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Research Article

Comparison of Oral Status Among Diabetic and Non-Diabetic Elders: A Pilot Study

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Abstract

The Brazilian elderly population is expected to increase by 15 times while the total population should increase by five times. Elders develop many chronic diseases that have important impacts on their well-being and among these diseases are diabetes and periodontitis. Type 2 diabetes is one of the most common types, and it relates to oral status. The aim of this study was to evaluate and compare dental and periodontal conditions among diabetic and non-diabetic elders. A hundred elderly subjects were divided into two groups: Test Group (diabetic group) and Control Group (non-diabetic group), each with 40 women and 10 men. Community Periodontal Index (CPI), Gingival Bleeding Index (GBI), and Decayed, Missing and Filled Teeth Index (DMFT) were used. In the Test Group, the mean DMFT index was 30.7 ± 3.62, and 2.2 ± 6.1 remaining teeth were identified. Among the diabetic individuals, 41 (82%) were edentulous while in the Control Group, 100% of the individuals had remaining teeth. The mean DMFT index was 22.3 ± 4.6 and 13.8 ± 6.8 teeth were present. With respect to GBI, the Mann-Whitney test was used, and statistical significance (p=0.02) was also found when comparing the groups. For CPI, Kruskal-Wallis/Dunn's test showed a significant difference between the Test group and the Control group (p=0.0031). When compared to non-diabetic individuals, elderly diabetic patients showed more periodontitis, gingival bleeding and tooth loss. There may be a relationship between diabetes and oral problems considering older people.

Keywords: Diabetes Mellitus; Periodontitis; Oral health; Elderly

Introduction

According to the World Health Organization (WHO) projections for the period between 1950 and 2025, the Brazilian elderly population is expected to increase by 15 times while the total population should increase by five times. Thus, Brazil will rank sixth in the number of elderly people in the world, reaching 32 million people aged 60 and older in 2025[1]. Many countries around the world, including Africa, which experienced a decline between 1990 and 2000, have seen an increase in life expectancy of their populations [2]. The world is experiencing a growth in the elderly population, and this population needs a healthy way of life. Today, one does not merely analyze life expectancy, but life expectancy with functional health.

Elders develop many chronic diseases that have important impacts on their well-being like diabetes and periodontitis. In the last twenty years, many published reports and data from clinical and epidemiological studies have pointed out an association between oral health status and systemic diseases. Periodontitis and its relationship with atherosclerosis, pneumonia and type 2 diabetes have been the focus of these studies [3]. These diseases have an increased occurrence and impact in older age groups, especially if the glycemic control of diabetes is not accomplished [4].

Like the aging process, diabetes is also recognized as a risk factor for periodontitis [5]. The primary feature of diabetes and periodontitis is inflammation [6]. Although the mechanisms of interrelation between the two diseases have not been fully elucidated, studies continue to demonstrate that not only periodontal tissues are affected by diabetes but also the glycemic control is worsened by periodontal infection in a bidirectional relationship [7].

Periodontitis can cause tooth loss, a major dental problem affecting elders. Tooth loss has an influence on elders' stomatognathic system and self-esteem [8,9]. Other oral alterations present in diabetic elders are xerostomia, halitosis, hyposalivation and dental caries [10]. Maintaining the oral health of diabetic elders is a challenge and one of the factors that contribute to a good quality of life [11,12]. The aim of this study is to compare the dental and periodontal conditions among diabetic and nondiabetic elders.

Materials and Methods

Type of study

This work is a descriptive study about the oral condition of diabetic and nondiabetic elders. It is a preliminary study of a project of the University of Fortaleza (UNIFOR).

Groups

A hundred elderly subjects were divided into two groups. The Test Group included 40 women and 10 men with type 2 diabetes mellitus (DM2). The Control Group comprised 40 women and 10 men without DM2. As this is a pilot study, a convenience sample was used. All individuals were chosen at random. Diabetic individuals were treated at the Endocrinology Unit of the Walter Cantídio University Hospital (HUWC) while non-diabetic patients received care at the Dentistry School of the University of Fortaleza (UNIFOR) where all of them were evaluated. Tobacco users and subjects aged less than 65 years and with time of diagnosis under two years were excluded.

Data collection

The Community Periodontal Index (CPI) was used to assess periodontal conditions. A total of six sites (mesio-buccal, buccal, disto-buccal, mesio-palatine, palatine and disto-palatine) in a full-mouth protocol were probed. If at least one site with probing depth > 3.5mm was observed, the subject was considered with periodontal attachment loss, which is consistent with periodontitis. Bleeding on probing (BOP), considered an objective inflammatory parameter in periodontitis establishment, was measured using Gingival Bleeding Index (GBI). GBI ≤ 0.1 was considered low risk for the development of periodontitis [13]. DMFT Index, which describes the amount of decayed, missing and filled teeth, was also used.

Data were collected using the WHO periodontal probe. All the material was sterilized in an autoclave, and the whole examination was performed in accordance with the standards of the Research Ethics Committee of the University of Fortaleza (UNIFOR), which approved this research under Opinion No. 340/11

Statistical analysis

Descriptive statistics was performed. Mann-Whitney test was used to compare the GBI between Test group and Control group; Kruskal-Wallis and Dunn's tests were used to compare the CPI and Z-test was applied for the DMFT, setting the significance level at 5%.

