"Phenotypic characterization and antibiotic susceptibility pattern of Acinetobacter species isolation from clinical samples at a tertiary care hospital at Kanpur"

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Abstract:

Acinetobacter is an important opportunistic pathogen and is a common cause of hospital acquired infections. Acinetobacter infections are often extremely difficult to treat because of their widespread resistance to the major groups of antibiotics. The study was conducted to determine prevalence and antibiotic susceptibility pattern of Acinetobacter species isolated from various clinical samples.

Aim: Isolation, Identification and Antibiotic susceptibility pattern of Acinetobacter species from clinical samples in a tertiary care hospital in Kanpur.

Materials and Methods: The present study was a prospective study conducted at Rama Medical College, Hospital & Research Centre, Kanpur, (U.P.). Total 350 samples were received from admitted patients. The isolated bacteria were identified by colony morphology, gram's stain, microscopy and standard biochemical tests. The Acinetobacter species isolates were subjected to antibiotic susceptibility test by Kirby Bauer disk diffusion test.

Results: Out of 350 samples, species 312 were culture positive. Out of 312 isolates 100 (32.05) were Acinetobacter species isolated from ET tube secretions (39%), pus (20%), tracheal aspirate (18%), sputum (16%), Central line (5%) and blood (2%). Sensitivity was observed to Meropenem was 71%, Piperacillin -Tazobactum 20%, Amikacin 51%, Ceftazidime 12%. The Acinetobacter species showed 100% sensitive to Colistin

Conclusion: The study will help to implement better infection control strategies and improve the knowledge of antibiotic resistance patterns of Acinetobacter species in our region

Key Words: Acinetobacter, drug resistance, meropenem

Introduction

Acinetobacter is gram negative coccobacilli, ornamented as sophisticated nosocomial pathogen in 21st century. The incidence of A. baumannii infections has risen over the past decades.[1], and recent studies indicate that this pathogen is more resistant and virulent, and has become a serious nosocomial threat. The infection caused by Acinetobacter spp is difficult to control due to multi drug resistance which limits its therapeutic options. Due to lack of its appreciation and confused taxonomic status it is often under identified. [2]

The present study was done in an attempt to isolate the Acinetobacter species from various clinical samples, identify the antimicrobial susceptibility pattern.

Aim

Isolation, Identification and Antibiotic susceptibility pattern of Acinetobacter species from clinical samples in a tertiary care hospital in Kanpur

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Materials and Methods

The present study was a prospective study conducted at Rama Medical College, Hospital & Research Centre, Kanpur, (U.P.). Total 350 samples were received from admitted patients during January 2018 to June 2018. The isolated bacteria were identified by colony morphology, gram's stain, microscopy and standard biochemical tests. The Acinetobacter species isolates were subjected to antibiotic susceptibility test by Kirby Bauer disk diffusion test [3]. Total 350 samples were received. These samples were ET tubes secretions / Aspirate, sputum, tracheal aspirates, pus, central line and blood samples. For sample collection, the nursing staffs were instructed to collect the sample aseptically. Any types of respiratory aspirates or tips, pus and aspirated fluids were aseptically collected. Blood sample was collected aseptically by venous puncture method.

All the samples were inoculated on Blood agar and MacConkey agar and incubated at 37 °C. On the bases of gram staining, colony morphology and biochemical tests all the isolated microorganisms were identified. All non-lactose ferment ring gram negative bacilli were subjected to phenotypic test.[4] The antimicrobial susceptibility pattern was performed by KirbyBauer disk diffusion technique as per Clinical and Laboratory

Standards Institute guidelines (CLSI) 2019.[3] The isolates were tested for Piperacillin(PI), ampicillin-sulbactam(A/S), piperacillin-tazobactam (PIT), cefotaxime (CTX), ceftraxone (CTR), Ceftazidime (CAZ), Cefepime (CPM) , Amikacin (AK), Imipenem (IMP), Meropenem (MRP), Polymyxin B (PB).

Results

Out of 350 samples, species 312 were culture positive. Out of 312 isolates 100 (32.05) were Acinetobacter species isolated from ET tube (39%), pus (20%), tracheal aspirate (18%), sputum (16%), Central line (5%) and blood (2%).[Table 1] Sensitivity was observed to Meropenem was 71%, Piperacillin - Tazobactum 20%, Amikacin 51%, Ceftazidime 12%. The Acinetobacter species showed 100% sensitive to Polymyxin-B.

