To Evaluate The Pervasiveness of Candida Infection Which Constitute An Opportunistic Infection Predominantly In Immunocompromised Patients.

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Abstract - **Candida is a yeast like fungus causing commonest fungal infections. Candida is normal inhabitant in the skin, mucous membrane of oral cavity including gastrointestinal tract, respiratory tract and genitourinary tract and may invade other parts of the body especially in immunocompromised individuals. Aim of the study was to determine the prevalence of candida infection and its prevalence factor mainly in immunocompromised patient in tertiary care hospital. Materials and Methods: Study will be conducted in the Department Of Microbiology, School of Medical Sciences & Research, Sharda Hospital, Greater Noida. Study type prospective analytical study, sample size 100 sample, specimen oral swabs, ear swabs, vaginal swabs, stool, urine, CSF, sputum, blood, pus, nail scrapings etc. Samples will be collected and processed as per the Standard microbiological procedures. Result: Total 120 isolates of Candida species isolate from various clinical specimens speciated and antifungal susceptibility was found. The prevalence of Candida albicans and non albicans candida are studied in relation to age, sex, site of isolation , underlying conditions and predisposing factors. Conclusion: Candidiasis is becoming one of the more frequently encountered fungal diseases. The incidence of disease is found to be increased due to predisposing factors like pregnancy, HIV infection, Diabetes etc. Discussion: Candida is yeast like fungus and is a normal commensal of skin and mucous membrane. Candida with change in external and internal environment causes candidiasis. The disease may be mild to severe, superficial to deep, acute to chronic. The origin of disease is commonly endogenous and represent an opportunistic infection mainly in immunocompromised patients and exogenous source is nosocomial in origin.**

keywords - **Candida, Candidiasis, Non- albicans, Fungal Infection, Immunocompromised patient**

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INTRODUCTION

Candida is a yeast like fungus causing commonest fungal infections. Candida is normal inhabitant in the skin, mucous membrane of oral cavity including gastrointestinal tract, respiratory tract and genitourinary tract and may invade other parts of the body especially in immunocompromised individuals [1] Patients admitted at tertiary care hospitals have access to very intensive management modalities.This along with increasing number of immune – compromised patients have lead to rise in infections caused by Candida especially by Non Candida Albicans [2] Candida glabrata , which is less susceptible to fluconazole, is the species whose incidence is increased the most to account for the decrease in the proportion of the cases of invasive disease caused by C.albicans [3]The Candida species rank as the fourth most common cause of Blood stream infections [4] . The proliferation of large – scale surveillance programmes of Candida BSIs has provided useful information regarding resistance trends, the distribution of species in various countries and type of infections [5] . From the results of these studies, it appears that substantial differences exist in species distribution and antifungal susceptibility profiles [6] The most commonly isolated yeast like fungus was *C. albicans* but decreasing trend in the rate of *C.albicans* isolation (6.74%) was evident over the 4.5-year period, along with increasing rates of isolation of C. *tropicalis, C. glabrata, C. parapsilosis*, and *C. rugosa* totaling 7.1%. Unusual yeasts, such as *C. pelliculosa*, Pichia species and *C.zeylanoides*, were reported during the last 2 years of the study but contributed only 1.12% of the total year 2001 isolates [7] In another study , Between September 2004 and December 2007, 5900 yeast isolates were collected and submitted to the central laboratory for identification and susceptibility testing. The distribution of species was as follows: *C. albicans*, 2,567 (43.5%) isolates*; C. glabrata*, 1,464 (24.8%) isolates; *C. parapsilosis*, 1,048(17.8%)isolates; *C. tropicalis*, 527(8.9%), *C. krusei*, 109 (1.9%) isolates; *C. lusitaniae*, 76 (1.3%) isolates*; C.guilliermondii*, 14 (0.2%) isolates; *C. hemulonii*, 12 (0.2%) isolates; *C. Kefyr*, 10 (0.2%) isolates; *C. pararugosa* and Trichosporonasahii, 4 (0.1%) isolates each; and Pichia burtonii, Rhodotorula mucilaginosa, Geotrichum species, *C. zeylanoides*, 1 (0.04%) isolates each. [8]In the past three decades with the use of potent antibacterial immunosuppressive and cytotoxic drugs, lethal invasive Candidiasis has been described with increasing frequency [9] . Predisposing factors for Candida infection are : prolonged use of antimicrobial agents, immunocompromised status, chemotherapy,catheterization [10] .The accurate species identification of Candida is important for the treatment, as there has been an increase in treatment failure because of drug resistance. Change in drug susceptibility of different species of Candida and the introduction of newer antifungal agents has made the invitro susceptibility testing of antifungal agents more important which helps in rational use of

