

Effect of smoking on the response to nonsurgical periodontal therapy

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تأثير التدخين على الاستجابة للمعالجة غير الجراحية لدواعم الأسنان

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الخلاصة: أجريت دراسة استقبلية للتعرف على تأثير التدخين على الاستجابة للمعالجة غير الجراحية لدواعم الأسنان، وشملت الدراسة 65 مدخناً و68 من الشواهد غير المدخنين. وقد أجريت فحوصات على كلا المجموعتين لتفحص اللويحات في دواعم الأسنان، والنزف وفقدان الالتصاق، وذلك قبل وبعد دورة علاجية تتضمن تعليمات حول صحة الفم، والتلقيح، وصقل وتخطيط الجذور في دواعم الأسنان. وقبل المعالجة، كان وسطي حرز منسب النزف أعلى بشكل ملحوظ لدى المدخنين مما هو عليه لدى غير المدخنين، إلا أن ذلك الحرز أصبح متماثلاً لدى المجموعتين بعد المعالجة. كما كانت أحراز منسب اللويحات متماثلة لدى المجموعتين قبل وبعد المعالجة. كما كانت أحراز منسب اللويحات متماثلة لدى المجموعتين قبل وبعد المعالجة. أما حرز فقدان الالتصاق فقد كان أعلى بشكل ملحوظ لدى المدخنين قبل المعالجة، وبقي مرتفعاً بعدها وقد أبدى المدخنون علامات لمرض دواعم الأسنان أكثر، ولم تحسّر المعالجة تلك العلامات بشكل كامل.

ABSTRACT To investigate the influence of smoking on the response of nonsurgical periodontal treatment, a prospective study was carried out on 65 smokers and 68 nonsmoker controls. Both groups were examined periodontally for plaque, bleeding and loss of attachment, before and after a course of treatment with oral hygiene instructions, scaling, root planning periodontal and polishing. Before treatment, mean bleeding index score was significantly higher in smokers than nonsmokers but scores were similar after treatment. Plaque index scores were similar in both groups before and after treatment. Loss of attachment score was significantly higher in smokers before treatment and remained higher after treatment. Smokers showed more signs of periodontal disease, and treatment did not reverse this fully.

Effets du tabagisme sur la réponse au traitement parodontal non chirurgical

RÉSUMÉ Afin d'étudier l'influence du tabagisme sur la réponse au traitement parodontal non chirurgical, une étude prospective a été menée sur 65 fumeurs et un groupe de contrôle de 68 non-fumeurs. Les deux groupes ont fait l'objet d'examens parodontaux, à la recherche de plaque dentaire, de saignements et de déchaussements, avant et après un traitement comprenant des conseils en matière d'hygiène bucco-dentaire, un détartrage, un surfaçage radiculaire et un polissage. Avant le traitement, l'indice moyen de saignements était nettement plus élevé chez les fumeurs que chez les non-fumeurs, mais les résultats après le traitement étaient proches. Les indices de plaque dentaire étaient similaires dans les deux groupes, avant et après le traitement, alors que les indices de déchaussements étaient nettement plus élevés chez les fumeurs avant le traitement et le sont restés après le traitement. Les fumeurs présentaient plus de signes de maladie parodontale ; le traitement n'a pas complètement inversé cette tendance.

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Introduction

Tobacco smoking has been identified as a risk factor for poor periodontal health in several studies over the years, and it has been reported that smokers have more severe periodontal diseases than former smokers or nonsmokers [1–7]. However, the exact mechanism behind the negative effect of smoking on the oral disease process is not fully understood. Conflicting results have been found in studies of the effect of smoking on gingival crevicular fluid flow [2–5], subgingival microflora [6–10], plaque index, [1,2], gingival capillary density and bleeding sites [11–13], bone loss and periodontal attachment [14], and gingival recession [15,16]. Rivera-Hidalgo summarized many previous studies about the effect of smoking on periodontal health [14].

Any of these factors could alter the response of smokers to periodontal therapy if there are effects on periodontal wound healing after surgical or non-surgical therapy. There are many reports that wound healing is poorer among smokers compared to nonsmokers [10,17–21]. In a systematic review of the effect of smoking on nonsurgical periodontal therapy Labriola et al. concluded that there was no evidence of a difference in gain in clinical attachment between smokers and nonsmokers or a reduction of bleeding on probing [20].

The aim of the present study was to investigate the influence of smoking on the response to nonsurgical periodontal treatment.

Methods

This prospective study was carried out during 2006 at Queen Alia Military Hospital in Amman, Jordan.

Sample

Participants were recruited from patients presenting for periodontal treatment

to the periodontal clinic of the dental department. All patients meeting the study criteria over the study period and willing to follow the study protocol were included in the sample. The study group was 65 male patients who had smoked a minimum of 10 cigarettes/day for more than 2 years. Their age range was 32–51 years (mean 43.1 years). The control group was 68 male nonsmokers who had not smoked before. Their age range was 35–50 years (mean 41.2 years). Ex-smokers were excluded. Both groups were medically fit. None of the participants were undergoing antibiotic or anti-inflammatory therapy or had undergone such therapy in the previous 6 months. Patients with gross oral pathology were excluded, and only those with chronic adult periodontitis and who reported that they brushed their teeth at least once/day were included in the study. Females were excluded to avoid confounding effects due to hormone-induced microcirculatory changes.

