DOI: 10.37988/1811-153X_2024_4_12

The effects of smoking on periodontal health among dental students at Basrah Dental College: Consumption patterns and risk factors

R.A. Radhi,
assistant lecturer of the Periodontology Department
H.J. Jebur,
assistant lecturer of the Periodontology Department
S.A. Jabbar,
assistant lecturer of the Oral diagnosis Department

University of Basrah, 61001, Basrah, Iraq

Abstract. Cigarette smoking is a risk factor for several diseases, and recent evidence strongly suggests an adverse effect on periodontal health. Nevertheless, the nature of the relationship between smoking and periodontal disease is not clear. Smoking causes defects in neutrophil function, impairs inflammatory and immune responses to periodontal pathogens, and exerts both systemic and local effects. **Aims.** This study aimed to assess periodontal health of smoker and nonsmoker under graduated dental students and to determine the possible factor of smoking and its effect on periodontal health. **Material and methods.** In this study, 118 dental student participants (males only) between 18—25 years from 450 male under graduated dental student fit to the criteria of our research, were divided in two groups,61 smoker student and 57 non-smoker students. Demographic data, smoking status, and clinical periodontal parameter including plaque index (PI), pocket depth (PD), tooth mobility and bleeding on probing (BOP) indices were determined for each participant. **Results.** Smokers had a slightly higher PI (0.803±0.483) than that of nonsmokers (0.609±0.397, p=0.018). BOP and pocket depth tend to be greater in smokers (BOP=0.14±0.10 and PD=0.97±1.90 mm) than nonsmoker (BOP=0.13±0.09 and PD=0.72±1.57 mm). The greater percentage of students had started smoking due to friends' influence (72%). There is a positive correlation between PD and PI for smokers (p=0.046). Also there is a positive correlation between BOP and PD for non-smokers with statistically significant difference (p=0.01). Moreover, there is a positive correlation between BOP and PD and PI for smokers (p=0.026) and there is a positive correlation between PI and BOP and PD for non-smokers with high statistically significant difference (p=0.0001). **Conclusions.** The students having friends who are smoker are the most important factors associated with smoking, furthermore the percentage of bleeding is low since the fact that smoking effect the bleed vessel and cause vasoconstriction, finally Longitudinal trials need to be performed in order to obtain more conclusive result regarding the effect of smoking in periodontal disease.

Key words: smoking, dental students, smoker, non-smoker

FOR CITATION:

Radhi R.A., Jebur H.J., Jabbar S.A. The effects of smoking on periodontal health among dental students at Basrah Dental College: Consumption patterns and risk factors. *Clinical Dentistry (Russia)*. 2024; 27 (4): 12—15.
DOI: 10.37988/1811-153X_2024_4_12

Влияние курения на здоровье пародонта среди студентов стоматологического колледжа Басры: модели потребления и факторы риска

Р.А. Радхи,
доцент кафедры пародонтологии
Х.Я. Джебур,
доцент кафедры пародонтологии
С.А. Джаббар,
доцент кафедры диагностики заболеваний полости рта

Университет Басры, 61001, Басра, Ирак

Реферат. Курение является фактором риска развития ряда заболеваний, а последние данные убедительно свидетельствуют о неблагоприятном влиянии курения на здоровье пародонта. Тем не менее, природа взаимосвязи между курением и заболеваниями пародонта остается неясной. Курение вызывает дефекты в функции нейтрофилов, ухудшает воспалительный и иммунный ответ на патогены пародонта и оказывает как системное, так и местное воздействие. **Цель исследования** — оценить состояние пародонта у курящих и некурящих студентов, а также определить возможный фактор курения и его влияние на состояние пародонта. **Материалы и методы.** В данном исследовании 118 студентов-стоматологов (только мужчины) в возрасте 18—25 лет из 450 студентов, отвечающих критериям исследования, были разделены на 2 группы: курильщики (61 человек) и некурящие (57 студентов). У каждого участника были определены демографические данные, статус курения и клинические пародонтальные параметры, включая индекс зубного налета (PI), глубину пародонтальных карманов (PD), подвижность зубов и кровоточивость при зондировании (BOP). **Результаты.** У курильщиков PI (0,803±0,483) был несколько выше, чем у некурящих (0,609±0,397, p=0,018). BOP и глубина пародонтальных карманов были больше у курильщиков (BOP=0,14±0,10 и PD=0,97±1,90 мм), чем у некурящих (BOP=0,13±0,09 и PD=0,72±1,57 мм). Большинство (72%) студентов начали курить под влиянием друзей. Существует положительная корреляция между PD и PI у курильщиков (p=0,046). Также наблюдается положительная корреляция между BOP и PD (p=0,01). Кроме того, существует положительная корреляция

