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Original Article

Isolation of Acinetobacter species and their antimicrobial resistance pattern in a tertiary care hospital in Dhaka, Bangladesh

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ABSTRACT
Acinetobacter species are important opportunistic and nosocomial pathogens capable of causing both community and health care-associated infections (HAIs). The clinical specimens obtained from patients admitted in Holy Family Red Crescent Medical College and Hospital (HFRCMCH) from July 2013 to June 2015. All laboratory works were performed in department of microbiology and immunology of HFRCMCH. The infection rate was maximum in blood (67.7%) followed by urine (12.9%), tracheal aspirate (8.8%) and wound swab (3.32%). Most of the Acinetobacter were isolated from Intensive care unit (ICU) and Neonatal intensive care unit (NICU). Acinetobacter displayed higher resistance to many antibiotics like Ampicillin which showed 96% resistance, Ceftriaxone 72%, Amikacin 72%, Imipenem 55%, Meropenem 60%, Tetraclycline 64%, Ciprofloxacin 60% and Cotrimoxazole showed 38% resistance. In conclusion, there was a high resistant rate to available and common antibiotics. It seems that infection control strategies may help to control the evolving problem of Acinetobacter infections and prevent an epidemic nosocomial life threatening infections.

Key words: Acinetobacter, Nosocomial, Resistant.

Introduction:

Acinetobacters are important opportunistic and nosocomial pathogens capable of causing both community and health care-associated infections (HAIs)[1]. Acinetobacter causes wide spectrum of infections, including nosocomial pneumonia, secondary meningitis, surgical wound infections, skin and soft tissue infections, urinary tract infections and bacteremia[2], [3].Outbreaks of infections are often associated with the spread of a unique strain and have been linked to contaminate respiratory therapy equipment[4], intravascular access devices[5], bedding materials[6,7] and transmission via the hands of hospital personnel[8].

Risk factors for nosocomial Acinetobacter spp. infection include increased length of hospital stay, surgery, wounds, broad-spectrum antibiotic therapy, parenteral nutrition, intravascular or urinary catheter, hospitalization in the ICU or burn unit, intubation and mechanical ventilation[9]. Risk factors for community-acquired Acinetobacter spp. infection include alcoholism, smoking, renal failure, chronic lung disease and diabetes[10, 11].

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Acinetobacter isolates is a growing problem and has been widely reported[12]. Resistance in Acinetobacter to majority of commercially available antibiotics like aminoglycosides, cephalosporins, and quinolones raises an important therapeutic problems[13, 14].

The purpose of the present study was to determine the antibiotic resistance pattern of Acinetobacter infection in Holy Family Red Crescent Medical College and Hospital.

Material and methods:

It was a retrograde study. Clinical samples were collected from patients admitted in Holy Family Red Crescent Medical College and Hospital. Sample were collected from the patients age limit 0 to 100 years admitted in holy family Red Crescent medical college from July 2013 to June 2015. Samples included blood, urine, wound swab, tracheal aspirate, pus, and sputum and catheter tip swab; etc. All laboratory works were performed in department of microbiology and immunology in Holy Family Red Crescent Medical College and Hospital (HFRCMCH).

Isolation and identification of Acinetobacter:

Typical colonies were enumerated, selected and examined further. Acinetobacter was identified by Gram staining, oxidase, citrate utilization and glucose oxidation in Krigler Iron Agar (KIA) media. These identification scheme were done as per standard technique[1].

Antimicrobial susceptibility tests:
All the Acinetobacter isolates were tested for antimicrobial susceptibility testing by disc diffusion method using Kirby-Bauer technique.Antimicrobial disks used for sensitivity tests were Ampicillin, Ceftriaxone, Amikacin, Imipenem, Meropenem, Tetracycline, Ciprofloxacin, Cotrimoxazole[16].

Result:
In the 2 year study period (from July2013-June2014 and July2014-June2015), total 15590 samples were analyzed. The positive samples from all isolates were 2355. Out of these 124 were Acinetobacter positive sample.

During the period July 2013-June 2014, 76 samples were studies which included: blood (51), urine (08) and tracheal aspirates (05). During the period July 2014-June 2015, 48 samples were studies which included: blood (33), urine (08) and tracheal aspirates (06). Rate of different samples in different are shown in table 1.

