



DETECTION OF CANDIDA SPECIES IN RELATION TO FIXED PARTIAL DENTURES IN DIABETIC AND NON-DIABETIC INDIVIDUALS

**Srinivasan
Neduntheru
Narasimhan***

Intern, Thai Moogambigai Dental College and Hospital, Dr. M.G.R. Educational and Research Institute, Chennai, India *Corresponding Author

Rathika Rai

Professor and Head, Department of Prosthodontics and Implantology, Thai Moogambigai Dental College and Hospital, Dr. M.G.R. Educational and Research Institute, Chennai, India

Geetha. K. R.

Professor, Department of Prosthodontics and Implantology, Thai Moogambigai Dental College and Hospital, Dr. M.G.R. Educational and Research Institute, Chennai, India

Srimathi NN

Msc, Medical Microbiology

ABSTRACT Even though there are several developments in the health care system there is an estimate report which states that the rate of edentulousness varies from 7 to 69% of the world's population^[1,2]. Diabetes being an immunosuppressive disease if left uncontrolled presents challenge of increased risk to periodontal disease thereby leading to tooth loss if untreated. In diabetic conditions the chances of getting infected with candidiasis is increased compared to the normal individuals^[9]. The objective of this pilot study was to ascertain the presence or absence of *Candida* spp in patients wearing fixed partial dentures with diabetic and non-diabetic conditions. A total number of 20 participants were recruited in the study among them 10 were diabetic and 10 are non diabetic. Among them 2 non diabetic and 4 diabetic patients showed positive for *Candida albicans*. Henceforth it was found that *Candida* spp., could possibly colonize in relation to fixed partial dentures due to various factors and their incidence is increased in diabetic individuals.

KEYWORDS : Fixed partial dentures ; Diabetes ; Candida

INTRODUCTION:

Over the last few decades there is an immense growth in technology related to the health care sector. This has led to development of newer treatment modalities across the globe. Increase in the self awareness of oral health among individuals can be attributed to this. Our oral cavity is an complex environment consisting not only bacteria but also other various organisms such as fungi, protozoa and virus, among them the majority belong to the category of opportunistic pathogens. But these organisms are kept in control with the help of our immune system. Numerous researches are conducted across the globe to study in this area to understand the relationship of immune system. Even though there are several developments in the health care system there is an estimate report which states that the rate of edentulousness varies from 7 to 69% of the world's population^[1,2]. This might be acquitted to the increased incidence of caries, periodontal diseases, trauma across the globe. Added to this our modern sedentary lifestyle which consists of diet rich in high sugar content, carbonated drinks, etc predisposes us to various health hazards.

Worldwide, 810 million people are aged 60 years or over, which is predicted to increase to atleast two billion by 2050 (22% of the entire global population)^[3], surely the life span has increased over the last decades. It is important that people have improved oral health and satisfaction even in the older ages. According to WHO in 2014 8.5% of the adult population above 18 years had diabetes^[4]. Diabetes being an immunosuppressive disease if left uncontrolled presents challenge of increased risk to periodontal disease thereby leading to tooth loss if untreated. When it comes to replacement of missing teeth patients prefer fixed partial dentures (FPD) over implants and removable partial dentures (RPD)^[5]. The fixed partial denture is defined as "any dental prosthesis that is luted, screwed, or mechanically attached or otherwise securely retained to natural teeth, tooth roots, and/or dental implants/abutments that furnish the primary support for the dental prosthesis and restoring teeth in a partially edentulous arch; it cannot be removed by the patient"^[6].

There are numerous literatures in context with the removable prosthesis and its relationship with the oral micro biota. Mainly denture stomatitis an inflammatory response that is caused due to ill fitting dentures super infected with fungal infection caused by *Candida* spp., has been documented widely in various literatures^[7,8,9]. But there are very few studies to enlighten the effects of fungal organisms in relation to the fixed prosthesis.

In diabetic conditions the chances of getting infected with candidiasis is increased compared to the normal individuals^[10]. So the question arises on whether candidal organisms provide any potential threat of infection to patient wearing fixed partial dentures.

