

## Prevalence of Dental Caries among Type I Diabetic children in Sudan

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### Abstract:

**Background:** Diabetes mellitus is one of the most common chronic diseases in the general population. Dental caries is the most prevalent disease affecting the human race. The relation between diabetes mellitus and dental caries is in the ingestion of carbohydrates. The main objective of this study is to determine the prevalence of dental caries in type I diabetic children.

**Subjects and Methods:** 63 Type I diabetics from Ja'far Ibn Ouf Children's Hospital (Khartoum) and 63 control subjects with a mean age  $\pm$  SD of  $13 \pm 3.19$  years. The data were collected by means of a questionnaire and an examination check list including dietary, oral habits and DMFT Index (D: diseased, M: missed and F: filled Teeth). Relationship between variables was tested by Chi-square with level of significance  $P < 0.05$ .

**Results:** dental caries of diabetic subjects was 60.3% with a DMFT index of 0.09, while that of the control group was 85.7% with a DMFT index of 0.20. The main dietary constituent consumed by the diabetic sample was found to be proteins (76.4%) while in the control it was carbohydrates (71%). The relationship between DMFT and dietary constituents for the control group was found to be statistically significant ( $P=0.006$ ). DMFT and the number of daily insulin injections of the diabetic sample was statistically significant ( $P=0.046$ )

**Conclusion:** The prevalence of dental caries and DMFT index were higher in the control group than in the diabetic children.

**Key words:** carbohydrates, diabetes mellitus, bacterial toxins.

**D**iabetes mellitus (DM) is a disease in which the balance and metabolism of energy is disturbed for lack of secretory insulin or functional disorders, which would lead to an abnormal metabolism of carbohydrates, protein, and fat<sup>1</sup>. Diabetes Mellitus has an effect on the oral cavity as patients with uncontrolled diabetes have been observed to be more prone to inflammation of highly vulnerable mucosa, due to a decreased systemic immunity and disturbed function of polymorph nuclear lymphocytes, which represent first-line defense of the oral cavity and the whole body against bacterial toxins<sup>2</sup>. Patients with poor disease control are more susceptible to multiplication of some fungi, *Candida albicans* in particular<sup>3</sup>.

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The caries process is well understood, it is a localized progressive demineralization of the hard tissues of the crown and the root surfaces of the tooth. The demineralization is caused by acid produced by bacteria that fermented carbohydrates<sup>4</sup>.

There is no absolute restriction of carbohydrate intake for management of diabetes especially for type 1, but it is traditionally a common believe that dietary restriction of sugar is an essential part of the management of diabetes. On the other hand sugar is the main factor for the development of dental caries. So diabetic children who were restricting sugar intake were assumed to have low caries prevalence. However this association between dental caries and diabetes mellitus has not received enough attention since no data were available on the prevalence of dental caries in patients with Type I Diabetes in Sudan.

**Materials and Methods**

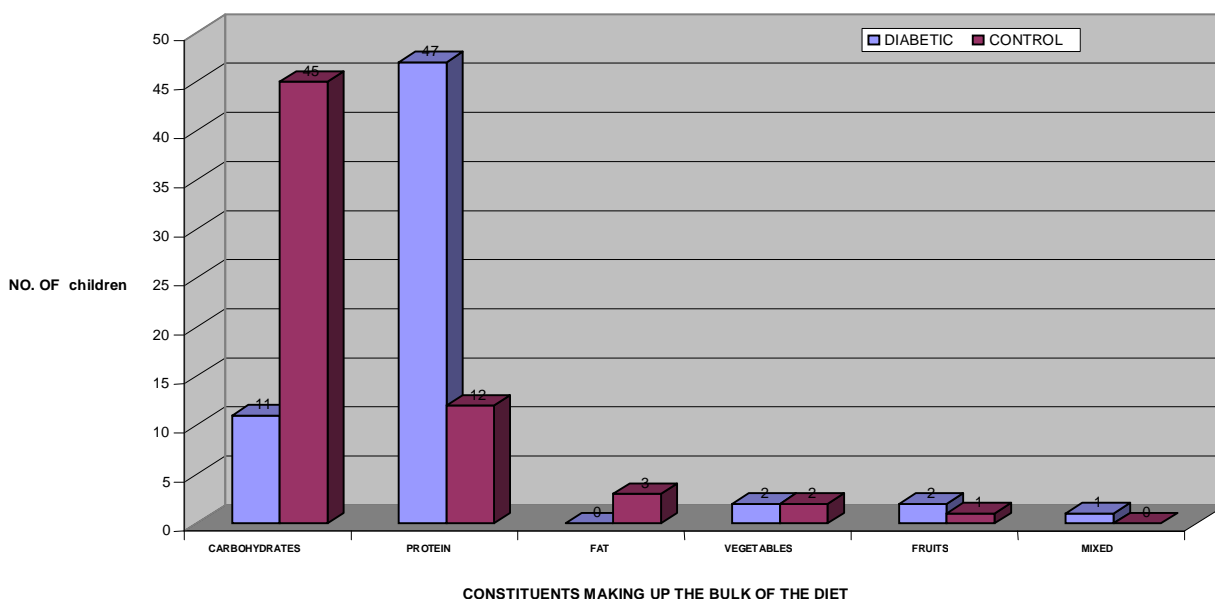
Sixty three Type I diabetic subjects attending Ja'far Ibn Ouf Children's Hospital for treatment and follow-up and 63 control subjects from elementary and higher schools in Khartoum state, Sudan, aged between 8-18 years were enrolled in the study. Verbal consent was obtained from guardians and patients over 16 years. A well structured Questionnaire including demographic data, medical history (diabetic history) and dental health status to each patient and control group were filled by the authors. Examination of all participants was performed and the data of