Results

In the diabetic group (Test Group), ages ranged between 65 and 79 years with a mean of 71.0 ± 4.1 years. The mean time of diagnosis was 12 ± 7.1 years, and the mean fasting blood glucose was 153.7 ± 72.3 mg/dl. Means of DMFT index and remaining teeth of 30.7 ± 3.6 and 2.2 ± 6.1, respectively, were observed (Table 1). Among the diabetic subjects, 41 (82%) were edentulous, and only 9 (18%) had teeth. While three (30%) of 10 men still had teeth, only six (15%) of the women still had teeth. The average GBI in the Test group was 22.5 ± 15.7%, and

70% of the assessed individuals presented GBI>10%.

Table 1. Dental caries among diabetics and non-diabetics. Fortaleza, CE-Brazil, 2014.

Variables	Total			*P* value
		Diabetic	Non diabetic	
	n = 100	n = 50	n = 50	
Decayed				
Mean (SD)	0,8±1,1 (3%)	0.1±0.4 (3.3)	1.5±1.6 (6.7)	
% of decayed DMFT				
Missing				
	23,9±7,5			
Média (SD)	(90,2%)	29.8±.6.1 (97.1)	17.9±6.8 (80.3)	
% of missing DMFT				
Filled				
Média (SD)	1,8±2,3 (6,8%)	0.8±2.7 (2.6)	2.9±3.1 (13.0)	
% of filled DMFT				
DMFT	26,5±5,0(100.0)	30.7±3.6 (100.0)	22.3±4.6 (100.0)	<0.0001
Mean (SD)				

The mean age of individuals of the Control Group was 69.9 ± 4 years. In all, 100% had remaining teeth. The mean DMFT index was 22.3 ± 4.6 and 13.8 ± 6.8 teeth were present (Table 1). After investigating the GBI, a mean of 11.3 ± 11.1% was observed and 20 (40%) individuals presented GBI > 10%.

Regarding periodontal disease, all the patients (100%) with teeth in the Test Group presented periodontal attachment loss, consistent with the presence of periodontitis. In the Control Group, 20 (40%) individuals had periodontitis. The assessment of periodontal disease by gender revealed a prevalence of 50% among men and 37.5% among women.

The comparison of the DMFT between the test and control groups revealed statistically significant difference, with p-value<0.0001 when using the Z-test (Table 1). Regarding the GBI, the Mann-Whitney test was used, and statistical significance (p=0.02) was also observed when comparing both groups. With regard to the CPI, Kruskal-Wallis/Dunn's test showed a significant difference between Test group and Control group (p=0.0031).

Discussion

This is a pilot study of research that is being conducted in Fortaleza-Ceará-Brazil and Rouen-Normandy-France. The final study aims to describe the oral conditions of diabetic elders and compare them to non-diabetic individuals from these two countries.

Chronic diseases are common in the elderly population and have a considerable impact on their quality of life, especially if comorbidities are considered [14]. Diabetes is one of the most prevalent chronic diseases among elders and projections show an increase in the number of diabetic elders in the next years. Likewise, periodontitis affects this population all over the world [15].

In Brazil, tooth loss is a major problem for the elders [16]. Besides affecting mastication, generating nutritional and gastro-intestinal problems, tooth loss affects self-esteem and communication [17]. The aging process is characterized by the accumulation of losses that lead to depression, and maintaining oral health is very important to avoid further psychological complications. Tooth loss and high DMFT index can have consequences on body composition in elderly people [18].

Epidemiological studies in Brazil show a high DMFT index in elderly populations. In a study conducted in the entire Brazilian territory, a DMFT index of 27.53 was observed for the population between 65 and 74 years old, with DMFT of 27.2 for the Northeast region and 27.2 for the city of Fortaleza [19]. In Manaus, a city in Northern Brazil, a study revealed a mean DMFT of 29.1, where 95.5% of the index represented the missing component, a fact that does not differ much from the diabetic group in this study [20]. The lower rate found in the group of non-diabetic individuals may be due to the fact that they were being treated in a dental school and this fact may demonstrate greater personal care to oral health, which can be considered a study bias.

A study in Lithuania showed a DMFT of 25.63 ± 0.3 with the missing component index accounting for 66% of the total index [21]. A research conducted in Norway with elders aged 67 years or older revealed a DMFT index of 25.4 [22]. A Canadian study with elders residing in long-term care facilities identified a DMFT index of 23.56 [23].

Many theories on the influence of diabetes on the periodontium have been proposed by extensive studies published along many years. However, the mechanism underlying the association between periodontitis and diabetes mellitus remains unclear. Concentration of oral microbial flora is increased due to higher concentration of glucose in saliva and crevicular fluid; cells functions like adherence, chemotaxis and phagocytosis involved in the host response are altered in many people with diabetes; increased action of Matrix metalloproteinases (MMPs) like collagenases, gelatinases, and elastiases of periodontal tissue that plays a role in collagen degradation of osseous and connective tissue; elevated levels of advanced glycation end-products (AGEs), which have the tendency to accumulate in the plasma and tissues and have been implicated in susceptibility of oral infections, exaggerated inflammatory response and destruction of alveolar bone, which occur in gingival tissues of diabetic patients, are some proposed mecha-

nisms [24,25].

On the other hand, patients with periodontal diseases can increase insulin resistance and make diabetes control difficult. All mechanisms involved in periodontal tissue destruction and metabolic imbalance have been associated with the classical complications of DM: retinopathy, nephropathy, neuropathy, macrovascular disease and poor wound healing. In this case, a major bleeding propensity observed in the gingival tissues of the diabetic individuals of this study can be explained [26].

Conclusion

When compared to non-diabetic individuals, elderly diabetic patients presented more periodontitis, gingival bleeding and tooth loss. Thus, there may be a relationship between diabetes and oral problems considering older people. Further studies are necessary in order to conclude an association between bad oral health and presence of diabetes in elders.

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