This study was hypothesized keeping in mind of the above factors. The aim of this pilot study was to ascertain the presence or absence of *Candida* spp in patients wearing fixed partial dentures with diabetic and non-diabetic conditions. The objective was to find the correlation of *Candida* spp., colony formation with diabetic and non- diabetic condition of the patients.

MATERIALS AND METHODOLOGY:

Materials: Sterile swab, Micro applicator tip, SDA Agar plate, Crome Agar tube

Institutional Ethical board approval was obtained and informed consent was obtained from the participants.

Sample size: A total number of 20 participants were recruited in the study among them 10 were diabetic (Group A) and 10 are non-diabetic (Group B).

Method of collection of sample: Samples were collected with the help of sterile swab and micro applicator tip. They were moistened with sterile double distilled water and run along the margins of the prosthesis and the gingiva. The samples were immediately inoculated into the SDA media.

Media Preparation: Sabouraud's Dextrose Agar with Chloramphenicol (0.005%) 30.70 grams were suspended in 500ml of distilled water and heat dissolved. It was then autoclaved at 121°C for 20 minutes at 15lbs pressure. (Himedia)

Crome agar 4.272 grams were suspended in 100 ml of water and heat dissolved, poured into sterile long test tubes. (Himedia)

Under sterile (aseptic) conditions the samples were inoculated and they were incubated at 37°C for 72 hours and they were observed at frequency of 48 hours and 72 hours respectively.

If any growth observed they were further confirmed by plating into Cromeagar.

RESULTS:

Out of 20 samples ten belonged to diabetic patients and other ten belonged to non diabetic patients.

4 samples showed positive growth for *Candida albicans* in Group A.
2 samples showed positive growth for *Candida albicans* in Group B.

Statistical analysis was done using SPSS version 26.0 (SPSS Inc., Chicago, IL). The method used was t-test: Paired two sample for means which yielded a Pearson correlation of 0.61 and P one tail of 0.08. (Table 1)

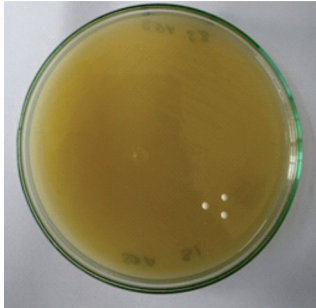


Fig 1: Candida colonies growth on SDA Agar plate

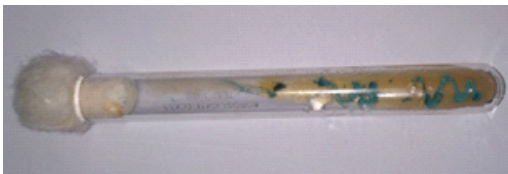


Fig 2: Candida albicans confirmed with Cromeagar

Table 1: t-Test: Paired Two Sample for Means

	Group A	Group B
Mean	0.4	0.2
Observations	10	10
Variance	0.27	0.18
Pearson Correlation	0.61	
Hypothesized mean	0	
Df	9	
T Stat	1.5	
P(T<=t) one-tail	0.08	
t Critical one-tail	1.83	
P(T<=t) two-tail	0.16	
T Critical two-tail	2.26	

DISCUSSION:

The number of missing teeth have found to have an impact on the oral microbiota and increased colonization of bacterial organisms have been found in relation to long span fixed partial dentures^[11]. The candidal growth in case of complete dentures and removable partial dentures have been found to be higher and among them *C. albicans* was the major contributor. The higher incidence of detection of *Candida* spp., in diabetic individuals (40%) is in correlation with the previous literatures. *Candida* spp., being one of the opportunistic organisms present in the oral cavity tend to colonize in the hard surfaces of the prostheses. Previous literatures have found that there is an increase in the colonization of various organisms in the oral cavity after the cementation of prostheses^[12]. The higher levels of *Candida* spp., in the oral cavity have appeared to switch the composition into more aciduric environment^[13]. This could potentially lead to survival of other pathogenic counterparts such as *Streptococcus* spp., *Lactobacillus* spp., *Porphyromonas* spp., leading to increased incidence of dental caries and periodontal diseases thereby potentially leading to tooth loss and even failure of the prostheses.

