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An In-Vivo Assessment of Scientific Relationships of Salivary Candida Among Dentulous And Edentulous/Complete Denture Patients: An Original Research Study

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Abstract

Aim: This study was primarily executed to compare and assess salivary candida among dentates and complete denture wearers. Authors also tried to search any clinical associations of salivary candida among the study groups.

Materials and Methods: In the present study, we considered total fifty patients including thirty male and twenty female subjects. Simple random sampling procedure was employed for their assortment. Exclusion criteria included patients with dry mouth, patients on antimicrobial agents, antifungal, cortico-steroids therapies. All considered patients were separated equally into two study groups of twenty five each. In Group one, all patients were completely edentulous (complete dentures patients). In Group two, patients were dentate (rpd patients). Saliva was collected using standard norms and armamentarium. All samples were analyzed by microbiological ways and candidal presence was seen. Results thus obtained was compiled and analyzed suitably. P value less than 0.05 was considered significant ($p < 0.05$).

Results: Applicable data and details sent for statistical estimation by statistical software SPSS. In 50 experimented patients, males were 30 and females were 20. Mean colony count for group one and two was 6.039 and 3.736 respectively. P value was highly significant for group one. The calculated standard error and Pearson Chi-Square Value was 0.839 and 1.748 for group one. One-way ANOVA calculations within group and between groups were tried in which p value was extremely significant.

Conclusion: Within the limitations of the study authors have drawn very significant outcomes. All studied complete denture wearers showed higher candidal colony counts when compared with rpd wearers. Hence, candidal growth is clearly correlated and affected by coverage of ridge and palate. Additionally, all denture wearers must utilize routine denture cleansing aids to avoid deleterious microbial colonization.

Key words: Candida Albicans, Complete Denture, Saliva, Potato Dextrose Agar.

Introduction

Oral microbial infections are of different types like bacterial, viral and fungal. Most of the inflammatory conditions mouth is associated with opportunistic oral fungi. Clinical spreads of these fungi are known to increase with presence of dental prosthesis.^{1,2,3} Many of the researchers have demonstrated about number, types and species of these causative agents.^{4,5} By definition denture stomatitis is a common inflammatory reaction of multi-factorial origin. Denture stomatitis is readily associated with Candida family specially Candida albicans.^{2,6} Many of the studies have been attempted to explore the basic mechanism of it.^{7,8,9} Candida albicans have been extensively studied for its behaviors and severity. It has potent ability of adhering and making bio-films in the oral mucous membrane. Candida albicans colonies are also found on the surfaces of prosthesis like complete denture or partial denture.^{10,11,12} The connection of Candida albicans as a possible contributory agent in denture associated stomatitis was firstly introduced in the literature in 1936.^{2,5,9} Till date, candida albicans is the most commonly found fungi in the mouth. However, combination of different species of candida is usually seen in solo isolation. Interestingly, with the continued usage of dentures, the formation of candidal colonies intensified.^{13,14,15} This phenomenon is more commonly seen in maxillary arch than mandibular arch. Various concepts and etiologies have been discussed for it like wide surface area of upper denture.^{13,16,17} Recent authors have stated that tissues under upper denture are packed within a closed space in which self cleansing action of saliva is ineffective.^{21,22} One more predisposing factors for development of candida infection is usage of immune suppressive drugs.^{18,19} In the recent past, relative usage of these drugs has been increased due to higher number of organ transplant cases.^{20,23,24} Similarly, clinical prescriptions of corticosteroids are also a alarming conditions for such oral infections. Generally, patients suffering from candida infection are asymptomatic with no apparent sign and symptoms therefore most of the cases remain unnoticed. However, patients with candida infection can exhibit different symptoms including aching, altered sense and swallowing intricacy.^{4,12,17} This study was conducted to compare and evaluate salivary candida among dentates and complete denture wearers. Authors also endeavored to explore possible clinical correlations of salivary candida among the study groups. The basic ideology of the study was to search about colonization patterns and magnitudes with use of partial dentures and complete dentures.

