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Original Research

Association between Oral Candidiasis and ABO blood types

Shilpa Jain [1], Kamal Shigli [2], Umesh Palekar [3], Vaibhav Awinashe [4], Arpit Jain [5], Khochai Chiang [6]

[1]*Senior lecturer, Department of Prosthodontics, Rishiraj College of dental sciences, Bhopal, M.P*
[2]*Professor & Head, Department of Prosthodontics, BVP deemed university dental College & Hospital, Sangli, Maharastra*
[3]*Professor & Head, Department of Prosthodontics, Modern Dental College & Research Centre, Indore ,M.P.*
[4]*Faculty, Dept. of prosthetic dental sciences, College of dentistry, Qassim University, Buraidah, Kingdom of Saudi Arabia.*
[5]*Senior lecturer, Dept. of Oral medicine & Radiology, Rishiraj college of dental sciences, Bhopal, M.P*
[6]*Senior Lecturer, Dept. of Oral Surgery, GITAM dental college & hospital, Vishakhapatnam, A.P*

A R T I C L E I N F O

Keywords:
ABO blood types, Phosphate buffer saline solution, Candida albicans (C.albicans), Candida Krusei, Candida tropicalis, Candida glabrata, Colony forming units (C.F.U), Denture induced stomatitis.

A B S T R A C T

Need for the study: an association between ABO blood types and several infections have been extensively studied. However, not much has been studied on the correlation between the blood types, degree of oral candidal colonization and denture plaque accumulation among denture wearers.

Purpose: To correlate the degree of oral Candidal colonization and ABO blood type among denture wearers.

Materials and methodology- patients requiring complete dentures were selected for the study and divided into control and study groups (Group A and B). Concentrated oral rinse samples were obtained from each patient to determine the Candidal carriage. Direct heamagglutination method was performed using monoclonal antibodies to determine blood groups (A,B,AB,O).

Data was tabulated and analysed by t-test, chi-square test and Tukey's test to determine the correlation.

Result- Oral Candidal carriage among the study group was 37.14% which was statistically significant ($p < 0.05$). Our results showed higher degree of oral Candidal carriage among individuals with blood group O.

Conclusion: individuals with blood group O are more susceptible to increased oral Candidal infection.

Introduction

The Oral health reflects one's general health. Good oral health allows good nutrition, aesthetics and has positive influence on physical and mental health of elderly patients.[1]

Among several species of micro-organisms in the oral cavity, the infection by Candida is most common.[3,4,5]*Candidal* colonization is a complex, multi factorial process[5,6,7,8] that may be affected by immunodeficiency, diabetes, poor oral hygiene, plaque accumulation, denture handling habits, person's blood type.

In India, data was lacking on association between blood groups and degree of Oral *Candidal* colonization. This study was aimed at looking into such association.

Materials and methods

Source of Data Collection: This in vivo study "To determine the correlation between oral Candidal colonization and ABO blood types in denture wearers" was carried out in a Dental college of Central India. It included 210 patients for isolation and further identification of species of Candida using standard protocol from samples obtained by using-

a) Oral rinse technique
b) Direct Heamagglutination test

* *Corresponding author:* ***Dr. Arpit Jain,Rose 410,New Minal Residency,J.K Road, Bhopal (M.P)Contact- 9425474806***

A. Sample and collection criteria:

Source of data collection: Complete denture patients (sample size of 210 subjects) reporting to the department of Prosthodontics who gave their consent for the study were included. Completely edentulous, healthy individuals with no denture wearing history- comprises the control group (group A) while, completely edentulous and healthy individuals, with atleast six months denture wearing history comprises the study group (group B). Individuals excluded from the study were those with any antifungal therapy, systemic diseases (immunocompromised, diabetics) and those taking antibiotics for more than two weeks, those with any hypoglycaemic or hypertensive drugs.

An informed consent was obtained from these subjects and approval for the study was taken by the ethical committee of the institution.

Collection of sample: Before start of the Prosthodontic treatment, demographic details as well as a questionnaire on the concerned diseases and denture hygiene was recorded. For assessing denture hygiene, modified plaque index were used as described by Tarbet.

