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Assessment of *Candida albican* and IgA level in patients undergoing orthodontic treatment: A clinico- biochemical study

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ABSTRACT

Background: The chances of infection by *Candida albican* increase with decrease in immunity due to various systemic conditions. The present study was conducted to assess the level of candida and IgA in patients wearing orthodontic appliances.

Materials & Methods: The present study was conducted on 40 patients of age ranged 8-18 years of both genders who were wearing removable orthodontic appliances. Equal number of age and gender matched subjects were taken as control. Patients wearing removable orthodontic appliances were put in group I and those without it in group II. Oral mucosal scrapings were obtained with wooden spatula from tongue margins and buccal mucosa. For assessment of anti candida IgA in saliva, ELISA method was used. Patients were further subdivided into 2 subgroups, patients who had orthodontic appliances and yeasts in their saliva (A), patients who had orthodontic appliances but no yeasts in their saliva (B), control subjects with yeasts in their saliva (C) and control subjects with no yeasts in their saliva (D).

Results: Both group I (Experimental) and group II (Control) had equal number of subjects ie. 40 each. Maximum number of C. albicans species was seen in group I (14) and group II (12) followed by C. Krusei in group I (5) and C. glabrata in 4 cases. C. lusitaniae was observed in 2 in group I and no in group II, C. tropicalis 3 in group I. In group I, candida colonies in group I was 1.14± 1.21 CFU/mL and in group II was 1.23± 1.36 CFU/mL. The difference was non- significant (P> 0.05). The mean IgA level in group A was 0.031 and in group B was 0.014, in group C was 0.042 and in group D was 0.037. The difference was significant (P< 0.05).

Conclusion: The levels of anti–*C. albicans* IgA in saliva did not correlate with the presence of *Candida* or its adherence to epithelial cells. Orthodontic appliances may favor the adherence of *Candida* species to epithelial cells.

Keywords: Candida, Orthodontic, Saliva.

INTRODUCTION

Candida albican is normal commensal of oral cavity. The chances of infection by Candida albican increase with decrease in immunity due to various systemic conditions. It shows its effects with production of enzymes, invasion into tissues and adherence to oral mucous membrane.[1]

Candida is a fungus and was first isolated in 1844 from the sputum of a tuberculosis patient. Like other fungi, they are non-photosynthetic, eukaryotic organisms with a cell wall that lies external to the

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Table I: Distribution of subjects.

Total- 80		
Groups	Group I (Experimental)	Group II (Control)
Number	40	40

Table II: Evaluation of Candidal species in both groups.

Species	Group I	Group II
C. albican	14	12
C. glabrata	4	1
C. tropicalis	3	2
C. Krusei	5	2
C. lusitaniae	2	0
C. guilliermondii	1	1
C. parapsilosis	2	1
Total	31	19

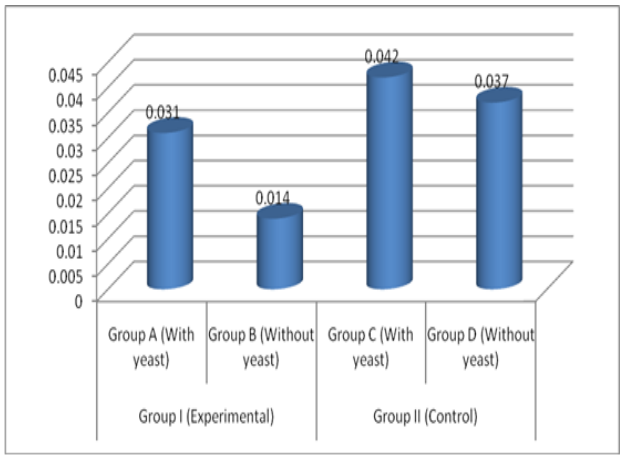
Table III: Assessment of Candida colonies in both groups.

Groups	Group I	Group II	P value
Count (CFU/mL)	1.14± 1.21	1.23± 1.36	0.12

Table IV: Assessment of IgA level in subgroups.

