

# IMPACT OF SMOKING ON ORAL HEALTH OF PATIENTS ATTENDING AN OUTPATIENT MEDICAL CLINIC

*Impacto do tabagismo na saúde bucal dos pacientes atendidos em um ambulatório de clínica médica*

*Impacto del tabaco en la salud bucal de pacientes asistidos en ambulatório de clínica médica*

Original Article

## ABSTRACT

**Objective:** To evaluate the impact of smoking on the oral health of patients attending the outpatient medical clinic of a reference hospital. **Methods:** A cross-sectional study was conducted in the period of September 2011 to July 2012 with 125 patients attending the ambulatory of the Federal University of Ceará. Patients were assessed through questionnaires regarding socio-demographic data, oral health quality and smoking habits. Data was analyzed using logistic regression and Pearson test, with  $p < 0.05$ . **Results:** Patients' mean age was  $50 \pm 15.5$  years and 52% (65) of them were female. As for the smoking habits, 28.8% (36) were current smokers, 28.8% (36) former smokers and 42.4% (53) non-smokers. It was observed that 53.3% (67) of the patients had lost more than five teeth in the last 10 years, 55.2% (69) had a change in the teeth color, 40% (50) reported halitosis and 54% (68) had ulcers or spots in the mouth. Teeth loss was more common for current smokers (86%) than among former smokers (63%) and non-smokers (24%). Smoking was found to be associated with tooth loss (OR 2.7; 95%CI 1.09-6.93) and with change in the teeth color (OR 2.5; 95%CI 1.03-6.41). **Conclusion:** In the studied sample, smoking is associated with deterioration of oral health, thus causing on it a negative impact.

**Descriptors:** Smoking; Oral Health; Risk Factors.

## RESUMO

**Objetivo:** Avaliar o impacto do tabagismo na saúde bucal dos pacientes atendidos em um ambulatório de clínica médica de um hospital de referência. **Métodos:** Realizou-se um estudo transversal no período de setembro de 2011 a julho de 2012 com 125 pacientes, os quais foram avaliados através de questionários quanto aos dados sociodemográficos, qualidade da saúde bucal e hábito tabagístico. Analisaram-se os dados através da correlação de Pearson e teste de regressão logística, com  $p < 0,05$ . **Resultados:** Os pacientes tinham idade média de  $50 \pm 15,5$  anos e 52% (65) eram do sexo feminino. Quanto ao hábito tabagístico 28,8% (36) eram fumantes, 28,8% (36) ex-fumantes e 42,4% (53) nunca fumaram. Observou-se que 53,3% (67) dos pacientes perderam mais de 5 dentes nos últimos 10 anos, 55,2% (69) apresentavam alteração na cor dos dentes, 40% (50) relataram halitose e 54% (68) apresentavam ulcerações ou manchas na boca. A perda dos dentes foi mais frequente entre os fumantes atuais (86%) quando comparado aos ex-fumantes (63%) e não fumantes (24%). Encontrou-se associação do tabagismo com perda de dentes (OR 2,7; IC95% 1,09-6,93) e alteração na cor dos dentes (OR 2,5; IC95% 1,03-6,41). **Conclusão:** Na amostra estudada, o tabagismo está associado à deterioração da saúde bucal, causando, pois, um impacto negativo sobre esta.

**Descritores:** Hábito de Fumar; Saúde Bucal; Fatores de Risco.

Eanes Delgado Barros Pereira<sup>(1)</sup>  
Edyr Pereira Paiva Freitas<sup>(1)</sup>  
Bianca Almeida Moreira<sup>(1)</sup>  
Felipe Augusto de Paula<sup>(1)</sup>  
Renata Delgado Pereira dos Santos<sup>(2)</sup>  
Antonio George Cavalcante Matos<sup>(3)</sup>

1) Universidade Federal do Ceará - UFC  
(Federal University of Ceará) - Fortaleza  
(CE) - Brazil

2) Universidade de Fortaleza - UNIFOR  
(University of Fortaleza) - Fortaleza (CE)  
- Brazil

