



## Awareness and Attitude of Diabetic Patients Towards Oral Health in Traghen, Southern Libya: A cross-sectional study

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### Abstract

**Background:** Diabetes mellitus (DM) is a chronic medical condition that is becoming more prevalent worldwide that cause severe medical complications. This illness has several effects on oral health, which in turn influence the management of diabetes. **Objectives:** This study aimed to evaluate diabetic patients' attitudes and knowledge regarding oral disease complications. **Methods:** A hospital-based, cross-sectional descriptive study was conducted using a confidential questionnaire that was randomly distributed to adults with diabetes. A total of 104 individuals with diabetes were included in this study. The study was conducted using this tool with a level of significance at  $p < 0.05$ . **Results:** More than half of respondents (53.8%) had a moderate level of awareness. Where, 78.8% of diabetic patients were aware that DM impacts general oral health. Additionally, 68.3% acknowledged that DM increases gingival bleeding, and 89.4% recognised that DM can cause tooth loss. In terms of attitude, 89.4% of diabetic patients in this research had poor attitudes towards daily oral hygiene practices. The results showed that 84.3% of participants never floss their teeth, and around 82.7% visit only when complaining of pain. The correlation between education and oral health awareness reveals that the level of dental knowledge among higher education subjects (30.4%) is significantly higher than at different levels of education,  $p$ -value (0.005). In addition, illiterate diabetic patients have the poorest knowledge (41.6%). Moreover, the relationship between age and overall attitude reveals that individuals in the age group over 55 showed a significant level of poor attitude (52.6%) in comparison to other age groups ( $p$ -value 0.05). **Conclusions:** In summary, patients with diabetes mellitus were found to have a moderate level of understanding of how their condition affects their oral health. Nonetheless, the study's subjects lacked attitude.

**Keywords:** attitude, awareness, diabetic patients, oral health.

### Introduction

Diabetes mellitus comprises a collection of metabolic disorders that are defined by elevated blood sugar levels. This condition is associated with metabolic irregularities in carbohydrates, fats, and proteins, resulting in long-term complications that include microvascular, macrovascular, and nerve-related issues.

[1] The World Health Organization (WHO) estimates that by 2022, there were 830 million people worldwide who had diabetes, up from at least 200 million in 1990.

[2] By 2030, the number of people with diabetes is predicted to rise from 171 million in 2000 to 366 million. [3] Moreover, Libya has a significant number of

individuals living with diabetes; it is expected to reach 245,000 by 2030. The rise in diabetes cases in developing countries aligns with trends in urbanization and lifestyle changes.<sup>[4]</sup>

DM is associated with serious health issues, such as a variety of oral health problems, including periodontal disease, dental caries, and oral infections.<sup>[5,6]</sup> It is important to know that diabetes and oral health have a bidirectional relationship in which blood sugar isn't well controlled, which raises the risk of oral diseases. On the other hand, oral infections, especially periodontitis, can adversely affect glycaemic control, which can make diabetes more difficult to manage.<sup>[7,8]</sup>

Diabetes mellitus increases the likelihood of experiencing oral health issues.<sup>[9,10]</sup>

Growing research indicates that oral disease is more severe in diabetics than in non-diabetics, and this is linked to long-term metabolic control.<sup>[11]</sup> As a result, periodontal disease is now regarded as the "sixth" diabetes-related complication.<sup>[7,12,13]</sup> The oral health behaviours of people with diabetes are greatly influenced by their attitudes and awareness of oral health.<sup>[14]</sup> There is an increased probability of seeking preventive dental care linked to dental knowledge; thus, health education for diabetic patients aims to influence behaviours by transforming their underestimation of the seriousness of oral complications.<sup>[15,16]</sup> While global literature reviews addressed the influence of diabetes on dental health, there remains a serious shortage of specialised data addressing this topic within our locations. In addition, we have identified limitations in studies that address this issue among diabetic patient groups in our area. To bridge this gap, this study primarily aims to evaluate the awareness and attitudes of local diabetic patients toward their oral health.

#### Materials and Methods

##### Study area

The study was conducted in Traghen, a small city in southern Libya. The surveys were distributed to diabetic patients at the outpatient diabetic clinic in the Educational Traghan Hospital and the primary health care centers in this area.

