

Original Research Article

Effect of wearing complete dental prosthesis on candidal count

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ABSTRACT

Background: Infection due to fungi have increased dramatically in recent years and are of prime importance because of the rising number of immunocompromised patients, such as cancer patients receiving chemotherapy, and human immunodeficiency virus infected patients. The aim of the analysis was to compare the candidal count at the time of insertion and after one month of wearing complete dentures.

Methods: It was a quasi-experimental study which consisted of forty edentulous patients with no previous denture history. They obtained new complete dentures. Samples were taken using the oral rinse technique and cultured on sabouraud agar for fungal growth and cultured positive samples had undergone for germ tube test in serum media.

Results: Candidal colonies were detected and counted as colony forming units at the time of insertion and after one month of wearing complete dentures. Change in candidal count was significantly higher after one month of wearing complete dentures ($p=0.0001$). Difference in candidal count was significantly higher in females than males.

Conclusions: Candidal count was significant after wearing complete dentures and this should be considered as an important factor that can pre-dispose the patients to candida induced denture stomatitis.

Keywords: Candidal count, Denture stomatitis, Sabouraud agar

INTRODUCTION

Longer life expectancy has led to an increase in the ageing population in developed countries. This growth in the number of elderly may lead to an increase in the number of people requiring removable dentures.¹ The current rates of edentulism have been estimated to be between 7 percent and 69 percent of the adult population internationally.² For those older adults lacking the appropriate manual dexterity to eliminate oral plaque from denture appliances and teeth, there might be more susceptibility to opportunistic oral mucosal infections, particularly bacterial and fungal.³ Infection due to fungi have increased dramatically in recent years and are of prime importance because of the rising number of immunocompromised patients, such as cancer patients receiving chemotherapy, and human immunodeficiency

virus infected patients.^{4,5} It has a high morbidity amongst the latter group with approximately 85% of patients being infected at some point during the course of their illness.⁴

A spongy denture tissue surface, full of nutritive substances, is an ideal incubator for species such as *Candida albicans*. *Candida albicans* is a commensal in the oral cavity of 45-65% of healthy individuals with a higher prevalence found in children and young adults.⁶ In denture wearers, the prevalence of *Candida* increases to 60-100% and the organism can be opportunistic, which can be explained by the fact that dentures decrease the flow of oxygen and saliva to the underlying tissue producing a local acidic and anaerobic microenvironment that favours yeast overgrowth.⁷ Additionally, *Candida* has affinity for the acrylic surface of dentures and nonrenewing surfaces such as teeth, dental fillings.^{8,9}

Surface characteristics of denture base acrylic resins, such as hydrophobicity, have generally been acknowledged to be one of the factors contributing to the adhesion, which is a crucial step in biofilm formation ^{7,10}. *Candida albicans* biofilms are frequently associated with the occurrence of denture stomatitis.

The objective of the study was to compare the Candidal count at the time of insertion and after one month of wearing complete dentures.

METHODS

Forty edentulous patients (20 males, 20 females with an age range of 50 to 65 years), who had obtained new maxillary and mandibular complete dentures, were selected by purposive non-probability sampling. Patients with history of treatment with chemotherapy or radiotherapy in the head and neck region, history of broad spectrum antibiotics or steroid therapy in past six months, smokers and diabetics were excluded from the study.

Upper and lower complete dentures were constructed by the same technician in the dental laboratory within the institution following standardized clinical techniques. Complete denture was provided to the patient. On insertion, dentures were checked in the mouth for adaptation of the denture and were relieved as needed. The oral rinse technique was used to take the oral sample at the time of insertion.

All the patients were asked to rinse mouth with distilled water thoroughly to remove any food debris. After 10 min phosphate buffer solution was used as oral rinse method for saliva collection. Samples were obtained by requesting patients to keep and swirl the solution for one minute, and then expectorate all saliva into presterilized container without swallowing. To minimize the effect of diurnal variation, meals and brushing, the rinse samples were collected at the same time of the day between 9 and 10 a.m. and at least two hours after eating, drinking or any oral hygiene procedure. The sample was carried out

microbiology laboratory for confirmation and count of candida colonies. The oral rinse sample was centrifuged at 1700g for 10 minutes. The supernatant was discarded and sediment material was carried out with pipette and inoculated in sabouraud media for 37°C for 48 hours. The growth appeared in 48 hours as creamy/white colored, smooth and pasty colonies. Very small inoculum from an isolated candidal colony was picked up with the sterile inoculating loop and was suspended in a test tube containing normal human serum (0.3-0.5ml) by rubbing the inoculated loop against the wall of test tube. This helps the diluting the pasty colonies by giving the serum turbid appearance. The mixture was incubated at 42°C for 2-3 hours. A drop of mixture was placed in clean glass slide and covered with cover slip. This was examined under low power objective to locate the group of cells and later, the presence of germ tube was confirmed under high power objective of the microscope.

