Fungal infections from the Candida have significant cause of blood stream infection. This is troublesome among those who have been hospitalized with serious underlying diseases or those who are immunocompromised. To know the prevalence and types of Candida species in blood stream infection and their antifungal susceptibility pattern. The study was carried out in the Department of Microbiology, PDU Medical College, Rajkot from September 2015 to August 2016. Total number of samples are 207. Blood culture specimens were collected and processed for, culture on SDA and HCD, Slide culture, Gram stain, Germ tube. Antifungal susceptibility testing was performed by modified Kirby Bauer method as per the CLSI guidelines. 58 (28.01%) Candida spp. [C. tropicalis (18), C. glabrata(14), C. guillermondii(12), C. parapsilosis(10), C. albicans(4)] were isolated from 207 specimens. Out of these, 203 (98.06%) from NICU/PICU and 4 (1.93%) from Skin ward, predominantly Males (57.97%). The isolates sensitive to Voriconazole (100%), Fluconazole (98.88%), followed by Ketoconazole (73.03%) and Clotrimazole (68.62%). Maximum resistance observed to Amphotericin B, Nystatin, Miconazole, Itraconazole. Candidemia is major cause of mortality due to lack of antifungal therapy. Blood stream infections by Candida species have shown highest rates of inappropriate therapy among all BSIs. Maximum resistance observed to ketoconazole (73.03%) and clotrimazole (68.62%). To know the Antifungal susceptibility pattern, patients who are at increased risk for developing nosocomial candidemia should be treated early with empiric therapy that reduced unnecessary patient mortality.

**Keywords**: BSI, Candidiasis, Candida spp., Candida albicans, Non albicans candida, Immunocompromised, candidemia.
typically defined as the use of a systemic antifungal drug which is active in vitro against a Candida isolate obtained from the patient and is dosed according the CLSI guidelines. Despite the many advances and wide availability of systemically active antifungal agents, still failure to receive any initial treatment, which is the most common cause of inappropriate empiric antifungal therapy [3-9].

**OBJECTIVE**
To know the prevalence and types of Candida species in blood stream infection. To know the antifungal susceptibility pattern of Candida isolates.

**MATERIAL AND METHOD**
The study was carried out in the Department of Microbiology, PDU Medical College, Rajkot from September 2015 to August 2016. Total number of samples are 207. All cases of having candidemia in patients admitted in critical care units, who presented with clinical history suggestive of blood stream infection were included in this study. All clinical information was collected for each patient by history and examination at the time of admission in hospital were noted. Signs and symptoms suggestive of candidemia were noted. From all patients who had clinical features suggestive of blood stream infection, blood was collected for culture and sensitivity before initiating antibiotic treatment.

Entire study is devided into three parts:
**Sample Collection**
**Mycological Processing and Identification**
**Antibiogram**
In this study, the blood culture medium used was Brain Heart Infusion Broth. The specimen was collected and processed as per the guidelines. Blood culture specimens were collected in Brain Heart Infusion Broth. After inoculation, the blood culture bottles were incubated at 37°C under aerobic conditions in the incubator for 7 days. The first subculture was done after 24 hours of incubation, the second on third day and a final on the seventh day on SDA. Bottles were examined macroscopically for growth in the morning and afternoon on the 1st day of incubation and in the morning of each day thereafter. After that, colony from SDA was inoculated on HCDA to differentiate Candida spp. and processed for, Slide culture on Corn Meal Agar (CMA), Gram stain, Germ tube test. Antifungal susceptibility testing was performed by modified Kirby Bauer method as per the CLSI guidelines. Tested Antifungal drugs was Voriconazole, Fluconazole, Ketoconazole, Clotrimazole, Amphotericin B, Nystatin, Miconazole, Itraconazole [11-14].

**RESULT**
58 (28.01%) Candida spp. [C. tropicalis (18) (Figure-1), C. glabrata (14) (Figure-4), C. gullermondii (12) (Figure-3), C. parapsilosis (10) (Figure-2), C. albicans (4) (Figure-5)] were isolated from 207 specimens (Table-1). The rate of change in candidaemia in the ICU over the study period was 28.01 percent which was significant. Males are predominantly affected (57.97%) (Figure-6). Out of these, 203 (98.06%) from NICU/PICU and 4 (1.93%) from Skin ward (Figure-7). The isolates sensitivite to Voriconazole (100%), Fluconazole (98.88%), followed by Ketoconazole (73.03%) and Clotrimazole(68.62%). Maximum resistance observed to Amphotericin B, Nystatin, Miconazole, Itraconazole (Table-2) [11-13].

