

DOI: 10.5455/medarh.2012.66.415-417

Med Arh. 2012 Dec; 66(6): 415-417

Received: October 11th 2012

Accepted: November 15th 2012

CONFLICT OF INTEREST: NONE DECLARED

ORIGINAL PAPER

The Relationship Between Oral Hygiene and Oral Colonisation with Candida Species

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The aim of this study is to determine relationship between oral hygiene and colonisation of Candia species in oral cavity. **Introduction:** Maintenance oral hygiene is reducing pathological agents in the mouth and preventing violation of oral health. **Material and methods:** Study included 140 patients. For oral hygiene assesment were used the dental plaque index, oral hygiene index and dental calculus index. Ph test strips were used to determine pH of saliva. For isolation of Candida species oral swabs were taken to all patients. **Results:** It was found out that pH of oral cavity does not varies notably, no matter of oral hygiene level. Candida species were identified in 28,6% respondents. The most present were Candida albicans, in 85% cases. The presence of plaque, tartar and high index oral hygiene (IOH) in patients with Candida is statistically significant. It was found that 83,4% of patients with Candida poorly maintained oral hygiene. Poor oral hygiene is associated with a significantly higher score in the presence of tartar, plaque and high IOH. In total patient's population 67% has amalgam fillings. Presence of amalgam fillings in patients with identified Candida was statistically significant. **Conclusion:** This study indicates low level of oral hygiene. Correlation between presence of Candida species and poor oral hygiene was proved. Also Candida was more present among patients with amalgam fillings. Improvement of oral hygiene is necessary for oral health and health in general, as well. **Key words:** oral hygiene, Candida species, plaque, tartar, index oral hygiene.

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1. INTRODUCTION

Oral health is defined as a perfect health of the oral cavity, including teeth and their supporting structures. To preserve good oral health it is necessary to maintain properly and regular oral hygiene. Improper oral hygiene leads to

oral homeostasis disorders and making condition for increasing the numbers of bacteria and fungi. The most commonly used practices for personal oral hygiene is teeth brushing and flossing (1). Professional oral hygiene perform dentist. The purpose of maintain-

ing a good oral hygiene is to decrease amount of pathological agents inside the mouth (2, 3).

At the surface of teeth first appear pellicula which is the purchased organic tape derivative salivary glycoproteins. At the beginning pellicula is deprived bacteria, but some later colonisation by microorganisms goes and pellicula transforms into dental plaque. Plaque becomes mineralised into dental calculus (tartar). Dental plaque and tartar allow development of cavities (dental caries) and periodontal diseases (4, 5, 6).

Candida species are present as a commensal organisms in the oropharynx. During some systemic or local disorders the number Candida can increase it's numbers and invasiveness, causing oral mucosal damage. An infection caused by Candida fungi is Candidiasis (7).

Aim of this study is to determine relationship between oral hygiene and colonisation of Candia species in oral cavity.

2. MATERIAL AND METHODS

A prospective study was conducted at the Dental Clinic, Health Centre "Dom zdravlja Novi Grad" - The Public