Oral yeast colonization was assessed by Concentrated Oral Rinse Sampling Technique as described by Samaranayake et al (1986). Each subject was requested to rinse their mouth with ten ml of Phosphate Buffer Saline Solution (PBS) (Fisher Scientific) with pH 7.2 for 60 seconds, supplied in a sterile universal container and expectorating this solution back into the container. The subjects were requested to remove their dentures prior to the sampling. The samples were then tested in the laboratory for microbiological analysis.

Blood groups were determined by direct Heamagglutination method, using monoclonal antibodies against human A and B blood group antigens.

B. Culturing (inoculation and incubation):

For serial dilution: Ten ml of oral rinse sample was centrifuged at 2000 rotations per minute (rpm) for ten minutes and the sediments was added to 1000 micro liter (µl of normal saline solution to build up the quantity to one ml. 50 µl of concentrated oral rinse was then inoculated on Hichrome agar medium plate (Himedia) to assess CFU/ml of oral rinse sample prior to incubation. The culture plates were labelled and enclosed in an aluminum foil. These plates were then further incubated aerobically in a B.O.D incubation chamber at (35± 0.5° C) for 48 hrs.

C. **Colony counting**:

Colony counting and its characteristics that appeared on the culture plates were carried out in an inoculation chamber with naked eye and with the help of magnifying lenses. Differentiation of *Candida* species was done according to their colony colour and characters on Hichrome Agar Medium and it was recorded in an observation chart. The oral carriage of *Candida* species were further expressed in terms of colony forming unit per millilitre (C.F.U/ml). The C.F.U/ml was calculated by multiplying dilution factor with total colony appearing on the plate.

C.F.U/ml = Dilution factor × total number of colonies on the plate

D. Direct microscopy (morphological test): Simultaneously sample were smeared and stained with gram stain and viewed under light microscopy.

OBSERVATION: Gram positive spherical to subspherical budding yeast like cells or blastoconidia; 2.0-7.0× 3.0-8.5 µm in size are seen.

Observations and result: This prospective study was carried out to evaluate the relationship between 'ABO' blood types and degree of oral Candidal colonization.

For the study, individuals requiring complete dentures were selected at random form the O.P.D of the department of Prosthodontics, Dental College of central India. Age range of samples varies between 40 -90 yrs and sex predilection favored predominantly males.

Individuals requiring complete dentures with at least six months of denture wearing history comprise the study group (n=105). While, the individuals with no denture wearing history comprise the control group (n=105). Blood type of each individual was then determined (Department of Oral and maxillofacial pathology) and samples were again subdivided according to their blood types (A/B/AB/O).

Result:

Two hundred ten patients requiring complete denture were included in the study, 105 of which were denture wearers with atleast six months denture wearing history and 105 samples were with no denture wearing history. It was revealed that the frequency of blood group O among patients with greater degree of oral Candidal colonization was the highest in comparison with other blood types.

Discussion

Out of 105 samples (study group), total of 39 samples (37.14%) were found to be positive for oral Candidal colonization which is statistically significant ($p < 0.01$). Candidal colony forming unit were thus higher in denture wearer as compared to non denture wearer who was comparable with studies conducted by Nikawa et al[9] and Daniluk T et al[34]. But it differs from a study conducted by Arirachakaran et al[3]. The presence of dentures might thus be considered as predisposing factor to the onset of pathologies related to *Candida.*

In our study, *C. albicans* was the most frequently isolated species followed by *C. glabrata* and *C. Krusei*. Identification of *Candida spp* has been found to be increasingly important for determining the appropriate course of treatment.[3] A study by Coo et al suggested that mixed *C. albicans* and *C. glabrata* biofilms could aggravate the clinical condition. However, it is not clear yet whether species co-existence plays an integral or antagonistic role in pathogenesis or virulence. Furthermore, the co-existence of mixed species could complicate treatment modalities.

Significant differences were observed in the degree of oral Candidal colonization among various blood groups. Blood group O shows higher degree of oral Candidal carriage as compared to other blood groups. Our results are consistent with a study conducted by Abdollahzadeh S[43]. According to a study conducted by Shin E S[29], no relevance exists between Candidal infection and ABO blood group.