##### Study Design

This study is a hospital-based, cross-sectional descriptive study that was carried out through a confidential questionnaire that was randomly distributed to adults who were diabetic patients aged 18 and above.

##### Study population and sample size

All diabetic patients attending the outpatient clinics and living in Traghen, Southern Libya. The study targeted 200 participants. The questionnaires were distributed to 104 diabetic patients who agreed to participate in the interview..

##### Eligibility criteria and inclusion criteria

Patients who were diagnosed with diabetes mellitus, both type 1 and type 2, aged 18 years and above. In addition, diabetic patients who were willing to participate in this study.

##### Exclusion criteria

Intellectually disabled individuals, patients below the age of 18, and patients who refused to participate in this study were excluded from this study

##### Study tool and data collection

The questionnaire was derived from other published studies that were similar to our study, including the one used in Alhuwais' study (2021). A pilot study assessment for 20 diabetic patients was done before officially starting the research. The data were collected over 12 weeks by a simple random sampling technique. The structured questionnaire consisted of four domains. The four domains of the

structured questionnaire were sociodemographic data, clinical information, patient awareness of the relationship between diabetes and dental health, and patient attitudes toward oral health. The questionnaire included an oral informational pamphlet on diabetes and general oral health. By providing oral hygiene recommendations, it assisted in educating the patients about the consequences of diabetes.

#### Ethical Considerations

The study design and questionnaire items were discussed and ethically approved by the Faculty of Nursing, Fezzan University, Libya. Informed consent was obtained from all participants before the beginning of the study to ensure the rights of privacy and secrecy of all registered data, and the purpose of the study was clearly defined.

#### Data analysis

The collected data were coded and recorded in Excel spreadsheets (Office 2016) and analysed using a software program, the Statistical Package for Social Sciences (SPSS). Qualitative variables were expressed as absolute numbers and percentages. The chi-square test was used to assess the associations between groups. Results were considered significant if the p-value was  $<0.05$ .

#### Results and Discussion

##### Results

A total of 104 patients took part in the study. Of these participants, 46.2% were males and 52.9% were females. Participants ranged in age from 18 to more than 55 years. More than half of the participants (51.0%) were aged  $>55$ . About a quarter of the patients (23.0%) had a higher level of education, while the minority (18.3%) were illiterate. In addition, the majority, 94.2%, were non-smokers (Table 1).

Out of 104 diabetic patients, 47.1% had Type 2 diabetes mellitus (DM), 36.5% had Type 1 DM, and 16.3% were unaware of their diabetes type. Regarding the duration of diabetes mellitus among participants, less than half (40.4%) were diagnosed within the period of 1-5 years. In terms of diabetes management, only 23.1% had uncontrolled diabetes, whereas 76.9% had managed blood glucose levels. The majority of participants (96.2%) reported being on diabetes medication (Table 2).

The level of awareness of diabetic patients regarding the impact of diabetes on oral health was assessed. Table 3 shows that the majority, 77.9%, agreed that smoking affects the gingiva of diabetic patients. A significant proportion (78.8%) of diabetic patients were aware that DM impacts general oral health. Additionally, 68.3% acknowledged that DM increases gingival bleeding, and 80.8% were aware that DM impairs the healing of oral wounds or ulcers. In addition, the majority of participants (89.4%) recognized that DM can cause tooth loss, and 76.9% understood the increased risk of oral infections in diabetic patients.

Table (1): Sociodemographic characteristics

| Patient characteristics | Number | Percentage |
|-------------------------|--------|------------|
| Male                    | 48     | 46.2%      |
| Female                  | 55     | 52.9%      |
| Age {years}             |        |            |
| 18-35                   | 12     | 11.5%      |
| 36-55                   | 39     | 37.5%      |
| >55                     | 53     | 51.0%      |
| Education               |        |            |
| Illiterate              | 19     | 18.3%      |
| Primary school          | 21     | 20.2%      |
| Middle school           | 27     | 26.0%      |
| High school             | 13     | 12.5%      |
| Higher education        | 24     | 23.1%      |
| Smoking status          |        |            |
| Smoker                  | 6      | 5.8%       |
| Non smoker              | 98     | 94.2%      |

