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Original Article

The Association Between Oral Health Literacy and Oral Health Behaviors Among Thai Older Adults in Health Region 6, Thailand

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Abstract

Background: Older individuals are susceptible to oral diseases, which are among the most prevalent diseases worldwide. Proper oral health behaviors (OHB) can prevent or manage most oral diseases.

Objective: To investigate the associations between oral health literacy (OHL) and OHB among older adults in Eastern (Health Region 6) Thailand.

Methods: A cross-sectional study was conducted to collect data from 385 older adults. A multistage sampling technique was used for sample selection. The questionnaires comprised 3 sections, including demographic characteristics, an OHL questionnaire, and an OHB questionnaire. Data was obtained through face-to-face interviews with participants. Multiple logistic regression was used to analyze variables that were associated with OHB.

Results: A total of 385 older adults, with a mean (SD) age of 64.78 (3.03) years, participated in the study. Only 32.2% demonstrated good OHB. In the adjusted models, good OHB scores significantly correlated with secondary school education level (OR [95% CI], 3.20 [1.62-6.45]), bachelor's degree and higher education level (OR [95% CI], 1.73 [1.01-2.98]), ever receiving oral health information (OR [95%CI], 2.53 [1.13-6.19]), alcohol drinking (OR [95% CI], 0.24 [0.07-0.70]) and an adequate level of OHL within 2 of 6 domains: media literacy (OR [95% CI], 1.73 [1.11-2.70]) and self-management skill (OR [95% CI], 2.45 [1.53-3.96]).

Conclusions: This study revealed that older adults in Health Region 6 have a low OHB level. Therefore, it is essential to increase the appropriate promotion of OHB, with behavioral modification programs for improving OHL, particularly in the areas of media literacy and self-management skills.

Keywords: Oral health behaviors, Oral health literacy, Older adults, Thailand

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Introduction

One of the most prevalent diseases and one of the main health concerns worldwide is poor oral health, particularly among older people.[1] Oral diseases are an important factor affecting their overall health and quality of life.[2, 3] Common oral health problems in older adults are periodontal disease, dental caries, tooth loss, xerostomia, and oral precancerous and cancerous conditions.[4] Poor oral health among older people can negatively affect daily activities, leading to impaired chewing, nutritional deficiencies, social relations, and loneliness.[1, 5] According to the World Health Organization (WHO), oral diseases are among the most common noncommunicable diseases worldwide, and they are related to a range of chronic diseases, such as diabetes mellitus, cardiovascular disease, certain cancers, and pneumonia.[6]

Oral health behaviors (OHB) clearly influence oral diseases, and an increase in good oral health behaviors leads to a decrease in their prevalence rate.[7, 8] The Encyclopedia of Public Health describes oral health behavior as a complex interplay of oral hygiene habits, nutritional preferences, and the pattern of a person's utilization of dental services, all of which affect individual oral health.[9] Ou et al[10] investigated older adult Chinese oral health behaviors and found that individuals who had never used dental floss and had irregular dental check-ups have a lower number of remaining teeth than those who floss at least once a day and have frequent dental check-ups. Likewise, Pan et al[11] investigated adult Taiwanese oral health behaviors and found that individuals who had never used dental floss have a lower number of remaining teeth than those who floss at least once a day.

Maintaining functional teeth is critical for supporting healthy aging. Successful oral aging is associated with adequate function and comfort. Older adults retaining more than or equal to 20 teeth are less likely to experience poorer health.[12] According to a 2023 report from the Thailand National Oral Health Survey (TNOHS), a nationally representative oral health survey, 48.6% of Thais aged 60-74 years in Eastern (Health Region 6) Thailand had at least 20 active permanent teeth, compared to the country's average of 60.9%. The report also found that older adults were experiencing oral health problems, due mainly to improper oral health behaviors, such as not brushing teeth before bed without eating any food, not using brushing accessories, and not getting dental services at least once a year. It is the leading cause of tooth loss in older adults. The older adults have improper OHB, limited access to oral health services, and communication problems with dentists.[13]

Oral health literacy (OHL) is correlated with poor OHB, as suggested by Alzeer et al.[14] They found that adolescents in the Kingdom of Saudi Arabia with low OHL often have inappropriate OHB. Further, OHL has been suggested to be associated with oral health status such as those proposed by Adil et al.[15] They found that parents' OHL scores were significantly associated with dental caries in Malaysian children. Low OHL has been identified as a major barrier to dental care, such as dental service utilization, daily brushing frequency, and urgent care utilization for a dental problem.[16, 17]

Oral health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions.[18] According to this definition, OHL for older adults is very crucial because it may influence their oral health. Inadequate oral health literacy leads to reduced utilization of services, poor outcomes, improper behaviors, and increased risk of oral disease.[19, 20] Improving OHL is essential for enhancing oral health outcomes and reducing disparities.[21] For that reason, investigating the associations between OHL and OHB in older adults is essential.

