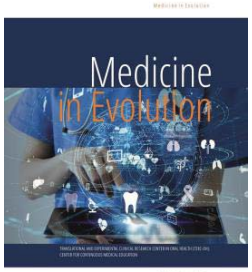
# Clinical study on the frequency of dental examinations and oral prophylaxis in patients diagnosed with type 2 diabetes mellitus and periodontal disease

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## Abstract

Data on diabetic patients' attitudes and behaviour toward oral hygiene procedures is limited. The purpose of this study is to compare the habits of diabetic and non-diabetic periodontitis patients in terms of dental health and prophylaxis, in order to promote public oral health education. A total of 94 patients from Bihor County participated in the study. Dental check-ups and oral prophylaxis are two aspects neglected by both diabetic patients with periodontal disease and non-diabetic patients with periodontitis. The findings of this clinical study could be used to develop public health policies aimed at screening and primary prevention of periodontal disease in diabetic patients, as well as raising awareness of the importance of dental examinations and the prevention and management of oral complications among patients suffering from diabetes.

**Keywords:** Prophilaxys, diabetes mellitus, periodontal disease

## INTRODUCTION

The oral cavity's health is now just as vital as one's overall health. However, there is a paucity of data on attitudes and behavior about oral hygiene measures in relation to overall health among dental patients [1]. The value people place on dental care practices and professional hygiene of the oral cavity is influenced by medical education, family skills and oral health behavior [2].

Improper oral hygiene practices encourage the development of different oral diseases [3]. Oral hygiene misconceptions can lead to dangerous practices, particularly in patients with chronic systemic diseases [4]. Diabetic patients are plagued by a slew of problems. Oral pathologies have a significant impact on diabetic patients standard of living [5].

However, knowledge of oral hygiene is often inadequate among diabetic patients. Hyperglycemia and dental disorders are on the rise in many populations, resulting in a decline in oral and general health-related quality of life [6, 7].

### *Aim and objectives*

The goal of this study is to assess diabetes versus non-diabetic periodontitis patients' attitudes and habits towards oral health and prophylaxis in order to improve public oral health education.

## MATERIAL AND METHODS

We conducted a case-control study. The clinical trial took place in Oradea, Bihor County. The study was launched after it was evaluated and approved by the Research Ethics Commission within the University of Oradea, Faculty of Medicine and Pharmacy, receiving the favorable opinion no. 3 from 29.06.2020.

The patients were randomly chosen from the general population who came to the dentist's office during the research. The project occured at CMI Dr. Potra Cicalău Georgiana Ioana, a private dental clinic in Oradea, for which I have the permission of the institution. Each patient was told of the research's goal, the methods of investigation used and the prospective advantages prior to being included in the research. In order to participate in the study, each patient gave his written consent.

Population group was split in two: study group - those who had been exposed to the risk factor - diabetes and control group - those who had not been exposed to the risk factor. Our investigation comprised a total of 94 patients. Study group consists of 41 patients with type 2 diabetes and periodontal disease and control group of 53 patients with periodontal disease but no diabetes.

Questionnaires were used to record the information gathered. The patient evaluation form was designed specifically for our investigation, based on national and international medical questionnaires and observation sheets [8, 9, 10].

The clinical research has several limitations because of the small sample size, which can be explained by the high rejection rate, caused by patients' disagreement with the filling out the "Informed Consent" or other documents in which personal data have been processed. The SPSS24 program was used for statistical analysis. The significance level of *p*-Value 0.05 has been chosen.

## RESULTS

The demographic data collected from the patients includes gender, age, geographic location and educational level. The gender distribution of patients in the two groups of analysis does not differ statistically significant (*p*-Value=0.203). The population is divided into 50% male and 50% female patients.

Table 1 shows how patients were classified into six groups based on their ages. Group IV had more than half of the patients. The average age of the patients in the research group is 61±9.7 years, whereas the average age of the control group is 43±15 years. The average age of the population is 51±16 years. From a statistical standpoint, the distribution of patients by age group in the two groups of patients differs significantly (*p*-Value=0).

Table 1. Population distribution by age

| Group | Age (years) |
|---|---|
| I | 22-30 |
| II | 31-40 |
| III | 41-50 |
| IV | 51-60 |
| V | 61-70 |
| VI | 71-80 |

There are no significant changes in patient distribution based on their origin environment (*p*-Value=1). Patients in the study group came from 65.8% of urban areas and 34.2%of rural areas, while patients in the control group came from 67.9% of urban areas and 32.01% of rural areas.

