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*RESEARCH ARTICLE*

# ADVERSE ORAL HABITS AND PERIODONTAL HEALTH STATUS: A CROSS SECTIONAL CLINICAL STUDY.

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## *Abstract*

**Background:** Periodontal disease is a chronic inflammatory disease of periodontium and is characterized by loss of periodontal ligament and surrounding alveolar bone. It is highly prevalent in adolescents, adults, and older individuals. Numerous risk factors such as smoking, poor oral hygiene, adverse oral habits, medication and stress are associated with periodontal diseases.

**Aims and Objectives:** The aim of this study was to investigate the prevalence of adverse oral habits and its association with the periodontal status among Saudi sub population of age between 15- 65 years.

**Material and methods:** Three hundred and thirty patients, referred for periodontal therapy were selected. The patients were asked for any adverse oral habits and then periodontal parameters (Plaque index, gingival index, probing pocket depth and clinical attachment loss) were assessed.

**Results:** Among 330 participants 69 (20.9%) had adverse oral habit of consuming tobacco either in the form of smoking or chewing, 23(7%) had bruxism and 6 (1.8%) nail biting habit. Parafunctional habits were found to be higher in female participants. Participants with adverse oral habit had PI (230/ 69.7%) and GI (284/86.1%) score of 2. Significant association was found between gender, adverse oral habit and mean CAL.

**Conclusion:** The results of the present study revealed a significant increase in parafunctional habits among female participants. Substantial association among type of adverse oral habits and CAL. To minimize the incidence and progression of periodontal disease in these subjects through oral hygiene and regular dental visits should be encouraged.



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## Introduction:-

Periodontal disease is a pathological inflammation of the gum and bone support surrounding the teeth. The two most common periodontal diseases are gingivitis and periodontitis**,** inflammation affecting the bone and tissues around the teeth.

Periodontal disease is the main cause of loss of tooth and is considered one of the two major dangers to the oral health [1]. Although bacterial plaque is the primary causative factor in pathogenesis of periodontitis, development and progression of it is associated with presence of risk factors which include oral hygiene, specific environmental and genetic predisposition[2]. Smoking[3] and stress[4] are well-established risk factors for periodontal disease.

Tobacco consumption is a major risk factor for morbidity and mortality [5].Smoking and smokeless tobacco are two forms of tobacco consumption. Smokeless tobacco (ST) comprises a great variety of products and mixtures that contain tobacco as the principle constituents and is used either orally or nasally. ST mixtures differ according to their geographic location of use and the nature of chemicals added to them [6] (Samman et al., 1998).

In Kingdom of Saudi Arabia (KSA), present facts on tobacco consumption are deficient. Some studies reported that tobacco consumption has increased in this region [7,8]. However, there are few studies from KSA that reported smoking status.[9,10,11]. In a national level STEPwise approach of survey on tobacco consumption in KSA in 2005 found prevalence of 22.2% current smoking in men and 1.4 % in women [12]. Other studies by Abdel Rahim[13] in 2012 reported a 23.5 % prevalence of current smoking in Jizan and Al-Khashan HI[14] et al in 2014 reported 35 % of current smokers in 2009 to 2011.

Shammah is a snuff-dipping form of ST prepared by mixing powdered tobacco, calcium oxide, ash, black pepper, oils, and flavors (Scheifele et al., 2007) [15]. This formula of ST is obtainable in various varieties and is grouped according to color and composition. Some forms of shammah are used as white, black, and gray powder (Agili and Park, 2012) [16].

Smokers have both increased prevalence and more severe extent of periodontal disease than in nonsmokers[17]**.** The greater severity of periodontal destruction may be due to the increase in the rate of periodontal disease progression[18] . Various data provide strong support that the risk of developing periodontal disease as measured by clinical attachment loss and alveolar bone loss increases with increased smoking[19].

