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Unveiling Understanding of Periodontitis Among Thai Adults: A Cross-sectional Study

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Abstract

Objectives: This study aims to assess the knowledge depth regarding periodontitis among Thai adults using open-ended questions and explore the factors influencing their comprehension of the disease.

Methods: A cross-sectional questionnaire-based study was conducted involving Thai adults aged 18 years and above. Participants were asked to describe periodontitis in an open-ended question and were classified as "totally correct" (TC), "partially correct" (PC) or "incorrect" (IC) based on the American Academy of Periodontology's definition. Subgroup comparisons were performed using the Chi-square test.

Results: Out of the 1205 participants analyzed, the majority (72.4%) fell into the PC category, primarily associating periodontitis with gingival inflammation. Terms such as "gingival inflammation," "gingival swelling," and "gingival bleeding" were frequently mentioned. Participants mentioning keywords related to attachment loss were more likely to demonstrate a better comprehension of the disease. Significant associations were observed between participants' familiarity with periodontitis and factors such as age (p<0.05), educational level (p<0.05), and frequency of dental visits (p=0.001).

Conclusions: This study highlights the superficial understanding of periodontitis within the Thai population, notably the limited awareness beyond gingival inflammation.

Keywords: attachment loss, gingival inflammation, knowledge, periodontitis, Thai population

Introduction

Periodontitis, a chronic disease affecting individuals across all regions of Thailand, stands out as a significant public health issue. The 9th National Health Survey (2566 BE)[1] highlighted the extensive impact of this condition, revealing that 51.8% of Thai adults aged 35 to 44 displayed signs of gingival inflammation. Remarkably, 23.4% of this group exhibited periodontitis with probing depths of 4 to 5 millimeters, while 9.2% had periodontal pockets exceeding 6 millimeters. Furthermore, the survey unveiled a concerning prevalence of periodontitis among the elderly, as 48.7% of those aged 60 to 74 were diagnosed with the condition.

Periodontitis is characterized by inflammation of the gingiva and loss of alveolar bone. Untreated periodontitis can result in tooth loss, affecting essential oral functions such as chewing, speech, and overall aesthetics. Despite its global impact[2-4], awareness of periodontitis among the general population remains low[5,6], possibly due to its gradual progression and a lack of understanding about the disease. Previous studies have shown that a significant proportion of the population remains uninformed about the causes, symptoms, and treatment of periodontitis, even after regular dental visits.[7,8]

Patient awareness and understanding of periodontitis significantly impact their decision to seek treatment. It is crucial for dental professionals to evaluate patients' knowledge of periodontal diseases to design effective, targeted oral health education programs that cater to various demographic groups. Knowledge of oral health, especially regarding periodontal diseases, is essential for the prevention and management of these conditions across different age groups, including children, adolescents, and adults.[9] Despite its importance, numerous studies have consistently indicated that the general population has a limited understanding of periodontal diseases.[10-13] However, these studies often predominantly focused on the symptoms of periodontitis. The questionnaire used in these studies included multiple-choice questions to assess knowledge and a Likert scale to measure agreement or disagreement. This methodological approach may constrain the assessment of participants' comprehensive understanding of the disease, potentially overlooking important aspects of their knowledge of periodontitis. To the best of our knowledge, there is none of studies in Thailand that examine the comprehension of periodontal disease.

Therefore, this study aimed to evaluate the knowledge of periodontitis among Thai adults through an open-ended question and explore the factors that shape their comprehension of the disease.

Materials and Methods

Data collection

An online questionnaire was created using Google Forms, which participants accessed via a QR code. The QR code to access the questionnaire was distributed to study participants via an online platform and in-person interaction, particularly within the Department of Periodontology's clinic, where they were invited to participate and provided access to the QR code on-site between December 2023 and January 2024. The questionnaire consisted of two sections: the first section collected demographic information such as age, gender, smoking status, diabetes status, social status, and frequency of dental visit, while the second section contained an open-ended question: "What is periodontitis?" Responses to the open-ended question were evaluated and analyzed by one periodontist (S.T.). Each response was manually tagged with keywords extracted from the answer. Keywords included phrases such as gingival inflammation, gingival swelling, gingival bleeding, tooth mobility, gingival recession, calculus, malodor, other conditions unrelated to periodontitis (e.g., dental caries), and the response "do not know".

