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Research Article

**IS THERE A CORRELATION BETWEEN POOR ORAL  
HEALTH AND DIABETES: QUESTIONNAIRE STUDY**

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**Abstract:**

*The purpose of this study is to determine whether there is a significant relationship between oral health and diabetes mellitus. The study is a cross-sectional analytical study, that used an e-form questionnaire, collecting 1095 participant. The questionnaire is designed to assess the common signs and symptoms of different common oral diseases, especially periodontal disease. Results showed that 9.6% of participants were diabetics. Significant relationship between symptoms and signs of dental disease and being a diabetic was found. Conclusion has been made that diabetes has a negative effect on oral health.*

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**INTRODUCTION:**

Oral health is a key indicator of overall health, well-being and quality of life. It encompasses a range of diseases and conditions that include dental caries, periodontal (gum) disease, tooth loss, oral cancer, oral manifestations of HIV infection, Oro-dental trauma, Noma and birth defects such as cleft lip and palate. The Global Burden of Disease Study 2017 estimated that oral diseases affect 3.5 billion people worldwide. According to the International Agency for Research on Cancer, cancers of the lip and oral cavity are among the top 15 most common cancers worldwide, with nearly 180 000 deaths each year.

Most oral diseases and conditions share modifiable risk factors with the leading noncommunicable diseases (cardiovascular diseases, cancer, chronic respiratory diseases and diabetes). These risk factors include tobacco use, alcohol consumption and unhealthy diets high in free sugars, all of which are increasing at the global level. There is a proven relationship between oral and general health. It is reported, for example, that diabetes mellitus is linked with the development and progression of periodontitis. Moreover, there is a causal link between high consumption of sugars and diabetes, obesity and dental caries.

People with diabetes who have irregular blood glucose levels have a higher risk of tooth problems and gum disease than people without diabetes. This is because they have lowered resistance to infection and may not heal as easily.

People with diabetes are at an increased risk for serious gum disease because they are generally more susceptible to bacterial infection and have a decreased ability to fight bacteria that invade the gums.

The higher your blood sugar level, the higher your risk of:

- Tooth decay (cavities): High sugar levels in the saliva increase the risk of tooth decay.
- Gingivitis: When left untreated, it can develop from simple inflammation to a severe one that may result in tooth loss.

If you are living with diabetes, you need to pay particular attention to your oral health and dental care, as well as controlling your blood glucose levels. Visit your dentist regularly for advice about how to keep your teeth and gums healthy.

Diabetes is a common disease among Australians, affecting almost 1.5 million people (around 7.6 per

cent of the population). The first signs and symptoms of diabetes can occur in the mouth, so paying attention to your oral health can also lead to earlier diagnosis and treatment.

The most common oral health problems affecting people with diabetes are:

- periodontal (gum) disease
- gum abscesses
- tooth decay
- fungal infections such as thrush
- lichen planus (an inflammatory, autoimmune skin condition)
- mouth ulcers
- taste disturbances
- a dry, burning mouth (low saliva levels).

The aim of this study is to determine If there is an association between poor oral health and diabetes .

The Objectives are to identify most common age , gender and level of education are suffering from poor oral health , also to show the relationship between poor oral health and smoking.

**METHODS:****Study design:**

This is an analytical cross-sectional study.

**Study Setting and period:**

This is an analytical cross-sectional study conducted at universities, hospitals, malls (from general population) KSA from June 2021 until October 2021

**Inclusion criteria:** Patients and General population

**Exclusion criteria:** None

**sampling method:**

Participants will be randomly selected and carried out by questionnaire.

**Sampling size:**

A number should be collecting 500 or more participants from the Patients and general population.

**Measurements:**

Explanatory variables:

1. Sociodemographic characteristics: age ,gender and education level.
2. Disease related information: Diabetes , Smoking , evaluation of oral health.

**Outcome measures:**

The outcome measure is by counting the ratio of the number of patients s who have poor oral health this will be measured using:

By determining evaluation and assessment of oral health and DM relation.

**Prevalence study:**

will be carried to test the questionnaire if easily understood and the response of the participants.

Data from the cross-sectional study will be used to calculate the sample size.

**Data Management and Analysis plan:**

Data will be entered and analyzed using SPSS version 23.0 Descriptive statistics will be performed and categorical data will be displayed as frequencies and percentages while measures of patients DM and have poor oral health and measures oral health assessment will be used to summarize continuous variables.

Univariate and multivariate analysis will be performed to investigate association between age, gender, and education level and DM , smoking. statistical significance is set at a P value of 0.05 or less.

