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Comparison of dental caries and tooth loss prevalence between diabetic and non-diabetic patients: Kabul, Afghanistan

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Abstract

Background: Diabetes is a systematic disease that reduces the amount of fluid in the body and causes Xerostomia or dry mouth, which leads to dental caries. Besides, type 2 diabetes is an inflammation-related disease that negatively affects the inflammatory response to dental plaque, leading to intense periodontitis that, if untreated, results in total tooth loss.

Aim and purpose: This study aimed to evaluate the prevalence of dental caries and tooth loss by comparison in diabetic and non-diabetic patients.

Material and method: The cross-sectional study was carried out on 1391 OPD patients over 16 in two governmental hospitals, Kabul University Hospital and National and Specialized Stomatology Hospital. The needed information has obtained through a questionnaire. Then the oral cavity and the teeth of patients were examined directly in a dental unit in sufficient light and using dental instruments such as dental mirrors and dental explorers. Afterward, data analysis was performed in IBM SPSS Statistic 25.0.

Result: The finding of this study shows that 100% of examined patients were suffering from dental caries, and on average, at least there were six teeth lost in each patient. Besides, 55.51% of patients had diabetes with tooth defects.

There was 29.92% tooth decay and 25.59% tooth loss, with a remarkable difference between anterior and posterior teeth, as the significant percentage of tooth decay and tooth loss in anterior teeth of diabetic patients than non-diabetics.

Keywords: Dental caries, tooth loss, Diabetes type 2.

Introduction

Several studies have assessed the relationship between type 2 diabetes, dental caries, and tooth loss. Diabetes is a multi-factorial disorder that causes chronic hyperglycemia due to insulin secretion deficiency or insulin action (1, 2).

Many body parts are affected by type 2 diabetes complications, such as the oral cavity (2). 90% of diabetic patients have oral symptoms, such as xerostomia, periodontal disease, tooth loss, and dental caries, which are the results of severe oral tissue damage by Diabetes Mellitus (3). Hence, one of the risk factors of dental caries is insignificant control of hemoglobin A1C (HbA1c) level (4).

Dental caries have many internal and external etiologies (5). Dental caries can be initiated by a reduction in saliva flow rate, PH value, and saliva minerals which can be seen further in patients with type 2 diabetes (6). By secretion of glucose in the oral cavity in diabetic patients, aciduric bacteria will grow faster, and caries lesions will increase (7).

Furthermore, patients with type 2 diabetes have a high outbreak and risk factor of tooth loss (8, 9). Diabetic patients confront tooth loss 1.46 times higher than non-diabetics. Moreover, the foremost tooth loss cases have been seen in subjects aged (25-55 years) with severe diabetes (9).

Diabetes type 2 is a risk factor for periodontal disease (10). According to a systematic review and meta-analysis, a moderate certitude exists for a higher risk of tooth loss in people with diabetes than nondiabetics, especially with poor diabetes mellitus control (11). An important oral complication associated with diabetes is periodontal disease (12). Regarding a case-control study on 300 diabetic patients, the prevalence of periodontal disease was 92.6%, more than in nondiabetic patients (13). Type 2 diabetes can lead to tooth loss, and one of the harmful effects of tooth loss is edentulism (14).

Material and method

This cross-sectional study was carried out by using a questionnaire and clinical checkup by directly intra-orally examination of patients in the dental unit, in ample light, and with a dental checkup kit. A team of 46 students from the Stomatology Faculty of Kabul University performed the study. Afterward, data analysis was performed in IBM SPSS Statistic 25.0.

This study was a population-based cross-sectional observational descriptive study executed on 1391 OPD patients in two governmental hospitals, Kabul University Hospital and National and Specialized Stomatology Hospital in Kabul, Afghanistan, from 10 Apr 2022 to 10 May 2022.

Before the study commenced, informed consent was obtained from each participant selected randomly in the hospitals. This study is approved by ethical committee 02-28042022 protocol number of dentistry faculty of Herat University.

Results

Of the 1,391 participants in this study, in two stomatology hospitals in Kabul, 100% had dental defects (caries and missing teeth).

In this study, it was found that all females, 65.86%, had defected teeth, the percentage of decay was 40.05%, and the tooth loss percentage was 25.81%. Also, all males, 34.14%, had defected teeth, for which the percentage of tooth decay was 20.79% and 13.35% was the percentage of tooth loss. Totally 2.25% of patients were diabetic which, 1.2% were females, and 1.05% were males (figure 1-2-3).

