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Factors promoting missing teeth in the Iraqi population: A retrospective cross-sectional study

Muhanad L. Alshami [1], Ruaa Hameed Karadi[2], Ahmed Abed Marzook[3]

Aim: The aim of the study is to evaluate the association between the number of missing teeth and demographic variables, brushing, smoking habits, and chronic systemic diseases in Baghdad city, Iraq.
Materials and Methods: The cross-sectional study extended from November 2022 to March 2023. Intraoral examinations determined the number of missing teeth. Subsequently, patients completed a written questionnaire covering demographic data, habits, and systemic diseases. Data were analyzed using descriptive and inferential methods.
Results: The total number of patients was 250, with 146 males and 104 females. The highest proportion (33.6%) belonged to individuals aged 31 to 45 years. Rural residents constituted 71.6%, and 59.6% were employed. Approximately half of the participants (48.8%) had a university education. The study sample revealed 40% with five or fewer missing teeth, 38% with 5 to 10 missing teeth, and 22% with 10 or more missing teeth. Among 250 patients, 28.8% reported daily tooth brushing. Additionally, 70.4% reported daily sweet consumption, 58.4% were smokers, 88.4% had diabetes, and 80% had hypertension. The increase in missing teeth was significantly associated with old age, educational level, rural residence, lack of tooth brushing, sweet intake, and complaints of hypertension and diabetes mellitus.
Conclusion: Tooth loss is multifactorial, resulting from both localized defects and systemic conditions. Preserving teeth plays a vital role in improving the quality of life and oral health. There is a need to educate and enhance awareness among patients about the harmful effects of losing or sacrificing teeth.

Keywords: Missing teeth, age, sex, brushing, smoking

1. Department of Dentistry, Dijlah University College, Baghdad, Iraq.
Corresponding author: Muhanad L. Alshami, email: iraqnoafct83@gmail.com

Introduction

Tooth loss is an oral health condition that can affect any individual worldwide. The increase in the number of missing teeth is associated with a decline in quality of life and social behavior due to its adverse impact on important functions of teeth such as chewing, phonetics, and aesthetics. [1] The World Health Organization has reported that adults should ideally have a minimum of 21 functional teeth to ensure proper dietary intake without needing to replace the missing teeth. [2] Dental caries and gum disease, as well as trauma and genetic factors, are recognized as the primary contributors to tooth loss.[3]

There are several factors that may play a role in increasing the incidence of tooth loss, including sex, age, low educational and socioeconomic status, poor oral hygiene, systemic disease, smoking, and frequent sugar intake. [4] Many studies have reported that women have a high prevalence of edentulism. [5] Moreover, it has been demonstrated that tooth loss increases with age. [6] Low income has also been suggested as a risk factor for edentulism. [7] Tooth loss is associated with behavioral factors such as the decrease in frequency of teeth brushing. [8] Cigarette smoking is considered a risk indicator for tooth loss. [9] Several studies in dentistry have reported that patients with periodontitis, which leads to tooth loss, have higher blood pressure. [10] Epidemiological studies persist in their efforts to highlight the primary factors linked to tooth loss and to improve current strategies aimed to minimize tooth loss incidence. The present study aimed to evaluate the association between demographic variables, brushing, smoking habit, chronic systemic diseases (diabetes mellitus and hypertension) with the number of missing teeth in Baghdad city, Iraq.

Materials and methods

The cross-sectional study extended from November 2022 to March 2023, with ethical approval (Ref. 66) having been obtained on September 9, 2023, from Dijlah University College. The study design depended on previous studies. [11]

The participants in the study represent the patients who attended the teaching clinic of the dental department at Dijlah University College, seeking dental treatments. Patients who met the inclusion criteria were invited to join this study. The inclusion criteria are:

- Patients above 18 years of age.
- Patients with missing teeth due to reasons other than congenital causes.

The exclusion criteria for omitting patients from the study are:

- Patients below 18 years of age.
- Patients with no missing teeth.
- Patients who experienced hypodontia or anodontia due to congenital defects, unerupted teeth, trauma, or extraction for orthodontic treatments.

After the selection of the patients, the aim of the study was explained, and written consent was obtained. An intraoral examination was conducted to determine the number of missing teeth, with the third molar excluded from the examination. The participants were classified into three groups based on the number of registered missing teeth: those with ≤ 5 missing teeth, those with between 5 and 10 missing teeth, and those with ≥ 10 missing teeth.

After the examination, patients were asked to answer a written questionnaire (Table 1).

Table 1: The questionnaire elements.

