ORIGINAL ARTICLE

FREQUENCY OF DENTAL CARIES AND LEVEL OF RISK AMONG PATIENTS WITH TYPE II DIABETES MELLITUS

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ABSTRACT

Objective: To know the frequency of dental caries and level of risk among patients of type II diabetes mellitus.

Material & Methods: : It was cross-sectional descriptive study in which 100 patients with type II diabetes mellitus visiting Sheikh Zayed Hospital Lahore were included. Frequency of dental caries was recorded through DMFT (Decayed, Missed, Filled, Teeth) index while risk of dental caries was assessed through 12 variables and each variable has one point. Risk of dental caries was divided into 3 categories such as low risk (0-4 points), moderate risk (5-8 points) and high risk (9-12 points). The collected data through questionnaire was analyzed by using SPSS 16.0.

Results: Among 100 patients with diabetes mellitus, 87% (n=87) were females and 63% (n=63) were 41-50 years old. The diabetes duration among 59% (n=59) patients was more than 5 years. Patients had mean decayed tooth 2.2, missed tooth 2.3, filled tooth 0.1 and DMFT index of 5.0. High level of risk of dental caries was found in 32% (n=32) patients.

Conclusion: Study concluded that level of risk of dental caries development was high in Diabetes Mellitus patients.

Key Words: Dental, Diabetes Mellitus, Oral Health, Risk.

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INTRODUCTION

Diabetes mellitus is a widespread metabolic disorder that affects majority of people worldwide.[1] The incidence of diabetes is increasing rapidly in low as well as low middle income states. During 2014, 8.5 percent adults 18 years old and above had diabetes mellitus. During 2015, approximately 1.6 million mortalities were directly associated with diabetes.[2] According to WHO (World Health Organization), in Pakistan 12.9 million persons are suffering from diabetes mellitus (10.0% of total populace), 9.4 million are diagnosed diabetes patients and 3.5 million individuals are not diagnosed. In contrast, 38 million individuals (15.9% male and 2.5% females) have

diabetes. Among top 10 countries, Pakistan comes on number 7 that have type-2 diabetes mellitus and anticipated number forth at the end of year 2030. In addition, it is stated that 120,000 persons die each year in Pakistan due to type-2 diabetes and complications associated with it.[3]

Diabetes is one of the silent widespread diseases that affects majority of people worldwide and directly associated with patients' dental health condition.[4] Diabetes has three main types namely diabetes-I, II and GDM (gestation diabetes mellitus).[5] Type-I diabetes is that wherein pancreases β-cells lose their ability to generate insulin while in type-II diabetes, a defect in β-cells or decrease in the tissue sensitivity to the insulin are essential for disease expression. Oral problems comprise periodontal disease, tooth mobility and dental caries, that is affected by saliva.[6] Oral symptoms appear more rapidly and severely among patients with diabetes mellitus.[7] In a study, Miko and colleague elucidated that poor blood sugar control and diabetes mellitus early onset could enhance dental caries risk, however, proper oral hygiene with adequate metabolic control could avert dental caries development.[8]

An appalling and elevated dental caries prevalence is observed among patients with diabetes mellitus when compared with non-diabetics.[9] In 2011, a study carried out in Pakistan showed 2.49 mean DMFT (Decayed, Missed, Filled, Teeth) among patients with diabetes mellitus in contrast to 0.53 among controls.[10] Also, among patients with diabetes, dental caries high prevalence have been demonstrated by Moin et al.[11] and Malicka et al.[12] in their studies, while irreconcilable outcomes were reported in a study conducted by Qureshi et al.[13]

Contagious structures and oral cavity can considerably be affected through diabetes. Such oral problems have considerable impacts on diabetic patients life quality and can indirectly or directly affect glycemic control as well.[14] Oral lesions and conditions related to diabetes mellitus comprise burning mouth, xerostomia, periodontal disease, gingivitis, dental caries and candidal infection.[15] Association between dental caries and diabetes, mainly among adults, has gained little attention until now despite that these both diseases are linked with carbohydrates intake[16] and that deficiency of insulin among diabetic patients may cause hyposalivation and raised level of salivary glucose, that may jeopardize diabetic patients of developing caries.[14]