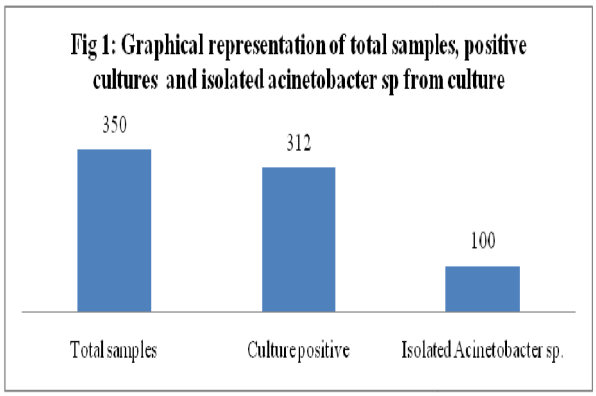
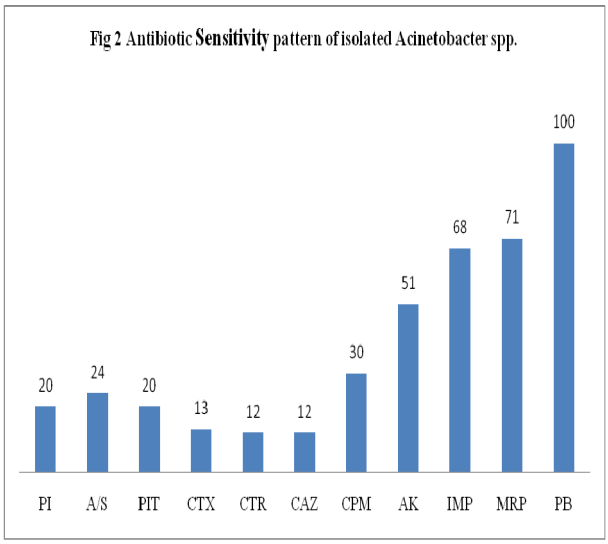


Table1: Distribution of samples

S.N.	Sample	No.	Percentage
1	E.T. tube /Aspirate	39	39%
2	Pus	20	20%
3	Tracheal aspirate	18	18%
4	Sputum	16	16%
5	Central line	5	5%
6	Blood	2	2%



Discussion

In the present study 350 samples was processed according to standard protocol. Among these, Acinetobacter spp. was isolated from 100 samples which show prevalence rate was 32.05%. This data is comparable with study conducted by Sarangi G et al.(2017) in Orissa[5] while in contrast to this data, in our study in 2017, only 10% Acinetobacter sp. were isolated[4]

Highest number of Acinetobacter species isolated from ET tube (39%) followed by pus (20%), tracheal aspirate (18%), sputum (16%), Central line (5%) and blood (2%). Similarly other study show maximum Acinetobacter sp. isolation from respiratory samples. [6, 7]

Acinetobacter is normal commensal of upper respiratory tract but because of low immunity, severe illness of patients in ICU gave the best opportunity for the commensally to become a pathogen. With the help of their virulence factors it invades the cells or with the support of invasive devices, bacteria reach the lower respiratory tract or any other favorable region and causes infection.

Sensitivity was observed to Meropenem was 71%, Piperacillin -Tazobactum 20%, Amikacin 51%, Ceftazidime 12%. The Acinetobacter species showed 100% sensitive to Polymyxin-B. In the study pipracilline and pipracilline tazobactum were 20% sensitive each. And only 12% cephalosporines were sensitive. Similarly Rahbar et al. also reported 90.9% of resistance for ceftriaxone and piperacillin and 84.1% resistance for ceftazidime.[8] while Neetu et al. reported comparatively less resistant to piperacillin (55%), followed by ceftriaxone (46%) and ceftazidime (46%).[9] in this study apporox 50% Acinetobacter sp were resistant to Amikacine while Plege Y et al. reported only 35% resistant to amikacin.[10]. Kaur A et al, Lautenbach E 2009 and Gladstone P et al. reported 57%, 23.1% and 14.2% of carbapenem resistant

Acinetobacter respectivily.[11,12,13] in this study approx 30% were resistant to carbapenem. The most probable explanation for this increasing trend is incorrect use of antibiotics to treat viral infections, misdiagnosis of diseases, inappropriate doses of antibiotics, arbitrary use of antibiotics and low quality of some of antibiotics. Only Polymyxins showed 100% sensitivity.

Conclusion

The results of these finding showed that there is need to implement better infection control strategies and improve the knowledge of antibiotic resistance patterns of Acinetobacter species in our region. Continuous surveillance of Acinetobacter especially resistance strain is necessary to control the further spread of resistant strains.

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