



Dental Caries in Diabetic Patients with Different Socioeconomic Status Using Mandibular First Molar as an Indicator

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Abstract

Background: The bacterial fermentation process of dietary carbohydrates is considered the main factor in developing dental caries, which is the most common chronic illness globally. **Objective:** The objective of this research was to evaluate the prevalence of dental caries in diabetic patients with different socioeconomic backgrounds using permanent mandibular first molar teeth as an indicator. **Methodology:** This cross-sectional research has a study group consisting of 90 randomly selected patients aged 17 to 75 years, 70 of them have diabetes. A non-invasive clinical dental examination was performed at the Dental Clinic of Al-Ameed University College of Dentistry. Statistical processing of the obtained research results was carried out in the environment of the IBM SPSS Statistics 23 application program. **Results:** Research data show a relationship between dental caries and socioeconomic status ($p < 0.001$) and oral health status and socioeconomic status ($p < 0.005$). For the relation between age and dental caries in the diabetic patients, there is no significant correlation. The data obtained by us indicate that SES could be an important indicator in assessing risk for dental caries. **Conclusion:** In conclusion, the prevalence of dental caries using PM1stM as an indicator was found to be higher in lower economic status when compared to upper economic status. There is a link between existence person's socioeconomic status and oral health conditions. SES could be considered a significant factor affecting oral health in developing countries like Iraq. It is essential to improve the education level of families to improve their oral health. [*Bangladesh Journal of Infectious Diseases, December 2025;12(2):200-204*]

Keywords: Dental caries, Socioeconomic status (SES); Permanent mandibular first molar (PM1stM); Diabetic; Bacterial fermentation

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Introduction

Dental caries is the localized destruction of susceptible dental hard tissues due to the bacterial fermentation process of dietary carbohydrates forming acids¹. Globally, dental caries is considered the most common chronic illness^{2,3}. Dental caries has many etiological factors grouped into internal and external types⁴. Diabetes mellitus occurs when the pancreas doesn't secrete enough insulin or on

the other hand, when the body can't utilize the insulin successfully⁵. A reduction in saliva flow rate, its PH value, and its minerals are major causes for which dental caries can be started and can be seen further in diabetic patients⁶. Glucose high level in the diabetic patient's oral cavity will lead to faster growth of aciduric bacteria, and caries lesions will increase⁷. On the other hand, others have reported that diabetic patients have a reduction in the caries incidence because of a low level of

carbohydrate diet and reduction in the sucrose consumption, which is the most cariogenic sugar⁸. Dental caries shows a reduction in the prevalence in both developed and developing countries⁹. Whatever the cause is, the prevalence of dental caries remains high among low socioeconomic status populations. Therefore, among the risk factors for dental caries, socioeconomic status are associated^{10,11}. Low socioeconomic status is associated with less access to dental services and oral hygiene products, also poorer knowledge regarding oral health leads to a greater frequency and severity of dental caries¹². World Health Organization (WHO) reported that dental treatments have always been the most expensive treatments among all chronic diseases¹³, and impose a great economic burden on peoples¹⁴. Kuppuswamy (1981) invented a socioeconomic scale.

The scale classifies the population into upper, middle, and low socioeconomic status^{15,16}. At approximately six years of age, the lower first permanent molar erupts in the oral cavity; it is susceptible and more vulnerable to the development of caries because of its early eruption and anatomical structure^{17,18,19}. Due to its effects on the eruption of third molar and contributing to the development of physiological occlusion and adequate masticatory function, it is considered an extremely important tooth in the oral cavity^{20,21,22}. This study includes parameters like oral hygiene status using simplified oral hygiene index, socioeconomic status, which are key for dental caries development. Therefore, this study was to assess the dental caries prevalence and its associated factors among patients with Diabetes mellitus and nondiabetic patients in Al-Ameed University College of Dentistry dental clinics, 2024.

Methodology

Study Settings and Population: The study group consisted of 90 randomly selected patients aged 17 to 75 years; 70 of them had diabetes. All of the patients were conducted in the Educational dental clinics at Al-Ameed University College of Dentistry, Iraq, Karbala. A non-intrusive dental

examination was clinically performed at the Dental Clinic of Al-Ameed University College of Dentistry from January to May 2024.

Study Procedure: The patients were examined in a dental chair with a professional light, a dental mirror, and a probe without dental radiographs being used. Data in this research include patient age, gender, socioeconomic status, oral health, diabetic status, and the absence or presence of carious lesions. In this study an epidemiological question investigated was as follows: are adult diabetic patients with worse socioeconomic indicators being more affected by dental caries than adult patients with better socioeconomic status? Including 20 case of non-diabetic patients to investigate the impact of socioeconomic status on diabetic patients. The socioeconomic status indicators encompassed any reference to the level of education, income, kind of occupation or employment, ability to access/non-access to private dental practice and so on.

