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Original Research Article

Prevalence of *Burkholderia cepacia* recovered from clinical specimens at tertiary care hospital

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ABSTRACT

Background: One of the multiple intrinsically resistant bacteria that cause opportunistic illnesses is *Burkholderia cepacia*. The distribution of *B. cepacia* isolates according to clinical specimen categories, hospital wards, patient gender and age, and antibiotic susceptibility assessment were the main objectives of the study.
Methods: This hospital based cross sectional study was conducted in department of microbiology at SAIMS Indore M. P. from May 2024 to June 2024. Relevant samples for e. g., blood, urine, sputum, body fluids, pus were collected as per institution collection protocol from inpatient and outpatient department.
Results: A total of 4875 clinical samples received for culture, 1738 samples were found positive of which 100 (2.015%) *B. cepacia* were isolated from various clinical samples (Table 1 and Figure 4). The majority of the 100 *B. cepacia* isolates were isolated from blood and respiratory samples (sputum, bronchoalveolar lavage, pleural fluid), followed by pus and urine samples, which accounted for 80 (80%), 12 (12%), 7 (7%) and 1 (1%) isolate, respectively.
Conclusions: *B. cepacia* is emerging cause of various clinical manifestations including septicemia with multi drug resistance that need to be treated quickly and effectively.

Keywords: Antimicrobial resistance, *Burkholderia cepacia*, Prevalence, Thoracic and vascular surgery

INTRODUCTION

The genus *Burkholderia* encompasses species with wide-ranging plant, human and animal pathogenesis and symbioses. Those of particular clinical relevance include *Burkholderia pseudomallei*, *Burkholderia mallei* and *Burkholderia gladioli*, species of the *Burkholderia cepacia* complex (Bcc) which colonize and infect immune-compromised patients, including those with cystic fibrosis (CF). The Bcc currently comprises 20 closely related species. Infections caused by *B. cepacia* include bacteremia, urinary tract infections, septic arthritis, peritonitis and respiratory tract infections; particularly in patients with cystic fibrosis (CF). Outbreaks of *B. cepacia* septicemia have been documented worldwide in ICUs, oncology units and renal failure patients. In recent years its role as a nosocomial pathogen and as a contaminant of medical equipment and products such as ultrasound gel and chlorhexidine wipes has also been increasingly documented. Hospitals are being increasingly recognized as dangerous places for cross-infection, either between patients or from the hospital environment. Nosocomial infections can occur, potentially with multidrug resistant organisms, including methicillin-resistant *Staphylococcus aureus*, *Enterococcus*, *Pseudomonas* and sometimes *Aspergillus* species. *B. cepacia* can now be added to this

list. In addition to CF patient, *B. cepacia* also cause serious infection in non CF patient.It was reported that *B. cepacia* also affects patients with comorbidities such as Chronic granulomatis, haematological malignancy, chronic renal failure and uncontrolled diabetes mellitus. *B. cepacia* are highly problematic to manage as they harbor resistance to multiple antimicrobial resistance.[1-4] In Central India, *B. cepacia* infections have not been studied widely. Therefore, the present study was conducted to know the prevalence and determine the antibiotic susceptibility of *B. cepacia* complex isolates.

METHODS

This hospital based cross sectional study was conducted in department of microbiology at SAIMS Indore M.P from May 2024 to June 2024. Relevant samples for e. g., blood, urine, sputum, body fluids, pus were collected as per institution collection protocol from inpatient and outpatient department. These sample were sent to department of microbiology for culture and sensitivity test. All sample except blood were cultured on blood agar and MacConkey agar; incubated for 18-24 hours at 37^0 C. For blood culture, at least 5 to 10 ml of blood was collected aseptically in paediatric or adult BACT/ALERT bottle. A positive flashed bottle was subculture on blood agar and MacConkey agar as other sample. Further analysis was done if there was growth of suspected pathogen. In positive cases isolates were identified by conventional and automated method both. In case of suspected *B. cepacia* growth on blood agar typical large circular, low convex, moist beta hemolytic colonies were grown and on MacConkey agar non lactose fermenting colonies were grown (Figure 1 and 2).

