Gingivitis and Periodontitis Risk Indicators and Prevalence Among Bahraini Population: Preliminary Study

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ABSTRACT

Introduction: Dentistry is developing rapidly with new emerging concepts of periodontal diseases due to more understanding of the causes and pathogenesis of these diseases. Various factors are associated with an increased risk of gingivitis and periodontitis.

Objectives: To investigate the prevalence and risk indicators of gingivitis and periodontitis in the Bahraini population.

Method: A total sample of 395 participants was selected randomly from subjects escorting patients from five governmental health centres. The sociodemographic variables, oral hygiene habits, income, smoking, frequency of dental visits, history of diabetes mellitus, family history of periodontal diseases, and educational level were recorded. Basic periodontal examination index (BPE) was used as an initial examination of the participants. A full mouth charting and radiograph were carried out if they scored 3 and 4.

Results: The majority had gingivitis (81.3%), 15.2% had chronic periodontitis, and only 3.5% were having healthy periodontal status. The frequency of female to male in the sample was 1.7:1; however, the prevalence of periodontal diseases (gingivitis and periodontitis) was higher in males. The periodontitis cases were distributed as 3% mild, 6.1% moderate, and 6.1% were severe.

Conclusion: This is the first study to report on the prevalence of periodontitis, gingivitis, and risk indicators among the adult population in the Kingdom of Bahrain. The prevalence of periodontitis was 15.2% and considered to be low. On the contrary, the prevalence of gingivitis (81.3%) was considerably high. Among all risk indicators, the age and frequency of dental visit were the only indicators with statistical significance.

Key Words: Gingivitis, Periodontitis, Population, Risk indicator, Bahraini

INTRODUCTION

Dentistry is developing rapidly with new emerging concepts of periodontal diseases due to more understanding of the causes and pathogenesis of these diseases.¹ The latest available classification of periodontal disease by the American Academy of Periodontology (AAP) based on the aetiology classifies all the periodontal diseases in two categories, gingival diseases and periodontal disease.² A focused update to this classification till 2017 has been published by the AAP as task force report. In this report, the issue of clinical attachment loss which was used by the AAP to classify the periodontal diseases is further clarified

and additional criteria to assess the severity is developed.³

Longitudinal studies have reported smoking as a true risk factor for periodontitis and heavy smokers are two times higher in attachment loss and loss of bone support than the light smoker.⁴ Diabetes is similarly an accurate risk factor for periodontitis. Diabetes is associated with increased susceptibility to infection and it is substantiated that poorly controlled diabetes in the presence of poor oral hygiene leads to more attachment loss and bone loss.⁵

Longitudinal studies reviewed noted that tobacco use, specific subgingival bacterial species, low education, infrequent

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dental visits, male sex, lack of flossing, and race (African-American) were statistically significant risk factors or risk predictors for clinical attachment loss.⁶ Numerous other precise periodontal bacteria, herpesviruses, increased age, male sex, depression, race, traumatic occlusion and female osteoporosis in the existence of high levels of dental calculus have been revealed to be associated with loss of periodontal support in cross-sectional studies and can be considered to be risk indicators of periodontitis.⁷

The World health survey covering the adult population reported a high prevalence of edentulism (35%) in the upper-middle-income countries.⁸ Based on case definitions, the prevalence of periodontitis for all ages was 36.0% with moderate periodontitis of 28.0% and advanced periodontitis of 8.0%.⁹ The results by the last cycles (2011-2012) of the National Health and Nutrition Examination Survey (NHANES) conducted in the United States (USA) reported 46% of US adults had periodontitis with 8.9% having severe periodontitis. Prevalence was positively associated with age and was higher among males.¹⁰

The first published report on the prevalence of periodontitis from an Arab country was an Egyptian study conducted in 1947 which reported the prevalence of what was classified as 'light', 'medium', and 'severe' periodontitis to be 27.6%, 25.2%, and 45%, respectively.¹¹ A literature review of the available studies reporting the periodontal diseases in the Arab world revealed of few studies. These published studies from Kuwait, Saudi Arabia, Iraq, Jordan, and Yemen included reports on the periodontal status of adult samples.

Most published surveys describing oral health status (including periodontal diseases) in the Arab world have been carried out in school children and adolescents. There is a paucity in the studies that present the periodontal diseases in adults. The prevalence of periodontitis in the reported studies ranged from 0.0% to 54.6%.¹² The only study in Bahrain reporting periodontal diseases was carried on the age group of 15-19 years as a national survey of oral diseases through World Health Organization (WHO).¹³ These results do not reflect the whole population of Bahrain as it represented a short range of young individuals and didn't include adult population. Hence, this study aims to assess the prevalence and risk indicators of gingivitis and periodontitis in the Bahraini population.

MATERIALS AND METHODS

Ethical approval for the present cross-sectional research was obtained from the Ethics Committee of Riyadh Colleges of Dentistry and Pharmacy (RCsDP), Ministry of Health (MOH), Bahrain. Study population was selected randomly from people escorting out-patients attending the health centers in the four regions. The minimum sample size of 385 sub-

jects was calculated based on the findings of the pilot study at a confidence level of 95%, power of 80%, and margin error of 2%.