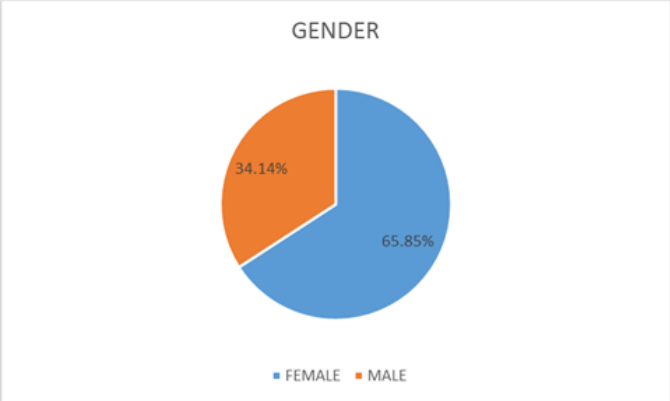

Fig. 1: comparison of participants according to gender

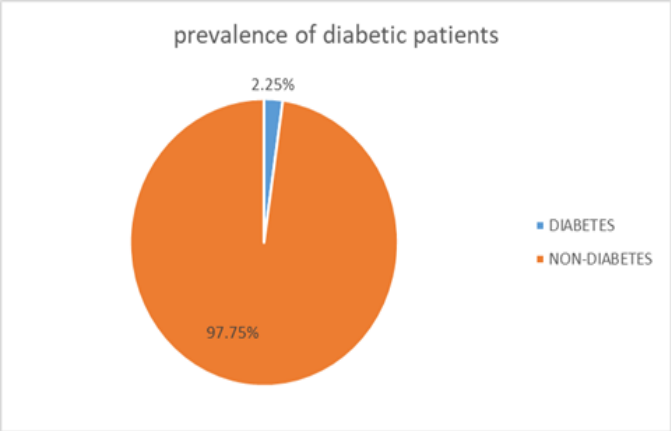

Fig. 2: prevalence of diabetic patients than non-diabetics

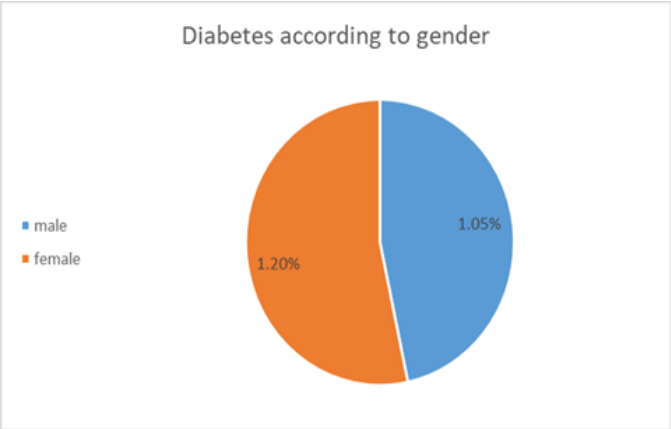

Fig.3: comparison of diabetes in males and femalesThe study shows a total percentage of 55.51% of diabetic patients with defected teeth. 29.92% of tooth decay and 25.59% of tooth loss were found in diabetic patients. The Percentage of tooth decay is significantly different in central, lateral, canine, and premolars in diabetics rather than non-diabetics as in diabetic patients; the percentages are 5.26% in centrals, 7.02% in laterals, 12.28% in canine, 14.91% in the first premolar and 16.67%

in the second premolar. While in non-diabetics, 4.08% of centrals, 4.42% of laterals, 4.62% of canines, 9.10% of the first premolar, and 12.62% of second premolars had decayed (figure 4-5).

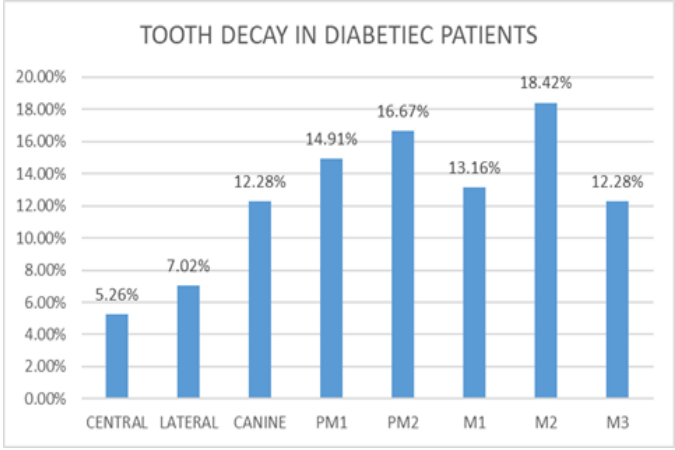

Fig. 4: percentages of tooth decay in diabetic patients.

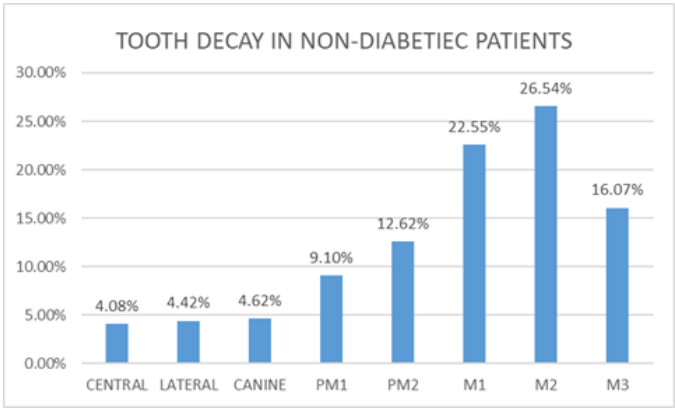

Fig. 5: percentages of tooth decay in non-diabetic patients

Besides, the most common teeth with decay are second molars, with 26.54% in non-diabetics and 18.42% in diabetics. The least common teeth are centrals, with 5.26% in diabetics and 4.08% in non-diabetics.

