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Research Article

THE INFLUENCE OF SOME IATROGENIC FACTORS ON A CYTOMORPHOMETRIC ANALYSIS OF GINGIVAL CELLS AND PERIODONTAL STATUS AMONG DIABETIC PATIENTS

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ABSTRACT

Background: The relation between dental restorations and periodontal health are more important so the healthy periodontal status requires correction of dental restorations that is mandatory for the protection of periodontal tissues.
Aims of the study: The present study was designed to evaluate the effect of some iatrogenic factors on a cytomorphometric analysis of gingival cells and periodontal status among diabetic patients.
Subjects and Methods: The sample of the present study consisted of three hundred diabetic patients and they were divided into three equal groups 100 patients per group control group, composite fillings group and metal ceramic crown group. They were selected from the clinics of the college of dentistry King Khalid University. Plaque index (PI), gingival index (GI), and clinical attachment loss (CAL) were recorded. The cytomorphometric changes were evaluated by the Cytological investigation (MN Apoptotic and Necrotic Test). The results were collected and analyzed by ANOVA test.
Results: In the present study there were significant differences were detected in all clinical parameters in the samples of the study groups where there was an increase in (PI), (GI), and (CAL) of study groups compared to control group. In a cytomorphometric analysis of gingival cells, there was no significant increase of apoptosis and necrosis compared to control group.
Conclusions: The results of a current study revealed that there were increased gingival inflammation and attachment loss in both study groups compared to the control group, but there was a significance induction of micronuclei formation in all groups.

INTRODUCTION

Biocompatibility of dental materials is an imperative for the patient, clinician, research facility expert, and the maker. Preferably, a dental material that will be utilized as a part of the oral cavity ought to be innocuous to every single oral tissue, gingiva, mucosa, pulp, and bone. Moreover, it ought to contain no dangerous, leachable or diffusible substances that can be assimilated into the bloodstream, bringing on systemic reactions; including teratogenic or cancer-causing impacts and their contact with tissues should be biologically acceptable and non destructive[1].

Moreover, the materials ought to likewise be free of operators that could evoke vulnerability or a hypersensitive reaction in a sensitive patient where dental filling materials may bring about various responses in the oral mucosa, for example, gingiva. It is not clear today the amount of the in vivo watched cytotoxicity is brought on, either by the dental filling materials or by microbial dental plaque that collects on teeth and dental fillings[2], but the filling materials display some cytotoxicity that will be diminished considerably in time as a result of the buffering and protein-restricting impacts of salivation to relieve against the cytotoxic impacts[3].

Composite resin materials are at first exceptionally cytotoxic in vitro trial of direct contact with fibroblasts[4]. The chemical interaction of a toxic substance with biologically relevant molecules is mandatory for local toxicity, whereas the compatibility of tissue may also based on the causes of other material toxicity[5]. On the other hand, in other vitro study that was carried out on newly and developed restorative materials which revealed decreased water solubility and absorption and displayed high characteristics of biocompatibility [6&7].

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Dental ceramics are used when the esthetics is required such as crowns, inlays, onlays and veneers on anterior teeth[8], where the first used of ceramic abutment Ceramic Core was in 1993 [9&10]. Furthermore, the metal ceramic systems are durability therapy characterized by long success rate, but there are disadvantages of these systems such as biocompatibility and aesthetics, through the last years there were many new ceramic systems that developed with the ability to anterior and posterior teeth restoration [11].

The surface characteristics of the materials influence on the biofilm growth, i.e. surface roughness and surface-free energy where the surface roughness is more effective on biofilm retention more than surface-free energy[12]. Diabetes mellitus is considered a metabolic disease characterized by pancreas dysfunction in beta cells of the islets of Langerhans that is causing increased in the level of blood sugar and display of sugar in the urine secretion [13,] it influences on 2-10% of the population [14] so it is the most common metabolic disorders in the world[15] on the other hand periodontal disease is considered as a complication of diabetes mellitus but there is no direct relation between initiation of periodontal disease and diabetes mellitus occurrence [16]

So the present study was designed to evaluate the influence of some iatrogenic factors on a cytomorphometric analysis of gingival cells and periodontal status among diabetic patients.

Subjects and Methods

Patients samples

Three hundred diabetic patients under dental restorative therapy by composite fillings and metal ceramic crowns were selected from outpatient clinics, college of dentistry, King Khalid University. They have not received any periodontal treatment since at least six months and they were divided according to dental reconstruction into three equal groups. Group I patients without dental reconstruction were considered as a control group and two group study included group II patients were received composite fillings for restoration of class II dental caries and group III patients were received metal ceramic crowns for reconstruction of destroyed crowns.

