

Original Research Article


Antibiotic Sensitivity Pattern of *Burkholderia cepacia complex* in blood stream infections in a tertiary care hospital

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Abstract

Introduction: *Burkholderia cepacia complex* (BCC) is ubiquitous in nature, present in water, soil, and plants. BCC is comprised of Gram-negative non-lactose-fermenting bacteria. Gram negative, non lactose fermenting *Burkholderia cepacia complex* has emerged as an opportunistic nosocomial pathogen causing significant morbidity and mortality in hospitalized patients owing to its high antibiotic resistance. This study was aimed to determine prevalence of *Burkholderia cepacia complex* and to evaluate sensitivity pattern of *Burkholderia cepacia complex* in blood stream infections in Dhiraj Hospital, Gujarat which is a tertiary care hospital and teaching institute.

Materials and Methods: The present study was conducted in the Department of Microbiology for a period from January 2022 to December 2022 of Dhiraj General Hospital, SBKS MI & RC, Waghodia, Gujarat. All samples were received in central laboratory and blood cultures were processed in BD BACTEC FX40. The positive culture bottles were sub cultured on Mac Conkey agar, Blood agar and Nutrient agar and were incubated for 24 hours at 37°C. The data was collected and analyzed statistically.

Results: During the study period 31 positive samples for BCC were isolated from a total of 612 culture samples, thus the prevalence rate was 5.06% in our setup. BCC was found majorly in ICUs (65%) and in wards (35%). The isolates showed maximum sensitivity to Co-Trimoxazole (83.87%), followed by Ceftazidime (58.06%), Meropenem (54.83%) and Minocycline (51.61%).

Conclusion: From various studies and our study we could conclude that there were variations in the results of drug sensitivity. So, there is need to properly isolate and do antibiotic sensitivity testing for better patient management. Prompt diagnosis is essential step to reduce mortality and establish infection control practices.

Key words

Burkholderia cepacia complex, Drug sensitivity, Opportunistic nosocomial pathogen.

Introduction

Burkholderia cepacia complex (BCC) is ubiquitous in nature, present in water, soil, and plants. BCC is comprised of gram-negative non-lactose-fermenting bacteria. Gram negative, non lactose fermenting *Burkholderia cepacia complex* has emerged as an opportunistic nosocomial pathogen causing significant morbidity and mortality in hospitalized patients owing to its high antibiotic resistance [1]. It can cause fatal necrotizing pneumonia and bacteremia in patients with cystic fibrosis. Pneumonia, meningitis, urinary tract infections, and bloodstream infections (BSIs) are caused by *Burkholderia cepacia complex* in non-cystic fibrosis patients [2]. BCC is a new pathogen that is causing significant morbidity and mortality in hospitalized patients, owing to its high intrinsic antibiotic resistance [3]. It has always been a tedious task for a routine microbiological laboratory to identify the non-fermenting gram-negative bacilli (NFGNBs), and poor laboratory proficiency in the identification of BCC prevails worldwide, including our own country. For this reason, reports of disease due to this organism are rare in India [4-8]. It shows intrinsic resistance to many β -lactam drugs, Aminoglycosides, Colistin, and Polymyxin B. This study was aimed to determine prevalence of BCC and to evaluate sensitivity pattern of BCC in blood stream infections in Dhiraj Hospital, Gujarat which is a tertiary care hospital and teaching institute.

Materials and methods

The present study was conducted in the Department of Microbiology for a period from January 2022 to December 2022 of Dhiraj General Hospital, SBKS MI & RC, Waghodia,

Gujarat. All samples were received in central laboratory and blood cultures were processed in BD BACTEC FX40 (**Photograph – 1**). The positive culture bottles were sub cultured on MacConkey agar (**Photograph – 2**). Blood agar and Nutrient agar and were incubated for 24 hours at 37°C. Non lactose fermenting colonies of BCC were identified by various biochemical reactions and confirmed by VITEK 2 automated system and antibiotic sensitivity was interpreted by VITEK 2 automated system. Antibiotic sensitivity was interpreted as per CLSI guidelines 2022 [9]. The data was collected and statistical Package of Social Sciences, version-23 (SPSS-23) were used for descriptive statistics. Categorical data were described using numbers and percentages.

Photograph – 1: BD BACTEC FX40.



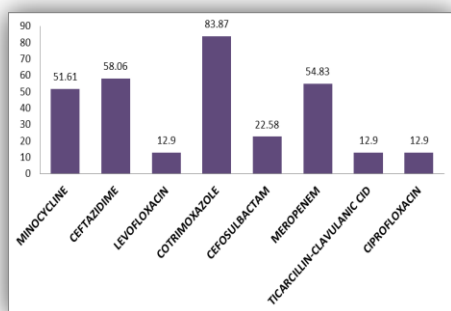
Photograph – 2: Non-lactose fermenting colonies on MacConkey agar.