Periodontal disease can cause gingival margin recession that can expose further tooth surfaces to the caries attack. Hyperglycemia among adults, adolescents and children with insulin-dependent diabetes mellitus has also been linked with elevated salivary glucose and reduced salivary secretion. Despite phosphate and calcium that assist in remineralization of tooth enamel, saliva also has components which can immediately attach the cariogenic bacteria. Lack of copious saliva can cause reducing buffer activity that encourages tooth structures remineralization before caries development. The decrease in saliva therefore reduces immunity to caries-producing bacteria. Also, elevated levels of glucose in saliva can boost fermentable carbohydrates amount through oral bacteria, causing acidic byproducts production that lead to demineralization of teeth in the dental caries. In saliva, abundant glucose can also encourage cariogenic bacteria growth and assist the duration and frequency of acidic episodes.[17] Protective factors of caries are biologic or curative measures that could be utilized to avoid or arrest pathologic challenges posed by risk factors of caries. Moreover, protective factors comprise constant use of toothpaste that contains fluoride, fluoridated water, xylitol, low-fluoride oral wash and obtaining relevant applications of chlorhexidine, fluoride and calcium phosphate agents.[18] Though the purported raised dental caries risk with regard to specific factors for example poor oral hygiene, unhealthy diet intake, lack of sugar control, administered insulin dose inadequate control, meal timings and physical exercise have never been evaluated simultaneously.[19]

Diabetes mellitus is believed a most prevalent persistent disease. Structure of the oral cavity could be affected due to diabetes that could cause various complications including dental

caries. Association between dental caries and diabetes has received researchers' attention. A few studies attempted so far that assessed frequency and dental caries risk level among diabetic patients in Pakistan. Therefore it is significant to conduct a study regarding frequency of dental caries and level of risk among patients with type II diabetes mellitus.

MATERIAL AND METHODS

It was cross-sectional descriptive study in which 100 patients with type II diabetes mellitus visiting Sheikh Zayed Hospital Lahore were included. Simple convenient random sampling technique was used. The collected data through questionnaire was analyzed by using SPSS 16.0. Frequencies and percentages were calculated and data was presented in tables and graphs. After taking verbal consent, frequency of dental caries was recorded through DMFT (Decayed, Missed, Filled, Teeth) index. Oral assessment was carried by trained examiner under the daytime light utilizing ball ended probe and dental mirror on mobile dental units.

The risk level of dental caries was assessed through fluoride exposure, daily intake of sugary drinks/foods, regular dental care received, special health care needs, eating disorders, drug/alcohol abuse, carious lesions, plaque, exposed root surfaces, restorations with over hangs margins, dental orthodontic appliances and severe dry mouth. Risk of dental caries assessed through 12 variables and each variable has one point. Risk of dental caries was divided into 3 categories such as low risk (0-4 points), moderate risk (5-8 points) and high risk (9-12 points).

Privacy and confidentiality was maintained at all costs in accordance with principles laid down in Helsinki Declaration of Bioethics.

RESULTS

Among 100 patients with diabetes mellitus, 13 (13.0%) were males and 87 (87.0%) were females. Among them, 18 (18.0%) were upto 40 years old and majority 63 (63.0%) was 41-50 years old while 19(19.0%) patients were more than 50 years old. The mean age of patients was 38 $\pm$ 12 yeas. Result shows that diabetes duration of 41 (41.0%) patients was upto 5 years while duration for 59 (59.0%) patients was more than 5 years. The mean diabetes duration was 8.5 $\pm$ 13.1 years. Among 100 patients, 29 (29.0%) were using insulin, 56 (56.0%) oral hypoglycemic and 15 (15.0%) patients were using both treatment.

Out of total patients, 21 (21.0%) had 1 decayed and 43 (43.0%) had 2 decayed while 36 (36.0%) patients had > 2 decayed. The mean decayed of patients was 2.2. Among patients, 19 (19.0%) had 1 missed tooth, 34(34.0%) had 2 missed teeth and 47 (47.0%) patients had >2 missed teeth. The mean missed tooth of patients was 2.3. Likewise among patients, 42 (42.0%) had 0 filled tooth, 50 (50.0%) had one filled tooth, 7 (7.0%) patients had 2 filled teeth and only 1 (1.0%) patient had more than 2 filled teeth. The mean filled tooth of patients was 0.1 and DMFT 5.0.