Clinical examination

Periodontal examination was carried out by an assessment of plaque index (PLI)[17] and (GI) [18]and clinical attachment loss (CAL) for clinical evaluation of gingival inflammation intensity and assessed also the relation existing between

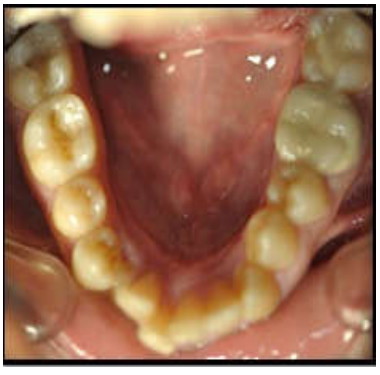


Fig 1 Clinical Examination

the gingiva and the margins of dental reconstructions in the current study also to evaluate the attachment level and maintaining of normal insertion or migration of the epithelial junction, furthermore if there are recession or periodontal pockets due to iatrogenic factors (Figure 1).

Cytological study

Cytological examination was done for evaluating the cytotoxic effects of composite fillings and metallic crowns on gingival cells and periodontal status. The Cytological smears, then sent into the biology lab, College of Sciences, King Khalid University (Figure 2 A&B).

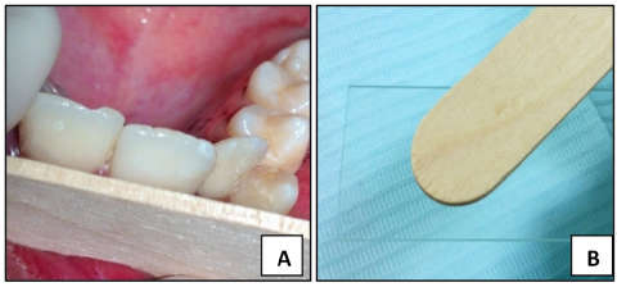


Fig 2 A& B Cytological gingival sample

Statistical analysis: The data were collected and analyzed by ANOVA test.

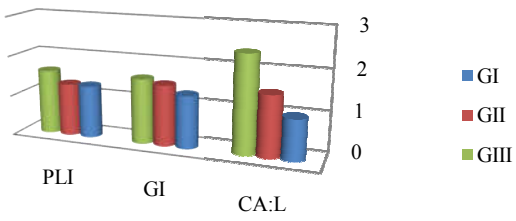
RESULTS

The table and figure 3 of clinical periodontal examination revealed significant differences between group I, II and III ($p<0.05$) where there were harmful effects of metallic ceramic crowns on periodontal tissues compared to control group (group I) whereas the destructive effects on periodontal tissue was more in group II compared to group I and group III in the present study.

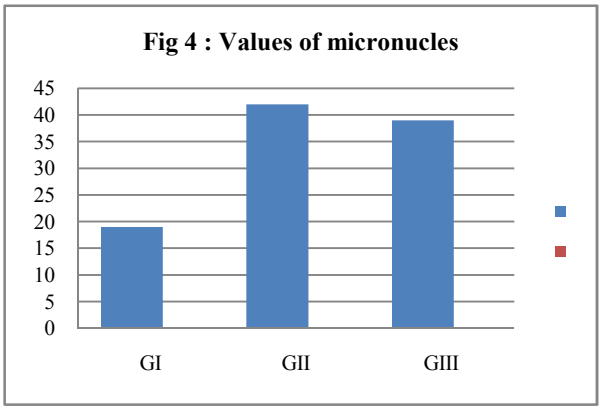
Table of clinical Findings

Group study	PLI	GI	CAL
GI	1.3±0,6	1.3±0,6	1.0±0,2
GII	1,3±0,6	1.5±0,5	1.5±0,1
GIII	1.6±0,6	1.6±0,6	2.4±0,2

Fig3:Clinical findings



The microscopic investigation displayed that there was no significant increase of apoptosis and necrosis in the study groups compared to control group, but, the results of the current study showed that (Composite filling) group had the highest value of micronucleus (MN) compared to metallic ceramic crowns group and the control group (Figure4). The microscopic investigation of Micronuclei also showed a variation in their shapes and number per cell.



