Original Article

Self-awareness of Individuals with Severe Periodontitis in Thai Adults

Supang Tuntrakul[1], Pimchanok Sutthiboonyapan[1,2], Prin Vathesatogkit[3], Artit Udomsak[4] Kanoknadda Tavedhikul[1,2], Attawood Lertpimonchai[1,2]

[1]Department of Periodontology, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

[2]Center of Excellence in Periodontal Disease and Dental Implant, Chulalongkorn University, Bangkok, Thailand

[3]Department of Medicine, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

[4]Medical and Health Department, Electricity Generating Authority of Thailand, Nonthaburi, Thailand

Abstract

This cross-sectional study aimed to estimate the level of self-awareness and its associated factors among Thai adults with severe periodontitis. This study comprised of 619 participants from employees of the Electricity Generating Authority of Thailand (EGAT) who had completed medical examinations, periodontal examinations, and an interview with self-reported periodontal status questions. All included participants had severe periodontitis. Periodontitis self-awareness was determined by one-on-one interviews of what they thought of their current periodontal status. The answer would be no problem or having gum disease/periodontitis. The prevalence of severe periodontitis with and without self-awareness was estimated. Binary logistic regression was used to identify associated factors with self-awareness. Results showed low awareness of Thai adults with severe periodontitis. Among the participants with the disease, only 24.9 % (95% CI, 21.5, 28.3) reported having periodontitis. The percentage of the participants aware significantly decreased with older age, lower education level, and lower income level. However, it significantly increased with disease severity. The multivariate logistic regression suggested a significant association between the unaware participants and education level of less than bachelor's degree with the adjusted OR of 1.7. In conclusion, this study shows that periodontitis self-awareness in Thai adults was poor. Older individuals with a lower education level, and lower income were more likely to be unaware of periodontitis. Therefore, periodontal health promotion needs to be emphasized.

Keywords: Awareness, Epidemiology, Periodontitis, Self-report

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Correspondence to:
Attawood Lertpimonchai, Department of Periodontology, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.
Tel: 02-218-8849 Fax-number: 02-218-8851 Email: attawood.l@chula.ac.th

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Introduction

Periodontitis is the most common oral disease affecting the global population.[1] According to Global Burden Disease Study[2], severe periodontitis was the sixth-most prevalence condition which affected 11.2 % of the population worldwide. According to a national oral health survey of Thailand in 2017[3], approximately 25.9 % of adults and 36.3 % of the elderly had periodontitis with a periodontal pocket depth of ≥4 mm. The hallmarks of periodontitis are gingival inflammation and alveolar bone destruction. If left untreated, it could eventually result in tooth loss. These pathological changes influence daily life functions such as masticatory functions, speech problems, esthetic problems, and an impaired quality of life.[4] Therefore, it is of paramount importance that participants be aware of the presence of their periodontal diseases, which may enable them to seek proper periodontal treatment.[5,6]

However, the course of periodontal disease is slow and relatively painless, participants were usually unaware of its presence and progression.[7] Not until it is at an advanced stage and symptoms such as gingival swelling, pus discharge or tooth mobility occur, that participants notice the presence of periodontal disease. In most of the studies[8-13], less than half of the participants were aware of having periodontal disease. The National Health and Nutrition Examination Survey in the United States (NHANES) demonstrated only 25 % of the participants with periodontitis were aware of having the disease.[9] The survey also showed that age, race, and educational level had an influence on the extent of periodontal awareness. Other previous studies found that 60 to 80 % of the participants lacked knowledge concerning the cause, symptoms, and treatment of periodontal disease. Most of them had never been informed about periodontal disease by a dentist even for participants who regularly visit the dentist.[8,14,15] This could imply that self-awareness of periodontitis was quite low, as many patients did not realize their condition. Additionally, studies indicated the need to improve periodontal awareness and the need to promote knowledge concerning periodontitis for better self-care and disease detection.

