Research Article

Risk Factors for Tooth Loss in Adults with Diabetes, Age and Education Level

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Abstract

Objective: The aim of this study was to assess the prevalence and risk factors of tooth loss in adults with diabetes in Kinshasa, Democratic Republic of Congo.

Materials and Methods: This cross–sectional study investigated the prevalence of tooth loss and risk factors in sample of 214 adults with diabetes attending the teaching hospital of Kinshasa University, during the period from October 2017 to March 2018. All consenting subjects received an oral health examination for missing teeth (edentulism) and caries (DMFT index). Data were analyzed using Chi-square, Fisher's exact test ($p \leq 0.05$).

Results: Of 214 adults with diabetes evaluated, 135 had no missing teeth, 79 had partial tooth loss and the patient who had partial tooth loss were generally older, had lower level of education. The DMFT was 2.8, with a high number of missing teeth. The prevalence of tooth loss was 36,8% among adults with diabetes. Among adults, those with type2 diabetes had a higher number of missing teeth than did adults with type 1 diabetes ($P < 0.05$). A strong association between diabetes and tooth loss was observed among adults with type 2 diabetes in the older age and lower education level.

Conclusion: This study revealed that adults with type 2 diabetes are at higher risk of experiencing tooth loss and edentulism than adults with type 1 diabetes. Although the association between diabetes, education level and tooth loss are well established.

Keywords: Tooth Loss; Diabetes; Age; Education Level

Introduction

Diabetes is a group of complex multisystem metabolic disorders due to a deficiency in insulin secretion caused by pancreatic β-cell dysfunction and/or insulin resistance in liver and muscle. Diabetes affects more than 9% of the adult population and has a dramatic impact on the health care system through high morbidity and mortality among affected individuals [1]. There are 2 types of diabetes.

Type 1 diabetes results from cellular-mediated autoimmune destruction of pancreatic β-cells, which usually leads to total loss of insulin secretion; in contrast, type2 diabetes is caused by resistance to insulin combined with a failure to produce enough additional insulin to compensate for the resistance.

Type 2 diabetes is commonly linked to obesity, which contributes to insulin resistance through elevation of circulating levels of free fatty acids derived from the adipocytes; these free fatty acids inhibit glucose uptake, glycogen synthesis and glycolysis. In many obese individuals, insulin resistance is compensated by increased insulin production [2]. More than 250 million persons worldwide have diabetes mellitus, and health officials estimate that this figure will exceed 300 million by 2020 [3].

People with diabetes are at increased risk of periodontitis and tooth loss [4,5]. The consequences of tooth loss include impaired chewing ability and poorer oral health-related quality of life and general health [6]. People with tooth loss may also experience dis-

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satisfaction with appearance, avoid social contacts, have trouble speaking, be more likely to be obese, eat less fruits and vegetables, and have lower biochemical levels of some nutriments and dietary fiber [7-9].

While many countries have seen a decrease in the prevalence of tooth loss, this oral condition still represents a significant health concern among adults and in the Global burden disease study, severe tooth loss was pointed as one of the 100 health conditions causing injuries among populations [10].

So, it is plausible to hypothesize that diabetes, age and education level predispose to oral infection and could also act as a risk factor for tooth loss. This study is the first epidemiologic cross-sectional study to investigate whether an independent association exists between diabetes, tooth loss, old age and education level among adults in Kinshasa, DR Congo.

Materials and Methods

This cross-sectional study investigated the prevalence of tooth loss and risks factors in adults with diabetes attending the teaching hospital of Kinshasa University, during the period from October 2017 to March 2018.

All subjects received an oral health examination for missing teeth (edentulism) and caries (DMFT index). The inclusion criteria considered adults aged with medical diagnosis of diabetes and who signed the consent form.

Patients with physical and/or mental disability, others chronic diseases and those who refused to be examined we excluded. Also excluded were adults who had no teeth because they may not recognize a need for dental visits, they are not at risk for tooth loss, and they have markedly lower rates of dental visits. Data were analyzed using Chi-square and Fisher's exact test (p ≤ 0.05).

Results

Of 214 adults with diabetes examined, 135 had no missing tooth, 79 had partial tooth loss and the prevalence of edentulism was 36.8% among them. The patient who had partial tooth loss were generally older and had lower level of education. The sample demonstrated a median DMFT of 2.8, with a high number of missing teeth.

Our finding that dental visit was related to tooth loss, 76% among adults with diabetes who were missing teeth 1 to 6 teeth and 24% among those who had lost 7 or more teeth.

Characteristics		Values
Age	Mean Age	58,5 ± 10,4
	Min - Max	36 - 89
Age category		
	36 - 41	3.5%
	42 - 47	8.9%
	48 - 53	15.2%
	54 - 59	16.5%
	60 - 65	21.5%
	66 - 71	20.3%
	72 - 77	5.1%
	78 - 83	6.3%
	84 - 89	2.5%
Gender		
	Female	57%
	Male	43%
Education level	No school education	0
	Primary school	29%
	Middle school	46%
	High school	25%
Diabetes type		
	Type 1	18%
	Type 2	82%
Dental visit		
	Yes	78%
	No	22%

Table 1: Characteristics of the study population.