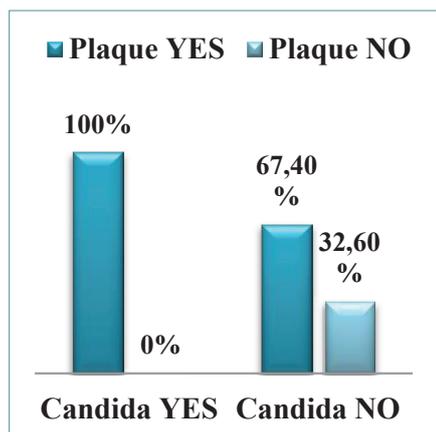


Figure 1. Candida and plaque

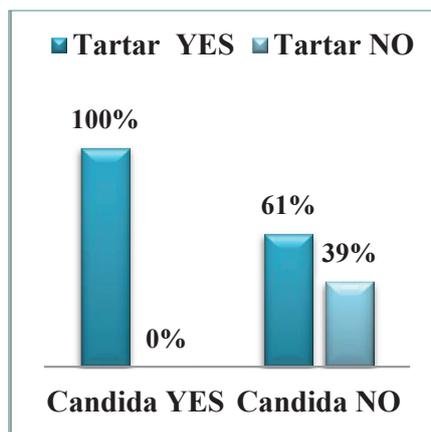


Figure 2. Candida and tartar

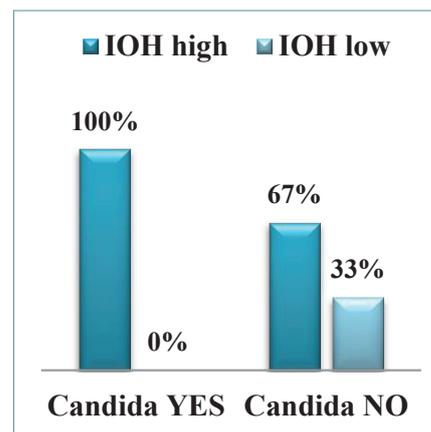


Figure 3. Candida and IOH

Institution Medical Centre of Sarajevo Canton from 01.01. 2010 to 01.07.2011. Study included 140 patients, 75 male and 65 female, between the ages of 18 to 60. Patients were divided into two groups: group I (patients between 18 and 30 years old), and group II (patients between 31 and 60 years old).

Study excluded patients with any mobile or fixed prosthetics and patients with chronic diseases. Medical history was taken and clinical examination were performed equally in all patients. All data were entered into a special designed database. For assessment of dental plaque accumulation and determination of oral hygiene were used the dental plaque index, oral hygiene index and dental calculus index.

Saliva pH testing involves the use of pH test strips. For isolation of Candida species oral swabs were taken to all patients, prepared and stained by methylene blue and examined microscopically (40x).

Also each sample was cultivated on Sabouraud's agar with addition of antibiotic to determinate presence of positive cultures. Yeast identification was performed by: Germ tube test, Cultivation on the selective medium (Chrom agar) and Yeast assimilation test (API test).

Standard methods of descriptive statistics were used. In a symmetric distribution of frequencies were applied parametric statistical analysis (student's t-test) and asymmetric distribution resulted in the application of non-parametric analysis (Chi square test). A level of statistical significance equals to or less than 0.05 indicated statistically significant difference.

3. RESULTS

Saliva varies in pH between 5,2 and 7. It was found out that pH of oral cavity does not vary notably, no matter of oral hygiene level. Candida species were identified in 28,6% asymptomatic healthy carriers. Candida were more

patients with and without the presence of Candida in the oral cavity statistically is significant ($p < 0.001$) (Figure 3).

Patients with identified Candida according to their different age group (group I and group II) belonging it was found that there was no significant

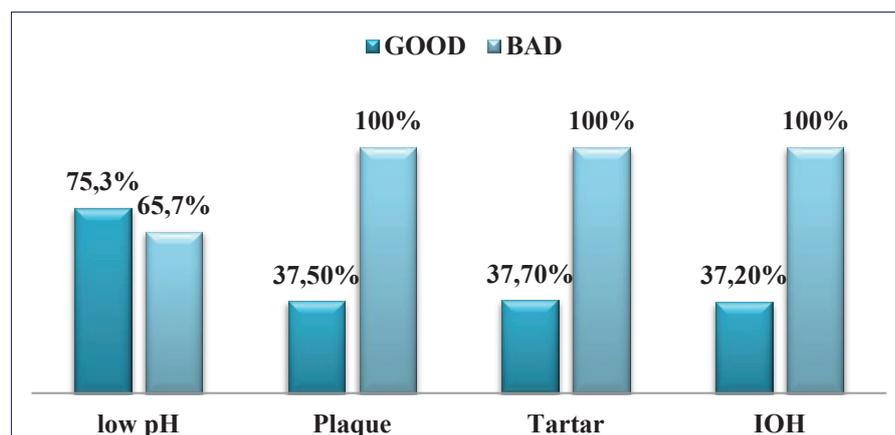


Figure 4. Oral hygiene, pH and indexes of oral hygiene

present among male (55%) but not statistically significant ($p > 0.05$). By microbiological analysis in 85% were identified *Candida albicans*, *Candida glabrata* in 10% cases and *Candida crusei* in only 5%. Presence of *Candida albicans* statistically is significant ($p < 0,05$).

Analyzing the presence of the plaque and tartar in patients with verified Candida and in patients who have no Candida (Figure 1 in 2), it was observed that all patients with Candida have plaque and tartar, and plaque and tartar is present in some patients without Candida. The presence of plaque and tartar in patients with Candida is statistically significant ($p < 0.001$).