The recognition and awareness of existing periodontal disease by patients is the first crucial step of treatment. Patients who noticed periodontal disease are more likely to seek periodontal treatment. Knowing to what extent patients are aware of their periodontal condition will be of significant use for oral health care providers in planning patients' education and motivation regarding periodontal disease especially in groups with low disease awareness. Therefore, the aims of this study were to estimate the level of self-awareness and its associated factors among Thai adults with severe periodontitis.

Materials and Methods

This cross-sectional study accessed and utilized the secondary data from a 2013 health survey among employees of the Electricity Generating Authority of Thailand (EGAT).[16] EGAT employees in Bangkok and the surrounding area were randomly selected by simple randomization with a specific age range. All participants underwent a routine health examination and oral examination. In addition, demographic data, underlying diseases, health behaviors and self-report periodontal status were assessed by the interview and questionnaires. This study protocol was approved by The Ethics Committee of the Faculty of Dentistry, Chulalongkorn University (HREC-DCU 2020-020).

Study population

The EGAT employees that met the inclusion criteria were those who registered for the 2013 health survey (EGAT 2/4) and completed both the periodontal examination, and the interview of a self-reported periodontal status question. Participants were excluded from the study if they were fully edentulous or had contraindication for periodontal examination including: a high-risk group of infectious endocarditis according to the American Heart Association or had an indication of antibiotic prophylaxis prior to periodontal examination.[17] Only participants with severe periodontitis, having ≥2 proximal sites with loss of clinical attachment level (CAL) ≥6 mm (not on same tooth) and ≥1 proximal site with probing depth (PD) ≥5 mm[18], were included in this study.

Periodontal examination

Dental examinations were carried out by eight experienced periodontists from the Department of Periodontology, Faculty of Dentistry, Chulalongkorn University in mobile dental units. Standardization for periodontal measurements were performed among the eight examiners before the survey. The weighted kappa (within ±1 mm) of the inter-examiners and intra-examiner ranged from 0.74-1.00, and 0.87-1.00, respectively. The details of periodontal examination were reported elsewhere.[19] In brief, the examination included the number of teeth remaining, plaque score, bleeding on probing (BOP), PD and recession (RE). The standard full-mouth periodontal examination protocol was performed. The PD and RE were measured in all teeth except the third molars and retained roots by UNC-15 periodontal probe at six sites per tooth (mesio-buccal, mid-buccal, disto-buccal, mesio-lingual, mid-lingual, disto-lingual). Then, the severity of periodontal disease was classified by the 2012 Centers for Disease Control/American Association of Periodontology (CDC/AAP) periodontitis case definition.[18]

Self-reported periodontal status question

Self-report periodontitis status question wording was simplified for easy understanding and the question was carried out in trials on dental assistants and lay persons. The question was tested for reliability by asking the same question to the same person twice one week apart. The kappa coefficient of the test-retest reliability in this question was 0.97. The interviewer was trained to provide related information for the question. Participants were interviewed one-on-one by the interviewer with a self-reported periodontitis status question prior to periodontal examination. Participants were asked the question concerning what they thought of their current periodontal status. The answer would be whether there was no problem or having gum disease/periodontitis. The interview was performed in Thai language without time constraints. In case that participants were uncertain, further relevant information about periodontal diseases would be provided by the interviewer.

Statistical analysis

Demographic data and clinical variables were presented using descriptive statistics. Participants with severe periodontitis who self-reported having a gum disease/periodontitis would be assumed to be individuals with awareness. The point estimation and 95 % confidence interval (95% CI) of self-awareness level were assessed from the proportion of aware participants among the total of all the participants. Characteristics between aware and unaware participants were compared by the Pearson Chi-square test. Periodontal parameters, which were considered as continuous data, were tested for normality by the Kolmogorov–Smirnov test. Then, the differences between the groups of aware and unaware participants were identified using the *t*-test or the Mann-Whitney *U* test, where appropriate. Moreover, the association between co-variables and periodontitis self-awareness was determined using binary logistic regression. Age, gender, marital status, education level, income, smoking habits, diabetes, dental visit frequency, and severity of periodontitis were considered as covariates in the binary logistic regression. The covariates with a *p*-value <0.2 in the univariate analysis were simultaneously considered in the multivariate analysis. Odds ratios (ORs) and their 95% CI were also estimated. All analyses were performed using the STATA version 14.2. The *p*-value <0.05 was considered statistically significant.