Number	Question
Q1	What is your gender? (Male/Female)
Q2	How old are you?
Q3	What is your educational level? (Primary/Secondary/University)
Q4	What is your residence? (Rural/Urban)
Q5	Are you employed? (Yes/No)
Q6	Do you brush your teeth? (Yes/No)
Q7	Do you eat sweets? (Yes/No)
Q8	Do you smoke? (Yes/No)
Q9	Have you been diagnosed with hypertension? (Yes/No)
Q10	Have you been diagnosed with diabetes? (Yes/No)

The questionnaire was written in their native language and composed of two main sections. The first section includes five questions, Q1-Q5, representing demographic information, including gender, age, educational level, residence, and occupation. The second section includes five questions as follows: Q6, do you brush your teeth? Q7, do you eat sweets? Q8, do you smoke? Q9, have you been diagnosed with hypertension? Q10, have you been diagnosed with DM? The answers to the questions in the second section were 'yes' or 'no' .

Statistical analysis

Data analysis was conducted using the statistical software SPSS (version 26). The descriptive analysis involved frequency and percentage calculations, while the inferential analysis utilized the chi-square test, with a significance level set at < 0.05.

Results

After obtaining consent, a total of 538 patients were examined. Based on exclusion criteria, 250 individuals were enrolled in the study, forming the study sample. The demographic data of the study sample are shown in Table 2. The study sample comprised 146 males and 104 females. According to age, individuals aged 31 to 45 years represented the highest proportion (33.6%) in the study sample. More than two-thirds of the participants (71.6%) resided in rural areas, and 59% of the patients were employed. Approximately half of the study participants (48.8%) had a university education. Based on the number of missing teeth, the study sample was divided as follows: 40% had five or fewer missing teeth, 38% had 5 to 10 missing teeth, and 22% had 10 or more missing teeth.

Table2: The demographic data of the study sample

Variable	Frequency, percentage
Age (years)	
30 ≥	54, 21.6%
31- 45	84, 33.6%
46 – 60	72, 28.8%
> 60	40, 16%
Sex	
Male	146, 58,4%
Female	104, 41,6%
Occupation	
Employee	149, 59.6%
Not employee	101, 40.4%
Education level	
Primary	51, 20.4%
Secondary	77, 30,8%
University	122, 48.8%
Residence	
Rural	179,71.6%
Urban	71,28.4%
Number of Missing teeth	
5 >	101, 40%
5-10	95, 38%
>10	54, 22%

Table 3 displays the habits affected the oral hygiene and the presence of systemic diseases of the patients. Out of 250 patients, 28.8% reported brushing their teeth daily, while 71.2% did not. Additionally, 70.4% of patients reported consuming sweets daily, 58.4% were smokers, 88.4% had diabetes, and 80% had hypertension.

Table 3: Habits of participants that affected the oral hygiene and the presence of systemic diseases.

Habits affected the oral hygiene	Frequency, percentage
Teeth brushing daily	
No	178, 71.2%
Yes	72, 28.8%
Sweets intake daily	
No	74, 29.6%
Yes	176, 70.4%
Smoking	
No	104, 41.6%
Yes	146, 58.4%
Systemic diseases	
Diabetes mellitus	
No	29, 11.6%
Yes	221, 88.4%
Hypertension	
No	50, 20%
Yes	200, 80%

Table 4 represents the association of the number of lost teeth with the studied factors.

The increase in missing teeth was significant with old age, educational level, rural residence, absence of tooth brushing, sweet intake, and complaints of hypertension and DM.

Table 4: Association between studied variables and missing teeth

Variables		Number of missing teeth [a]			
		<5	5-10	> 10	P value *
Age (year)	30 ≥	46, 45.5%	8, 8.4%	0, 0.0%	**0.001**
	31- 45	37, 36.6%	38, 40.0%	9, 16.7%	
	46 - 60	15, 14.9%	33, 34.7%	24, 44.4%	
	> 60	3, 3.0%	16, 16.8%	21, 38.9%	
Sex	Male	61, 60.4%	48, 50.5%	37, 68.5%	0.088
	Female	40, 39.6%	47, 49.5%	17, 31.5%	
Occupation	Employee	59, 58.4%	57, 60.0%	33, 61.1%	0.943
	Not employee	42, 41.6%	38, 40.0%	21, 38.9%	
Education	Primary	10, 9.9%	15, 15.8%	26, 48.1%	**0.001**
	Secondary	33, 32.7%	34, 35.8%	10, 18.5%	
	University	58, 57.4%	46, 48.4%	18, 33.3%	
Residence	Rural	83, 82.2%	66, 69.5%	30, 55.6%	**0.001**
	Urban	18, 17.8%	29, 30.5%	24, 44.4%	
Teeth brushing daily	No	76, 75.2%	72, 75.8%	30, 55.6%	**0.001**
	Yes	25, 24.8%	23, 24.2%	24, 44.4%	
Sweets intake daily	No	21, 20.8%	27, 28.4%	26, 48.1%	**0.002**
	Yes	80, 79.2%	68, 71.6%	28, 51.9%	
Smoking	No	45, 44.6%	35, 36.8%	24, 44.4%	0.490
	Yes	56, 55.4%	60, 63.2%	30, 55.6%	
Diabetes mellitus	No	5, 5.0%	14, 14.7%	10, 18.5%	**0.020**
	Yes	96, 95.0%	81, 85.3%	44, 81.5%	
Hypertension	No	11, 10.9%	23, 24.2%	16, 29.6%	**0.009**
	Yes	90, 89.1%	72, 75.8%	38, 70.4%	

a: Frequency, percentage.
*: significant (bold font) at > 0.05 by chi-square test.