3) Hospital Universitário Walter Cantídio  
- HUWC (Walter Cantídio University  
Hospital) - Fortaleza (CE) - Brazil

Received on: 01/04/2013

Revised on: 08/27/2013

Accepted on: 12/12/2013

## RESUMEN

**Objetivo:** *Evaluar el impacto del tabaco en la salud bucal de pacientes asistidos en un ambulatorio de clínica médica en un hospital de referencia.* **Métodos:** *Se realizó un estudio trasversal entre septiembre de 2011 y julio de 2012 con 125 pacientes los cuales fueron evaluados con cuestionarios sobre datos sociodemográficos, calidad de salud bucal y el hábito del tabaco. Se analizó los datos a través de la correlación de Pearson y el test de regresión logística con  $p < 0,05$ .* **Resultados:** *Los pacientes presentaron edad media de  $50 \pm 15,5$  años y el 52% (65) era del sexo femenino. Sobre el hábito del tabaco, el 28,8% (36) era fumadores, el 28,8% (36) ex-fumadores y el 42,4% (53) nunca había fumado. Se observó que el 53,3% (67) de los pacientes perdieron más de 5 dientes en los últimos 10 años, el 55,2% (69) presentó alteración del color de los dientes, el 40% (50) relató halitosis y el 54% (68) presentó ulceraciones o manchas en la boca. La pérdida de los dientes fue más frecuente en los fumadores actuales (86%) al comparar a los ex-fumadores (63%) y no fumadores (24%). Se encontró una asociación del tabaquismo y la pérdida de los dientes (OR 2,7; IC 95% 1,09-6,93) y alteración del color de los dientes (OR 2,5; IC 95% 1,03-6,41).* **Conclusión:** *El tabaquismo está asociado a la deterioración de la salud bucal en la muestra estudiada, llevando, así, a un impacto negativo sobre ella.*

**Descriptor:** *Hábito de fumar, Salud bucal, Factores de Riesgo.*

## INTRODUCTION

Smoking is one of the most important public health problems and one of the main preventable causes of death worldwide<sup>(1)</sup>. It is estimated that, in case no action is taken, the annual number of deaths caused by tobacco use in developing countries will reach 7 million in 2020<sup>(2)</sup>. In Brazil, one-third of the adult population smokes, according to data from the Instituto Nacional de Câncer - INCA (*National Cancer Institute*), and the estimated number of deaths related to smoking for 2014 is 580,000 cases<sup>(3)</sup>.

Besides being harmful to general health, smoking also impairs the oral health<sup>(4,5)</sup>. The smoking habit has been associated with increased risk of oral cancer, leukoplakia, acute necrotizing ulcerative gingivitis, oral candidiasis, failure of dental implants and periodontal disease, in addition to interfering with the results of surgical and non-surgical periodontal therapy<sup>(4-9)</sup>. Smoking leads to peripheral vasoconstriction, and it consequently prejudices the healing of wounds in the mouth<sup>(6)</sup>. It also causes discoloration in teeth and dental restorations, jeopardizes the senses of smell and taste, and frequently gives rise to halitosis<sup>(6-9)</sup>.

The habit of chewing tobacco usually causes wrinkling of the buccal mucosa, gingival recession and oral cancer<sup>(6)</sup>. Epidemiological studies have revealed a higher prevalence and severity of the periodontal disease in smokers compared

to non-smokers, indicating the direct impact of tobacco on the tissues of the oral cavity<sup>(4,6,8)</sup>.

As a result, it is highlighted the dentist and physician's role in warning patients on the health risks caused by smoking, including not only the risk of periodontal disease but the oral cancer<sup>(5,7-10)</sup>. The studies involving smoking and oral health impairment are generally conducted with experts in dental clinics or in the community<sup>(11-15)</sup>. Hence, it becomes important to conduct studies in specific populations, such as patients monitored by general practitioners, so that these professionals will be alerted about the problems involving their patients' oral health, referring them early to a specialized dental care.