Results

Of all 2,037 employees registered for the health survey, 45 participants denied periodontal examination, another three were excluded due to systemic contraindication for periodontal examination, and 19 were fully edentulous participants. Out of 1,970 participants with periodontal examination, 1,317 non-severe periodontitis participants were excluded. Thirty-four participants had incomplete records on the periodontal self-awareness questionnaire. Therefore, the total number of 619 participants with severe periodontitis were included for the analysis. The flow of included participants is shown in Figure 1.

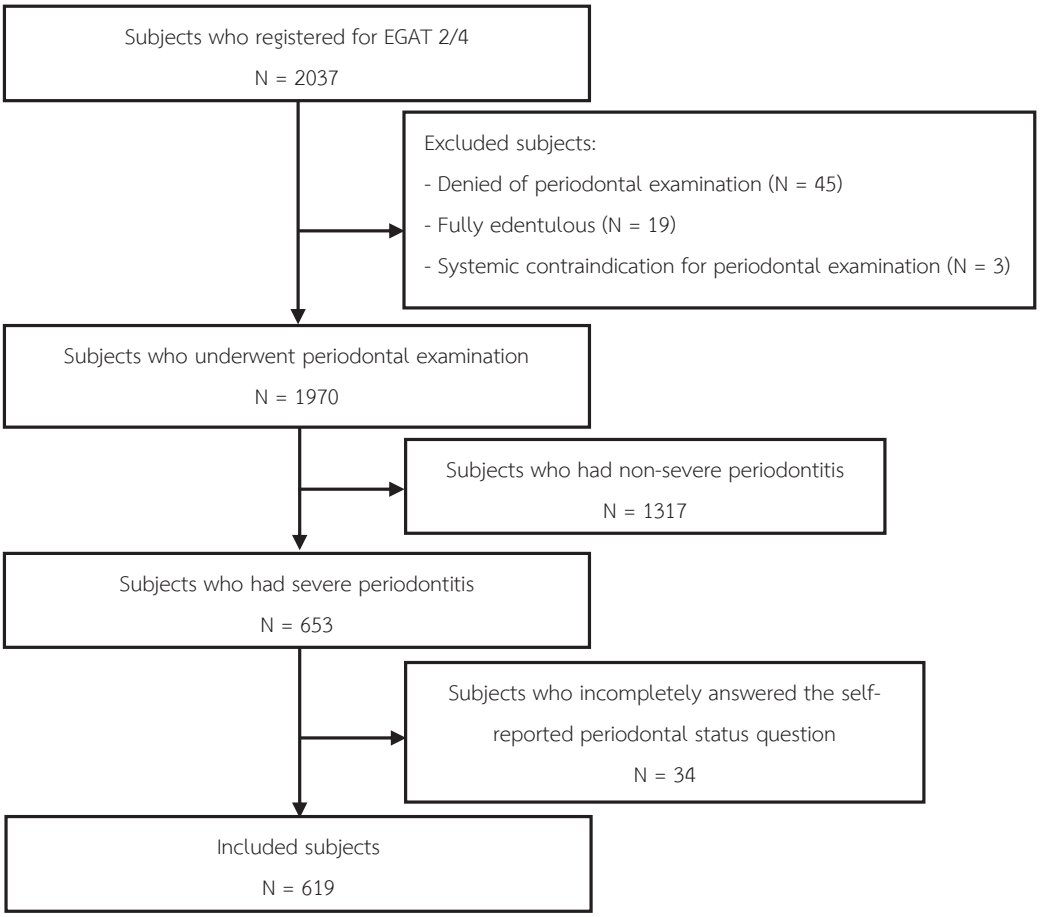

Figure 1 *Flow of included subjects*

The demographic data is presented in Table 1. Out of 619 participants, 111 were females and 508 were males with an age range from 49 to 70 years old, and a mean age of 57.8 ± 4.8 years old. The majority of the participants were married. The education level was mostly diploma or higher degrees with an income of ≥50,000 baht/month. Approximately a quarter of the participants were current smokers. Only 15 % of the participants had never had a dental visit in the last five years, while 40 % had regular annual dental visits.