Adverse oral habits such as bruxism are considered as risk factor for periodontal disease. Bruxism can have unpleasant and harmful effects on periodontium causing gingival recession, occlusal wear and trauma from occlusion[20] . Abnormal occlusal forces can cause changes in the alveolar bone and periodontal connective tissue both in the presence and in the absence of periodontitis[21] **.**

Only few studies are done in KSA with respect to prevalence of oral parafunctional habits and its influence on periodontium. Murshid Z et al [22] in their study found that prevalence of breathing disorders, bruxism, thumb-sucking and clenching habits were 20.2%. 30.2%, 16.7% and 13.6%, respectively. Bruxism was more prevalent in boys (33.1%) than girls (23.7%). Other studies reported nail‑biting habit was highly prevalent among the study participants (27.2%), followed by mouth breathing during sleeping (13.8%), thumb sucking (7.4%), and teeth clenching (6.0%) [23].

The aim of the our study was two-fold: (1) to investigate the prevalence of adverse oral habits and (2) to find its association with the periodontal status among saudi sub population of age between 15- 65 years of southern region.

## Material And Methods:-

A cross sectional study was conducted at the OPD of Periodontics, College of Dentistry, King Khalid University among new patients referred from Intern clinic for oral prophylaxis or phase 1 periodontal therapy. The study was conducted between March to June 2018 in patients between the ages of 15 to 65 years. 330 patients consented to participate and hence were included in the study. Ethical approval was sought from the institutional scientific committee. It was carried out in accordance with the code of ethics in the Declaration of Helsinki.

Patients excluded were individuals who gave history of any systemic conditions, or were taking any type of medication, periodontal therapy in last 6 months, systemic antibiotics within last 3 months along with pregnant and lactating mothers.

**Characteristics of study participants**

Complete description of the characteristics of study participants was collected according to major age strata to enable an understanding of the reasons that may account for observed differences in prevalence across studies. In this study, age was categorized as less than or equal to 25 years (I), 26- 40 (II), 41-60 (III) and above 60 years (IV). A single examiner was employed for the questionnaire and periodontal examinations to avoid bias. Probing pocket depth (PPD) (distance from FGM to the base of sulcus or periodontal pocket) were measured using a William's graduated periodontal probe placing parallel to the long axis of the tooth at each site. Each measurement was rounded to the lower whole millimeter. Clinical Attachment Loss (CAL) was calculated same using the William's graduated periodontal probe as the distance between cemento-enamel junction (CEJ) to base of pocket. Severity of periodontitis was defined as shallow when probing depth was less than or equal to 5 mm and deep when probing depth was more than 5 mm. CAL was divided into mild(1 to 2mm), moderate (3 to 4mm) and severe (equal or more than 5mm). Gingival index (GI) and plaque index (PI) were also recorded in these patients.

**Data analysis**

The collected data from patients were subjected to appropriate statistical analysis using SPSS software for Windows, Version 16.0 (SPSS Inc., Chicago, IL, USA). Frequency distribution and percentage were calculated as summary measures for editing the data. Chi-square test was used for finding significant proportion difference in various types of adverse oral habits among the participants. A calculated P value less that 0.05 is statistically significant.

## Results:-

Overall 330 patients gave consent to participate in the study, out of which 170 (51.5%) were female and 160 (48.5%) were male as shown in Table 1. Also Table 1 shows the age-wise distribution of the study participants. The age of patients as categorized were < 25(n=50), 26-40 (n=126); 41-60 (n=143) and >60 years old (n=11). Frequency distribution and percentage of different adverse oral habits in these patients are shown in Table 2. It was found that 232/330 (70.3%) had no adverse oral habits while 1/330 (0.3%) had habit of using shamah, 56/330 (17%) smoking, 5/330 (1.5%) shisha, 7/330 (2.1%) chewing tobacco, 23/330 (7%) bruxism and 6/330 (1.8%) of nail biting habit.

Table 3 shows frequency distribution and percentage of PI, GI, PPD and CAL in these patients. In patients with all types of adverse oral habits or no habits who participated in the study, majority (69.7% and 86.1%) had PI and GI of score 2 respectively. Mean probing pocket depth showed varying results 128/330 (38.8% ) normal PPD upto 3mm, 200/330 (60.6%) 3 to 5mm(Shallow) and 2/330 (0.6%) more than 5mm (Deep).Mean CAL also showed similar pattern as PPD no CAL in 37/330 (11.2%), mild 45/330 (13.6%), moderate 183/330 (55.5%) and severe in 65/330 (19.7%) among the participants.