The aim of the study was to evaluate the impact of smoking on the oral health of patients attending an outpatient medical clinic of a reference hospital.

## METHODS

A case-control study was conducted at the Outpatient Medical Clinic of Walter Cantídio University Hospital, of the Federal University of Ceará, from September 2011 to July 2012.

Patients who attended the outpatient clinic for regular medical consultation were consecutively selected through non-probability and convenience sampling. All the patients were older than 18 years and had been in attendance for more than six months.

By means of a questionnaire developed by the authors, occurred the collection of the following data: demographic data (age and gender), smoking habits, quality of oral health, dietary habits (eating foods with excess sugar at least five times per week), alcoholism, and oral hygiene. The questionnaire was applied at the moment the patients attended their appointments. A pilot study with 10 patients was initially performed to clarify doubts about the questions. There was a previous training of the team members in the questionnaire application in order to minimize the collection errors.

The definition of the smoking habit followed the World Health Organization's criteria<sup>(16)</sup>: current smokers, those individuals who had smoked at least one cigarette per day for at least six months before the study began; former smokers, those who had smoked and stopped smoking at least six months prior to the beginning of the study; and non-smokers, those who had never smoked. The definition of alcoholism followed the World Health Organization's criteria<sup>(17)</sup>: drinking daily more than two cans of beer or two doses of distillates, such as whisky or white rum (*cachaça*).

Oral health was considered poor in patients who had one of the following adapted criteria<sup>(11-15)</sup>: loss of more

than five teeth in the last 10 years, presence of tooth discoloration, and presence of ulcers or spots in the mouth. The oral hygiene was based on the recommendation of the American Association of Dental Surgeons<sup>(18)</sup>.

Demographic, clinical, and oral health variables were presented as percentages in tables. Factors associated with poor oral health received analysis through the Pearson's chi-square test. A multivariate logistic regression model was applied to analyse the possible risk factors related to the patients' oral health conditions, where the independent variable was the loss of more than five teeth in the last 10 years, and the dependent one was the change in the colour of teeth. The risk factors included in the multivariate model were sex, age, dietary habits, oral hygiene and alcohol consumption, as they showed a significance level greater than 20% in the univariate analysis or their clinical importance. Was considered significant the descriptive value below 5% ( $p < 0.05$ ), adjusted odds ratio (OR) and 95% confidence interval (95% CI), using the Statistical Package for the Social Sciences, version 16.0 (SPSS Inc., Chicago, IL, EUA).

The study protocol was approved by the research ethics committee of the institution with the number 041.04.11 on 05/09/2011. All participants signed a free and informed consent form.

## RESULTS

The study evaluated 125 patients with mean age of  $50.0 \pm 15.5$  years. Stratification by age showed that 34% ( $n = 43$ ) were aged under 60 years; 41% ( $n = 52$ ) between 40 and 59 years; and 24% ( $n = 30$ ) under or equal to 39. Of these patients, 52% ( $n = 65$ ) were female.

Regarding the smoking habits, 28.8% ( $n=36$ ) were smokers, 28.8% ( $n=36$ ) were former smokers and 42.4% ( $n=53$ ) non-smokers.

Among the patients, 96% ( $n=121$ ) reported performing oral hygiene, 52.8% ( $n=66$ ) reported eating foods with excess sugar and 14.4% ( $n=18$ ) were drinking alcohol regularly. Regarding changes in oral health, it was observed that 53.3% ( $n=67$ ) of the patients had lost more than five teeth in the last 10 years, 55.2% ( $n=69$ ) had a change in the colour of teeth, 40% ( $n=50$ ) reported halitosis and 54% ( $n=68$ ) had ulcerations or spots in the mouth (Table I).

There was a significant association between the smoking habits and the patients' quality of oral health. Smokers had a higher percentage of tooth loss and change in the colour of teeth in relation to former smokers and non-smokers (Table II).

By the backward stepwise process, the variables that showed an association with teeth loss greater than 5 in the

Table I - Sociodemographic, clinical, and oral health characteristics of 125 patients attending the outpatient medical clinic of the Walter Cantidio University Hospital. Fortaleza-Ce, 2012.

