Oral Health Status and Oral Dryness of Elderly Dementia Patients

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Abstract

To study oral health status and oral dryness and their relationship in the elderly dementia patients.

Fifty-two elderly dementia patients who were currently treated at Sawanpracharak Hospital, Thailand were participated in this cross-sectional descriptive research. Demographic information, oral health status and oral dryness were collected by means of oral examination and a questionnaire. Descriptive statistics and Chi - Square Test followed by The Fisher's Exact Test were used for statistical analysis at $p<0.05$.

The mean age of these dementia patients was 72.3 years old. Forty-three patients were dentate with 18.1 remaining teeth/person. On average, there were 6.0 decayed teeth/person, 1.3 filled teeth/person and 13.4 extracted teeth/person. The DMFT scores were 20.5 on average/person. The mean plaque scores were 86.9% and the most patients had mild oral dryness (Mean CODS = 2.8 per person). Statistical analysis showed that types of dementia and oral dryness had a significant relationship.

This study revealed that tooth decay, tooth filing, tooth extraction and DMFT scores in elderly dementia patients were higher than those of general elderly population. All of them had "poor" plaque score level. Most elderly dementia patients had mild oral dryness and types of dementia was significantly related to oral dryness.

Clinical article (J Int Dent Med Res 2020; 13(3): 1059-1064)

Keywords: Oral health status, Oral dryness, Elderly, Dementia, The clinical oral dryness score, Xerostomia.

Received date: 17 June 2020 **Accept date:** 22 July 2020

Introduction

The number of elderly persons all over the world is substantially increasing. In 2017, 962 million elderly persons were accounted for 12.7% of the world populations.[1] With aging, human bodies undergo degenerative changes and suffer from various congenital/systemic diseases. Dementia is one of abnormalities that is commonly found among the elderly persons. Currently, up to 50 million patients are negatively affected by dementia.[2]

Dementia is a syndrome in which there is deterioration in memory, thinking, behavior and the ability to perform everyday activities. There are many different forms of dementia. Alzheimer's disease is the most common form.

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Other major forms include Vascular dementia, dementia with Lewy bodies and a group of diseases that contribute to Frontotemporal dementia.[2] Good oral health status leads to good quality of life of dementia patients.[3-7] However, dementia can impact hand dexterity and coordination. As a result, elderly dementia patients may not be able to take care of their teeth and oral tissue as clean as the others resulting in unhealthy oral condition.[8,9] Additionally, having other diseases makes patients pay attention to those diseases rather than oral hygiene. Oral dryness is directly associated with dementia medication.[10] Furthermore, the dementia patients may experience oral dryness due to the aging of the patients which lead to shriveling of the acinus cells or ductal cells of salivary gland and more mucous production.[11-13] These patients are more susceptible for dental caries, periodontal disease, higher potential of tooth loss and reduction of food appetite, dining, chewing and swallowing ability of the patients.[12,14,15]

Currently, studies investigated the oral health status and oral dryness of the elderly dementia patients in Thailand are limited. Therefore, this current study aims to explore the oral health status, oral dryness and their relationship of these patients who had treatment at Sawanpracharak Hospital, Thailand. Information obtained from this study would be beneficial for policy development/improvement in order to provide the appropriate oral health care program for these patients especially in where this study is implemented.

Materials and methods

This study was approved by Naresuan University Ethical Committee, Phitsanulok, Thailand (IRB Number 0225). All participants were voluntarily signed the inform consent prior to participate in the study.

This study is cross-sectional descriptive research conducted with a questionnaire as well as evaluation of oral health status and oral dryness. Fifty-two patients who are at least 60 years old and diagnosed with dementia were participated in this study. This study was conducted at Sawanpracharak Hospital, Nakhonsawan Province, Thailand during June to December 2019.

The questionnaire includes demographic information and dementia related information such as types, severity and medication used. The IOC (Index of Item-objective Congruence) which is used to test the accuracy and content validity of the questionnaire was examined by 3 experts.

Oral health examination comprised of the number of permanent teeth, decayed teeth, filled teeth and extracted teeth. The full mouth plaque record was also performed by macroscopically examining dental plaque of all remaining teeth (except for the 3rd molar) around gingival margin from mesial to distal side of buccal and lingual surfaces without gram staining . Plaque score on each side was 1 when plaque could be seen macroscopically or when it was seen using periodontal probe. Plaque score was 0 when no plaque was found. The total plaque score is further calculated based on the percentage of position of the plaque that was found. These plaque scoring data were used to categorize oral hygiene of the patients as follows: good (0-20%), fair (>20-40%) and poor (more than 40%).[16]

Oral dryness was evaluated according to the clinical oral dryness score (CODS) from 10 clinical characteristics as follows: 1.mirror sticks to buccal mucosa, 2.mirror sticks to tongue, 3.frothy saliva, 4.no saliva pooling in floor of mouth, 5.tongue shows loss of papillae, 6.altered/smooth gingival architecture, 7.glassy appearance of other oral mucosa, especially palate, 8.tongue lobulated/fissured, 9. active or recently restored (last 6 months) cervical caries (> 2 teeth), and 10.Debris on palate (excluding debris under dentures)

The severity of oral dryness were categorized based on 10 clinical characteristics into 3 levels as follows: mild oral dryness (1-3 characteristics), moderate oral dryness (4-6 characteristics) and severe oral dryness (7-10 characteristics).[17]

Statistical analysis

Demographic information of the patients, oral health status and oral dryness were analyzed with descriptive statistics including mean, standard deviation (SD), percentage and ratio. The relation between dementia and oral dryness was analyzed with Chi - Square Test and The Fisher's Exact Test at $p<0.05$.