The micronucleus type (M1) was found in all groups, while, type (M2) in metal ceramic crowns and (M3) micronucleus were not found in any group (Figure 5). Where the deformed nucleus (irregular in shape and has loops) and necrotic cells were not detected in any group.

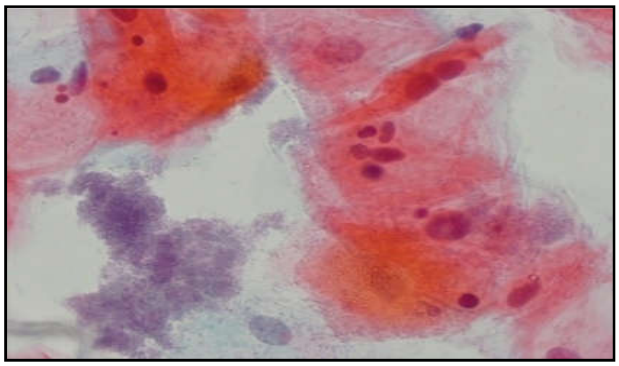


Fig 5 Micronuclei also showed a variation in their shapes and number per cell

DISCUSSION

Iatrogenic factors in dentistry are the inappropriate diagnostic or dental therapy procedures by practitioners that resulted accidentally reverse effects on periodontal tissues, thus, the current study here is presented to evaluate the influence of some iatrogenic factors on a cytomorphometric analysis of gingival cells and periodontal status among diabetic patients. In general, dental restorations impact on periodontal tissues due to increased dental plaque accumulations on gingival margins and changes of the composition of the subgingival microbiota with an increase in periodontal pathogens [19] this in agreement with the cross sectional study of by van Dijken et al. where they found that the microbiological alterations occurring in the subgingival flora with different materials used in dentistry[20]

In the study that was done by Larato on composite resin restorations adjacent to subgingival region and also in the similar study of Hammer & Hotz where there were gingival inflammation in gingival tissues adjacent composite resin restorations more than metal restorations[21,22] furthermore, in another study that carried out by Willershausen *et al* there were increased gingival bleeding and probing depth of resin-based restorations, as compared with other restorative materials[23] these findings in agreement of our study where there were increases in GI and CAL in group II competed to control group (group I) but there were no significance differences in PLI between GI and GII.

The inappropriate prosthodontic treatment assists the appearance of arrogance pathological changes in periodontal tissues based on the roughness, surface status of the crown margins that participate in plaque accumulation and gingival tissue inflammation[24] .On the other hand, in the experimental study on patients were followed up 5 years after part of fixed prosthesis there were increases in pocket depth more than the control group [25] and clinical attachment loss was reported in other longitudinal studies that extended from 1 to 1 5 years where the meaning of attachment loss was from 0.1 5 to 1.3 mm during this study[25,26,27] these findings similar the results of the current study where there were increases in PLI, GI, and CAL in GIII compared GI. On the other hand the GI of GII and GIII more than GI but it was more in GIII than GII furthermore, there were significance differences in CAL in our study where it was more in GIII and GII than GI but it was more in GIII than GII.

In the comparison with the cytological samples of metal ceramic crowns of the current study there were percentage of apoptotic cells caused by composite filling and this is in agreement with Samuelsen *et al* [28] and Schweikl et al[29]. This effect may be due to an increase the duration of composite resin fillings (more than 1week) that induced an elevation of the monomer transformation rate based on the chemical nature of these materials and also there was an increase in the dimethacrylates cytotoxicity after more than (72hr) where the treated cell cultures could not able to modify their form that were destroyed cells[29]. Furthermore, there were a toxic product generation like methacrylic acid (MA) due to the effect of enzymatic hydrolysis (by esterases) on composite resins[30,31]. which may be oxidized to form formaldehyde as a secondary product[32] consequently the biodegradation of resin may play important role in changes of the oral environment [31,33] On the other hand and in the current study there were no significant differences in increase of apoptosis and necrosis in the study groups compared to control group, but there were increase in value of micronucleus (MN) in group II compared to group I and group III, furthermore, the microscopic investigation of Micronuclei revealed differences in shapes and number of cells in group II compared to group I and group III where the micronucleus type (M1) was found in all groups, while, type (M2) in metal ceramic crowns and (M3) micronucleus were not found in any group. Finally, we did not find any nucleus abnormal and necrotic cells in all study groups.

CONCLUSION

The results of a current study revealed that there were significant induction of micronucleus formulation in all groups compared to the control group, this induction and variation may due to the effect of composite resin filling materials, and it may need further studies to confirm these results.

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