Research Article

Medical Conditions, Oral Health Practices, and Barriers to Treatment among Patients Visiting a Teaching Dental Hospital in Eastern Saudi Arabia

Faisal A Alonaizan,1 Khalid Almas,2 Muhammad Ashraf Nazir,2 Dalal Almazrou,2 Manar Alzamil,2 and Mohammed A. AlOlyani3

1Department of Restorative Dental Sciences, College of Dentistry, Imam Abdulrahman Bin Faisal University, Dammam 31441, P. O. Box 1982, Saudi Arabia
2Department of Preventive Dental Sciences, College of Dentistry, Imam Abdulrahman Bin Faisal University, Dammam 31441, P. O. Box 1982, Saudi Arabia
3Clinical Affairs Department, College of Dentistry and Dental Hospital Imam Abdulrahman Bin Faisal University, Dammam 31441, P. O. Box 1982, Saudi Arabia

Correspondence should be addressed to Muhammad Ashraf Nazir; manazir@iau.edu.sa

Received 15 July 2021; Accepted 19 January 2022; Published 4 February 2022

Objective. To assess the prevalence of medical conditions, oral hygiene practices, and dental visits among patients who attended a teaching dental hospital in Dammam, Saudi Arabia.

Materials & Methods. This retrospective cross-sectional study used patient records from 2009 to 2015 from the dental hospital of the College of Dentistry Imam Abdulrahman Bin Faisal University, Dammam. Patients’ demographics, medical history, oral hygiene practices, reasons for attending the facility, attendance patterns, and smoking habits were studied. Results. The study included 1502 records of patients with 65.1% of males and 34.9% of females. The prevalence of medical conditions was 25.7% in the study. The most common medical conditions included diabetes mellitus (7.2%), hypertension (6.5%), and anemia (4.7%). Only 21.8% reported visiting the dental hospital in the past one year. The prevalence of smoking was 16.7%, and this did not differ significantly between healthy and medically compromised patients (P = 0.165). Fillings were the most common (21.6%) reason for visiting a dental hospital, followed by treatment for periodontal problems (12.9%) and oral lesions (12.6%), whereas treatment for braces (orthodontics) was the least common (5%) reason for visiting the hospital. The reasons for visiting the hospital did not differ significantly between healthy and medically compromised patients (P > 0.05). The three most common barriers to dental visits included long waiting time (18.1%), fear of dental treatment (14.4%), and difficulty in getting an appointment (11.3%). Conclusion. The study showed that dental patients had a high prevalence of medical conditions. Diabetes mellitus was the most prevalent problem. Most patients visited the dental hospital to receive restorative treatment, and a long waiting time was the most common barrier to dental visits. Public health measures should be taken to improve the general health and oral care of patients.

1. Introduction

Dental professionals are confronted with the challenge of treating an increasingly large number of medically compromised patients in their dental practices [1]. Chronic systemic conditions in these patients may hinder the provision of quality dental care and may lead to adverse consequences including medical emergencies [2]. For instance, a patient with a prosthetic heart valve may develop bacterial endocarditis if antibiotic prophylaxis is not prescribed and adequate oral hygiene is not maintained [3]. Proper recording of medical history is important for the effective management of patients because medical conditions in many patients who are present for dental treatments
may be ignored by dental professionals because they may look healthy [4]. Moreover, a strong relationship between systemic conditions and oral diseases that is consistently reported in the literature underscores the need for increased awareness about medically compromised patients [5–8].