Figure 1: *B. cepacia* as grown on blood agar.

According to the Gram stain results, *B. cepacia* bacterial cells had Gram negative bacilli (rod) shape with pink cell color (Figure 3). NLF late oxidase positive colony were subjected to identification and antibiotic sensitivity test by vitek 2 compact system (Biomeriux) by using ID and AST 406 card according to antibiotic panel as per CLSI guideline 2023. All data were entered in Microsoft excel, p values were calculated by using Chi-squared test and presented in the form of table and charts.

Figure 2: *B. cepacia* as grown on MacConkey agar.

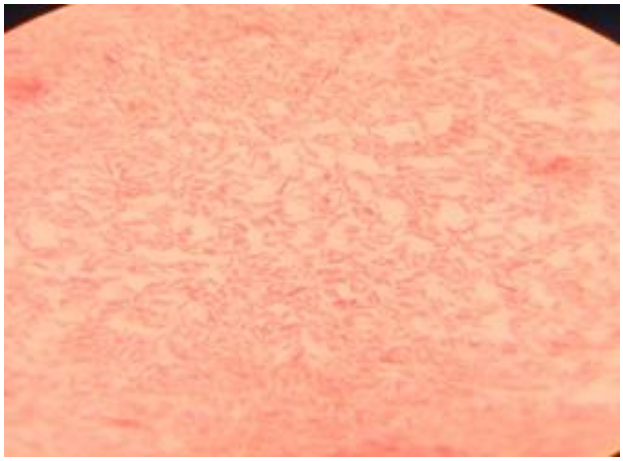

Figure 3: *B. cepacia* (gram negative bacilli) as seen in gram stain

RESULTS

Distribution of *B. cepacia* isolates: A total of 4875 clinical samples received for culture, 1738 samples were found positive of which 100 (2.015%) *B. cepacia* were isolated from various clinical samples (Table 1). The majority of the 100 *B. cepacia* isolates were isolated from blood and respiratory samples (sputum, bronchoalveolar lavage, pleural fluid), followed by pus and urine samples, which accounted for 80 (80%), 12 (12%), 7 (7%) and 1 (1%) isolate, respectively (Table 2). Based on the units, *B.*

cepacia isolates were predominantly detected in clinical specimens from oncology and ICU followed by general surgery, medicine, CTVS (Cardio-thoracic and vascular surgery), paediatrics, ENT, OBG (Obstetrics and gynecology), orthopaedics department, respiratory medicine department which account for 44, 38,7, 2, 2, 2, 1, 1, 1 and 2 respectively (Table 3). Men were more infected than women (66 (66%) vs. 34 (34%) (Table 4). Furthermore, present study divided age group into four groups among that, the majority of *B. cepacia* isolates 33 (33%) were isolated from age group of 19-45 years (Table 5).

Table 1: Isolation of *B. cepacian*.

Total specimens	Positive sample	Number of *B. cepacian* (N/100=%)
4875	1738	100 (2.015%)

Table 2: Isolation of *B. cepaci* according to clinical samples.

Clinical specimens	Number of clinical samples (N/100=%)
Blood	80
Respiratory samples (sputum, bronchoalveolar lavage and pleural fluid)	12
Pus	7
Urine	1
Total	100

Table 3: Isolation of *B. cepacia* according to units.

Name of unit	Number of *B. cepacia*
Oncology	44
ICU	38
General surgery	7
Medicine	2
CTVS	2
Paediatric	2
ENT	1
OBG	1
Orthopedics department	1
Respiratory medicine	2
Total	100

Table 4: *B. cepacia* isolates according to gender of patients.

N	Male	Female	P value
100	66	34	0.008594

Antibiotic susceptibility of B. cepacia isolates

Among the antibiotics, ceftazidime, meropenem, minocycline, levofloxacin, co-trimoxazole and ciprofloxacin were found highly (>50) sensitive antibiotics and exhibited 81%, 80%, 78%, 72%, 72%, 52% sensitive against *B. cepacia* respectively while cefaperazone sulbactam, amikacin, piperacillin tazobactum, cefepime, were found (<50) low sensitivity antibiotics and exhibited 49%, 41%, 16 %, 11% sensitive against *B. cepacia* respectively (Table 6).

