

TOOTH LOSS AND RISK FACTORS AMONG ELDERLY VIETNAMESE

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ABSTRACT

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Introduction: Oral health care systems for older people tend to be reducing tooth loss and saving functional dentition. Elderly Vietnamese had to live under challenging conditions and were not entitled to any dental care for over 30 years due to the Vietnam War. The aim of the current study was to investigate tooth loss and related risk factors among elderly Vietnamese aged 65-74.

Methodology: The sample study was 258 elderly Vietnamese aged 65-74 years old. Each absent tooth was registered as a tooth loss. Risk factors were evaluated based on the Oral Health Questionnaire for adults (WHO, 2013).

Results: The mean tooth loss for the sample was 7.6 (± 7.0). 27.1% of participants had lost 1-3 teeth, 23.6% 4-6 teeth, 27.1% 7-16 teeth and 13.6% >16 teeth; 8.5% had full dentition. Within each category of predictors, a statistically higher number of lost teeth was found for: the 70-74 age group (Mean \pm SD, 8.8 \pm 7.9); rural residents (8.8 \pm 7.6); time in education ≤ 5 years (10.2 \pm 7.7); frequency of teeth cleaning ≤ 1 time/day (8.7 \pm 7.3); last visit to dentist > 1 year ago (8.2 \pm 7.5); tobacco smoking (9.4 \pm 7.6); no alcohol drinking (8.3 \pm 7.2). The odds of having >6 lost teeth was significantly more frequent among elders with less time in education (OR=2.2, $p < 0.01$) and tobacco smoking (OR=2.8, $p < 0.01$).

Conclusion: There are high prevalence and number of tooth loss among elderly Vietnamese. Smoking behaviour and time in education were significantly related to maintaining teeth of the elderly community population.

Keywords: elderly, oral health, risk factors, tooth loss, Vietnamese.

1. Introduction

The World Health Organization (WHO) has called for improved oral health among the elderly who are most disposed to oral diseases, including tooth loss. It is estimated that no less than 90% of the elders are influenced by tooth loss¹.

According to the WHO, the main aims of oral health care systems for older people are reducing tooth loss and saving functional dentition with at least 20 natural teeth. Tooth loss often has an adverse impact on quality of life and general health^{2,3}. Posterior tooth loss results in impaired masticatory performance and temporomandibular disorders, and anterior tooth loss influences social communication owing to reduced aesthetics³⁻⁶.

Risk factors for tooth loss have been extensively studied. Among health behaviours, several studies

have shown that tobacco smoking results in higher tooth loss^{7,8}. Others have found that insufficient income can impede oral health care leading to tooth loss^{5,9}. Also, the educational background may affect individuals' perception of the importance of oral health behaviours and could be the primary cause of tooth loss among the elders^{2,9,10}.

During the twentieth century, Vietnam faced a lot of hardship owing to the Vietnam War. People born in pre-1951 had to live under challenging conditions and were not entitled to any dental care for over 30 years. Furthermore, as far as we know there have been no studies regarding tooth loss among the Vietnamese population.

Thus, the aim of the present study was to investigate tooth loss and related risk factors among elderly Vietnamese aged 65-74.

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2. Methodology

2.1. Study sample

This cross-sectional study involved elderly people aged 65-74 years old, living in Danang, Vietnam. The participants were selected according to a multistage stratified random sampling method based on demographic characteristics.

Danang is subdivided into six urban districts and two rural districts. In the first stage of the current study, three urban districts and one rural district were randomly selected including Hai Chau, Thanh Khe, Cam Le, and Hoa Vang. The second stage, the lists of the elderly aged 65-74 were obtained from the community unions for elderly adults into which include all the citizens over 60 years of age. Forty-five participants from each of the selected urban districts and 135 participants from the rural district were randomly sampled and stratified into groups by gender and age (male:female ratio 1:1, and 65-69:70-74 years old 1:1). After factoring in 10% of compensation for the possible decline of survey participants, the total sample consisted of 300 participants; however, 42 participants withdrew during the study. Thus, the final sample was 258 participants including 128 females and 130 males. A written informed consent was obtained from each participant. Selected participants were mentally healthy persons who were able to answer questionnaires about their oral health status. The examination was performed at the local health centre or the dental clinic of the Danang University of Medical Technology and Pharmacy. Two dental students were trained to ask the questions and record the answers on an assessment form. The first author conducted all clinical oral examinations. Ten percent of the participants were re-examined to test the reliability of the collected data. The intra-rater reliability between studies was above 0.9.