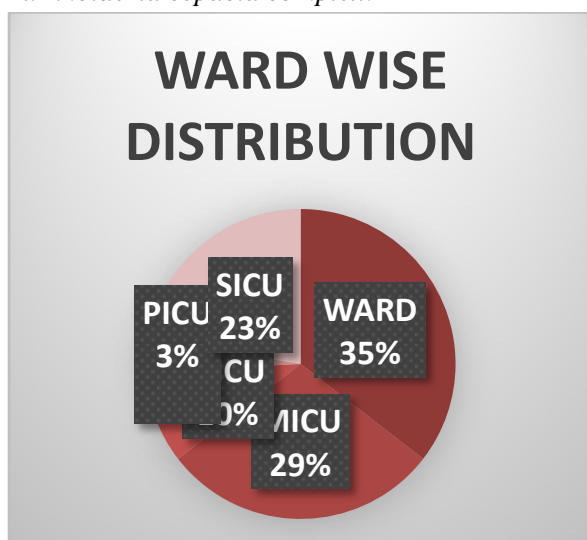
Results

BCC was isolated from 31 BSI patients over 1 year period. The age of the patient population ranged from 5 to 84 years, with a mean age of 38 (standard deviation: 11.5) years. The number of males and females enrolled in the study was 21 and 9, respectively, with a M:F ratio of 2.3:1. During the study period 31 positive samples for BCC were isolated from a total of 612 culture samples, thus the prevalence rate was 5.06% in our setup. BCC was found majorly in ICUs (65%) and in wards (35%). The isolates showed maximum sensitivity to co-Trimoxazole (83.87%), followed by Ceftazidime (58.06%), Meropenem (54.83%) and Minocycline (51.61%) (**Photograph – 3**).

Photograph – 3: Antibiotic Sensitivity Pattern.



Photograph – 4: Ward wise distribution of *Burkholderia cepacia complex*.



Discussion

The present study showed no epidemics and only sporadic cases of BCC infections. Ku, et al. studied BCC bacteremia and found BCC infection to be commoner in male patients (66.7%) [10]. Similarly our study also had a male preponderance with 70% of infected patients being male. The most frequent risk factors in the study population were use of steroids, immunosuppressive drugs, and chemotherapy, which could be because most of the patients in the study had malignancy, which itself is an immunocompromised state. Tasneem, et al. in their study found 100% sensitivity to minocycline. Ceftazidime and meropenem were found to be sensitive i.e., 73.3% and 70%, respectively [1]. Our study showed maximum sensitivity to Co-trimoxazole (83.87%), followed by Ceftazidime (58.06%), Meropenem (54.83%), Minocycline (51.61%). Levofloxacin, Ticarcillin-clavulanic acid and Ciprofloxacin showed maximum resistance. Usham, et al. in their study found maximum patients from ICU and were immunocompromised [11]. Our study shows maximum patients from Medical and Surgical ICU - 29% and 23% respectively. The multidrug resistance of BCC has been implicated to an impermeable selective outer membrane, an efflux pump mechanism, and/or the production of an inducible chromosomal β -lactamase. Comparing the results of this study most of the isolates were sensitive to minocycline meropenem and ceftazidime as suggested by the CLSI guidelines, with varying sensitivity to other antimicrobials tested. From various studies finally, we could conclude that there were variations in the results of drug susceptibility that may be because of various antibiotic policies followed in different hospitals. So, there is need to properly isolate and do antibiotic sensitivity testing for each strain for better patient management.

Conclusion

From various studies and our study we could conclude that there were variations in the results of drug sensitivity. So, there is need to properly isolate and do antibiotic sensitivity testing for

better patient management. Prompt diagnosis is essential step to reduce mortality and establish infection control practices.

References

1. Siddiqui T, Sahu C, Patel SS, Ghoshal U. Clinical and Microbiological Profile of Patients with Bloodstream Infections Caused by *Burkholderia cepacia* Complex. J Lab Physicians., 2022 Feb 9; 14(3): 312-316. doi: 10.1055/s-0042-1742634. PMID: 36119424; PMCID: PMC9473939.
2. Bhalodia Nidhi, Lakhani Sucheta, Vasava Sangita, Solanki Manoj & Pandya Himani. (2021). Microbiological and Clinical profile of *Burkholderia cepacia* infection in patients admitted at Rural based teaching Multispeciality hospital. Annals of Tropical Medicine and Public Health, 2021; 23. 10.36295/ASRO.2020.2323140
3. LiPuma JJ C B, Lum G D, Vandamme P AR. *Burkholderia*, *Stenotrophomonas*, *Ralstonia*, *Cupriavidus*, *Pandoraea*, *Brevundimonas*, *Comamonas* and *Acidovorax*. Washington, DC: ASM Press; 2007; p. 749–769.
4. Gautam V, Arora A, Madhup S K. *Burkholderia cepacia* complex in septicaemic non-cystic fibrosis cases from two tertiary care hospitals in north India. Indian J Med Res., 2010; 131: 829–832.
5. Gautam V, Ray P, Das A. Two cases of *Burkholderia cenocepacia* in septicemic patients. Jpn J Infect Dis., 2008; 61(02): 133–134.
6. Gautam V, Ray P, Puri G D. Investigation of *Burkholderia cepacia* complex in septicaemic patients in a tertiary care hospital, India. Nepal Med Coll J., 2009; 11(04): 222–224.
7. Gautam V, Ray P, Vandamme P. Identification of lysine positive non-fermenting gram negative bacilli (*Stenotrophomonas maltophilia* and *Burkholderia cepacia* complex) Indian J Med Microbiol., 2009; 27(02): 128–133.
8. Mukhopadhyay C, Bhargava A, Ayyagari A. Two novel clinical presentations of *Burkholderia cepacia* infection. J Clin Microbiol., 2004; 42(08): 3904–3905.
9. Clinical and Laboratory Standards Institute M100 – Performance standards for antimicrobial susceptibility testing, 32nd Edition
10. Ku N S, Han S H, Kim C O. Risk factors for mortality in patients with *Burkholderia cepacia* complex bacteraemia. Scand J Infect Dis., 2011; 43(10): 792–797.
11. Gangaram U, Ramya T, Jithendra K, Mohan DR. *Burkholderia cepacia* an emerging cause of septicemia, in an intensive care unit from a tertiary care hospital, Nellore, India. Int J Adv Med., 2020; 7: 413-7.