Original Article

Distribution of Medical Conditions among Dental Patients

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Abstract

Aims: The aim of the study was to determine the distribution of medical conditions among dental patients in our local environment. **Settings and Design:** This is a descriptive cross-sectional study conducted at the Oral Diagnosis (OD) Clinic of Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife, Osun State. **Materials and Methods:** Participants were selected using a simple random method from the pool of dental patients who presented at the OD Clinic of OAUTHC during the study period. Information was obtained from each participant using a structured questionnaire organized into sections. Section 1 collected information on participants' biodata such as age, sex, and weight. Section 2 recorded data on the history of the presence of relevant oral and systemic symptoms, while section 3 collected information on findings from intraoral and extraoral examination. **Statistical Analysis Used:** The results were analyzed using STATA 13 statistical software. **Results:** Of the 1503 patients who visited dental hospital during the study period, 176 (11.7%) had medical problems. The mean age of patients with medical problems was 48.5 ± 21.0 years. The mean age was higher in men compared to women ($P = 0.013$). More than one-fifth (21.6%) of the patients were first diagnosed in the dental clinic. Hypertension was the most frequently seen medical condition, closely followed by peptic ulcer and diabetes mellitus. Patients whose medical problems were first diagnosed following dental consultation were significantly older than those with known medical conditions. **Conclusions:** Prevalence of medical conditions in dental patients is high. Hypertension is the most frequently associated systemic conditions among dental patients. Medical conditions were common among older age group (>50 years), males, and those with gum problems.

Keywords: Diabetic mellitus, hypertension, medical conditions, peptic ulcer

Introduction

Dentists require sound medical knowledge in the provision of dental services to the teeming population of patients. This becomes very necessary due to increasing prevalence of medical problems among the general population. The implication is that more patients with medical conditions will be presenting themselves for dental treatments. Nadeem *et al*. had earlier reported that many patients who presented for routine dental treatments may also have complex medical condition(s) which may or may not be known to them.[1] Top on the list of such systemic problems are the non-communicable diseases such as systemic hypertension, diabetes mellitus, peptic ulcer disease, and chronic renal failure which are increasingly becoming public health problem. More so, the prevalence of systemic hypertension, diabetes mellitus, peptic ulcer, and chronic renal failure is 73%,[2] 10%,[3] 34%,[4] and 26%,[5] respectively, which is high. To make things worse, many of these conditions do not present with acute pain that will make them seek help, and so many patients are not aware of their illness. This is the usual trend in developing countries where health awareness is grossly deficient coupled with poor access to health care. The implication of this is that many patients presenting for routine dental consultations may have underlying medical problems that are unaware of. Without a proper understanding of the medical problems and its role in the progression and pathogenesis of the dental problem, the necessary treatment modifications for such dental treatment will not be appreciated or wrongly applied making it difficult to achieve the desired results.[6]

Access this article online

Quick Response Code:

Website: www.nigeriamedj.com

DOI: 10.4103/nmj.NMJ_80_19

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Submitted: 10-Jun-2019 **Revised:** 04-Dec-2019
Accepted: 13-Feb-2020 **Published:** 04-Jul-2020

How to cite this article: Oyetola EO, Adesina OM, Ogunbameru K, Egunjobi S, Adejobi AF. Distribution of medical conditions among dental patients. Niger Med J 2020;61:129-35.

Oral health is an integral part of systemic health; hence, medical problems have a great influence on the oral health. Mirzashahi *et al*. in a recent study established a positive association between surgical site infection and the presence of oral lesions.[7] Immunosuppression, a common feature in medical problems such as diabetes mellitus, HIV, renal diseases, and malabsorption syndrome, results in alteration of oral structures due to plaque bacteria.[8] In addition, the use or abuse of medications for the management of these systemic problems may result in concomitant oral complaints such as mucositis (chemotherapy), gingivitis, oral ulcerations, xerostomia, and pigmentations.[9] In a cross-sectional study done by Suresh *et al*., medical problems were observed in more than half (51.2%) of the dental patients, with female sex predilection.[10]

