

## NON-SECRETOR STATUS; A PREDISPOSING FACTOR FOR VAGINAL CANDIDIASIS

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**Abstract :** A secretor is an individual who secretes blood group antigens into body fluids such as saliva, sweat, tears, semen and serum. An attempt has been made to establish the correlation between the secretor status and susceptibility to vaginal candidiasis. The secretor status was determined by haemagglutination inhibition technique. The presence of *Candida albicans* infection was detected by direct microscopy of the wet smear and confirmed by germ tube test and corn meal agar test. It was observed that out of the 64 patients, 15 were secretors and 49 were non-secretors. However 43 subjects were secretors and 13 non-secretors among the 56 controls. Thus prevalence of vaginal candidiasis was significantly higher in non-secretor group ( $P < 0.01$ ). The absence of blood group antigens in the body fluids and the lack of enzyme glycosyl transferase enhance the attachment of yeast to the epithelial cell and render the non-secretor more prone to infection.

**Key words :** vaginal candidiasis  
secretors

blood group antigens  
uro-epithelium

### INTRODUCTION

Blood group antigens are secreted into various body fluids by the secretors. Non-secretors on the other hand, put out little or none of their blood group antigens into these body fluids. Absence of the blood group antigen is a health disadvantage, as this appears to increase susceptibility to a number of diseases. The secretion of the antigen into saliva and mucus offers added degree of protection against bacterial

fimbria lectins. Earlier studies have indicated that the secretors are more prone to hemolytic anemia, oral cancer and viral infections (1), whereas diseases like tuberculosis, rheumatic fever, juvenile diabetes and various autoimmune diseases are more common in non-secretors (2). Inability to secrete the blood group substances in gastrointestinal mucus has also been associated with peptic ulcer, gastric malignancy and pernicious anemia (3). Lack of blood group antigen in mucosal

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fluid in non-secretors might contribute to the colonisation by *H. pylori*, which appears to attach itself with greater aggressiveness and cause local inflammation (4, 5). It has been reported that urinary tract infections are more common in women than men and more likely to be in non-secretors (6). Non-secretion of blood group antigen might greatly influence the pathogenic sequel of urinary tract infection (7). Women belonging to B and AB groups showed significantly higher relative risk of infection (8). It has been reported that oral carriers of *Candida albicans* among healthy subjects were predominantly non-secretors (9) and significant number of them belonged to O group (10). However, Shin ES et al (11) have not been able to establish any association between oral candida carriage with secretor status or ABO blood groups. These earlier studies have evaluated the relationship between ABO blood group, secretor status with oral carrier state of *Candida albicans* in healthy population. Information about the influence of secretor status on vaginal candidiasis is not readily available in Indian population. Hence, an attempt has been made to establish the relationship between the secretor status and ABO blood groups with vaginal candidates thus evaluating them as predisposing factors for the infection.

## METHODS

This was a hospital-based study involving patients with the history of leucorrhoea attending the Medical College hospital. The patients were in the age group of 25 to 35 years. They gave no history of any other major illness and had not

consumed any antibiotics in the recent past. Asymptomatic, clinically normal female relatives of the patients of comparable age group served as controls. There were 64 patients and 56 controls. The ABO groups were determined by the conventional haemagglutination test using the Anti A, B and D sera (12). The secretor status was determined by using the haemagglutination inhibition test (13). It is based on the principle that, if ABH antigens are present in a soluble form in saliva, they will neutralize the antibodies in the antisera added. Thus the antibodies are not available in the mixture of saliva and antisera to agglutinate red cell suspension possessing the same antigen added to this mixture. Thus haemagglutination inhibition indicates that the subject is a secretor.

In the subjects suspected to have vaginal candidiasis, 2 high vaginal swabs were taken. One swab was used for microscopic examination immediately. A smear was prepared with material collected, heat fixed and stained by Grams' method. The characteristic budding cells (blastoconidia), yeast hyphae that were Gram positive, and the beaded appearance of cell content suggested the presence of *Candida albicans*. The material on the other swab was transferred to the culture medium, Sabouraud's Dextrose Agar containing glucose, mycological peptone, agar and water with the pH adjusted to 5.4. It was incubated for a period of 48 hours at 37°C. The pasty, opaque and pale coloured colonies that developed on incubation were subjected to germ tube test and corn meal agar test (14) for confirmation of candidial growth.

## Statistical analysis

Chi square test was applied to find the association between the study and control group with respect to their secretor status.

