

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

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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 in 1964, calculus index according to calculus component of the Periodontal Disease Index, (PDI) of Ramfjord 1959 and gingival index of Löe and Sillness 1963 as well as loss of attachment according to criteria of WHO in 1997. 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-wallis 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 among water-pipe smokers and the control group.

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

Keywords: water-pipe, plaque, calculus and periodontal disease (Received: 11/8/2018; Accepted: 16/9/2018)

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 medicament, 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).

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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 cleanness 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 shops workers.

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⁽¹⁶⁾ 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 evaluated 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 Sillness 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 ($P \leq 0.01$). 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
				Chi- value	P		
Active smokers	20	1.58	41.05	21.071	0.000**	Active smoker × control	0.000**
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 $P \leq 0.01$

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
				Chi- value	P		
Active smokers	20	0.25	43.00	28.278	0.000**	Active smoker × control	0.000**
Passive smokers	20	0.17	33.63			Passive smoker × control	0.001**
Control	20	0.00	14.88			Active smoker × Passive smoker	0.245

** Highly significant $P \leq 0.01$

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 severe 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
				Chi- value	P		
Active smokers	20	1.54	38.63	19.103	0.000**	Active smoker × control	0.000**
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 $P \leq 0.01$

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 results 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 Loe and Sillness⁽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, Hanioka *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.

REFERENCES

1. World Health Organization: TobReg Advisory Note. Water-pipe tobacco smoking: health effects, research needs and recommended actions by regulators Geneva: World Health Organization. 2005.
2. Aljarrah K, Ababneh Q, Delaimy W. Perceptions of hookah smoking harmfulness: predictors and characteristics among current hookah users. *Tobacco Induced Diseases*. 2009; 5:16.
3. Hashim, R., Thomson, W.M. And Pack, A.R. Smoking in adolescence as a predictor of early loss of periodontal attachment. *Community Dent Oral Epidemiol*. 2001; 29(2), pp.130-135.
4. Yamamoto, M., Kobayashi, R., Kono, T., Bolerjack, B., Gilbert, R. Induction of IL-10-producing CD4T-cells in Chronic Periodontitis. *J Dent Res*2011; 90(5): 653-658.
5. Waziry R, Jawad M, Ballout RA, Al Akel M, Akl EA. The effects of waterpipe tobacco smoking on health outcomes: an updated systematic review and meta-analysis. *Int J Epidemiol*. 2017. Epub ahead of print.
6. Ramoa CP, Eissenberg T, Sahingur SE. Increasing popularity of waterpipe tobacco smoking and electronic cigarette use: implications for oral healthcare. *J Periodontal Res*. 2017; 52:813-23.
7. Dumitrescu AL. Etiology and pathogenesis of periodontal disease. New York: Springer, 2010.
8. Marya A. Textbook of public health dentistry.1st ed. Jaypee Brothers, New Delhi, 2011.
9. Kumar S, Patel S, Tadakamadla T, Tibdewal J, Duraiswamy P, Kulkarni S. Effectiveness of a mouthrinse