Data collection

Assessment

Both study groups were examined periodontally for plaque accumulation, gingival bleeding and loss of attachment for all teeth except the third molar or any tooth that had caries or restoration at the cervical area. Presence of supragingival plaque was recorded according to the Löe and Silness plaque index [22]. The bleeding index was examined in response to probing according to Ainamo and Bay [23], using a calibrated Williams periodontal probe. Loss of attachment was read to the nearest millimetre at 6 areas (mesiobuccal, midbuccal, distobuccal, mesiolingual, midlingual and distolingual). The probe was positioned parallel to the long axis of the tooth and interproximally as close as possible to the contact point.

Intervention

Both control and study groups were subjected to nonsurgical treatment by one periodontist. Patients were treated and

data collected by the same periodontist throughout the treatment period.

Periodontal parameters were recorded for each patient before the start of treatment. At the first session all patients were given oral hygiene instructions about methods of toothbrushing and using interdental cleaning aids for 2 weeks. Treatment sessions consisted of debridement of supra- and subgingival oral deposits through scaling and root planing using Gracey curettes. At each visit for scaling and root planing, the oral cavity was divided into 2 halves (upper and lower left side and upper and lower right side). Polishing was carried out after that. The treatment sessions lasted for 30–40 minutes and the course of treatment was between 2 and 5 months.

An appointment was scheduled for all patients 6–8 weeks after the last session of treatment. Compliance with the instructions that had been given to them was recorded, then patients were re-examined and all periodontal parameters were recorded again.

Statistical analysis

Statistical analysis was performed using SPSS, version 9. Unpaired Student *t*-test was used, with the level of significance at $P < 0.05$

Results

All selected patients continued to the end of the study; no participants were excluded for any reason. Before therapy the mean values of all 3 periodontal parameters were higher in smokers than nonsmokers (Table 1). Mean scores for bleeding index and loss of attachment were significantly higher ($P = 0.02$ and $P < 0.001$ respectively), whereas the difference in plaque index was not significant.

Table 1 shows the mean scores for both groups after nonsurgical periodontal treatment. There was a reduction in

Table 1 Comparison of mean bleeding index, plaque index and loss of attachment between smokers and nonsmokers, before and after nonsurgical periodontal therapy

Group	Bleeding index			Plaque index			Loss of attachment (mm)		
	Before Mean (SD)	After Mean (SD)	% change	Before Mean (SD)	After Mean (SD)	% change	Before Mean (SD)	After Mean (SD)	% change
Smokers (n = 65)	0.55 (0.31)	0.32 (0.21)	-42	0.40 (0.26)	0.30 (0.21)	-25	0.71 (0.20)	0.51 (0.31)	-28
Nonsmokers (n = 68)	0.40 (0.28)	0.29 (0.11)	-28	0.39 (0.20)	0.27 (0.19)	-31	0.33 (0.28)	0.25 (0.19)	-24
t-value	2.93	1.03		0.25	0.86		9.04	5.80	
P-value	0.02	0.82		0.07	0.80		< 0.001	0.01	

SD = standard deviation.

bleeding index in both groups but the difference between smokers and nonsmokers was no longer significant after treatment. Plaque index was reduced in both groups after treatment, and the difference between the groups remained non-significant. After treatment, mean loss of attachment scores remained significantly higher in the smokers compared with nonsmokers ($P = 0.01$).

Discussion

The present study assessed the periodontal status of smokers and nonsmokers in response to nonsurgical treatment in both groups. Smokers showed more signs of periodontal disease at the start of the study, and treatment did not reverse this fully.

Preber and Bergström reported that nonsurgical periodontal treatment was an efficient means of reducing the probing depth of pathological pockets [2]. The magnitude of probing depth reduction was smaller in smokers than in nonsmokers. In another study, Ah et al. found that smokers did not respond as well as nonsmokers to non-surgical periodontal therapy, and smokers had less reduction in pocket depth [19]. Machtei et al. reported that after mechanical periodontal therapy nonsmokers showed much greater attachment gain (13.9%) compared with smokers (9.0%), and that the reduction in probing depth was 50% greater among nonsmokers than smokers [24]. Previous studies [17,19,21,24] agree with our results, where loss of attachment was significantly higher in smokers before treatment and remained higher after treatment.

In a study conducted by Calsina et al. no difference was found between smokers and nonsmokers in plaque index [25], which is in agreement with this study, where no difference between smokers and nonsmokers was recorded either before or after the treatment. The

result may be explained by the aggravated effect of nicotine on the periodontal tissues, especially if accompanied by plaque.

Another study by Ah et al. reported that nonsmokers had more bleeding on probing than smokers at the initial examination but less bleeding than smokers after phase 1 therapy, which was explained by a decrease in the wound healing process in smokers [19]. In another study, Calsina et al. found that the difference in bleeding on probing was statistically significant between smokers, former smokers and nonsmokers and smokers showed less bleeding [25]. The authors explained the results as due to reduced vascular inflammatory reaction in response to the vasoconstriction induced by tobacco at the gingival level. The results of our study are consistent with the results of both earlier studies [19,25], where the difference between smokers and nonsmokers was significant before but not after treatment. Smokers exhibited a greater reduction in bleeding on probing after nonsurgical periodontal treatment.

The results of this and previous [2,19,24,25] studies are consistent with the impression of many practitioners that smoking has a negative effect on the periodontium, both before and after periodontal treatment. Smokers are affected more than nonsmokers and respond less favourably to therapy.

In conclusion, this short-term study has shown that smokers had more signs of periodontal disease than nonsmokers and treatment did not reverse this fully, which may imply a negative influence of smoking on the periodontal healing response. This study has some limitations, such as the small sample size and the short period of the study. To overcome these limitations, further studies are needed over longer periods of time with a larger number of participant to study the effect of smoking on the periodontium as a whole.

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