



Serum Calcium Level in Diabetes Mellitus with and Without Periodontitis

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Abstract

Background: The study was undertaken to compare serum total calcium in diabetics with periodontitis and diabetics without periodontitis.

Objectives: To investigate whether periodontitis affects the serum calcium level in type 2 Diabetes Mellitus.

Materials and Methods: The study was conducted on 80 patients of both sexes between 30 and 65 years of age having diabetes mellitus type 2, taken from Department of Periodontics, NIMS Dental College, Jaipur, and Rajasthan, India. Forty of them had periodontitis and 40 were without periodontitis. Biochemical analysis was done in Department of Biochemistry, National Institute of Medical Sciences & Research, Jaipur. Statistical analysis was done by Student's unpaired t-test. A p-value < 0.05 was considered as significant.

Results: Mean \pm SD serum calcium was 8.64 ± 0.45 mg/dl in diabetics without periodontitis and 9.26 ± 0.41 mg/dl in diabetics with periodontitis. The level in diabetics with periodontitis was significantly higher ($p < 0.001$). The age, body mass index and blood glucose concentration were not significantly different in diabetics with and without periodontitis.

Conclusion: The diabetics with periodontitis had significantly higher serum calcium concentration as compared to diabetics without periodontitis.

Keywords: Diabetes Mellitus, Periodontitis, Calcium, Blood sugar

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder characterized by the presence of hyperglycemia accompanied by greater or lesser impairment in the metabolism of carbohydrates, lipids and proteins.[1] Diabetes is the most common non-communicable global health problem in which type 2 diabetes mellitus (T2DM) accounts for 85-95% of all diabetes

cases.[2] According to the Diabetes Atlas (2006), published by the International Diabetes Federation, the number of people with diabetes in India is currently around 40.9 million and is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken.[3] Indians are susceptible to risk factors such as age, general adiposity (BMI), and

central adiposity, measured either as waist circumference (WC) or as the waist: hip ratio (WHR) at lower threshold levels.[4,5]

Periodontal disease (PD) is characterized by destruction of the collagen fibers present in the periodontal ligament, supporting the tooth leading to a periodontal pocket formation between gingiva and the tooth. Periodontal disease is caused by gram-negative bacterial infections which are largely asymptomatic, and most of the tissue destruction observed clinically is the result of inflammatory host response. Periodontal disease (PD) is the second main cause of oral cavity disorders affecting the population due to its high prevalence.[6]

The relationship between DM and PD has been well-documented since the 1960s starting with the work by Belting *et al*.[7] In the mid-nineties, after 30 years of exhaustive research and some 90 published epidemiological studies, the association between DM and periodontitis is established, and periodontitis has become known as the sixth complication of diabetes.[8]

According to some studies, high serum Ca may promote the development and progression of oxidative stress, altered immunity and altered insulin secretion or its action.[9] It has been shown that serum calcium is higher when chronic periodontitis is present together with diabetes mellitus and elevated calcium level may be a contributing factor in many inflammatory conditions.[10] However, the changes in serum calcium in diabetic patients having chronic periodontitis are not well documented. The present study was aimed at investigating the changes in serum calcium in diabetic patients with chronic periodontitis.

Material and Methods:

This study was a cross-sectional study conducted in the Department of Biochemistry, National Institute of Medical Sciences & Research, Jaipur in association with Department of Periodontics, NIMS Dental College, Jaipur. The study was approved by the ethics committee of the institution. The study was conducted upon 80 adult diabetic subjects of both genders. The subjects were divided into two groups. Group A (control group) consisted of 40 clinically

diagnosed cases of Type 2 Diabetes Mellitus without Periodontitis and Group B (test group) was composed of 40 clinically diagnosed cases of Type 2 Diabetes Mellitus with Periodontitis.

Patients who had periodontal therapy during six months preceding the study, patients having systemic diseases other than diabetes, female patients taking oral contraceptives, pregnant/lactating women, patients with oncological disorders, patients taking hormone replacement therapy or any vitamin or mineral supplement, smokers, alcoholics and drug abusers were excluded from the study.

Type 2 Diabetes Mellitus were diagnosed by a physician. Dental examination was performed by a periodontist. The periodontal status included measurements of clinical attachment loss (CAL), gingival recession, pathological migration, and pocket depth in oral cavity. Patients having more than 35% of the sites with clinical attachment level ≥ 3 mm and pocket depth ≥ 5.5 mm were considered as having periodontitis.