между BOP, PD и PI у курящих (p=0,026) и положительная корреляция между PI, BOP и PD у некурящих (p=0,0001). **Заключение.** Курящие друзья являются наиболее важным фактором вовлечения в курение. Кроме того, среди курильщиков довольно низок показатель кровоточивости пародонта при зондировании из-за сосудосуживающего влияния табачного дыма. Наконец, необходимо провести более длительное исследование, чтобы получить более убедительные результаты о влиянии курения на заболевания пародонта.

Ключевые слова: курение, студенты-стоматологи, курящие, некурящие

ДЛЯ ЦИТИРОВАНИЯ:

Радхи Р.А., Джебур Х.Я., Джаббар С.А. Влияние курения на здоровье пародонта среди студентов стоматологического колледжа Басры: модели потребления и факторы риска. — *Клиническая стоматология*. — 2024; 27 (4): 12—15. DOI: 10.37988/1811-153X_2024_4_12

INTRODUCTION

Periodontal health is defined by absence of clinically detectable inflammation [1]. According to the condition of the periodontium, there are 4 stages of periodontal health (structurally and clinically sound or reduced) and the relative treatment outcomes: (1) pristine periodontal health, with a structurally sound and uninflamed periodontium; (2) well-maintained clinical periodontal health, with a structurally and clinically sound (intact) periodontium; (3) periodontal disease stability, with a reduced periodontium, and (4) periodontal disease remission/control, with a reduced periodontium [2].

The term “periodontal disease” refers to a group of chronic inflammatory disease that affect the bone, ligament, and gingiva (the soft tissue that surrounds the teeth), as well as the alveolar bone that supports the teeth. Tobacco smoking is one of the most prevalent public health problems negatively influencing systemic and oral health problems, such as periodontal diseases and dental caries [3].

According to J. Reibel (2003), smoking has a number of negative oral and dental effects, including tooth discoloration, loss of taste and smell, melanosis, smoker’s palate, oral candidiasis, and dental caries [4]. Long-term smoking dramatically lowers salivary flow rate and worsens oral and dental conditions associated with dry mouth, particularly cervical caries, gingivitis, tooth mobility, calculus, and halitosis [5]. More than 300 carcinogens have been identified in tobacco smoke or in its water-soluble components that will leach into saliva [6]. In addition Smoking exerts a strong, chronic, and dose-dependent suppressive effect on gingival bleeding on probing which is a more sensitive clinical sign of gingivitis than changes in color [7]. According to research done by V. Kumar and M. Faizuddin (2011), smokers had less vascular density and less gingival vessel lumen [8]. Smoking is associated with excessive destruction of the supporting periodontal tissues, resulting in bone loss, pocket formation, and premature tooth loss. It is well established in the literature that bone loss and attachment loss are significantly more pronounced in smokers compared to non-smokers [9]. Quitting smoking has an additional beneficial effect in reducing probing depths following non-surgical treatment over a 12-month period [10].