Groups	Group I (Experimental)		Group II (Control)		P value
	Group A (With yeast)	Group B (Without yeast)	Group C (With yeast)	Group D (Without yeast)	
Mean	0.031	0.014	0.042	0.037	0.05

Graph I: IgA level in subgroups.



plasma membrane. There is a nuclear pore complex within the nuclear membrane. Several factors such as adhesion proteins, germinative tubes, enzymes and extracellular polymers play an important role in attachment of candida to epithelial cells whereas fibrin and fibrinogen, sexl hormones such as testosterone and progesterone, mucine, salivary proteins and secretory IgA immunoglobulin are host-related factors which may also manipulate this process. Other factors such as presence of dentures such as removable partial denture, fixed partial denture, complete denture, orthodontic appliances such as orthodontic brackets etc. may trigger their adhesion.[2]

It has been observed that adhesion of candida to epithelial cells is of paramount importance for progression of disease process. Thus, inhibition of their attachment to epithelial cells may be fruitful in controlling disease. The role of IgA in preventing Candidial infection may be its capacity to cause fungal aggregation and preventing the adherence to mucosa or oral surfaces.[3] The present study was conducted to assess the level of candida and IgA in patients wearing orthodontic appliances.

MATERIALS & METHODS

The present study was conducted in the department of Orthodontics. It comprised of 40 patients of age ranged 8-18 years of both genders who were wearing removable orthodontic appliances. Equal number of age and gender matched subjects were taken as control. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

General information such as name, age, gender etc. was recorded in case history performa. Patients wearing removable orthodontic appliances were put in group I and those without it in group II. A thorough oral examination was done in all subjects. Oral mucosal scrapings were obtained with wooden spatula from tongue margins and buccal mucosa. 3ml of unstimulated saliva was obtained in sterile tubes which were diluted with 1:10 and 1:100 with sterile saline. From it, 1 ml of saliva was shifted to sterile tubes containing 5.0 mM phenylmethylsulfonyl fluoride and 0.002% sodium azide, and stored at –20°C until antibody analysis.

0.1 ml saliva samples were plated in Sabouraud dextrose agar supplemented with 0.1 mg/mL chloramphenicol. The samples were incubated at 37°C for 48 hours. The number of colony-forming units per milliliter (CFU/ mL) was calculated. The identification of *Candida* species was done by plating saliva samples on CHROMagar.

For assessment of anti candida IgA in saliva, ELISA method was used. For exfoliative cytology, the prepared slides were immediately fixed in a 1:1 solution of ether and alcohol and stained with Papanicolaou method and assessed under microscope. The number of cells with and without *Candida* was counted.

Patients were further subdivided into 2 subgroups, patients who had orthodontic appliances and yeasts in their saliva (A), patients who had orthodontic appliances but no yeasts in their saliva (B), control subjects with yeasts in their saliva (C) and control subjects with no yeasts in their saliva (D). Results thus obtained were subjected to statistical analysis using SPSS version 21.0. Data was presented as mean ±SD. P value less than 0.05 was considered significant.

RESULTS

Table I shows that both group I (Experimental) and group II (Control) had equal number of subjects ie. 40 each. Table II shows maximum number of C. albicans species was seen in group I (14) and group II (12) followed by C. Krusei in group I (5) and C. glabrata in 4 cases. C. lusitaniae was observed in 2 in group I and no in group II, C. tropicalis 3 in group I. Table III shows that in group I, candida colonies in group I was 1.14± 1.21 CFU/mL and in group II was 1.23± 1.36 CFU/mL. The difference was non-significant (P> 0.05). Table IV, graph I shows that mean IgA level in group A was 0.031 and in group B was 0.014, in group C was 0.042 and in group D was 0.037. The difference was significant (P< 0.05).