**Statistical analysis:**

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 23.0 . Descriptive statistics were displayed as frequencies and percentages for categorical variables. Measures of central tendencies (the median), and measures and dispersion (minimum – maximum) were used to summarize continuous variables, as the continuous variables were not normally distributed when tested by Shapiro-Wilk test. Univariate analysis was performed to investigate the association between the exposure factors with the outcome on the one hand, this was performed using Chi-squared test. Multivariate analysis to investigate factors independently was performed using binary logistic regression. P value was set at a significance level of < 0.05.

**Literature review:**

Although oral health knowledge, attitude and behaviour showed improved results from 1st to 4th year dental students, it should be improved in order to serve better for the community in the future. (2015, June). This study was based on evaluation and

knowledge, especially in the target group of dental students. The study differs from our study in an integrated manner. More education and consideration should be given to oral and dental health.

The prevalence of dental caries and plaque accumulation was significantly poorer in non-hospitalized children when compared to hospitalized patients, and gingival health was more deteriorated in hospitalized children in Riyadh city. (2021) This study linked dental health to immunocompromised disease who are in the hospital and outside the hospital, where the results showed that the most group suffering from the deterioration of the health status of the mouth and teeth are the residents in hospitals.

This study reported adequate knowledge of the sample with respect to diabetes-related oral health. An important finding of this study was that the majority of the study participants did not receive information leading to diabetes-related oral health awareness or knowledge from anyone, which implies that health professionals and health media do not play the requisite role in dissemination of this important aspect of public health. (n.d.) This study indicated an increase in work and intensification of spreading awareness and education about oral and dental health for all patients without exception, especially diabetic patients, it was evident from the results of the previous study that there was a lack of awareness about oral and dental health, and this shortcoming on the part of the treating doctor and the clinic.

**RESULTS:****Baseline characteristics:**

The study included 1095 patients in which among them were 623 males (56.9 % ) and the rest were females. Age group ranged from 18 to older than 55, with most frequent age groups were 25-34 (n= 454, 41.5%) and from 35-44 (n= 318, 29%).

The level of education of the study population showing that most of them in collage or higher (n= 862, 78.7%) and the rest in high school or lower.

The pie chart in figure 1 shows the distribution of study participants according to age groups.