2.2. Evaluation of tooth loss

Each absent tooth regardless of the circumstances would be registered as a tooth loss. In the case of at least one existing third molar, the other third molar loss was recorded. Recording all third molars would be excluded if all of them were not present during the dental examination.

The number of lost teeth was classified into categories: 1) No tooth loss; 2) 1-3 lost teeth; 3) 4-6 lost teeth; 4) 7-16 lost teeth; 5) > 16 lost teeth. The number of lost teeth was also dichotomized into ≤ 6 lost teeth or > 6 lost teeth. The position of any lost tooth based on tooth functional groups, such as incisors, canines, premolars, and molars was also determined for both upper and lower jaws.

2.3. Evaluation of risk factors

The assessment of tooth loss risk factors was based on the Oral Health Questionnaire for adults (WHO, 2013). Personal interviews were conducted before the dental examination, and data from the questionnaires were categorised into the bivariate classes:

Sociodemographic factors: gender (female, male); age group (65-69, 70-74); place of residence (rural, urban); time in education (≤ 5 years, > 5 years).

Oral health behaviours: Participants were asked the following questions: "How often do you clean your teeth?" (Categorised as: ≥ 2 times/day or ≤ 1 time/day); "How long is it since you last visited a dentist?" (≤ 1 year or > 1 year); "Do you smoke tobacco, consume alcohol or have any chronic disease?" (Yes or no).

This study was registered and approved by the Human Research Ethics Committee of the Danang University of Medical Technology & Pharmacy and performed according to the World Medical Association Declaration of Helsinki.

2.4. Statistical methods

Data entry and statistical analyses were performed in version 17.0 of the Statistical Package for Social Sciences (SPSS). The Student's t-test, Chi-square test were used to analyse correlations between tooth loss status and risk factors. Binomial logistic regression was used to determine the odds of having > 6 lost teeth. A confidence level of 95% and a two-tailed p -value of 0.05 were used to determine any significant difference.

3. Results

Among the 258 elderly Vietnamese, the prevalence of missing, at least, one incisor, canine, premolar or molar were 42.2%, 20.9%, 50.4% and 89.1% respectively. The prevalence of tooth loss (canines, premolars, and molars) in the upper jaw was statistically higher than in the lower jaw, except for incisors ($p < 0.01$) (Table 1 and Fig. 1).

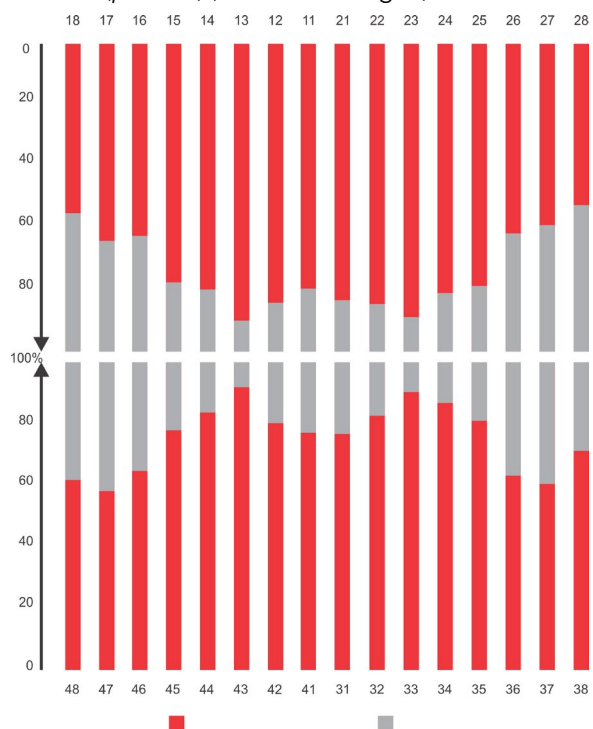


Figure 1. The distribution of tooth loss among elderly Vietnamese (red -Residual teeth; grey - Missing teeth)