Discussion

The present study showed that tooth loss was significantly associated with aging. The incidence of missing a third or more of total teeth appeared high in individuals over 40 years old. Increasing age is considered a risk factor for dentition loss due to the cumulative effects of oral and dental diseases including dental caries, and periodontal diseases. [12] Tooth or teeth extraction could be part of prosthodontic treatment plan for old patients. [13] Older individuals could their retirement salary may not be enough, leading them to prefer to extract the defective tooth or teeth rather than the other dental treatments like filling, endodontic treatment, and crown which are more expensive than tooth extraction. [14]

There was no difference in the number of missing teeth between males and females. This outcome disagrees with previous studies; Meisel and his colleagues found a high prevalence of missing teeth in men, [15] and a study conducted in Tanzania stated that females complained of tooth loss more than males. [16] The disharmony in results could be attributed to the fact that both sexes in Iraq showed no difference in the incidence of periodontal disease [17] and the dental caries index. [18]

The present outcome, in agreement with previous studies conducted in Nigeria [11], Iran [19], Brazil. [20] and Poland, [21] reveals that an increase in educational level is associated with a decrease in the number of teeth lost. Bad oral health and high caries index were mentioned in previous studies. [22] A previous study showed that people with low educational level less satisfied about the dental treatment which could impact on their visits to dental clinic and restricted on the cases with severe dental pain, leading the dentist to extract the affected. [23]

In general, caries and periodontitis are the main reasons for tooth loss. It is widely accepted that both diseases can be prevented by good home care, specifically regular toothbrushing. [24] According to this study, not brushing was reported to significantly increase the number of missing teeth. This result aligns with the findings of previous study held in India, which revealed that a greater number of remaining teeth was unambiguously related to a subject's regular tooth-brushing habits.[25]

Sweets intake, as observed in the present study, is associated with an increase in missing teeth. High-sugar content foods have been mentioned as an important factor

in dental caries, as they enable cariogenic bacteria to produce demineralized acid. [26]

Chronic systemic diseases impact negatively on available teeth numbers. According to the present findings, the increase in missing teeth was significantly high among patients who complained of DM. This result is consistent with previous studies. [27] Periodontitis and the reduction in alveolar bone as well as dental caries, which are considered major factors leading to tooth loss, are more prevalent among DM patients. [28]

Hypertensive patients appeared to have a higher risk of losing teeth. This result is consistent with a study conducted in the Pakistani community. [10] No obvious how the Hypertension or chronic raised blood pressure is associated with missing teeth. Hypertensive drugs could impact salivary gland function and interfere with its ability to reduce the incidence of dental caries. [29] The chance of experiencing dental carries with the consequence unsalvageable teeth in obese individuals is high. Not replacement of missing was documented to be association with Obesity which is one of the major risk factors for hypertension. [30] Hypertension is shared with losing teeth in that the incidence increases with age. Periodontitis which considers one of the major causes for tooth missing, also reported to leads to increase in blood pressure through inflammatory and bacterial products that could affect the blood vessels walls. [31] These facts could also explain the positive relationship between hypertension and missing teeth.

People who live in rural areas complained from missing teeth more urban people. This finding agree with previous study held in Poland. [32] Although, in study conducted in Mexico the result was contrast, the number of missing teeth is significant high people in urban areas. [33] The low awareness of oral health in the rural population is proportional to that in urban areas, which could be attributed to the increase in missing teeth and consequently affects the quality of life. [34]

A small sample size and a lack of information about the specific cause and timing for losing each tooth, as well as the history of systemic diseases for each patient, could be highlighted as limitations of the present study.

Conclusion

Tooth loss is multifactorial and can result from localized defects and systemic conditions. Improving the quality of life and oral health plays a vital role in preserving teeth. It is necessary to educate and enhance awareness among patients about the harmful effects of losing or sacrificing teeth.

Funding

The supporting source/financial relationships had no such involvement.

Data availability statement

The data that support the findings of the present study are available from the corresponding author upon reasonable request.

Author statement

All authors have read and approved the final version of the manuscript. Muhanad L Alshami had full access to all the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

Ethics approval and consent to participate

Ethical approval (No. 66) was obtained from the ethical committee at the dentistry department of Dijlah University College on September 9, 2023.

Conflict of interest

The authors declare no conflict of interest

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