Table 4 shows frequency distribution and percentage of periodontal status according to different adverse oral habits in the study participants. It was found that participants with adverse oral habit had PI (230/ 69.7%) and GI (284/86.1%) score of 2. With respect to mean PPD and mean CAL the participants with adverse oral habits had shallow pocket depth and moderate attachment loss. With respect to mean CAL there was statistically significant with p value 0.038.

Table 5 shows frequency distribution and percentage of adverse oral habits according to age groups and gender among the participants. It shows that male participants showed significantly increased prevalence of tobacco consumption. Among female participants 11.8% had bruxism and 3.5% nail biting habit. Parafunctional habits were found to be higher in female participants. Significant association was found among type of adverse oral habit and gender.

Table 6 shows the frequency distribution and percentage of mean PPD and CAL according to age groups and gender among the participants. It was found that participants in the middle age groups showed more of shallow PPD and moderate CAL. Statistically significant association was found between gender and mean PPD. With respect to gender more number of participants had shallow PPD and moderate CAL. Statistically significant association was found between age groups, gender and mean CAL.

## Discussion:-

To the best of our knowledge, this study is the first of its kind that explore the prevalence of adverse oral habit and its association with the periodontal status among saudi sub population of age between 15 - 65 years. Bacterial plaque is the primary cause of periodontal disease but many factors such as adverse oral habits play an important role as risk factor promoting the accumulation of plaque or progression of periodontal disease.

In this study, the number of patients consented to participate were almost equal, male (48.5%) and female (51.5%).The most prevalent adverse oral habit was the smoking (17%) and then the bruxism (7%) among the participants. The overall prevalence of tobacco use was 20.9%; the prevalence of smoking (17%), shammah (0.3 ), shisha (1.7% ) and tobacco chewing were 2.1% respectively. 34.4% of male participants were current smokers and the prevalence of the tobacco usage increased subsequently in the old age groups as compared to that in the younger age groups. The prevalence of smoking in our study was almost same to those which were reported by Jarallah JS et al. [9] which is a lower than our estimate of 17 %.

Male tend to smoke much more than female in most of the countries of the region. In our study also the smoking among female participants was lower compare to male. This results are similar to reported by Jaralla et al [9] , Fouad H et al [24] and Meysamie A et al [25].

Tobacco consumption is associated with suppression of gingival inflammation caused by plaque accumulation. The relative risk of causing periodontal disease is 5.1 fold higher with smokers compared to non-smokers [26]. In our results we found that 48.2% smokers had shallow PPD, 57.1% moderate and 32.1% severe CAL. Whereas with tobacco chewing habit it was 57.1% shallow PPD and 71.4% moderate CAL.

In this study the frequency distribution and prevalence of bruxism (7%) and nail biting was 1.8% among the participants. 11.8% of female participants had habit of bruxism compare to male with 1.9%. This finding was lower to results of Murshid Z et al [22] who reported 30.2% in their study and more prevalent with 33.1% in male than girls 23.7%, which is opposite to our results. Aloumi A et al [23] in their study reported 27.2% prevalence of nail bitting which in our study is much lower of 1.8%. The results of our study also found that 69.9% of participants with habit of bruxism had shallow PPD and 43.5% had moderate CAL.

Studies have reported prevalence of periodontal disease to be nearly 100% in adults [27,28]. However; there is a considerable range in the findings of different epidemiological studies. In this study, higher proportion of patients showed shallow mean PPD in middle age group and moderate mean CAL among same age group with statistically significant P value of .007. The results of our study were in concordance with the studies done by Hetland L et al [29] with similar results of shallow probing pocket depth more prevalent in middle age group.

Oral health education should focus on improving knowledge, attitude and removing obstacles to daily oral health care. One must aim at ascertaining and enhancing the psychological features that portray dental behaviors. Motivation and education plays critical role in altering attitude of patient and it should be the first step in treating any patient.

Our study has some limitations. First, our study is cross-sectional and hence we cannot consider causation. Second, many of our behavioral information, such as smoking are self-reported.