Table 2 shows that the mean tooth loss for the sample was 7.6 (± 7.0). Within each category of predictors, a statistically higher number of lost teeth was found for: the 70-74 age group

(Mean±SD, 8.8±7.9); rural residents (8.8±7.6); to dentist >1 year ago (8.2±7.5); tobacco smoking time in education ≤5 years (10.2±7.7); frequency of teeth cleaning ≤1 time/day (8.7±7.3); last visit (9.4±7.6), and no alcohol drinking (8.3±7.2).

Table 1. The prevalence of tooth loss for each functional group among elderly Vietnamese

Functional group	Prevalence of tooth loss (%)			p-value
	Upper jaw	Lower jaw	Both	
Incisor	27.9	30.6	42.2	<0.001
Canine	15.5	12.0	20.9	<0.001
Premolar	37.6	34.1	50.4	<0.001
Molar	77.5	74.8	89.1	<0.001

Chi-square test

According to the distribution of a number of lost teeth, 27.1% of the elderly participants had lost 1-3 teeth, 23.6% 4-6 teeth, 27.1% 7-16 teeth and 13.6% >16 teeth; only 8.6% had full dentition. There was a significant correlation between the distribution of a number of lost teeth and time in education, and alcohol drinking ($p<0.05$, Table 2).

Having >6 lost teeth was statistically significantly related to time in education, frequency of cleaning teeth, tobacco smoking and alcohol drinking (Table 2). However, the odds ratio of losing >6 teeth was calculated for time in education, tobacco smoking and alcohol drinking.

Table 2. Mean tooth loss and tooth number class percentages in relation to risk factors

Variables	n(%)	Tooth loss Mean ± SD	p-value ^a	Number of lost teeth (%)					p-value ^b	Dichotomized number of lost teeth		p-value ^b
				0	1-3	4-6	7-16	>16		≤6	>6	
Age												
65-69	129(50)	6.6 ± 6.0	0.01*	10.1	26.3	28.7	26.4	8.5	0.07	65.1	34.9	0.06
70-74	129(50)	8.8 ± 7.9		7.0	27.9	18.6	27.9	18.6		53.5	46.5	
Gender												
Female	128(49.6)	8.4 ± 7.0	0.14	9.4	18.8	25.8	31.2	14.8	0.06	53.9	46.1	0.08
Male	130(50.4)	7.1 ± 7.1		7.7	35.4	21.5	23.1	12.3		64.6	35.4	
Residence												
Rural	121(46.9)	8.8 ± 7.6	0.01*	6.6	22.3	25.6	27.3	18.2	0.14	54.5	45.5	0.14
Urban	137(53.1)	6.7 ± 6.4		10.2	31.4	21.9	27.0	9.5		63.3	36.5	
Time in education												
≤5 years	105(40.7)	10.2 ± 7.7	<0.001	3.8	19.0	21.9	33.3	21.9	<0.001	44.8	55.2	<0.001
>5 years	153(59.3)	6.0 ± 5.9		11.8	32.7	24.8	22.9	7.8		69.3	30.7	
Frequency of cleaning teeth												
≤1 time/day	132(51.6)	8.7 ± 7.3	0.01*	6.8	24.2	21.2	32.6	15.2	0.24	52.3	47.7	0.02*
≥2 times/day	124(48.4)	6.8 ± 6.7		10.5	29.0	26.6	21.8	12.1		66.1	33.9	
Last visit to a dentist												
>1 year	191(74.6)	8.2 ± 7.5	0.02*	8.9	23.0	25.1	26.7	16.2	0.09	57.1	42.9	0.28
≤1 year	65(25.4)	6.2 ± 5.3		7.7	36.9	20.0	29.2	6.2		64.6	35.4	
Tobacco smoking												
Yes	60(23.4)	9.4 ± 7.6	0.04*	8.3	21.7	15.0	38.3	16.7	0.12	45.0	55.0	0.01*
No	196(76.6)	7.3 ± 6.9		8.7	28.1	26.5	24.0	12.8		63.3	36.7	
Alcohol drinking												
Yes	56(21.9)	5.9 ± 6.4	0.02*	7.1	44.7	21.4	19.7	7.1	0.01*	73.2	26.8	0.01*
No	200(78.1)	8.3 ± 7.2		9.0	21.5	24.5	29.5	15.5		55.0	45.0	
Chronic disease												
Yes	138(53.9)	7.0 ± 7.1	0.10	9.4	32.7	21.7	23.2	13.0	0.14	63.8	36.2	0.09
No	118(46.1)	8.5 ± 6.9		7.6	19.5	26.3	32.2	14.4		53.4	46.6	
Total	258	7.6 ± 7.0		8.6	27.1	23.6	27.1	13.6		59.3	40.7	

