

## ORIGINAL ARTICLE

# Comparison of Dental Caries and Gingival Bleeding Status among Diabetic and Non-Diabetic Type 2 Children

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## ABSTRACT

**Objective:** To compare the dental caries and gingival bleeding status among diabetic and non-diabetic type 2 children

**Design of the Study:** Cross sectional study

**Study Settings:** The current study was conducted in the OPD of Dentistry at the CMH Lahore between the months of January 2021 and June 2021.

**Material and Methods:** A total of 400 children aged 6–18 years enrolled in the research. Children with Type 2 Diabetes Mellitus (T2DM) were included in the study group, whereas children without T2DM were included in the control group (non-diabetic group).

**Results of the Study:** Among non-diabetic subjects, there were 191 (47.8%) males and 209 (52.2%) females respectively and among diabetic subjects, there were 198 (49.5%) males and 202 (50.5%) females respectively. Prevalence of teeth with dental caries among Non-diabetic subjects was found to be 87% (350) whereas among diabetic subjects, it was found to be 93% (371).

**Conclusion:** According to the findings, diabetics were more likely than non-diabetics to have dental caries and periodontal disease. There was a high prevalence of dental caries and missing teeth in diabetic participants, which led to an overall higher mean DMFT score.

**Keywords:** Gingival Bleeding, Dental Caries, Diabetic, Non-Diabetic, Children

## INTRODUCTION

An increased risk of oral illness has been associated to diabetes mellitus (DM).<sup>1</sup> Pathogenic bacteria colonise more frequently in the mouths of diabetics, resulting in the loss of both hard and soft tissues. Diabetes-related oral conditions include gingivitis and periodontitis, dysfunction of salivary gland, xerostomia and enhanced dental caries and periapical abscesses, taste impairment, tooth loss, lichen planus, and burning mouth syndrome are all possible side effects of having a compromised immune system in this person.<sup>2,3</sup>

Diabetic patients often complain of xerostomia, which can lead to oral health issues such as tooth decay, particularly root caries.<sup>4</sup> Some of these may cause oral pain or dysfunction and a lower quality of life. The frequency of Type II diabetes mellitus and the preservation of teeth in old age are predicted to lead to a rise in oral health problems in the next decades.<sup>5,6</sup> Dental caries, which can be traced back to microorganisms in the diet, are one of the most frequent long-term diseases.<sup>7</sup> Due to frequent availability to fermentable carbohydrate-rich foods, the dental biofilm environment changes from a healthy group of microorganisms of low cariogenicity (more aciduric and acidogenic) to a population of microorganisms that are more aciduric and acidogenic.<sup>8</sup> It is possible to generate a cavitation if acid is produced near the tooth structures.<sup>9,10</sup>

There has been a lot of debate in the literature on the link between diabetes mellitus and the likelihood of acquiring gingivitis. While diabetes mellitus does not induce gingivitis or periodontal disease.<sup>11</sup> Tooth calculus may be a predisposing local factor for gingival irritation development and progression. Gum disease is more common and more severe in people with diabetes who have difficulty controlling their blood sugar levels.<sup>12</sup> Periodontal disease may be more severe in poorly controlled diabetics because of a shift in the microflora's environment, resulting in qualitative alterations in periodontal disease.<sup>13</sup>

There is currently no conclusive evidence that dental caries are linked to diabetes mellitus (DM). Small, cross-sectional clinical investigations published before have yielded mixed or no definitive outcomes. Therefore current study was undertaken to compare dental caries and gingival bleeding status among diabetic and non-diabetic type 2 children.

## MATERIAL AND METHODS

The current study was conducted in the OPD of Dentistry at the CMH Lahore between the months of January 2021 and June 2021. The Ethical Committee Review Board of the institution authorised the study's protocol. The purpose of the study was described, and signed consent was acquired, before the study began. A promise was made to the authorities that the children's identities would not be revealed.

Children aged 6–18 years with parental agreement, cooperation, full medical records, and T2DM were included in the study, as were children in the control group (non-diabetic) who were healthy and free of systemic disorders. Children who were medically challenged but not suffering from type 2 diabetes and were not receiving any other medications that could affect salivary flow were excluded from the trial.