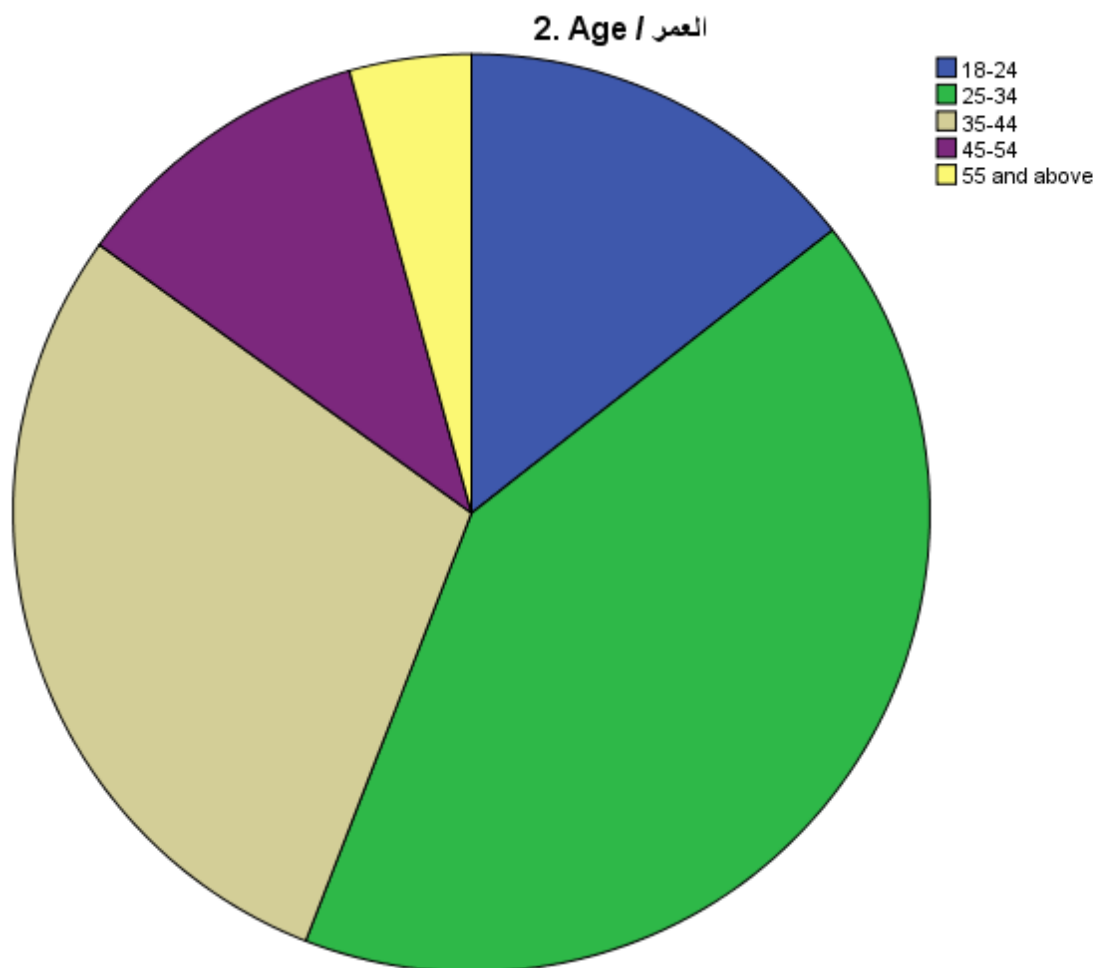


Figure 1: Distribution of study participants according to age groups

**Prevalence of smoking:**

Results show that more than half of participant of the sample not smoked (  $n = 797$  , 72.8 % ) , the rest was smoker or ex-smoker. The pie chart in figure 2 shows the prevalence of smoking .

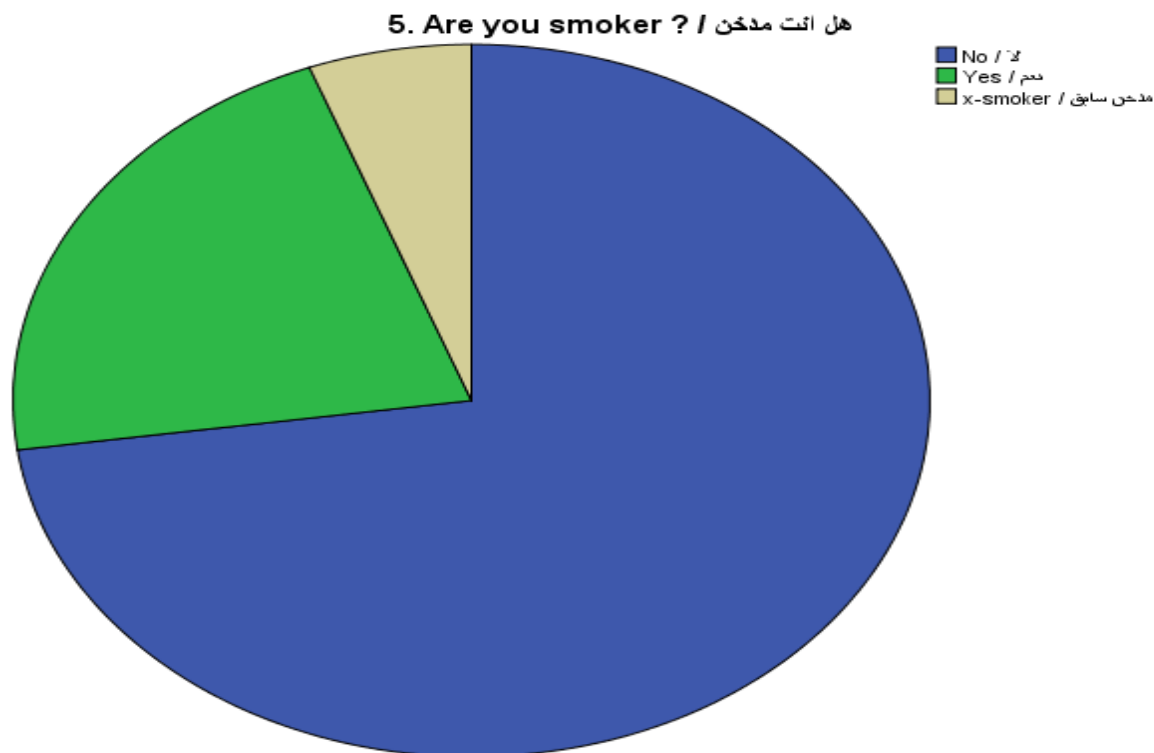


Figure 2 shows the prevalence of smoking .

