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## Evaluation of Caries and Periodontal Status in A Group of Diabetic Egyptian Children

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### ABSTRACT

The present study was carried out to evaluate the dental and periodontal status in a group of Insulin dependent Egyptian children and this was accomplished clinically and microbiologically. One hundred diabetic children represented by group 1 with age range 6-14 years who had selected from out-patient clinic of Abo EL-Rish , Endocrine department of faculty of medicine, Cairo university. And ten healthy children represented by group 2 with the same age range, were selected from those who referred to the out-patient Pediatric clinic of faculty of dental medicine, Al-Alzhar University, Girls branch. In this study dental examination was done by using mirror, probe, and periodontal probe. And caries prevalence was accomplished by using DMF, dmf and def indices. While periodontal status was evaluated by using PI, GI, PD and AL. Also this study evaluated the bacterial content qualitatively in plaque and saliva where *Streptococcus Mutans* and *Lactobacilli acidophilus* were chosen because of their importance in causing dental caries. And *A. actinomycetemcomitans* was chosen as a gram negative bacteria type which has a major role in causing periodontal diseases. DMF and def recorded values of both groups were at the same with no statistically significant difference. While as regarded to dmf no cases in healthy group so comparison was not performed. PI, GI and PD recorded values of both groups were at the same with no statistically significant difference. While as regarded to AL no cases in healthy group so comparison was not performed. Regarded prevalence of all bacterial species there were no statistically significant difference between two groups.

### INTRODUCTION

#### KEYWORDS

PI, GI, PD, AL, def, dmf, DMF

The term “diabetes mellitus” is used to identify a group of disorders characterized by elevated levels of glucose in the blood. This elevation

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is the result of a deficiency in insulin secretion or an increased cellular resistance to the actions of insulin, leading to a variety of metabolic abnormalities involving carbohydrates, fats and proteins metabolism<sup>(1)</sup>. A number of oral disorders have been associated with diabetes mellitus. In addition to gingivitis and periodontitis, dental caries, salivary dysfunction, oral mucosal diseases, oral infections such as candidiasis, taste and other neurosensory disorders. The occurrence of dental caries in patients with diabetes mellitus has been studied, but no specific association has been identified<sup>(2-4)</sup>. The relationship between dental caries and diabetes mellitus is complex. Children with DM Type I often are given diets that restrict their intake of carbohydrate-rich, cariogenic foods, but children and adults with DM Type II, which often is associated with obesity and intake of high-calorie and carbohydrate-rich food can be expected to have a greater exposure to cariogenic foods<sup>(5)</sup>. Furthermore, a reduction in salivary flow has been reported in people with diabetes who have neuropathy, and diminished salivary flow is a risk factor for dental caries<sup>(6)</sup>. The susceptibility to periodontal disease often called the “sixth complication of diabetes mellitus” is the most common oral complication of diabetes. The patient with poorly controlled diabetes is at greater risk of developing periodontal disease. It starts with gingivitis and then, with poor glycemic control, progresses to advanced periodontal disease. Children with diabetes and adults with less-than-optimal metabolic control show a tendency toward higher gingivitis scores<sup>(7-9)</sup>.

## MATERIALS AND METHODS

### Study Design

In this study, 110 Egyptian children aged between 6 and 14 years (mean age  $9.5 \pm 3$  years) were studied. Ethical approval was obtained from the Research and Ethics Committee of the Faculty of Dental Medicine of AL-Azhar University (Girls Branch), Cairo- Egypt and Abo-Elresh Hospital,

Department of Endocrinology. The study was explained to all participants' parents and they signed informed consent denoting their agreement to participate in the study. Also verbal consent from the children was obtained. The children were divided into two groups:

- **Group I:** Included 100 children 44 males and 56 females, mean age  $9.5 \pm 3$  years) with a medical history of insulin-dependent diabetes mellitus (Type I).
- **Group II:** Included 10 apparently healthy children the children in this group (3 males and 7 females, mean age  $8.8 \pm 2.8$  years).

**Inclusion Criteria include:** The medical history of patients involving their diabetes such as Glycated Hb, hyper-or hypoglycemia, albuminuria, glycosuria, diabetic coma and hospitalizations and For case selection of control group (Group II): Children free of systemic diseases and did not receive any medication

### • Method

Oral and Dental Examination include Survey Questionnaire, Extra oral examination and Intra oral examination

### ➤ Dental caries indices

The WHO criteria were utilized for the diagnosis of dental caries.<sup>(10)</sup> Clinical evaluation of dental caries prevalence accomplished by recording of Decayed-Missing-Filled index (**DMF** index) for permanent dentition, decayed-missing-filled index (**dmf** index) for deciduous dentition, decayed-extracted-filled index (**def** index) for mixed dentition

### • Indices used for assessment of gingival periodontal diseases

Periodontal status will be evaluated by recording the following clinical parameters: Plaque Index (Silness and Loe)<sup>(12)</sup>, Gingival Index (Loe and Silness)<sup>(11)</sup>, pocket depth and attachment level.