- containing active ingredients in addition to chlorhexidine and triclosan compared with chlorhexidine and triclosan rinses on plaque, gingivitis, supragingival calculus and extrinsic staining. *Int J Dent Hygiene*. 2013; 11: 35-40. Cited.
10. Bibars AR, Obeidat SR, Khader Y, Mahasneh AM, Khabour OF. The effect of waterpipe smoking on periodontal health. *Oral Health Prev Dent* 2015;13:253-259.
 11. Javed F, Al-Kheraif AA, Rahman I, Millan-Luongo LT, Feng C, Yunker M, Malmstrom H, Romanos GE. Comparison of Clinical and Radiographic Periodontal Status Between Habitual Water-Pipe Smokers and Cigarette Smokers. *J Periodontol* 2016;87:142-147.
 12. Stoltenberg JL, Osborn JB, Pihlstrom BL, Herzberg MC, Aeppli DM, Wolff LF, et al. Association between cigarette smoking, bacterial pathogens, and periodontal status. *J Periodontol*. 1993; 64:1225-1230.
 13. Preber H., Linder L., Bergström J. Periodontal healing and periopathogenic microflora in smokers and non-smokers. *J Clin Periodontol*. 1995; 22:946-952.
 14. Darby IB, Hodge PJ, Riggio MP, Kinane DF. Microbial comparison of smoker and non-smoker adult and early-onset periodontitis patients by polymerase chain reaction. *J Clin Periodontol*. 2000; 27:417-424
 15. Bergström J, Eliasson S., Preber H. Cigarette smoking and periodontal bone loss. *J Periodontol*. 1991; 62:242-246.
 16. Silness J, Loe H. periodontal disease in pregnancy. Correlation between oral hygiene and periodontal condition. *Acta Odont Scand* 1964; 22: 121-35.
 17. Loe H, Silness J. Periodontal disease in pregnancy I. *Acta Odont Scand* 1963; 21:533-551.
 18. Ramfjord S. Indices for prevalence and incidence of periodontal disease. *J. periodontal*. 1959; 30: 51-9.
 19. World Health Organization. Oral health surveys. Basic methods. 4th ed. Geneva. 1997.
 20. Jenkins C, Pham XD, Do HN, et al (1997). Tobacco use in Vietnam. Prevalence, predictor and the role of the transnational tobacco corporations. *JAMA* 277: 1726-1731.
 21. Ciancio SG. Current status of indices of gingivitis. *Journal of Clinical Periodontology* 1986; 13:5. 375-378.
 22. Albandar JM, Streckfus CF, Adesanya MR, Winn DM. Cigar, pipe, and cigarette smoking as risk factors for periodontal disease and tooth loss. *Journal of Periodontology*. 2000;71:1874-1881.
 23. Akl, E.A., Gaddam, S., Gunukula, S.K., Honeine, R., Abou Jaoude, P., Irani, J. The effects of waterpipe tobacco smoking health outcomes: a systematic review. *International Journal of Epidemiology*. 2010; 39, 834-857.
 24. Natto S, Baljoon M, Dahlen G, Bergstrom J. Tobacco smoking and periodontal microflora in a Saudi Arabian population. *J Clin Periodontol* 2005; 32:549-555.
 25. Bergstrom J, Floderus-Myrhed B. Co-twin control study of the relationship between smoking and some periodontal disease factors. *Community Dent oral Epidemiol* 1983; 11, 113-116.
 26. Preber H, Bergström J (1985b). Occurrence of gingival bleeding in smokers and nonsmokers patients. *Acta Odontol Scand* 43: 315-320.
 27. Danielsen B, Mannji F, Nagelkerke N, Fegerrskov O, Baelum V. Effect of cigarette smoking on the transition dynamics in experimental gingivitis. *J Clin Periodontol* 1990; 17:159-164.
 28. Lie M, Timmerman M, Valden U, Weijde n G. Evaluation of two methods to assess gingival bleeding in smokers and non-smokers in natural and experimental gingivitis. *J Clin Periodontol* 1998; 25: 695-700.
 29. Palmer R, Scott D, Meekin T, Poston R, Odell E, Wilson R. Potential mechanisms of susceptibility to periodontitis in tobacco smokers. *J Periodontol* 1999; 34: 363-369.
 30. Hanioka T, Tanaka M, Ojima M, Takaya K, Matsumori Y, Shizukuishi S. Oxygen sufficiency in the gingiva of smokers and non-smokers with periodontal disease. *J Periodontol* 2000; 71: 1846-1851.
 31. Scott D, Singer D. Suppression of vert gingival inflammation in tobacco smokers-clinical and mechanistic considerations. *Int J Dent Hygiene* 2004; 2:104-110.

المستخلص

الخلاصة: الأركيلة هي عبارة عن أداة ذات جذع منفرد أو متعدد يستعمل لتبخير وتدخين التبغ المنكه، حيث يتم تمرير الدخان خلال وعاء يحتوي على ماء قبل الاستنشاق. يتعرض مدخنو الأركيلة إلى العديد من المواد الكيميائية السامة التي لا يصفوها وعاء الماء بالإضافة إلى خطر انتقال الأمراض المعدية في حال مشاركة الجزء القوي من الأركيلة.

هدف الدراسة: اجريت هذه الدراسة لتتحرى عن نظافة الفم وصحة اللثة بين مدخني الأركيلة. المواد والطرق: شملت الدراسة 60 شخص تتراوح اعمارهم بين 22 و 23 عاما. تشمل 40 عاملا من عمال المقاهي لمدة لا تقل عن خمس سنوات نصفهم من مدخني الأركيلة والنصف الاخر غير مدخنين (مدخنين سلبيين). اما المجموعة الاخيرة فهي المجموعة الضابطة والتي شملت عشرين طالبا من غير المدخنين ومطابقين لمجموعة الدراسة في السن والجنس والمكان الجغرافي. تم قياس مؤشر الصفيحة الجرثومية للأسنان وتم قياس صحة اللثة حسب مواصفات مؤشر اللثة ومؤشر الترسبات الكلسية القوية كما وتم تقييم فقدان الالتصاق حسب مواصفات منظمة الصحة العالمية 1997.

النتائج: تم تسجيل القيم الوسطية للصفائح الجرثومية للأسنان لتكون الاعلى بين عمال المقاهي من المدخنين للأركيلة يليها العمال الغير مدخنين (المدخنين السلبيين) ثم المجموعة الضابطة مع وجود اختلافات معنوية عالية ($P < 0.001$). كما تم الحصول على نتائج مماثلة فيما يتعلق بمؤشر اللثة ومؤشر الترسبات الكلسية مع وجود اختلافات معنوية عالية ($P < 0.001$). اما فيما يتعلق بفقدان الالتصاق، لم يكن هناك اختلاف ذو قيمة احصائية عالية بين مدخني الأركيلة والمجموعة الضابطة. الاستنتاجات: خلصت هذه الدراسة إلى ان تدخين الأركيلة يرتبط سلبا مع صحة الفم وصحة اللثة.