Oral health knowledge, attitude and practice among children and adolescents with type 1 diabetes

Razie Meshki¹, Masoumeh Khataminia¹, Zeinab Jokar¹, Mohammad Salehi Veisi²

¹Department of Pedodontics, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, ²Department of Statistics, Faculty of Science, Behbahan Khatam Alanbia University of Technology, Behbahan, Iran

ABSTRACT

Introduction and Objective: The prevalence of tooth decay and chronic gingivitis is higher in people with diabetes than in healthy people. The aim of this study was to evaluate the knowledge, attitude and practice (KAP) of children and adolescents with type 1 diabetes towards oral diseases. Methods: A descriptive-analytical cross-sectional study was performed on 182 patients less than 25 years of age with type 1 diabetes referred to Golestan Clinic in Ahvaz during 2015-2020. The questionnaire consisted of four sections of demographic information, different dimensions of KAP questionnaire was used to collect data about oral health. Statistical analysis was performed using SPSS software version 22 using Mann-Whitney, Kruskal-Wallis and Chi-square tests. The significance level was considered of $P < 0.05$. Results: The results of the present study showed that 65% of patients had a moderate and low level of knowledge and attitude. Only 13.7% of patients with diabetes reported good levels of oral health performance. Parent’s level of education, patient age and urbanization significantly improved the level of KAP of children and adolescents with diabetes towards oral health ($P < 0.05$). The effect of knowledge on attitude and practice of individuals and also the effect of attitude on practice was positive and significant ($P < 0.05$). Conclusion: Considering that the KAP of 50% of patients were at low and medium levels, therefore it seems necessary to provide an appropriate solution in order to improve the level of KAP of diabetic patients in relation to oral health.

Keywords: Attitude, diabetes, knowledge, oral health, practice

Introduction

Type 1 diabetes, which is caused by a lack of insulin as a result of decreased secretion from the pancreas, can cause an increase in blood sugar concentration.[¹] According to the World Health Organization (WHO) in 2016, the number of people with diabetes in the world was 422 million and it is estimated that by 2030 the disease will become the seventh leading cause of death in the world. Less developed countries have the highest rates of diabetes. According to WHO statistics, in 2011, 4.5 million people in Iran had diabetes, of which about 1.5 million were unaware of their disease. Inadequate information and education about the disease, as well as genetic factors, are among the factors that increase the incidence of this metabolic disorder.[²] Type 1 diabetes is an autoimmune disease in which a person’s immune system acts against beta cells in the pancreas and increases the chances of contracting infectious diseases.[³] One of the most important complications of diabetes is its effect on vascular organs such as the kidneys, retina and neurons. Similar effects of this disease have been reported on small blood vessels in the oral cavity tissue.[⁴] Tooth decay and chronic gingivitis are the most common periodontal diseases that are about twice as common in people with diabetes as in healthy people.[⁵] Geetha
et al.[8] reported that bleeding gums were significantly higher in patients with diabetes than in healthy individuals. Based on the results of several epidemiological studies, periodontal disease is known as the sixth complication of diabetes.[4] Inadequate information and education among diabetic patients can lead to incurable complications such as oral diseases. Bowyer et al.[7] stated that 69% of patients with diabetes had not received any training on the relationship between diabetes and other diseases. Poudel et al.[4] reported that people with diabetes have insufficient knowledge about oral health and fewer visits to the dentist. Sadeghi et al.[8] reported that 36.5% of diabetic patients were aware of the relationship between diabetes and periodontal. Bakhshandeh et al.[9] reported that the practice of diabetic patients in relation to oral health was poor; their study also revealed that 29% of patients brushed twice a day and 54% of them brushed only once a day. Therefore, considering the higher prevalence of oral diseases in people with diabetes on the one hand and their limited awareness of oral health, on the other hand, it seems necessary to provide a suitable solution in order to increase awareness and proper practice among such patients. The aim of this study was to evaluate the KAP of 182 patients aged less than 25 years having type 1 diabetes in Ahvaz city (Ahvaz, Iran) about oral diseases.

Materials and Methods

This descriptive-analytical cross-sectional study was performed on 182 patients with type 1 diabetes under 25 years of age referred to Golestan Clinic in Ahvaz who were selected by census method during 2015-2020. All participants signed their written consent to participate in the study. This research was reviewed by the ethics committee of Ahvaz Jundishapur University of Medical Sciences and approved by the ethics code of IR.AJUMSE.REC.1399.690. Inclusion criteria included having a maximum age of 25 years, at least one year of proven diabetes and no other underlying diseases. Exclusion criteria also included dissatisfaction with participation in the study and simultaneous participation in another study.

