PREVALENCE OF ORAL CANDIDIASIS IN COMPLETE DENTURES WEARERS

ПРЕВАЛЕНЦА НА ОРАЛНА КАНДИДИЈАЗА КАЈ НОСИТЕЛИ НА ТОТАЛНИ ПРОТЕЗИ

Tmava-Dragusha A.[1], Shala K.[1], Ivanovski K.[2], Dirjanska K.[2], Ristoska S.[2], Elenchevski S.[3]

[1]Department of Prosthetic Dentistry, Faculty of Medicine, School of Dentistry, Prishtina, Kosovo, [2]Department of Oral pathology and Periodontology, Faculty of Dentistry, University "Ss Cyril and Methodius" – Skopje, [3]Department of Prosthetic Dentistry, Faculty of Dentistry, University "Ss Cyril and Methodius" – Skopje

Abstract

Objective: As the population age is growing the need for oral prosthetic rehabilitation is increasing accordingly. Oral candidiasis is a common opportunistic infection of the oral cavity caused by an overgrowth of Candida spp., the commonest being Candida albicans. **Materials and Methods:** To obtain the set objectives, 50 patients (from the experimental group EG), complete denture wearers, were included and sampled at the University Dentistry Clinical Center of Kosovo, Prishtina. Also, we designate a control group of 50 patients, older than 50 years of age. Clinical changes in the oral mucosa were assessed using thorough intra/extra–oral examination with the emphasis on the eventual oral mucosal changes in contact with dentures. In both experimental and control -roup patients' swabs were obtained for testing the presence of Candida albicans. In the experimental group of patients along with oral mucosal swabs, denture swabs were taken as well. **Results:** In our study the highest percentage was found for Candida albicans - 26.0%, followed by Candida tropicalis - 12.0%, and Candida crusei - 6.0%, of the cases.There was a correlation between denture wearing and the occurrence of oral candidiasis.($p<0.05$)(Pearson Chi-square: 13.6364, p=.000222). While there was no correlation found between the duration of denture wearing and the occurrence of oral canididiasis. ($p>0.05$)(Pearson Chi-square: 1.02339, p=.311716), however, there was a correlation noted between the years of denture wearing and the occurrence of candida spp. on the patient denture base. **Conclusions:** The prevalence of Denture Stomatitis in complete denture wearers is high and no association with its risk factors was found. **Key words:** denture stomatitis, complete denture wearers, oral candidiasis, candida albicans.

Апстракт

Цел на трудот: Како што се зголемува возраста на популацијата, соодветно се зголемува и потребата од орална протетска рехабилитација. Оралната кандидијаза е честа опортунистичка инфекција во усната празнина, којашто е предизвикана од прекумерен раст на Candida spp, од коишто најчесто станува збор за Candida albaicans. **Материјали и Методи:** За да се постигнат поставените цели, 50 пациенти (од експерименталната група ЕГ), носители на тотални протези, беа вклучени и од нив беа земени примероци во Универзитетскиот Стоматолошки Клинички Центар во Косово, Приштина. Исто, офомивме контролна група од 50 пациенти, постари од 50 години. Клиничките промени на оралната мукоза беа оценети преку темелен интра/екстраорален преглед со акцентирање на евентуалните промени на мукозата којашто е во контакт со тоталната протеза. И во експерименталната и во контролната група, од пациентите беше земен брис за одредување на присуство на Candida albicans. Во експерименталната група на пациенти, покрај брисот од оралната мукоза, беше земен и брис од тоталната протеза. **Резултати:** Во нашето испитување, процентуално најголемо присуство беше одредено за Candida albicans – 26.0%, потоа Candida tropicalis – 12.0% и Candida crusei – 6.0% од случаите. Утврдивме корелација помеѓу носењето на тотална протеза и појавата на орална кандидијаза. ($p<0.05$) (Pearson Chi-square: 13.6364, p=.000222). Не утврдивме корелација помеѓу времето на носење на протезата и појавата на орална кандидијаза ($p>0.05$) (Pearson Chi-square: 1.02339, p=.311716), но, забележавме корелација помеѓу годините на носење на тоталната протеза и појавата на candida spp. на базата на тоталната протеза. **Заклучоци:** Преваленцата на протетскиот стоматитис кај носителите на тотални протези е висока и не е во асоцијација со неговите ризик-фактори. **Клучни зборови:** протетски стоматитис, носители на тотални протези, орална кандидијаза, candida albicans.

