European Journal of Molecular & Clinical Medicine
ISSN 2515-8260 Volume 08, Issue 01, 2021

Comparison of peri implant soft tissue and crystal bone status of dental implant placed in pre diabetic, diabetic and non-diabetic individuals

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ABSTRACT

Background: The present study was conducted to compare peri implant soft tissue and crystal bone status of dental implant placed in pre diabetic, diabetic and non diabetic individuals.

Materials & Methods: 60 patients were divided into 3 groups. Group I were pre diabetic (HbA1c 5.5 to 6.4%), group II were patients with poorly controlled type 2 DM (HbA1c ≥ 6.5%) and group III were healthy individuals (HbA1c < 5.7%). In all patients, peri-implant GI, PD and plaque index (PI) were measured.

Results: In group I, there were 12 males and 8 females, in group II were 10 males and 10 females and in group III, 9 males and 11 females. The mean plaque index in group I was 2.7 in group II was 3.1 and in group III was 0.5, gingival index was 2.9 in group I, 3.4 in group II and 0.6 in group III, probing depth was 4.1 in group I, 4.8 in group II and 1.2 in group III, crestal bone loss on mesial side was 3.6 mm in group I, 4.2 mm in group II and 0.7 mm in group III and crestal bone loss on distal side was 3.7 mm in group I, 4.0 mm in group II and 0.8 mm in group III. The difference was significant (P< 0.05).

Conclusion: Chronic hyperglycemia increases the risk of peri-implant diseases, there a good glycaemic control is necessary to prevent it.

Key words: Chronic hyperglycemia, Diabetics, Plaque index

1. INTRODUCTION

Stability of peri-implant tissue status and maintenance of crestal bone are essential for the long-term survival and success of dental implants. Many studies have reported that a 2 mm loss of crestal bone from the implant abutment junction in the first 12 months of implant placement followed by an annual 0.2 mm crestal bone loss (CBL) normal.[1] Non-splinted implants are commonly used in areas of missing adjacent teeth; however, formation of a "black triangle" in the interproximal space between the implant-supported crowns is a typical complication of adjacent implant.[2]

Chronic hyperglycemia is manifested in patients with prediabetes and poorly controlled type 2 diabetes mellitus (DM) and is a risk factor of periodontal and peri-implant diseases.[3] In vitro studies have reported that the formation and accumulation of advanced glycation end products in gingival and systemic tissues is increased in patients with chronic hyperglycemic conditions. Persistent hyperglycemia is also associated with a higher accretion of advanced glycation end products (AGE) in gingival tissues.[4] When these end products interact with their receptors (receptors for AGE [RAGE]), it results in the expression of destructive inflammatory cytokines including interleukin (IL)-6, IL-1b, and tumor necrosis factor-alpha (TNF-a) in the serum and gingival crevicular fluid. These proinflammatory cytokines contribute toward augmenting oral inflammation and increasing CBL around implants as well as teeth.[5]

These pathophysiological mechanisms have been associated with an increased peri-implant soft tissue inflammation (clinically manifested as an increased gingival index [GI] and probing depth [PD]) and crestal bone loss (CBL) around dental implants.[6] The present study was conducted to compare peri implant soft tissue and crystal bone status of dental implant placed in pre diabetic, diabetic and non diabetic individuals.

2. MATERIALS & METHODS

The present study comprised of 60 patients of both genders. All were made aware of the purpose of the study and their consent was obtained. Ethical clearance was obtained before starting the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 3 groups. Group I were pre diabetic (HbA1c 5.5 to 6.4%), group II were patients with poorly controlled type 2 DM (HbA1c $\geq$ 6.5%) and group III were healthy individuals (HbA1c < 5.7%). In all patients, peri-implant GI, PD and plaque index (PI) were measured on 6 surfaces per implant (midlingual/palatal, distolingual/palatal, mesiolingual/palatal, distobuccal, midbuccal, and mesiobuccal). Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

3. RESULTS

Table I Distribution of patients

Groups	**Group I**	**Group II**	**Group III**
Status	Pre diabetic	Diabetic	Healthy
M:F	12:8	10:10	9:11

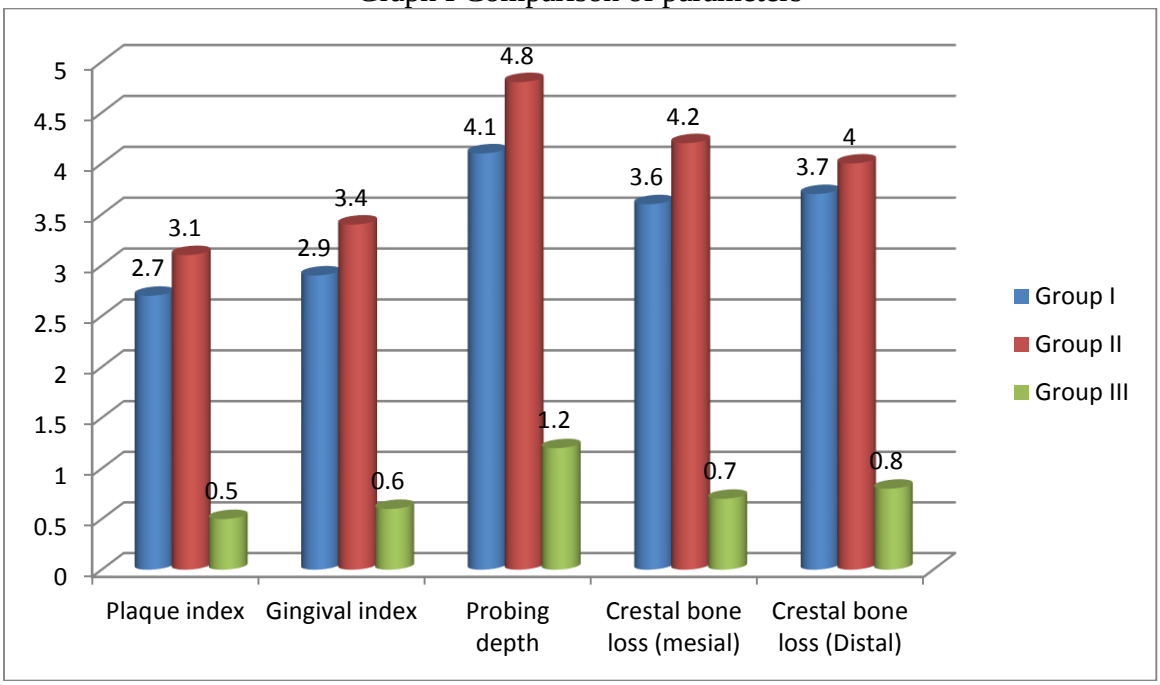
Table II shows that in group I, there were 12 males and 8 females, in group II were 10 males and 10 females and in group III, 9 males and 11 females.