**Gingival Index include :** Plaque index, Silness and Loe (1964), <sup>(12)</sup> Pocket depth and Attachment level

#### • Microbiological Examination

- Saliva and plaque samples collected from each subject at same time of clinical examination and examined with different culture methods to evaluate qualitatively the bacterial contents of the examined plaque samples. Medium for *Streptococcus mutans* “Mitis Salivarius agar” <sup>(13)</sup> Medium for *Lactobacillus* culture “Tomato agar” <sup>(14)</sup> and Medium for *A. actinomycetemcomitans*: Trypticase soy Agar <sup>(15)</sup>

#### Statistical analysis

Numerical data were presented as mean and standard deviation (SD) values. Age data showed parametric distribution; so Student's t-test was used to compare between the two groups. Caries indices and clinical parameters data showed non-parametric distribution; so Mann-Whitney U test was used to compare between the two groups. This test is the non-parametric alternative to Student's t-test.

### RESULTS

#### Caries indices

There was no statistically significant difference between DMF and def in the two groups. As regards dmf, there were no cases in normal group so the comparison was not performed.

#### Clinical Parameters of GI & PI Table (1), Fig. (1)

There was no statistically significant difference between GI and PI in the two groups.

#### Clinical Parameters Of PD & AL

There was also no statistically significant difference between PD in the two groups. As regards CAL, there were no cases in normal group so the comparison was not performed

**Table (1)** Descriptive statistics and results of Mann-Whitney U test for comparisons between clinical parameters in the two groups

Clinical parameters	Diabetics	Normal	P-value
GI (Mean $\pm$ SD)	0.59 $\pm$ 0.50	0.33 $\pm$ 0.31	<b>0.146</b>
PI (Mean $\pm$ SD)	0.89 $\pm$ 0.58	0.54 $\pm$ 0.49	<b>0.097</b>
PD (Mean $\pm$ SD)	0.35 $\pm$ 0.33	0.23 $\pm$ 0.31	<b>0.310</b>
CAL (Mean $\pm$ SD)	0.03 $\pm$ 0.07	No cases	

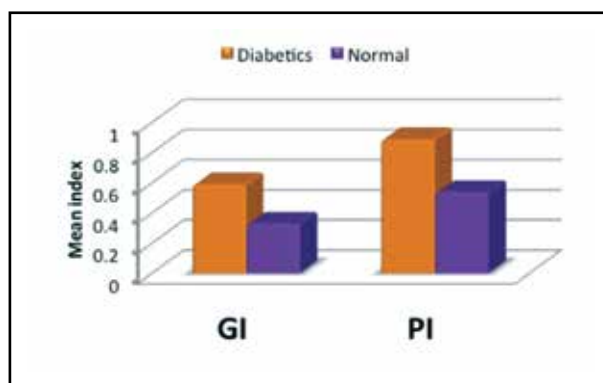


Fig. (1) Bar chart representing mean GI and PI in the two groups

#### Saliva prevalence Of All Bacteria

There was no statistically significant difference between prevalence of all bacterial species in the two groups

#### Plaque prevalence Of All Bacteria

There was no statistically significant difference between prevalence of all bacterial species in the two groups.

### DISCUSSION

In this study when comparing *Streptococcus mutans*, other *Streptococcus species* and *Lactobacillus acidophilus* between diabetic children with Type I DM and non diabetic children by taking samples

from saliva and plaque, it was found that no statistically significant difference between prevalence of *Streptococcus mutans*, other *Streptococcus species* and *Lactobacillus acidophilus* between the two groups in both saliva and plaque samples. In other recent study by **El-Tekeya et al.** <sup>(16)</sup> done in 2012 where 50 children with Type I DM and 50 healthy children from 6 to 9 years old were included to detect the prevalence of *Streptococcus mutans* and *Lactobacillus acidophilus* in saliva where diabetic children were classified into 3 groups: well, fairly and poorly controlled based on glycated hemoglobin level. And the result was no significant difference existed between diabetic and healthy children regarding the prevalence of *Streptococcus mutans* and *Lactobacillus acidophilus*.

In this study when comparing the presence of *A. actinomycetemcomitans* in both diabetic and non-diabetic groups, there were no statistically significant difference between two groups. In a comparative study done in India 2013<sup>(17)</sup> to detect *A. actinomycetemcomitans* and other putative periodontopathic bacteria in Type I DM and healthy children, where these study include 50 Type I DM and 50 healthy children in the age group of 7-14 years, and plaque samples were collected from permanent first molars. The result of these study that there were no significant statistical difference between Type I DM and healthy children/adolescent in the prevalence of *A. actinomycetemcomitans* and other putative periodontopathic bacteria. These results were in agreement with the results in these study.