Participants were grouped based on their familiarity with periodontitis as shown in their responses to the open-ended question. Familiarity with periodontitis was assessed according to the American Academy of Periodontology (AAP)'s Glossary of Periodontal Terms definition of periodontitis[14], which was deemed appropriate for general population understanding. Apart from the "do not know" response, the tagged keywords in each response were categorized into groups related to gingival inflammation (e.g., gingival inflammation, gingival swelling, or gingival bleeding), attachment loss (e.g., tooth mobility or gingival recession), conditions suggestive of periodontitis but not consistent with the AAP's periodontitis definition[14], and other unrelated conditions.

An answer was considered "totally correct" if it included keywords related to both gingival inflammation

and attachment loss, as per the AAP's Glossary of Periodontal Terms[14] Conversely, responses were labeled as "partially correct" if they contained keywords associated with either gingival inflammation or attachment loss, while answers with other keywords were categorized as "incorrect". Consequently, participants were classified into 3 groups: totally correct (TC), partially correct (PC) and incorrect (IC).

Statistical analysis

Data analysis was performed using SPSS software version 29.0 (SPSS®: Inc., Chicago, IL, USA). Descriptive statistics were utilized to present demographic data and clinical variables. Subgroup comparisons were conducted using the Pearson chi-square test, with a significance level set at $p \leq 0.05$.

Results

A total of 2150 participants completed the questionnaire. Among them, 772 participants (35.9%) did not respond to the open-ended question, and 173 participants (8.0%) answered "do not know", leading to their exclusion from the analysis. Therefore, the analysis was conducted on a total of 1205 participants (Figure 1).

The 1,205 participants included in the study had a mean age of 38.4±14.4 years. The gender distribution was 366 (30.4%) male, 805 (66.8%) female, and 34 (2.8%) unspecified. A majority of the participants held a bachelor's degree (62.7%), and their reported income was 10,001-30,000 THB (39.9%). More than half of the participants reported visiting the dentist on a regular basis (62.7%). Furthermore, 3.3% of the participants were smokers, and 1.9% reported having diabetes.

The keywords extracted from the response of the open-ended questions, "What is periodontitis?" are presented in Table 1. Out of the 1205 answers analyzed, 75.8% of participants (914 responses) included 1 keyword, while 17.5% (211 responses) contained 2 keywords. Furthermore, 54 responses (4.5%) included 3 keywords, 21 responses (1.7%) had 4 keywords, 4 responses (0.3%) featured 5 keywords, and 1 response (0.1%) included 6 keywords.

Of the total 1608 keywords identified from the 1205 participants, 70.3% were related to gingival inflammation, while 10% were associated with attachment loss. The remaining keywords were categorized as "other keywords implying periodontitis but not in the AAP periodontitis definition" (7.2%) and "other conditions not related to periodontitis" (12.6%). The most common keywords related to gingival inflammation were "gingival inflammation" (44.3%; 713 out of 1608), "gingival swelling" (17.8%; 287 out of 1608), and "gingival bleeding" (8.1%; 131 out of 1608). Keywords associated with attachment loss were primarily "gingival recession" (Table 1).

Upon categorizing the participants based on their responses, the majority (72.4%) were classified into the PC group. Remarkably, within the PC group, a significant 95.8% provided responses containing keywords related to gingival inflammation, contrasting with only 4.2% that included keywords linked to attachment loss. About one fifth of the participants were assigned to the IC group, with only 8.5% falling into the TC group (Table 2).

In this study cohort, a significant majority (77.8%; 938 out of 1205) of participants mentioned keywords associated with gingival inflammation. In contrast, a smaller proportion (11.6%; 140 out of 1205) reported keywords related to attachment loss. Notably, among those who mentioned attachment loss keywords, a significantly higher percentage (73.6%; 103 out of 140) also referenced keywords related to gingival inflammation compared to the group (11%, 103 out of 938) that mentioned gingival inflammation keywords and also reported attachment loss keywords.

The findings from Pearson chi-square analysis indicated that age, educational level, and dental visit frequency were statistically significant factors associated with participants' familiarity with periodontitis. In contrast, sex, Diabetes mellitus status, smoking status and income showed no significant association with participants' familiarity with periodontitis (Table 3).

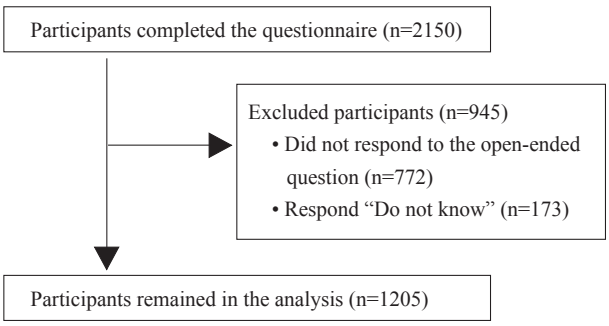

Figure 1: Flow of data collection.