Research instrument

Data were collected using a questionnaire. The questionnaire prepared by the researcher included four sections of demographic information, different dimensions of KAP about oral health. The validity of the questionnaire was confirmed by experts in the field of oral health and diabetes. Data related to the awareness section included 10 questions. A score of 1 was given to the positive answer and a score of 0 was given to the answer “I do not know and wrong”. A total score of 0 to 4 indicated a low level of awareness, 5 to 7 indicated a moderate level of awareness and a score above 8 indicated a high level of awareness. Attitudes of diabetic patients about oral diseases were assessed using a 10-item questionnaire and a 5-point Likert scale. In this questionnaire, 4, 3, 2, 1 and 0 scores were assigned to the options of strongly agree, agree, disagree, strongly disagree and have no opinion, respectively. The questionnaire used to assess the practice of diabetic patients in the field of oral health consisted of 10 questions with a Likert scale with four options including never, sometimes, often and always. In this questionnaire, the scores of 0, 1, 2 and 3 were considered for the options of never, sometimes, often and always, respectively. Based on the final score, the patient’s practice was classified into three levels: poor, medium and high. Cronbach’s alpha coefficient was used to evaluate the validity of the answers and the internal consistency of the items.

Statistical analysis

Statistical analysis was performed using Mann-Whitney, Kruskal-Wallis and Chi-square tests. Correlation analysis, Pearson correlation coefficient and multiple linear regression were used in order to predict the level of knowledge and attitude of individuals in their practice. Statistical analysis was performed using SPSS software version 22. The significance level was considered to be $P < 0.05$.

Results

The demographic characteristics of the participants are presented in Table 1. Out of 182 patients participating in the study, 137 (75.3%) were female and 45 (24.7%) were male. A total of 111 (61%) patients were urban and 71 (39%) were rural. In addition, the results of the study showed that 163 patients (91.7%) are the first to third child of the family. About 25% of patients had a history of diabetes in their first and second degree relatives.

The knowledge level of the subjects in relation to different dimensions of oral health is shown in Table 2. The highest level of knowledge was related to the top dental hygiene tools with 96.7%. The attitude and practice of patients with diabetes in relation to different dimensions of oral health are reported in Tables 3 and 4, respectively. Based on the results of the present

| Table 1: Socio-demographic background |
|--------------------------------------|
| Variable                             | n  | %  |
| Gender                               |    |    |
| Female                               | 137 | 75.3|
| Male                                 |  45 | 24.7|
| The child of several families        |    |    |
| First                                |  45 | 24.7|
| Second                               |  76 | 41.8|
| Third                                |  42 | 23.1|
| Fourth                               |   7 |  3.8|
| Fifth and more                       |  12 |  4.5|
| Addressing                           |    |    |
| Rural                                |  71 |  39|
| Urban                                | 111 |  61|
| Number of observed symptoms from diabetes |    |    |
| 1                                    |  18 | 9.70|
| 2                                    |  18 | 9.70|
| 3 and more                          |  93 | 50.4|
| Family history of diabetes           |    |    |
| No history                           | 137 | 75  |
| First-degree relatives               |  27 | 15  |
| Second-degree relative               |  18 | 10  |
study, the difference in knowledge level, attitude and practice were statistically significant in all different dimensions of oral health \( (P = 0.0001) \).

KAP of diabetic patients towards oral health based on the division into three levels: Low, medium and high are shown in Table 5. About 65% of patients had moderate to low knowledge. About 51.6% of patients had a moderate level of attitude regarding oral health issues. Also, only 13.7% of patients with diabetes reported good levels of oral health practice. In general, differences in levels of KAP were significant among diabetic patients [Table 5].

The results of the knowledge level, attitude and practice of the subjects towards oral health issues based on demographic characteristics are shown in Table 6. KAP of diabetic patients were not affected by gender \( (P > 0.05) \). Urban diabetic patients had significantly higher KAP regarding oral health than rural patients \( (P < 0.05) \). Ageing significantly increased the level of knowledge and attitude of patients towards oral health issues \( (P < 0.05) \). The practice level was lower in adolescence (13-18 years) than the other two age groups \( (P < 0.05) \). Also, increasing the education level of parents significantly improved the level of KAP of children and adolescents with diabetes towards oral health \( (P < 0.05) \).