The patients were provided with verbal and written instructions on how to clean their denture. Patient was recalled after one month and same sampling and culture technique were employed. Data was analysed on computer program SPSS version 13. Mean and standard deviation were calculated for age. Frequency and percentage were calculated for gender and candidal colony forming units. Non-parametric sign test was applied to compare candidal outcome at the time of insertion and after one month of wearing complete dentures. The p-value <0.05 was considered significant.

RESULTS

A total of forty edentulous patients, provided with first time complete dentures, were included in this study. Minimum age was 50 years and maximum age was 65 years. The average age of the patients was 58.90±4.37 years. Out of 40 patients, 20(50%) were male and 20(50%) were female with 1:1 male to female ratio. At the time of insertion candidal count of the patients was zero for all patients while after one month of wearing complete dentures candidal count increased (Table 1).

Table 1: Frequency of candidal count at the time of insertion and after one month of wearing complete dentures (n=40).

Candidal Count	At the time of insertion	After one month of wearing complete dentures
0	40 (100%)	26 (65%)
200-3000	---	07 (17.5%)
3001-4000	---	03 (7.5%)
4001-5000	---	03 (7.5%)
>5000	---	01 (2.5%)

Comparison of candidal outcome in term of negative (count zero) and positive (Candidal count >1) were presented (Table 2). Change in candidal count was

significantly higher after one month of wearing complete dentures (p=0.0001). Similarly difference in candidal count was significantly higher after one month of wearing

complete dentures in females than males (Table 3). Non-parametric sign test applied. Zero candidal count means

negative and more than and equal to 1 mean positive count.

Table 2: Comparison of the candidal count at the time of insertion and after one month of wearing complete dentures (n=40).

Candidal outcome	At the time of insertion	After one month of wearing complete dentures	P-value
Negative	40 (100%)	26 (65%)	0.0001
Positive	0 (0%)	14 (35%)	

Table 3: Comparison of the candidal count at the time of insertion and after one month of wearing complete dentures with respect to gender (n=40).

Candidal outcome	At the time of insertion	After one month of wearing complete dentures	P-value
Male			
Negative	20 (100%)	15 (75%)	0.063
Positive	0 (0%)	5 (75%)	
Female			
Negative	20 (100%)	11 (55%)	0.004
Positive	0 (0%)	9 (45%)	

DISCUSSION

Candida species are known as the most prevalent opportunistic fungi, producing a high prevalence disease, candidiasis in human body, with the extremely varied localization. Colonization of *Candida albicans* in human mouth can promote oral candidiasis, with different manifestations. Angular cheilitis, one of the mucosal manifestations of oral candidiasis, results from colonization of *Candida* species in commissural folds.¹¹

The results of the present study support the hypothesis that there is a significant quantitative alteration in the candidal count after the complete denture is worn for a month. In this study, oral carriage of candida count was higher in female (Table 3) which is similar to many other studies. This may be explained due to the fact that women have more candidal load on the basis of iron deficiency anemia and hormonal changes.¹²⁻¹⁴ The majority of the women in the present study were in an age group where menopause was likely to occur. Most of the studies found that higher denture induced stomatitis in male patients in comparison to female.^{15,16} Smoking is more common in males and can be a reason of high candidal count. Smokers were excluded and this may be the cause for low candidal count in present study.

For this in vivo study, the sampling method used for candida in the oral cavity was oral rinse technique. This method is extensively used, and even though it does not directly target specific mucosal lesions, it provides a count of the candidal carriage. This technique was verified to be the most sensitive and ideal technique to

find and determine overall candidal carriage.¹⁷ The results of this study (Table 2) showed that wearing complete denture significantly increased the candidal carriage which is also seen in another study.^{14,18}

According to studies there is significant association exists between denture type and candida colony forming unit count. Mucosal lesions occurred more frequently in complete denture wearers followed by partial denture wearers.^{12,19} The significant results of this study emphasize the critical need to measure candidal activity of complete denture wearers.²⁰

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