Bidirectional relationship between oral lesions and systemic conditions has been reported.[11] This implies that while the management of systemic problems alleviate oral problems and vice-versa, the management of oral problems could also alleviate the underlying systemic problem. A typical example of this is seen when improved glycemic control is observed following the treatment of periodontal problem, just as reported with stroke, chronic kidney diseases, and periodontal therapy.[12,13]

So many dental complications may be as a result of undiagnosed or poorly managed medical conditions. As patients with medical conditions may present first to the dentist, it is required that when patients present to oral care dentists, they should be able to make a preliminary diagnosis of the systemic problems and make an appropriate referral. However, despite the general belief that dentist should be able to provide limited preventive medical care, inadequate exposure to medical training in some dental training institutions as well as the perception that dentists only treat teeth may play some role in this unfortunate situation where dental patients with medical conditions are not identified properly.[6,14] This necessitates the present study which is aimed at determining the prevalence of medical problems among dental patients with a view to educating dentists on the need for adequate medical history which is expected to aid thorough systemic evaluation and prompt referral during routine dental consultations.

Materials and Methods

Study design

This was a cross-sectional study as a cross-sectional study of all the patients who visited oral diagnosis (OD) clinic for routine dental consultation from December 2018 to May 2019. The OD clinic serves as the first point of care for all patients who come for dental consultation where patients are triaged to the respective specialist clinics following consultation and general/preliminary investigations.

Study location

The study was conducted at the OD clinic of the Obafemi Awolowo University Teaching Hospitals' Complex, Ile-Ife. It is one of the tertiary hospitals providing oral medicine services in Southwestern Nigeria.

Subjects selection

Subjects were selected from the pool of patients who presented for routine dental consultations at the OD clinic of the hospital during the study period. Patients were recruited using simple random method. A box containing twenty wrapped papers, ten marked "YES" and ten "NO," were mixed together and presented to each patient. Each patient was asked to pick one wrapped paper from the box, only those who picked "YES" were recruited for the study, thereafter the papers were rewrapped and returned into the box for the next participant to pick from.

Sample size calculation

The total number of required participants for the study was calculated using the formula for estimating sample size for a descriptive study designed to measure characteristics in terms of proportion as reported by Eng. 2003[15] as follows:

$$N = \frac{4 \times (Z_{crit})^2 \; p\,(1 - p)}{D^2}$$

Where N is the total number of participants required and p is the prestudy estimate of the proportion to be measured. Al-Bayaty *et al*.[14] had reported the prevalence of medical problems among dental patients (p) as 42%; hence, this reported prevalence (0.42) was taken as p. Z_{crit} is a constant called standard normal deviance which is 1.96 at the clinical significance of 0.05. D is the total width of the expected confidence interval (CI) and was set at 0.15.

Putting the above parameters into the above formula with the power of 90% and a significance level of 0.05, the sample size was calculated as shown below.

$$N = \frac{4 \times (1.96)\; 2 \times 0.42 \times 0.58)}{0.15 \times 0.15}$$

$$N = \frac{3.74}{0.023}$$

$N = 160$

To take care of possible attrition, 10% of the calculated value[16] was added and a total number of 176 were obtained.

$N = 176$.

Ethical consideration

The study was done in accordance with the provisions of the Declaration of Helsinki.[16] Ethical clearance for the study was obtained from the Institutional Review Board of the Obafemi Awolowo University, Ile-Ife, with reference number IPH/OAU/12/1288. All patients were fully briefed about the study. Written informed consent was obtained from each patient using a consent form which was duly signed and dated; only consenting patients were recruited. Participants are free to decline from participation in the study at any time during the study period. The collected information was treated with the highest level of confidentiality.

Data collection

Data collection was done using structured questionnaires which were organized into three sections. Section 1 collected information on patients' biodata and demographic variables such as age, sex, weight, and religion. Section 2 recorded relevant history on the presence of oral/dental and medical symptoms. Questions were asked on the history of burning sensation, abnormal oral swellings, halitosis, oral pigmentation, and oral ulceration. Section 3 recorded the findings on both extraoral and intraoral examinations. Patients were examined for facial asymmetry, temporomandibular joint tenderness, jaw deviation, and nerve and muscle dysfunction during extraoral examination. On intraoral examination, the mouth was thoroughly examined for oral hygiene, as well as pathology on oral soft and hard tissues.