The inclusion criteria were Bahraini citizen, aged between 15-65 years, healthy females and males subjects except for diabetes, Arabic speaking subjects and should be selected from the health centre as escorts of the patients. The exclusion criteria were subjects with a history of or current orthodontic treatment, subjects with current or previous periodontal treatment, subjects with any medical condition that might have a relation with periodontal diseases, subjects on a medication causing gingival enlargement, pregnant women, subjects taking bisphosphonates and subjects selected shouldn't be attending the centres to seek any medical or dental treatment.

Selected people were informed verbally of the details of the research and if approved to participate, the participant had to sign the consent form. Participants were examined in allocated clinics; these clinics were assigned to work on this research for the proposed period (August 2016-January 2017). Information was collected by interviewing the participant and filling a structured questionnaire by the research team. Demographic and socio-demographic variables were recorded including biodata (age, gender, and educational level). In addition to medical history, information on oral hygiene habits, smoking, and family history of periodontal diseases were obtained. An electronic periodontal chart was created to record the Probing Depth (PD) and Clinical Attachment Loss (CAL).

Five teams were created comprising each of an examiner and a recorder (Examiners were dentists and recorders were dental hygienist). The teams were trained and calibrated to carry on the periodontal examination. Basic Periodontal Index (BPE) was used as an initial screening examination using the WHO probe. If the examined patient scored 0 then the patient was considered disease-free. However, if scored 1-2 then this was considered as gingivitis, but if scored 3-4 then the patient was further examined with full mouth charting. Intraoral radiographs (bitewing for posterior teeth and periapical for the anterior teeth) were taken for PD >3mm to confirm the diagnosis with aid of the beaming device.

Initial sessions of training were planned before starting the calibration. Eight examiners were trained in the ideal method of the probing. The CAL measurement was explained and demonstrated. Inter and Intra examiner agreement was recorded. The quantitative data were analysed using Statistical Package for Social Science (IBM* SPSS) Version 22 for Windows. The descriptive investigation was started to present an overview of the findings from this sample. Differences between groups were examined using Chi-square test and cross-tabulations to compare different groups. Binary logistic regression was used

to define factors related to periodontal disease. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

In the multivariate analysis, the only factor significantly associated with periodontitis was age. Increasing age was associated with an increased likelihood of exhibiting periodontal disease. For each 1 year increase in age, the odds of having periodontitis increased by 10%. Males were 1.8 times more likely to exhibit periodontal disease than females. The odds of having periodontitis increased 1.5 times among subjects who reported irregular tooth brushing and subjects who reported a family history of gum disease compared to subjects who reported regular tooth brushing and subjects who reported no family history of gum disease respectively. Low socioeconomic status (SES) was 1.9 times and medium SES was 1.2 times more likely to exhibit periodontal disease than high SES. Subjects who reported irregular dental visits had 1.9 times higher odds of having periodontitis than subjects who had regular dental visits. The odds of having periodontitis increased 2.1 times among subjects who had diabetes mellitus and 1.5 times among smokers (Table 1).

Regarding the risk factors associated with periodontal diseases, diabetes mellitus (DM) was found in 4.6% (n=18) of examined participants. Among those individuals with DM, none had healthy periodontal status, 83.3% (n=15) had gingivitis, and 16.7% (n=3) were diagnosed with periodontitis ($p>0.05$). Among the majority (70.6%, n=279) of the participants reported irregular tooth brushing, 82.4% (n=230) were diagnosed with gingivitis followed by periodontitis (13.3%, n=37) and only 4.3% (n=12) were with healthy periodontal status ($p>0.05$).

Smokers comprised 15.4 % (n=61) among the examined participants and majority of the smokers (80.3% n=49) and past smokers (76.2% n=16) suffered from gingivitis and only 16.4% (n=10) and 14.3% (n=3) were diagnosed with periodontitis respectively ($p>0.05$). One fifth (20%, n=21) of the participants who were diagnosed with periodontitis had a family history of gum diseases. Among the gingivitis patients, 78.5% (n=84) had a family history of periodontal diseases ($p>0.05$). The relation between the level of education and periodontal diseases showed gingivitis in 80.9% (n=152) and 82.6% (n=147) for high school and college-level respectively. In regards to periodontitis, primary school level showed 20.7% (n=6) followed by high school level (16%, n=30) and college-level 13.5% (n=24) ($p>0.05$). There was a statistically significant relationship between age and periodontal diseases ($p<0.05$). Figure 1 shows the distribution of BPE scores by age (Score 0: Healthy periodontal tissues; Score 1: Bleeding on probing; Score 2: Plaque retentive factors such as overhanging restorations or calculus; Score 3:

Probing depths of 3.5-5.5 mm; Score 4: robing score of over 5.5 mm) (Figure 1).