Based on Twetman et al.<sup>14</sup>, the sample size was determined. For a 0.05 level of significance, the sample size needed to be 389 to achieve 90% power. Thus, the number of participants was rounded up to 400. As a result, 200 T1DM youngsters aged 6 to 18 years were included in the research. The control group consisted of 200 children who were chosen at random from two public schools and matched by age and gender. An official form was utilised to keep track of the ages and genders of the children and their medical histories, as well as any soft tissue or hard tissue findings found outside of the mouth.

The children were checked while seated straight in a chair, with plenty of natural daylight streaming in to ensure they had the best possible illumination. Our department provided training and calibration for dental caries examination. Due to inter-examiner variability, the oral examination was done by a single examiner. As the examiner gave his or her codes, a dental surgeon sat next to him or her to record their results for accuracy. Inter-examiner reliability was tested on 10% of the youngsters. 0.93 was the intra-examiner agreement kappa value for teeth.

A sterile mouth mirror was used to do the oral examination. For permanent teeth (decayed, missing, and filled teeth [DMFT]), dental caries status was documented. In order to diagnose dental caries, the WHO criteria (2013) for caries lesions were employed.<sup>15</sup> In order to determine the overall health of the gingiva, the GI, developed by Loe and Silness, was used.<sup>16</sup> For data analysis, SPSS version 26.0 was employed

**STUDY RESULTS**

A total of 400 children took part in the research. Children with Type 2 Diabetes Mellitus (T2DM) were included in the study, whereas children without T2DM were included in the control group (non-diabetic group). Among non-diabetic subjects, there were 191 (47.8%) males and 209 (52.2%) females respectively and among diabetic subjects, there were 198 (49.5%) males and 202 (50.5%) females respectively as shown in Table 1. Mean age of Non diabetic patients was found to be 17.065±3.565 while mean age of Diabetic participants was found to be 15.72±3.632. Distribution of

diabetes and non-diabetic topics based on education is also presented in Table 1

Table 3 shows that prevalence of teeth with dental caries among Non-diabetic subjects was found to be 87% (350) whereas among diabetic subjects, it was found to be 93% (371). Prevalence of teeth without dental caries was found to be 13% (50) among non-diabetic subjects whereas among diabetic subjects, it was found to be 7% (29). It is shown in Table 4 that among diabetes patients, the mean number of sound decaying teeth was 25.250 ±4.404; the mean number of teeth with caries was 2.78; the mean number of teeth filled due to caries was 2.1900; and the mean number of missing teeth was 1.410.

Table 1: Demographics of the study participants

Characteristics	Variables	Diabetic subjects	Non-Diabetic subjects
Age	Mean±SD	15.72±3.632	17.065±3.565
Gender	Male	198 (49.5%)	191(47.8%)
	Female	202 (50.5%)	209 (52.2%)
School	Primary	76(19%)	92(23.2%)
	Middle	104(26%)	113(28.2%)
	High	13(3.3%)	32(8.4%)
	Intermediate or Post High	207(51.7%)	163(40.2%)

Table 2: Diabetes and non-diabetic patients were compared in terms of their oral hygiene habits.

Questions	Questions	Non-Diabetic subjects	Diabetic subjects
Type of Tooth Brush	Soft Bristles	114(28.5%)	103(25.8%)
	Medium Bristles	144(36.0%)	160(40%)
	Hard Bristles	142(35.5%)	137(34.3%)
Method of Cleaning	Vertical	125(31.3%)	94(23.5%)
	Horizontal	175(68.2%)	306(76.5%)
Frequency of Brushing	Once	241(60.3%)	(69.8%)
	Twice	159(39.7%)	121(30.2%)
Time of Brushing	Before Meals	292(73%)	315(78.7%)
	After Meals	108(27%)	85(21.3%)
Frequency of changing tooth brush	2 months	10(2.5%)	0(0%)
	3 months	53(13.3%)	42(10.5%)
	4 months	256(64%)	282(70.5%)
	6 months	81(20.2%)	76(19%)
Use of any other oral hygiene Aids	Yes	127(31.8%)	159(39.8%)
	No	273(68.2%)	241(60.2%)

Table 3: Dental caries prevalence in diabetics and non-diabetics is compared.