Table (2): Clinical data of diabetic patients

|                         |     |       |
|-------------------------|-----|-------|
| Patient characteristics |     |       |
| Type1 DM                | 38  | 36.5% |
| Type2 DM                | 49  | 47.1% |
| I don't know            | 17  | 16.3% |
| Duration of diabetes    |     |       |
| > one year              | 13  | 12.5% |
| 1-5 years               | 42  | 40.4% |
| 6-10 years              | 39  | 37.5% |
| < 10 years              | 10  | 9.6%  |
| Diabetes status         |     |       |
| Controlled              | 80  | 76.9% |
| Uncontrolled            | 24  | 23.1% |
| Medications taken       |     |       |
| Yes                     | 100 | 96.2% |
| No                      | 4   | 3.8%  |

Table 3: Knowledge of diabetic patients about the effect of diabetes on oral health.

|                                               | Yes       | No        |
|-----------------------------------------------|-----------|-----------|
| Smoking affects the gingiva of diabetics      | 81(77.9%) | 23(22.1%) |
| DM affects general oral health                | 82(78.8%) | 22(21.2%) |
| DM increases gingival bleeding                | 71(68.3%) | 33(31.7%) |
| DM affects the healing of oral wounds /ulcers | 84(80.8%) | 20(19.2%) |
| DM affects ketosis, causing bad breath        | 69(66.3%) | 35(33.7%) |
| DM can cause tooth loss                       | 93(89.4%) | 11(10.6%) |
| DM increase the risk of oral infections       | 80(76.9%) | 24(23.1%) |

Table 4 shows the attitude of participants when they have oral problems; less than half (49.0%) visited a dentist, while a minority of patients (13.5%) did not visit the dentist and relied on self-therapy. Regarding the frequency of visits to the dentist, the majority of participants (82.7%) visited the dentist only when complaining of

pain. In contrast, only 3.8% of the patients visited the dentist regularly, once a month. Surprisingly, the majority (85.6%) of participants never flossed their teeth. Moreover, our results show that only 27.9% of diabetic patients brushed their teeth directly after a meal, while 10.6% never **used** mouthwash.

Table 4: Attitude of diabetic patients toward oral health.

|                              | Frequency | Percent |
|------------------------------|-----------|---------|
| When having problems         |           |         |
| Visit doctor                 | 39        | 37.5%   |
| Visit dentist                | 51        | 49.0%   |
| Self-therapy                 | 14        | 13.5%   |
| Frequency of visiting        |           |         |
| Monthly                      | 4         | 3.8%    |
| Every three months           | 5         | 4.8%    |
| Once a year                  | 2         | 1.9%    |
| When complaining of pain     | 86        | 82.7%   |
| Never                        | 7         | 6.7%    |
| Frequency of Brushing Teeth  |           |         |
| After meal                   | 29        | 27.9%   |
| Twice a day                  | 30        | 28.8%   |
| Once a day                   | 34        | 32.7%   |
| Never                        | 11        | 10.6%   |
| Frequency of Flossing        |           |         |
| Twice a day                  | 3         | 2.9%    |
| Once a day                   | 9         | 8.7%    |
| 1-3 times a week             | 3         | 2.9%    |
| Never                        | 89        | 85.6%   |
| Frequency of Using Mouthwash |           |         |
| Twice a day                  | 29        | 27.9%   |
| Once a day                   | 30        | 28.8%   |
| 1-3 times a week             | 34        | 32.7%   |
| Never                        | 11        | 10.6%   |

The distribution of the patients' oral health awareness is displayed in Figure 1. In all, 13.50%, 32.70%, and 53.80% showed poor, moderate, and good levels of oral health knowledge, respectively. This indicates that the study's diabetic patients had a good level of awareness (53.8%). Additionally, the distribution of the individuals' attitudes toward oral health is shown in Figure 2. Overall, 89.4%, 6.70% ,and 3.8% of the participants showed poor, moderate, and good attitudes

toward their oral health, respectively. This reveals poor attitudes in 89.4% of the diabetic patients in this research.