Evidence from previous studies shows a high prevalence of medical problems among patients visiting dental care facilities in different parts of the world [4, 9–11]. Al-Bayaty et al. reported medical conditions in 42% of the patients who attended the emergency clinic of a dental school in the West Indies [9]. Similar prevalence estimates (38%) were reported by Aggarwal et al. in a study of dental patients in a teaching dental institute in India [4]. A recent study by Frydrych et al. identified medical problems in 86% of dental patients in Australia, and the most common medical problems included cardiovascular disease, allergy, and mental disorders [11]. On the other hand, Oyetola et al. reported the occurrence of medical conditions in 11.7% of patients in Nigeria [10]. In Saudi Arabia, two studies evaluated the prevalence of medical conditions among patients attending periodontal clinics in teaching dental hospitals in the Riyadh and Asir regions [12, 13]. Almas and Awartani indicated that 10% of patients had medical conditions in the Riyadh region [12], whereas Javali et al. reported medical conditions in 40.2% of patients in the Asir region [13].

Certain dental procedures are contraindicated in some medically compromised patients, and some medical conditions require the use of medication or special arrangements prior to the provision of dental care [7, 14]. Therefore, dental students, dental practitioners, and dental staff are required to have adequate knowledge about chronic systemic conditions, proper management of medically compromised patients, and their referral to physicians [8, 15]. It is also important that dental professionals should be aware of the oral hygiene behaviors and tobacco consumption practices of their patients so they can play an important role in the prevention of oral diseases and promotion of optimal oral health. They should also raise awareness about the positive oral health outcomes associated with routine dental visits among their patients. However, there is a lack of data concerning the medically compromised patients in the Eastern Province of Saudi Arabia. In addition, there was a need to investigate the frequency of dental attendance and dental treatment reasons for visiting the dental hospital [12, 13, 16]. Therefore, the study aimed to assess the prevalence of medical conditions, oral hygiene practices, and dental visits among patients who attended a teaching dental hospital in Dammam, Saudi Arabia.

2. Materials and Methods

2.1. Study Design and Subjects. This retrospective cross-sectional study included records of male and female patients attending the dental hospital of the College of Dentistry at the Imam Abdulrahman Bin Faisal University (IAU), Dammam, Saudi Arabia. Patient records from the years 2009 to 2015 were reviewed for demographic information, medical history, oral hygiene practices, dental visit behaviors, and smoking habits. A sample size of 1611 records was calculated using a 95% confidence interval, 2% margin of error, 30% response distribution, and approximate population size (≈8,000). A convenience sample of patient records was used for the present study. Patient records were excluded from the study if there was inaccurate or incomplete information about study variables. In addition, the records of children and adolescents (≤ age of 18 years) were excluded from the study.

2.2. Measurement of Study Variables. Two researchers (DA and MA) involved in the recording of data went through training and calibration. These calibrated examiners then reviewed selected patient charts and recorded data in a structured chart that included demographic information (age and gender), reasons for visiting the dental hospital, medical conditions, patterns of dental visits, smoking, and oral hygiene practices. Gum problems (periodontal disease), fillings, braces, oral surgery, crowns and bridges, root canal treatment, dentures, and oral lesions were recorded as the reasons for attending a dental hospital. Medical history included information about cardiac disease, hypertension, diabetes, anemia, renal disease, liver disease, asthma, gastric disease, allergy to medication, and sickle cell disease. The frequency of visiting the dental hospital and barriers to dental attendance were recorded under patterns of dental visits. Oral hygiene practices included the use of toothbrush and floss and smoking habits.

2.3. Ethical Considerations. The hospital administrator authorized the collection, analysis, and publication of data from patients’ records. Patient charts and patient names were coded to protect confidentiality and privacy. The study was conducted in accordance with the guidelines of the Declaration of Helsinki. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement was used for the reporting of the study [17].

2.4. Statistical Analysis. Data from 1502 patients’ records were entered into Microsoft Excel (2010) and analyzed using the Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, version 22.0. Armonk, NY: IBM Corp). Descriptive data were presented in the form of frequencies,
proportions, means, and standard deviations. The chi-square test was performed to compare medical conditions between male and female participants. Similarly, oral hygiene behaviors and reasons for dental visits were compared between healthy and medically compromised participants using chi-square tests. Statistical significance was set at $P$ value $<0.05$.