Materials & Methods

This study's design and ideology was discussed initially among the authors to define precise methodology. Authors studied total fifty subjects who included thirty male and twenty female patients. Case selection was completed very cautiously since authors planned to study microbiological status of saliva in different individuals. Simple random sampling procedure was used for their selection. By definition, simple random sampling is a part of the sampling technique in which each sample has an equal probability of being chosen. All patients were screened from regular OPD of the department without any favoritism. All willing subjects have been told about the relative importance of study in very palliative way. Duly signed informed consent obtained accordingly from all participants. Authors have also adapted certain strict exclusion criterions to ensure equality and minimize any methodological error. These included patients with high or extremely low salivary flow, patients on antibiotics, antifungal, steroids or immunosuppressive therapies. Additionally, authors excluded all smokers unanimously. Detailed case history was noted including the history of previous prosthesis if any. All fifty patients were divided equally into two study groups (of twenty five each) as per their status of dentition. In

Group one, all patients were completely edentulous. All patients in this group were wearing complete dentures. These prostheses were fabricated in the department in last one year tenure by compression moulding technique. In Group two, patients were dentate (partially edentulous subjects considered). All patients in this group were wearing removable partial dentures. Like group one, these prostheses were fabricated in the department in last one year tenure by standard technique. In group two, authors specified about the number of missing teeth. Patients with less than three missing teeth were included in study. The basic ideology of the study was to explore about colonization patterns and magnitude with use of partial dentures and complete dentures. Collection of whole saliva (non stimulated/exaggerated) was performed in wide sterile glass container. Patients were asked to spit into it with minimum one hour gap with consecutive meals. All samples were sent for microbiological examination and candidal estimation. Initial processings included centrifugation with culture on potato dextrose agar (Difco Inc.) or broth. Any positive finding related to colonial growth was noted. Microbial colony count was attempted in all positive samples and related data was entered into pre-framed spreadsheet. Spreadsheets of both groups were sent for further statistical analysis. Results thus obtained was compiled and analyzed suitably. P value less than 0.05 was considered significant ($p < 0.05$).

Results

All the recorded data and related details were entered into excel sheet and sent for statistical evaluation using statistical software Statistical Package for the Social Sciences version 21.0 (IBM Inc., NY, USA). The significant data was subjected to appropriate statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Table 1 and Graph 1 illustrate that out of 50 patients, males were 30 and females were 20. Total 13 patients (maximum) were in age range of 52-58 years. P value was found to be significant in this age group (0.01). 7 patients have been identified in second age range of 38-44 years. 11 patients were seen in age range of 59-65 years. P value was non-significant here. Minimum 3 patients were noticed in last age group of >65 years. P value was not significant for it. Table 2 exhibits two sample t- test assessment of mean score (for colony count) and standard deviation in both the study groups. Mean colony count for group one and two was 6.039 and 3.736 respectively. P value was highly significant for group one (0.001). Table 3 demonstrated the fundamental statistical description with level of significance assessment using pearson chi-square test for group I & II. The measured standard error and Pearson Chi-Square Value was 0.839 and 1.748 for group one. Similarly, the measured standard error and Pearson Chi-Square Value was 0.948 and 1.647f or group two. P value was fairly significant for both groups. Table 4 exhibited the comparison among the 2 study groups using one-way ANOVA. Assessments within group and between groups were attempted. The overall comparison and p value was highly significant (0.000021). There were significant lap between mean square values when checked between group and within group. However, critical variation was noted to be within fair ranges which indicate significant value deviations among groups

Table 1: Age & Gender Wise Distribution of Patients

Age Group (Yrs)	Male	Female	Total	P value
31-37	4	5	9 [18 %]	0.02*
38-44	3	4	7 [14 %]	0.50
45-51	4	3	7 [14 %]	0.08
52-58	9	4	13 [26 %]	0.01*

59-65	8	3	11 [22 %]	0.09
>65	2	1	3 [6 %]	0.10
Total	30	20	50 [100 %]	*p<0.05 significant