#### Relationship between Diabetes and Oral Health:

Question	Diabetics	Non-diabetics	Significance
How many teeth did you lose? (less than 6 = 1, 6 or more = 2)	Mean = 1.2952	1.1596	0.00
During the past 3 months, have you noticed that you have a tooth that doesn't look right? (no = 0, yes = 1)	Mean = .5905	Mean = .5515	.445
Have you ever had any teeth that become loose on their own, without an injury (not baby teeth)? (no = 0, yes = 1)	Mean = .3905	Mean = .1697	0.00
How often during the last year, have you had discomfort in the following parts of your mouth: teeth? (no = 0, yes = 1)	Mean = 3.9524	Mean = 3.1263	0.00
How often during the last year, have you had discomfort in the following parts of your mouth: gum? (no = 0, yes = 1)	Mean = 3.5524	Mean = 2.9384	0.00
How often during the last year, have you had discomfort in the following parts of your mouth: tongue? (no = 0, yes = 1)	Mean = 3.0095	Mean = 2.2939	0.00
How often during the last year, have you had discomfort in the following parts of your mouth: jaw? (no = 0, yes = 1)	Mean = 3.0286	Mean = 2.4222	0.00
Have you visited an oral healthcare center for scaling treatment in the past 12 months? (no = 0, yes = 1)	Mean = .4190	Mean = .3485	.151
Have you visited an oral healthcare center for treating loose teeth in the past 12 months? (no = 0, yes = 1)	Mean = .2286	Mean = .2091	.642

Have you visited an oral healthcare center for abusing bad habits in the past 12 months? (no = 0, yes = 1)	Mean = .2381	Mean = .2020	.385
Have you visited an oral healthcare center for treating cavities in the past 12 months? (no = 0, yes = 1)	Mean = .4381	Mean = .4333	.925
How satisfied are you with the health of your teeth? (very dissatisfied = 1, not satisfied = 2, neutral = 3, satisfied = 4, very satisfied = 5)	Mean = 3.3333	Mean = 2.8444	.00
How satisfied are you with the health of your gum? (very dissatisfied = 1, not satisfied = 2, neutral = 3, satisfied = 4, very satisfied = 5)	Mean = 3.4286	Mean = 3.0899	.00
How satisfied are you with the health of your tongue? (very dissatisfied = 1, not satisfied = 2, neutral = 3, satisfied = 4, very satisfied = 5)	Mean = 3.7429	Mean = 3.5525	.092
How satisfied are you with the health of your jaws? (very dissatisfied = 1, not satisfied = 2, neutral = 3, satisfied = 4, very satisfied = 5)	Mean = 3.7429	Mean = 3.4636	.018
How satisfied are you with the overall oral health of yours? (very dissatisfied = 1, not satisfied = 2, neutral = 3, satisfied = 4, very satisfied = 5)	Mean = 3.6286	Mean = 3.2626	.001
In a percentage, how much do you think the following factors increase the risk for oral health problems? (eating lots of suger)	Mean = 53.7143	Mean = 51.1616	.626
In a percentage, how much do you think the following factors increase the risk for oral health problems? (not brushing teeth)	Mean = 83.3333	Mean = 81.6465	.525
In a percentage, how much do you think the following factors increase the risk for oral health problems? (eating and drinking a lot)	Mean = 77.7143	Mean = 76.4747	.405
In a percentage, how much do you think the following factors increase the risk for oral health problems? (not brushing after meals)?	Mean = 68.6667	Mean = 67.4646	.672
In a percentage, how much do you think the following factors increase the risk for oral health problems? (smoking)?	Mean = 79.4286	Mean = 78.7677	.825

Differences are statistically significant in several questions. Teeth loss, loosening of teeth, discomfort in gum, teeth, tongue, or jaws, are significantly related to being diabetic. Patients' satisfaction about the health of their teeth, tongue, jaws, and overall oral health is significantly related to being a diabetic.

#### DISCUSSION:

Results of this study are strongly agreeing with other studies, focusing the light on oral health in diabetic patients, and showing a significant relationship of dental health issues with diabetes. In a literature review done in 2008 (Ira B. Lamster, et al), periodontitis was strongly found to be increased in prevalence in patients with diabetes. That is related to what this study is showing that gum and teeth loosening problems was significantly increased in patients with diabetes.

In another article published by JONATHAN A. SHIP, it was concluded that gingivitis and periodontitis are strongly correlated with poor glycemic control in diabetic patients. It was also included that dental carries, and periodontal infections are associated with diabetes patients, especially those with poor glycemic control.

#### CONCLUSION:

Diabetes mellitus can affect oral health aspects, increasing the chance to develop periodontal disease, and minimising the overall oral health.

#### Keywords:

Oral Health , smoking

#### Data availability:

they are available upon reasonable request.

**Conflict of interest:**

Authors have no conflict of interest to declare

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**Ethical considerations:**

Administrative approval will be sought from the unit of biomedical ethics research committee Ethical approval will be sought from the ethical committee of the faculty of medicine, king Abdelaziz university. An informed consent will be sought from the participants.

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