Data analysis

Data was analyzed using Stata 13 statistical software (Statacorp, College Station, Texas, USA). Descriptive statistics was used to characterize sociodemographic variables such as sex, marital status, and ethnicity. Analysis of descriptive continuous variables such as age was done, after subjecting normality test, using appropriate test statistics to determine the mean, median, minimum value, maximum value. Simple frequency and percentages were used to characterize categorical variables such as the presence or absence of medical conditions among dental patients. Bivariate analysis such as Student's *t*-test and Fisher's exact test as and/or their nonparametric equivalents were used as appropriate to compare between age and sex differences among patients with medical conditions. Statistical significance was inferred at $P < 0.05$ and CI was set at 95% for all the analyses.

Results

Of the 1503 patients who presented in the OD clinic during the study period, 176 participants consisting of 80 (45.5%) male and 96 (54.5%) female had underlying systemic conditions resulting in prevalence of 176 (prevalence: 11.7%). Over half of these patients were male and above 50 years, majority of who were single and of Yoruba ethnicity and nearly 70% practiced Christianity [Table 1].

Relationship between age, sex, and marital status of dental patients with the presence of the underlying medical condition

Dental patients with underlying medical conditions (mean age: 48.4 years) were older than those without systemic problems (mean age: 35.8 ± 17.5 years). More males present with medical conditions in dental hospitals [Figure 1].

Relationship between mean age and sex of dental patients with medical condition

Men, with a mean age of 51.4 ± 21.2 years, were slightly older than the women (46.2 ± 20.7 years). The difference was, however, not statistically significant, $P = 0.103$ [Figure 2].

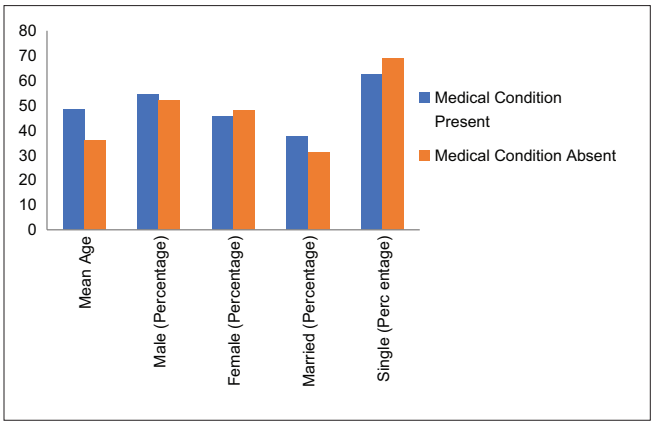

Figure 1: Relationship between age, sex, marital status of dental patients with the presence of underlying medical condition