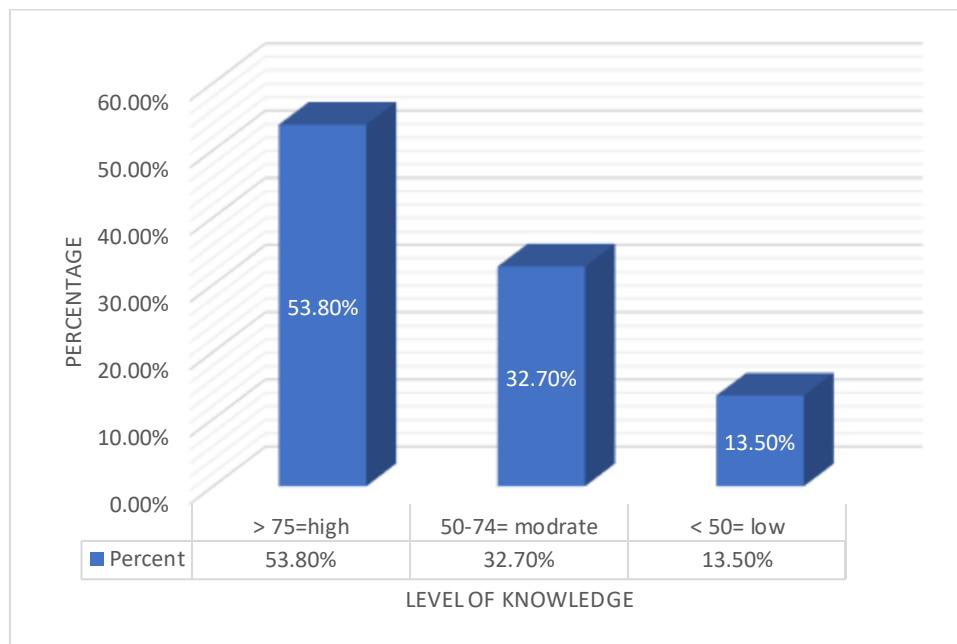


Figure 1 shows the level of knowledge among diabetes patients toward oral health.

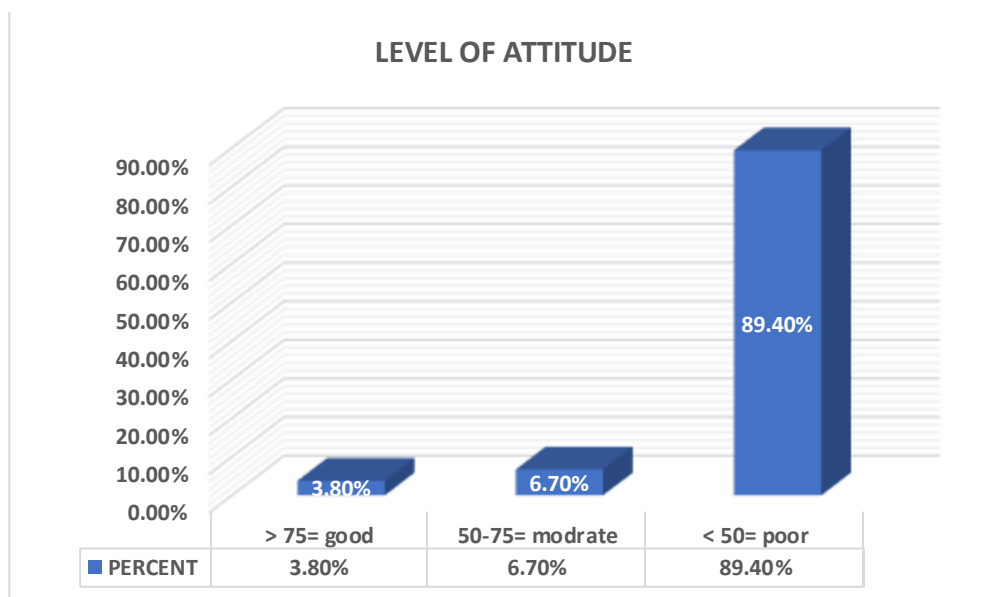


Figure 2 shows the level of attitude among diabetes patients toward oral diseases. Correlation between gender and overall knowledge (Table 5). It reveals that statistical **analysis showed** that there is no significant association between gender and awareness of oral health ( $p$ -value = 0.87). Moreover, there is a significant relationship between education and oral health awareness among diabetic patients in this study ( $p$ -value = 0.005). Illiterate diabetic patients had the poorest knowledge (52.7%) compared with university-level participants