Table 1: Distribution of keywords across participant groups based on responses to the question "What is periodontitis?".

Keywords	Number of keywords; N=1608 (100%)			
	All groups	TC group	PC group	IC group
Gingival inflammation	**1131 (70.3%)**	**148**	**1083**	**0**
- Gingival inflammation	713	74	639	0
- Gingival swelling	287	43	244	0
- Gingival bleeding	131	31	200	0
Attachment loss	**160 (10%)**	**116**	**44**	**0**
- Tooth mobility	74	60	14	0
- Gingival recession	86	56	30	0
Other keywords implying periodontitis but not in the AAP periodontitis definition	**115 (7.2%)**	**33**	**53**	**29**
- Calculus	84	20	39	25
- Malodor	31	13	14	4
Other conditions not related to periodontitis	**202 (12.6%)**	**0**	**0**	**202**
- Dental caries	10	0	0	10
- Disease in the mouth, cystic lesion, tooth disease, etc.	192	0	0	192
Total	**1608 (100%)**	**297**	**1180**	**231**

Abbreviations: TC = Totally correct; the answer with keywords related to both gingival inflammation and attachment loss, PC = Partially correct; the answer with keywords associated with either gingival inflammation or attachment loss, IC = Incorrect; the answer with other keywords

Table 2: Distribution of the participants in study groups based on responses to the question "What is periodontitis?"

	Group of the participants				Total
	TC group	PC group		IC group	
Number of participants; n (%)	103 (8.5%)	872 (72.4%)		230 (19.1%)	1205 (100%)
		Keywords related to "gingival inflammation"	Keywords related to "attachment loss"		
		835	37		

Abbreviations: TC = Totally correct, PC = Partially correct, IC = Incorrect

Discussion

This study on periodontitis comprehension among the Thai population highlights the pressing need for increased public awareness. A comprehensive understanding of periodontitis is essential, as patient awareness directly influences their willingness to seek timely and appropriate treatment. Given the progressive nature and long-term consequences of untreated periodontal diseases, dental professionals must assess and address public knowledge gaps. Developing targeted, evidence-based oral health education programs that consider demographic and socioeconomic variations is essential to improving periodontal outcomes. Oral health literacy, especially concerning periodontitis, is crucial for effective prevention, early diagnosis, and management across the lifespan. Despite its clinical significance, research indicates that public awareness and understanding remain alarmingly low[5,6], underscoring the urgent need for intensified educational and preventive strategies at individual and community levels.

In this study, of the 1378 respondents, 12.6% (173 individuals) lacked knowledge about periodontitis, while a substantial 72.4% of the remaining participants exhibited only a superficial understanding, primarily linking periodontitis with gingival inflammation. Participants mentioning attachment loss keywords were more likely to demonstrate a better understanding of periodontitis. These findings underscore the necessity to enhance public awareness of periodontitis, particularly in elucidating its broader implication beyond gingival inflammation.

Table 3: Demographic variables and dental visit frequency and their association with the responses to the question "What is periodontitis?".