Table II Comparison of parameters

Parameters (Mean)(mm)	Group I	Group II	Group III	P value
Plaque index	2.7	3.1	0.5	0.02
Gingival index	2.9	3.4	0.6	0.01
Probing depth	4.1	4.8	1.2	0.04
Crestal bone loss (mesial)	3.6	4.2	0.7	0.05
Crestal bone loss (Distal)	3.7	4.0	0.8	0.02

Table II, graph I shows that mean plaque index in group I was 2.7 in group II was 3.1 and in group III was 0.5, gingival index was 2.9 in group I, 3.4 in group II and 0.6 in group III, probing depth was 4.1 in group I, 4.8 in group II and 1.2 in group III, crestal bone loss on mesial side was 3.6 mm in group I, 4.2 mm in group II and 0.7 mm in group III and crestal bone loss on distal side was 3.7 mm in group I, 4.0 mm in group II and 0.8 mm in group III. The difference was significant (P< 0.05).

Graph I Comparison of parameters



4. DISCUSSION

The AGE-RAGE interactions have also been associated with an increased production of inflammatory cytokines (such as TNF-α and IL-1β) in the tissues that in turn worsen gingival inflammation and increase the activity of osteoclasts.[7] This is an explanation for the increased peri-implant GI, PD, and CBL among hyperglycemic patients than non-diabetic patients and patients with well-controlled type 2 DM.[8] Therefore, besides convincing patients to maintain glycemic levels via regimes such as regular exercise and dietary control, it is also essential to adopt measures to minimize CBL and peri-implant tissue inflammation in diabetic individuals. Results from an experimental study on rats showed that an impaired glycemic status jeopardizes implant osseointegration and compromises implant stability.[9] In the study by Alrabiah et al[10] levels of AGEs in the peri-implant sulcular fluid were significantly higher among patients with prediabetes and poorly controlled type 2 DM compared with patients without DM. However, under optimal glycemic control, dental implants can demonstrate successful stability and osseointegration, which is similar to that observed in systemically

healthy individuals. The present study was conducted to compare peri implant soft tissue and crystal bone status of dental implant placed in pre diabetic, diabetic and non diabetic individuals.

In present study, in group I, there were 12 males and 8 females, in group II were 10 males and 10 females and in group III, 9 males and 11 females. Alshahrani et al[11] eighty-three patients (20 patients had prediabetes, 22 with poorly controlled type 2 DM, 20 with well-controlled type 2 DM, and 20 self-reported non-diabetic individuals) were included. The mean HbA1c levels were significantly higher among patients with prediabetes and poorly controlled type 2 DM than patients with well-controlled type 2 DM and non-diabetic controls. Peri-implant PI, GI, PD, and mesio-distal CBL levels were significantly higher among patients with pre-diabetes and poorly controlled type 2 DM than patients with well-controlled type 2 DM and non-diabetic controls. Peri-implant PI, GI, PD, and mesio-distal CBL levels were significantly higher among patients with poorly controlled type 2 DM than patients with prediabetes.

We observed that mean plaque index in group I was 2.7 in group II was 3.1 and in group III was 0.5, gingival index was 2.9 in group I, 3.4 in group II and 0.6 in group III, probing depth was 4.1 in group I, 4.8 in group II and 1.2 in group III, crestal bone loss on mesial side was 3.6 mm in group I, 4.2 mm in group II and 0.7 mm in group III and crestal bone loss on distal side was 3.7 mm in group I, 4.0 mm in group II and 0.8 mm in group III. Alasqah et al[12] in their study peri-implant bleeding-on-probing (BOP), plaque index (PI), probing depth (PD), and mesial and distal CBL were measured. Eighty-six male participants (44 in Group-1 and 42 in Group-2) were included. The mean age of individuals in groups 1 and 2 were 57.6 6 5.5 and 61.6 6 4.3 years, respectively. In Group1, the mean duration of type-2 diabetes was 10.1 6 3.5 years. A family history of diabetes was more often reported by individuals in Group-1 than Group-2. In groups 1 and 2, 44 and 42 pairs of adjacent implants, respectively were placed in the regions of missing premolars and molars in both arches. All implants were delayed loaded and were fixed with non-splinted screw-retained restorations. In groups 1 and 2, tooth-brushing twice daily was reported by 79.5% and 85.7% individuals, respectively. There was no difference in peri-implant PI, BOP, PD, mesial and distal CBL and HbA1c levels among individuals in groups 1 and 2.

5. CONCLUSION

Authors found that chronic hyperglycemia increases the risk of peri-implant diseases, there a good glycaemic control is necessary to prevent it.

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