There are substantial disparities in educational levels between the two groups of patients (*p*-Value=0). The majority of patients in the study group have completed vocational school, while the majority of patients in the control group have completed higher education. Figure 1-4 depicts the features of the population group.

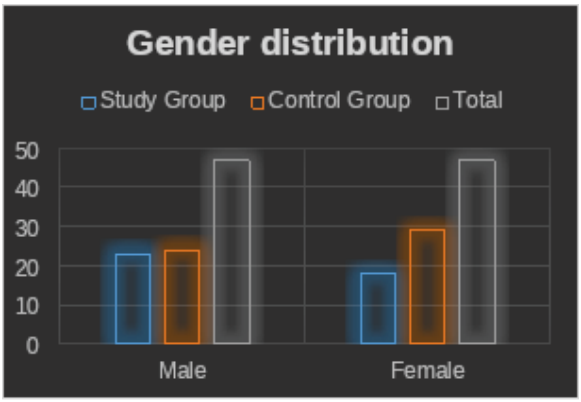


Figure 1. Gender distribution

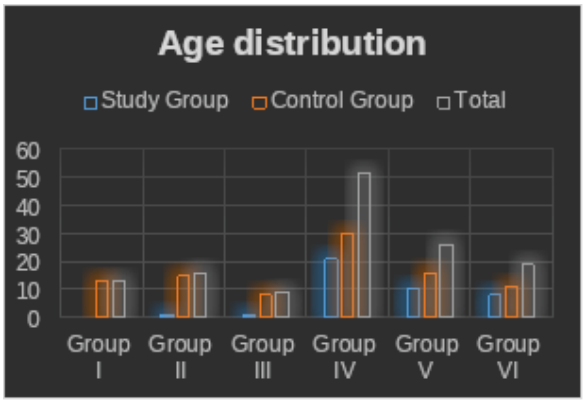


Figure 2. Age distribution

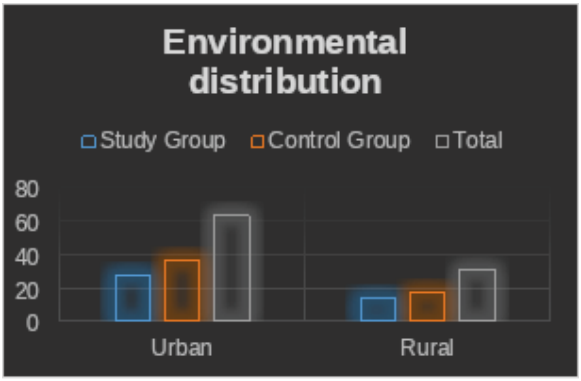


Figure 3. Environmental distribution

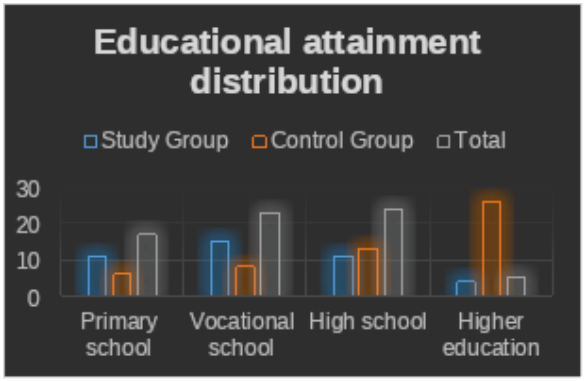


Figure 4. Educational attainment distribution

In the distribution of patients according to the frequency of dental examinations and the frequency of oral prophylaxis, there are significant differences (*p*-Value=0.006).

In the study group, 29.3% of patients reported dental examinations once a year and 70.7% never in the last year. No patient in the study group was consulted by the dentist twice a year. The frequency of dental follow-ups in the control group is 37.7% once a year, 17% twice a year and 45.3% never in the last year.

Oral prophylaxis among patients in the study group had a frequency of 9.8% once a year and 90.2% never in the last year. In the control group, the majority (62.3%) of the patients did not benefit from oral prophylaxis services in the last year. Only 9.4% of the patients in the control group requested oral prophylaxis twice a year, while in the control group the professional hygiene of the oral cavity was not requested by any patient. Figure 5-6 ilustrates the frequency of dental examinations and oral prophylaxis of the participants enrolled in our study.