In addition, the effect of smoking on surgical periodontal therapy. Smokers responds less favorably than non-smokers to non-surgical periodontal treatment, periodontal flap surgical procedures, periodontal regeneration in end-osseous defects and guided tissue regeneration for root coverage purpose [11]. Smoking cessation has been suggested to be effective in reducing wound complications of various types of invasive surgeries [12]. Smoking has a negative effect on bone regeneration after periodontal treatment. Patients should be advised that their smoking habit may result in poorer bone regeneration after periodontal treatment [13].

This study aims to assess periodontal health of smoker and nonsmoker under graduated dental students and to determine the possible factor of smoking and its effect on periodontal health.

MATERIALS AND METHODS

The study was carried out in period from November 2021 to May 2022. This study was cross-sectional and was carried out among dentistry students at college of dentistry, university of Basra. The sample was composed of 118 males, being 61 smokers and 57 nonsmokers. The total enrollment of male under graduated dental student was 450.

The inclusion criteria for sample screening was non-smokers and smokers under-graduated dental student between 18 and 25 years of age with no periodontal treatment in the previous 3 months, also absence of systemic or acute periodontal alterations and finally no antibiotic therapy within the previous 3 months.

Data collected included smoking habits, associated risk factors, and demographic factors, such as age, gender, marital status, residency status, current level of study, grade point average (GPA). Smoking habits were categorized as non-smoker and current smoker. Students’ smoking habits were assessed as: time starting smoking (before or after starting college), duration of smoking (in years), types (cigarettes, shisha, or both), frequency (daily or weekly), and quantity (number of cigarettes smoked daily), as well as what triggered the initiation of smoking (friends’ influence, smoking parents, stress, experimenting, reward for hard work, and boredom). Students’ intentions to quit in the future were assessed, as were smoking habits among parents, siblings, and friends.

The following clinical parameters were evaluated: Probing depth (PD), gingival bleeding on probing index (BOP) and plaque index (PI) [14].

Statistical analysis was performed for comparison between smokers and non-smokers, using plaque index, bleeding upon probing and pocket depth and adopting a 5% significance level. T-test, Mann—Whitney U-test and Spearman correlation test were used in the research.

RESULTS

In this study data analysis showed that smokers had a slightly higher PI than non-smokers student with significant difference (p=0.018; table 1). Furthermore, BOP and PD tend to be greater in smokers (table 2). The greater percentage of students had started smoking due to friends' influence (72%; table 3).

By using Spearman's correlation there is a positive correlation between PD and PI for smokers (p=0.046). Also there is a positive correlation between BOP and PD for non-smokers with statistically significant difference (p=0.01). Moreover, there is a positive correlation between BOP and PD, PI for smokers and there is a positive correlation between PI and BOP (p=0.026), PD for nonsmokers with high statistically significant difference (p=0.0001; table 4).

DISCUSSION

Tobacco smoking has been implicated in periodontal pathology through various mechanisms, including perturbations of the inflammatory and host responses to putative periodontal pathogens, alterations in the subgingival microbial communities, and a compromised healing potential of the tissues leading to imbalance of tissue homeostasis.

In the present study reveals that plaque accumulation among smoker students is higher than non-smokers student which is in accordance with the observations of Müller et al. (2002), which showed greater plaque accumulation for smokers than nonsmoker with a statistically significant difference [15]. Other study supposed that there is no significant difference in the PI between smokers and non-smokers [16]. It is important to highlight that the study subjects are dental students so they have good knowledge and oral hygiene measures. Furthermore the current result was found that bleeding on probing BOP and PD between smoker and non-smoker students tend towards greater means of bleeding on probing and pocket depth in smoker students but a statically not significant and this result agree with van der Weijden et al. (2001), as they said: there is no statistically significant differences between smokers and non-smokers as they found that the mean percentage of sites that bled upon probing (76% of smokers, 72% of non-smokers) [17]. Another study shows disagreement in this point such as by T. Dietrich et al (2004) as they said: Smoking had a strong suppressive effect on gingival bleeding [18]. Regarding PD a study by G. Calsina et al. (2002) show disagreement with our study as they said: Among cases, probing depth, gingival recession and clinical attachment level were greater in smokers than in former smokers or non-smokers [19]. The possible explanation between our study and the previous studies mentioned above may due to difference in type of participants, in our study the participants are dental students who they had good oral hygiene instructions.