### 3. Results

The study included charts of 978 male (65.1%) and 524 female (34.9%) patients. Half the sample (48.6%) was below 30 years of age, and medical conditions were recorded in 25.7% of patients (Table 1).

Diabetes ($N = 108$, 7.2%), hypertension ($N = 98$, 6.5%), and anemia ($N = 70$, 4.7%) were the most commonly reported conditions. The least commonly reported conditions included hepatitis ($N = 13$, 0.90%), renal disease ($N = 15$, 1%), and sickle cell disease ($N = 18$, 1.20%) (Figure 1).

The three most commonly distributed medical conditions were compared between male and female patients and are presented in Table 2. It was found that a significantly greater proportion of males than females had diabetes ($P = 0.047$) and hypertension ($P = 0.031$).

Table 2: Comparison of medical conditions between male and female patients ($N = 1502$).

| Medical condition | Male $N$ (%) | Female $N$ (%) | $P$ value |
|-------------------|-------------|---------------|-----------|
| Diabetes Yes      | 80 (74.1)   | 28 (25.9)     | 0.047*    |
| No                | 893 (64.1)  | 501 (35.9)    |           |
| Hypertension Yes  | 54 (55.1)   | 44 (44.9)     | 0.031*    |
| No                | 924 (65.8)  | 480 (34.2)    |           |
| Anemia Yes        | 38 (54.3)   | 32 (45.7)     | 0.052     |
| No                | 940 (65.6)  | 492 (34.4)    |           |

*Statistically significant.

Toothbrushing was observed in 67.5% and dental flossing in 12.4% of the sample. No statistically significant differences were observed between healthy and medically compromised patients with regards to toothbrushing ($P = 0.091$) and flossing ($P = 0.714$). There were 16.7% of smokers in the study, and smoking did not differ significantly between healthy and medically compromised patients ($P = 0.165$) (Table 3).

The patients reported visiting the dental hospital within 0–6 months (11.1%), 7–12 months (10.7%), and after 12 months (49.5%). About one quarter (28.8%) of the sample had never visited the hospital before. No statistically significant differences were observed between healthy and medically compromised patients with regard to the frequency of visiting the dental hospital ($P = 0.758$) (Table 4).

Fillings (tooth restorations) were the most common reason (21.6%) for visiting the dental hospital, followed by periodontal problems (12.9%) and oral lesions (12.6%). Braces (orthodontics) were the least common reason for visiting the hospital (5%). The reasons for visiting the hospital did not differ significantly between healthy and medically compromised patients ($P>0.05$) (Table 5).

The three most common barriers to dental visits to the hospital included long waiting time (18.1%), fear of dental treatment (14.4%), and difficulty in getting an appointment (11.3%). Length of the treatment was the least commonly reported (5.3%) barrier to visiting the dental hospital (Figure 2).

### 4. Discussion

The present study evaluated the distribution of medical problems among patients visiting a teaching dental hospital in the eastern part of Saudi Arabia. The study showed that 25.7% of the patients had medical conditions. In contrast, a recent study by Javalie et al. [13] reported a higher prevalence of medical conditions (40.2%) in patients who visited a teaching dental hospital for periodontal treatment in the Asir region (southwest) of the country [13]. On the other hand, Almas and Awartani (2003) reported the distribution of systemic diseases in 10% of the patient population after analyzing patient records from periodontal clinics at the College of Dentistry, King Saud University, Riyadh, Saudi Arabia [12]. The exponential increase in diabetes mellitus and its complications over the last decades may account for a higher prevalence of medical conditions in the present study compared with the estimates by Almas and Awartani in 2003 [12, 18, 19]. International literature indicates variations in the prevalence estimates of medical conditions in dental patients in different countries [4, 7–9, 16–18]. The prevalence of medical conditions in dental patients was 11.7% in Nigeria [10], 12.2% in Thailand [20], 27.7% in Ireland [21], 38% in India [4], 42% in West Indies [9], 52.5% in the U.S. [22], and 86% in Australia [11].