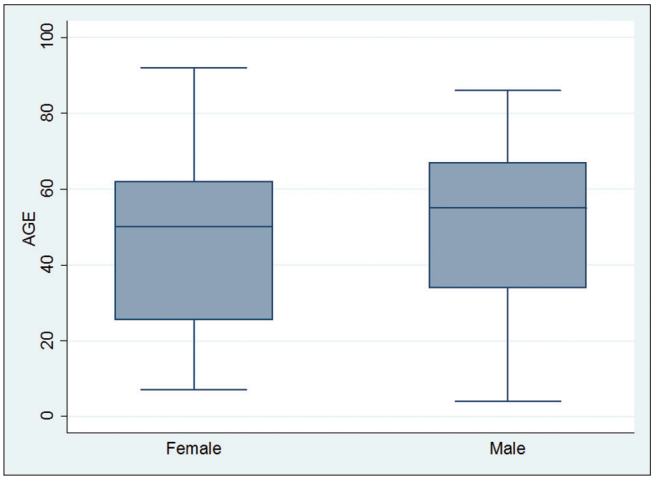

Figure 2: Relationship between mean age and sex

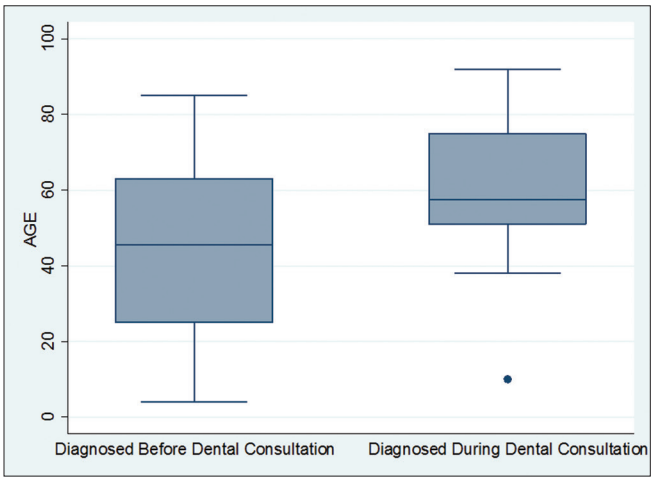

Figure 3: Relationship between age and mode of diagnosis of the systemic condition ($P = 0.0000$, *t* test)

Medical conditions and their relative occurrences among dental patients

A wide range of medical conditions were seen among dental patients. Hypertension was the most frequently seen systemic

conditions, present in more than one-third (68, 38.4%) of the patients. This was followed by peptic ulcer disease (57, 32.4), diabetic mellitus (12, 9.7), and asthma (11, 9.7). Eight patients had a combination of diabetic mellitus and hypertension suggestive of metabolic syndrome. Pneumonia, rheumatism, chronic kidney disease, and cerebral palsy were very rare being present each on one patient [Table 2].

Dental diagnosis and mode of arriving at the systemic diagnosis

In over one-fifth (38, 21.6) of the patients, the diagnosis of their underlying medical condition was initiated following a high index of suspicion and clinical evaluation by the oral physicians, while a majority of the patients were known cases of medical illness or following referral from their physician. Periodontitis was the most common dental diagnosis seen among patients with systemic diseases followed by dentoalveolar abscess and pulpitis [Table 3].

Table 1: Socio demographics of the dental patients with underlying medical condition

Variable	Frequency	Percentage (n=176)
Sex		
Male	80	54.5
Female	96	45.5
Marital Status		
Single	110	62.5
Married	66	37.5
Religion		
Christianity	120	68.2
Islam	46	31.8
Ethnicity		
Yoruba	162	92.1
Hausa	8	4.5
Others	6	3.4
Age (years) mean=48.5±21.0		
<20	21	11.1
21-30	25	14.2
31-40	18	10.2
41-50	20	11.4
51-60	38	28.6
>60	54	30.7

Table 2: Medical conditions and their relative occurrences among dental patients

Medical Conditions	Frequency	Percentage
Hypertension	68	38.4
Peptic ulcer disease	57	32.4
Diabetes mellitus	12	9.7
Asthma	11	6.3
Diabetes mellitus and hypertension	8	4.6
Mental disorder	3	1.7
Congenital scoliosis	1	0.6
Rheumatism	1	0.6
Cerebral palsy	1	0.6
BPH	1	0.6
CKD	1	0.6
Pneumonia	1	0.6
Congenital urological disease	1	0.6

Distribution of dental treatment

Tooth extraction, root planning, and root canal therapy were the frequently done treatment for the patients. Mandibulectomy, orthodontic fixed appliance, and sequestrectomy were only done for one patient each [Table 4].

Relationship between age and mode of diagnosis of the systemic condition

Patients whose medical conditions were incidentally diagnosed by oral physicians, with mean age of 60.7 ± 16.3 years were older than those with the known systemic disease before dental consultation (45.1 ± 20.9). This difference was statistically significant, $P = 0.0000$, t-test [Figure 3].

Discussion

Medical problems among dental patients are not uncommon, especially with an increasing prevalence of common medical problems. The present study aimed at determining the prevalence and relative distribution of underlying medical conditions among patients attending a dental clinic. In this study, we found underlying medical conditions in 176 (11.7%) patients following routine dental consultation. Several scientific researches had reported prevalence of medical problems among dental patients as a range from 30%–60% unlike the present study which reported a smaller value.[14,17,18] Poor dental awareness is still a big issue in this part of the world; the lower values may attributable to the poor dental visit.