Parameters	Variables	Non-Diabetic subjects	Diabetic subjects	p value
Caries	No. of People With Caries	350(87%)	371(93%)	p<0.04
	No. of people Without Caries	50(13%)	29(7%)	
Gingival Bleeding GB	No. of People With GB	382(95.5%)	400(100%)	p<0.000
	No. of people Without GB	18(4.5%)	0(0%)	

Table 4: Assessment of dental caries and periodontal status among diabetic subjects

Disease	Variable	Mean	Std.Deviation	Mean±SD
Dental caries	Number of decayed teeth	25.250	4.404	25.250±4.404
	Number of teeth with caries	2.7850	1.756	2.7850±1.756
	Number of teeth filled	2.1900	1.100	2.1900±1.100
	Number of teeth missing	1.410	1.535	1.410±1.535
	DMFT	6.3850	4.200	6.3850±4.200
Periodontal disease	Absence of gingival bleeding	21.165	2.272	21.165±2.272
	Presence of gingival bleeding	10.835	2.272	10.835±2.272
	Teeth not present	.4356	0.958	0.4356±0.958
	Absence of periodontal pocket	19.415	1.765	19.415±1.765
	Periodontal pocket 4-5mm	8.470	1.739	8.470±1.739
	Periodontal pocket 6mm or more	4.060	1.272	4.060±1.272

**DISCUSSION**

The present study was conducted to find out the prevalence of dental caries and Gingival Bleeding among diabetic and non-diabetic children. Out of 800 subjects examined 48.6% were males and 51.4% were females. This distribution is similar to the study conducted by Sridhar et al<sup>42</sup> in Bangalore city, wherein there were 38% males 62% females.<sup>17</sup> No significant difference was found between the diabetic and non-diabetic subjects with regard to type of tooth brush used, method of cleaning, frequency of changing tooth brush. According to the findings of a study by Emrich J et al. in Arizona.<sup>18</sup> Study participants with diabetes and non-diabetics

were both found to have high rates of dental caries (93 percent and 87 percent, respectively). These findings contrast with those of the study by Ekta et al.<sup>19</sup>, which indicated a statistically significant difference between the prevalence of dental caries in diabetes participants (73.33%) and the prevalence of dental caries in non-diabetic subjects (33.33%).

In the present study, prevalence of gingival bleeding among diabetic subjects was found to be 100% and prevalence of gingival bleeding among non-diabetic subjects was found to be 95.5%. This contrasted with the findings of a research by Bissong et al<sup>20</sup>, in which the prevalence of gingival bleeding among non-diabetic

subjects was found to be 23.5% and the prevalence of gingival bleeding among diabetic subjects was found to be 76.5%. The mean DMFT value among diabetic subjects in the present study was found to be  $6.385 \pm 4.200$ . According to the findings of a study by Seetalakshmi et al.<sup>21</sup> in Chennai, in which mean DMFT value among diabetic subjects was found to be 8.10.

Non-diabetic participants in this study had a mean DMFT value of  $6.242 \pm 3.863$ . The non-diabetic participants in Seetalakshmi et al.<sup>21</sup> study in Chennai had a mean DMFT score of 1.15, in contrast to this. There were  $22.012 \pm 3.084$  on average for non-diabetic patients, and  $21.165 \pm 2.272$  on average for diabetes subjects in terms of teeth without gingival bleeding. Gingival bleeding was discovered in  $9.830 \pm 3.087$  non-diabetic people and  $10.835 \pm 2.72$  diabetes patients, and this difference was found to be statistically significant, according to the results of the study. These results were in stark contrast to those of Glavind et al.<sup>22</sup> in Denmark who reported the number of teeth with gingival bleeding among non-diabetic participants to be  $4.072 \pm 1.2445$ .

The results of present study can be used for planning future services and strategies towards better oral health for this population. Besides generating awareness, treatment and restorative services need to be made available and accessible to the diabetic population.

## CONCLUSION

According to the findings, diabetics were more likely than non-diabetics to have dental caries and periodontal disease. There was a high prevalence of dental caries and missing teeth in diabetic participants, which led to an overall higher mean DMFT score.

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