Variable	n	%
Sex		
Female	65	52.0
Male	60	48.0
Age range		
$\geq 60$ years	43	34.0
40 – 59 years	52	41.0
$\leq 39$ years	30	24.0
Oral hygiene	121	96.8
Alcoholic	18	14.4
Smoking habits		
Current smoker	36	28.9
Former smoker	36	28.9
Non-smoker	53	42.4
Dietary habits		
Diet with excess sugar	66	52.8
Quality of oral health		
Teeth loss above 5 in the last 10 years	67	53.6
Ulcerations/spots in the mouth	68	54.0
Halitosis	50	40.0
Teeth discolouration	69	55.0

Table II - Association of the smoking habit with oral modifications in 125 patients attending the outpatient medical clinic of the Walter Cantidio University Hospital. Fortaleza-Ce, 2012.

Variable	Current smoker (36)	Former smoker (36)	Non- smoker (53)
Teeth loss above 5 in the last 10 years (%)	86%*	63%**	24%
Teeth discolouration (%)	72%†‡	44%	50%
Ulcerations/spots in the mouth (%)	11%	2%	3.9%

\*Difference compared to non-smokers ( $p = 0.001$ ), \*\* Difference compared to non-smokers, † Difference compared to former smokers ( $p = 0.03$ ), ‡ Difference compared to non-smokers ( $p = 0.04$ ). Applying Pearson's chi-square test

Table III - Logistic regression analysis to assess the association between smoking and oral health adjusting for sex, age, history of alcoholism, dietary habits, oral hygiene. Fortaleza-Ce, 2012.

Outcome/predictor	Adjusted Odds Ratio	CI* 95%	<i>p</i>
Teeth loss			
Current smoker	2.7	1.09-6.93	0.01
Age $\geq 60$ years	2.7	1.25-6.13	0.03
Change in the colour of teeth			
Current smoker	2.5	1.03-6.41	0.04

\*CI = Confidence Interval

last 10 years were smoking (OR = 2.7; 95% CI 1.09 to 6.93) and age above 60 years (OR = 2.7; 95% CI 1.25 to 6.13). To evaluate the change in the colour of teeth, it was observed that smoking showed a significant association (OR = 2.5; 95% CI 1.03 to 6.41) (Table III).

## DISCUSSION

The present study showed that smoking is a risk factor for tooth loss and change in the colour of teeth among the patients attending the outpatient clinic of a teaching hospital.

The association of smoking with poor oral health is demonstrated, smoking being one of the major risk factors for the development and progression of periodontal disease<sup>(8-10,13)</sup>. This condition is characterized by a chronic inflammatory process of the gums and/or supporting tissues of the teeth, which can lead to alveolar bone resorption, increased tooth mobility, roots exposure and teeth loss<sup>(15)</sup>.

In this study, 86% of the participants reported loss of more than five teeth in the last 10 years. This result was higher than that found in a survey conducted with individuals of Japanese origin, aged 20-39 years and in a country with better socioeconomic conditions. This study detected a loss of 4 to 6 teeth in the percentage of 3.1%<sup>(19)</sup>. Methodological aspects and the type of population may explain the differences between the two studies.

It was observed in this study a significant association between smoking and tooth loss. Other studies have also shown this association<sup>(12,19-22)</sup>. A population-based survey recently conducted in the United States of America with postmenopausal women showed association of the smoking habit with tooth loss (OR = 1.82; 95% CI 1.10 to 3.00)<sup>(12)</sup>, and therefore similar to the present study.

Another American study, also population-based and with questionnaires application, assessed 3552 individuals aged above 20 years about oral health and smoking, noting an association between the smoking habits and the poor quality of oral health (OR = 1.42; 95% CI 1.07 to 1.88)<sup>(13)</sup>.

Age above 60 years is also a risk factor for tooth loss. In the last national epidemiological survey, held in Brazil in 2010<sup>(14)</sup>, the average dental loss for that age was 7.3 teeth.