Regarding the correlation between BOP and PD, PI for both smoker and non-smoker students. The current work revealed that there was a positive correlation between BOP and PD, also there was a positive correlation between BOP and PI for both smokers and nonsmokers.

The current result was consistent with other results reported by S. Gonzalez et al. (2015) and S.C. Oliveira (2015), as they found a positive correlation between BOP and PI, PD, as they said that the supragingival plaque considered as a strong factor for increasing BOP, and the last one considered as a causative factor for increasing PD [20, 21].

These results suggested that an increase in BOP is a sign of increase a periodontal disease activity and vas versa, also plaque accumulation tend to be a risk and causative factor of increased BOP. Therefore, an establishment of good oral hygiene measures such as brushing, flossing and professional dental cleaning take its place in reduction of supragingival plaque and thus reduction of BOP. Furthermore, there was a positive correlation between PI and PD for both smoker and non-smoker students with a statistically significant difference. The current result was confirmed and consistent with other results reported by H.P. Muller et al. (2000) and L.I. Luzzi et al. (2007) as they found that dental plaque contributes to variety of periodontal problems as gingival inflammation and bone loss, thus increases BOP and PD [22, 23]. So the oral hygiene is mandatory to keep the mouth clean, hence improve the periodontal maintenance with as little as gingival inflammation and pocket depth.

In Basra city, there is a great need for clinical studies to establish baseline data on the prevalence of oral diseases

Table 1. The difference in of plaque index between study groups

Group	n	Plaque index	p (t-test)
Nonsmokers	57	0.609±0.397	0.018
Smokers	61	0.803±0.483	

Table 2. The difference in mean values of PD and BOP for smoker group and nonsmoker group

Index	Nonsmokers (n=57)			Smokers (n=61)			p (U-test)
	mean	median	min—max	mean	median	min—max	
BOP	0.13±0.09	0.11	0—0.44	0.14±0.10	0.12	0—0.47	0.688
PD (mm)	0.72±1.57	0.00	0—4.50	0.97±1.90	0.00	0—6.50	0.420

Table 3. The trigger factors for smoking

Factor	no.	%
Friends influence	44	72
Stress	15	25
Experimenting	1	2
Grandfather	1	2
Total	61	100

Table 4. Spearman correlation coefficients among BOP, PD and PI in groups

Group	n	BOP and PI		PD and PI		PD and BOP	
		r	p	r	p	r	p
Nonsmokers	57	0.385	0.003	0.339	0.010	0.294	0.026
Smokers	61	0.428	0.001	0.257	0.046	0.516	<0.001

and there is only one study published in 2013 regarding the prevalence of oral mucosal lesions with a limited sample [24].

The research involved only dental students and I tried to explain the effects of smoking on the periodontal tissues, in consideration that dental students are the group most aware of this aspect and interested in dental health.

Population-based smoking cessation programs should be implemented in an attempt to reduce the incidence of periodontal disease in populations with a high level of smoking exposure.

In PubMed, several number of papers linking oral pathology with COVID-19, where smoking is not the dominant risk factor. However, smoking is one of the important and dangerous factors for inflammation and destruction of the periodontal tissues, but it does not lead to death. It is just a habit and not a disease.

CONCLUSION

The most important factors associated with smoking are the dental students having friends who are smokers, furthermore the percentage of bleeding is low since short duration of smoking in addition to the fact that the student were at a high level of education, finally longitudinal trials need to be performed in order to obtain more conclusive result regarding the effect of smoking in periodontal disease.

Conflict of interests. The authors declare no conflict of interests.
Received: 16.05.2024 **Accepted:** 16.09.2024

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