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Original Research Article

Influence of Diabetes Mellitus on Dental Health Status

Abdulaziz Gul[1*], Muataz Banjar[2], Mohammed Redwan[2**], Wahdan M. Elkwatehy[#@]**

[1]Demonstrator, [2]Post Graduate Student,
[*]Oral Surgery Department, Faculty of Dentistry, Umm Alqura University, Saudi Arabia.
[**]Community Dentistry Department, Faculty of Dentistry, Umm Alqura University, Saudi Arabia.
[#]Public Health and Preventive Dentistry Dept, Faculty of Dentistry, Umm Alqura University, Saudi Arabia.
[@]Public Health and Preventive Dentistry Department, Faculty of Dentistry, Mansoura University, Egypt.

Corresponding Author: Wahdan M. Elkwatehy

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ABSTRACT

Background: Diabetes mellitus is a silent epidemic disease which affects large number of people around the world and is directly related to the dental health status of the patients.
Objective: This study was conducted to compare between dental health status (dental caries, periodontal disease and oral hygiene) of diabetic and non-diabetic patients.
Methods: The present study was carried out on 98 participants [49 diabetic individuals (30 types I and 19 type II) and 49 controls]. The dental health status of the participants was recorded using DMFS, Russell and Plaque Indexes.
Results: The results showed no statistically significant differences in DMFS, Periodontal and plaque scores as regards diabetic and non diabetic groups, type I and type II subgroups. There were statistically significant high levels of self care measures in cases group compared to control group.
Conclusion: Diabetic patients who are well controlled and maintain good oral hygiene have good oral health status similar to normal patients.

Keywords: Diabetes mellitus, Dental caries, periodontal disease, Oral hygiene.

INTRODUCTION

Diabetes mellitus (DM) is a systemic disease that happen when the blood glucose level is increased in the body more than the normal level of fasting or random blood test, DM according to World Health Organization (WHO) is a silent epidemic which affects large number of people around the world and is directly related to the oral health status of the patients. [1]

Alqurashi et al., [2] carried out a cross sectional study in Saudi Arabia to determine the prevalence of DM and they found that 30% of 6024 subjects were diagnosed with DM.

DM may cause due to tissue resistance to insulin or insufficient amount of insulin is produced in the body because of genetic factor or disease or removal of the pancreas. There are two types of diabetes mellitus type 1 and type 2, patient with type 1 called insulin dependent patient and the patient with type 2 called non insulin dependent patient, diabetes has an effect on the normal function of other organs like eyes and kidney and also affect the coagulation system by increasing the coagulation time. [3,4]

As regards dental caries in diabetic patient, previous study concluded that type I

diabetic patients on restricted sugar diet experience fewer carious lesions. [5] Patients with poor glycemic control may experience more carious lesions mainly due to high plasma glucose concentration and reduced salivary flow. [6,7] On the other hand, some studies disagree with this ideology and related that type 1 diabetes mellitus in fact have a low carbohydrate diet and particularly low doses of sucrose. [8,9]

Bacic et al, [3] performed a study on the prevalence of dental caries in diabetic and non diabetic subjects and also between type 1 and type 2 diabetic patients. The results indicated that, there is no significant difference between the diabetic and non diabetic group in the prevalence of dental caries, and they found that type 1 diabetic have significantly higher number of teeth with filling than type 2, and type 2 have significantly higher number of extracted teeth .

Periodontal disease has been recognized as the sixth complication of diabetes. [10] Several studies concluded that diabetic patients are highly susceptible to periodontal disease [11-13] and on the other hand, a lot of studies have failed to find this increased risk. [14-17]

Mealay et al., [18] reported that type 2 diabetic is more common in population than any other type of diabetes; also they thought the increase prevalence of periodontal disease among diabetic patient is due to their low immunity level comparing with healthy individual.

Taylor et al., [19] reported that, periodontal disease consider as the sixth complication of diabetes mellitus, they also need patient or individual compliance to control both of these diseases, they also found that the diabetic patient with poorly controlled diabetic also have the more severe form of periodontal disease but the researchers are not sure that the good periodontal health will affect the diabetic disease in a good way.

Bharateesh et al., [20] carried out a case control study on a diabetic and non diabetic subject to assess the prevalence of oral disease affect diabetic patients, the results indicated that, dental caries was more in non diabetic group than in diabetic group, but the periodontal disease was more in diabetic group than non diabetic group.

Velea et al., [21] reported that, sever periodontal disease and sever periodontal destruction are correlated with poor diabetic control, on other hand the controlled diabetic individual are free from this disease and destruction.