Introduction

As the population age is growing the need for oral prosthetic rehabilitation is increasing accordingly[1]. Although, the number of treatment options for dentate and edentulous patients is staggering both in number and techniques, not every member of that population can benefit from all of the options, mainly due to the financial constraints[2]. One of the most common and optimal options, both clinically and financially, is resin-based complete denture[3].

Oral fungal infection is a common disease in complete denture wearers. Oral candidiasis is a common opportunistic infection of the oral cavity caused by an overgrowth of Candida spp., the most common being Candida albicans[4]. C. albicans is a dimorphic yeast

strongly gram-positive able to live as a normal commensal organism in the oral cavity of healthy people of 45–65%, but in denture wearers, the prevalence of Candida increases to 60–100% which increases the risk of infection[5, 6, 7].

The etiology of denture stomatitis is multifactorial, with factors including trauma caused by ill-fitting dentures, increased age of the patient and of the dentures, lack of denture hygiene, and a favorable environment for proliferation for Candida albicans in particular[8, 9, 10].

Patients with candidiasis may report varied symptoms such as painful sensations, local discomfort, difficulty swallowing, a burning sensation in the oral cavity, or an alteration in taste, but such infections are most often asymptomatic[11].

Candida species are frequently isolated from the oral cavity in healthy individuals of all ages, and it is therefore difficult to differentiate oral candidiasis from the commensal state by microbiological detection of the *Candida* species in the oral cavity. Therefore, additional microbiological criteria are required to diagnose oral *Candida* infection correctly. Various methods can be used to isolate *Candida* from the oral cavity, including smears, plain swabs, imprint cultures, whole saliva collection, concentrated oral rinses, and mucosal biopsies[12, 13]. Clinical studies have shown that C. *albicans* is not only able to adhere to the mucous surfaces, but also to stick to the acrylic resins of the dental prostheses, where both the plaque accumulated on the dentures and the poor oral hygiene contribute to the virulence of *Candida*, offering a clinical picture of Candida-associated denture stomatitis[14].

The purpose of this study was to determine changes in the oral environment occurring in denture-wearers by recording:

- Clinical expression in oral mucosa in close contact with complete dentures.
- Microbiological findings.

Material and Methods

To obtain the set objectives, 50 patients (from the experimental group EG), complete-denture wearers, were included and sampled at the University Dentistry Clinical Center of Kosovo, Department of Prosthodontics, Pristina. Inclusion criteria were as follows:-

- Patients that have worn their dentures for at least one year.
- The dentures should have been fabricated at the laboratory of UDCCK from the same technician under the most similar conditions for denture fabrication for all groups, and
- The patients should be older than 50 years.

Also, we designate a control group (CG) of 50 patients, older than 50 years, without removable prosthodontic restorations, that attend the University Dentistry Clinical Center of Kosovo, Pristina, for other reasons.

History was recorded in the experimental and control group including:

- Medical and Medication History,
- Duration of Denture Wearing (Experimental Group),
- Subjective issues related to their dentures.

Denture hygiene habits were recorded using special questionnaire developed by **Peracini at al.** (2010)[15].

Clinical changes in the oral mucosa were assessed by means of thorough intra/extra–oral examination with emphasis on the eventual oral mucosal changes in contact with dentures. These examinations included the control group as well.