Some factors, such as socioeconomic conditions, that influence individuals' OHB for the prevention and control of oral disease are unmodifiable.17 On the other hand, the 6 competencies and skills of individuals for promoting oral health literacy — access skills toward oral health information and services, cognitive skills, communication skills, self-management skills, media literacy skills, and decision-making skills — are all modifiable factors that can be improved to serve as a strategy for the prevention of oral disease.[22, 23] Accordingly, measuring and identifying the association between these modifiable variables might be of significant help in improving oral health. Older adults had a high prevalence of limited oral health literacy[24] although research into and promotion of the dimensions of

oral health literacy in older adults is still scarce, and the association between OHB and associated factors remains inadequately investigated.

According to the TNOHS 2023 report, there was a high prevalence of oral disease among older adults, as well as a lack of information on the efficacy of oral health programs. Therefore, this study aimed to investigate the associations between OHL and OHB among older adults in Eastern (Health Region 6) Thailand. This study has provided essential data for organizing an improved OHL program to improve individuals' adoption of proper OHB.

Methods

Participants and Setting

This research was a cross-sectional study that was conducted in the Eastern (Health Region 6) Thailand. The sample size was calculated using a finite population for testing proportions with a 95% confidence level.[25] The sample size was 369, and after adjusting the sample size for a dropout rate of ten percent,[26] the final sample size was 406. A multistage sampling technique was used for selecting the sample units. Based on a Gross Provincial Product (GPP) level that represents economic and social indicators at the provincial level, the 8 provinces in the Eastern (Health Region 6) Thailand were divided into 2 groups: high and low.[27] One province was randomly selected from each GPP province group. In the second step, 2 distinct individuals were randomly selected to represent the province. In the third step, the research was performed at a health-promoting hospital run by the Ministry of Public Health, where oral hygienists could provide services. Participants were selected through consecutive sampling. After the data had been organized and verified, participants were then selected from 4 districts across high GPP, which was Chon Buri, and low GPP, which was Chanthaburi province.

Instruments

An interview questionnaire was used to collect research information. In the process of data collection, the trained interviewers collected data on demographic characteristics, OHB, and OHL variables through face-to-face interviews while participants were waiting to receive typical health services at a health-promoting hospital, and the duration of each interview was approximately 20 minutes. The questionnaire consisted of 3 sections. The first section collected demographic characteristics about the participants, including gender, age, marital status, education level, occupation, financial status, chronic health conditions, smoking, alcohol consumption, betel nut use, receiving information about dental health, and experience with the replacement of natural teeth.

The second section of the questionnaire was an OHL questionnaire, adapted from the previous study by Jittimanee et al.[22] The OHL questionnaire was a comprehensive assessment tool for identifying self-perceived oral health care competencies. This study developed 6 domains of OHL for the older Thai adult population: 1) cognitive skills; 2) accessing skills; 3) communication skills; 4) self-management skills; 5) media literacy skills; and 6) decision-making skills regarding oral health. The scale comprised 35 items with a rating scale. Oral health literacy scores were interpreted and classified in terms of percentile 75, with inadequate OHL (< percentile 75) and adequate OHL (≥ percentile 75).[28, 29]

The third section of the questionnaire was the oral health behaviors questionnaire, which was modified from the 8th Thailand Oral Health Survey 2017 to be suitable for the context of older adult people living in Thailand.[30] The questionnaire focused on oral

hygiene habits, nutritional preferences, and utilization of dental services.[7,9] The questionnaire comprised 13 items, and older adult participants could choose only one answer for activities they did during the previous week. The questionnaire was characterized by the scale levels: always practiced (5-7 times/week), sometimes practiced (2-4 times/week), and never practiced. The following classification was applied to the scoring criteria: The scores of 32-39 indicated good oral health behaviors, while the scores of 13-31 indicated low oral health behaviors that required improvement.