## Conclusion:-

The findings of this study provide an insight into the periodontal health status among the patients with adverse oral habits like tobacco consumption, bruxism or nail biting.
More significantly, the results of our study will help in planning oral health promotion programs and tobacco consumption habits cessation counseling sessions and stress management at regular interval which will help to prevent periodontal disease occurrence and progression.

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**Conflicts of Interest:**
Nil

**Table 1:**-Distribution of the study sample according to age groups and gender.

| Gender | Number | Percentage (%) | Age group | Number | Percentage (%) |
|---|---|---|---|---|---|
| **Male** | 160 | 48.5 | **15 - 25** | 50 | 15.2 |
| **Female** | 170 | 51.5 | **26-40** | 126 | 38.2 |
| **Total** | 330 | 100.0 | **41-60** | 143 | 43.3 |
| | | | **>60** | 11 | 3.3 |
| | | | **Total** | 330 | 100.0 |

**Table 2:**-Frequency distribution and percentage of different adverse oral habits

| Habits | Number | Percentage (%) |
|---|---|---|
| **No Habits** | 232 | 70.3 |
| **Shammah** | 1 | .3 |
| **Smoking** | 56 | 17.0 |
| **Shesha** | 5 | 1.5 |
| **Tobacco chewing** | 7 | 2.1 |
| **Bruxism** | 23 | 7.0 |
| **Nail biting** | 6 | 1.8 |
| **Total**l | 330 | 100.0 |

**Table 3**:-Frequency distribution and percentage of different periodontal parameters among the samples.

| Perio Parameters | Grades | | | | |
|---|---|---|---|---|---|
| | N/% | N/% | N/% | N/% | N/% |
| | 0 | 1 | 2 | 3 | Total |
| **PI** | 1/0.3 | 80/24.2 | 230/69.7 | 19/5.8 | 330/100 |
| **GI** | 1/0.3 | 35/10.6 | 284/86.1 | 10/3 | 330/100 |
| **Mean PPD** | 128/38.8 | 200/60.6 | 2/0.6 | ------ | 330/100 |
| **Mean CAL** | 37/11.2 | 45/13.6 | 183/55.5 | 65/19.7 | 330/100 |

T**able 4:**-Frequency distribution and percentage of periodontal status according to different adverse oral habits.

| Adverse oral habits | Plaque Index | | | | | P value |
|---|---|---|---|---|---|---|
| | 0(N/%) | 1(N/%) | 2(N/%) | 3(N/%) | Total(N/%) | |
| **No Habits** | 1/0.4 | 64/27.6 | 155/66.8 | 12/5.2 | 232/100 | $0.265^{ns}$ |
| **Shammah** | 0/0 | 0/0 | 1/100 | 0/0 | 1/100 | |
| **Smoking** | 0/0 | 4/7.1 | 46/82.1 | 6/10.76 | 56/100 | |
| **Shesha** | 0/0 | 0/0 | 5/100 | 0/0 | 5/100 | |
| **Tobacco chewing** | 0/0 | 1/14.3 | 6/85.7 | 0/0 | 7/100 | |
| **Bruxism** | 0/0 | 9/39.1 | 14/60.9 | 0/0 | 23/100 | |
| **Nail biting** | 0/0 | 2/33.3 | 3/50 | 1/16.7 | 6/100 | |
| **Total** | 1/3 | 80/24.2 | 230/69.7 | 19/5.8 | 330/100 | |
| **Adverse oral habits** | **Gingival Index** | | | | | **P value** |
| | 0(N/%) | 1(N/%) | 2(N/%) | 3(N/%) | Total(N/%) | |
| **No Habits** | 1/0.4 | 30/12.9 | 197/84.9 | 4/1.7 | 232/100 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Shammah** | 0/0 | 0/0 | 1/100 | 0/0 | 1/100 | |
| **Smoking** | 0/0 | 4/7.1 | 47/83.9 | 5/8.9 | 56/100 | |
| **Shesha** | 0/00 | 0/0 | 5/100 | 0/0 | 5/100 | $0.441^{ns}$ |
| **Tobacco chewing** | 0/0 | 0/0 | 7/100 | 0/0 | 7/100 | |
| **Bruxism** | 0/0 | 1/4.3 | 22/95.7 | 0/0 | 23/100 | |
| **Nail biting** | 0/0 | 0/0 | 5/83.3 | 1/16.7 | 6/100 | |
| **Total** | 1/3 | 35/10.6 | 284/86.1 | 10/3 | 330/100 | |
| **Adverse oral habits** | **Mean PPD** | | | | **P value** | |
| | **0(N/%)** | **1(N/%)** | **2(N/%)** | Total **(N/%)** | | |
| **No Habits** | 85/36.6 | 147/63.4 | 0/0 | 232/100 | | |
| **Shammah** | 0/0 | 1/100 | 0/0 | 1/100 | | |
| **Smoking** | 27/48.2 | 27/48.2 | 2/3.6 | 56/100 | | |
| **Shesha** | 3/60 | 2/40 | 0/0 | 5/100 | $0.206^{ns}$ | |
| **Tobacco chewing** | 3/42.9 | 4/57.1 | 0/0 | 7/100 | | |
| **Bruxism** | 7/30.4 | 16/69.6 | 0/0 | 23/100 | | |
| **Nail biting** | 3/50 | 3/50 | 0/0 | 6/100 | | |
| **Total** | 128/38.8 | 200/60.6 | 2/2 | 330/100 | | |