Statistical Analysis: The data in this study were collected and organized in Excel. For statistical analysis the tabulated data from Excel was imported to SPSS version 23.0. The data was represented by bar graphs and the statistical tests used were Chi square and correlation analysis. The correlation between Dental caries and socioeconomic status in diabetic and control patients were analyzed. Statistical significance was set at $p < 0.05$.

Ethical Consideration: The project proposal was presented to the Chair of the Research Ethics Committee of Al-Ameed University College of Dentistry. In accordance with international criteria, formal ethical approval was completed.

Results

Demographic and clinical characteristics of the study's subjects according to the economic status was clarified in tables and graphs. Total number of 90 patient 35 of them was females (38.8%) and 55 was males (61.2%). The data percentages for each category were clarified (Table 1).

Table 1: Demographic and Clinical Profile of Patients According to Economic Status

Parameter	Poor	Middle	Good	F (KWT)	P
Mean Age \pm SD	42.0 \pm 12.59	40.6 \pm 15.27	37.1 \pm 13.33	0.392	0.947
Gender (Female/Male)	6/12	12/24	17/19	1.735	0.416

Parameter	Poor	Middle	Good	F (KWT)	P
Oral Health Bad/Good	16/2	24/12	10/26	21.15	<0.005
PM1stM N/C/M/F	0/5/13/0	4/7/13/12	18/0/7/11	40.187	<0.001
DM No/Yes	5/13	7/29	8/28	0.482	0.786

KWT: Kruskal Wallis Test, Results are expressed as mean ± standard deviation for normally distributed data. Binomial data were expressed as ratios and analyzed by Chi-squared test. p. probability value.

There are three main groups of socioeconomic status (poor, middle and good). For the poor socioeconomic section employment percentage is 0%, good oral health percentage is 11%, PM1stM percentage (0% for normal, 27.8% for caries, 72.2% for missing and 0% for filling), whether the patient being diabetic or healthy the percentage is (27.8% healthy and 72.2% diabetics). For the middle socioeconomic section employment percentage is 33.3%, good oral health percentage is 33.3%, PM1stM percentage (11.11% for normal, 19.4% for caries, 36.11% for missing and 33.3% for filling), whether the patient being diabetic or healthy the percentage is (19.4% healthy and 80.5% diabetics). For the good socioeconomic section employment percentage is 52.7%, good oral health percentage is 72.2%, PM1stM percentage (50% for normal, 0% for caries, 19.4% for missing and 30.55% for filling), whether the patient being diabetic or healthy, the percentage is (22.2% healthy and 77.7% diabetics). Table 2 and Figure I show the Prevalence of caries in diabetic patients and the healthy control group using PM1stM teeth as an indicator.

Table 2: Prevalence of Caries In Diabetic Patients and Healthy Control Group using PM1stM Teeth

Group	Healthy Control	DM Patients
Healthy	4(20.0%)	18(25.7%)
Carries	3(15.0%)	9(12.9%)
Missing's	8(40.0%)	25(35.7%)
Fillings	5(25.0%)	18(25.7%)

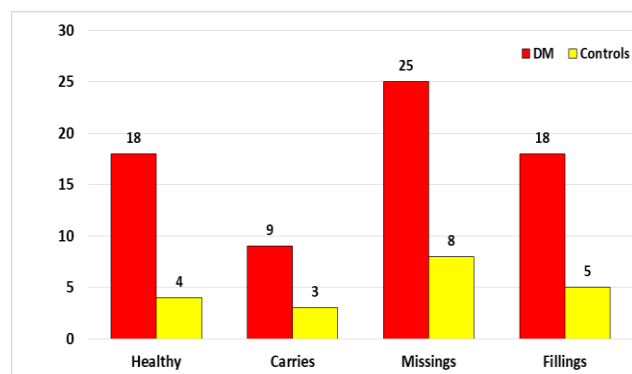


Figure I: Showing PM1stM Conditions in Diabetes Mellitus Patients and Control Group

The relation between PM1stM status and SES in diabetic patient clarified in Figure II. The correlation study using Cramer's V indicates a negative correlation between the PM1stM conditions and the economic status with a correlation coefficient (Cramer's V value) of 0.452 (p<0.001).