In a pilot study, the overall questionnaires were tested on 30 older adult people from the Eastern (Health Region 6) Thailand who had similar characteristics. This study conducted a reliability test on sections 2-3 of the questionnaires, achieving Cronbach's α coefficients of 0.83 and 0.86, respectively. Three experts in oral health behavioral research qualified the questionnaire to confirm its validity and comprehensiveness, with the item-objective congruence index (IOC) showing content validity above 0.5.

Statistical Analysis

Statistical analysis was performed using the Jamovi version 2.3.28 program software package. This study used percentage and mean (SD) in descriptive statistics, and analyzed with multiple logistic regression using the enter method to identify the independent variables associated with oral health behaviors. The initial univariate analyses led this study to include variables with a *P* value of less than .25 in the multivariate analysis. As a result, the final model was considered significant with a *P* value less than .05.

Results

Demographic Data and Clinical Characteristics

A total of 385 older adults participated, the mean (SD) age of participants was 64.78 (3.03) years, and over half of them were female (72.7%). Most participants (71.4%) were uneducated or obtained only primary school education, and 65.7% were married. Just over a third (46.0%) of participants had self-reported sufficient income. For health behaviors, 14.3% smoked cigarettes, 8.8% used betel nuts, and approximately one fifth of participants drank alcohol. The majority (91.7%) had received oral health information (Table1).

Table 1. General Characteristics of Participants

Characteristic	No. (%)
Gender	
Female	280 (72.7)
Male	105 (27.3)
Age, y	
60-64	169 (43.9)
65-69	216 (56.1)
Marital status	
Single	50 (13.0)
Married	253 (65.7)
Separated/divorced/windowed	82 (21.3)

Table 1. General Characteristics of Participants (Continued)	
Characteristic	**No. (%)**
Education level	
Uneducated and primary school	275 (71.4)
Secondary school	65 (16.9)
Bachelor's degree and higher	45 (11.7)
Occupation	
Agriculturists	97 (25.2)
Personal business	163 (42.3)
Unemployed/retired	125 (32.5)
Financial status	
Insufficient	103 (26.7)
Sufficient, but no savings	177 (46.0)
Sufficient and savings	105 (27.3)
History of chronic disease	
No	142 (36.9)
Yes	243 (63.1)
Smoking	
No	330 (85.7)
Yes	55 (14.3)
Alcohol drinking	
No	312 (81.0)
Yes	73 (19.0)
Betel nut use	
No	351 (91.2)
Yes	34 (8.8)
Experience for the replacement of natural teeth	
Never	196 (50.9)
Ever	189 (49.1)
Receiving information about dental health	
No	32 (8.3)
Yes*	353 (91.7)
By village health volunteers	100 (28.3)
By family member/relatives	56 (15.9)
By friends	26 (7.4)
By health personnel	239 (67.7)
By online media	92 (26.1)

* Each participant could select more than 1 option.

The majority of participants (75.1%) had inadequate OHL and the mean (SD) score of OHL was 100.44 (19.04). In terms of OHB, the majority of older adults (67.8%) demonstrated OHB at low level and the mean (SD) score of OHB was 29.23 (4.49) (Table 2).

In multivariate analysis, the results from the final model showed that the significant variables associated with good oral health behaviors were education level, alcohol consumption, receiving oral health information, and 2 domains of oral health literacy (self-management skills and media literacy skills). Older people with a secondary school education level were 3.20 times more likely to have good oral health behaviors than those with uneducated and primary levels (OR [95% CI], 3.20 [1.62-6.45]; *P* = .001). The results also showed that older people who were alcohol drinkers were less likely to have good oral health behaviors than those in the reference group (OR [95% CI], 0.24 [0.07-0.70]; *P* = .013). Older people who had ever received oral health information were 2.53 times more likely to have good oral health behaviors than those who had never received oral health information before (OR [95% CI], 2.53 [1.13-6.19]; *P* = .030). In addition, older people with adequate self-management skills and media literacy skills were 2.45 (95% CI, 1.53-3.96; *P* < .001) and 1.73 (95% CI, 1.11-2.70; *P* = .015) times more likely to have good oral health behaviors than those in the reference group, respectively (Table3).