| **Adverse oral habits** | **Mean CAL** | | | | | **P value** |
|---|---|---|---|---|---|---|
| | **0(N/%)** | **1(N/%)** | **2(N/%)** | **3(N/%)** | Total **(N/%)** | |
| **No Habits** | 28/12.1 | 32/13.8 | 130/56 | 42/18.1 | 232/100 | |
| **Shammah** | 0/0 | 0/0 | 1/100 | 0/0 | 1/100 | |
| **Smoking** | 0/0 | 6/10.7 | 32/57.1 | 18/32.1 | 56/100 | |
| **Shesha** | 0/0 | 1/20 | 3/60 | 1/20 | 5/100 | 0.038* |
| **Tobacco chewing** | 0/0 | 1/14.3 | 5/71.4 | 1/14.3 | 7/100 | |
| **Bruxism** | 6/26.1 | 4/17.4 | 10/43.5 | 3/13 | 23/100 | |
| **Nail biting** | 3/50 | 1/16.7 | 2/33.3 | 0/0 | 6/100 | |
| **Total** | 37/11.2 | 45/13.6 | 183/55.5 | 65/19.7 | 330/100 | |

ns=not significant; *=significant when p (less than 0.05)

**Table 5:-**Frequency distribution and percentage of adverse oral habits according to age groups and gender.

| **Habit** | **Gender** | | **Age Groups** | | | | |
|---|---|---|---|---|---|---|---|
| | **Male N/%** | Female **N/%** | 10 – 25 **N/%** | 26 – 40 **N/%** | 41 – 60 | More than 60 **N/%** | Total **N/%** |
| **No Habits** | 89/55.6 | 143/84.1 | 30/60 | 79/62.7 | 113/79 | 10/90.9 | 232/70.3 |
| **Shammah** | 1/0.6 | 0/0 | 0/0 | 1/0.8 | 0/0 | 0/0 | 1/0.3 |
| **Smoking** | 55/34.4 | 1/0.6 | 11/22 | 30/23.8 | 15/10.5 | 0/0 | 56/17 |
| **Shesha** | 5/3.1 | 0/0 | 0/0 | 2/1.6 | 3/2.1 | 0/0 | 5/1.5 |
| **Tobacco chewing** | 7/4.4 | 0/0 | 3/6 | 3/2.4 | 1/0.7 | 0/0 | 7/2.1 |
| **Bruxism** | 3/1.9 | 20/11.8 | 4/8 | 8/6.3 | 10/7 | 1/9.1 | 23/7 |
| **Nail biting** | 0/0 | 6/3.5 | 2/4 | 3/2.4 | 1/0.7 | 0/0 | 6/1.8 |
| **Total** | 160/100 | 170/100 | 50/100 | 126/100 | 143/100 | 11/100 | 330/100 |
| **P value** | .0008* | | $.136^{ns}$ | | | | |

ns=not significant; *=significant when p (less than 0.05)

