Oral cleanliness and periodontal health status among coffee-shop workers in Najaf city / Iraq

Amjed M. Sahib B.D.S(1)  
Nada J. Radhi, B.D.S., M.Sc., Ph.D. (2)

ABSTRACT

Background: Water-pipe can be defined as a single or multi stemmed device that used to vaporize and smoke flavored tobacco whose smoke is passed via water vase before inhalation. Water-pipe smokers are at risk of exposure to many toxic chemicals that are not filtered by water, as well as risk of infectious diseases when the mouth piece of the water-pipe is shared. This study was carried out to investigate the effect of water pipe on the oral health.

Materials and Methods: Sixty persons were included in this study aged between 22 and 23 years. Forty persons were coffee shop workers for at least five years, half of them were water-pipe smokers (active smokers) and the other weren’t smokers (passive smoker), the last group was the control group which includes twenty non-smoker students matching the study group in the age, gender and geographical location. They had been diagnosed for plaque index of Silness and Leo in1964, calculus index according to calculus component of the Periodontal Disease Index, [PDI] of Ramfjord 1959 and gingival index of Löe and Silness 1963 as well as loss of attachment according to criteria of WHO in1997. The values of the present study were subjected to statistical analysis by Statistical Package for Social Sciences version 20 to specify the statistical differences between the three groups. The Kruskal-walls test was used to determine the statistical significance of difference between the three groups. Mann-Whitney test was used to assess the statistical significance of difference between each 2 groups.

Results: The mean rank values of dental plaque were recorded to be the highest among the coffee shop workers who were active water-pipe smokers group followed by the workers who were passive water-pipe smokers then control with statistically highly significant difference. Similar results were obtained concerning gingival and calculus indices with statistically highly significant difference. There is no significant difference concerning the attachment loss attachment loss among water-pipe smokers and the control group.

Conclusions: this study concluded that water-pipe smoking is negatively associated with the oral cleanliness and gingival health.

Keywords: water-pipe, plaque, calculus and periodontal disease  
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INTRODUCTION

Water-pipe considered as a device used by millions of people in order to smoke tobacco and other substances, such as molasses, flavoring agents and herbal medicaments, it works by heating up the air by charcoal then it passes via perforated aluminum foil toward the tobacco and other constituents then the air is cooled by water in the bowl before it will be inhaled by the smokers to reach their lungs (1). It was found that one gathering of water-pipe can consume smoke volume reaches to one hundred times more than cigarette (2). Water-pipe contains about 70 chemical compounds that can directly cause cancer, in addition to other constituents which considered as cancer promoters (3).

Periodontal disease is a chronic bacterial infection characterized by a complex inflammation of the tooth supporting tissues including gingiva, periodontal ligament, cementum and alveolar bone; it includes gingivitis and periodontitis (4). Studies revealed that water-pipe smoking may adversely aggravate the gingival health and increase the occurrence as well as the severity of the periodontal disease (5,6).

On the other hand, dental plaque is a sticky soft non-mineralized bacterial deposit that can be recognized clinically when it reaches a certain thickness. It forms and firmly adhere to the hard surfaces in the oral cavity including the teeth, removable and fixed restorations (7,8), it considered as a primary causative factor of caries and periodontal disease (9). Authors found that dental plaque was higher among water-pipe smokers than those who were non-smokers (10,11). Others studied the relationship between tobacco in cigarette to dental plaque and they reached to similar results (12-14). While Bergström et al. (15) didn’t find any significant difference between the smokers and non-smokers (15).

Dental calculus is a hard deposit that forms by dental plaque mineralization, it has a rough surface and considered as an ideal medium for further plaque deposition that threatening the gingival health (8). Javed et al (11) demonstrated that dental calculus index was higher among water-pipe smokers when compared with those who were non-smokers.

The aim of this study was to investigate the oral health status including oral cleanliness and gingival health among active and passive water-pipe smoking groups in comparison to the control group. As far as, no Iraqi study was conducted to investigate the negative effects of water pipe smoking on oral health among coffee shop workers. 

(1) Ministry of Health, Al-Najaf, Iraq.
(2) Assistant Professor, Department of Pedodontics and Preventive Dentistry, College of Dentistry, University of Baghdad.
MATERIALS AND METHODS

Tousi University College to examine their students as a part of the sample without obligation, to ensure cooperation from college authority. The study included sixty male persons, aged between 22 and 23 years old who lived in Najaf city/ Iraq. They were divided into three equal groups: coffee shop workers for at least five years and considered as water-pipe smokers (active smokers), coffee shop workers for similar period but without being smoker to the water pipe (passive smokers), the last group was the control group who were without history of active nor passive smoking.