the same. [11]As there is no report on the prevalence of Candida infection in Western Uttar Pradesh especially in Greater Noida we have planned this study to look for the Candidiasis in patients attending the OPD/IPD of Sharda Hospital.

MATERIAL AND METHODS
Study were conducted in the Department Of Microbiology, School of Medical Sciences & Research, Sharda Hospital, Greater Noida in prospective analytical study of 1 year duration with sample size of 100 samples. specimens are Oral swabs, ear swabs, vaginal swabs, stool, urine, CSF, sputum, blood,pus,nail scrapings etc.

PROCESSING
Samples will be collected and processed as per the Standard Microbiological procedures. They will be screened for budding yeast like cells with the help of Gram stain, 10% KOH, and culture on Sabourad's Dextrose Agar. The Candida isolates which were obtained will be further Speciated by the germ tube test, chlamydospore formation On corn meal agar And then sugar fermentation and sugar assimilation test will be done.

Inclusion criteria:
1. All the suspected cases of candidiasis like oral thrush, vaginitis, skin and nail infections, diarrhea, urinary tract infection, respiratory tract infection, diabetic and postoperative wound infections, endocarditis, meningitis and neonatal septicemia.
2. Patients who have given the consent

Exclusion criteria
1. Patients visiting with signs and symptoms of fungus other than Candida species.
2. Patients who have not given consent.

Social / clinical relevance of the study
Although various studies have been conducted on the mycology profile of Candida infection in India, Sharda Hospital being a newly established and upcoming tertiary care institute, still needs such studies to be conducted in its premises. Bridging of this gap will make the choice of empirical therapy much easier for the clinicians. Our study therefore aims to establish local data on the Mycological(candida) profile of hospital acquired infections and their susceptibility pattern at Sharda Hospital, Greater Noida and also to facilitate the hospital in establishing policy on fungal infection.

Result
Total 120 isolates of *Candida* species isolate from various clinical specimens speciated and antifungal susceptibility was found. The prevalence of *Candida albicans* and non *albicans candida* are studied in relation to age, sex, site of isolation , underlying conditions and predisposing factors. Age distribution of patients was from 3 months to 68 years. The highest incidence was seen in the age group 20-40 years comprising 53.3%.
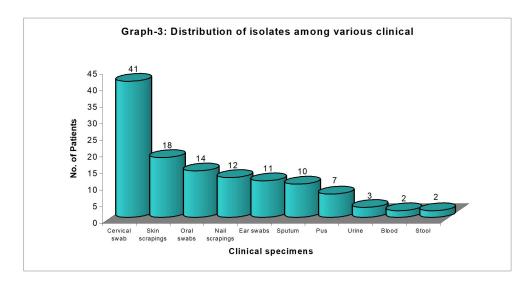
Table –1 Distribution of patient according to age

Age	No. of Patients	Percentage
0-10	14	11.67
11-20	10	8.33
21-30	36	30.00
31-40	28	23.33
41-50	9	7.50
51-60	11	9.17
>61	12	10.00

Table –2 Distribution of patients according to sex

Sex	No. of Patients	Percentage
Male	54	45
Female	66	55
Total	120	100

The *Candida* species isolated more from female (55%) than male(45%) patients in the ratio of 1:1.22(M:F).

Graph –1 Distribution of isolates among various clinical specimens

Graph-3: Distribution of isolates among various clinical

The highest number of isolates were from cervical swab isolated form vulvovaginitis constituting 41(34.17%). The other major samples were skin scrapings 18(15%), oral swabs 14(11.67%), nail scrapings 12(10%), ear swabs 11(9.17%), sputum 10(8.33%) followed by pus 7(5.83%), urine 3(2.50%), blood 2(1.67%) and stool 2(1.67%).