These differences might be due to the fact that *Candida* adherence to the host cell surface is mediated mainly by specific adherence, and several kinds of hexoses and hexosamines are identified as the receptor for *Candida albicans*, some of which are immunodominant sugars of blood types. Furthermore, these glycocompounds in body fluids such as saliva have been reported to enhance or inhibit the adherence of *Candida* to the host cell surfaces invivo and in-vitro.

Conclusion

Within the limitations of the study, it was inferred that blood group O was more susceptible to increased candidal colonization.

Furthermore, research should be perused in various aspects of aging and age related oral health problems, including epidemiological studies to measure the burden of oral diseases, impact of oral diseases on nutrition and general health, the impact of interventions and so forth.

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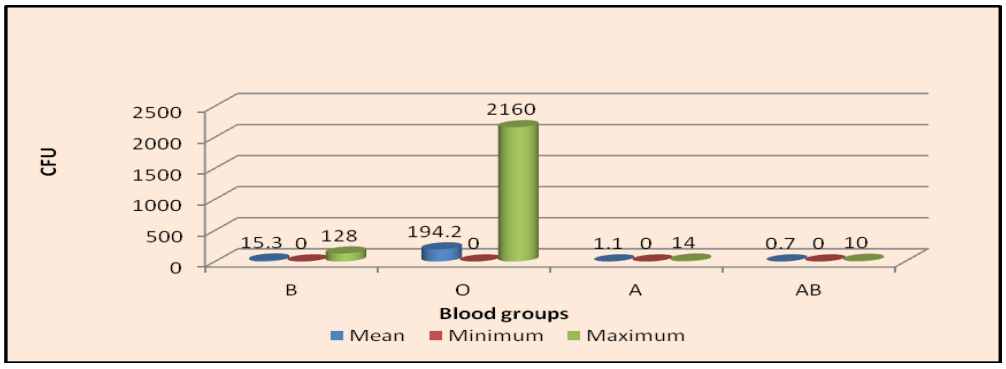
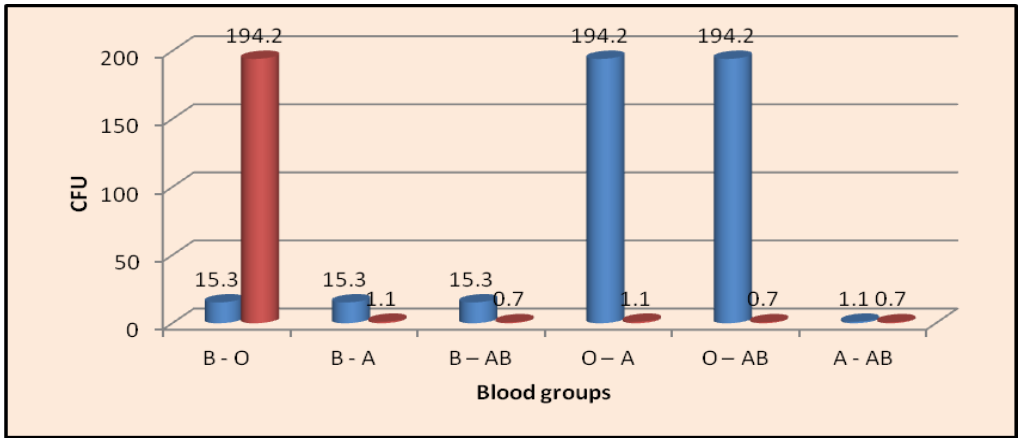
Table : Mean and range values of various parameters in study and control groups with different blood groups

Blood group	Study group				Control group			
	Mean	**Range**		**±SD**	**Mean**	**Range**		**±SD**
		Min.	**Max.**			**Min.**	**Max.**	
'B' blood group								
CFU	15.3	0.0	128.0	28.5	0.7	0.0	10.0	2.2
'O' blood group								
CFU	194.2	0.0	2160.0	531.3	7.4	0.0	60.0	16.5
'A' blood group								
CFU	1.1	0.0	14.0	3.4	0.2	0.0	4.0	0.8
'AB' blood group								
Dental age	5.1	1.5	10.0	3.0	0.0	0.0	0.0	0.0
CFU	0.7	0.0	10.0	2.6	0.0	0.0	0.0	0.0



Graph 1 : Mean and range values of CFU in various blood groups



Graph. 2: Mean differences for CFU between blood groups