When stratifying the sample of the current study into smokers, former smokers and non-smokers, a higher percentage of patients with tooth loss was observed in the smokers group compared to non-smokers. Consistent with this finding, a study involving 165 workers from the countryside in the south of Brazil observed a greater likelihood of periodontitis, and subsequent tooth loss among smokers compared to non-smokers<sup>(12)</sup>. A prospective cohort study carried out in the period from 1986 to 2002, also showed that smokers were more likely to tooth loss than non-smokers<sup>(15)</sup>.

Regarding the change in the colour of teeth, there was a difference between the groups of smokers, former smokers, and non-smokers, in the present investigation. This change was also observed by other authors<sup>(7,15)</sup>. A study conducted in the UK community found 28% as the percentage of teeth discoloration among smokers and 15% among non-smokers<sup>(23)</sup>, results that are lower than in the present study. This is probably because the population investigated in this study presents socio-demographic characteristics different from the UK population. In addition, the subjects were studied in an outpatient basis, and therefore a population with increased morbidity.

In the present study only questionnaires were used to evaluate the oral health. This fact, however, is not an important limitation, since the questions were clear and used a strict definition for quality of oral health. Another study also considered appropriate the questionnaires to evaluate oral health<sup>(24)</sup>.

The power and sample size of the current study were adequate to demonstrate an association of smoking with tooth loss, as well as change in the colour of teeth. The confounding was carefully eliminated by logistic regression analysis controlling for other variables that could be associated with poor oral health. With this analysis, satisfactory odds ratios with appropriate confidence interval were observed.

This is the first study conducted in Brazil, with patients attending outpatient medical clinic, which highlights the negative impact of smoking on the patients' oral health. The results support the need, on the part of health professionals, to alert the population about the risk of smoking on oral health and the need for early dental care.

## CONCLUSION

In the studied sample, smoking is associated with deterioration of oral health thus causing on it a negative impact.

The authors declare that there are no conflicts of interest.

## REFERENCES

- World Health Organization - WHO. WHO Report on the Global Tobacco Epidemic [updated Dec 2009]. Disponível em: <http://www.who.int/tobacco/mpower/en/index.html>.
- Abdullah AS, Husten CG. Promotion of smoking cessation in developing countries: a framework for urgent public health interventions. *Thorax*. 2004;59(3):623-30.
- Instituto Nacional de Câncer – INCA. Agência de notícias: Ministério da Saúde informações [acesso em 2012 Dez 2]. Disponível em: <http://www.inca.gov.br/tabagismo/frameset.asp?item=publicacoes&link=indice.htm>.
- International Association for Dental Research. Policy statements: oral diseases related to tobacco use [acesso em 2012 Dez 2]. Disponível em: <http://www.aadronline.org/i4a/pages/index.cfm?pageid=3465#TOBACCO>.
- Centers for Disease Control and Prevention (US). How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General [acesso em 2012 Dez 2]. Atlanta: Centers for Disease Control and Prevention; 2010. Disponível em: <http://www.ncbi.nlm.nih.gov/books/NBK53017/>.
- Lee YC, Marron M, Benhamou S. Active and involuntary tobacco smoking and upper aerodigestive tract cancer risks in a multicenter case-control study. *Cancer Epidemiol Biomarkers Prev*. 2009;18(12):3353-61.
- Warnakulasuriya S, Dietrich T, Bornstein MM, Peidrô EC, Preshaw PM, Walter C, et al. Oral health risks of tobacco use and effects of cessation. *Int Dental J*. 2010;60(1):7-30.
- Tanaka K, Miyaka Y, Arakawa M, Sasaki S, Ohya Y. Household smoking and dental caries in schoolchildren: the Ryukyus Child Health Study. *BMC Public Health*. 2010;10(335):1-4.
- Davis JM, Ramseier CA, Mattheos N, Schoonheim-Klein M, Compton S, Al-Hazmi N, et al. Education of tobacco use prevention and cessation for dental professionals - a paradigm shift. *Int Dental J*. 2010;60(1):60-72.
- Victoroff KZ, Dankulich-Huryn T, Haque S. Attitudes of incoming dental students toward tobacco cessation promotion in the dental setting. *J Dent Educ*. 2004;68(5):563-8.
- Moimaz SA, Zina LG, Saliba O, Garbin CA. Smoking and periodontal disease: clinical evidence for an association. *Oral Health Prev Dent*. 2009;7(4):369-76.
- Mai X, Wactawski-Wende J, Hovey KM, LaMonte MJ, Chen C, Tezal M, et al. Associations between smoking and tooth loss according to the reason for tooth loss: the Buffalo OsteoPerio Study. *J Am Dent Assoc*. 2013;144(3):252-65.
- Liu Y. The relationship between lifestyle and self-reported oral health among American adults. *Int Dental J*. 2014;64(1):46-51.