Females were more likely than males to have dental visit, but the difference was no significant.

Discussion

Our study is the first to examine the association between tooth loss among patients with diabetes attending the teaching hospital of Kinshasa University. Our results confirm previous findings of disparities in annual dental visits by, age, and education level reported among patients with diabetes [11]. It is difficult to compare our findings with most other studies because of different study methods.

This study examines the association between tooth loss, diabetes, age and education level among adults attending the teaching hospital of University. Although the majority of these adult diabetes

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Variables		≤ 6 teeth n = 71 (%)	> 6 teeth n = 8 (%)	P
Age	36 - 41	3 (4.3)	0 (0)	0.19
	42 - 47	7 (9.8)	0 (0)	
	48 - 53	12 (16.9)	0 (0)	
	54 - 59	13 (18.3)	0 (0)	
	60 - 65	14 (19.7)	3 (37.5)	
	66 - 71	14 (19.7)	2 (25.0)	
	72 -77	4 (5.6)	0 (0)	
	78 - 83	3 (4.2)	2 (25.0)	
	84 - 89	1 (1.4)	1 (12.5)	
Gender				
	Male	26 (36.6)	5 (62.5)	0.69
	female	45 (63.4)	3 (37.5)	
Dental visits				
	No	15 (22)	8 (100)	0.01
	Yes	56 (78)	0 (0)	
Caries				
	No	14 (19.7)	2 (25)	0.014
	Yes	57 (80.3)	6 (75)	
Diabetes type				
	Type 1 diabetes	11 (15.5)	3 (37.5)	0.012
	Type 2 diabetes	60 (84.5)	5 (62.5)	
Education level				
	No school education	0 (0)	0 (0)	0.001
	Primary school	17 (24.0)	4 (50)	
	Middle school	38 (53.5)	4 (50)	
	High school	16 (22.5)	0 (0)	

Table 2. Tooth loss in adult with diabetes.

Note: The table presents weighted values. Significance level is p value < 0,05.

patients had serious complications associated with diabetes, the possible impact of diabetes on oral health should be included in their overall management.

The prevalence of severe impacts (fairly/very often) was associated with untreated caries, the reason to use dental care. Untreated caries, severe tooth loss and periodontitis were pointed out as being among the 100 conditions that cause burden in the Global Burden Disease [12]. People with diabetes are at increased risk of periodontitis and tooth loss [4,5,13].

Risk indicator		Prevalence	P
Tooth loss	Loss of 1 to 2 teeth	37 (46.8)	0.061
	Loss of 3 to 4 teeth	23 (29.2)	0.886
	Loss of 5 to 6 teeth	11 (13.9)	< 0.001
	Loss of 7 to 9 teeth	5 (6.3)	< 0.001
	Loss of up 10 teeth	3 (3.8)	0.026
Caries	Yes	63 (79.8)	< 0.001
	No	16 (20.2)	0.463
Reason for use of dental services	Need	13 (16.5)	0.014
	Pain	44 (55.7)	0.002
	Routine	22 (27.8)	0.969

Table 3. Tooth loss and Risk indicator.

Note: The table presents weighted values. Significance level is p value < 0,05.

Ideally, dental and medical care will become more integrated in future health care systems. However, given the present separation of medical and dental care, health plans and diabetes health education programs should consider reviewing their approach to promoting preventive dental care as an integral and vital part of self-care, with special attention to financial barriers, cultural sensitivity, translation services, and accessibility for those with inadequate health literacy. In this sample, 78% (n = 214) of patients had dental visit.

The consequences of periodontitis and tooth loss include impaired chewing ability and poorer oral health-related quality of life and general health [7]. Thus, good oral health may contribute to good management of diabetes. Caries appears to be more significant in patients with diabetes who have poor glycemic control [14-21].

Meanwhile, few reports have discussed the oral conditions of adults with diabetes in DR Congo. However, the factors that have been reported as risk factors for tooth loss among adults with diabetes, such as age and education level can be considered as risk factors for tooth loss.

Epidemiological studies have shown that molars are the most affected tooth type by caries and periodontal diseases. Besides, molars have the lowest bone height scores and the lowest attachment levels. Consequently, molars are the most frequently extracted teeth, followed by premolars and lower anterior incisors.

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Loss of tooth, particularly loss of posterior teeth has long been considered an important predisposing factor for TMD. It was argued that firstly, the absence of posterior support result in overloading of the temporomandibular joint (TMJ) structures. Secondly, it was assumed that the absence of posterior teeth would result in mandibular over-closure and as a consequence, the condyles would deviate from their normal centric position in the TMJ, causing dislocation in the joint. It is important to make adults with diabetes aware of their high risk for tooth loss and underscore the importance of good oral health and preventive care beyond annual dental examinations, which may also help in glycemic control.

Multidisciplinary efforts are needed to raise awareness of the risk of tooth loss among adults with diabetes. Good oral hygiene as well as annual dental examinations are important for preventing tooth loss. Thus, good oral health may contribute to good management of diabetes.

Conclusion

This study revealed that adults with type 2 diabetes are at higher risk of experiencing tooth loss and edentulism than adults with type 1 diabetes. Although the association between diabetes, education level and tooth loss are well established.

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