Graph 1: Age & Gender Wise Distribution of Patients

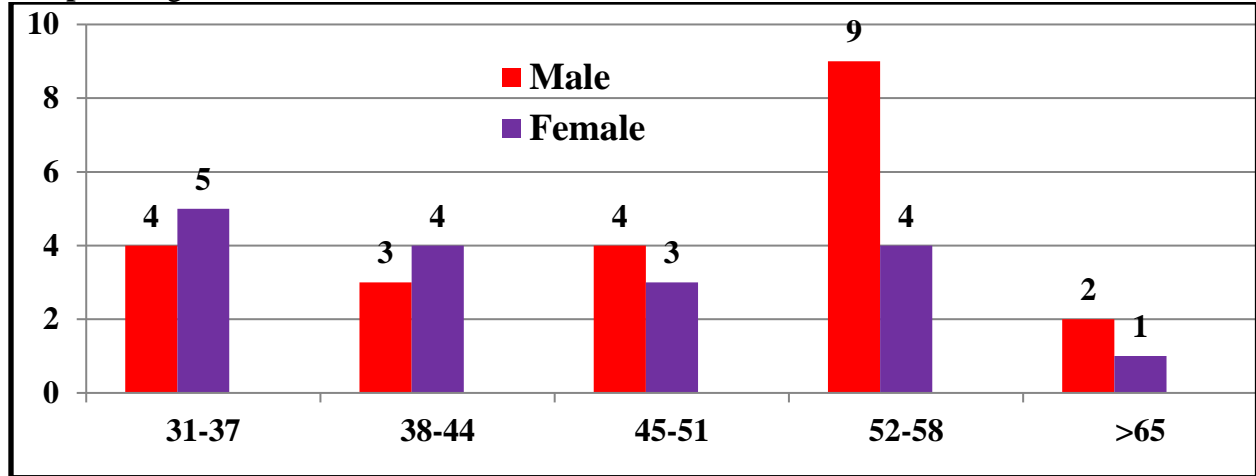


Table 2: Two sample t- test assessment of mean score (for colony count) and standard deviation in both the study groups

Two sample t- test	Group I		Group II	
	Mean Score	SD	Mean Score	SD
Values	6.039	2.08	3.736	1.02
P-value	0.001 (Significant)		0.608(Non-Significant)	

Table 3: Fundamental statistical description with level of significance assessment using Pearson chi-square test

n=25 (Completely Edentulous [CD Wearers])					
Assessments	Std. Error	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Group I	0.839	2.28	1.748	1.0	0.005* (Sig.)
n=25 (Partially Edentulous) [RPD Wearers]					
Group II	0.948	1.32	1.647	2.0	0.001* (Sig.)

Table 4: The analysis of variance through one way – ANOVA

SOURCE	SUM OF SQUARE	Df	MEAN SQUARE	F-RATIO	P-VALUE	CRITICAL VARIATION
Between Group	0.9403	1	0.4176	21.0494	0.000021 (<0.05)	0.94849
Within Group	0.5368	18	0.0169			
TOTAL	0.0494	19	The F-ratio value is 24. 0494. The p-value is 0.000021.			

			The result is significant at $p < 0.05$
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Discussion

As we all are aware that fungi are the typical inhabitants of the human body. Fungal infections are often referred as opportunistic since the fungi develop circumstances which are favorable for them. These circumstances are usually weakening of the body milieu.^{6,14,25} Candida species are common oral inhabitant that present in approximately thirty to seventy percent of normal individuals. Few of the pioneer workers have isolated candida species from vagina and skin. Amongst oral Candida infections, Denture stomatitis is considered as the universal variety of oral thrush. Insertion of prosthesis in mouth creates severe alteration in intraoral milieu.^{26,27,28} Many of past researchers have used germ tube test for detection of candida albicans from other Candida species.^{2,8,19,24} Literature have well evidenced that poorly fitting denture always acts as potent and favorable reservoir for growth and development of candida albicans.^{29,30,31} Therefore it is advisable to check the extent and fit of dentures in all aspects. Nayak and associates studied about quantification Candida in non-denture wearers and denture wearers.³² They also explored the effects of smoking and diabetes on candidal growth and developments with prosthesis usages. They concluded that Candidal growth and development was more potent and evident in denture wearers compared to control group. Additionally, smoking and diabetes have been shown to worsen the condition in denture wearers only. These inferences are quite comparable to our study since similar outcomes are seen here. Prakash and colleagues have studied about occurrence of Candida species in denture wearers and non-denture wearers.³³ They correlated the inferences with age and hygiene conditions of subject. Among total hundred subjects, they collected salivary swabs from fifty complete dentures wearers and fifty non-denture wearers. Detection of Candida species was completed by standard microbiological procedures. They found Candida species in both denture and non-denture subjects. Nagaral and co-workers examined the immediate candidal colonization of oral cavity mouth.³⁴ They also aimed to check the presence of candida on fingertips of complete denture patients. They concluded that denture patients had higher candidal incidence rate. They noticed similar inferences during fingertip examination. Therefore authors emphasizes on the significance of denture hygiene and personal care.

Conclusion

Within the limitations of the study authors concluded that there were significant difference between colony counts of Candida albicans in both groups. Complete denture wearers showed higher candidal colonies compared to RPD wearers. Therefore it indicates that candidal growth is directly influenced by coverage of ridge and palate. With the increasing coverage of oral tissues with denture, candidal colonization is also enlarging. Accordingly, complete denture wearers must be maintaining optimal oral hygiene so as to minimize candidal and other superadded infections. Furthermore, all denture wearers (complete & partial) should utilize routine denture cleansing aids. The outcomes of this study must be taken as suggestive for estimating clinical results of such critical situations. Nevertheless, we expect some other large scale studies to be conducted that could further set certain authentic norms in this prospective.

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