Clinical examination to the sample was performed by using plane mouth mirror and dental probe. In this study dental plaque was coded according to the criteria described by Silness and Leo 1964 in which the examination included only six teeth of the permanent dentition which were 16, 12, 24, 36, 32 and 44. Meanwhile, dental calculus was calculated according to calculus component of the Periodontal Disease Index, (PDI) of Ramfjord 1959 (18). Gingival inflammation was evaluated by the application of Gingival Index (GI) of Löe and Silness 1963 (17).

Loss of attachment was measured by community periodontal index (CPI) (19).

The values of the present study were subjected to statistical analysis by using SPSS version 20 (Statistical Package for Social Sciences) to specify the statistical differences between the three groups. Non-normally distributed variables were conveniently described by median and mean rank. The Kruskal-wallis test was used to determine the statistical significance of difference between the three groups. However, Mann-Whitney test was used to assess the statistical significance of difference between each two groups. P value of less than or equal the 0.05 level of significance was considered to be statistically significant.

This study was carried out during the period from the end of November, 2017 till the end of February, 2018. The consent was gained from Ash-Sheikh Al-

RESULTS

Table (1) shows the median and mean rank of plaque index among different water-pipe smoking categories, the mean rank of plaque index was higher among active water-pipe smoker category (p < 0.001), followed by passive water-pipe smoker category then the control category. Mann-Whitney test was used to compare between each two categories of water-pipe smoking. The result showed that the plaque index (PI), represented by mean rank, was lower among the control category than the active water-pipe smoking category with highly significance (Z=4.457, P= 0.000), and lower than the passive water-pipe smoking category with highly significant difference (Z=3.180, P=0.004). While the mean rank among the active water-pipe smoking was higher than passive water-pipe smoking category. However, there was no statistical significance difference between the active water-pipe and the passive water-pipe smoking category (Z=1.277, P=0.604).

The mean rank of calculus index according to the categories of water-pipe smoking is shown in Table (2). Higher value of mean rank was observed among the active water-pipe smoking category, compared to the passive water-pipe smoking and control categories with statistically highly significant difference (P≤ 0.01). Highly significant difference was found between the control and the active category and between the control with the passive water-pipe smoking categories separately (Z=5.222, 3.481; P= 0.000, 0.001 respectively). Although, the mean rank for active water-pipe smoking categories was more than passive water-pipe smoking category, there was no statistical significant differences (Z=1.741, P= 0.245).

Table 1: plaque index (Median, Mean Rank) among water-pipe smokers in comparison to control group.

| Water-pipe smoking categories | No | Median | Mean rank | Statistical differences | Pair wise comparison | Adjustment significance |
|-------------------------------|----|--------|-----------|-------------------------|---------------------|------------------------|
| Active smokers                | 20 | 1.58   | 41.05     | 21.071                  | 0.000**             | Active smoker × control |
| Passive smokers               | 20 | 1.40   | 34.00     |                         | Passive smoker × control | 0.004**               |
| Control                       | 20 | 0.35   | 16.45     |                         | Active smoker × Passive smoker | 0.604 |

** Highly significant P ≤ 0.01
Table 2: Calculus index (Median, Mean Rank) among water-pipe smokers in comparison to control group.

| Water-pipe smoking categories | No | Median | Mean rank | Statistical differences | Pair wise comparison | Adjustment significance |
|-------------------------------|----|--------|-----------|-------------------------|---------------------|------------------------|
| Active smokers                | 20 | 0.25   | 43.00     | 28.278                  | 0.000**             | Active smoker × control|
| Passive smokers               | 20 | 0.17   | 33.63     | 0.001**                 | Passive smoker × control |
| Control                       | 20 | 0.00   | 14.88     |                         | Active smoker × Passive smoker | 0.245                 |

** Highly significant P ≤ 0.01

The mean rank of gingival index for the water-pipe smoking categories is shown in Table (3). Higher value of mean rank was observed among the active water-pipe smokers category, compared to the other groups with statistically highly significant difference (P=0.005). Regarding the differences between each two groups, there was highly significant difference between the control with the active group and between the control with the passive water-pipe smokers categories (Z= 3.984, 3.549; P=0.000, 0.001 respectively). In spite of the mean rank of the gingival index for the active water-pipe smoking category was more than that of the passive water-pipe smoking category, there was no statistical significant differences (Z=0.435, P=1.000). Concerning the severity of the gingival inflammation among the subjects according to different categories of water-pipe smoking, mild type gingivitis was higher among the control category than other categories. For moderate type gingivitis, it was more among active water-pipe smoking category. While sever gingivitis was observed among active water-pipe smokers only (Table 4). Concerning attachment loss, in the present study there was no attachment loss recorded among neither the control group nor the active water-pipe smokers. However, among the passive smokers attachment loss was observed among one person only at one tooth and it was recorded as a (degree 1) among one person only, at one tooth (four surfaces).