Kakade et al., [22] carried out a study to determine the relation between diabetic patient and non diabetic patient as regard their periodontal status, the results indicated that, there is a significant different between diabetic and non diabetic group, the diabetic group have more clinical attachment loss sites than non diabetic and their bleeding sites are more than non diabetic group.

There is a recognized lack in scientific evidence that investigates the dental health of diabetic individuals in the city of Mecca and associated factors. The population of Mecca is diverse, so allows studying large scale interaction between several epidemiological factors and health conditions. This study focuses on evaluating the dental health status of diabetic patients in comparison to control group and to compare between dental health status of type1 and type 2 diabetic patients in Mecca city.

MATERIALS AND METHODS

Subjects

The present study was carried out on 98 participants (case and control groups). Case group includes 49 controlled diabetic individuals (30 type I and 19 type II diabetic patients), there age was between 20 and 70 years old. The control group includes 49 participants who were matched with all characteristics of the cases group except they are non diabetic. Subjects were free from other systemic diseases that may influence the dental health. Subjects were selected from King Faisal Hospital and Umm Al-Qura University Dental Hospital. Written informed consents were obtained

from all participants before clinical examination.

Data collection

Before clinical examination, the levels of self care were estimated using indicators of oral health hygiene including frequencies of tooth brushing per day, approximal cleaning per day, and regularity of dental checkups. The information was obtained using a structured interview method.

Clinical examination was carried out in the dental chair under conditions of good illumination, in both groups of subjects. The dental caries, periodontal disease and level of oral hygiene were recorded using DMFS Index, [23] Russle Index [24] and Plaque Index [25] respectively.

Statistical analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software statistical computer package, version 22. Kolmogorov-Smirnov test was used to explore the normality of the data. The data was presented as mean and standard deviation (SD) and compared by independent student t test. The differences between the two groups were considered significant at $p \leq 0.05$.

RESULTS

The dental health status of diabetic and non diabetic patients is shown in table (1) and figure (1). There were no statistically significant differences in DMFS, Periodontal and plaque scores between the two groups (p = 0.374, 0.301 and 0.201 respectively). There were statistically significant differences in tooth brushing, interdental cleaning and dental checkups frequencies between the two groups (p= 0.019, 0.048 and 0.003 respectively).

Table 1: shows comparison between dental health status of diabetic and non diabetic patients.

Group / Index	Diabetic Mean ± SD	Non diabetic Mean ± SD	P- value
DMFS Index	39.30 ± 48.36	57.24 ± 39.16	0.374
Russle Index	2.67 ± 2.11	3.37 ± 1.97	0.301
Plaque Index	1.87 ± 1.22	1.66 ± 0.85	0.201
Tooth brushing/day	2.64 ± 1.18	1.91 ± 0.51	0.019
Interdental cleaning/day	1.15 ± 0.98	0.78 ± 0.82	0.048
Dental checkups/year	2.97 ± 1.73	1.54 ± 0.47	0.003

DMFS = Decayed, Missed due to caries and Filled permanent tooth Surface, SD = Standard Deviation, p = value of significance. Analysis done by independent t test at CI=95% and level of significance at p≤0.05.

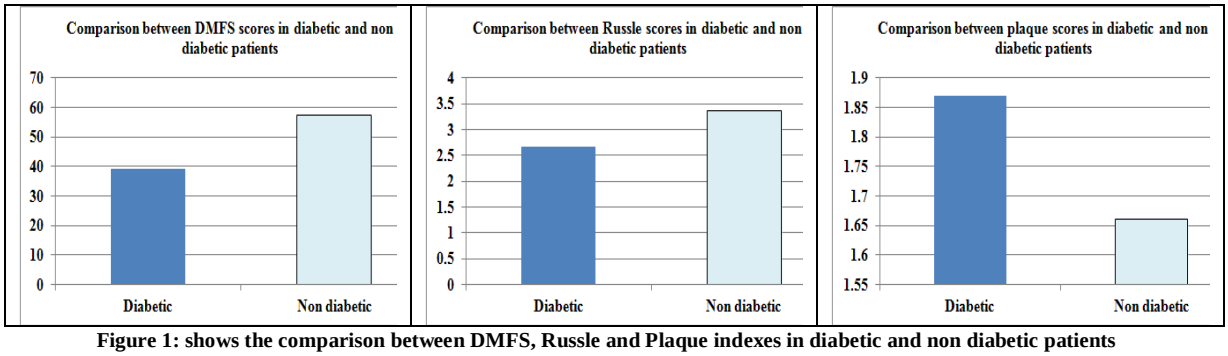

Figure 1: shows the comparison between DMFS, Russle and Plaque indexes in diabetic and non diabetic patients

The dental health status of type I diabetic and type II diabetic patients is shown in table (2) and figure (2). There were no statistically significant differences in DMFS, Periodontal and plaque scores between the two subgroups (p = 0.271, 0.285 and 0.369 respectively).