Adequate record-keeping remains a major challenge in health planning and management in the developing world. In addition, not many patients give honest reports of their medical history, especially when there is no plausible association with their dental complaint or due to their cultural and religious belief that prohibits negative confession of suffering an ailment. Many patients therefore prefer discussing the spiritual aspects of their illness with the doctor.[19]

The higher prevalence of medical problems in dental patients may not be unconnected to increase in life span as a result of improving health care, a higher rate of use of medication as well as rising prevalence of common systemic diseases. A higher index of suspicion and prompt professional awareness among dentists in identifying patients with medical problems and subsequent referral to relevant physicians is therefore requisite. The mean age of dental patients with medical conditions was higher than those without medical conditions. Increasing age is a known predisposing (g) factor to some of the systemic diseases such as hypertension and diabetic mellitus.[20]

The mean age of men with medical conditions was higher than that of women in this study and may reflect the sex distribution of these medical conditions (higher among the elderly men). Furthermore, females, in general, acted more positively toward

Table 3: Dental diagnosis and mode of arriving at the systemic diagnosis

Dental diagnosis	Subjects with previously diagnosed systemic conditions	Subjects diagnosed following dental consultation and investigations	Total
Dentoalveolar abscess	25 (78.1)	7 (22.9)	32 (100)
Periodontitis	53 (73.6)	19 (26.4)	72 (100)
Pulpitis/caries	23 (85.2)	4 (14.80)	27 (100)
Fractured tooth	5 (62.5)	3 (37.5)	8 (100)
Denture induced candiasis	6 (100)	0 (0)	6 (100)
Pericoronitis	6 (100)	0 (0)	6 (100)
Crack tooth	4 (100)	0 (0)	4 (100)
TMJ dysfunction	2 (66.7)	1 (33.3)	3 (100)
Malocclusion	3 (100)	0 (0)	3 (100)
Trigeminal neuralgia	2 (66.7)	1 (33.3)	3 (100)
Grossly broken down tooth	2 (66.7)	1 (33.3)	3 (100)
Aphthous ulcer	2 (100)	0 (0)	2 (100)
Sdenoid cystic carcinoma	1 (50)	1 (50)	2 (100)
Caries	1 (100)	0 (0)	1 (100)
Space infection	0 (0)	1 (100)	1 (100)
Chronic osteomyelitis	1 (100)	0 (0)	1 (100)
Ameloblastoma	1 (100)	0 (0)	1 (100)
Sialadenitis	1 (100)	0 (0)	1 (100)

Fisher's exact=0.582

Table 4: Distribution of dental treatment

Dental treatment	Frequency	Percentage
Tooth extraction	67	38.1
Root planning	63	35.5
Root canal therapy	18	10.3
Medications	11	6.3
Denture repair	4	2.3
Scaling and polishing	3	1.7
Composite restoration	2	1.1
Amalgam filling	2	1.1
Parotidectomy	1	0.6
Sequestrectomy	1	0.6
Fixed appliance	1	0.6
Mandibulectomy	1	0.6
Total	176	100

oral health than males probably due to concern for esthetics. Most men are unlikely to present until the pain becomes unbearable.[21]

Despite the widespread reports about the high prevalence of medical conditions among dental patients, none was specific about the status of the diagnosis: whether patients had a prior knowledge of their systemic conditions or not, as approximately one-fifth of the patients in the current study had no prior knowledge since they showed no obvious systemic symptoms. In addition, the observation of a higher age of patients with a recent diagnosis of systemic conditions than those with previously known underlying diseases suggests a lack of dental and medical awareness as well as poor health behavior and lack of health promotion. Routine medical checkup or presentation for evaluation at the early stages of disease process is not done unless by compulsion such as preemployment medical checkup.