decayed (D), missed (M), Filled (F), and healthy teeth (H) - i.e. DMFT according to the WHO criteria, 1997-were registered in examination sheet. Clinical examination was conducted using a mirror and probe under daylight in upright chair in the hospital and in the schools. Data analysis was done using Chi square test. The level of significance used was  $P < 0.05$ .

**Results**

The mean age of the study sample was 13 years with a standard deviation of  $\pm 3.19$ . The median age was also 13 years.

Fig 1: distribution of the diabetic and control samples.



Fig(1) DISTRIBUTION OF THE DIABETIC AND CONTROL SAMPLE ACCORDING TO DIETARY CONSTITUENTS (DIABETIC=63, CONTROL=63)

In Fig 1 main dietary constituent consumed by the diabetic subjects was found to be proteins (76.4%) while in the control it was carbohydrates (71%), the relationship between DMFT and dietary constituents for the control group was found to be statistically significant ( $P=0.006$ ) while for the diabetic sample it was not ( $P=0.595$ ).

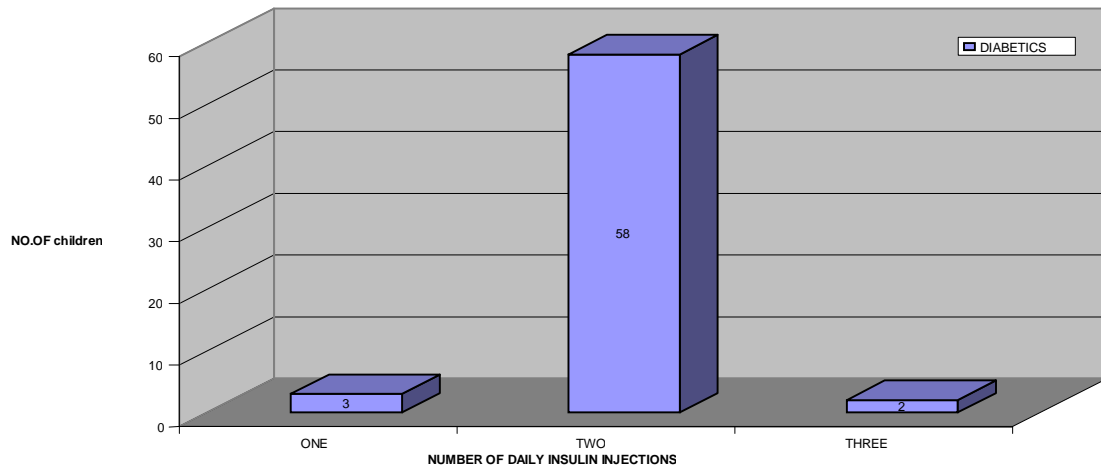
Table 1 showed the diabetic sample [DMFT] having a mean  $\pm$  standard deviation of  $0.09 \pm 0.10$ , while the control group was found to be  $0.20 \pm 0.15$

Table 1:

	DMFT of the diabetic and control sample		
	DMFT		
	mean	median	standard deviation
diabetic	0.09	0.07	0.10
control	0.20	0.20	0.15