Diabetes and hypertension were the most common conditions in the present study. These findings are in accordance with the results of previous similar studies from Saudi Arabia [12, 13]. The analysis of data from the World Health Organization and the International Diabetes
Federation revealed that Saudi Arabia had the highest prevalence of diabetes (14.4% and 20%, respectively) among high-income countries [23, 24]. Sø he literature also reports the existence of diabetes in 7 million and prediabetes in 3 million people in Saudi Arabia [19]. Hypertension and dyslipidemia among diabetic patients are the most common risk factors for cardiovascular diseases, and 70–75% of patients with coronary artery disease also have diabetes or abnormal glucose levels [25]. Sø he studies from India and the West Indies also showed that diabetes and hypertension were the most prevalent conditions among dental patients [4, 9]. On the other hand, gastrointestinal disease and bleeding tendencies were common conditions among dental patients in Jordan [16]. The most common medical conditions in patients attending dental clinics in Western Australia included cardiovascular disease, allergies, and mental disorders [11]. Similarly, drug allergies and cardiovascular disease were the most frequently reported in patients in the U.S. [22]. The pattern of medical conditions identified in the present study can help dental professionals

| Frequency of dental visits | Total N (%) | Healthy N (%) | Medically compromised N (%) | P value |
|---------------------------|-------------|---------------|-----------------------------|---------|
| Toothbrushing             |             |               |                             |         |
| Yes                       | 1014 (67.5) | 740 (73)      | 274 (27)                    | 0.091   |
| No                        | 488 (32.5)  | 376 (77)      | 112 (23)                    |         |
| Dental flossing           |             |               |                             |         |
| Yes                       | 186 (12.4)  | 138 (75.4)    | 45 (24.6)                   | 0.714   |
| No                        | 1316 (87.6) | 975 (74.1)    | 341 (25.9)                  |         |
| Smoking                   |             |               |                             |         |
| Yes                       | 251 (16.7)  | 193 (77.8)    | 55 (22.2)                   | 0.165   |
| No                        | 1251 (83.3) | 921 (73.6)    | 330 (26.4)                  |         |

| Frequency of dental visits | Total N (%) | Healthy N (%) | Medically compromised N (%) | P value |
|---------------------------|-------------|---------------|-----------------------------|---------|
| 0–6 months                | 118 (11.1)  | 84 (71.2)     | 34 (28.8)                   |         |
| 7–12 months               | 114 (10.7)  | 87 (76.3)     | 27 (23.7)                   | 0.758   |
| More than 12 months       | 528 (49.5)  | 393 (74.4)    | 135 (25.6)                  |         |
| Never visited before      | 307 (28.8)  | 233 (75.9)    | 74 (24.1)                   |         |

| Frequency of dental visits | Total N (%) | Healthy N (%) | Medically compromised N (%) | P value |
|---------------------------|-------------|---------------|-----------------------------|---------|
| Periodontal problems      |             |               |                             |         |
| Yes                       | 194 (12.9)  | 149 (76.8)    | 45 (23.2)                   | 0.393   |
| No                        | 1308 (87.1) | 967 (73.9)    | 341 (26.1)                  |         |
| Fillings (tooth restorations) |         |               |                             |         |
| Yes                       | 325 (21.6)  | 240 (73.8)    | 85 (26.2)                   | 0.832   |
| No                        | 1177 (78.4) | 876 (74.4)    | 301 (25.6)                  |         |
| Braces (orthodontics)     |             |               |                             |         |
| Yes                       | 75 (5)      | 53 (70.7)     | 22 (29.3)                   | 0.460   |
| No                        | 1427 (95)   | 1063 (74.5)   | 364 (25.5)                  |         |
| Oral surgery              |             |               |                             |         |
| Yes                       | 130 (8.7)   | 92 (70.8)     | 38 (29.2)                   | 0.335   |
| No                        | 1372 (91.3) | 1024 (74.6)   | 348 (25.4)                  |         |
| Crowns and bridges        |             |               |                             |         |
| Yes                       | 102 (6.8)   | 69 (67.6)     | 33 (32.4)                   | 0.111   |
| No                        | 1400 (93.2) | 1047 (74.8)   | 353 (25.2)                  |         |
| Root canal treatment      |             |               |                             |         |
| Yes                       | 133 (8.9)   | 101 (75.9)    | 32 (24.1)                   | 0.651   |
| No                        | 1369 (91.1) | 1015 (74.1)   | 354 (25.9)                  |         |
| Dentures                  |             |               |                             |         |
| Yes                       | 94 (6.3)    | 73 (77.7)     | 21 (22.3)                   | 0.441   |
| No                        | 1408 (93.7) | 1043 (74.1)   | 365 (25.9)                  |         |
| Oral lesions              |             |               |                             |         |
| Yes                       | 189 (12.6)  | 133 (70.4)    | 56 (29.6)                   | 0.186   |
| No                        | 1313 (87.4) | 983 (74.9)    | 330 (25.1)                  |         |