Table 1: Frequency of dental caries

	Frequency	Percentage (%)
Decayed		
1	21	21.0
2	43	43.0
>2	36	36.0
Total	100	100.0
	Mean $\pm$ SD = 2.2	
Missed		
1	19	19.0
2	34	34.0
>2	47	47.0
Total	100	100.0
	Mean $\pm$ SD = 2.3	
Filled		
0	42	42.0
1	50	50.0
2	7	7.0
>2	1	1.0
Total	100	100.0
	Mean $\pm$ SD = 0.1	
	DMFT Mean $\pm$ SD = 5.0	

Of the 100 patients, 74 (74.0%) had no fluoride exposure, 36 (36.0%) consumed sugary drinks/foods daily, 67 (67.0%) received regular dental care, 65 (65.0%) patients required special health care, 54 (54.0%) had eating disorders, 17

(17.0%) used drug/alcohol. Among 100 patients, 25 (25.0%) had no carious lesions, 33 (33.0%) had 1 or 2 curious lesion and 42 (42.0%) patients had ≥3 curious lesions. Similarly among patients, 49 (49.0%) had plaque, 55(55.0%) exposed root surfaces, 97 (97.0%) restorations with overhang margins, 9 (9.0%) had dental orthodontic appliances, and more than half 52 (52.0%) patients had xerostomia (severe dry mouth). Results showed that 34 (34.0%) patients had low level of risk and 34 (34.0%) moderate while mainstream 32(32.0%) of patients had high level of risk.

DISCUSSION

Diabetes is one of the chronic and silent widespread diseases that affects majority of people worldwide and directly associated with patients' dental health condition. Present study was carried out to assess the frequency of dental caries and level of risk among patients of type II diabetes mellitus. To acquire appropriate results, a group of 100 patients with diabetes mellitus was included in the study. Study revealed that majority of the patients were females (87.0%) and only 13.0% patients were males. A similar study carried out by Aziz et al. also confirmed that most of the patients were females (57.8%) and 42.2% were male patients indicating an evaluated prevalence of diabetes among females.[1]

In the past, diabetes was believed a disease of elderly people but in current scenario no specific age group is related to diabetes as it is prevalent in all age groups people. Study revealed that significant majority (81.0%) was upto 50 years old and only 19.0% patients were more than 50 years old. But the study undertaken by Sadeghi et al. indicated that 36.5% patients were upto 50 years old and mainstream (63.5%) was more than 50 years old.[20] It was found during study that mean duration of diabetes among patients was 8.5 years. Almost same results were also obtained from the study done by Mohammed et al. who confirmed that among diabetes patients mean duration of disease was 9.0 years.[21] Treatment to control diabetes is more beneficial for patients' health. Study disclosed that massive portion (56.0%) was taking hypoglycemic tables, followed by insulin (29.0%) and both (15.0%). The findings of our study are comparable with the study conducted by Moin and Malik (2015) who asserted that 54.7% patients were taking hypoglycemic tablets, followed by insulin (28.3%) and both (17.0%).[19]

It is observed that patients with diabetes face much dental problems than the general population. Study highlighted that among patients mean decayed was 2.2, mean missed 2.3 and mean filled was 0.1. The results of the study performed by Malvania and teammates (2016) exhibited better scenario than our study results who confirmed that among patients mean decayed was 1.06, mean missed 1.24 and mean filled was 0.1.[14] In our study mean DMFT was 5.0 while the study carried out by Singh et al. (2016) highlighted that mean DMFT among diabetes patients was 5.55. The findings of our study are better than the study done by Aziz (2012) who indicated that among patients mean decayed was 2.11, mean missed 10.84 and mean filled was 10.3 while DMFT was 14.04.[1] When the level of risk of dental caries development among diabetes patients was assessed, study disclosed that significant majority had eating disorders, carious lesions and no exposure to fluoride, and required special health care. Study showed very discouraging results that among patients, 32.0% had high and 34.0% had moderate risk of dental caries development while 34.0% patients had low risk. The results of our study exhibited better scenario than the study performed by Moin and Malik (2015) who reported that majority (89.0%) of patients had high level of risk.[19]

CONCLUSION

Study concluded that most of the patients with diabetes mellitus were females and above 50 years old. Oral hypoglycemic was most frequent treatment among majority. Among patients with diabetes mellitus, the level of risk of dental caries development was high. Further studies are needed on vast level to know the frequency of dental caries and level of risk among patients of type II diabetes mellitus to prevent this vulnerable group from ill effects of disease.

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