Table 3: Gingival index (Median, Mean Rank) among water-pipe smokers in comparison to control group with statistical difference.

| Water-pipe smoking categories | No | Median | Mean rank | Statistical differences | Pair wise comparison | Adjustment significance |
|-------------------------------|----|--------|-----------|-------------------------|---------------------|------------------------|
| Active smokers                | 20 | 1.54   | 38.63     | 19.103                  | 0.000**             | Active smoker × control|
| Passive smokers               | 20 | 1.48   | 36.23     |                         | Passive smoker × control | 0.001**                 |
| Control                       | 20 | 0.33   | 16.65     |                         | Active smoker × Passive smoker | 1.000                 |

** Highly significant P ≤ 0.01

Table 4: Distribution of water-pipe smokers and the control groups according to severity of gingivitis

| Water-pipe smoking categories | Active smokers | Passive smokers | Control |
|-------------------------------|----------------|-----------------|---------|
| No | % | No | % | No | % |
| Mild (0.1-1)                  | 2 | 10.0 | 5 | 25.0 | 16 | 80.0 |
| Moderate (1.1-2)              | 16 | 80.0 | 15 | 75.0 | 4 | 20.0 |
| Sever (2.1-3)                 | 2 | 10.0 |  - |  - |  - |  - |
Discussion

In the present study, plaque index was higher among the active water-pipe smokers followed by the passive smokers than the control with a statistically significant difference and this result was in consistent with other studies (10,11). This result is agrees with previous studies done on cigarette smoking (12,13) that explained this heterogeneity in plaque level by differences in presence of periodontal pathogens between tobacco smokers and non-smokers. Also the result of present study was in agreement with Darby et al. (16) who assumed that the smoking increases the periodontal pathogens. Thus, increase plaque accumulation may be due to other reasons rather than smoking such as poor oral hygiene (20). On the other hand, other study didn’t find a significant difference in plaque level between tobacco smokers and non-smokers (12).

The present study revealed that the calculus index was higher among active and passive smokers than control group. This result was in agreement with Bibars et al. (10) and Javed et al. (11). While it disagreed with a study of Jenkins et al. (20) who studied the association between tobacco at cigarette and calculus formation and they disproved any correlation and assuming that there were many factors affect dental calculus including the amount of dental plaque, and poor oral health.

In order to provide precise evidence of the relationship between the amount of the gingival inflammation and dental plaque, the gingival index of Silness and Loe (17) was used together with the plaque index of Silness and Loe (18). These indices were used because their application was easy in addition to their flexibility which provides the possibility of selection of certain teeth for examination rather than the whole dentition and the minimum duration of the examination (21). In this study gingival index was significantly higher among active and passive water-pipe smokers than the control group while there was no significant difference between active and passive smokers, this result was in agreement with many studies (6,22, 23). While it disagreed with others (11,24) who stated that smoking lead to reduced inflammatory response, this finding was in coincide with numerous epidemiological and clinical studies reported previously with regard to cigarette smoking (25-29).

Palmer et al. (29) illustrated the correlation between tobacco and periodontal disease by the effect of tobacco in decreasing oxygen and other blood constituents to reach gingiva which would reducing the capacity to remove tissue waste products leading to compromising the immune response and the periodontal tissue destruction. In addition, Hanikoa et al. (30) assumed that gingival health could be affected by smoking due to functional impairment in the gingival microcirculation, which might be associated with alteration of the subgingival micro-flora. While Scott & Singer (31) reached to similar results and they hypothesized that tobacco was responsible for restriction of periodontal angiogenesis responsiveness to dental plaque bacteria, they suggested that tobacco smoking components could restrict the periodontal angiogenesis in response to plaque bacteria. Data of the current study showed that there was no impact of the water-pipe on the loss of attachment since there wasn’t a significant difference between water-pipe smokers and control group. This result disagreed with other studies (10,11) since they reached that tobacco smoking lead to up regulation of pro-inflammatory cytokine that lead to attachment loss and bone loss. The heterogeneity in prevalence of attachment loss among water-pipe smokers may be attributed to the age included in the sample that was not exceed 23 years.

CONCLUSION

This study concluded that water-pipe smoking might contribute to increase the susceptibility to periodontal disease, in addition to its role in rising both plaque and calculus levels that negatively affect the oral health.

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