Federation revealed that Saudi Arabia had the highest prevalence of diabetes (14.4% and 20%, respectively) among high-income countries [23, 24]. The literature also reports the existence of diabetes in 7 million and prediabetes in 3 million people in Saudi Arabia [19]. Hypertension and dyslipidemia among diabetic patients are the most common risk factors for cardiovascular diseases, and 70–75% of patients with coronary artery disease also have diabetes or abnormal glucose levels [25]. The studies from India and the West Indies also showed that diabetes and hypertension were the most prevalent conditions among dental patients [4, 9]. On the other hand, gastrointestinal disease and bleeding tendencies were common conditions among dental patients in Jordan [16]. The most common medical conditions in patients attending dental clinics in Western Australia included cardiovascular disease, allergies, and mental disorders [11]. Similarly, drug allergies and cardiovascular disease were the most frequently reported in patients in the U.S. [22]. The pattern of medical conditions identified in the present study can help dental professionals
better manage patients with medical problems to avoid medical emergencies and other adverse outcomes in dental practice in the Eastern Province of Saudi Arabia. It is known that the patients with medical conditions are more likely to experience medical emergencies [26]. It was also reported that 35% of the patients who suffered medical emergencies in dental settings had underlying systemic diseases [27].

Oral lesions are common, and they range from ulcerations, infections, hyperpigmentation, and benign to malignant neoplasms [28]. This is depicted in the present study where 12.6% of participants reported visiting the dental hospital because of oral lesions. The literature indicates that systemic diseases are associated with oral lesions [29, 30]. For instance, oral ulceration may be a sign of underlying systemic conditions [30]. Likewise, certain chronic conditions such as dyslipidemia and asthma are independently associated with oral leukoplakia [29]. Given the challenges of diagnosing and treating oral lesions due to remarkable similarities in their clinical appearance, it is crucial for clinicians to have a clear understanding of the distribution and clinical presentations of oral lesions for the provision of quality oral care.

The present study showed that most patients visited the dental hospital for fillings (tooth restorations) and treatment for periodontal problems. The high occurrence of caries and periodontal disease in Saudi Arabia may account for a greater need for restorative treatment for untreated caries and periodontal therapy in our sample of the patients. In Saudi Arabia, a high prevalence of dental caries has been observed in adult populations with estimates ranging from 68.5% to 98% [31]. Similarly, poor periodontal health is also a significant oral health problem among adults in the country. A recent review reported a lack of periodontal health in 50% of the adult population in Saudi Arabia and showed a strong association with diabetes and tobacco use [32]. In addition, the existence of a strong bidirectional relationship between periodontal disease and diabetes can further worsen oral and systemic health [33].