Table 5. Association between factors and oral health awareness among diabetes patients

|           |                       | Awareness toward oral health |                 |            | p- value |
|-----------|-----------------------|------------------------------|-----------------|------------|----------|
|           |                       | > 75=good                    | 50-75= moderate | < 50= poor |          |
| Gender    | Male                  | (45.8%)                      | (33.3%)         | (20.9%)    | 0.87     |
|           | Female                | (42.8%)                      | (32.2%)         | (25.0%)    |          |
| Education | Illiterate            | (21.0%)                      | (26.3%)         | (52.7%)    | 0.005    |
|           | primary stage         | (33.3%)                      | (28.5%)         | (38.2%)    |          |
|           | middle school         | (44.4%)                      | (40.7%)         | (14.9%)    |          |
|           | high school           | (69.3%)                      | (30.7%)         | (0%)       |          |
|           | University and higher | (58.4%)                      | (33.3%)         | (8.3%)     |          |

A significant correlation was found between age groups and overall oral health attitudes among diabetic patients in this study (p-value = 0.05) in Table 6. The results revealed that participants in the age group of >55 years demonstrated the highest level of poor attitudes (92.4%) compared with other age groups. On the other hand, there was no significant correlation between both genders' oral health attitudes (p- value 0.49).

Table 6. Association between factors and oral health attitude among diabetes patients

| gender * attitude Crosstabulation |             |                   |                        |                   |          |
|-----------------------------------|-------------|-------------------|------------------------|-------------------|----------|
|                                   |             | Attitude levels   |                        |                   | p- value |
|                                   |             | > 75= good<br>(%) | 50-75= moderate<br>(%) | < 50= poor<br>(%) |          |
| Gender                            | Male        | (6.2%)            | (6.2%)                 | (87.5%)           | 0.49     |
|                                   | Female      | (1.8%)            | (7.1%)                 | (91.0%)           |          |
| Age                               | 18-35 years | (0%)              | (25.0%)                | (75.0%)           | 0.05     |
|                                   | 36-55 years | (2.5%)            | (7.6 %)                | (89.7%)           |          |
|                                   | < 55 years  | (5.6%)            | (1.8%)                 | (92.4%)           |          |

### Discussion:

Diabetes's numerous complications have a detrimental effect on a patient's health. Patients with diabetes develop various complications due to a lack of awareness and a poor dental hygiene mindset. In addition, the ability of patients to take care of themselves in their daily lives is crucial to the management of diabetes.<sup>[17]</sup> There is increasing evidence that the best strategy to reduce diabetic complications is patient education.<sup>[18]</sup>

The purpose of this cross-sectional questionnaire-based study was to evaluate diabetic patients' awareness of and attitudes toward their oral health based on their degree of knowledge.



In the current study, the results showed that the majority (76.9%) of the participants had controlled diabetes. This may be due to the adherence of patients to their medications, as the results of our study demonstrated that the majority of them (96.2%) had taken medication. In accordance with the Ahluwalia et al. study, which found that 77.7% of patients had controlled diabetes.<sup>[19]</sup>

Interestingly, the majority of the participants (94.2%) were nonsmokers, demonstrating an awareness of the effect of smoking on diabetic patients' health. This outcome corresponds to another study carried out by Al-saif et al., as 97.1% of diabetic patients were nonsmokers.<sup>[20]</sup>

In this study, more than half of patients with diabetes (53.80%) were found to have a good level of knowledge and awareness of oral health. The finding in our study was significantly lower than the result in Chennai, India, which showed good knowledge (78%) about healthy gums and controlled diabetes.<sup>[7]</sup>

In contrast, diabetics have lower levels of oral health knowledge and awareness, according to other global studies. According to a study's findings, most participants were unaware of the connection between diabetes and dental problems. Patients with diabetes do not appear to comprehend how their risk is increased for several oral health issues.<sup>[11]</sup> Another study conducted in Oman by Noora Al Shihi and others found that only 1.8% had good levels of oral health awareness..<sup>[21]</sup>

Over 50% of the research participants (53%) had good knowledge, which may have been acquired through attending the education sessions held in the study area and by reading educational brochures supplied regularly in primary health care centres, where diabetes education may be more readily accessible to patients.