The results presented in Table 7 show that knowledge has a positive and significant effect on patients’ attitudes (Pearson correlation coefficient: 0.604). Also, the effect of attitude on practice (Pearson correlation coefficient: 0.525) and the effect of knowledge on practice (Pearson correlation coefficient: 0.621) were positive and significant.

### Discussion

Tooth decay and chronic gingivitis are the most common periodontal diseases that are about twice as common in people

| Table 2: Frequency distribution of evaluation of knowledge towards oral health among diabetic patients |
|--------------------------------------------------|
| Questions and answers                           | n   | %    | P   |
| Major causes of tooth decay                     |     |      |     |
| Fruits and vegetables                           | 1   | 0.50 | 0.0001 |
| Sweet and Sticky                               | 174 | 95.60 |
| Dairy                                           | 2   | 1.10 |
| I do not know                                   | 5   | 2.70 |
| Top Dental Hygiene Tools                        |     |      |     |
| Mouthwash                                       | 1   | 0.50 | 0.0001 |
| Toothbrush and floss                            | 176 | 96.70 |
| Chewing gum                                     | 1   | 0.50 |
| I do not know                                   | 4   | 2.20 |
| The easiest way to clean between your teeth     |     |      | 0.0001 |
| Dental floss                                    | 109 | 55.90 |
| Toothpick                                       | 5   | 2.70 |
| Toothbrush                                     | 65  | 35.70 |
| I do not know                                   | 3   | 1.60 |
| The Best Times to Brush Your Teeth              |     |      | 0.0001 |
| Before bedtime                                  | 53  | 29.10 |
| After every meal                                | 125 | 68.70 |
| After breakfast                                 | 0   | 0.00 |
| I do not know                                   | 3   | 1.60 |
| Good time to change your tooth brush            |     |      | 0.0001 |
| 3-month                                         | 63  | 34.60 |
| 6-month                                         | 99  | 54.40 |
| 1-year                                         | 5   | 2.70 |
| I do not know                                   | 15  | 8.20 |
| Diabetes can lead to gum disease                |     |      | 0.0001 |
| Agree                                           | 116 | 63.70 |
| Disagree                                        | 1   | 0.50 |
| I do not know                                   | 65  | 35.70 |
| Oral hygiene can affect the diabetes.           |     |      | 0.0001 |
| Agree                                           | 76  | 41.80 |
| Disagree                                        | 7   | 3.80 |
| I do not know                                   | 98  | 53.80 |
| Fluoride toothpaste is effective in preventing tooth decay and maintaining Good Health | | |
| Agree                                           | 112 | 61.50 |
| Disagree                                        | 5   | 2.70 |
| I do not know                                   | 64  | 35.20 |

| Table 3: Frequency distribution of evaluation of attitude towards oral health among diabetic patients |
|--------------------------------------------------|
| Questions and answers                           | n   | %    | P   |
| I can protect my teeth from decaying            |     |      |     |
| Neither agree nor disagree                      | 24  | 13.20 | 0.0001 |
| Strongly disagree                               | 1   | 0.50 |
| Disagree                                       | 6   | 64.30 |
| Agree                                          | 117 | 18.70 |
| Strongly agree                                  | 34  |      |
| I Need to See a Dentist even if my teeth are healthy | | |
| Neither agree nor disagree                      | 24  | 13.20 | 0.0001 |
| Strongly disagree                               | 14  | 7.70 |
| Disagree                                       | 71  | 39.00 |
| Agree                                          | 58  | 31.90 |
| Strongly agree                                  | 15  | 8.20 |
| Tooth decay can lead to serious health problems | | |
| Neither agree nor disagree                      | 38  | 29.50 | 0.0001 |
| Strongly disagree                               | 1   | 0.50 |
| Disagree                                       | 1   | 0.50 |
| Agree                                          | 110 | 60.40 |
| Strongly agree                                  | 32  | 17.60 |
| Diabetes patients are at high risk for dental caries and bleeding gums | | |
| Neither agree nor disagree                      | 53  | 29.10 | 0.0001 |
| Strongly disagree                               | 0   | 0.00 |
| Disagree                                       | 4   | 2.20 |
| Agree                                          | 95  | 52.20 |
| Strongly agree                                  | 30  | 16.50 |
| Halitosis (bad breath) can be caused in diabetics patients | | |
| Neither agree nor disagree                      | 26  | 14.30 | 0.0001 |
| Strongly disagree                               | 0   | 0.00 |
| Disagree                                       | 3   | 1.60 |
| Agree                                          | 114 | 62.60 |
| Strongly agree                                  | 39  | 21.40 |
Inadequate education can lead to a higher prevalence of oral diseases among diabetics. The findings of the present study showed that the education level of parents has a significant effect on the KAP of diabetic patients in relation to oral health. Our results are in agreement with previous studies, including the research of Moghadam et al.[11] and Basri et al.[12] In contrast, MirzaeiAlavijeh et al.[13] and Allen et al.[14] in their study reported a better level of knowledge for diabetic patients about oral health. There is a lot of evidence that shows that educating diabetic patients has a significant effect on reducing the complications of diabetes. Differences in the results of different studies can be due to differences in age group, community culture and previous education of the subjects. The attitude level of more than 50% of diabetic patients studied in this research was moderate towards oral health. In contrast, Wang et al.[15] and Eldarrat[16] reported that the attitude of diabetic patients is poor towards oral health.

