

# FREQUENCY OF DENTAL CARIES IN TYPE 2 DIABETICS VERSUS NON- DIABETICS A CROSS- SECTIONAL STUDY IN PRIVATE HOSPITALS OF KARACHI

Talha M Siddiqui<sup>1</sup>, Aisha Wali<sup>2</sup>, Murtaza Nazar<sup>1</sup>, Ahmad Masaud<sup>1</sup>, Wali Rahman<sup>1</sup>

<sup>1</sup>Department of Operative Dentistry, Baqai Dental College, Medical University (BMU) Karachi, Pakistan

<sup>2</sup>R&D Department, Baqai Dental College, Baqie Medical University (BMU) Karachi, Pakistan

## ABSTRACT

**Objective:** The current study was conducted to assess the frequency of dental caries in type 2 diabetics versus non-diabetics

**Materials and Methods:** A cross sectional study was conducted from August 2018-October 2018 amongst Type II Diabetics and non- diabetics attending the Diabetic Outpatient Department (OPD) in Baqai Institute of Diabetology, Nazimabad and out -patient Department of Oral Diagnosis, Baqai Dental College. The sample size was estimated using Open Epi version 3.03a by taking 27% prevalence rate with 95% confidence interval and  $\alpha = 5\%$ . The sample size calculated is 300. A consecutive sampling method was done and 150 patients with type II diabetes and 150 non- diabetic patients were examined. Data was analyzed using SPSS (Statistical Package for Social Sciences) version 22.

**Results:** The frequency of dental caries in type II diabetic patients was found to be 42.7% and 42% in non-diabetic patients. The results were statistically significant.

**Conclusion:** There is an association between dental caries and type II diabetes mellitus but there was less difference reported in prevalence of dental caries amongst diabetics and non- diabetics.

**Keywords:** Caries Index, Dental caries, Diabetes Mellitus, Oral health, Risk assessment

## INTRODUCTION

Diabetes mellitus is a type of metabolic condition characterized by high blood glucose levels caused by a lack of insulin secretion or an insulin action or both.<sup>1</sup> Diabetes mellitus has been classified into two basic types: insulin-dependent DM (IDDM; type 1) and non-IDDM type 2.<sup>2</sup> Obesity is most commonly seen after 30 years of age and increased blood glucose levels are a sign of Type 2 DM.<sup>3</sup> Dental caries is a microbial disease of the calcified tissues of the teeth which is characterized by alternate phase of demineralization and remineralization of the or-

ganic substances resulting in cavitation.<sup>4</sup> There is an intricate association between the diabetes mellitus and dental caries,<sup>5</sup> particularly amongst adults which has received not much attention so far despite of the fact that both diabetes mellitus and dental caries are related to carbohydrate ingestion.<sup>6-9</sup> Various studies reported that dental caries is associated with systemic diseases like cardiovascular disease,<sup>8</sup> cerebrovascular disease,<sup>9</sup> metabolic syndrome.<sup>10</sup>

Some researchers reported association between dental caries and type 2 diabetes mellitus<sup>11-13</sup> whereas others reported no association<sup>14</sup> or even inverse association<sup>15</sup> between dental caries and type 2 diabetes mellitus.

According to the World Health Organization (WHO), diabetes mellitus is now growing abruptly worldwide, and spread is epidemic.<sup>16</sup> Diabetes mellitus affected approximately 2.8% of people worldwide

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### Correspondence:

Aisha Wali

Assistant Director Research & Head  
R&D Department, Baqai Dental College, Baqie Medical  
University (BMU) Karachi, Pakistan  
Email: aishawali@baqai.edu.pk  
Contact: +923002248518

in 2000 in all age groups and it is projected to grow to 4.4% by 2030.<sup>17</sup> Roglic et al<sup>18</sup> in a study reported that Diabetes is responsible for almost nearly 3 million deaths per year which is equal to 5.2% of all deaths. Moosa Y et al<sup>19</sup> in a study found that non- diabetics had a higher prevalence of dental caries than diabetics. The Rationale of the study was to highlight caries experience in diabetics and non –diabetics.