A total of seven examiners participated in the study. One of the examiners withdrew from the study at the second calibration. The results of the second calibration were found to be better than the first with agreement ranging from 80-100 % except for one examiner with $< 80\%$ agreement. This examiner was further trained individually and calibrated again. Among the total number of the 395 examined participants, 62.8 % (n=248) were female and 37.2% (n=147) were male, with a female-male ratio of 1.7:1. The mean ($\pm$ SD) age was 35.37 ($\pm$ 10.19) years, ranging between 15-65 years. It was found that majority had gingivitis (81.3%, n=321) followed by periodontitis (15.2%, n=60) and only 3.5% (n=14) healthy periodontal status (Figure 2).

It was found that among the 60 patient diagnosed with periodontitis, severe and moderate were in equal proportion (40%, n=24) and only 20% (n=12) were mild BPE index scores were recorded in six sextants for each patient. There was a positive correlation between age and BPE score (Figure 3).

DISCUSSION

This is the first study reporting the prevalence and risk indicators of periodontal diseases among adults in Bahrain. The prevalence of periodontitis was 15.2% and gingivitis was 81.3%. In general, the prevalence estimates are influenced by the employed methodology, including case definitions of periodontal diseases and recording protocols.¹⁴ In the present study the risk indicators were recorded through interviewing the participant in addition to the oral examination. In the current study, it was found that gingivitis being ubiquitous in both younger and older age. The overall prevalence of gingivitis among 15-19 years was by the national surveys in the USA and previous WHO survey.¹⁵

The results obtained by Nhanes et al., the study was far higher in the prevalence of periodontitis than that reported in earlier epidemiologic studies from the US. These results may be attributed to the fact that the full mouth charting was applied in 2009-2010 survey study which gave a fair picture of extent and severity of the periodontal condition.¹⁶ In the present study, it was difficult to estimate the overall affected teeth as full mouth charting was carried only for patients with chronic periodontitis.

Given the diverse background of Asian populations, it was interesting to note that the prevalence of chronic periodontitis in the Asian continent is at a similar level, in the range of 15–20%.^{17,18} In this study the Farm Machinery Power Engineering was carried out only for cases where the probing depth was more than 3 mm which refers to BPE score 3 and 4. The prevalence of periodontitis was about 15.2% and the

cases were further classified as mild, moderate, and severe according to AAP case definition.¹⁰ It was found that 40% had moderate periodontitis, 40% had severe periodontitis and 20% were mild periodontitis.

In the current study sample, despite the female to male ratio was 1.7:1, the periodontitis was more prevalent in male than female. This was in accordance with most periodontitis epidemiologic studies that periodontitis is more prevalent in males.¹⁹⁻²¹ Age by itself is not a risk determinant, but it is the lifetime accumulation of the diseases.²² In the present study, age was the only factor which is significantly associated with periodontitis. There was no significant association between diabetes mellitus and periodontitis due to paucity of participants.

The prevalence of periodontitis in the past smoker and current smoker were almost similar and this is following a previous study.²³ The odds of having periodontitis increased 1.5 times among subjects who reported irregular tooth brushing than regular brushing. This finding was similar to a past study.²⁴ A higher prevalence of gingivitis and periodontitis was perceived in subjects reporting an emergency and on need visits compared to subjects regular dental visits and this finding is in agreement with an epidemiological study in Brazil.²⁵

Subjects with low socioeconomic status were 1.9 times higher odds of having periodontitis than subjects with high socioeconomic status probably due to delay in the governmental dental appointments and inability to afford the private dental clinic made them negligent and less caring. With regression analysis, it was found that the only risk factor that is statistically significant is age. These results may be attributed to the sampling design. Certain variables investigated depended on patients' reports such as oral hygiene habits and smoking which may not be true or accurate sometimes.

CONCLUSIONS

Overall, 15.2% prevalence of periodontitis was observed in the present study sample, considering that majority had moderate and severe periodontitis in equal proportion. Age was significantly associated with an increased risk of periodontitis. The study established numerous socio-demographic risk factors related to an increased risk of periodontitis. Being the first study among adult populations in Bahrain, a high prevalence of gingivitis was found providing evidence that gingivitis consists of a significant problem.

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Authors contribution

1. Dr. Haifa Salman Dhaif AlBanna: Data collection, Investigation,
2. Dr. Sami Shafik: Manuscript preparation
3. Dr. Hesham Al-Mashat: Manuscript review, Statistical evaluation
4. Dr. Ashwin C Shetty- Drafting the manuscript

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Table 1: Multivariate analysis of factors associated with periodontitis

Variables		Odds Ratio	p-value
Age in years		1.1	0.000
Sex	Male	1.8	0.086
	Female	1	
Frequency of tooth brushing	Irregular	1.5	0.229
	Regular	1	
Socioeconomic status	Low	1.9	0.221
	Medium	1.2	
	High	1	
Dental visit	Irregular	1.9	0.144
	Regular	1	
Family history of periodontal disease	Yes	1.5	0.232
	No	1	
Diabetes mellitus	Yes	2.1	0.340
	No	1	
Smoking	Yes	1.5	0.409
	No	1

Figure 1: Distribution of BPE scores by age.

Figure 2: Distribution of periodontal status.

Figure 3: Distribution of severity of the periodontal disease.