Table 1- Acinetobacter isolates from different sample

Samples	2013-2014 N (%)	2014-2015 N (%)	Total N (%)
Blood□	51 (61.10)□	33 (68.75)□	84 (67.71)
Urine□	08 (10.72)□	08 (16.67)□	16 (12.90)
Wound Swab□	03 (3.94)□	01 (2.08)□	04 (3.32)
Tracheal Aspirates□	05 (6.57)□	06 (12.5)□	11 (8.87)
Pus□	03 (3.94)□	-□	03 (2.42)
Sputum□	03 (3.94)□	-□	03 (2.42)
Swab from Catheter tip□	01 (1.31)□	-□	01 (0.81)
Total□	76 (100)□	48 (100)□	124 (100)

Table-2 shows ward distribution of Acinetobacter positive samples. In both of the periods; most of the samples were from ICU and NICU. From July2013-June2014 period 65.8% samples and from July 2014-June 2015 period 70.48% samples were isolated from ICU and NICU.

Table 2- Ward distribution of Acinetobacter infection

Places in the hospital	2013-2014 N (%)	2014-2015 N (%)	Total N (%)
ICU□	31 (40.8)□	23 (47.92)□	54 (43.55)
NICU□	19 (25)□	11 (22.92)□	30 (24.19)
General Wards□	19 (25)□	08 (16.7)□	27 (21.77)
Cabins□	07 (9.2)□	06 (12.5)□	13 (10.48)
Total□	76 (100)□	48 (100)□	124 (100)

In both of the study periods, higher level of resistance was recorded for Ampicillin, Ceftriaxone. Imipenem, meropenem and cotrimoxazole showed lower resistance. (Table 3)

Table 3-Antibiotic resistance pattern of Acinetobacter species isolated from different site of infection (Number of percent resistant)

Name of drugs	2013-2014 (%)	2014-2015 (%)
Ampicillin□	92□	96
Ceftriaxone□	82□	72
Amikacin□	66□	72
Imipenem□	50□	55
Meropenem□	54□	60
Tetracycline□	73□	64
Ciprofloxacin□	70□	60
Cotrimoxazole□	58□	38

Discussion:
In this study, most of the samples (65%) were isolated from Blood. Another study inHFRCMCH in 2013 showed most isolates were from blood followed by respiratory tract[17]. In BSMMU, 50% Acinetobacter species were isolated from blood (central venous catheter and peripheral blood) which was similar to our study[18]. Another study conducted in Karachi showed 44% of organisms were solely from blood[19].In BIRDEM hospital; Acinetobacter species were isolated from Blood 18.4%, urine 4.7% and respiratory secretion 40.9%[18]. Acinetobacter colonization has been reported from the respiratory tract (41%) followed by urinary tract (25.5%), wound (20%) and blood (12.7%) in a study conducted in India[20]. Another study in Brazil showed most of their sample were from treacheal aspirate (26%), followed by sputum (20%), blood samples (13%), urine(9%)[21], which probably were due to the fact that most patients either had prior respiratory problems or were on ventilators.

Table 2 showed the ward distribution of Acinetobacter infection among patients. In our study, most of the samples were from ICU and NICU collectively about 70% followed by general wards 23 %, cabin 12%. A study in Iran showed 74% patients were from ICU[22]. Acinetobacter species has recently emerged to one of the most important pathogen of ICU. In BIRDEM hospital 27.5% Acinetobacter species were isolated from ICU samples[23]. In India, Acinetobacter is reported for about 13.2% of nosocomial infection in ICU patients[24].

Table 3 showed Acinetobacter species were about 96% resistance to Ampicillin in 2013 and 92% in 2014, Ceftriaxone resistance was 77%, Amikacin 69%, Imepenem 52.5%, Meropenem 57%, Tetracycline 68.5%, and Ciprofloxacin 65%. High level of resistance was recorded in Ampicilin 92% and low level was in imepenem about 55%. A study conducted in BSMMU showed Ceftriaxone resistance was 100%, Amikacin resistance was 68.4% and imepenem resistance was 66.7%[18]. A study from BIRDEM hospital in 2010 reported ceftriaxone resistance was 98.2%, amikacin resistance was 81.4%, and imepenem resistance was 72.4% 23. A study done in turkey showed amikacin resistance was almost 60%[25]. Changing pattern of antibiotics resistance were found in Pakistan during 2009 to 2011. It showed Amikacin resistance was 86.3%, Ciprofloxacin resistance was 84.9%, Imepenem resistance was 48.1%,[26]. Resistance pattern of Acinetobacter against various antimicrobials are considerably different among countries, centers and even among different wards of the same hospital; therefore such type of local surveillance studies are important in deciding most adequate therapy for Acinetobacter infection[27].

Conclusion:

The emergence of resistant strains of Acinetobacter spp. leads to prolong hospitalization, increased medical expenses and mortality. Injudicious use of antibiotics, mechanical ventilation, cross infection is found to be potential risk factors for development of Acinetobacter infection. There is a high resistant rate to available and common antibiotics. It seems that infection control strategies may help to control the evolving problem of Acinetobacter infections and prevent an epidemic nosocomial life threatening infections.

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