	76.7
6	Awareness of routine oral health check-ups	10	32.2	20	67.8
7	Knowledge of actions to take when dental problems occur	5	16.7	25	83.3
	Average	8.4	25.1	22.5	74.9
	Category		Poor		

Based on Table 4, most elderly respondents experienced severe pulp disease (50%). Meanwhile, 26.6% were classified as having mild pulp disease and 23.3% had moderate conditions. These findings indicate that pulp disease among the elderly at Wonosalam Primary Health Center was predominantly severe.

Referring to Table 5, the Chi-Square test resulted in a p-value of 0.030, indicating a statistically significant relationship between the level of oral health knowledge and the incidence of pulp disease among the elderly at Wonosalam Primary Health Center. The findings suggest that respondents with poorer knowledge levels were more likely to experience more severe pulp disease.

Table 4. Distribution of pulp disease status among the elderly at Wonosalam Primary Health Center, Jombang, 2025

Pulp disease category	Frequency	Percentage
Mild	8	26.6
Moderate	7	23.3
Severe	15	50

Table 5. The correlation between oral health knowledge and pulp disease among the elderly at Wonosalam Primary Health Center, Jombang, 2025

Level of knowledge	Pulp disease						p-value
	Mild		Moderate		Severe		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Good	0	0	2	100	0	0	0.030
Poor	8	28.6	5	17.9	15	53.6	

## DISCUSSION

Based on the findings of this study conducted among elderly individuals at Wonosalam Primary Health Center, it was identified that the majority of respondents provided incorrect answers regarding knowledge of oral and dental health. The results showed that many elderly participants did not understand the proper brushing technique for the inner surfaces of the anterior teeth, were unaware of recommended actions after brushing, and did not know the benefits of fluoride-containing toothpaste. In addition, several respondents lacked knowledge about the harmful effects of sugary foods on teeth, the potential impact of consuming cold food and beverages on dental sensitivity, the importance of routine dental check-ups every six months, and appropriate management when plaque and calculus are present.

Knowledge of oral and dental health plays a crucial role in maintaining oral hygiene and preventing dental and oral diseases. Efforts to maintain oral hygiene aim not only to prevent oral health problems but also to support immune function and improve oral performance, which influences appetite and overall well-being. Maintaining oral hygiene in the elderly is particularly important to ensure better health during aging. Questionnaire data regarding quality of life revealed that physical pain was the most frequently reported dimension, while limitations in daily activities were less commonly reported. The severity of dental caries among the elderly was found to be relatively high. This finding is consistent with the report from which indicated that the prevalence of dental caries among the elderly population. Untreated dental caries can progress to involve the pulp tissue, and the resulting cavity cannot be naturally restored by the body. This progression may lead to pulp inflammation, pain, discomfort, loss of vitality, and eventually tooth loss.

Based on respondent characteristics, all participants had experienced pulp disease, categorized as mild, moderate, or severe. This condition is likely associated with insufficient knowledge and inadequate oral hygiene practices among the elderly, which contribute to poor dental maintenance and increase the risk of oral health problems that may progress to pulp disease. Good oral health knowledge is generally associated with positive oral health behavior [14]. Behavior reflects how individuals respond to internal and external stimuli, and it is influenced not only by personal characteristics but also by environmental factors. Perspectives shaped by emotional responses and socialization processes significantly influence how individuals perceive and respond to oral health issues. Individuals react to stimuli related to dental health, such as recognizing whether their teeth are healthy or diseased and understanding how to care for them appropriately [15].

Exposure of the inner dental tissues due to bacterial infection, dental caries, or trauma—such as accidental injury or operative procedures—indicates pulp pathology. Common contributing factors include enlargement of the pulp chamber, more exposed pulp tissue, and thinner enamel and dentin layers. If saliva contamination or trauma results in pulp exposure, infection may occur, leading to inflammation and potentially causing pulp necrosis [16]. These pathological processes highlight the importance of preventive measures and early intervention to avoid severe complications.

Data analysis using the Chi-Square test revealed a statistically significant correlation between the level of oral health knowledge and the occurrence of pulp disease among the elderly at Wonosalam Primary Health Center in 2025. This finding reinforces the concept that knowledge plays a crucial role in preventing oral health disorders, particularly pulp disease, which often arises due to inadequate understanding of proper dental care. The statistical results emphasize that comprehensive and continuous oral health education should be prioritized within primary healthcare services.

Prior research also reported that knowledge of oral health maintenance among the elderly is closely associated with the incidence of dental and oral diseases. Elderly individuals with better understanding of oral health care are more capable of implementing preventive measures, thereby achieving optimal oral health status [17]. Educational programs that are delivered in a general or large-scale format without considering the specific conditions of elderly individuals—such as cognitive limitations and reduced motor skills—tend to be less effective in improving their understanding.

Overall, these findings suggest that knowledge is not merely a passive indicator but a significant determinant influencing the health status of the elderly. Therefore, improving oral health literacy should become an integral component of dental disease prevention strategies, especially for vulnerable groups such as older adults [18-21].

This study used a cross-sectional design, which allows identification of associations but does not establish causal relationships between oral health knowledge and the incidence of pulp disease. Furthermore, the relatively small sample size and purposive sampling method conducted at a single primary health center limit the generalizability of the findings. The use of a questionnaire to measure knowledge may also introduce information bias, as responses depend on participants' comprehension and honesty.

## CONCLUSION

Based on the findings of this study, it can be concluded that knowledge of oral and dental health is significantly associated with the incidence of pulp disease among the elderly at Wonosalam Primary Health Center, Jombang Regency. The results indicate that a lower level of knowledge regarding proper oral hygiene practices and dental care increases the risk of developing pulp disease, whether in mild, moderate, or severe categories. In this context, knowledge functions as an important risk factor influencing the occurrence and severity of pulp pathology in older adults.

These findings emphasize that inadequate understanding of oral health maintenance contributes to delayed prevention and treatment of dental problems, allowing caries to progress into pulp involvement. Therefore, continuous educational and mentoring programs specifically designed for the elderly are essential to improve their awareness and comprehension of proper oral health care. By strengthening knowledge as a preventive factor, it is expected that the incidence of pulp disease among the elderly can be reduced, ultimately contributing to improved oral health status and overall quality of life in this population.

## Ethical consideration, competing interest and source of funding

-Ethical approval for this study was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Surabaya under ethical clearance number EA/3737/KEPK-Poltekkes\_Sby/VI/2025. All participants were informed about the purpose and procedures of the study, and their participation was voluntary with informed consent obtained prior to data collection.

-There is no conflict of interest related to this publication.

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