The current study was conducted to assess the prevalence of dental caries amongst type 2 diabetic and non-diabetic adults visiting Hospitals of Karachi.

## MATERIALS AND METHODS

A cross sectional study was conducted from August 2018-October 2018 amongst Type 2 Diabetics and non- diabetics attending the Diabetic Outpatient Department (OPD) in Baqai Institute of Diabetology, Nazimabad and Outpatient Department of Oral Diagnosis, Baqai Dental College. The study was approved by ethical committee, Baqai Dental College and permission for patient examination was obtained from respective authorities. Patients aged 30-70 years with a history of 3 years of type 2 Diabetes and healthy patients with no history of Diabetes were included in the study. Open Epi version 3.03a was used to calculate the sample size by taking 27% prevalence rate at 95% confidence interval and  $\alpha = 5\%$ . The sample size calculated was 300. A consecutive sampling method was done and 150 patients with type 2 diabetes and 150 non diabetic patients were examined. An informed consent was taken, and data was collected with a closed ended questionnaire which included questions about demographic profile, type of Diabetes Mellitus and history of duration of Diabetes Mellitus. The participants completed the questionnaire to ensure data collection accuracy. The WHO 2013 proforma was used to record dental caries.<sup>20</sup> Clinical examination was performed by a single examiner and was trained for a week in the Department of Operative Dentistry. Patients were seated comfortably on dental chair to examine all teeth present sextant wise using mouth mirror and sickle probe with disposable gloves and mask.

Data was analyzed by using SPSS (Statistical Package for Social Sciences) version 22. The chi-square test was used to compare the prevalence of dental caries between the sample groups and mean and SD were determined by using Student's t-test. Level of significance was kept at 0.05.

## RESULTS

A total of 300 patients aged 17-70 years were examined, out of which 187 were male patients and 113 female patients. (Table 1)

The frequency of dental caries in type II diabetic patients was found to be 42.7% and 42% in non-diabetic patients. The results were statistically significant. (Table 2)

Dental caries was recorded as DT (decayed teeth), MT (missing teeth), FT (filled teeth). Mean value of DT and MT was higher than FT in type II Diabetic group. Mean value of DT and MT was again found to be higher than FT in non-diabetic group. Mean DMFT was found to be higher in Type II diabetic group than non- diabetic group. The results were statistically significant. (Table 3)

## DISCUSSION

The present study reported that there is an association between dental caries and type 2 Diabetes Mellitus. Dental caries was found to be 42.7% more common in diabetics than non-diabetics (42%). Dissimilar results were reported by Malvania E et al<sup>21</sup> that prevalence of dental caries amongst diabetics was 73.33% and 30.83% amongst the non-diabetics. Reddy C et al<sup>6</sup> also reported dissimilar results that prevalence of dental caries amongst diabetics was 69.7% and non-diabetics 65.3%. Moin M et al,<sup>22</sup> Malicka et al,<sup>23</sup> Shoaib A et al,<sup>24</sup> and Sadia I et al<sup>25</sup> reported high prevalence of dental caries amongst type 2 diabetics and non- diabetics. Mohammed N et al<sup>26</sup> in a study reported a low prevalence of dental caries amongst type 2 diabetics. Basic M et al<sup>27</sup> in a study reported no difference in the prevalence of dental caries amongst diabetics and non - diabetics. Hawraa K<sup>28</sup> in a study reported no significant differences of dental caries amongst diabetics and non-diabetics. High caries in diabetic patients can be attributed to more regular meals than normal patients and even small amount of carbohydrates may be cariogenic when combined with high blood glucose level and hyposalivation.<sup>29,30</sup> Another explanation may be that diabetic patients are less likely have access to oral health services as compared to non- diabetics. The reasons for differences were not investigated but its likely that this is due to lack of knowledge on the part of diabetic patients about oral diseases, and apparently lack of time management for this oral care