From clinical aspect, all patient with denture related stomatitis are classified into three clinical types (Newton classification):

Newton´s type I: pin-point hyperemic lesions (localized simple inflammation)

Newton´s type II: diffuse erythema confined to the mucosa contacting the denture (generalized simple inflammation)

Newton´s type III: granular surface (inflammatory papillary hyperplasia).

In addition, thedentures' stability was assessed.

In both experimental and control group, patients' swabs were obtained for testing the presence of *Candida albicans.* In the experimental group of patients along with oral mucosal swabs, denture swabs were taken as well.

Microbiology analysis was conducted at the Institute of Public Health, Department of Microbiology, Pristina. Oral and palatal mucosal samples were taken.

Results

In patients from the CG there was no candida infections recorded.

Candida infections were recorded in 24.0% of the patients in the EG. *Candida crusei* and *Candida albicans* was simultaneously found in two patients (4.0%). *Candida albicans* alone was found in 20.0% of patients, evidently *Candida albicans* is found in 24.0% of total patients. (Table1, Graph 1).

Table 1. Patient distribution by *Candida* – mouth variable

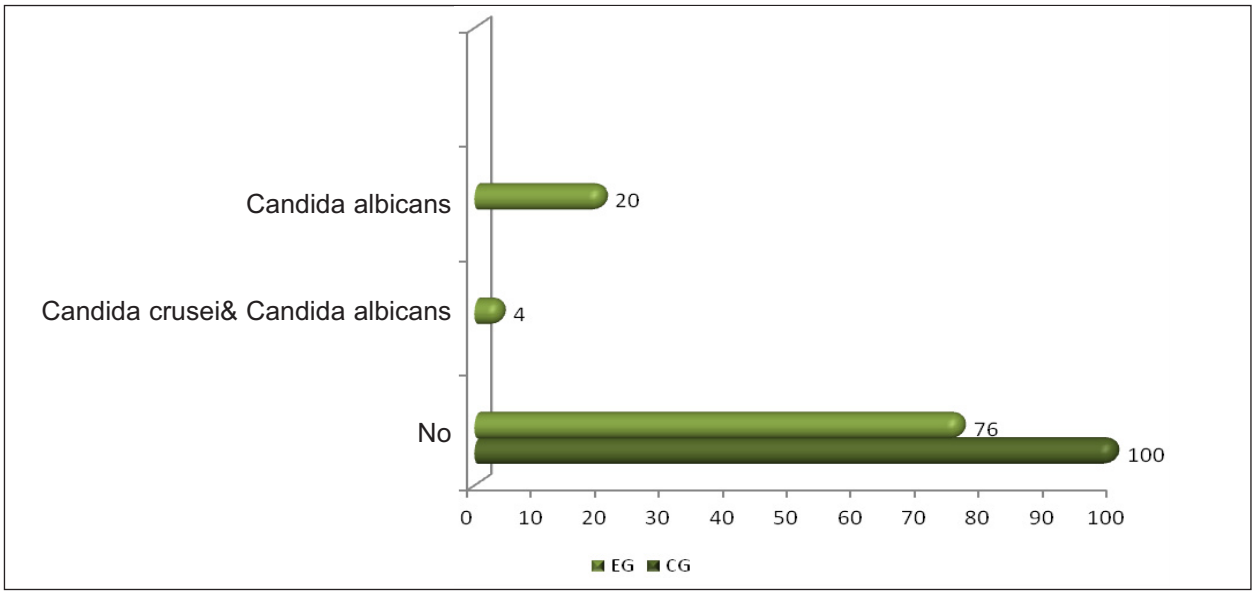
	CG		EG	
	Count	Percent	Count	Percent
No	50	100.0	38	76.0
Candida crusei & Candida albicans			2	4.0
Candida albicans			10	20.0
Total	50	100.0	50	100.0