^aStudent's t-test

^bChi-square test

* $p<0.05$

Table 3 shows the odds of having >6 lost teeth was significantly more frequent among elderly persons with less time in education (OR=2.2, $p<0.01$) and tobacco smoking (OR=2.8, $p<0.01$). However, alcohol drinking was significantly inversely associated with >6 lost teeth (OR = 0.3, $p<0.01$).

4. Discussion

The main finding of this study was that there was

a high prevalence of tooth loss among the elderly Vietnamese aged 65-74. Tooth loss might impact the general health, cause the loss of mastication and reduce the quality of life^{2,3}.

Over ninety percent of the elderly Vietnamese presented tooth loss condition. This result was in line with the study conducted in the South Vietnam where 96% of the older population had missing teeth¹¹. We found that posterior teeth lost more

often than anterior teeth. This finding is expected because of the morphology of the occlusal surfaces of posterior teeth, which easily accumulates plaque and food debris. Furthermore, it was often difficult for the elders to perform oral hygiene on the last position of the dental arch, and this could increase the risk of caries and periodontitis, leading to tooth loss.

We observed that the prevalence of losing canine and posterior teeth of the maxilla were statistically higher than that of the mandible. The maxilla is known as the spongy bone type, and the mandibular is of the compact bone type; consequently, inflammation of the supporting bone in the maxilla could lead to a more rapid resorption of bone and earlier tooth loss than in the mandibular¹². However, our finding was in contrast with the study of Nguyen et al.¹¹, which indicated that loss of lower posterior teeth was more frequent than that of upper posterior teeth.

The elderly Vietnamese had an average of 7.6 missing teeth. At the same age group, this observed number is higher compared to the study conducted in Australia (5.3)¹³, Turkey (7.0)¹⁴, but lower than the one reported in China (11.2)⁸, and Brazil (26.1)¹⁵. Regarding the influence of sociodemographic factors on tooth loss, participants aged 70–74 had lost significantly more teeth on average than those aged 65–69. This finding was in agreement with previous studies, which indicated that the number of lost teeth tends to increase with age^{14,15}.

Maintaining more than 20 teeth is a core mission of Oral health care programmes for the older population¹⁶. Approximately 60% of the elderly Vietnamese still had 20 teeth or more. This prevalence was far lower compared with the findings in a neighbouring country¹⁷, but in line with a study conducted in Iran¹⁸, and higher than the ones reported in Turkey¹⁴.

Table 1. The odds of >6 lost teeth in relation to risk factors

Variables	Odds ratio		
	OR	95% CI	p-value
Frequency of cleaning teeth			
>2 times/day	1.0(ref)		
≤1 time/day	1.4	0.8-2.7	0.15
Time in education			
>5 years	1.0(ref)		
≤5 years	2.2	1.3-3.8	0.004*
Tobacco smoking			
No	1.0(ref)		
Yes	2.8	1.4-5.6	0.003*
Drink alcohol			
No	1.0(ref)		
Yes	0.3	0.1-0.7	0.003*

Binary logistic regression
Ref: reference, * $p < 0.01$

Rural residents had significantly higher tooth loss than urban residents. This reflected the difference in oral health services among regions in Vietnam where the density of dentists in the rural area was much lower than in the urban area (1/200,000 for rural vs. 1/13,500 inhabitants for urban)¹¹. Moreover, the elderly Vietnamese living in a rural area often prefer to remove a painful tooth rather than having it restored because they think that tooth loss is a natural part of the aging process.