**Table 1: Demographic profile of study groups**

Variables	Options	Frequency (%)
Gender	Male	187(62.3%)
	Female	113(37.7%)
Marital status	Married	288(96%)
	Unmarried	12(4%)
Study groups	<b>Type II Diabetic</b>	
	Decayed	128(42.7%)
	No decay	22(7.3%)
	<b>Non- Diabetic</b>	
	Decayed	126(42%)
	No decay	24(8%)
Age	Mean ±SD.	44.82±13.83
	Min± Max	17±70

**Table 2: prevalence of Dental caries among the study**

N= Total no of individuals n= No of individuals with dental caries

Variable	N	n	prevalence	p-value
Type II Diabetic	150	128	42.7%	0.000
Non-Diabetic	150	126	42%	0.000

**Table 3: Descriptive statistics of dental caries among diabetics and non-diabetics**

Variable	DT (mean±SD)	MT (mean±SD)	FT (mean±SD)	DMFT (mean±SD)
Type II Diabetic	4.79±4.123	4.19±5.353	0.23±0.689	9.21±6.461
Non-Diabetic	3.89±3.783	2.50±3.689	0.15±0.454	6.54±5.673
Independent t-test values	0.51	0.002	0.2	0.000

activity when patients are preoccupied with diabetes management.<sup>31</sup>

Regarding dental caries risk indicators, the present study reported that DT and MT amongst type II diabetics were higher than FT in non- diabetics. In type II diabetics, the mean score of DMFT was found to be higher in type II diabetics than non- diabetics.

Reddy C et al<sup>6</sup> in a study reported that mean DMFT score amongst diabetics was high than non-diabetics. Kampoo K et al<sup>32</sup> in a study reported that mean DMFT score was higher in diabetics as compared to non- diabetics. Latti B et al<sup>33</sup> in a study reported that mean DMFT score was higher in diabetics than non-diabetics. Singh A et al<sup>34</sup> in a study reported

high DMFT score in diabetics as than non- diabetics. Seetha Lakshmi et al<sup>35</sup> reported that the mean DMFT was higher in diabetics when than non-diabetics. Iqbal S et al<sup>24</sup> in a study reported that DFT score was higher in diabetics than non-diabetics. Jawed M et al<sup>36</sup> in a study reported a higher DMFT score in diabetics as compared to non- diabetics. Dissimilar results were reported by Bacic M et al,<sup>27</sup> Collin H et al.<sup>37</sup> Kanjirath P et al<sup>38</sup> in a study reported slight difference in DMFT amongst diabetics as compared to non- diabetics. The lack of defensive mechanism on the part of the saliva causes oral diseases in diabetics because it cleans and buffers the mouth and action of saliva are also compromised.

## LIMITATIONS

The present study was limited to the sample size, selection criteria of diabetic and non- diabetic patients. qualitative and quantitative rate of saliva flow, blood glucose level, dental visits and oral hygiene variables were missing.

## CONCLUSIONS

The present study findings concluded that there is an association between dental caries and type II diabetes mellitus but there was less difference reported in prevalence of dental caries amongst diabetics and non- diabetics. Diabetic patients should always seek care to maintain their oral hygiene by following proper tooth brushing, regular visits to dentists, physicians for blood glucose level and dietician for proper intake of diet.