Results

Part 1: Demographic information and dementia data of the samples

The samples participating in this research included 52 patients consisting of 53.8% females and 46.2% males. Their age ranged from 60-88 years old with the average age of 72.3 years old. Most patients had primary education, followed by below primary education (34.6%) and higher than primary education (23.2%), respectively (Table 1). The most common dementia was Alzheimer's disease accounted for 65.4% and the most severity of the dementia was at mild level (46.2%) followed by moderate level (40.4%) and severe level (13.4%), respectively. This study found that the only medication used to treat the dementia patients accounted for 80.8% was Donepezil and 19.2% did not take dementia medication (Table 2).

Part 2: oral health status of the samples

Nine patients were complete edentulism and 43 patients were dentate. The average teeth/person was 18.1 with 6.0 decayed teeth, 1.3 filled teeth and 13.4 extracted teeth. The

mean DMFT scores were 20.5 /person. All dentate patients had poor plaque score level with mean plaque score at 86.9% per person (Table 3).

Description	Number	Percentage
Sex		
Male	24	46.2
Female	28	53.8
Education		
Below primary level	18	34.6
Primary level	22	42.3
Above primary level	12	23.1
Average age (SD)	72.3	5.8
Lowest-highest age	60-88	(SD = 8.3)

Table 1. Demographic information of the samples **(n = 52).**

Description	Number	Percentage
Types of dementia		
Alzheimer's disease	34	65.4
Vascular dementia	15	28.8
Others	3	5.8
Dementia severity level		
mild	24	46.2
moderate	21	40.4
severe	7	13.5
Medication for dementia treatment		
Yes (Donepezil)	42	80.8
No	10	19.2

Table 2. Dementia condition of the samples **(n = 52).**

Description	Number (person)	Remaining teeth	Decayed	Filled	Missing	Decayed,missing filled teeth
Condition of remaining teeth	43	18.1(7.1)	6.0(5.9)	1.3(1.9)	13.4(7.1)	20.5(7.7)
Mean plaque score = 86.9 % (18.2) / person						

Table 3. Tooth condition of the samples (patients were dentate (n= 43)).

Part 3: Oral dryness of the samples

Most patients had mild oral dryness (57.7%), followed by moderate oral dryness (23.1%), no oral dryness (15.4%) and severe oral dryness (3.8%), respectively. The mean clinical oral dryness score (CODS) of the samples was 2.8/ person (Table 4).

Description	No dryness		Mild dryness		Moderate dryness		Severe dryness	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
All samples	8	15.4	30	57.7	12	23.1	2	3.8
Mean CODS = 2.8 (1.8)								

Table 4. Oral dryness of the samples **(n = 52).**

Part 4: Relation between dementia and dryness

Table 5 showed the types of dementia in relation to the oral dryness. Chi-Square Test and the Fisher's Exact Test revealed significant relationship between types of dementia and oral dryness (p=0.002).

	Oral dryness		Total
	No-mild oral dryness	Moderate-severe oral dryness	
Type of dementia			
Alzheimer's disease	30	4	34
Other dementias	8	10	18
Total	38	14	52

Table 5. Distribution of oral dryness and types of dementia**.**
Fisher's Exact Test, Exact Sig. (2 – sided) = 0.002.

Table 6 showed the severity of dementia in regard to the oral dryness. The hypothesis testing for relationship between severity of the dementia and oral dryness using Chi-Square Test demonstrated p-value of 0.556 indicating no significant relationship.

	Oral dryness		Total
	No- mild oral dryness	Moderate-severe oral dryness	
Severity of dementia			
Mild	16	8	24
Moderate	17	4	21
Severe	5	2	7
Total	38	14	52

Table 6. Distribution of oral dryness and severity of dementia.
Chi – Square = 1.173 Sig. = 0.556

Table 7 revealed the degree of oral dryness (no-mild and moderate-severe) and the medication used to treat dementia (Donepezil and no medication). Statistical analysis showed no significant correlation between those two factors (p=1.00).

	Oral dryness		Total
	No-mild oral dryness	Moderate-severe oral dryness	
Medication for dementia treatment			
No	7	3	10
Yes (Donepezil)	31	11	42
Total	38	14	52

Table 7. Testing of relation of medications for dementia treatment and oral dryness.
Fisher's Exact Test Exact Sig. (2 – sided) = 1.000.

