Braz J Otorhinolaryngol. 2017;xxx(xx):xxx–xxx

Brazilian Journal of
OTORHINOLARYNGOLOGY
www.bjorl.org

ORIGINAL ARTICLE

Nasal mucociliary transportability of male and female smokers☆

Juliana Souza Uzeloto*, Dionei Ramos, Ana Paula C.F. Freire, Diego G.D. Christofaro, Ercy M.C. Ramos

Universidade Estadual Paulista ''Júlio de Mesquita Filho'' (UNESP), Faculdade de Ciências e Tecnologia, São Paulo, SP, Brazil

Received 12 December 2016; accepted 23 March 2017

KEYWORDS
Mucociliary transport;
Mucociliary clearance;
Sex characteristics;
Tobacco use disorder;
Smoking;
Saccharin

Abstract
Introduction: Female smoker's present increased susceptibility to several diseases when compared to the opposite gender. However, there are no studies showing differences in nasal mucociliary transport behavior between male and female smokers.
Objective: To compare the nasal mucociliary transportability in male and female smokers and non-smokers, taking into consideration age, anthropometric data, smoking load and pulmonary function.
Methods: The analysis included 139 individuals (33 men and 37 women smokers and 32 men and 37 women non-smokers). All participants answered an initial interview to obtain personal data and smoking load. Anthropometric data and carbon monoxide in the exhaled air were assessed. Individuals also performed pulmonary function test and Saccharin Transit Time test. To compare saccharin transit time values between men and women, smokers and non-smokers, stratification of all independent variables was performed (sociodemographic, smoking and respiratory variables) into two categories: below and above the median values.
Results: There was no difference between men and women, smokers and non-smokers, regarding nasal mucociliary transportability. Significant differences were only observed between non-smokers. Among those with less forced vital capacity values (<97.37% of predicted), women presented mucociliary transport faster than men. Moreover, it was observed influence of BMI and COex (women smokers), FCV and FEV1 (men non-smokers) and $FEF_{25-75\%}$ (women non-smokers) on saccharin transit time values.
Conclusion: Based on the findings of this study, nasal mucociliary transport in male and female adult smokers, apparently healthy, are similar.

☆ Please cite this article as: Uzeloto JS, Ramos D, Freire AP, Christofaro DG, Ramos EM. Nasal mucociliary transportability of male and female smokers. Braz J Otorhinolaryngol. 2017. http://dx.doi.org/10.1016/j.bjorl.2017.03.006

* Corresponding author.
E-mail: juliana_uzeloto@hotmail.com (J. Souza Uzeloto).
Peer Review under the responsibility of Associação Brasileira de Otorrinolaringologia e Cirurgia Cérvico-Facial.

http://dx.doi.org/10.1016/j.bjorl.2017.03.006

PALAVRAS-CHAVE
Transporte mucociliar;
Clearance mucociliar;
Características sexuais;
Distúrbio do tabagismo;
Fumo;
Sacarina

Transportabilidade mucociliar nasal de homens e mulheres tabagistas

Resumo
Introdução: Mulheres tabagistas apresentam maior susceptibilidade à diversas doenças quando comparadas ao sexo masculino. No entanto, não há estudos mostrando diferenças no comportamento do transporte mucociliar nasal entre tabagistas do sexo masculino e feminino.
Objetivo: Comparar a transportabilidade mucociliar nasal em homens e mulheres fumantes e não-fumantes, levando em consideração idade, dados antropométricos, carga tabágica e função pulmonar.
Método: A análise incluiu 139 indivíduos (33 homens e 37 mulheres fumantes e 32 homens e 37 mulheres não-fumantes). Todos os participantes responderam a uma entrevista inicial para a obtenção de dados pessoais e a carga tabágica. Dados antropométricos e monóxido de carbono no ar expirado foram avaliados. Os indivíduos também realizaram teste de função pulmonar e o teste de trânsito de sacarina. Para comparar os valores do teste de trânsito de sacarina entre homens e mulheres, fumantes e não-fumantes, foi realizada a estratificação de todas as variáveis independentes (variáveis sociodemográficas, tabágicas e respiratórias) em duas categorias: abaixo e acima dos valores médios.
Resultados: Não houve diferenças entre homens e mulheres, fumantes e não-fumantes, em relação à transportabilidade mucociliar nasal. Diferenças significativas foram observadas apenas entre não-fumantes. Entre os que apresentaram valores menores de capacidade vital forçada (<97,37% do previsto), as mulheres apresentaram transporte mucociliar mais rápido que os homens. Além disso, observou-se influência do IMC e COex (mulheres fumantes), CVF e VEF_1 (homens não fumantes) e $FEF_{25\%-75\%}$ (mulheres não fumantes) sobre os valores do teste de trânsito de sacarina.
Conclusão: Com base nos achados desse estudo, o transporte mucociliar nasal em tabagistas masculinos e femininos adultos, aparentemente saudáveis, são semelhantes.

Introduction

Female smokers present greater susceptibility to various diseases when compared to the opposite gender, being more likely to develop cancer, ischemic heart disease, and Chronic Obstructive Pulmonary Disease (COPD). Women are more prone to develop COPD quicker, with lower smoking exposure, and greater severity, showing an increased mortality rate.[1]

Langhammer et al.[2] reported that female smokers present narrowing of the airways and increased bronchial hyper responsiveness, with superior intensity than men. This can be explained by hormonal levels, whereby estrogen increases the bioactivation of many compounds in tobacco.[3,4] This finding is disturbing considering that estimations of future generations will have approximately 500 million female smokers.[5]

Regarding nasal mucociliary transport, the main mechanism of defense of the respiratory system, there is no evidence showing differences between male and female smokers. However, studies performed on non-smokers show some differences; some report that women exhibit better transportability than men,[6–8] while others[9,10] report no relationship between sex and mucociliary transportability. Furthermore, it is necessary to consider some variables that could possibly interfere in the analysis of this relationship, such as sociodemographic, anthropometric and lifestyle.

Given the above, it is necessary to evaluate the influence of gender on nasal mucociliary transportability in smokers, to make campaigns and programs against tobacco use more intense and specific to the population that presents the greatest harm.

Thus, the aim of this study was to compare nasal mucociliary transportability in male and female smokers and non-smokers, taking into consideration age, anthropometric data, smoking load, and pulmonary function.

Methods

This study has a cross-sectional design and the sample is composed of smokers, recruited according to the availability of individuals participating in the University smoking cessation group. All participants were informed about the purpose and procedures of the study and signed a consent form.

The project was approved by the Ethics Committee of the proponent Institution of the study (Protocol no. 18/2011).

Inclusion criteria was defined as: age between 30 and 50 years old; both genders; normal lung function (assessed by spirometry); no diagnosis of pulmonary disease; no history of surgery or nasal trauma, nasal septum deviation, infection or inflammation in the respiratory system observed in clinical evaluation during the interview and experimental protocol; and smoking for at least one year (smoker group). Subjects who did not understand or cooperate with the