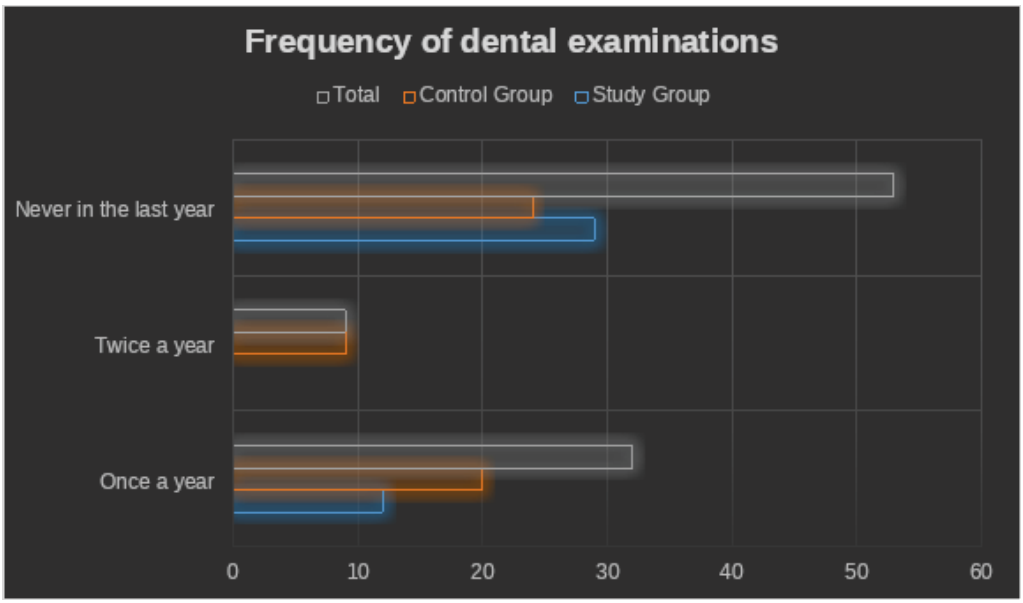


Figure 5. Frequency of dental examinations

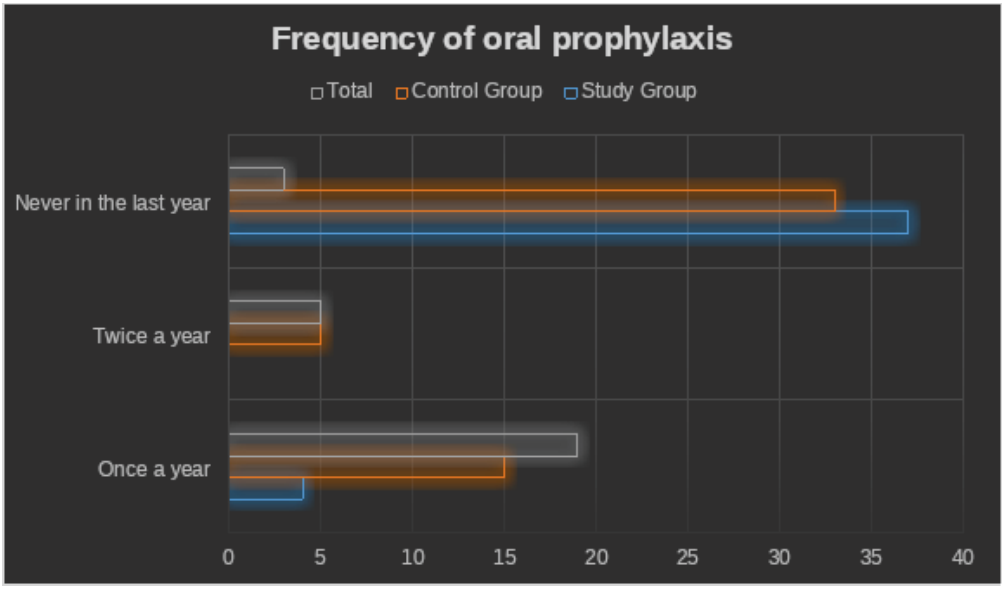


Figure 6. Frequency of oral prophylaxis

## DISCUSSIONS

According to statistical analysis of the demographic characteristics of the patients, the study group has predominantly male patients, whereas the control group contains mostly female patients. Older men have a higher prevalence of type 2 diabetes than women, due to the fact that men have greater visceral fat than women [11]. Males are being diagnosed with diabetes at an increasing rate, on the report of IDF. In 2013, there were 14 million times more diabetic men than women [12]. Regarding periodontal disease, Jain et al. said that the combined effect of gender-specific genetic architecture and circulating levels of sex steroid hormones may explain the variation in the risk of chronic periodontitis, but in their study men were more susceptible than women [13]. Men have a higher prevalence of periodontal disease, as stated by other studies [14]. Ioannidou et al. investigated the role of gender in chronic periodontitis and found that it is more common in males than in women, implying that gender plays a role in periodontal disease development. This can be explained by the fact that most traditional periodontal disease investigations have been undertaken as one-of-a-kind studies that have only focused on men [15]. As a result, Kautzky-Willer et al. believe that modern tailored treatment must account for biological variations between men and women, such as genetic predisposition and sex hormones, as well as behavioral and environmental differences [16].

