The relationship between cigarette smoking and oral colonization with Candida species in healthy adult subjects

Selma Muzurović1, Mirsada Hukić2, Emina Babajić3, Rubina Smajić4

1Dental Clinic, Health Centre “Dom zdravlja Novi Grad”, Public Institution Medical Centre of Sarajevo Canton, 2Institute for Clinical Microbiology, University Clinical Centre of Sarajevo, Sarajevo, 3Department of Otolaryngology and Maxillofacial Surgery, Cantonal Hospital Zenica, 4Department of Preventive and Pediatric Dentistry, School of Dental Medicine, University of Sarajevo; Bosnia and Herzegovina

Corresponding author: Emina Babajić; Cantonal Hospital Zenica; Crkvice 67, 72 000 Zenica, Bosnia and Herzegovina; Phone: +387 32 405 133; fax: +387 32 226 576; Email: eminababajic@hotmail.com

Original submission: 22 October 2012; Revised submission: 09 November 2012; Accepted: 19 December 2012.

Med Glas (Zenica) 2013; 10(2):397-399

ABSTRACT

The aim of the study was to determine presence of Candida species in oral cavity and to investigate their relation with the smoking habit. This prospective study included 140 healthy respondents (75 male and 65 female) divided into two groups according to the age: group I (from 18 to 30 years) and group II (from 31 to 60 years). In 77 (55%) cases the respondents were smokers. Group I included 37 (52.8%) and group II 40 (57.1%) smokers. There were significantly more male smokers, 49 (62.3%). Candida spp. were identified in 40 (29%) healthy respondents (carriers). The most frequently isolated was Candida albicans (over 80%) (3,4). Many predisposing factors (local and general) lead to an increasing number and invasiveness of Candida species, causing damage to the oral mucosa. Some of factors are tobacco smoking, bad oral hygiene, wearing of dentures, hypovitaminosis, iron deficiency, pregnancy, HIV infection, diabetes mellitus and debilitated patients such as those receiving antibiotic, steroids or cytotoxic therapy (4-7). Effects of cigarette smoke on the oral mucosa are chemical and thermic (8,9). Tobacco use is a primary cause of many oral diseases and adverse oral conditions (10). In some industrialized countries studies have shown that smoking is responsible for more than half of the periodontitis cases among adults (11).

The aim of this study was to assess oral colonization of Candida species and to investigate a relation between oral Candida colonization and smoking cigarettes. The purpose of this study is to introduce some oral health adverse factors and point out the necessity of good oral hygiene maintenance.

EXAMINEES AND METHODS

A prospective study was conducted among 140 healthy respondents (75 males and 65 females), between the ages of 18 to 60 at the Dental Clinic, Health Centre “Dom zdravlja Novi Grad”, the Public Institution Medical Centre of Sarajevo Canton from 01.01. 2010 to 01.07. 2011. Patients were divided into two equal groups according to the age. Group I included patients aged from 18 to 30 years (average 23), and group II included patients aged between 31 to 60 years (average 42 years).

Medical history was taken and clinical examination was performed. For the assessment of oral hygiene the dental plaque index, oral hygiene index and dental calculus index were used. For isolation of Candida species (spp.) samples were taken by sterile swab and stained by methylene blue and examined microscopically (40x) detecting the presence of blastospores and pseudo-
udohyphae. Simultaneously, each sample was cultivated on Sabouraud dextroza agar (Oxoid, Besingstoke, UK) and brilliance Candida Agar (Oxoid, Besingstoke, UK). Sabouraud dextroza agar was prepared with the addition of antibiotics (penicillin, chloramphenicol, streptomycin and garamycin) to prevent growth of bacterial flora. After 48 hours of incubation at 37 °C, cultures were separated into positive (growth of yeast) or negative cultures (no yeast growth). On positive cultures the number of yeast colonies was determined. Brilliance Candida Agar is a selective differential medium for the rapid isolation and identification of clinically important Candida spp., allowing the differentiation of Candida albicans and Candida tropicalis from other species of Candida within 48 hours. The results were confirmed by yeast assimilation test API 20C AUX (bioMérieux, L’Étiolle, France).

Standard methods of descriptive statistics were used (mean, median, standard deviation). In a symmetric distribution of frequencies were applied parametric statistical analysis (student’s t-test) and asymmetric distribution resulted in the application of nonparametric analysis (χ2 test). The value of p ≤ 0.05 was considered as significant.

**RESULTS**

Male patients were more represented, 75 (53.6%) than female patients, 65 (46.4 %). According to medical history, 77 (55%) were cigarettes smokers, and 63 (45%) were nonsmokers. Group I included 37 (52.8 %) and group II 40 (57.1%) smokers (p=0.165). There were 49 (62.3%) male smokers and 28 (37.7%) female smokers (p<0.001).

Candida spp. were identified in 40 (29%) examinees (asymptomatic healthy carriers). In 34 (85%) Candida albicans was identified, Candida glabrata in four (10%) cases, and Candida crusei in only two (5%) (p< 0.05). Prevalence of oral Candida carriers was comparable between both males and females: 22 (55%) and 18 (45%) (p > 0.05). Differences in the prevalence of Candida among the carriers according to the age groups were: 23 (58.3%) in the group I, and 17 (41.7 %) in the group II (p<0.05).

Among the patients presented with oral Candida (40 patients), 33 (82.5%) were smokers, while patients without Candida (100 patients) were smokers only in 44 (44 %) cases, so it can be concluded that cigarettes smoking was significantly correlated to the presence of Candida in the oral cavity (p< 0.05). The consumption of tobacco cigarettes was significantly correlated with plaque, calculus and index oral hygiene (p<0.05) (Table 1). The correlation between smoking and poor oral hygiene was not statistically significant (p= 0.864).

**DISCUSSION**

Candida species were identified in about one third of the patients, and the most present was Candida albicans, which corresponds to other studies (12,13). The relationship between oral colonization with Candida species and tobacco cigarette smoking is still not completely elucidated. Some studies indicate correlation, some of them deny it (14,15). Results of this study were not in accordance with the results of the study conducted in 2010 by Darwazeh et al, where among 100 patients (50 smokers and 50 nonsmokers) Candida spp. were isolated from 84% of the smokers and 74% of nonsmokers (16). Tobacco smoking did not have influence on oral colonization with Candida spp. in healthy subjects in Drawazeh’s study (16), which is opposite to the results of this study. Prevalence of oral Candida carriage was comparable between both smokers and nonsmokers in Reichart et al study (17).

In this study among the patients with oral candidiasis two-thirds were smokers, and among the patients without candidiasis only one-third were smokers. Those data are in accordance with the results of studies conducted by Arendorf et al, who proved statistically significant correlation between smoking and Candida colonisation (18). Smoking, mobile prosthetics and systemic disease were found as predisposing factors for the development of oral candidiasis in other studies too (4, 19).

Reportedly, the prevalence of candida carriage is increasing significantly as a function of age, and it is comparable among sexes, but not significantly (20). Opposite to the Drawazeh’s study, the results of this study proved no statistically significant difference in the presence of oral Candida between younger and older responders. But results of both researches agreed that there was no statistical significance in the presence of oral Candida between males and females (20).

Smoking cigarettes and presence of Candida species in oral cavity have adverse effects on
FUNDING
No specific funding was received for this study.

TRANSPARENCY DECLARATIONS
Competing interests: none to declare.

REFERENCES