Table 5: *B. cepacia* isolates according to various age group of patients.

Age group (in years)	Male	Female	Total
<18	26	06	32
19-45	20	13	33
46-60	15	12	27
>60	05	03	08
Total	66	34	100

Table 6: Antibiotic susceptibility of *B. cepacia* isolates.

Antibiotics	Sensitive	Intermediate	Resistance
Ceftazidime	81	13	06
Meropenem	80	02	18
Minocycline	78	13	09
Levofloxacin	72	09	19
Co. trimoxazole	72	01	27
Cefaperazone sulbactam	49	17	34
Ciprofloxacin	52	06	42
Pieracillin tazobactum	16	02	82
Amikacin	41	02	57
Cefepime	11	10	79

DISCUSSION

When rate of bacterial growth in blood exceeds body's defenses mechanism, septicemia results. However, frequency of *B. cepacia* outbreaks in hospitalized and immune-compromised patients is rising these days, primarily as result of different hospital related contaminations.[5-7]

B. cepacia nosocomial infections are rarely documented in hospital reports; this is primarily because laboratories have difficulty identifying this organism during regular testing; resulting they are simply reported as pseudomonas species.[8,9]

The rate of isolation of *B. cepacia* was found to be 2.015%. Which was correlated with study done by Omar et al that showed nearly similar finding 1.7%.[10] however Kady et al found that *B. cepacia* rate of isolation was 5.3% (8/150).[11] The reasons for varying in results may be attributed to the fact that variation in geographical distribution, sample size, duration of study period, socioeconomic factors, infection control practices in various hospitals.

In this study men 66 (66%) were found more infected with *B. cepacia* than female 34 (34%) which was correlated

with study done by Gangaram et al showed males were predominantly affected 68.4% than females 31.6%.[4]

According to present study among the various age group majority of *B. cepacia* isolates 33 (33%) were isolated from age group of 19-45 years which was correlated with study done by Padma et al showed majority of *B. cepacia* 59 (17.46%) and 143 (42.31%) isolated from 18-40 and 40-65 respectively.[13]

In the present study, out of 100 patients who were shown positive for BCC, highest rate of isolation was from Blood 80% and from respiratory secretion 12%. According to the study by Gales et al 62.7% of BCC were isolated from blood, 30.1% from sputum, 3.6% from infections of the skin and soft tissues, and 3.6% from urine.[12] The limitations of this study are co-morbidity of the patients and bacteria other than *B. cepacia* not included and will be improvised for further research.

In present study, ceftazidime, meropenem, minocycline, levofloxacin, co-trimoxazole and ciprofloxacin were found highly (>50) sensitive antibiotics and exhibited 81%, 80%, 78%, 72%, 72% and 52% sensitive against *B. cepacia* respectively while cefaperazone sulbactam, amikacin, piperacillin tazobactam, cefepime, were found (<50) low sensitivity antibiotics and exhibited 49%, 41%, 16% and 11% sensitive against *B. cepacia* respectively.

Similar study done by Padma et al among the antibiotics minocycline, meropenem, ceftazidime chloramphenicol levofloxacin and cotrimoxazole found highly sensitive against *B. cepacia* and demonstrated sensitivity in 50 (89.28%) out of 56 cases, in 48 (85.71%) out of 56 cases, in 47 (83.93%) out of 56 cases, in 38 (67.86%) out of 56 cases, in 35 (62.5%) out of 56 cases, and in 34 (60.71%) out of 56 cases.[13] Gangaram et al and Suhartono et al showed cefaperazone sulbactam, ciprofloxacin, ticarcillin clavulanic acid, piperacillin/ tazobactam, amikacin, tobramycin and gentamicin highly resistance antibiotics.[14,15]

CONCLUSION

Although *B. cepacia* is not very prevalent in hospitals, it was mostly the cause of septicemia however it can cause disease in immunocompromised patients. To manage opportunistic infections similar to *B. cepacia*, an effective antibiogram is required.