The proportion from self-reported showed that only 24.9 % of participants with severe periodontitis reported having periodontitis (95% CI: 21.5, 28.3) when comparing the characteristics between the aware and the unaware groups (Table1). the percentage of the aware participants significantly decreased with older age, lower education level, and lower income.

Table 1 *Distribution of baseline demographic characteristics according to periodontitis self-awareness*

Characteristics	Total N* (%)	Unaware	Aware	*p*-value
Age				0.017
<60	422 (68.2)	305 (72.3)	117 (27.7)	
≥60	197 (31.8)	160 (81.2)	37 (18.8)	
Gender				0.109
Female	111 (17.9)	90 (81.1)	21 (18.9)	
Male	508 (82.1)	375 (73.8)	133 (26.2)	

Table 1 *Distribution of baseline demographic characteristics according to periodontitis self-awareness (cont.)*

Characteristics	Total N* (%)	Unaware	Aware	*p*-value
Marital status				0.414
Single	23 (3.8)	16 (69.6)	7 (30.4)	
Married	513 (84.2)	382 (74.5)	131 (25.5)	
Divorced	73 (12.0)	59 (80.8)	14 (19.2)	
Education level				0.047
≤High school	188 (30.9)	148 (78.7)	40 (21.3)	
Diploma	233 (38.2)	180 (77.2)	53 (22.8)	
≥Bachelor's degree	188 (30.9)	129 (68.6)	59 (31.4)	
Income				0.019
<20,000 Baht/month	87 (14.3)	75 (86.2)	12 (13.8)	
20,000 – 49,999 Baht/month	103 (16.9)	80 (77.7)	23 (22.3)	
≥50,000 Baht/month	418 (68.8)	302 (72.2)	116 (27.8)	
Smoking status				0.546
Non-smoker	238 (39.0)	180 (75.6)	58 (24.4)	
Quit	227 (37.2)	174 (76.7)	53 (23.3)	
Smoker	145 (23.8)	104 (71.7)	41 (28.3)	
Diabetes mellitus				0.460
No	492 (79.6)	367 (74.6)	125 (25.4)	
Yes	126 (20.4)	98 (77.8)	28 (22.2)	
Dental visit frequency				0.279
Never in last 5 years	85 (15.0)	70 (82.4)	15 (17.6)	
When having symptoms	254 (44.8)	189 (74.4)	65 (25.6)	
Regularly every year	228 (40.2)	169 (74.1)	59 (25.9)	

** Total number in study sample may vary depending on missing values*

Participants' proportions were distributed evenly regardless of their marital status, smoking status, and medical condition. Female participants and ones who have never visited a dentist demonstrated slightly lower periodontitis awareness, although these associations were not statistically significant.

A comparison of periodontal parameters between the periodontitis awareness and unawareness participants is shown in table 2.

The periodontal status among the aware participants was more advanced than the unaware. The mean PD and CAL were significantly higher in the aware participants. The extent of disease represented by the percent sites with PD ≥6 mm and CAL ≥5 mm was also significantly higher in the group.

From the co-variable selection processes, age, gender, education level, income, and severity of periodontitis were included in the multivariable analysis, Table 3.