Medical conditions can affect patients of any age category. More than half of the respondents with systemic problems in our study were 50 years and older. This is attributable to the higher prevalence of common diseases such as diabetic mellitus and hypertension in older age groups, wherein medications for these conditions induce oral lesions. Immunosuppression, dryness of the mouth, and nonspecific oral problems are thought to be associated with the higher extremes of age. [22] The higher mean age of affected men is in consonance with the higher prevalence of common systemic conditions in older males. Systemic inflammation enhances the initiation and progression of hypertension.[23] Women who have a higher concentration of anti-inflammatory immune profile when compared to males tend to have a lower prevalence of hypertension especially when other related factors are absent.[24]

Hypertension and peptic ulcer disease and diabetic mellitus were high on the list of the common medical conditions seen in this study. This is in agreement with an Indian study by Bahtejha *et al*. who reported cardiovascular diseases as the most common medical condition in dental patients, followed by endocrine disorders.[25] Differences in environmental and genetic factors which affect disease epidemiology may be responsible for this variation. Unlike some scientific reports which showed hypertension and diabetes as the common medical conditions in dental patients,[20,26] the present study found peptic ulcer as the second most common medical conditions following hypertension. The association between poor oral hygiene and *Helicobacter pylori* as well as a greater prevalence of peptic ulceration has been reported in the literature.[27,28] Patients with poor oral health have a higher concentration of *H. pylori* in their dental plaque and

this predisposes to gastric infections and ulceration.[28] Most patients in the developing world are thought to have poor oral hygiene because of a lack of deliberate oral hygiene practices and access to prophylaxis. Javali *et al*.[26] reported that 45% of medical problems in dental patients were found to be diabetic mellitus, while the gastrointestinal problem was only 5%, contrary to our finding. Immunosuppression and variation of these systemic conditions may be responsible for the differences.

Knowledge of medical problems among dentists aids clarity in dental diagnosis as well as the modification of treatment in patients with underlying systemic conditions. Dentoalveolar abscess and periodontitis were the most common dental diagnoses among these groups of dental patients which is not unexpected as they tend to have poor oral hygiene and are immunocompromised. Most patients had tooth extractions and root planning done, in conformity with the usual pattern of treatment offered in dental hospitals. This is a reflection of awareness and attitude to a dental practice in this part of the world. More awareness and education of the population (especially those with systemic conditions) is required to avoid complications.

Conclusions

The present study revealed that more than 10% of dental patients had an underlying medical condition, and the prevalence might be higher among adult males above 50 years of age. Most frequent medical condition found was hypertension followed by peptic ulcer and diabetic mellitus, while the rare conditions are mental conditions, chronic kidney diseases, and pneumonia. Considering the bidirectional influence of the systemic and oral health implication on the management of diseases,[1,11,12] there is a great need for dentists to be more acquainted with the medical history of their patients to prepare for holistic management of the patients.