Body weight and height of all subjects were measured for calculating body mass index. Venous blood sample were collected after an overnight fast, and serum was obtained by centrifuging the blood at 4000 rpm for 5 minutes. Blood sugar was measured using a ready to use kit based on GOD-POD method [11] and serum total calcium was measured by a kit based on Arsenazo method.[12] The control and test groups were compared using Student's unpaired t-test. A p value < 0.05 was considered as statistically significant.

RESULTS:

The mean \pm SD age, height, weight, BMI and fasting blood glucose level of test group and control group were comparable (Table 1). The mean levels of periodontal probing depth (PPD) and clinical attachment level (CAL) were significantly greater in T2DM with periodontitis, when compared to T2DM without periodontitis.

The mean \pm SD serum calcium concentration found in diabetes mellitus without periodontitis (control group) was 8.64 ± 0.45 mg/dl. In diabetes mellitus with periodontitis (test group), it was 9.26 ± 0.41

mg/dl (Table 2). Compared to the diabetes mellitus without periodontitis subjects, the diabetes mellitus

with periodontitis cases had significantly higher serum calcium concentration with a p value < 0.001.

Table 1: Comparison of age, height, weight, BMI and blood glucose between diabetes mellitus without periodontitis and diabetes mellitus with periodontitis groups (All the values are Mean ± SD)

Parameters	Diabetes mellitus without periodontitis (N=40)	Diabetes mellitus with periodontitis (N=40)	p-value
Age (years)	50.625±9.60	51.925±4.99	>0.05*
Height (mt)	1.57±.04	1.59±.074	>0.05*
Weight (kg)	54.88±9.41	56.52±3.88	>0.05*
BMI (kg/mt ²)	21.83 ±1.67	22.26 ±1.56	>0.05*
Blood glucose (mg/dl)	240.73 ±117.34	236.08 ± 56.85	>0.05*

*Not significant

Table 2: Comparison of serum calcium concentration between diabetes mellitus without periodontitis and diabetes mellitus with periodontitis groups (the values are Mean ± SD)

Parameter	Diabetes mellitus without periodontitis (N=40)	Diabetes mellitus with periodontitis (N=40)	p-value
Calcium (mg/dl)	8.64 ± 0.45	9.26 ±0.41	< 0.001*

*Highly significant

DISCUSSION

Epidemiological studies confirm that diabetes mellitus is a significant risk factor for periodontitis and the risk of periodontitis is greater if glycaemic control is poor. people with poorly controlled

diabetes (who are also most at risk for the other macrovascular and microvascular complications) are at an increased risk of periodontitis and alveolar bone loss.[13, 14] It has been reported that the properties of human collagen are changed during aging and with

the metabolic abnormalities in diabetes mellitus and that altered collagen metabolism in diabetics is expected to contribute to the progression of periodontal disease.[15] It has also been reported that the prevalence of periodontitis in Type 2 diabetes patients was significantly higher than that in the normal population and that Type 2 diabetes was positively correlated with periodontal destruction.[16] Increased advanced glycation end products in diabetes are involved in accelerating inflammatory response and changing the tissue repair process, which affects the elasticity of gingival collagen and blood vessels. In addition, periodontal pathogens in the oral microbial flora of diabetic subjects, which accumulate due to a higher concentration of glucose in saliva and crevicular fluid, also contribute to the severity of periodontal status.[17,18]

The anthropometric and clinical characteristics of subjects having Type 2 Diabetes Mellitus without periodontitis (control group) and Type 2 Diabetes Mellitus with periodontitis (test group) included in the present study are shown in Table 1. These two groups were comparable with respect to age, height, weight, BMI and fasting blood glucose level. Thus, the major difference in these two groups was the presence or absence of periodontitis.

We have compared serum calcium level in diabetics with periodontitis and diabetics without periodontitis. The former group had significantly higher serum calcium concentration ($p < 0.001$). Our results are in conformity with those reported in two earlier studies.[10,19] Calcium and insulin are important for the formation of bone collagen[20,21] and depletion of bone calcium leads to alveolar bone loss, bone fractures, and tooth loss in periodontitis patients with diabetes. Our results corroborate the existing evidence which suggests that altered calcium homeostasis may also play a role in the development of T2DM with periodontitis.[22]

CONCLUSION

Serum calcium was found to be significantly higher in diabetics with periodontitis as compared to diabetics without periodontitis. Altered calcium homeostasis may play a role in the development of T2DM with periodontitis.

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