The practice level of a higher percentage of samples in the present study was moderate (52.7%) and low (33.5%), which is consistent with the results Basri et al.[12] and MirzaeiAlavijeh et al.[13]. The results of the correlation matrix between the variables in this study showed that knowledge has a positive and significant effect on attitude and practice as well as attitude has the same effect on practice. Ferrari et al.[17] stated that the attitude level of individuals improves with increasing their knowledge about diabetes. Contrary to the results of the present study, Alsous et al.[18] reported that the lack of relationship between knowledge and attitudes toward diabetes and its complications may be due to unscientific education.

### Conclusion

Findings show that the level of knowledge and practice of diabetic patients about oral health is insufficient, which may be due to insufficient information and education of patients in this regard. Therefore, due to the higher prevalence of oral diseases in diabetic patients than healthy individuals, it seems necessary to provide comprehensive educational programs related to oral health to diabetic patients by dental professionals.
Table 6: Knowledge, attitude and practice towards oral health according to demographic characteristics

| Variable                  | Knowledge |          |           | Attitude |          |           | Practice |          |
|---------------------------|-----------|----------|-----------|----------|----------|-----------|----------|----------|
|                           | n         | Mean ratings | P        | n         | Mean ratings | P        | n         | Mean ratings | P        |
| Gender                    |           |           |          |          |           |          |           |           |          |
| Male                      | 45        | 92.80     | 0.847    | 45        | 84.46     | 0.300    | 45        | 86.07     | 0.433    |
| Female                    | 137       | 91.70     |          | 137       | 93.81     |          | 137       | 93.28     |          |
| Addressing                |           |           |          |          |           |          |           |           |          |
| Rural                     | 71        | 50.83     | 0.0001   | 71        | 63.90     | 0.0001   | 71        | 54.81     | 0.0001   |
| Urban                     | 111       | 109.6     |          | 111       | 109.6     |          | 111       | 114.9     |          |
| Age range                 |           |           |          |          |           |          |           |           |          |
| 7-12                      | 16        | 43.63     | 0.0001   | 16        | 58.75     | 0.0001   | 16        | 49.28     | 0.0001   |
| 13-18                     | 74        | 69.22     |          | 74        | 77.09     |          | 74        | 28.63     |          |
| 19-25                     | 92        | 117.9     |          | 92        | 108.7     |          | 92        | 131.5     |          |
| Father's education level  |           |           |          |          |           |          |           |           |          |
| Less than high school     | 64        | 60.34     | 0.0001   | 64        | 70.10     | 0.0001   | 64        | 67.23     | 0.0001   |
| Diploma                   | 52        | 94.55     |          | 52        | 89.27     |          | 52        | 86.34     |          |
| College education         | 66        | 119.3     |          | 66        | 114.0     |          | 66        | 119.1     |          |
| Mother's education level  |           |           |          |          |           |          |           |           |          |
| Less than high school     | 83        | 65.35     | 0.0001   | 83        | 67.22     | 0.0001   | 83        | 70.24     | 0.0001   |
| Diploma                   | 47        | 101.4     |          | 47        | 103.3     |          | 47        | 104.2     |          |
| College education         | 52        | 127.0     |          | 52        | 122.3     |          | 52        | 116.5     |          |

Table 7: Pearson's correlation analysis of knowledge, attitude and practice related to oral health among diabetic patients

| Knowledge | Attitude | Practice |
|-----------|----------|----------|
| Knowledge | 1        | 0.604**  |
| Attitude  | 1        | 0.525**  |
| Practice  | 1        |          |