Dental services utilization behaviors are known to affect oral health, and routine dental visits are associated with lower caries experience, tooth loss, dental pain, and improved oral health-related quality of life [34, 35]. A previous study reported that only 9.6% of participants attended dental office within six months in the Eastern Province of Saudi Arabia [36]. Similar trends of low dental attendance were observed in the present study where only 11.1% visited the hospital within 6 months and 28.8% had never visited the dental hospital before. The study did not find significant differences in dental visiting patterns between medically compromised and healthy patients. Given the importance of routine dental visits for positive oral health outcomes and the high prevalence of medical conditions in dental patients, the patterns of dental attendance should be investigated in medically compromised patients in large multicenter studies in the future.

Oral health depends upon the interaction of factors related to individuals' perceptions, attitudes, and behavior [37]. Appropriate oral hygiene is required for the prevention of oral diseases and the maintenance of optimal oral health. Poor oral hygiene practices were observed in our sample where one-third of patients did not use toothbrush and only a small proportion of participants used dental floss. Moreover, a considerable proportion of participants were smokers in the present study. Similar trends of oral hygiene practices and smoking habits were also observed in a study of adolescents from Dammam, Saudi Arabia, where toothbrushing was reported in 64.5% and smoking in 20.2% of the participants [38]. The literature also indicates the lack of importance of oral health in Saudi populations despite the high prevalence of oral diseases in the country [37].

There were certain limitations to the present study. First, self-reported information about study variables may lead to bias in the present research. Second, data were collected from records of patients visiting a teaching dental hospital in the Eastern Province; hence, the generalizability of study results to dental patients in other regions of Saudi Arabia should be avoided. Third, this study could not evaluate routine dental visits because dental records lacked this information. Fourth, the type and frequency of oral lesions were not investigated in the present study, despite the fact that medical conditions are associated with oral lesions.

5. Conclusion

This study showed a high prevalence of medical conditions in dental patients. Diabetes mellitus was the most prevalent problem. Most patients visited the dental hospital to receive restorative treatment, and a long waiting time was the most common barrier to dental visits. The study findings call for integration between dental and medical professionals for improved general health of patients. Dental professionals should take measures to reduce barriers to oral care for positive oral health outcomes.

Data Availability

The SPSS data file of this study is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.
Acknowledgments

The authors are thankful to Mr. Intisar Siddiqi for his help in data entry and initial data analysis.

References

[1] A. Maryam, P. Atessa, M. M. Pehag et al., “Medical risk assessment in patients referred to dental clinics, Mashhad, Iran (2011-2012),” The Open Dentistry Journal, vol. 9, pp. 420–425, 2015.

[2] L. Radfar and L. Suresh, “Medical profile of a dental school patient population,” Journal of Dental Education, vol. 71, no. 5, pp. 682–686, 2007.

[3] M. Mang-de la Rosa, L. Castellanos-Cosano, M. Romero-Perez, and A. Cutando, “The bacteremia of dental origin and its implications in the appearance of bacterial endocarditis,” Medicina Oral, Patología Oral y Cirugía Bucal, vol. 19, no. 1, pp. e67–e74, 2014.

[4] A. Aggarwal, S. R. Panat, and S. Talukder, “Self-reported medical problems among dental patients in Western Uttar Pradesh, India,” Journal of Dental Education, vol. 75, no. 12, pp. 1635–1640, 2011.

[5] M. A. Nazir, “Prevalence of periodontal disease, its association with systemic diseases and prevention,” International Journal of Health Sciences, vol. 11, no. 2, pp. 72–80, 2017.

[6] S. F. Kane, “The effects of oral health on systemic health,” General Dentistry, vol. 65, no. 6, pp. 30–34, 2017.

[7] J. J. Napeñas, O Kujan, P. G Arduino et al., “World Workshop on Oral Medicine VI: controversies regarding dental management of medically complex patients: assessment of current recommendations,” Oral surgery, oral medicine, oral pathology and oral radiology, vol. 120, no. 2, pp. 207–226, 2015.