14. Ministério da Saúde (BR). Projeto SBBrasil 2010: Pesquisa Nacional de Saúde Bucal [acesso em 2012 Dez 2]. Disponível em: [dab.saude.gov.br/cnsb/sbbrasil/index.html](http://dab.saude.gov.br/cnsb/sbbrasil/index.html).
15. Dietrich T, Maserejian NN, Joshipura KJ, Krall EA, Garcia RI. Tobacco use and incidence of tooth loss among US male health professionals. *J Dent Res*. 2007;86(4):373-7.
16. World Health Organization - WHO. WHO Report on the Global Tobacco Epidemic, 2013. Enforcing bans on tobacco advertising, promotion and sponsorship [acesso em 2012 Dez 2]. Disponível em: [http://www.who.int/tobacco/global\\_report/2013/en/](http://www.who.int/tobacco/global_report/2013/en/).
17. World Health Organization, Department of Mental Health and Substance Dependence - Noncommunicable Diseases and Mental Health Cluster. International guide for monitoring alcohol consumption and related harm [acesso em 2012 Dez 2]. Geneva: WHO; 2000. Disponível em: [http://whqlibdoc.who.int/hq/2000/who\\_msd\\_msb\\_00.4.pdf](http://whqlibdoc.who.int/hq/2000/who_msd_msb_00.4.pdf).
18. American Dental Association. Brushing Your Teeth. [acesso em 2012 Dez 2]. Disponível em: <http://www.mouthhealthy.org/en/az-topics/b/brushing-your-teeth>.
19. Ojima M, Hanioka T, Tanaka K, Aoyama H. Cigarette smoking and tooth loss experience among young adults: a national record linkage study. *BMC Public Health*. 2007 [acesso em 2012 Dez 2];7:313-20. Disponível em: <http://www.biomedcentral.com/1471-2458/7/313>.
20. Piassi EO, Lara PA Fonseca DC, Fagundes VV. O Fumo como Fator Modificador da Doença Periodontal. *Rev Intern de Periodontia Clínica*. 2005;2(5):67-73.
21. Carvalho AE, Santos IG, Cury VF. A Influência do Tabagismo na Doença Periodontal: Revisão de Literatura. *SOTAU Revista Virtual Odontol*. 2008;2(5):7-12.
22. Sallum AW, César Neto JB, Sallum EJ. Tabagismo e a Doença Periodontal. *Periodontia*. 2007;17(2):45-53.
23. Alkhatib N, Holt RD, Bedi R. Smoking and tooth discolouration: findings from a national cross-sectional study. *BMC Public Health*. 2005;5(27):1-4.
24. Cascaes AM, Peres KG, Peres MA. Periodontal disease is associated with poor self-rated oral health among Brazilian adults. *J Clin Periodontol*. 2009;36(1):25-33.

**Mailing address:**

Eanes Delgado Barros Pereira  
Departamento de Medicina Clínica (UFC)  
Rua Professor Costa Mendes, 1608/4º andar  
Bairro: Rodolfo Teófilo  
CEP: 60430-140 - Fortaleza - CE - Brasil  
E-mail: eanes@fortalnet.com.br