**Correlation is significant at 0.01 levels

Acknowledgements

The authors thank all the participants in the present study.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Mazhari F, Khordi Mood M, Esmaeili H, Tootooni H. Prevalence of periodontal diseases and oral health status, in children with type I diabetes in Khorasan, Iran in 2002. J Islam Dent Assoc Iran 2007;19:29-34.
2. World Health Organization (WHO). World Health Organization-Diabetes Country Profiles. Diakses 2016.
3. Rafatjou R, Razavi Z, Khalili M, Farhadian M. Oral health status in 5-18 years old children and adolescent with type 1 diabetes compared with healthy group in Hamadan, Iran 2013-2014. J Dent Med 2016;29:109-15.
4. Poudel P, Griffiths R, Wong VW, Arora A, Flack JR, Khoo CL, et al. Oral health knowledge, attitudes and care practices of people with diabetes: A systematic review. BMC Public Health 2018;18:577.
5. Naguib G, Al-Mashat H, Desta T, Graves DT. Diabetes prolongs the inflammatory response to a bacterial stimulus through cytokine dysregulation. J Invest Dermatol 2004;123:87-92.
6. Geetha S, Pramila M, Jain K, Suresh CM. Oral health status and knowledge among 10-15 years old type 1 diabetes mellitus children and adolescents in Bengaluru. Indian J Dent Res 2019;30:80-6.
7. Bowyer V, Sutcliffe P, Ireland R, Lindenmeyer A, Gadsby R, Graveney M, et al. Oral health awareness in adult patients with diabetes: A questionnaire study. Br Dent J 2011;211:E12.
8. Sadeghi R, Taleghani F, Farhadi S. Oral health related quality of life in diabetic patients. J Dent Res Dent Clin Dent Prospects 2014;8:230-4.
9. Bakhshandeh S, Murtomaa H, Vehkalathi MM, Mofid R, Suomalainen K. Oral self-care and use of dental services among adults with diabetes mellitus. Oral Health Prev Dent 2008;8:279-86.
10. Moghadam FA, Haerian A, Salimi MS, Hasan M, Karbasi A, Fakhri-Tabatabayi R, et al. Evaluation of knowledge, attitude and practice between periodontal disease and diabetes. J Community Health Res 2013;2:124-30.
11. Basri A, Motamed N, Mazinani N. Evaluation of knowledge, attitude and practice of diabetic patients about periodontal disease in Bushehr in 2013-16. Iran South Med J 2018;20:553-61.
12. Yavari MR, Morowatisharifabad MA, Haghi M, Rezaeipandari H, Hatamzadeh N, Azad E. Study of
knowledge, attitude, practice and oral health status among high school students in Yazd. TB 2016;14:261-75.

13. Mirzaei Alavijeh M, Jalilian F, Moghadam MB, Hatamzadeh N, Zinat Motlagh F, Dahaghin N. Knowledge, attitude and practice of elementary schools students about oral health in Yazd. Iran J Pediatr Dent 2013;9:43-50.

14. Khodakarami B, Masoumi Z, Oliyayi R, Oliyayi MH. The survey of knowledge, attitude and practice of students to oral and dental health in Allameh Helli(1) high school in Hamadan. Iran J Pediatr Dent 2015;11:15-22.

15. Eldarrat AH. Awareness and attitude of diabetic patients about their increased risk for oral diseases. Oral Health Prev Dent 2011;9:235-41.

16. Allen EM, Ziada HM, O’Halloran D, Clerhugh V, Allen PF. Attitudes, awareness and oral health-related quality of life in patients with diabetes. J Oral Rehabil 2008;35:218-23.

17. Wang CX, Ma LL, Yang Y, Ru MX, Wang X, Feng XP, et al. Oral health knowledge, attitudes, behaviour and oral health status of Chinese diabetic patients aged 55 to 74 years. Chin J Dent Res 2018;21:267-73.

18. Ferrari M, Dal Cin M, Steele M. Self-compassion is associated with optimum self-care behaviour, medical outcomes and psychological well-being in a cross-sectional sample of adults with diabetes. Diabet Med 2017;34:1546-53.

19. Alsous M, Jalil MA, Odeh M, Al Kurdi R, Alnan M. Public knowledge, attitudes and practices toward diabetes mellitus: A cross-sectional study from Jordan. PLoS One 2019;14:e0214479.