Demographic data	Group of the participants				
	TC group (N = 103)	PC group (N = 872)	IC group (N=230)	Total (N=1205)	*p*-value
Gender					0.648
Female	74 (9.2%)	581 (72.2%)	150 (18.6%)	805 (100%)	
Male	25 (6.8%)	268 (73.2%)	73 (19.9%)	366 (100%)	
Unspecified	4 (11.8%)	23 (67.6%)	7 (20.6%)	34 (100%)	
Age (years)					0.016*
18-39	61 (8.8%)	488 (70.1%)	147 (21.1%)	696 (100%)	
40-59	38 (10.2%)	273 (73.0%)	63 (16.8%)	374 (100%)	
≥60	4 (3.0%)	111 (82.2%)	20 (14.8%)	135 (100%)	
Educational Level					0.012*
Below bachelor's degree	26 (11.9%)	139 (63.8%)	53 (24.3%)	218 (100%)	
Bachelor's degree	64 (8.5%)	552 (73.1%)	139 (18.4%)	755 (100%)	
Above bachelor's degree	13 (5.6%)	181 (78.0%)	38 (16.4%)	232 (100%)	
Income (THB)					0.367
<10,000	15 (8.3%)	130 (71.8%)	36 (19.9%)	181 (100%)	
10,001-30,000	45 (9.4%)	332 (69.0%)	104 (21.6%)	481 (100%)	
30,001-50,000	26 (8.8%)	222 (75.5%)	46 (15.6%)	294 (100%)	
>50,001	17 (6.8%)	188 (75.5%)	44 (17.7%)	249 (100%)	
Dental visit frequency					0.001*
Regularly (At least once a year)	77 (10.2%)	545 (72.1%)	134 (17.7%)	756 (100%)	
Only when having symptoms	22 (5.1%)	320 (73.9%)	91 (21.0%)	433 (100%)	
Never	4 (25.0%)	7 (43.8%)	5 (31.3%)	16 (100%)	
Diabetes mellitus status					0.286
Yes	102 (8.6%)	852 (72.1%)	228 (19.3%)	1182 (100%)	
No	1 (4.3%)	20 (87.0%)	2 (8.7%)	23 (100%)	
Smoking status					0.625
Non-smoker	92 (8.4%)	795 (72.3%)	212 (19.3%)	1099 (100%)	
Smoker	5 (12.5%)	26 (65.0%)	9 (22.54%)	40 (100%)	
Former smoker	6 (9.1%)	51 (77.3%)	9 (13.6%)	66 (100%)	

Abbreviations: TC = Totally correct, PC = Partially correct, IC = Incorrect, THB = Thai baht
**Pearson Chi-square test: p<0.05.*

An open-ended question was utilized in this study to evaluate participants' understanding of periodontitis. Unlike multiple-choice questions, this approach assesses the comprehension of the disease rather than recalling information from memory, thereby minimizing the potential for guessing. However, some participants may leave the question blank, as seen in this study, where approximately 36% did not respond. Previous studies have typically developed questionnaires to assess periodontal health knowledge and awareness among the population related to variables and factors using multiple choices and Likert scale.[5,12,13,15] However, the findings of existing studies raise important considerations regarding the assessment of participants' understanding of periodontitis. Researchers have employed simplified terminology, such as "gum disease," and have primarily focused on the symptoms of the condition. This approach may not adequately capture the complexities associated with periodontitis and could limit insights into participants' comprehensive understanding of the disease. Additionally, by concentrating on symptoms, the assessment may provide an incomplete picture of participants' awareness. While participants may recognize certain symptoms, they might benefit from a deeper understanding of periodontitis. In this study, To enhance the evaluation of knowledge, it may be beneficial to incorporate open-ended questions

that allow for a deeper exploration of participants' understanding. To our knowledge, no validated questionnaire specifically designed to evaluate understanding of periodontitis currently exists.

In this study, the definition of periodontitis from the AAP Glossary of Terms was employed as the reference for answers of the question, "what is periodontitis?". According to this definition, periodontitis is characterized by inflammation of the periodontal tissues, leading to clinical attachment loss, alveolar bone loss, and periodontal pocket formation. While the most recent 2018 periodontal classification[16] provides a case definition of periodontitis based on detectable interdental clinical attachment loss at two non-adjacent teeth, this classification is primarily intended for dental professionals to aid in treatment decisions and clinical research. The complexity of the 2018 periodontitis case definition renders it unsuitable for the present study aimed at assessing the general population's understanding of periodontitis.

It may be speculated that the loss of support of the periodontium around teeth can cause difficulty in masticatory function such as tooth sensitivity and pain during function. This, in turn, leads individuals to understand and become aware that attachment loss, such as tooth mobility or gingival recession, may serve as potential indicators of periodontitis. This heightened awareness parallels findings from prior research that established a correlation between self-awareness of tooth mobility and the presence of severe periodontitis.[17] This awareness will prompt consideration for dental evaluation when such signs become apparent.

The significance of understanding attachment loss cannot be overstated, as it indicates the progressive destruction of supporting structures around the teeth, leading to various oral health issues and systemic implications. Dental professionals play a crucial role in educating patients about this aspect of periodontitis, emphasizing the importance of proper oral hygiene practices, regular dental examinations, and early symptom recognition. Effective collaboration between dentists and patients is crucial for preventing and managing periodontitis. Additionally, improving knowledge dissemination and promoting optimal periodontal health can be strengthened through public health campaigns, educational programs, and digital platforms.[18]