Patients in both groups were mostly in their 50s and 60s. On the authority of IDF, type 2 diabetes affects almost 400 million people globally between the ages of 20 and 70. This value is predicted to increase to 592 million by 2035 [17]. Furthermore, diabetes claimed the lives of nearly 4.2 million persons aged 20 to 99 in 2019 [18]. In the opinion of Han et al. aging increases the risk of periodontal disease in diabetic patients [19]. The begining of type 2 diabetes was once thought to occur between the ages of 40 and 50, but cases are now being found in younger age groups, as indicated by our study [20, 21]. Reynolds et. al considered that chronic inflammation is a key component of prevalent age-related disorders such as periodontal disease and diabetes [22]. Kassebaum et al. showed a dramatic increase in the prevalence of severe periodontitis, between the third and fourth decades of life [23].

In terms of the origin environment, we discovered that the urban environment predominated in both groups. Other researchers achieved the same results [24, 25]. On the

other hand, children in rural settings are more likely to develop periodontal disease than children in urban areas, as claimed by Rao et al. [26]. At the same time, Agarwal et al. said that periodontal disease is more common in rural areas due to a lack of a structured dental care system [27]. The study's prevalence of the urban environment can be explained by the fact that the research was conducted in an urban dentistry office.

The majority of patients with type 2 diabetes and periodontal disease have professional training, whereas those in the control group are college graduates, according to our data. Low educational attainment is linked to poor health. It has been documented in some studies that low educational status is associated with a negative effect on glycemic control [28]. Patients with a high school diploma had a higher risk of diabetes than those with at least a bachelor's degree [29]. Roy et al. and Al-Rasheedi et. al found that there is a strong association between lifestyle and education with periodontal health [30, 31].

Diabetic patients ignore dental check-ups more than non-diabetic patients in the control group, as evidenced by the low frequency of visits to the dentist in the previous year. These findings are in line with research reported in the Journal of the American Dental Association, which indicated a general drop in dental visits among people with and without diabetes. Adults with diabetes are less likely than those with prediabetes or no diabetes to go to the dentist [32], despite the American Dental Associations' recommendations for at least once-a-year visits to the dentist for routine examinations and professional hygiene [33]. In another study, Simon et al. found that the average interval between visits to the dentist for diabetes patients was over a year [34]. Commercials advise visiting the dentist twice a year or more frequently [35].

Even worse, 90% of diabetics have never obtained oral prophylaxis services in the previous year, indicating that oral prophylaxis is unknown among them. According to Yuen et al., dental hygienists do not commonly educate patients on oral health and diabetes-related healthy lifestyles [36]. According to Oyapero et al., dental prophylaxis and oral care education can improve the wellbeing of individuals with diabetes [37]. Similarly, Willershausen et al. believe that professional dental hygiene should be performed every 3 to 6 months to reduce the incidence of periodontal disease [38].

Periodontal disease and diabetes mellitus are two diseases with a global distribution and a common trait of chronic inflammation [39]. Oral disease and periodontitis can be prevented by proper mouth cleaning, regular teeth brushing and dental flossing [40]. Periodontal disease management may help with glycemic control [41].

## CONCLUSIONS

1. Male patients (56%) have an increased prevalence of diabetes and periodontal disease, while female patients have a greater prevalence of periodontal disease (56%).
2. Patients with diabetes and periodontal disease are on average 61.19 years old, while those without diabetes are 43.45 years old.
3. Patients with diabetes and periodontitis account for 65.8% of the total, whereas patients with periodontal disease account for 67.9% of the total.
4. Diabetics with periodontitis have as educational level, vocational school in 36.6% of cases, while patients with periodontal disease without diabetes, have a higher level of education (49.05%).
5. In the previous year, 70.7% of patients with diabetes and periodontal disease and 45.3% of patients with periodontitis did not visit the dentist.
6. Of the patients with type 2 diabetes and periodontal disease, 90.2% had not received oral prophylaxis in the previous year, nor 62.3% of patients with periodontal disease.