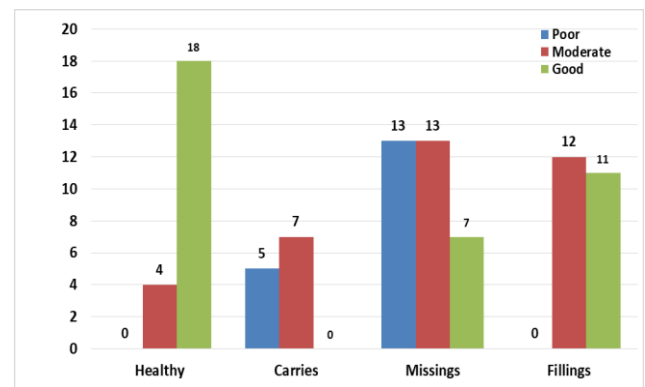


Figure II: Showing PM1stM conditions according to subjects' economic status (poor, moderate, and good)

The correlation study using Cramer's V indicates a correlation between the economic state and oral health with a correlation coefficient (Cramer's V value) of 0.387 (p=0.005) and figure III revealed the related data distribution.

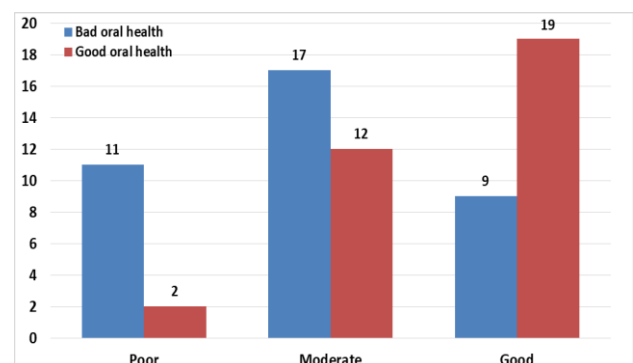


Figure III: Showing the Oral Health in Diabetes Mellitus Patients According to Subjects' Economic status (poor, moderate, and good)

The relation between gender and PM1stM status in the diabetic patient was clarified. There was no significant correlation using Cramer's V between the PM1stM conditions and gender with a correlation coefficient (Cramer's V value) of 0.180 ($p=0.517$) (Figure IV).

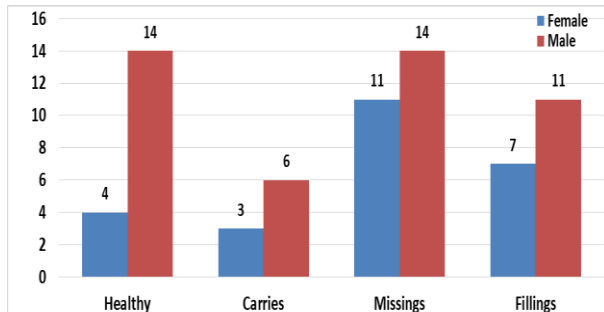


Figure IV: Distribution of PM1stM conditions according to subjects' gender

The correlation between age and PM1stM status in the diabetic patients was analyzed. There was no significant correlation between PM1stM and age ($r=0.166$, $p=0.117$) (Table 3).

Table 3: Correlation between Age and PM1stM Status in the Diabetic Patient

Values	Results
Pearson Correlation	0.166
P Value	0.117
N	90

Discussion

The research samples for this study are 90 patients. Many researches dealing with the relationship between diabetes mellitus, dental caries and loss of tooth cannot be more accurate because of the study samples being less than 300 patients²³. The significance of dental caries prevalence among diabetic and non-diabetic patient has not been proved in this study and this is consisting with several previous studies. In general, previous researches showed a conflict results where some of them found a relation between them^{24,25,26}. A higher content of salivary glucose in diabetic patients may be the cause for this²⁷. In contrast, other studies revealed a higher dental caries prevalence among patient without diabetics. The possible understanding for this inconsistency may be good recognition of diabetic patients on diet management practices, like diets with sugar-free²⁸. SES is also regarded as an important indicator in assessing risk for dental caries. many

studies showed a link between the presence of decayed teeth, unreplaced extracted teeth and bad oral health with people who belonged to lower socioeconomic status²⁹. Our results reveal the same where there is a strong correlation between oral health, dental caries and SES. The number of filled teeth of certain patient is mainly affected by Monthly income of the that individual. The individual educational level, socioeconomic status and household income interact with each other in determine dental caries³⁰. In our study there is a strong link between educational level and the individual income, this link was significantly associated with the severity of dental caries and other oral health issues and perception.

Conclusion

The study concluded that the prevalence of dental caries using PM1stM as an indicator was found to be higher in lower economic status when compared to upper economic status. There is a link between existence person's socioeconomic status and oral health condition. SES could be considered a significant factor affecting oral health in developing countries like Iraq. It is essential to raise families' education levels to improve their oral health.

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None

Conflict of Interest

The Author has declared no conflict of interest in this work.

Financial Disclosure

No funding is received for this work.

Authors' contributions

The author has been involved in protocol development, protocol finalization, revised the manuscript for important intellectual content, approved the final version, and agreed to be accountable for all aspects of the work.

Data Availability

The datasets used and analyzed during the present study are derived from hospital surveillance systems and DGHS databases. Data are available from the corresponding author upon reasonable request and subject to approval by the relevant institutional authorities.

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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