Table 2: shows comparison between dental health status of type I diabetic and Type II diabetic patients.

Subgroup / Index	Type I Mean ± SD	Type II Mean ± SD	P- value
DMFS Index	33.66 ± 42.80	67.85 ± 47.90	0.271
Russle Index	3.89 ± 2.11	3.13 ± 2.13	0.285
Plaque Index	2.18 ± 1.33	1.43 ±1.13	0.369

DMFS = Decayed, Missed due to caries and Filled permanent tooth Surface, SD = Standard Deviation, p = value of significance. Analysis done by independent t test at CI=95% and level of significance at p≤0.05.

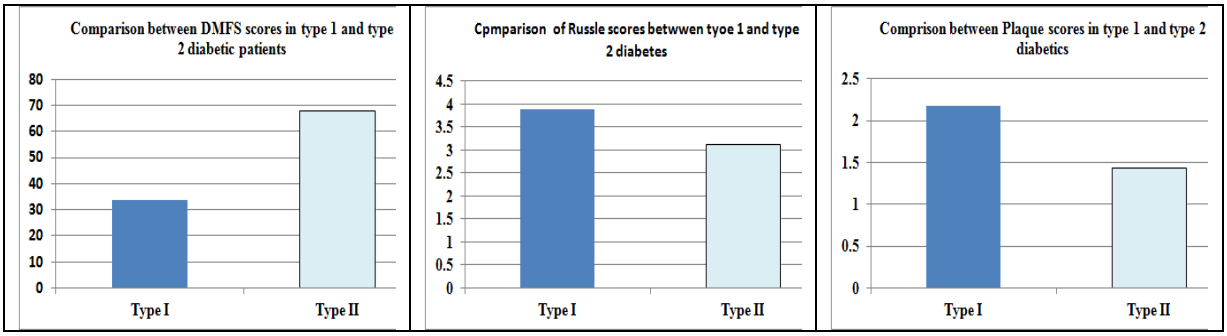

Figure 2: shows the comparison between DMFS, Russle and Plaque indexes in type I and type II diabetic patients.

DISCUSSION

Diabetes Mellitus is a chronic disease prevalent worldwide with an increasing frequency of occurrence. Diabetes produces a wide array of symptoms throughout the body. It is said that mouth is the mirror of systemic health. [26] Diabetes has profound effects on oral health. Increasing evidence of oral complications in diabetes increases the attention for oral health status in these patients. The results of the present study found that, there were non significant difference between diabetics and non diabetics as regards dental caries scores. These results were agreed with the results reported by Bacic et al., [3] This may be due to the diet of diabetics, which consists of high protein content and limited fermentable carbohydrates as compared to the diet of non-diabetics, making the diabetics less prone to dental caries.

In the present study there were non significant difference between diabetics and non-diabetics groups as regards periodontal disease and oral hygiene which was agreed with the results reported by Velea et al., [21] Although there are no significant differences between dental health status of diabetic and non diabetic patients, the scores of DMFS and periodontal diseases were higher in non diabetic group. These results disagreed with the results obtained by Kakade et al., [22] This disagreement may be explained by that, the patients under the present study were well controlled diabetic patients and the most of them came for regular check up for their oral and body status, the results of the present study indicating significant higher oral health care measures in diabetic patients as regards frequency of tooth brushing, interdental cleaning and regular checkups. Also, the hospitals in Mecca city provided regular motivating programs for those patients to improve their oral hygiene and control their blood glucose level.

As regards the dental health status of type I and type II diabetic patients, the differences between the two group were non significant for DMFS, periodontal and plaque scores. These results were agreed with the results obtained by Bacic et al., [3]

In present study the DMFS scores in type 1 diabetic group were less than that of type II, this may be due to that, the type 1 diabetic patients are more conservative in their diet and its carbohydrates components were less than non insulin dependent (type2) which may be lead to more dental caries in them. Also, type 2 diabetics are often associated with obesity and intake of high calorie and carbohydrate rich food which are highly cariogenic. Furthermore, diminished salivary flow in type 2 diabetics is a risk factor for dental caries. [27]

The results of the present study indicated that, diabetes apparently had a minor or no effect on dental health status parameters and these results were agreed with the results reported by Schulze and Busse. [28]

CONCLUSION

There is no significant difference between dental health status of diabetic and non diabetic groups. The regular health education programs provided by health care providers for diabetic patients are very important to maintain their dental health

status, and thereby, improve the quality of life of these individuals.