There was an extremely high rate of tooth loss in people with diabetes compared to non-diabetics in anterior teeth. 9.92% of centrals and 9.16% of laterals had tooth loss in diabetics, while the percentages were 4.02% and 3.56% in non-diabetics, respectively, and the least common teeth for tooth loss are canines, with 3.09% in non-diabetics and 2.29% in people with diabetes (Figure 6-7).

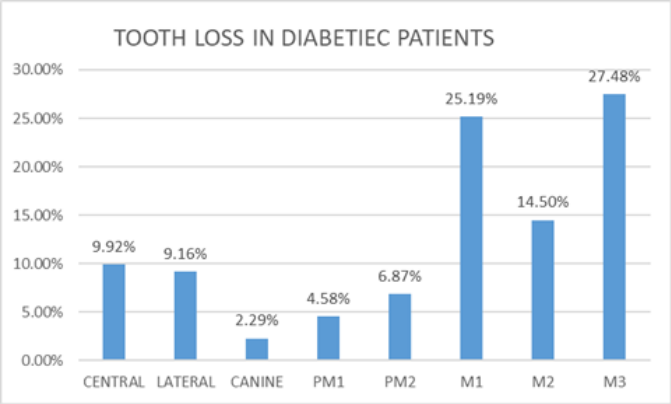

Fig. 6: percentages of tooth loss in diabetic patients.

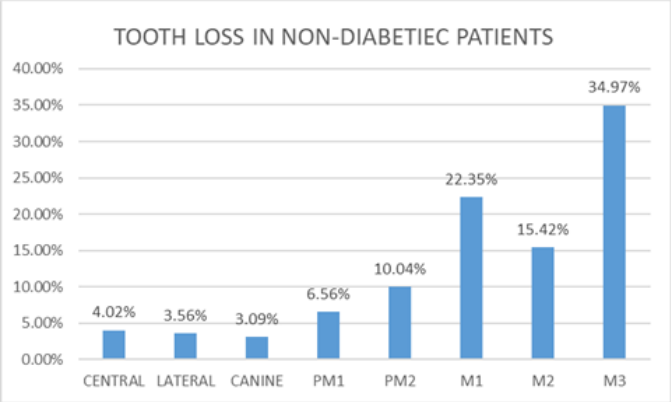

Fig. 7: percentages of tooth loss in non-diabetic patients

Discussion

Many studies about the relationship between diabetes, dental caries, and tooth loss cannot be more precise due to the sample being less than 300 people (1). Diabetes type 2 has many different oral manifestations (15). In spite of several oral manifestations related to type 2 diabetes, awareness of the relationship between diabetes and oral health is insufficient (12, 16). Oral appearances frequently occur and are the primary signs and symptoms of systematic diseases (17, 18).

In addition, related to this study, it is concluded that the prevalence of teeth defects (caries and missing teeth) by 65.86% is higher in females than males, with 34.14%, as the incidence of diabetes with 1.20% is further in females.

About 285 million people globally suffer from diabetes, and this number predictably will increase by approximately 50% by the year 2030 (19). Periodontal disease as a complication of type 2 diabetes is a microvascular complication and a group of infections and lesions that affects the tissues, which form the attachment of teeth (20, 21). Another cross-sectional study of 259 adolescents aged 15-19years with type 2 diabetes in comparison to the non-diabetes Mellitus control group, which was carried out in the Department of Internal Medicine Semmelweis University in Budapest, demonstrates that dental condition can be better in diabetics if they have good oral hygiene and proper metabolic control (22, 23).

In a cross-sectional study of over 3,406 Mexican adult patients in a public university from 2013 to 2017, It was found that 64.2% of them were women the age of 42.45 years, and 12.1% of them had diabetes (24).

About 285 million people globally suffer from diabetes, and this number Considering the patient's condition of periodontal disease and diabetes mellitus, cooperation between dentists and physicians in managing both diseases is crucial (25). According to many well-conducted studies, Relation between tooth decay and diabetes is inconsistent. Still, some dental caries risk factors are prevalent in diabetic patients. Therefore, more research is needed in this area (26, 27).

Conclusion

There was a significant relationship between diabetes and oral cavity manifestations such as dental caries and tooth loss. Of the 1,391 patients, 55.51% of diabetic patients had tooth defects (loss or decay), with 29.92% tooth decay and 25.59% tooth loss. A high incidence of tooth decay and tooth loss was observed in second molars, and the lowest incidence of defects was in centrals and canines.

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