The findings of this clinical study could be used to develop public health policies aimed at screening and primary prevention of periodontal disease in diabetic patients, as well as raising awareness of the importance of dental check-ups and the prevention and management of oral complications among diabetics.

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**REFERENCES**

1. AlYousef Y, Damiano P, Weber-Gasparoni K, Qian F, Murph J, Nothwehr F. Medical students' child oral-health-related knowledge, practices and attitudes. Eur J Dent Educ. 2013; 17(4): 218-24.
2. Woelber J, Bienas H, Fabry G, Silbernagel W, Giesler M, Tennert C, Stampf S, Ratka-Kr€uger P, Hellwig E. Oral hygiene-related self-efficacy as a predictor of oral hygiene behaviour: a prospective cohort study. J Clin Periodontol. 2015; 42(2):142-9.
3. Slaughter A, Evans L. Culturally sensitive oral health educational materials for older African Americans. J Health Care Poor Underserved. 2007; 18(4): 868-86.
4. Yuen H, Wiegand R, Slate E, Magruder K, Salinas C, London S. Dental health knowledge in a group of Black adolescents living in rural South Carolina. J Allied Health 2008; 37(1):15-21.
5. Davis TME, Bruce DG, Curtis BH, Barraclough H, Davis WA. The relationship between intensification of blood glucose-lowering therapies, health status and quality of life in type 2 diabetes: the Fremantle Diabetes Study Phase II. Diabetes Res Clin Pract. 2018; 142: 294-302.
6. Shanmukappa SM, Nadig P, Puttannavar R, Ambareen Z, Gowda TM, Mehta DS. Knowledge, attitude, and awareness among diabetic patients in davangere about the association between diabetes and periodontal disease. J Int Soc Prev Community Dent. 2017; 7(6): 381-388.
7. Poudel P, Griffiths R, Wong VW, et al. Perceptions and practices of diabetes educators in providing oral health care: a Qualitative Study. Diabetes Educ. 2018; 44(5): 454-464.
8. Dumitriu HT, Dumitriu S, Dumitriu AS. In: Parodontologie, Vth Edition. Bucuresti: Viaţa Medicală Românească, 2009. pp. 39-500.
9. Shantipriya R. In: Manual of Clinical Periodontics, First Edition. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd, 2011. pp. 1-56.
10. Periodontal Chart. Available from: https://www.periodontalchart-online.com/uk/.
11. Nordström A, Hadrévi J, Olsson T, Franks PW, Nordström P. Higher Prevalence of Type 2 Diabetes in Men Than in Women Is Associated With Differences in Visceral Fat Mass. J Clin Endocrinol Metab. 2016; 101(10): 3740-3746.
12. International Diabetes Federation. IDF Diabetes Atlas. 6th ed Brussels, Belgium: International Diabetes Federation; 2013.
13. Kautzky-Willer A, Harreiter J, Pacini G. Sex and Gender Differences in Risk, Pathophysiology and Complications of Type 2 Diabetes Mellitus. Endocr Rev. 2016; 37(3): 278-316.
14. Jain A, Bhavsar NV, Baweja A, Bhagat A, Ohri A, Grover V. Gender-Associated Oral and Periodontal Health Based on Retrospective Panoramic Radiographic Analysis of Alveolar Bone Loss. In: Moolla A, editor. Clinical Concepts and Practical Management Techniques in Dentistry. London: IntechOpen; 2020.
15. Ioannidou E. The Sex and Gender Intersection in Chronic Periodontitis. Front Public Health. 2017; 5: 189.
16. Shiau HJ, Reynolds MA. Sex differences in destructive periodontal disease: exploring the biologic basis. J Periodontol. 2010; 81(11): 1505-17.
17. International Diabetes Federation. IDF Diabetes Atlas 6th Edition. IDF [online], http://www.idf.org/sites/default/files/EN_6E_Atlas_Full_0.pdf (2013).