Table –4 Distributions of isolates among various predisposing factors

Predisposing factors	No. of patients	Percentage
Pregnancy	26	21.67
HIV seropositive	25	20.83
Diabetes	19	15.83
Prolonged contact with water	14	11.67
Secondary to infection	10	8.33
Prolonged use of corticosteroids/ antibiotics	8	6.67
Others	18	15.00

In the study, pregnancy is the major predisposing factor constituting 26 (21.67%) followed by HIV seropositives 25(20.83%),diabetes 19(15.83%), prolonged contact with water 14(11.67%), secondary to infections 10(8.33%) and prolonged use of drugs 8(6.67%). Others 18(15%) in predisposing factors include neutropenia, presence of malignancies, catheterisation, stay in ICU, parenteral nutrition, prematurity and major surgery.

Table–5 Distribution of different *Candida* species among various clinical specimens.

Clinical specimens	C.albicans	C.tropicalis	C.glabrata	C.krusei
Cervical swab	28	10	2	1
Skin scrapings	14	3	1	-
Oral swabs	10	1	2	1
Nail scrapings	10	1	1	-
Ear swabs	8	2	1	-
Sputum	9	1	-	-
Pus	4	2	1	-
Urine	2	1	-	-
Blood	2	-	-	-
Stool	2	-	-	-

Among the 41 cervical swabs, 28(68.27%) isolates were *C.albicans*, 10 (24.39%) were *C.tropicalis,* 1(2.44%) were *C.glabrata* and one was *C.krusei*. Among 18 skin scrapings, 14 (77.78%) were *C.albicans*, 3 (16.67%) were *C.tropicalis,* 1 (5.56%) was *C.glabrata.*
Among 14 oral swabs, 10 (71.43%) were *C.albicans*, 1(7.14%) was   *C.tropicalis*, 2(14.29%) were *C.glabrata* ,1(7.14 %) was *C.krusei..*Among 12 nail scrapings, 10(83.33%) were *C.albicans*, 1(8.33%) each were *C.tropicalis* and *C.glabrata.* Among 11 ears swabs, 8(72.73%) were *C.albicans*, 2(18.18%) were *C.tropicalis* and 1(9.09%) was *C.glabrata.*
Among 10 sputum samples, 9(90%) were *C.albicans*, 1(10%) was *C.tropicalis,*
Among 7 pus samples ,4(57.14%) were *C.albicans*, 2(28.57%) were *C.tropicalis* and 1(14.29%) was *C.glabrata* Among 3 urine samples, 2(66.6%) were *C.albicans*, 1(33.3%) was *C.tropicalis,* Among 4 samples of blood and stool all species were *C.albicans*.

Table –7 Distribution of different species of *Candida* among various predisposing factors

Predisposing factors	C.albicans	C.tropicalis	C.glabrata	C.krusei
Pregnancy	18	7	1	-
HIV seropositive	16	5	3	1
Diabetes	15	3	-	1
Prolonged contact with water	10	3	1	-
Secondary to other infections	8	1	1	-
Prolonged use of steroid/antibiotics	8	-	-	-
Others	14	2	2	-

Among 26 *Candida* isolates having pregnancy as predisposing factors, 18(69.23%) were *C.albicans*, 7(26.92%) were *C.tropicalis*, 1 (3.85%)was *C.glabrata*. HIV infection stood the second major predisposing factor with *C.albicans* as major isolate 16(64%), followed by *C.tropicalis*-5(20%), *C.glabrata* 3(12%) and *C.krusei* 1(4 %). *C. albicans* 15(78.95%) was the major isolate in diabetes mellitus ,followed by *C.tropicalis* 3(15.79%) and *C.krusei* 1(5.26%).Among 14 *Candida* isolates with prolonged contact with water 10(71.43%) isolates were *C.albicans*, 3 (21.43%) isolates were *C.tropicalis* and 1(7.14%) isolate *C.glabrata*. Among 10 *Candida* strains isolated from patients with primary bacterial infections, 8(80%) were *C.albicans* followed by non*albicans Candida*, *C.tropicalis* 1(10%) and *C.glabrata*1(10%). All the 8 *Candida* isolated from patients on prolonged antibacterial agents and corticosteroid were *C.albicans*. Among the 18 isolates of various other predisposing factor were *C.albicans* 14(77.78%), *C.tropicalis* 2(11.11%) and *C.glabrata* 2(11.11%).