Table 2 *Comparison of periodontal parameters between periodontitis aware and unaware participants*

Periodontal parameters	Aware	Unaware	*p*-value
Number of remaining teeth (teeth)	23.02 ± 6.18	23.25 ± 6.40	0.697*
Mean PD (mm)	3.24 ± 0.87	3.01 ± 0.75	0.004*
Mean CAL (mm)	4.21 ± 1.41	3.95 ± 1.33	0.040*
% site PD ≥6 mm (%)	4.36 (0, 75.0)	2.47 (0, 58.33)	<0.001**
% site CAL ≥5 mm (%)	29.68 (3.33, 97.73)	20.18 (1.39, 100)	0.007**

** t-test*
*** Mann-Whitney U test*

Table 3 *Multivariable analysis*

Factors	OR adjusted	95% LCI	95% UCI	*p*-value
Age				
<60	1			
≥60	1.483	0.906	2.426	0.117
Gender				
Female	1.376	0.802	2.361	0.247
Male	1			
Education level				
≤High school	1.703	1.016	2.854	0.043
Diploma	1.757	1.119	2.758	0.014
≥Bachelor's degree	1			
Income				
<20,000 Baht/month	1.834	0.870	3.868	0.111
20,000 – 49,999 Baht/month	1.057	0.596	1.876	0.849
≥50,000 Baht/month	1			
Periodontal severity				
(%site with PD ≥6 mm; continuous)	0.963	0.945	0.981	<0.001

The results of binary logistic regression showed that age, gender, and income were not associated with the level of periodontitis awareness. However, education level and the extent of severe periodontitis was statistically significantly associated with the perception of the participants. Compared with higher education individuals, ones who graduated with less than a bachelor's degree were 1.7 times more likely to be unaware of their periodontitis. In addition, for periodontitis extent, the adjusted OR of 0.96 (95%CI: 0.95, 0.98) indicated that the increase of each percentage of sites with PD ≥6 mm reduced the likelihood of being periodontitis unaware participants by 4 %. In other words, the awareness relatively increased with the severity of periodontitis.

Discussion

This was the first study on self-awareness of individuals with severe periodontitis conducted in Thailand. This study aimed to estimate self-awareness level and indicated its associated factors. The results showed that among Thai adults, only a quarter of participants with severe periodontitis recognized their periodontitis presence. The

low level of education and periodontitis severity were associated with the perception of patients.

Our study showed that the level of self-awareness was low for severe periodontitis, demonstrating that only 24.9 % of participants with severe periodontitis reported having periodontitis whereas 75.1 % thought that they had no gingival problems. Our results agreed with most of the previous studies done in many countries, such as the USA[9,12,20], the UK[11], Spain[21,22], Norway[14,23], and Brazil.[24] They found that a small percentage of periodontal participants were aware of having the disease. The level of awareness varied from 14 to 40 % in different studies depending on characteristics and number of included participants, methods of data collection, and definition of periodontal diseases. Interestingly, studies conducted in the specific groups of health educated participants or participants during dental care, resulted in a high level of awareness of more than 60 %[25,26], which could have been related to the knowledge of oral health care.

Examples of responses to this study question, "In your opinion, how is your current periodontal status?", were "I don't feel anything wrong about my gums. I think it is healthy.", "I think I must have a gum disease because I have painful and swollen gums.", "I have periodontitis. A dentist told me so.", and "I am not sure, but my gums might hurt sometimes.". Most of the answers were simple, clear, and direct to the point. They usually gave additional reasons why they think so. In case that the interviewees were uncertain, the interviewer would explain that periodontitis is a chronic inflammatory destructive disease of the gums and bone that surround and support the teeth, with symptoms such as painful gums, halitosis, bleeding on brushing, tooth mobility, pus from the gums, or swollen gums, so that they could give a definitive answer. These answers showed that participants could understand the question well. However, a lot of them might be unable to perceive the problem or unconcerned about their periodontal health or lack sufficient knowledge to be aware of it.