## REFERENCES

- Mellitus DI. Diagnosis and classification of diabetes mellitus. *Diabetes care*. 2006 1;29: S43.
- Orbak R, Simsek S, Orbak Z, Kavrut F, Colak M. The influence of type-1 diabetes mellitus on dentition and oral health in children and adolescents. *Yonsei Med J*. 2008; 49:357–65.
- Bangash RY, Khan AU, Tariq KM, Yousaf A. Oral aspects, and complications in type 2 diabetes mellitus – A study. *Pak Oral Dent J* 2012;32: 296-9.
- Shafer G William, Maynard K Hine, Barnett M Levy. 2017. *Shafer's Textbook of oral pathology*. Dental caries. B Sivapatha sundharam and A R Raghu. (eds). Elsevier.Inc. pp. 359.
- Vasquez, MS. and Contreras, SS. 2005. Candida hyphas presence in adults with clinically healthy oral mucous. *Rev Estomatol Herediana* 2005, 15:5.
- Reddy C, Maurya M. A comparative study to assess the oral health status and treatment needs of diabetic and non-diabetic population attending some of the hospitals in Mysore city. *J Indian Assoc Public Health Dent* 2008; 12:1-14. 9.
- Singh A, Thomas S, Dagli R, Katti R, Solanki J, Bhateja GA. To access the effects of salivary factors on dental caries among diabetic patients and non-diabetic patients in Jodhpur city. *J Adv Oral Res* 2014; 5:10-4.
- Taubman MA, Nash DA. The scientific and public-health imperative for a vaccine against dental caries. *Nature Reviews Immunology*. 2006;6(7):555-63.
- Ylöstalo P, Järvelin M, Laitinen J and Knuuttila M. Gingivitis, dental caries, and tooth loss: risk factors for cardiovascular diseases or indicators of elevated health risks. *J Clin Periodontol* 2006;33(2): 92– 101.
- Ojima M, Amano A and Kurata S. Relationship between decayed teeth and metabolic syndrome: data from 4716 middle-aged male Japanese employees. *J Epidemiol* 2015;25(3): 204–211.
- Arheiam A and Omar S. Dental caries experience and periodontal treatment needs of 10- to 15-year-old children with type 1 diabetes mellitus. *Int Dent J* 2014; 64(3):150–54.
- Biesbrock AR, Bartizek R, Gerlach R, Jacobs S and Archila L. Dose response efficacy of sodium fluoride dentifrice at 9 and 21 months with supervised brushing. *Am J Dent* 2003; 16(5): 305–12.
- Gæde P, Lund-Andersen H, Parving H-H and Pedersen O. Effect of a multifactorial intervention on mortality in type 2 diabetes. *N Engl J Med* 2008;358(6): 580–91.
- Collin H-L, Uusitupa M, Niskanen L, Koivisto A-M, Markkanen H and Meurman JH (1998): Caries in patients with non-insulin-dependent diabetes mellitus. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;85(6): 680–85.
- Gupta VK, Malhotra S, Sharma V and Hiremath SS. The Influence of Insulin Dependent Diabetes Mellitus on Dental Caries and Salivary Flow. *Int J Chronic Dis* 2014, 790898.
- Puranik MA, Hiremath SS. Oral health status and treatment needs among adult diabetic and non-diabetic patients in Bangalore city- A comparative study. *J Indian Assoc Public Health Dent*. 2006; 4:31–7.
- Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes estimates for the year 2000 and projections for 2030. *Diabetes Care*. 2004; 27:1047–53.
- Roglic G, Unwin N, Bennett PH, Mathers C, Tuomilehto J, Nag S, et al. The burden of mortality attributable to diabetes realistic estimates for the year 2000. *Diabetes Care*. 2005; 28:2130–5.
- Moosa Y, Shahzad M, Shaikh AA, Matloob SA, Khalid M. Influence of Diabetes Mellitus on Oral Health. *Pakistan Oral & Dental Journal* 2018;38(1):67-70.
- World Health Organization. *Oral Health Surveys- Basic Methods*. 5th ed. Geneva; 2013.
- Malvania EA, Sheth SA, Sharma AS, Mansuri S, Shaikh F, Sahani S. Dental caries prevalence among type II diabetic and nondiabetic adults attending a hospital. *J Int Soc Prevent Communit Dent* 2016; 6: S232-6.
- Moin M, Malik A. Frequency of Dental Caries and Level of Risk among Type II Diabetics. *Dentistry* 2015; 5(10): 334
- Malicka, Barbara & Kaczmarek, U & Ziętek, M. Dental caries in adult patients with type 1 and 2 diabetes mellitus. *Journal of Stomatology* 2011;64: 9-24.
- Shoib A, Ul Hassan M, Hussain RI, Firdous K. Fre-