Acknowledgment

The authors would like to appreciate Mr. Olanrewaju Timothy K, Senior Correspondent, Sun Newspaper @ Maiduguri, Bornu State for proofreading the manuscript.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Nadeem M, Stephen L, Schubert C, Davids MR. Association between periodontitis and systemic inflammation in patients with end-stage renal disease. SADJ 2009;64:470-3.
2. Uwah AF, Ndem JI, Emmanuel U. Prevalence of hypertension among adults attending Faith-based Centres in Abak Township, Akwa Ibom State, Nigeria. Mert Res J Med Med Sci 2015;3:245-8.
3. Song P, Yu J, Chan KY, Theodoratou E, Rudan I. Prevalence, risk factors and burden of diabetic retinopathy in China: A systematic review and meta-analysis. J Glob Health 2018;8:010803.
4. Sayehmiri K, Abangah G, Kalvandi G, Tavan H, Aazami S. Prevalence of peptic ulcer in Iran: Systematic review and meta-analysis methods. J Res Med Sci 2018;23:8.
5. Chukwuonye II, Ogah OS, Anyabolu EN, Ohagwu KA, Nwabuko OC, Onwuchekwa U, *et al*. Prevalence of chronic kidney disease in Nigeria: Systematic review of population-based studies. Int J Nephrol Renovasc Dis 2018;11:165-72.
6. Ehigiator O, Ehizele A, Ugbodaga P. Assessment of a group of Nigerian dental students' education on medical emergencies. Ann Med Health Sci Res 2014;4:248-52.
7. Mirzashahi B, Tonkaboni A, Chehrassan M, Doosti R, Kharazifard MJ. The role of poor oral health in surgical site infection following elective spinal surgery. Musculoskelet Surg 2019;103:167-71.
8. Vesterinen M, Ruokonen H, Furuholm J, Honkanen E, Meurman JH. Clinical questionnaire study of oral health care and symptoms in diabetic vs. non-diabetic predialysis chronic kidney disease patients. Clin Oral Investig 2012;16:559-63.
9. Shekarchizadeh H, Khami MR, Mohebbi SZ, Ekhtiari H, Virtanen JI. Oral health of drug abusers: A review of health effects and care. Iran J Public Health 2013;42:929-40.
10. Suresh KS, Sunder R, Atul K, Deepak S, Kanika GV, Sanjay D, *et al*. Prevalence of medical problems among patients attending a dental school in India-A cross sectional study. OHDM 2015;16:429-34.
11. Monica AF, George WT, Brady TW, Ellen TM. Bi-directional relationship between chronic kidney and periodontal disease; a study using structural equation modelling. Kidney Int 2011;79:347-55.
12. Dai R, Lam OL, Lo EC, Li LS, McGrath C. Oral health-related quality of life in patients with stroke: A randomized clinical trial of oral hygiene care during outpatient rehabilitation. Sci Rep 2017;7:7632.
13. Oyetola EO, Owotade FJ, Agbelusi GA, Fatusi OA, Sanusi AA. Oral findings in chronic kidney disease: Implications for management in developing countries. BMC Oral Health 2015;15:24.
14. Al-Bayaty HF, Murti PR, Naidu RS, Matthews R, Simeon D. Medical problems among dental patients at the school of dentistry, the university of the West Indies. J Dent Educ 2009;73:1408-14.
15. Eng J. Sample size estimation: How many individuals should be studied? Radiology 2003;227:309-13.
16. General Assembly of the World Medical Association. World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. J Am Coll Dent 2014;81:14-8.
17. Chandler-Gutierrez L, Martinez-Sahuquillo A, Bullon-Fernandez P. Evaluation of medical risk in dental practice through using the EMRRH questionnaire. Med Oral 2004;9:309-20.
18. Fernández-Feijoo J, Garea-Gorís R, Fernández-Varela M, Tomás-Carmona I, Diniz-Freitas M, Limeres-Posse J. Prevalence of systemic diseases among patients requesting dental consultation in the public and private systems. Med Oral Patol Oral Cir Bucal 2012;17:e89-93.
19. Best M, Butow P, Olver I. Do patients want doctors to talk about spirituality? A systematic literature review. Patient Educ Couns 2015;98:1320-8.
20. Opeodu OI, Adeyemi BF. Prevalence of coexisting diabetes mellitus and hypertension among dental patients in a tertiary care hospital. J West Afr Coll Surg 2015;5:16-35.
21. Hamasha AA, Alshehri A, Alshubaiki A, Alssafi F, Alamam H, Alshunaiber R. Gender-specific oral health beliefs and behaviors among adult patients attending King Abdulaziz Medical City in Riyadh. Saudi Dent J 2018;30:226-31.
22. Buford TW. Hypertension and aging. Ageing Res Rev 2016;26:96-111.
23. De Miguel C, Rudemiller NP, Abais JM, Mattson DL. Inflammation and hypertension: New understandings and potential therapeutic targets. Curr Hypertens Rep 2015;17:507.
24. Gillis EE, Sullivan JC. Sex differences in hypertension: Recent advances. Hypertension 2016;68:1322-7.
25. Bhateja S. High prevalence of cardiovascular diseases among other medically compromised conditions in dental patients: A retrospective study. J Cardiovasc Dis Res 2012;3:113-6.
26. Javali MA, Khader MA, Al-Qahtani NA. Prevalence of self-reported

medical conditions among dental patients. Saudi J Med Med Sci 2017;5:238-41.
27. Kaneto C, Toyokawa S, Inoue K, Inoue M, Senba T, Suyama Y, *et al*. Association between periodontal disease and peptic ulcers among Japanese workers: MY health up study. Glob J Health Sci 2012;4:42-9.
28. Al Asqah M, Al Hamoudi N, Anil S, Al Jebreen A, Al-Hamoudi WK. Is the presence of *Helicobacter pylori* in dental plaque of patients with chronic periodontitis a risk factor for gastric infection? Can J Gastroenterol 2009;23:177-9.