[8] E. AlShwaimi, M. Idrees, Z. Berri, H. El-Sakka, and O. Kujan, “Association between diabetes mellitus and periodontal diseases: a survey of the opinions of dental professionals,” Medical Principles and Practice, vol. 28, no. 2, pp. 141–149, 2019.

[9] H. F. Al-Bayaty, P. R. Murti, R. S. Naidu, R. Matthews, and D. Simeon, “Medical problems among dental patients at the school of dentistry, the university of the West Indies,” Journal of Dental Education, vol. 73, no. 12, pp. 1408–1414, 2009.

[10] E. Oyetola, O. Adesina, K. Ogunbameru, S. Egunjobi, and A. Adejobi, “Distribution of medical conditions among dental patients,” Nigerian Medical Journal, vol. 61, no. 3, pp. 129–135, 2020.

[11] A. M. Frydych, R. Parsons, and O. Kujan, “Medical status of patients presenting for treatment at an Australian dental institute: a cross-sectional study,” BMC Oral Health, vol. 20, no. 1, p. 289, 2020.

[12] K. Almas and F. A. Awartani, “Prevalence of medically compromised patients referred for periodontal treatment to a teaching hospital in Central Saudi Arabia,” Saudi Medical Journal, vol. 24, no. 11, pp. 1242–1245, 2003.

[13] M. Jawali, M. Khader, and N. Al-Qahthani, “Prevalence of self-reported medical conditions among dental patients,” Saudi Journal of Medicine and Medical Sciences, vol. 5, no. 3, pp. 238–241, 2017.

[14] J. W. Little, C. Miller, and N. L. Rhodus, Dental Management of the Medically Compromised Patient-E-Book, Elsevier Health Sciences, London, UK, 2017.

[15] A. A. A. Faden, A. B. Alsalhanni, M. M. Idrees, M. A. Alshehri, M. Z. Nassani, and O. B. Kujan, “Knowledge, attitudes, and practice behavior of dental hygienists regarding the impact of systemic diseases on oral health,” Saudi Journal of Medical, vol. 39, no. 11, pp. 1139–1147, 2018.

[16] Y. S. Khader, O. Alsaeed, S. Z. Burgan, and Z. O. Amarin, “Prevalence of medical conditions among patients attending dental teaching clinics in northern Jordan,” The Journal of Contemporary Dental Practice, vol. 8, no. 1, pp. 60–67, 2007.

[17] E. von Elm, D. G. Altman, M. Egger, S. J. Pocock, P. C. Gøtzsche, and J. P. Vandenbroucke, “The strengthening the reporting of observational studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies,” International Journal of Surgery, vol. 12, no. 12, pp. 1495–1499, 2014.

[18] M. A. Nazir, L. AlGhamdi, M. AlKadi, N. AlBeajjan, L. AlRashoudi, and M. AlHussan, “The burden of diabetes, its oral complications and their prevention and management,” Open Access Macedonian Journal of Medical Sciences, vol. 6, no. 8, pp. 1545–1553, 2018.

[19] M. Abdulaziz Al Dawish, A. Alwin Robert, R. Brahnam et al., “Diabetes mellitus in Saudi Arabia: a review of the recent literature,” Current Diabetes Reviews, vol. 12, no. 4, pp. 359–368, 2016.

[20] K. Dhanuthai, K Sappayatosok, P Bijaphala, S Kulvitit, and T Sereerat, “Prevalence of medically compromised conditions in dental patients,” Medicina Oral, Patología Oral Y Cirugía Bucal, vol. 14, no. 6, pp. E287–E291, 2009.

[21] M. R. Fenlon and B. E. McCartan, “Medical status of patients attending a primary care dental practice in Ireland,” Journal of the Irish Dental Association, vol. 37, no. 3–4, pp. 75–77, 1991.

[22] M. E. Peacock and R. E. Carson, “Frequency of self-reported medical conditions in periodontal patients,” Journal of Periodontology, vol. 66, no. 11, pp. 1004–1007, 1995.