- quency of Tooth Decay in Diabetic and Non-diabetic individuals because of Dental Plaque, a comparative study. *Pakistan Journal of Medical & Health Sciences*. 2016;10(4):1397-8.
25. Iqbal S, Kazmi F, Asad S, Mumtaz M, Khan AA. Dental Caries & Diabetes Mellitus. *Pakistan oral & dental journal*. 2011;31(1):60-3.
  26. Mohammed N El-Shall, O., El-Malt, M., Badawy, N. Evaluation of Caries and Periodontal Status in A Group of Diabetic Egyptian Children. *Al-Azhar Dental Journal for Girls*, 2016; 3(2): 119-24.
  27. Bačić, M., Ciglar, I., Granić, M., Plančak, D. and Šutalo, J. Dental status in a group of adult diabetic patients. *Community Dentistry and Oral Epidemiology* 1989; 17: 313-16.
  28. Aziz H.K. The relationship between the dental caries and the blood glucose level among type II non-insulin dependent diabetic patients. *J Bagh Coll Dentistry* 2012; 24(1):108-14.
  29. Al-Khateeb TL, AL-Amoudi NH, Fatani HH, Mira SA, Ardawi MS. Periodontal disease, and caries experience of diabetic patients in Arabian community. *Saudi Dent J*. 1990; 2:91–5.
  30. Novotna M, Podzimek S, Broukal Z, Lencova E, Dusko-va J. Periodontal Diseases and Dental Caries in Children with Type 1 Diabetes Mellitus. *Mediators Inflamm*. 2015; 2015:379626.
  31. Ira BL. Diabetes and oral health- current concepts regarding periodontal disease and dental caries. *US Endocrinol*. 2012; 8:93–7.
  32. Kampoo K, Teanpaisan R, Ledder RG, McBain AJ. Oral bacterial communities in individuals with type 2 diabetes who live in southern Thailand. *Appl Environ Microbiol*. 2014;80(2):662-71.
  33. Latti BR, Kalburge JV, Birajdar SB, Latti RG. Evaluation of relationship between dental caries, diabetes mellitus and oral microbiota in diabetics. *J Oral Maxillofac Pathol*. 2018;22(2):282.
  34. Singh I, Singh P, Singh A, Singh T, Kour R. Diabetes an inducing factor for dental caries: A case control analysis in Jammu. *J Int Soc Prev Community Dent* 2016;6(2):125-9.
  35. Seethalakshmi C, Reddy RC, Asifa N, Prabhu S. Correlation of Salivary pH, Incidence of Dental Caries and Periodontal Status in Diabetes Mellitus Patients: A Cross-sectional Study. *J Clin Diagn Res*. 2016;10(3): ZC12-4.
  36. Jawed M, Shahid SM, Qader SA, Azhar A. Dental caries in diabetes mellitus: role of salivary flow rate and minerals. *Journal of diabetes and its complications*. 2011;25(3):183-6.
  37. Collin HL, Uusitupa M, Niskanen L, Koivisto AM, Markkanen H, Meurman JH, et al. Caries in patients with non-insulin-dependent diabetes mellitus. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998; 85:680–5.
  38. Kanjirath PP, Inglehart MR, Habil P. Diabetes and oral health: The importance of oral health related behavior. *The Journal of Dental Hygiene* 2011; 85:264–72.
  39. Goyal D, Kaur H, Jawanda MK, et al. Salivary pH and dental caries in diabetes mellitus. *International Journal of Oral & Maxillofacial Pathology* 2012;3(4):13–16.