**Table 6:-**Frequency distribution and percentage of mean PPD and CAL according to age group and gender.

| **Age Group** | **Mean PPD** | | | **Total** | **P Value** |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | | |
| **15 – 25** (N / %) | 20/40 | 30/60 | 0/0 | 50/100 | |
| **26-40** (N / %) | 55/43.7 | 71/56.3 | 0/0 | 126/100 | |

| | | | | | |
|---|---|---|---|---|---|
| **41-60** (N / %) | 51/35.7 | 90/62.9 | 2/1.4 | 143/100 | 0.391[ns] |
| **>60** (N / %) | 2/18.2 | 9/81.8 | 0/0 | 11/100 | |
| **Total** (N / %) | 128/38.8 | 200/60.6 | 2/0.6 | 330/100 | |

| **Gender** | **Mean PPD** | | | **Total** | **P Value** |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | | |
| **Male** (N / %) | 74/46.3 | 84/52.5 | 2/1.3 | 160/100 | .007* |
| **Female** (N / %) | 54/31.8 | 116/68.2 | 0/0 | 170/100 | |
| **Total** (N / %) | 128/38.8 | 200/60.6 | 2/0.6 | 330/100 | |

| **Age Group** | **Mean CAL** | | | | **Total** | **P Value** |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | | |
| **15 – 25** (N / %) | 12/24 | 10/20 | 22/44 | 6/12 | 50/100 | .007* |
| **26-40** (N / %) | 13/10.3 | 19/15.1 | 75/59.5 | 19/15.1 | 126/100 | |
| **41-60** (N / %) | 12/8.4 | 15/10.5 | 81/56.6 | 35/24.5 | 143/100 | |
| **>60** (N / %) | 0/0 | 1/9.1 | 5/45.5 | 5/45.5 | 11/100 | |
| **Total** (N / %) | 37/11.2 | 45/13.6 | 183/55.5 | 65/19.7 | 330/100 | |

| **Gender** | **Mean CAL** | | | | **Total** | **P Value** |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | | |
| **Male** (N / %) | 3/1.9 | 18/11.3 | 99/61.9 | 40/25 | 160/100 | 0.000* |
| **Female** (N / %) | 34/20 | 27/15.9 | 84/49.4 | 25/14.7 | 170/100 | |
| **Total** (N / %) | 37/11.2 | 45/13.6 | 183/55.5 | 65/19.7 | 330/100 | |

ns=not significant; *=significant when p (less than 0.05)

## References:-


1. Benjamin RM. Oral health: The silent epidemic. Public Health Rep. 2010;125:158–9.
2. Fenesy KE. Periodontal disease: An overview for physicians. Mt Sinai J Med. 1998;65:362–9.
3. Bergstrom J. Smoking rate and periodontal disease prevalence: 40-year trends in Sweden, 1970-2010. J Clin Periodontol. 2014;41:952–7.
4. Reners M, Brecx M. Stress and periodontal disease. Int J Dent Hyg. 2007;5:199–204.
5. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012;380:2224–60.
6. Samman MA, Bowen ID, Taiba K, Antonius J, Hannan MA . Mint prevents shamma induced carcinogenesis in hamster cheek pouch. Carcinogenesis.1998; 19: 1795–801.
7. Mokdad AH, Jaber S, Aziz MIA, AlBuhairan F, AlGhaithi A, AlHamad NM, et al. The state of health in the Arab world, 1990–2010: an analysis of the burden of diseases, injuries, and risk factors. Lancet. 2014;383:309–20.
8. Memish ZA, Jaber S, Mokdad AH, AlMazroa MA, Murray CJL, Al Rabeeah AA. Saudi Burden of Disease Collaborators: Burden of disease, injuries, and risk factors in the Kingdom of Saudi Arabia, 1990-2010. Prev Chronic Dis 2014, 11:E169.
9. Jarallah JS, Al-Rubeaan KA, Al-Nuaim ARA, Al-Ruhaily AA, Kalantan KA. Prevalence and determinants of smoking in three regions of Saudi Arabia. Tob Control. 1999;8:53–6.
10. Al-Turki KA, Al-Baghli NA, Al-Ghamdi AJ, El-Zubaier AG, Al-Ghamdi R, Alameer MM. Prevalence of current smoking in Eastern province, Saudi Arabia. East Mediterr Health J. 2010;16:671–676.
11. Al-Turki YA. Smoking habits among medical students in Central Saudi Arabia. Saudi Med J. 2006;27:700–3.
12. Al Obaikan AH. WHO STEPwise Approach to NCD Surveillance. Countryspecific Standard report, Saudi Arabia, 2005. J Fam Community Med.2014;21:147–53.
13. Abdel Rahim B-eE, Mahfouz MS, Yagoub U, Solan YMH, Alsanosy RM. Practice and Attitude of Cigarette Smoking: A Community-Based Study. 2014;PLoS ONE 9(4): e92939.
14. Al-Khashan HI, Al Sabaan FS, Al Nasser HS, Al Buraidi AA, Al Awad AD, Horaib GB, et al. The prevalence of smoking and its associated factors among military personnel in Kingdom of Saudi Arabia: A national study. J Fam Community Med. 2014;21:147.