18. International Diabetes Federation. IDF Diabetes Atlas. 9th ed. Brussels, Belgium: International Diabetes Federation; 2019.
19. Han K, Park J-B. Clinical implications of age and sex in the prevalence of periodontitis in Korean adults with diabetes. Exp Ther Med. 2018; 15 (4): 3865-3873.
20. Casanova, L, Hughes F, Preshaw P. Diabetes and periodontal disease. BDJ Team. 2015; 15007.
21. Reynolds MA. Modifiable risk factors in periodontitis: at the intersection of aging and disease. Periodontol 2000. 2014; 64(1): 7-19.
22. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. J Dent Res. 2014; 93(11): 1045-53.
23. Mordarska K, Godziejewska-Zawada M. Diabetes in the elderly. Prz Menopauzalny. 2017; 16(2): 38-43.
24. Aung WP, Htet AS, Bjertness E, Stigum H, Chongsuvivatwong V, Kjøllesdal MKR. Urban-rural differences in the prevalence of diabetes mellitus among 25-74 year-old adults of the Yangon Region, Myanmar: two cross-sectional studies. BMJ Open. 2018; 8(3): e020406.
25. Zaoui S, Biémont C, Meguenni K. Approche épidémiologique du diabète en milieux urbain et rural dans la région de Tlemcen (Ouest algérien). Sante. 2007; 17(1): 15-21.
26. Rao SP, Bharambe MS. Dental caries and periodontal diseases among urban, rural and tribal school children. Indian Pediatr. 1993; 30(6): 759-64.
27. Ramoji Rao MV, Katari PK, Vegi L, Bypureddy TT, Prabhakara Rao KS, Tejaswi KS. Prevalence of periodontal diseases among rural population of Mustabad, Krishna District. J Int Soc Prev Community Dent. 2016; 6(Suppl 1): S59-63.
28. Boillot A, El Halabi B, Batty GD, Rangé H, Czernichow S, Bouchard P. Education as a predictor of chronic periodontitis: a systematic review with meta-analysis population-based studies. PLoS One. 2011; 6(7): e21508.
29. Santanu SR, Debasis M, Aakansha M, Dibyendu KK, Abhijit C, Debarshi J. Association between Education level and lifestyle on periodontal health status in adults (35-44 years) - A cross sectional study. Int. J. Sci. Res. 2019; 8(8): 24-28.
30. Borrell LN, Dallo FJ, White K. Education and diabetes in a racially and ethnically diverse population. Am J Public Health. 2006; 96(9): 1637-42.
31. Al-Rasheedi AA. The Role of Educational Level in Glycemic Control among Patients with Type II Diabetes Mellitus. Int J Health Sci (Qassim). 2014; 8(2): 177-87.
32. People with Diabetes Visit the Dentist Less Frequently, Despite Link Between Diabetes and Oral Health Complications. Available from: https://www.nyu.edu/about/news-publications/news/2018/april/people-with-diabetes-visit-the-dentist-less-frequently--despite-.html.
33. Simon LE, Karhade DS, Tobey ML. Oral Health Status of Hospitalized Patients With Type 2 Diabetes. Diabetes Spectr. 2020; 33(1): 58-65.
34. American Dental Association (ADA). Questions About Going to the Dentist. Available from: https://www.mouthhealthy.org/en/dental-care-concerns/questions-about-going-to-the-dentist.
35. Colgate Oral and Dental Health Resource Center. How often should you go to the dentist? Available from: https://www.colgate.com/en-my/oral-health/dental-visits/dental-visits-the-dentist-visit-and-what-to-expect.
36. Yuen HK, Mountford WK, Magruder KM, Bandyopadhyay D, Hudson PL, Summerlin LM, Salinas CF. Adequacy of oral health information for patients with diabetes. J Public Health Dent. 2009; 69(2): 135-41.
37. Oyapero A, Adeniyi AA, Sofola O, Ogbera A. Impact of Oral Health Education and Oral Prophylaxis on Quality of life of Controlled Diabetic Patients in Lasuth. J. oral hyg. Health. 2015; 3: 181.
38. Willershausen B, Kasaj A. Mundhygiene, Prophylaxe und Therapie bei entzündlich-rheumatischen Erkrankungen. Z Rheumatol. 2010; 69(2): 117-23.
39. Cicalău GIP, Babes PA, Calniceanu H, Popa A, Ciavoi G, Iova GM, Ganea M, Scrobotă I. Anti-Inflammatory and Antioxidant Properties of Carvacrol and Magnolol, in Periodontal Disease and Diabetes Mellitus. Molecules. 2021; 26(22): 6899.

40. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. Int J Health Sci (Qassim). 2017; 11(2): 72-80.
41. Potra Cicalău GI, Babeş PA, Domocoş D, Pogan M. The assessment of two-way relationship between periodontal diseases and diabetes mellitus. Acta Stomatologica Marisiensis. 2021; 4(1).