In the current study, the association between education and oral health awareness revealed that the mean score of dental knowledge among higher education subjects (69.3%) was significantly higher than that of different levels of education ( $p$ -value = 0.005). This means that the level of education is one of the factors that can affect the level of knowledge and awareness among diabetic patients. In addition, there is growing evidence that the best strategy to reduce diabetic complications is patient education.

Furthermore, it was found that diabetic patients with T2DM with a higher level of knowledge had fewer complications, which significantly reduced the likelihood of diabetes-related complications.<sup>[22]</sup>

Although a moderate level of diabetic patient awareness was observed in our study, there was a poor attitude toward oral health (89.4%). In comparison, only 3.8% of participants demonstrated a good attitude. The results are consistent with other studies in the Sultanate of Oman, which revealed poor levels of oral health attitudes among the participants (23.8%).<sup>[21]</sup> Similarly, a study conducted in Bangladesh showed that the level of attitude among diabetic patients was higher than in our study (33.5%), even though it was considered a poor level (Hasan et al., 2021).<sup>[23]</sup>

The study showed that the majority of Southern Libyan diabetics (82.7%) preferred not to consult a dentist until they complained of dental pain. In addition, only 3.8% of the patients visited the dentist regularly, once a month. This finding is consistent with another study conducted in Kuwait, which found that more than 50% of the participants visited the dentist when in pain.<sup>[19]</sup>

The results are consistent with another study in the Sultanate of Oman, which revealed poor levels of oral health attitudes among the participants (23.8%).<sup>[21]</sup> Interestingly, only 2.9% of participants **flossed** their teeth twice a day. This low



percentage indicates that very few participants are maintaining a high standard of oral hygiene. In contrast, a significant 84.3% of participants never flossed their teeth. This alarmingly high percentage indicates a major gap in attitudes towards oral hygiene practices. It is accepted that using interdental flossing is crucial for teeth and periodontal health. It was found that using floss in addition to toothbrushing may reduce gingivitis and plaque. [20] This low level indicates a need for increased awareness and education on the importance of oral hygiene.

Interestingly, our results show that only 27.9% of diabetic patients brushed their teeth directly after a meal. This low percentage indicates a severe lack of positive attitudes toward basic oral hygiene practices, although they are aware and have good knowledge about the effect of diabetes on oral health, which is concerning and requires immediate attention.

### **Conclusion**

The level of awareness of oral and dental health among diabetic patients was quite good; more than half of the diabetics (53.8%) were aware of the various complications of diabetes related to oral health. Regarding the attitudes of diabetic patients in this area of southern Libya towards oral health, overall dental practices were poor (89.4%). Further investigations should be conducted in other parts of Libya with larger populations. Increased care is required for diabetic patients in southern Libya, where all patients should receive special attention to improve their attitudes towards their oral health and to educate them about the importance of practising good oral hygiene, which supports diabetic management.

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- No ✓ ☐

#### Conflict of Interest

- Yes ☐
- No ✓ ☐

#### Data Availability

- Yes ☐
- No ☐ ✓

#### Authors' Contributions

| N° | Author Name and Email and ORCID link           | Study Conception / Idea | Data Collection or Contribution to Data Collection | Contribution to Previous Studies / Literature Review | Study Methodology | Conducting Analyses (Practical Aspect) | Data Analysis | Interpretation and Discussion of Results | Approval of Final Version |
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| 1  | Salha. Khames<br>sal.mohamedali@fezzanu.edu.ly | ✓                       | ✓                                                  | ✓                                                    | ✓                 | ✓                                      | ✓             | ✓                                        | ✓                         |
| 2  |                                                |                         |                                                    |                                                      |                   |                                        |               |                                          |                           |
| 3  |                                                |                         |                                                    |                                                      |                   |                                        |               |                                          |                           |