DISCUSSION

Candida albican is one of component of normal oral microflora. It is prevalent in 30%- 50% normal individuals. The frequency of occurrence increases with age of the patient.[4] Studies have revealed that the presence of Candida albicans is mostly seen in patients wearing complete denture. The role of advanced age cannot be overlooked. In approximately 60% of denture wearer, the occurrence of Candida albicans has been observed.[5,6]

Many types of Candida species are seen in the oral cavity such as C. albicans, C. tropicalis C. glabrata, C. krusei, C. guillermondii, C. parapsilosis, C. pseudotropicalis and C. stellatoidea etc. Its ability to attach to artificial prostheses such as undersurface of complete or partial denture and orthodontic appliances etc. is one of provoking factors for causing fungal infection in oral cavity. The present study was conducted to assess the level of candida and IgA in patients wearing orthodontic appliances.[7]

In present study, we included 40 patients with Candidial infection and 40 as control. We found that C. albicans species was the prevalent Candidial species found in 14 in group I and 12 in group II. C. Krusei in group I (5) and C. glabrata in 4 cases. C. lusitaniae was observed in 2 in group I and no in group II, C. tropicalis 3 in group I.

Biasoli et al.[8] in their study of adherence of Candida strains isolated from the human gastrointestinal tract observed a strong association of yeast to adhere and colonize mucosal surfaces of gastrointestinal tract. *C.* albicans demonstrates the highest values of adherence to oral epithelial cells in respect to other Candida species.

Bosh et al.[9] in their study assessed whether there is any relation between stress and occurrence of candida infection in the oral cavity. The role of saliva in adherence of candida was also evaluated. Author suggested that moderate stress may affect the process of microbial colonization and the adherence of C. albicans to epithelial cells by altering the secretory activity of salivary glands.

In present study, we observed that Candida colonies found to be 1.14± 1.21 CFU/mL in group I and 1.23± 1.36 CFU/mL in group II. It has been observed that with the increase in the use of immunosuppressive and corticosteroids and the AIDS epidemics, dentists may come upon more patients requiring orthodontic treatment who are immunocompromized. Thus, it is essential to know how the orthodontic appliances affect the oral

candidal status as the presence of Candida in the oral cavity can lead to infection.

Hagg et al[10] in their study assessed the prevalence of *Candida* and Enterobacteriaceae in patients undergoing fixed orthodontic therapy on 27 subjects; 13 males, 14 females with mean age 15.5 ± 2.3 years. It was found that there was significant increase in candidal numbers in patients after fixed orthodontic appliances insertion. The overall candidal prevalence rates obtained using the oral rinse and pooled plaque techniques did not show much difference. *C. albicans* was the predominant *Candida* species isolated as detected by the oral rinse and the pooled plaque techniques.

In present study, we observed that there was significant difference in mean IgA level in patients and control groups. The mean IgA level in group A was 0.031 and in group B was 0.014, in group C was 0.042 and in group D was 0.037. Silva et al[11] in their study classified patients into four groups, EG1 patients wearing orthodontic appliances, with yeasts, EG2 orthodontic appliances, without yeasts, CG1 control, with yeasts and CG2 control, without yeasts. The mean IgA level in all groups found to be 0.036, 0.012, 0.044 and 0.038 respectively.

A similar study conducted by Koga-Ito et al.[12] in their study evaluated salivary levels of immunoglobulins to Streptococcus mutans and Candida albicans in month breathing patients. However, there was no significant difference in the levels of anti–C. albicans IgA in the saliva of treated and untreated children with mouth-breathing syndrome and control children.

Millán et al[13] in their study of effect of salivary secretory IgA on the adhesión of Candida albicans to polystyrene. Authors found that in patients wearing dental prosthesis or removable orthodontic devices, salivary IgA reduces the adherence of *C. albicans* to polystyrene. Silva et al in their study of relationship between Candida in vaginal and oral mucosae and salivary IgA level found that patients with clinical diagnoses of vaginal candidiasis exhibited lower levels of anti-Candida IgA in the saliva.

The limitation of the study is small sample size. Only patients in age range 8-18 years of age was considered. The inclusion of more number of patients and wide range of patients could have been provided different results.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

CONCLUSION

Author suggested that the levels of anti–*C. albicans* IgA in saliva did not correlate with the presence of *Candida* or its adherence to epithelial cells. Orthodontic appliances may favor the adherence of *Candida* species to epithelial cells.

Clinical significance: Patients undergoing orthodontic treatment are more prone to develop Candidial infection. Thus early assessment of *C. albicans* and IgA level in such patients may be useful in preventing further infection.

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