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REFERENCES

1. Kenna DTD, Lilley D, Coward M, Martin K. Prevalence of *Burkholderia* species, including members of *Burkholderia cepacia* complex, among UK cystic and non-cystic fibrosis patients. J Med Microbiol. 2017;66(4):490-501.
2. Jones AM, Dodd ME, Webb AK. *Burkholderia cepacia*: current clinical issues, environmental controversies and ethical dilemmas. Eur Respir J. 2001;17(2):295-301.
3. Suhartono S, Mahdani W, Muzayanna NN. Prevalence of *Burkholderia cepacia* recovered from clinical specimens in the Zainoel Abidin general hospital, Banda Aceh, Indonesia. Iran J Microbiol. 2023;15(1):38-44.
4. Gangaram U, Ramya T, Jithendra K, Mohan DR. *Burkholderia cepacia* an emerging cause of septicaemia, in an intensive care unit from a tertiary care hospital, Nellore, India. Int J Adv Med. 2020;7(3):413-7.
5. LiPuma JJ, Currie BJ, Peacock SJ, Vandamme PA. *Burkholderia, Stenotrophomonas, Ralstonia, Cupriavidus, Pandoraea, Brevundimonas, Comamonas, Delftia, and Acidovorax*, in Manual Clinical Microbiology ch. 43, Vol 1, 11th edition, Washington DC, USA, American Society for Microbiology. 2011;791-812.
6. Levy I, Lenard L, Moshie D, Samra Z, Konisberger H, Ashkenazi S. A prospective study of Gram-negative bacteremia in children. Paediatr Infec Dis J. 1996;15(2):117-22.
7. Mandell GL, Bennett JE, Dolin R. Mandell, Douglas, and Bennett's principles and practice of infectious diseases. 5th ed. Philadelphia: Churchill Livingstone. 2000.
8. Mac Faddin JF. Biochemical tests for identification of medical bacteria. 3 rd ed. Philadelphia, PA: Lippincott Williams and Wilkins. 2000:411-80.
9. McMenamin JD, Zaccone TM, Coenye T, Vandamme P, LiPuma JJ. Misidentification of *Burkholderia cepacia* in US cystic fibrosis treatment centers. Chest. 2000;117(6):1661-5.
10. Omar N, El Raouf HA, Okasha H, Nabil N. Microbiological assessment of *Burkholderia cepacia* complex (BCC) isolates in Alexandria Main University Hospital. Alexand J Med. 2015;51(1):41-6.
11. Kady HE, Mohamed One, Abaza AF, Zidan YHM, *Burkholderia Cepacia* Complex Among Intensive Care Unit Patients in Two Private Hospitals in Alexandria. Inter J Sci Technol Res. 2018;7(1):102-9.
12. Gales AC, Jones RN, Andrade SS, Sader HS. Antimicrobial susceptibility patterns of unusual non-fermentative gram-negative bacilli isolated from Latin America: report from the SENTRY Antimicrobial Surveillance Program (1997-2002). Memórias do Instituto Oswaldo Cruz. 2005;100(6):571-7.
13. Padma SS, Appalaraju B, Someshwaran R. Clinico-microbiological Profile and Antibiotic Susceptibility Pattern of BCC Isolates, J Clin Diagnost Res. 2023;17(10):DC01-8.
14. Suhartono S, Mahdani W, Muzayanna NN. Prevalence of *Burkholderia cepacia* recovered from clinical specimens in the Zainoel Abidin general

hospital, Banda Aceh, Indonesia. Iran J Microbiol. 2023;15(1):38-44.
15. Gangaram U, Ramya T, Jithendra K, Mohan DS. *Burkholderia cepacia* an emerging cause of septicaemia, in an intensive care unit from a tertiary care hospital, Nellore, India. Int J Adv Med. 2020;7(3):413-7.

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