## RESULTS

Amongst the controls ( $n = 56$ ) 43 subjects were secretors and remaining 13 were non-secretors. 22.0% belonged to blood group 'A', 33.9% were 'B' group, 35.6% were 'O' group and 8.5% were 'AB'. In the patients with confirmed vaginal candidiasis ( $n = 64$ ) 15 were secretors and 49 were non-secretors. Among the patients, 20.3% were 'A' group, 43.7% belonged to 'B', 29.7% were 'O' and 6.3% were 'AB' group (Table I). The

TABLE I: Comparison of the secretor status between the study and control groups.

	Study group ( $n = 64$ )	Study group ( $n = 56$ )
Secretors	15	43
Non-secretors	49	13

(Chi square=31.94, Degree of freedom is 1,  $P < 0.01$ )

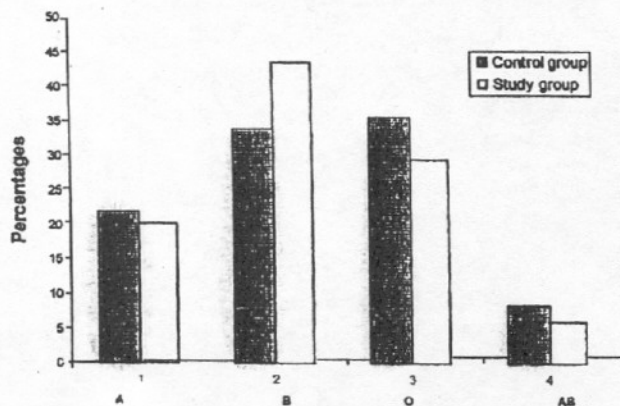


Fig. 1: Pattern of blood group distribution in normal subjects and patients with vaginal candidiasis.

prevalence of vaginal candidiasis was significantly higher in non-secretors ( $P < 0.01$ ). Patients belonging to 'B' group were more prone to develop vaginal candidiasis. (Fig. 1)

## DISCUSSION

It was evident that the non-secretors were more prone to develop vaginal candidiasis. They lack the glyco-compounds and the enzyme glycosyl-transferase enhancing the chance of attachment of the organism to the epithelial surface and hence causing the infection (9). It has been shown that non-secretor saliva not only fails to prevent the attachment of candida but actually promotes its binding to the tissues (15). The virulence attributes of candida could be due to host recognition by cell surface adhesin. In attachment studies, preincubation of blastospores with the boiled saliva of secretor reduced their binding ability to the epithelial cell by inhibition of the adhesin on their surface. The concentrations of IgA and IgG antibodies were lower in non-secretors (16). These antibodies were demonstrated to provide local immunity by destroying the organism. The secretors wall out the invading organisms and prevent its entry into the host. They have innate defense against superficial infection by candida species due to the ability of the subject to secrete water-soluble form of blood group antigen into the body fluids. The blood group substances in the body fluids of the secretors act as receptors and bind to the pathogenic organism. The bondage reduces the contact with mucosal surface or the epithelial layer thus reducing the possibility of infection. The secretor status alters the carbohydrates



present in the body fluids. This will influence microbial attachment and persistence.

Stapleton et al (17) have reported that women with history of recurrent urinary tract infection with *E coli* were predominantly non-secretors. The uroepithelial cells of non-secretors exhibited tendency for greater adherence of the uropathogenic *E coli* when compared to secretors. Radiolabelled *E coli* showed greater affinity to bind to extended globo series, Sialosyl-gal globoside (SGG) and Disialosyl-gal-globoside (DSGG) formed from glycosphingolipids extracted from the non-secretors. The SGG and DSGG were selectively produced by them as a result of sialylation of glycolipids. In the secretors, the glycolipids were fucosylated and processed as ABH antigens. They have reported that there was a difference in the expression of blood group antigen on the vaginal epithelium and mucus, which could act as a critical factor in influencing the susceptibility to urinary tract infection. Increased susceptibility to recurrent urinary tract infection among women may be due to interaction between uropathogenic organism and women's uroepithelial cell. Women with recurrent UTI will have prolonged colonisation of vaginal mucosa with uropathogenic organism even in infection free interval. A similar mechanism could play a role in the causation of vaginal candidiasis.

In an earlier study, the relative percentages of healthy subjects carrying oral candida were higher in O group. There were a higher number of non-secretors (48.9%) with oral and vaginal candida infection compared to their proportion (26.6%) in healthy population (18). The results of our study also indicate a pattern of infection similar to the earlier reports. In our study relatively larger number of patients belonged to 'B' group, which is consistent with earlier reports (8). It is likely that absence of anti-B isohemagglutinin and a non-secretor status combine to increase risk of vaginal candidiasis. However a study with a larger sample could conclusively establish the possible relationship between the candida infection and ABO blood group. It can be concluded that the absence of local immunity and lack of innate defense mechanism in non-secretors could act as a predisposing factor for the development of vaginal candidiasis.

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