Table 2. Oral Health Literacy and Oral Health Behaviors of Older Adults

Variable	No. (%)
Oral health literacy	
Inadequate (score ≤ 112)	289 (75.1)
Adequate (score > 112)	96 (24.9)
Mean (SD) [range], score	100.11 (19.04) [33-135]
Cognitive skills	
Inadequate (score ≤ 8)	232 (60.3)
Adequate (score > 8)	153 (39.7)
Mean (SD) [range], score	7.98 (1.59) [1-10]
Accessing skills	
Inadequate (score ≤ 20)	256 (66.5)
Adequate (score > 20)	129 (33.5)
Mean (SD) [range], score	18.56 (4.38) [5-25]
Communication skills	
Inadequate (score ≤ 16)	288 (74.8)
Adequate (score > 16)	97 (25.2)
Mean (SD) [range], score	14.55 (3.75) [4-20]
Self-management skills	
Inadequate (score ≤ 25)	280 (72.7)
Adequate (score > 25)	105 (27.3)
Mean (SD) [range], score	22.94 (4.58) [6-30]

Table 2. Oral Health Literacy and Oral Health Behaviors of Older Adults (Continued)	
Variable	**No. (%)**
Media literacy skills	
Inadequate (score ≤ 23)	221 (57.4)
Adequate (score > 23)	164 (42.6)
Mean (SD) [range], score	20.85 (6.33) [6-30]
Decision-making skills	
Inadequate (score ≤ 17)	282 (73.2)
Adequate (score > 17)	103 (26.8)
Mean (SD) [range], score	15.56 (3.34) [4-20]
Oral health behaviors	
Low (score ≤ 31)	261 (67.8)
Good (score > 31)	124 (32.2)
Mean (SD) [range], score	29.23 (4.49) [15-39]

Table 3. Univariate and Multivariate Logistic Regression Analyses of Oral Health Behaviors of Participants

Variable	Good OHB, No. (%)	Univariate Analysis		Multivariate Analysis	
		Crude OR (95% CI)	*P* Value	Adjusted OR (95% CI)	*P* Value
Education level					
Primary school	73 (58.9)	1 (Reference)	NA	1 (Reference)	NA
Secondary school	25 (20.1)	3.78 (1.97-7.24)	< .001	3.20 (1.62-6.45)	.001
Bachelor's degree or higher	26 (21.0)	2.18 (1.01-4.74)	.047	1.73 (1.01-2.98)	.045
Alcohol drinking					
No	108 (87.1)	1 (Reference)	NA	1 (Reference)	NA
Yes	16 (12.9)	0.53 (0.29-0.96)	.039	0.24 (0.07-0.70)	.013
Receiving oral information					
No	3 (2.4)	1 (Reference)	NA	1 (Reference)	NA
Yes	121 (97.6)	5.04 (1.50-16.88)	.009	2.53 (1.13-6.19)	.030
Oral health behaviors					
Self-management skill					
Inadequate	68 (54.8)	1 (Reference)	NA	1 (Reference)	NA
Adequate	56 (45.2)	3.56 (2.22-5.70)	< .001	2.45 (1.53-3.96)	< .001
Media-literacy skill					
Inadequate	50 (40.3)	1 (Reference)	NA	1 (Reference)	NA
Adequate	74 (59.7)	2.81 (1.81-4.36)	< .001	1.73 (1.11-2.70)	.015

Abbreviations: NA, not applicable; OHB, oral health behaviors.

Discussion

A majority of the participants (67.8%) demonstrated OHB at low level, which included not flossing daily, performing oral self-examination, limiting sugar intake, and not getting regular checkups. However, they had good OHB, such as brushing their teeth with fluoride toothpaste, and brushing their teeth twice daily. Additionally, this study revealed the variables significantly associated with good oral health behaviors were education level, alcohol consumption, receiving oral health information, and 2 domains of oral health literacy (self-management skills and media literacy skills).

This study's findings about the OHB of participants were in agreement with a study conducted among older adults in Nakhon Pathom by Subbowon,[31] where only 18.4% of the older adults underwent annual check-ups or oral examinations. This might have been due to increased medical expenses, long wait times, and fear of COVID-19 infection, which could hinder regular checkups.

This study found a substantially significant association between oral health behavior level, demographic characteristics, and some domains of oral health literacy among older adults in Thailand.

In terms of demographic characteristics, the study found that education level, receiving oral health information, and drinking alcohol had statistically significant associations with oral health behaviors. This was similar to reports by Piyakhunakorn et al[32] and Khamrin et al[24] who have reported that higher education levels may lead to good oral health behaviors, but education alone is not a reliable predictor of these behaviors. Therefore, to encourage older adults to manage their oral health care effectively, oral health care professions should provide simple, understandable, and context-appropriate information, ensuring they can make informed decisions about their oral health.