15. Scheifele C, Nassar A, Reichart P . Prevalence of oral cancer and potentially malignant lesions among shammah users in Yemen. Oral Oncol.2007; 43, 42–50.
16. Al Agili DE, Park HK. . The prevalence and determinants of tobacco use among adolescents in Saudi Arabia. J Sch Health. 2012; 82, 131-8.
17. Tonetti M. S. Cigarette smoking and periodontal diseases: etiology and management of disease. Annals of Periodontology. 1998; 3(1): 88-101.
18. Van Dyke T. E, & Dave S. Risk factors for periodontitis. Journal of the International Academy of Periodontology. 2005; 7(1): 3.
19. Renvert S, Dahlen G, Wikstrom M. The clinical and microbiological effects of non-surgical periodontal therapy in smokers and non-smokers. J Clin Periodontol. 1998; 25: 153-7.
20. Leof M. Clamping and grinding habits; their relation to periodontal disease. The Journal of the American Dental Association. 1944; 31(3): 184-194.
21. Kato T., Thie N. M. R., Montplaisir J. Y., & Lavigne G. J. Bruxism and orofacial movements during sleep. Dental Clinics of North America. 2001; 45(4): 657-684.
22. Murshid Z, Phil M, Abdulaziz AM, Amin HE, Al‐Nowaiser AM. Assessment of parafunctional oral habits among a sample of Saudi dental patients. Med Sci 2007;14:35‐47.
23. Aloumi A, Alqahtani A, Darwish A. Oral parafunctional habits among preschool children in Riyadh,Saudi Arabia. Saudi J Oral Sci. 2018;5:22-7.
24. Fouad H, Awa FE, Naga RAE, Emam AH, Labib S, Palipudi KM, Andes LJ, Asma S, Talley B: Prevalence of tobacco use among adults in Egypt, 2009. Glob Health Promot 2013 Sep 16. [Epub ahead of print], doi:10.1177/ 1757975913499801.
25. Meysamie A, Ghaletaki R, Haghazali M, Asgari F, Rashidi A, Khalilzadeh O, et al. Pattern of tobacco use among the Iranian adult population: results of the national Survey of Risk Factors of Non-Communicable Diseases (SuRFNCD-2007). Tob Control. 2010;19:125–8.
26. Natto .S, et al .Tobacco smoking and periodontal health in a Saudi Arabian population.J Periodontol.2005 Nov;76(11):1919-26.
27. Kumar S, Dagli RJ, Chandrakant D, Prabu D, Suhas K. Periodontal status of green marble mine labourers in Kesariyaji, Rajasthan, India. Oral Health Prev Dent. 2008;6:217‐21.
28. Shaikh H, Shankar S, Vinay S. Assessment of periodontal status and treatment needs among beedi factory employees Harapanahalli town, Davangere district, Karnataka. J Indian Acad Dent Spec. 2011;2:13‐7.
29. Hetland L, Midtun N, Kristoffersen T. Effect of oral hygiene instructions given by paraprofessional personnel. Community Dent Oral Epidemiol. 1982;10:8‐14.