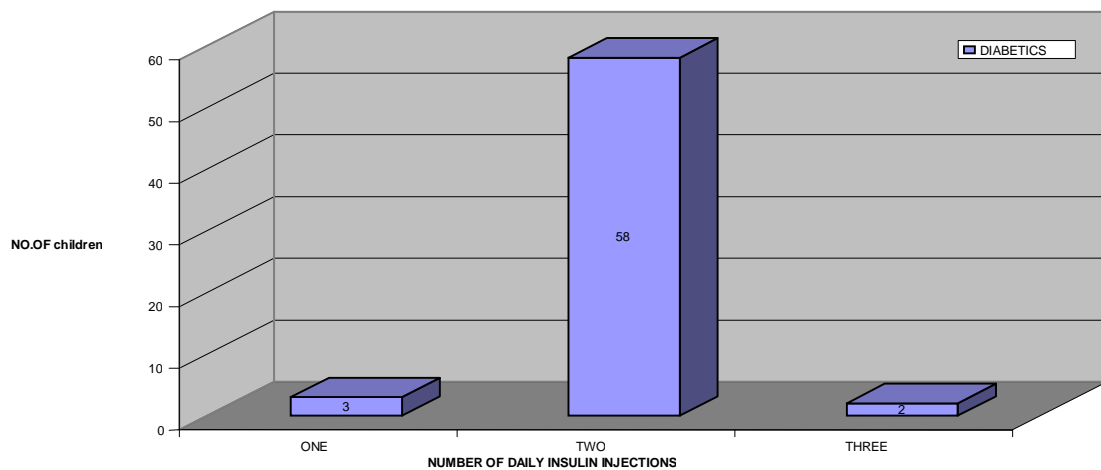
diabetic=63 ;control=63

Fig2 showed the relationship between DMFT and the number of daily insulin injections of the diabetic sample was statistically significant ( $P=0.046$ ).



Fig(2) RELATIONSHIP BETWEEN DMFT ANDTHE NUMBER OF INSULIN INJECTIONS IN DIABETICS=63)(STATISTICALLY SIGNIFICANT  $P<0.05$ )

Fig3 presents the relationship between the DMFT and the frequency of teeth brushing per day for both the diabetic ( $P=0.391$ ) and control ( $P=0.124$ ). There was no statistically significant difference.



Fig(3) RELATIONSHIP BETWEEN DMFT ANDTHE NUMBER OF INSULIN INJECTIONS IN DIABETICS=63)(STATISTICALLY SIGNIFICANT  $P<0.05$ )

Table 2 revealed that the prevalence of dental caries in the diabetic subjects was 60.3%, while in the control group was 85.7%.

Table (2) Prevalence of dental caries.

	Diabetic	Control
Prevalence of dental caries	60.3%	85.7%

Diabetic=63 ;Control=63

### Discussion

Data concerning oral health in diabetic patients in Sudan were not enough. The prevalence of dental caries among Type I diabetic patients in our study was nearly similar to an Iranian study<sup>5</sup>. The relationship between DMFT and age was not statistically significant for diabetics ( $P=0.790$ ) or control ( $P=0.00$ ). These results disagree with Stadtler et al<sup>6</sup>. The relationship of DMFT with gender and brushing for diabetics and control was not significant agreeing with Ali et al<sup>5</sup>. The relationship between DMFT and diet was not significant for diabetics but it was found to be significant in the control group which may be due to the increased amount of carbohydrates in their diet.

Traditionally the management of diabetes mellitus involves sugar restriction. This is evident in our results as the main dietary for diabetic subjects is protein while that for control is carbohydrate. This may highlight the importance of dietary advice and counseling for carbohydrate intake for growing type I diabetic children. Although sugars are known as etiological factors for dental caries development, however diabetes mellitus per se is a disease which is known to cause xerostomia which is a predisposing factor for dental caries, but this most commonly affects adult with type II diabetes. No statistically significant relationship was found between the DMFT and family history for either the diabetics or the control. The number of daily insulin injections taken by the diabetic sample was found to have a significant relation with the DMFT this may be due to the control of diabetes. The DMFT for Type I diabetic patients was found to be

0.09 and for the control group it was found to be 0.20. This is less than that found in Finland and Iran<sup>5</sup> this clear difference may be due to dietary habits, sample size and the prevalence of diabetes among Sudanese children compared to the other population.

The DMFT found in this study is within the range of the DMFT recommended by the WHO for non diabetic children ( $<3$ )<sup>7</sup>. The rate of dental caries in Type I diabetes mellitus is lower than that for the control group in our population. This result agrees with the results of the studies conducted by Tavares et al<sup>8</sup>. It however, disagrees with other literature<sup>6, 9-11</sup>. In other studies no difference in dental caries was found between the diabetics and the control group<sup>9, 12-14</sup>. There is no clear explanation for this discrepancy.

It is known that patients with good glycaemic control- where the complications of diabetes are grossly reduced or even absent- have normal lives similar to those who have no diabetes. In order to know the glycaemic control a specific test is used (HbA1C) which is repeated once every three months. All (100%) of the study sample did not know what this test was. This highlights the importance of educating the patients regarding this test in diabetic centers in Sudan.

**Conclusion:** The prevalence of dental caries among type I diabetic subjects is lower than control group. The main dietary constituent consumed by the diabetic subjects was found to be proteins while in the control it was carbohydrates, the contributory magnitude of this dietary difference in development of dental caries needs further studies.

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