Table 2. Patient distribution by Candida-dentures variable in EG

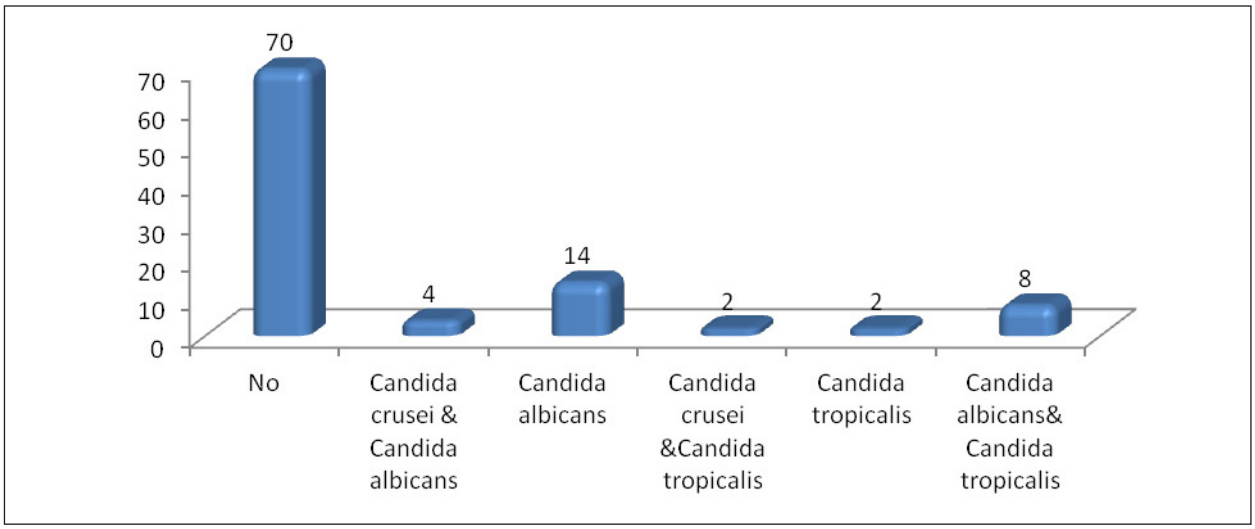
	EG	
	Count	Percent
No	35	70.0
Candida crusei & Candida albicans	2	4.0
Candida albicans	7	14.0
Candida crusei & Candida tropicalis	1	2.0
Candida tropicalis	1	2.0
Candida albicans & Candida tropicalis	4	8.0
Total	50	100.0

In 30% of complete denture wearer patients, candida spp. was isolated on the actual denture base. *Candida crusei* and *Candida albicans* were simultaneously found in two patients (4.0%). *Candida albicans* alone was found in 14.0% of the patients. *Candida crusei* and *Candida tropicalis* were simultaneously found in a single patient, (2.0%). *Candida tropicalis* alone was found in a single patient. *Candida albicans* and *Candida tropicalis* were simultaneously found in 8.0% of EG of patients (Table 2, Graph 2). In total, the highest percentage was found for *Candida albicans* - 26.0%, followed by *Candida tropicalis* - 12.0% and *Candida crusei* - 6.0%, of the cases.

There was a correlation between denture wearing and the occurrence of oral candidiasis. ($p<0.05$)(Pearson Chi-square: 13.6364, p=.000222).



Graph 1. *Patient distribution by Candida – mouth variable*



Graph 2.*Patient distribution by Candida-dentures variable in EG*

During the study, there was no correlation found between the years of denture wearing and the occurrence of oral canididiasis. (p>0.05)(Pearson Chi-square: 1.02339, p=.311716), however, there was a correlation noted between the years of denture wearing and the occurrence of candida spp. on the patient denture base. (p<0.05)(Pearson Chi-square: 13.7188, p=.000212). Similarly, a correlation between diabetes in denture-wearing patients and candida infections was confirmed. (p<0.05)(Pearson Chi-square: 17.9107, p=.000023).