Previous studies used a variety of questions to assess individuals' periodontitis self-awareness. Apart from a question of self-perception of periodontal condition, questions regarding self-reported periodontal symptoms were also used.[27-29] Besides, questions regarding history of periodontal treatment, previous periodontal diagnosis, and oral hygiene behavior may be used in addition to self-perception of periodontal status and symptoms. However, most studies found that using self-reported parameters was ineffective, participants were frequently unaware of periodontal symptoms.[27,28]

The 2012 CDC/AAP periodontitis case definitions classified periodontal disease into gingivitis, mild, moderate, and severe periodontitis. However, the difference between gingivitis and especially between mild and moderate periodontitis according to these criteria was very modest. Moreover, the early stage of disease exhibited relatively mild symptoms which could lower the self-detection of participants. Therefore, our study chose to assess the self-awareness specifically in participants with severe periodontitis, and excluding gingivitis, mild and moderate periodontitis cases.

It was observed from this study that participants who were older, had a lower education level, and lower income were more frequently unaware of having periodontitis. The characteristics were quite in concordance with the previous findings[9,29] which found that age, race, education level, and systemic conditions had an influence on periodontal awareness. In addition, Alshammary *et al.*[30] found that females who had a higher education, and higher income all contribute to a positive perception of oral health, whereas increasing age has the opposite effect. These could be explained by the fact that these factors led to the lack of access to dental care and oral health-related knowledge which were the key factors to periodontal self-awareness. The elderly may have low self-awareness because they recognized the deterioration of their health conditions as a normal part of the aging or adaptation process. Moreover, individuals with higher education and income may have a better attitude toward

oral hygiene practice and be more attentive to their oral health status. Hence it was confirmed from this study that participants with older age and low socioeconomic status (SES) should be the top priority for the periodontal health promotion campaign.

This study also found that self-awareness was not associated with the frequency of dental visits. Among participants who had regular dental visits at least once a year, the level of self-awareness of periodontitis was only 26 %. Limited communication between dentists and patients, as well as negligence of proper periodontal examination by dentists might be implied from this unpleasant circumstance.[8,14,15] As a result, it could be suggested that there is a need for oral health care providers to not only do dental and periodontal examinations more carefully but also to improve patient education concerning periodontal disease.

Interestingly, in contrast to previous studies[28,31,32] which found that smokers and participants with diabetes mellitus were more likely to be aware of periodontitis as they had more prevalent and severe periodontitis, both factors were not associated with the self-awareness level in our study. Due to vasoconstriction induced by tobacco, the clinical signs of inflammation, such as gingival redness and gingival bleeding, could be reduced. Thus, smokers may miss early signs of periodontal disease.[29] In regard to our diabetes mellitus participants, most of them were well controlled or borderline diabetes, which might have less pronounced periodontal symptoms. In addition, the number of smokers and diabetics in ours was low which may have insufficient power in statistical testing leading to biased results. This indicated the need for further investigation in large well-designed diagnostic studies in various Thai populations.

Besides the advantages of a large sample size, our study also has other strengths. Attaining the answers to the questions was done in the native language of the participants by trained interviewers. The questions had been well designed, easy to understand, and the test-retest for reliability was performed.[21,24] Among the method used for collecting information from self-reported questions, the one-on-one interviewing demonstrated the highest validity and reliability.[20] Moreover, the gold standard full-mouth periodontal examination was done by the trained and calibrated periodontists instead of using some of the indexed teeth to represent the whole mouth.

However, there are some limitations to this study. The study was conducted with a specific group of Thai population, most of them were moderate to high SES. Moreover, our definition of low income[19] may not accurately reflect "low income" in Thailand, which is likely to be lower. Therefore, the generalization might be limited. Next, most of the included participants received the dental services at the provided health section of the EGAT enterprise. The reported association between self-awareness and dental visit might be biased. Finally, to justify self-awareness based on only one question. Even though this study used interview question, the perception of participants could be different from the interviewers, mis-interpretation of the question was still possible.

Conclusion

This study showed that periodontitis self-awareness in Thai adults was poor. Individuals with older age, lower educational level, and lower income were more likely to be unaware of periodontitis. Periodontal health promotion should be emphasized in Thailand, especially for older people with low SES.

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