[23] D. Atlas, International Diabetes Federation. IDF Diabetes Atlas, International Diabetes Federation, Brussels, Belgium, 7th edition, 2015.

[24] WHO, Diabetes Country Profiles, World Health Organization, Geneva, Switzerland, 2016.

[25] E. Standl, K. Khunti, T. B. Hansen, and O. Schnell, “The global epidemics of diabetes in the 21st century: current situation and perspectives,” European Journal of Preventive Cardiology, vol. 26, no. 2, suppl, pp. 7–14, 2019.

[26] P. L. Anders, R. L. Comeau, M. Hatton, and M. E. Neiders, “The nature and frequency of medical emergencies among patients in a dental school setting,” Journal of Dental Education, vol. 74, no. 4, pp. 392–396, 2010.

[27] D. A. Haas, “Management of medical emergencies in the dental office: conditions in each country, the extent of treatment by the dentist,” Anesthesia Progress, vol. 53, no. 1, pp. 20–24, 2006.

[28] H. Mortazavi, Y. Saki, and M. Baharvand, “Peripheral exophytic oral lesions: a clinical decision tree,” International Journal of Dentistry, vol. 2017, Article ID 9193831, 19 pages, 2017.

[29] L. W. Giudice, E. A. Graff, Y. Haripersad et al., “Chronic disease comorbidity in patients with oral leukoplasia: a matched case-control study,” Oral Diseases, vol. 26, no. 5, pp. 894–902, 2020.

[30] S. Minhas, A. Sajjad, M. Kashif, F. Taj, H. Alwadaani, and Z. Khurshid, “Oral ulcers presentation in systemic diseases: an update,” Open Access Macedonian Journal of Medical Sciences, vol. 7, no. 19, pp. 3341–3347, 2019.

[31] A. Al-Ansari, “Prevalence, severity, and secular trends of dental caries among various Saudi populations: a literature review,” Saudi Journal of Medicine and Medical Sciences, vol. 2, no. 3, p. 142, 2014.
[32] A. K. Alshammari and M. M. Wahi, "A narrative review of the prevalence of periodontitis in Saudi Arabia: a proposal for a national oral health research agenda for vision 2030," *The Open Dentistry Journal*, vol. 13, no. 1, 2019.

[33] M. Sanz, A. Ceriello, M. Buysschaert et al., "Scientific evidence on the links between periodontal diseases and diabetes: consensus report and guidelines of the joint workshop on periodontal diseases and diabetes by the International diabetes Federation and the European Federation of Periodontology," *Diabetes Research and Clinical Practice*, vol. 137, pp. 231–241, 2018.

[34] G. Almoznino, D. Aframian, Y. Sharav, Y. Sheftel, A. Mirzabaev, and A. Zini, "Lifestyle and dental attendance as predictors of oral health-related quality of life," *Oral Diseases*, vol. 21, no. 5, pp. 659–666, 2015.

[35] W. M. Thomson, S. M. Williams, J. M. Broadbent, R. Poulton, and D. Locker, "Long-term dental visiting patterns and adult oral health," *Journal of Dental Research*, vol. 89, no. 3, pp. 307–311, 2010.

[36] M. Nazir, "Factors associated with dental pain related to last dental visit among adult patients," *Dental and Medical Problems*, vol. 55, no. 1, pp. 63–68, 2018.

[37] A. S. A.-E. Ammar Ahmed Siddiqui, F. Alshammary, S. Shaikh, and J. Amin, "Oral health in Saudi Arabia," *Handbook of Healthcare in the Arab World*, Springer, Cham, 2021.

[38] H. Al-Qurashi, M. Al-Farea, T. Al-Qurai, M. Al-Kadi, B. Al-Bassam, and M. A. Nazir, "Comparison of oral hygiene practices and oral health problems among smoker and non-smoker male adolescents in the Eastern Province of Saudi Arabia," *The Saudi Journal for Dental Research*, vol. 7, no. 2, pp. 106–111, 2016.