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REFERENCES

1. Soell M1, Hassan M, Miliauskaite A, et al.; The oral cavity of elderly patients in diabetes. Diabetes Metab., 2007, 33 Suppl 1:S1-8.
2. Alqurashi KA, Aljabri KS, Bokhari SA; Prevalence of diabetes mellitus in a Saudi community, Ann Saudi Med., 2011, 31(1):19-23.
3. Bacić M, Ciglar I, Granić M, et al.; Dental status in a group of adult diabetic patients. Community Dent Oral Epidemiol., 1989, 17(6):313-316.
4. Orbak R, Simsek S, Orbak Z, et al.; The influence of type I diabetes mellitus on dentition and oral health in children and adolescents. Yonsei Med J., 2008, 49(3):357-365.
5. Iughetti L, Marino R, Bertolani MF, Bernasconi S; Oral health in children and adolescents with IDDM. A review. J Pediatr Endocrinol Metab., 1999, 12:603-610.
6. Canepari P, Zerman N, Cavellari G; Lack of correlations between salivary streptococcus mutans and lactobacilli counts and caries in IDDM children. Minerva stomatol., 1999, 43:501-515
7. Siudikiene J, Machiulskiene V, Nyvad B, et al.; Dental caries and salivary status in children with type 1 diabetes mellitus, related to the metabolic control of the disease. Eur J Oral Sci., 2006, 114: 8-14.
8. Edblad E, Lundin SA, Sjodin B, Aman J; Caries and salivary status in young adults with type 1 diabetes. Swed Dent J., 2001, 25:53-60.
9. Ciglar L, Skaljac G, Sutalo J, et al.; Influence of diet on dental caries in diabetics. Coll Antropol., 2002, 26(1): 311-317.
10. Grossi SG, Zambon JJ, Ho AW, et al.; Assessment of risk for periodontal disease. I. Risk indicators for attachment loss. J Periodontol., 1994, 65: 260-267.
11. Seppala B, Seppala M, Ainamo J; A longitudinal study on insulin- dependent diabetes mellitus and periodontal disease. J Clin Periodontol., 1993, 20:161-165.
12. Mattson JS, Cerulis; Diabetes mellitus: A review of the literature and dental implications. Compendium, 2001, 22:757-772.
13. Radhika T, Kannan R; Diabetes mellitus and oral health. J Orofac Sci, 2012, 4(1): 7-10.
14. Benveniste R, Bixler D, Conneally PM; Periodontal disease in diabetics. J Periodontol, 1967, 38:271-279.
15. Hove KA, Stallard RE; Diabetes and the periodontal patient. J Periodontol., 1970, 41:713-718.
16. Bay I, Ainamo J, Gad T; The response of young diabetics to periodontal treatment. J Periodontol., 1974, 45:806-808.
17. Barnett ML, Baker RL, Yancey JM, et al.; Absence of periodontitis in a population of insulin-dependent diabetes mellitus (IDDM) patients. J Periodontol, 1984, 55:402-405.
18. Mealey B, Oates T; Diabetes mellitus and periodontal diseases. J Periodontol., 2006, 77: 1289-303.
19. Taylor GW, Borgnakkes WS; Periodontal disease: associations with diabetes glycemic control and complications. Oral Dis.2008, 14: 191-203.
20. Bharateesh JV, Ahmed M, Kokila G; Diabetes and Oral Health: A Case-Control Study. Inter J Prevent Med., 2012, 3-11.
21. Velea OA, Kralev C, Onisei D, et al.; Diabetes mellitus and periodontal disease-a two-way road: current concepts and future considerations (literature review). European Scientific J. 2013, 9(9): 61-79.
22. Kakade SP, Shetiya SH, Kakodkar P, et al.; Periodontal status of type I diabetics compared to non-diabetic participants: Ceylon Medical J., 2014, 59: 19-20.
23. Oral Health Surveys, Basic Methods 4th ed. Geneva; World Health Organization Publications. 1997.

24. Russell AL; Epidemiology and the rational bases of dental public health and dental practice, in The Dentist, His Practice, and His Community,Youngand Striffler, Philadelphia, London, Toronto: W. B. Saunders Company., 1996, 35-62.
25. Silness J, Loe H; Periodontal disease in pregnancy (II). Correlation between oral hygiene and periodontal condition. Acta Odontol Scand., 1964, 22:121–135.
26. Thayumanavan B, Jeyanthikumari T, Abu Dakir, Vani NV; Diabetes and oral health- An overview of clinical cases. A review. IJMDS, 2015, 4(2): 901-905.
27. Ship JA; Diabetes and oral health: an overview. J Am Dent Assoc., 2003, 134:4S-10S.
28. Schulze A, Busse M; Gender Differences in Periodontal Status and Oral Hygiene of Non-Diabetic and Type 2 Diabetic Patients. The Open Dent J., 2016, 10, 287-297.

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