Age and educational level emerged as key demographic factors associated with comprehension of periodontitis, with gender showing no correlation with participants' familiarity of the disease, consistent with previous research.[19,20] The majority of participants across all age groups demonstrated only a partial understanding of periodontitis. Importantly, only 3.4% of elderly individuals demonstrated a complete understanding, while a higher proportion of young adults and middle-aged participants could explain the key characteristics of periodontitis. In terms of educational level, individuals with less than a bachelor's degree accounted for the largest proportion of subset providing incorrect answers, at 24.3%, while participants with higher education levels exhibited a smaller proportion of subsets with incorrect answers, at 18.4% for those with a bachelor's degree and 16.4% for those with a degree above bachelor's level. This is consistent with prior research linking both age and educational level to knowledge of periodontal disease.[21-25] Despite common assumptions, our study challenged the notion that higher education ensures a comprehensive understanding of periodontitis, as most participants, regardless of educational background, fell into the PC group.

In terms of dental visit frequency, participants who have never seen a dentist exhibited limited knowledge or understanding of periodontitis. Conversely, the majority of the participants who accurately answered the open-ended question about periodontitis tended to visit the dental office regularly. Surprisingly, even among those who visit the dentist regularly, a significant portion still only have partial knowledge of periodontitis, with nearly 20% lacking any understanding of the condition. These findings suggest that dental professionals may not be placing enough emphasis on educating patients about periodontitis. Interestingly, these results were in contrast with previous study which regular dental attendees demonstrated a better understanding of periodontal health.[26] This is possibly due to differences in the focus of the questionnaires used; the previous study centered on periodontal health in general, while our study specifically addressed understanding of periodontitis.

This study found that diabetes mellitus and smoking status are not associated to an understanding of periodontitis, which contrasts with previous[27,28] studies suggesting that individuals with diabetes or smokers tend to have lesser knowledge and awareness of periodontitis

compared to non-diabetics and non-smokers. However, those studies used multiple-choice or yes/no questions and focused on the symptoms or negative effects of periodontitis rather than a deeper understanding of what periodontitis is. Additionally, the sample composition in those studies differed, with more diabetics and smokers, while this study's sample consisted mostly of non-diabetics and non-smokers, which may have influenced the results.

While this study benefited from a large and diverse population sample, it is important to acknowledge certain limitations. The online dissemination of the questionnaire may have created barriers to access for certain groups, potentially leading to the underrepresentation of elderly individuals and those with limited internet connectivity. Consequently, the study primarily included participants between the ages of 18 and 40, predominantly holding bachelor's degrees and belonging to middle to high socioeconomic groups. Future studies may aim to include a more diverse range of participants by distributing paper questionnaires alongside the online version. Furthermore, The data collection was conducted through an online questionnaire distributed via Google Forms, which, while efficient in reaching a broad audience, did not allow for clinical examinations. As a result, the actual periodontal status of participants could not be verified. To address these limitations, future research should aim to include a more diverse and representative sample by incorporating both paper-based and online surveys, and should also integrate clinical examinations to ensure more accurate and objective assessment of periodontal health.

In addition, participants may have sought information from sources other than the survey itself, such as the internet or consultations with peers, which could have influenced their responses. However, This highlights the way individuals often interpret health information in real-world scenarios. it is well-recognized that external influences, such as media, personal experiences, and interactions with healthcare professionals, significantly shape participants' knowledge and perceptions.[29] The intention of this study was to capture this broader, general awareness, rather than aiming for clinical precision, as it reflects the reality of how health information is understood and applied by the public.

In this study, the questionnaire included a single open-ended question designed to explore participants' understanding in their own words. Because the question was straightforward and exploratory in nature, a formal validation process was not carried out. To improve future research, it is recommended that a more detailed and validated instrument be developed to ensure greater reliability and applicability of results across diverse populations and levels of periodontal health literacy.

Conclusions

In conclusion, this study successfully evaluated the knowledge of periodontitis among Thai adults through an open-ended question, revealing a superficial understanding of the disease, with limited awareness beyond gingival inflammation. Additionally, age, gender, and frequency of dental visits were identified as significant factors influencing the level of comprehension. These findings underscore the critical role of dental professionals in educating patients about the broader implications of periodontitis, including attachment loss. Continuous efforts are required to enhance public education and promote a deeper understanding of periodontal health in Thailand.

Ethical Declaration

This cross-sectional questionnaire-based study received ethical approval from the Faculty of Dentistry, Chulalongkorn University (HREC-DCU 2023-123) and adhered to the principles the Declaration of Helsinki. Study participants included Thai adults aged 18 years and above. Prior to participation, all individuals provided written informed consent.

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Conflict of Interest

The authors declare that they hold no competing interests.

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