In the present study there were no statistically significant differences in **DMF** between the two groups, but it's slightly lower in diabetic group. As regards to **def** values recorded at both groups there were no statistically significant difference, but it's slightly lower in diabetic group. As regards **dmf** there were no cases in normal group so the comparison was not performed.

In other study done in 2011 by **Tagelsir et al.** <sup>(18)</sup> to investigate caries experience and dental care in-

dex in diabetic and normal children where these study included 52 children and adolescents, 3-16 years of age with Type I DM and 50 healthy children as a control group, and caries lesions assessed by using caries indices. The study showed no significant differences were observed regarding caries experience and dental care between diabetic children and healthy controls. In a study by **El-Tekeya et al.** in 2012<sup>(19)</sup> done to detect caries prevalence in 50 children with Type I DM and 50 non diabetic children all 6-9 years old, where diabetic children were classified into 3 groups: well, fairly and poorly controlled based on glycated hemoglobin level. The result was: No significant differences existed between all groups regarding caries experience. Some studies which reported fewer caries in Type I diabetic patients – relating this observation to the diet prescribed in such patients, with restricted sugar intake, where they reported that controlled diabetic patients usually have a diet low in refined carbohydrates (especially sucrose) and high in protein content, which make the diet of these diabetic subjects clearly less cariogenic than non-diabetics. Also these approved by other studies which found lower caries prevalence among diabetic children as compared to non-diabetics and these low caries experience in diabetics has been explained mainly by the sucrose free diet that is apart of a lifelong treatment.<sup>(20-22)</sup>

Other suggested reason for decrease in caries experience at teenage include the increase in the salivary IgA immunoglobulin levels at this age. Furthermore, a possibility that exposure of the newly erupted premolars to sugars has not yet taken affect.

Young diabetics may initially exhibit a higher caries activity but when subjected to dietary control and insulin therapy, the frequency of caries is gradually reduced. So in well-controlled diabetic children patients with good oral hygiene, the incidence of caries is equal to or lower than nondiabetic.<sup>(23)</sup> **Sandberg et al.** <sup>(24)</sup> obtained that those patients with a longer duration of their

disease as well as those who are insulin-dependent, presented more caries lesions.

Clinical studies showed that diabetics are very prone to dental caries prior to the use of insulin, perhaps due to a decrease in salivary secretion and increase of carbohydrates in the parotid gland saliva. However, since its has been introduced into the treatment of the disease, many investigators have not found statistically significant differences in the prevalence of caries between diabetic patients and the healthy population. <sup>(25)</sup>

This study compared G.I & P.I values between diabetic and non-diabetic children aged from 6 to 12 years and found that there were no significant differences between the two groups. Also this study compared PD & AL values between diabetic and non-diabetic children and found that there were no statistically significant differences in PD between the two groups. As regards AL no cases were found in the normal group so the comparison was not performed. For pediatricians, it is important to note that gingivitis is not common in diabetic patients younger than twelve years of age, which means that periodontal diseases are not common in diabetic children but it was common in diabetic adolescents where periodontal disease has been found to occur in 9.8% of adolescents with diabetes as compared to 1.7% of adolescents without diabetes. The length of time that patients suffered from diabetes seems to increase their risks for developing periodontal disease. Patients with less than 10 years of diabetes seems to sustain more periodontal attachment than those who have had diabetes for more than 10 years, this is more clear in patients over 35 years of age. <sup>(26)</sup> So the incidence of periodontitis increased among diabetics after puberty and as in adults. This was also approved by **Mariotti A.** in 1994, <sup>(27)</sup> The dramatic rise in steroid hormone levels during puberty in both genders has a significant transient effect on the inflammatory status of the gingiva.

**Silvestre et al.** in 2009<sup>(28)</sup> proved that age of diabetic patients and duration of diabetes was a

periodontal disease risk factor where they concluded in their study that the duration of diabetes mellitus of over 10 years tended to influence both attachment loss and pocket depth.

## CONCLUSIONS

**With the limitation of the present study it could concluded that:**

1. Dentists have an opportunity and responsibility to educate patients with diabetes about the oral complications of the disease, and to promote proper oral health behaviors that limit the risks of tooth loss, periodontal disease and soft-tissue pathologies.
2. Improvement of glycemic control has a major role in reducing the occurrence of oral complications such as xerostomia, dental and periodontal diseases.
3. The dental team can improve the metabolic control of a patient's diabetes by maintaining optimal oral health.

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