Discussion

The Candida species form the normal commensal fungi component, and its activity is regulated by many intrinsic and extrinsic factors. The pathogenic nature of Candida has been correlated with various systemic conditions, which in some manner affect the immunity of the patients[16].

The *Candida* concentration associated with several clinical oral signs in the infected patients and may be closely related to the patient's current clinical status and prognosis[17]. In our research of patients from the CG there was no candida infections recorded. Our results agree with Al Tarawnehn et al.[18] who concluded that mucosal candidal counts and the presence of cytological hyphae did not show significant difference when comparing DS to healthy participants. Our results show that the highest percentage was found for *Candida albicans* in denture in EG patients (26.0%), followed by *Candida tropicalis* and *Candida crusei*, of the cases. Many authors have reported that Candida albicans is the most common species in denture users, making up 70% of all isolates[19]. Zomordian et al.[20], investigated risk factors associated with progression to candida-related dentures stomatitis in patients using complete dentures, and they found that C. albicans was the most frequently recovered species, followed by C. glabrata and C. tropicalis. Therefore, according to Mizugai et al.[21] in their study evaluate the association among age distribution and denture wearing status and Candida spp. detection rate. This study indicates that, although detection rate of single Candida spp. were rather high in the youngest group of non-dentures wearers, detection rates of single and multiple *Candida spp.* were significantly higher in denture wearers of all other age groups compared with non-denture wearers (P<0,05). Many studies have also shown that denture hygiene practices are essential, because the porous material of the surface biofilm can serve as a reservoir of fungal microorganisms, and contribute to reinfection[22,23].

During the study there was no correlation found between the years of denture wearing and occurrence of oral canididiasis, however, there was a correlation between the years of denture wearing and occurrence of Candida spp. on the patient denture base. Our results agree with previous reports which indicate that DRS are in statistically significant continuous denture wearing[24, 25]. Due to the deterioration of dentures over time, such as the polished surfaces fit to the underlying tissues and the occlusion, dentures could become more irritant to the mucosa and more open to candida and bacterial colonization.

Our findings suggest that there is a significant difference between diabetes in denture wearing patients and candidiasis. The most frequent oral signs and symptoms observed in both controlled and uncontrolled diabetic

patients was hyposalivation, halitosis, periodontitis, taste alteration, aphthous stomatitis, and they found significant difference between the groups. Also, the most common lesion seen in both the groups were candidiasis, fibrous hyperplasia, aphthous ulcers and benign neoplasia where the chi-square test showed a significant difference between the groups P<0,05 according to Shrimali et al.[26], Daniluk et al.[27]. *Candida albicans*, statistically significantly, more frequently was isolated in denture wearers' patients with diabetes melitus and without diabetes, comparing to such groups of patients but without dentures.

Our results may differ due to our smaller number of participants, or due to other issues associated with their age and general health. Therefore it should be pointed out that older dentures are harder to clean due to a tendency for porosity in their bases, which can contribute for the emergence of the disease. It should be concentrated on patient information and motivation on hygiene, for prophylactic purposes. Future studies will be a series of clinical epidemiologic studies, already planned in our department, to investigate pathogenesis of Denture stomatitis.

Denture Wearers

Laura Lourenço Morel[1], Anna Paula da FernandaFaot[1], Luciana de Rezende Pinto[1],

Laura Lourenço Morel[1], Anna Paula da FernandaFaot[1], Luciana de Rezende Pinto[1]

Conclusion

In conclusion, the prevalence of Denture Stomatitis in the total number of denture wearers is high and although no association with its risk factors was found.

Preventive and educational measures for oral health in the elderly, stimulating the correct hygiene of the denture and the oral cavity, should be a routine among professionals. Patients that use dentures must maintain their dentures in order to preserve their oral health.

Conflicts of interest

The authors confirm that this article content has no conflict of interest.

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