A study found a significant relationship between oral health information and older adults' oral health behaviors. This agreed with a study conducted in older adults by Kongsri[33] in Khon Kaen. They found that social support influenced the older adults' attitude towards oral healthcare and self-management skills. Limited access to dental health information led to inappropriate behaviors and increased oral health problems. The increasing trend of older adult people using the internet, particularly on personal smartphones, can increase the potential to actively collect oral health information.[13, 34] Therefore, incorporating oral health information into social media and enhancing information search skills can foster and sustain healthy oral health habits in older adults.

This study found a significant correlation between alcohol consumption and oral health behaviors, leading to increased oral health issues.[35] Alcohol drinkers may experience psychological effects and personality changes, affecting the patient-dentist relationship, leading to reduced interest in dental care and noncompliance. Additionally, alcohol dependents may experience dry mouth at night and neglect both personal and professional oral health care, increasing their risk of caries.[31, 35] Therefore, obtaining an alcohol history is crucial for effective preventative measures.

In terms of OHL, the majority of the participants (75.1%) demonstrated OHL at an inadequate level. This was is consistent with the study by Khamrin et al[24] that investigated oral health literacy, self-efficacy, social support, and factors associated with the oral health behaviors of older adults in the rural areas of northern Thailand. That research found that the participants (85%) had OHL at inadequate level. However, this study differed from the result of Piyakhunakorn et al[32] that studied the associations

between OHL and OHB among community-dwelling older adults in Thailand. That study found just over half of the participants (51.3%) had OHL at high level.

This study examined 6 competencies and skills for promoting oral health literacy: cognitive skills, accessing skills, communication skills, self-management skills, media literacy skills, and decision-making skills. This study aimed to measure and identify the association between these domains of oral health literacy and oral health behaviors to improve oral health behaviors among older adults in Eastern Thailand. This study's analysis of factors revealed that self-management skills, media literacy skills, and 2 domains of oral health literacy, significantly correlated with oral health behaviors.

This study's finding about OHL of participants were in agreement with a study by Li et al,[36] that investigated adolescents' Chinese oral health self-management ability. That study found that the poor oral health self-management ability of adolescents was due to lack of awareness, lack of knowledge, and inability to solve oral problems. Self-management skills are crucial for managing symptoms, treatments, and oral health behaviors, enhancing dental care, and preventing problems. Furthermore, it is considered that adolescents usually take responsibility for personal care such as oral hygiene care, making decisions about eating meals during school hours and reporting abnormality or a symptom related to their teeth. It is evident that OHL appears to impact effective self-care oral behaviors in adolescents and older populations. Inadequate self-management skills among older adults can lead to decreased decision-making and increased oral health problems. Further, this study found that media literacy had statistically significant associations with oral health behaviors. This was similar to reports by Geraee et al[37] who investigated an adolescent Iranian media literacy training program. That study found media literacy training programs were effective on the participants' knowledge and behavioral intention. Therefore, encouraging older adult individuals to recognize the importance of self-management and media literacy skills can help develop good OHB, enhancing their ability to independently manage care. It is essential to enhance the promotion of appropriate OHB. Behavioral modification programs should be implemented to improve OHL, particularly in the areas of self-management and media literacy skills.

To the best of this study team' knowledge, this was the first study performed in the Health Region 6 assessing OHL and its association with the OHB. This study has provided essential data for organizing an improved OHL program to improve individuals' adoption of proper OHB. Additionally, the OHL questionnaire used in this study is an instrument that measures all 6 competencies and skills of individuals for promoting OHL and is suitable for the context of older adult people living in Thailand. However, there were limitations. Initially, the variable outcomes reported in this study are specific to oral health behaviors; so future research could concentrate on other outcomes, such as oral health status. The second limitation is this study used self-reported questionnaires, which are prone to bias due to participants forgetting some information.

Conclusions

This study has revealed that the older adults in Thailand have low levels of OHB. A statistically significant association was found between oral health behavior and 2 domains of OHL. Therefore, it is essential to enhance the promotion of appropriate OHB through behavioral modification programs aimed at improving OHL, particularly in media literacy and self-management skills.

Additional Information

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Ethics Approval: This study was conducted under the highest ethical standard as outlined by the Burapha University-Institutional Review Board for Protection of Human Subject in Research (BUU-IRB), Thailand (IRB3-021/2565 on 21 March 2022). The participants' identifying information remained confidential throughout.

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