![Fig-1: C.tropicalis](image)
Fig-2: C. parapsilosis

Fig-3: C. gullermondi

Fig-4: C. glabrata
Table-1: Showing diff C.spp. from blood culture of patients

<table>
<thead>
<tr>
<th>Species</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. tropicalis (18)</td>
<td>31.03 %</td>
</tr>
<tr>
<td>C. glabrata (14)</td>
<td>24.13 %</td>
</tr>
<tr>
<td>C. gulermondi(12)</td>
<td>20.68 %</td>
</tr>
<tr>
<td>C. parapsilosis(10)</td>
<td>17.24 %</td>
</tr>
<tr>
<td>C. albicans (4)</td>
<td>06.89 %</td>
</tr>
</tbody>
</table>

Fig-5: C.albicans

Fig-6: Showing Gender wise distribution of samples

Fig-7: Showing ward wise distribution of samples
DISCUSSION
The current retrospective analysis of candidemia over a 1-yr period revealed an increase in candidemia cases at our centre. Data on nosocomial BSIs has also shown up to increase in incidence in the United States [15]. However, Chakarbari et al., [16] in a retrospective evaluation of candidemia in an Indian teaching hospital have observed even higher rates of incidence [17]. These studies suggested wide variations in the prevalence of candidemia in different hospitals in India. The observed increase in candidemia cases in our study was probably due to the greater use of invasive devices, broad-spectrum antibacterial agents, more extensive surgical procedures and use of advance life support on various transplant patients. We observed a significant increase in rate of antibacterial drug consumption in our institution which has doubled the risk. The observed increase in candidemia was significant in ICU settings. There has been a major increase in the prescription of antifungal drugs over the last two decades. In the present study, the overall antifungal use increased 13-fold. As reported by others [16, 19], fluconazole was the most frequently prescribed antifungal agent. In the change to non-albicans Candida species from candida spp. has responsible by widespread use of azole. In the present study, there was a statistically significant correlation between yearly fluconazole use and increase in isolation of non albicans Candida species, even though the antifungal susceptibility patterns revealed that the most common species C. tropicalis showed high sensitivity to voriconazole followed by fluconazole. Our susceptibility data showed that susceptibility to fluconazole was same in C.glabrata and C. parapsilosis. C. parapsilosis has usually been reported to be sensitive to azoles. Still, Sarvikivi et al., [20] have been reported that treatment with fluconazole as a prophylaxis leads to the appearance of subclone of C. parapsilosis in susceptible isolates which responsible for BSI in neonatal ICU. Also, C. parapsilosis is known to form extensive biofilms on bioprosthetic materials such as central venous catheters (CVCs), which can confer relative resistance to antifungal agents. Cross-resistance between fluconazole and voriconazole has been frequently reported in many species [21] and development of voriconazole resistance after fluconazole exposure without any known prior exposure to voriconazole has also been documented [18]. In our study, cross-resistance or reduced susceptibility to both fluconazole and voriconazole was observed. These findings coupled with high azole consumption at our hospital may preclude the use of voriconazole as initial therapy in unstable patients with invasive candidiasis. In conclusion, there has been a rise in the occurrence of candidemia cases in our tertiary care hospital. Non-albicans Candida species was noticed significantly. The high usage of fluconazole appeared to have played a role in this shift, however, it may be recognised that other events like patient specific risk factors might have also contributed in selection of different species. Despite C. tropicalis being the commonest isolate, maximum resistance observed to Amphotericin B, Nystatin, Miconazole, and Itraconazole.

CONCLUSION
Candidemia is major cause of mortality due to lack of early detection of infection and inappropriate antifungal therapy. Blood stream infections by Candida species have shown highest rates of inappropriate therapy among all BSIs. Strategies are needed to rapidly identify cases of candidemia who are already suffering from serious underlying disease and develop rapid diagnostic technology that widely available and cost effective. By knowing Antifungal susceptibility pattern, patients who are at increased risk for developing nosocomial candidemia should be treated early with empiric therapy that reduced unnecessary patient mortality. In most clinical settings, this is typically all that is needed in order to provide the patient an antifungal that is required to minimize the spread of an infecting organism from the site of infection. Candida albicans is the most common cause of nosocomial candidemia, but the epidemiology of species causing candidemia is changing. Candida tropicalis is the most common cause of candidemia in hospitals. Clearly, early identification and treatment of candidemia is important in order to facilitate positive outcomes for hospitalized patients in regards to overall mortality and keeping health care associated costs down.

REFERENCE

Table-2: Antibiotic Susceptibility Pattern of Positive samples

<table>
<thead>
<tr>
<th>Candida spp.</th>
<th>VRC</th>
<th>FLC</th>
<th>KT</th>
<th>CC</th>
<th>IT</th>
<th>MIC</th>
<th>NS</th>
<th>AP</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. tropicalis</td>
<td>100</td>
<td>94.44</td>
<td>61.11</td>
<td>83.33</td>
<td>38.88</td>
<td>55.55</td>
<td>50</td>
<td>5.55</td>
</tr>
<tr>
<td>C. glabrata</td>
<td>100</td>
<td>100</td>
<td>85.71</td>
<td>71.42</td>
<td>64.28</td>
<td>71.42</td>
<td>78.57</td>
<td>0</td>
</tr>
<tr>
<td>C. gulermondii</td>
<td>100</td>
<td>100</td>
<td>83.33</td>
<td>58.33</td>
<td>33.33</td>
<td>25</td>
<td>58.33</td>
<td>25</td>
</tr>
<tr>
<td>C. parapsilosis</td>
<td>100</td>
<td>100</td>
<td>60</td>
<td>80</td>
<td>30</td>
<td>60</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>C. albicans</td>
<td>100</td>
<td>100</td>
<td>75</td>
<td>50</td>
<td>50</td>
<td>25</td>
<td>75</td>
<td>25</td>
</tr>
</tbody>
</table>