In diabetic individuals the increased incidence of *Candida* organisms could be attributed to their immuno suppressive condition. The duration of the prostheses in the oral cavity could also be potentially contributing towards the colonization of organisms as longer the prostheses is in the oral cavity the more number of organisms could colonize^[10]. Other factors such as the oral hygiene habits, dietary habits, smoking and systemic health conditions could all potentially have

their impact on the oral microbiota.

CONCLUSION:

With the paradigm shift in the technology and treatment opportunities available for the clinician to choose from preferences should always be given to them. The replacement of missing teeth should be done in accordance with general health condition of the patients and available technology. Patients should be made aware of the importance of having adequate oral hygiene and maintenance of prostheses.

This pilot study has been helpful in identifying the incidence of prevalence of *Candida* spp., in relation to fixed partial dentures. Diabetic control status of diabetic individuals were not recorded in this study and their correlation with the *Candida* spp., colonies are beyond the scope of this study. The type of material used in the prostheses could also be evaluated to find if they have any relation with the *Candida* spp., colonization.

A longitudinal study right from preparation of tooth till cementation of the prostheses has to be done in order to evaluate *Candida* spp., colonization.

REFERENCES:

1. Felton D, Cooper L, Duquim I, Minsley G, Guckes A, Haug S, et al. Evidence-based guidelines for the care and maintenance of complete dentures: a publication of the American College of Prosthodontists. *Journal of Prosthodontics: official journal of the American College of Prosthodontists*. 2011; 20 Suppl 1: S1-S12. doi: 10.1111/j.1532-849X.2010.00683.x PMID: 21324026.
2. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century—the approach of the WHO Global Oral Health Programme. *Community dentistry and oral epidemiology*. 2003; 31 Suppl 1: 3-23. PMID: 15015736.
3. Guzmán JM, Pawliczko A, Beales S, Till C, Voelcker I. Ageing in the twenty-first century: a celebration and a challenge. 2012. United Nations Population Fund (UNFPA), New York, and HelpAge International, London.
4. Roglic G. WHO Global report on diabetes: A summary. *Int J Non-Commun Dis* 2016; 1: 3-8
5. K.R.Geetha et al. Age and its Influence on the Preference of Various Fixed Prosthetic Treatment Modalities in Partially Edentulous Patients. *International Journal of Science and Research (IJSR)*. 8, 146-149.
6. The Glossary of Prosthodontic terms, 9th edition
7. Gendreau L, Loewy ZG. Epidemiology and etiology of denture stomatitis. *Journal of prosthodontics: official journal of the American College of Prosthodontists*. 2011; 20(4): 251-60. Epub 2011/04/06. doi: 10.1111/j.1532-849X.2011.00698.x PMID: 21463383.
8. Jeganathan S, Lin CC. Denture stomatitis—a review of the aetiology, diagnosis and management. *Australian dental journal*. 1992; 37(2): 107-14. Epub 1992/04/01. PMID: 1294074.
9. Newton A. Denture sore mouth. A possible etiology. *Br dent J*. 1962; (112): 357-60
10. Rodrigues CF, Rodrigues ME, Henriques M. *Candida* sp. Infections in Patients with Diabetes Mellitus. *J Clin Med*. 2019; 8(1): 76. Published 2019 Jan 10. doi: 10.3390/jcm8010076
11. Junko Tanaka and Masahiro Tanaka, "Influence of Type of Prosthesis on Oral Environment and the Number of Missing Teeth in Elderly Persons," *International Journal of Dentistry*, vol. 2010, Article ID 584134, 4 pages, 2010. <https://doi.org/10.1155/2010/584134>.
12. Swetha, S & Jain, Ashish. (2017). Assessment of Microbial Growth and Salivary pH in Patients Wearing Fixed Partial Denture. *Journal of Pure and Applied Microbiology*. 11. 1925-1928. 10.22207/JPAM.11.4.33.
13. O'Donnell LE, Robertson D, Nile CJ, et al. The Oral Microbiome of Denture Wearers Is Influenced by Levels of Natural Dentition. *PLoS One*. 2015; 10(9): e0137717. Published 2015 Sep 14. doi: 10.1371/journal.pone.0137717