The frequency of dental visits reflect the attitudes of the patient or the provider, accessibility to dental care and prevailing societal attitudes regarding oral health care. We found that 74.6% of the elderly Vietnamese ignored an oral health check-up during the previous year, they only visited dentists with the unique aim to remove teeth due to an acute toothache or an impaired ability to chew (i.e. mobility teeth). Moreover, material and transportation-related obstacles, especially in the rural areas, are also factors that limit access to oral health care services^{19,20}. Therefore, the number of teeth lost in this group was much higher than those who annually visited the dentist for oral care. Our finding was close to the third China National

Oral Health Survey. This survey reported that more than three-fourths of the Chinese aged 65–74 had missing teeth more often than those who regularly visited a dentist⁸.

The risk factors for tooth loss have been studied all over the world. However, as far as we know, no data have been reported on the risk factors of tooth loss in Vietnam. Lack of knowledge among the elderly Vietnamese regarding oral health might be influenced by the level of education²¹. Forty percent of the elderly Vietnamese in the current study who were in education ≤5 years had lost 10.2 teeth on average. Their education might have been interrupted due to the Vietnam War (1945–1975). The subjects believe that the prolonging the existence of a tooth in their mouth would have an adverse impact on the life of their descendants. Also, the elders with less time in education were significantly associated with the odds of losing >6 teeth (OR=2.2), it might be due to the lack of awareness about oral health behaviours for maintaining teeth.

In the current study, we found that smokers (23.4%) had significantly higher tooth loss (9.3 ± 7.6) than non-smokers (7.2 ± 6.8). It could be due to the well-

known fact that tobacco smoking can increase the risk for periodontitis. Substances in tobacco might facilitate the accumulation of bacteria and lead to the destruction of tooth-supporting tissue²². Our study indicated that the odds ratio for smokers losing >6 teeth was 2.8 as compared to non-smokers. These results are similar to those of studies in Japan and China^{23,8}. Reports about the relationship between alcohol consumption and tooth loss have been focused on dose-related effects. Some studies have shown that drinking causes periodontitis, with the latter considered a risk factor for tooth loss^{7,24}. However, alcohol consumption was not considered as indicator for losing >6 teeth in the current study. The similar findings were also reported by Yoshioka et al.²³, and Eustaquio-Raga et al.²⁵. The shortcomings of our study were that the quantity and frequency of alcohol consumption were not accurately measured, and the reason for tooth loss (due to dental caries or periodontal disease) could not be exactly determined. A further

study is required to investigate the impact of tooth loss on the function of the stomatognathic system in the elderly persons.

5. Conclusions

The data obtained allowed us to conclude that there were high prevalence and a high number of teeth lost among elderly Vietnamese. Smoking behaviour and time in education were significantly related to maintaining teeth of the elderly community population. The data serve setting up an oral health intervention programme for the older Vietnamese.

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Questions**According to the WHO, which age group represents the older population in the oral health survey?**

- a. Over 60 years old;
- b. From 60 to 80 years old;
- c. From 65 to 74 years old;
- d. It depends on the method of study.

According to the WHO, as the target of oral health care older people have to:

- a. Maintain at least 20 functional teeth;
- b. Maintain at least 16 functional teeth;
- c. Visit a dentist twice a year;
- d. Have prosthesis to replace the missing teeth.

According the Oral health survey of WHO for the older population, the M component in the DMFT index represents a missing tooth due to:

- a. Dental caries, excluding the third molar;
- b. Periodontal disease, excluding the third molar;
- c. Dental caries and periodontal disease, excluding the third molar;
- d. Any reason, including the third molar.

Which score of DMFT represents a high level of dental caries among the older population?

- a. $DMFT \geq 8$;
- b. $DMFT \geq 10$;
- c. $DMFT \geq 12$;
- d. $DMFT \geq 14$.