DISCUSSION

Candida is yeast like fungus and is a normal commensal of skin and mucous membrane. *Candida* with change in external and internal environment causes candidiasis. The disease may be mild to severe, superficial to deep, acute to chronic. The origin of disease is commonly endogenous and represent an opportunistic infection mainly in immunocompromised patients and exogenous source is nosocomial in origin.[12] As *Candida* is also isolated normally from nonsterile sites, the presence in clinical specimens must be interpreted with caution.[11]

Age and sex distribution In the present study it is found that candidiasis occurs at all ages and in both sexes. The youngest in the study was a 3 months baby while the oldest was 68 years old man. The highest number of cases occurred in age group 20-40years which accounted for 53.33%. This is mainly attributed to the reproductive age group having predisposing factors like pregnancy, HIV infection and use of contraceptives. The other age groups showed nearly equal distribution with increased incidence at extreme ends of life. The present study showed that females are more commonly affected than males with an incidence of 66 (55%) and 54 (45%) in ratio 1:1.22 (M:F). According to a study conducted by P.J.Dalal and K.Khelkar at Bombay, the greatest incidence of Candidiasis was in the age group 21-40 years (35%). In a similar study conducted by K.C. Kandhari et al AIIMS New Delhi the incidence in females was about 61.2% while in males it was only 38.8% with ratio of 1:1.57.

Distribution of clinical specimens In the present study, the highest number of samples were from cervical swab 41(34.17%), followed by skin scrapings 18(15%), oral thrush 14(11.67%), nail scrapings 12 (10%), ear swabs 11(9.17%), sputum 10(8.33%), pus 7(5.83%), urine 3 (2.50%), blood 2(1.67%) and stool 2(1.67%). The highest incidence was found to be candidial vulvovaginitis followed by intertrigo.According to a study done in 1980,it was found that vulvovaginitis accounted for 30% of total cases, onychia and paronychia accounted for 12%,oral thrush accounted for 16% and the rest of cases were distributed among other lesions.[13]

Different species of *Candida* isolated The predominant species isolated in the present study is *Candida albicans* constituting 89 (73.33%). The non-albicans *Candida* isolated are *C.tropicalis* 21 (17.5%) followed by *C.glabrata* 8 (6.67%) and *C.krusei* 2(1.67%). The albicans group comprised 73.33% and non albicans 26.66%. According to study conducted in 1995, it was noted that *C.albicans* was the predominant species (65%) causing candidiasis in immunocompromised patients .*C.tropicalis* (12%) and *C.parapsilosis* (12%) were the non*candida albican* species most frequently detected followed by *C.glabrata*(7%), *C.guilliermondii* (5%), *C.krusei*(3%) and *C.lusitaniae* (0.5%). [41]In another study of candidiasis in 1996,it was seen that C.*albicans* was the commonest species(51%). The rest were *C.glabrata*(16.3%), *C.tropicalis*(15%) *C.parapsilosis* (11.1%), *C.krusei* (4.3%), *C.lusitaniae* (1.1%) and *C.pseudotropicalis* (0.6%).[14]

CONCLUSION

Candidiasis is becoming one of the more frequently encountered fungal disease. The incidence of disease is found to be increased due to predisposing factors like pregnancy, HIV infection, Diabetes etc. Pregnancy being the major factor. Prevalence of Candida infection was seem maximum among the patients of age group 21-30 years followed by 31 to 40 years. The most common form is vulvovaginal candidiasis. The commonly isolated Candida species was C.albicans and non-albicans species isolated were C.tropicalis followed by C.glabrata and C.krusei. Compromised immunity is the most important susceptible factor for clerical fungal infections. Neutrophil deficiency as a result of bone marrow subdoing or damage is usually associated with such infections. Different fungi infect humans and may live in extracellular tissues and within phagocytes. That is why, the immune responses to these microbes are often combinations of the responses to

extracellular and intracellular bacteria. Neverthless, few is known about antifungal immunity than about immunity against bacteria and viruses. This lack of profeciency is partly due to the scaricity of animal models for mycoses and partly due to the fact that these infections generally occur in individuals who are unable to mounting functional immune responses.

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