Discussion

The results of this study showed the slightly higher prevalence of female dementia patients than male[18,19] with average age of 72.3 years old. Similarly, other studies also revealed the early 70's year of age as the average age of dementia patients including a study conducted in Chiang Mai Neurological Hospital and in Nakhonsawan Province, Thailand that had the average age of dementia patients at 75.5 years old[19] and 73.6 years old[20] respectively. In the current study, most dementia patients had levels of education at primary education and lower, which were in agreement with a number of studies, finding that most dementia patients had below primary level of education at.[21,22] This finding suggests the level of education as risk factor affecting the dementia condition when the samples were aged.[23]

In this work, the most common dementia in the samples was Alzheimer's disease, followed by Vascular dementia. The literatures found the same results that Alzheimer's disease was the most common dementia accounted for 50 – 75% of dementia and Vascular dementia as the second most common dementia found approximately 20% of the dementia cases.[24,25] The severity of dementia was mostly at mild level which was in accordance with the study of Zimmerman et al in 2014.[26] Most patients (80.8%) received Donepezil; an anticholinesterases drug as a medication for dementia treatment. Donepezil inhibits elimination of acetylcholine around synaptic cleft leading to the increasing number of this substance, and Donepezil was an effective treatment for the patients who have mild to severe dementia.[27]

Moreover, these samples had similar average number of teeth/elderly persons according to the national-level survey in Thailand and had average tooth decay, tooth filling, tooth extraction and Decayed, Missing and Filled Teeth index (DMFT) higher than general elderly persons according to the natural oral health status survey.[28] This finding was consistent with the study of Foley et al that dementia patients had fewer teeth but higher DMFT and tooth decay than those who had no dementia.[8]

According to the full mouth plaque record, the dentate samples had plaque score higher than 40%, which was at poor level. This finding was in accordance with several studies, evaluating oral hygiene of the dementia patients that showed significantly worse oral hygiene in dementia patients than the non-dementia patients.[29-32] In addition, the data from oral hygiene evaluation with standard instruments in a number of literatures demonstrated that dementia patients had significantly lower oral hygiene score that those without dementia.[4,31-35] Meanwhile, the oral health examination of the dementia patients from the start of dementia treatment showed that regular checkup and proper care of oral health could prevent any oral diseases, and this was what should be properly done for the dementia patients.[36]

This research demonstrated that 15.4% had no oral dryness and 84.6% had oral dryness divided as mild oral dryness (57.7%), moderate oral dryness (23.1%) and severe oral dryness (3.8%). Other studies reported the feeling of oral dryness of both dementia and non-dementia patients. In dementia patients, 9.1-45% felt dryness of their mouth while 8.4-20% of the non-dementia patients felt oral dryness.[37-39] In this study, the number of oral dryness was higher than because it was based on the clinical assessment, not subjective symptom reported from patients. For example, the patients who had mild oral dryness may not feel that they had oral dryness but the clinical examination may show the opposite results. Several studies reported the reduction of unstimulated salivary flow rate of dementia patients compared to the normal individual.[38,40] Additionally, it was discovered that stimulated salivary flow rate from submandibular salivary gland was higher than that of the Alzheimer's disease group.[11] Reduction of salivary flow rate has direct effects on oral clearance and oral hygiene, leading to increase susceptibility to dental caries, worsen periodontal disease and high potentials of tooth loss. Oral dryness also affects food appetite, dining, chewing and swallowing.[41] To maintain good oral health status, the patients need to be regularly monitored to examine subjective and objective symptoms and consult a dentist if needed. The clinical oral dryness scoring system (CODS) can be re-evaluated to recognize oral dryness levels of the patients whether it remains the same and the necessary treatment should be accomplished.[42]

After finding relation between dementia and oral dryness, the researcher observed the

association between types of dementia and oral dryness. This relationship was in agreement with Warren's study in 1997. Oral dryness among patients with other types of dementia other than Alzheimer's disease was different from the oral dryness of Alzheimer disease patients.[39] Although different types of dementia lead to distinct oral dryness condition, the patients having any types of dementia had more oral dryness than the group without dementia.[37,38] Therefore, whatever types of dementia patients have, the dentists should pay attention to evaluate oral dryness/oral health and take care of the oral condition of patients having dementia of all kinds.

This study discovered no relation between the severity of dementia and oral dryness, which was contrary to numerous research studies. Those studies reported that the more severe the dementia was, the more severe the oral dryness depending on the time of having this disease and the duration of medication taken for dementia treatment.[43,44] The contradictory results of this study may possibly be because the distribution of sample size in three types of dementia severity was not equal, where patients in the severe type were fewer than the mild and moderate severity.

No relationship between medications for dementia treatment and oral dryness was observed in this study. This finding differs from several studies in which the Anticholinesterases drug (i.e. Donepezil) resulted in oral dryness.[43,44] It was probably because of other factors such as age, other systemic disease and the medication use apart from dementia medication that may cause oral dryness.[10]

Conclusions

Oral health status of the samples in this study showed that they had tooth decay, tooth filling, tooth extraction and DMFT higher than general elderly persons and all of them had poor oral hygiene. Most samples had mild oral dryness and types of dementia was related to oral dryness.

Declaration of Interest

The authors report no conflict of interest.

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