The higher value of oral hygiene index (IOH) indicates poorer oral hygiene. High IOH is present in all patients with Candida. Difference between IOH of

difference (between younger and older carriers). Analysis inside groups were performed. Patients of group I with isolated Candida in oral cavity has significantly lower pH and significantly higher scores in the presence of: tartar, plaque and IOH compared to patients without Candida. Patients with identified Can-

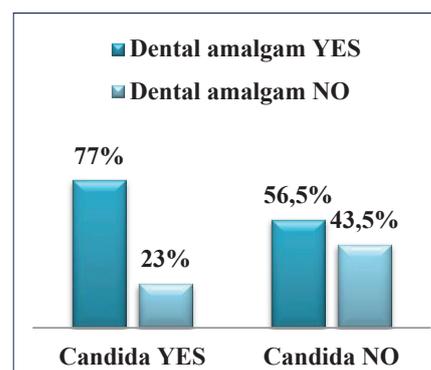


Figure 5. Candida and dental amalgam

dida in group II also had significantly higher score in the presence of tartar, plaque and IOH values compared to patients without Candida. The pH in patients of group II were not statistically significant regardless of the presence or absence of Candida. It was found that 83,4% of patients with Candida poorly maintained oral hygiene, while the majority of patients (64.7%) without Candida maintain good oral hygiene. Poor oral hygiene is associated with a significantly higher score in the presence of tartar, plaque and high IOH compared to good oral hygiene ($p < 0,001$), (Figure 4).

In total patient's population were significantly more subjects with amalgam fillings (67%). Presence of amalgam fillings in relation to age was not statistically significant. Patients with Candida had 2.5 times more amalgam fillings from patients without Candida. Presence of amalgam fillings in patients with identified Candida was statistically significant ($p < 0.05$) (Figure 5).

4. DISCUSSION

Previous studies have shown that there is a link between poor oral hygiene and the development of bacteria and fungi (7). Data from this study, about personal maintenance of oral hygiene show that 76% of patients brush their teeth more than twice per day, 16% brushed twice per day and 8% only once. Most respondents (71%) said they were instructed in the proper brushing by parents or dentists. It can be concluded on the basis of the above reported data that respondents awareness about oral hygiene maintenance was at high level, but clinical examination indicates that there is disproportion between actual clinical findings and data reported by the respondents. Physical examination showed that the oral hygiene is on a quite poor level, so it can be assumed that they were giving socially adjusted answers. Only 2% of patients claimed that they are using dental floss. The study conducted in Jordan in 2010. found out use of floss is directly relate to the proportion of Candida in the oral cavity (8). According to a survey conducted by Agrawal et al. 2011, only 28.1% of respondents was maintained oral hygiene satisfactory (9).

Research indicates that the saliva pH can range from 5.5 to 6.1 (10). According to research by Pasic the ideal pH is 6.7 (11). In this study, the pH values of oral cavity were ranged from 5.2 to 7. Ožegovic et al claim that Candida is present in 50 to 70% of healthy subjects as an oral commensals (12). Pankhrust in his study conducted 2012. year found that 60% of healthy subjects had Candida (13). Most research indicates the predominance of oral Candida in a female population (14, 15). Ožegovic et al. in their study found from 60 of the patients with Candida, 42 patients were female (12). Darwazeh et al. also came to the result that women are more likely to have Candida (58.7%) (16). Opposite to previously mentioned studies, in this study, Candida is more prevalent in men (55%) than in women (45%). From all Candida species the most present was *Candida albicans* which coincides with other studies (17, 18). The results of this study are consistent with the results of studies conducted by Nishiyama and Agrawal et al. which indicate a positive association between poor oral hygiene and the presence of Candida (18). In studies conducted by Hadzic, patients with poor oral hygiene *Candida albicans* was significantly more present compared to the findings in patients with good oral hygiene. Those finding coincides to the results of this study (7). Darwazeh et al. were not found association between the occurrence of Candida and oral hygiene (18).

In a research conducted by Thomas Rau (1999), he concluded that all patients with Candida in the oral cavity has significantly higher amalgam fillings than those who did not have Candida (19), which was also confirmed in this study. In this study was found that there is a positive correlation between poor oral hygiene and the presence of plaque, calculus, and higher IOH and the presence of Candida species. This corresponds to the research conducted by Rylander H and J. Lyndhe conducted 1997 (20).

The purpose of this study is paying attention on importance of oral health which is essential for health in general. Through cooperative interaction of patient and dentist improving of oral hygiene should be accomplished.

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