ORIGINAL RESEARCH PAPER

Microbiology

STUDY OF AEROBIC BACTERIAL ISOLATES FROM THE ASPIRATED BODY FLUIDS IN A TERTIARY CARE HOSPITAL OF PATNA, BIHAR.

KEY WORDS: Aspirated body fluid, Aerobic bacteria, Antimicrobial sensitivity testing

Wasim Ahmad Senior Resident, Department of Microbiology, IGIMS, Patna, Bihar.

Namrata Kumari* Professor, Department of Microbiology, IGIMS, Patna, Bihar. *Corresponding Author

ABSTRACT

In this cross-sectional hospital based study we identified the common aerobic bacterial pathogens and their antimicrobial sensitivity pattern isolated from aspirated body fluid samples in a tertiary care hospital of Patna, Bihar. By using conventional culture technique we found that Escherichia coli was most prevalent pathogen (32.18%) followed by Pseudomonas spp (19.54%), Staphylococcus aureus (14.94%), Acinetobacter spp (10.34%), Klebsiella spp (8.04%), Enterobacter spp (5.74%) and others. Commonly isolated gram negative bacilli were sensitive to aminoglycosides , monobactam, carbapenem, colistin and tigecycline. Pseudomonas spp was resistant to cephalosporins including higher generations. Among the gram positive cocci, Staphylococcus aureus was sensitive to all drugs used for antimicrobial sensitivity testing.

INTRODUCTION

Bacteria can invade any body tissue or sterile body fluid site [1], which may lead to infection, which in turn may contribute to considerable morbidity and mortality. All the samples aspirated from the body are considered normally sterile, therefore, even one colony of a potentially pathogenic microorganism may be significant [1]. Wide variety of aerobic and anaerobic species of bacteria may be present either singly or in combination in infection of soft tissue and sterile body site. Some infections resolve without antibiotic, but some needs prompt antibiotic therapy [2]. Accurate detection of bacterial pathogens along with their antimicrobial sensitivity pattern is important for more specific treatment.

The antimicrobial sensitivity pattern of a bacterial pathogen varies from region to region. So for the start of appropriate empirical treatment in these infections, it is important to know the local antibiotic sensitivity pattern of the isolated bacterial pathogens. Also, It may help the Institute to develop its own Antibiotic policy.

AIMS AND OBJECTIVE

1. Identify the common bacterial isolates from aspirated body fluids.
2. Determine their antimicrobial sensitivity pattern to guide the clinician to start appropriate empirical therapy.

MATERIAL AND METHODS

Type of study and duration - This is a cross-sectional hospital based study where the samples were collected over a period of six months duration from January 2017 to June 2017.

Inclusion and Exclusion criteria – All types of body fluids (except blood) collected from patients of different indoor and outdoor departments were included in the study, whereas, blood samples were excluded from the study.

METHODS

Needle aspiration was done following the standard precautions, which was either ultrasonography (USG) guided or by surgical procedure. Aspirated body fluids were immediately transported to microbiology laboratory after collection. Fluid having less turbidity were concentrated by centrifugation and subjected to gram stain and aerobic culture. Sample portion for culture was divided into two parts and one part was inoculated on Blood agar and McConkey's agar for solid plate culture. The second part was enriched by putting into Brain Heart Infusion (BHI) broth following standard laboratory protocol. Innoculated media were incubated overnight at 37 degree centigrade. Identification of isolated bacteria was done by conventional methods and their antimicrobial sensitivity testing was performed by Kirby-Bauer's disk diffusion method as per CLSI 2016 guidelines [3]. The culture was declared sterile if there was no growth after 48 hours of incubation.

RESULTS

A total of 783 aspirated body fluid samples were received for culture and sensitivity from which 87 (11.11%) showed growth of pathogenic bacterial isolates whereas 696 (88.88%) showed no growth of any pathogenic bacteria (Table I). On the basis of conventional bacterial identification technique, such as gram stain, culture characteristic and biochemical reactions, eleven different bacterial pathogens were identified.

Gram negative bacteria were isolated in 80.45%, whereas gram positive cocci in 19.54% of positive growth (Table II) . Among the gram negative bacteria, the most common isolate was Escherichia coli (32.18%), followed by Pseudomonas spp. (19.54%), Staphylococcus aureus (14.94%), Acinetobacter spp. (10.34%), Klebsiella spp. (8.04%), Enterobacter spp. (5.74%), Citrobacter spp. (3.44%) and Coagulase negative staphylococci (CoNS) (2.29%). Each of Proteus mirabilis, Streptococcus spp. and Enterococcus spp. were isolated in 1.14% positive isolates (Table II).

Antibiotic susceptibility pattern of the commonly isolated gram negative bacilli and gram positive cocci are shown in table III. The commonly isolated gram negative bacilli except pseudomonas spp showed higher sensitivity against amikacin, imipenem, tigecyclin and colistin. Among these, eight isolates were found to be extended spectrum beta lactamase (ESBL) producer.

The isolated Pseudomonas spp were relatively resistant having sensitivity of more than 50% against aminoglycosides only. Imipenem was found to be sensitive only in 41% of isolates.

Staphylococcus aureus isolates showed higher sensitivity against all the antibiotics that had been put for the testing. All the staphylococcus aureus isolates were found to be sensitive to cefotaxime, cefuroxime, vancomycin and linezolide and all were Methicillin sensitive Staphylococcus aureus (MSSA).

DISCUSSION

Most common sample received in our study is ascitic fluid which is in agreement to a study by R Sharma et al 2017 [4].

In our study, 11.11% of the aspirated body fluid samples gave positive culture results. Studies conducted separately by B. Vishalakshi et al 2016 [5] and by Paul Bourbeau et al 1998 [6] showed an isolation rate of 14.78% and 16.68% respectively. The isolation rate in our study was slightly lower, which may be due to the presence of anaerobic or fastidious organisms lacking proper sample enrichment before culture, or due to the use of antibiotics in patients before sample collection.

Among all the bacterial isolates, Escherichia coli was the predominant organism with an isolation rate of 32.18%. This finding matches the finding of a similar study conducted by R Sharma et al 2017 [4]. E coli showed highest resistance to cephalosporins and fluoroquinolones which is in accordance with a study conducted by Barai L et al [7]. The percentage of sensitivity was highest for amikacin, imipenem, tigecycline and colistin.

This study provides the evidence of high prevalence of antibiotic resistance in Pseudomonas spp isolates from the body fluid samples, which is contradictory to the findings of several other studies, in which sensitive strains of pseudomonas have been reported [4][5][8][9].

Staphylococcus aureus isolated in our study was sensitive to most of the antibiotics which were used for antimicrobial sensitivity testing. This is in accordance with the study done by Kaushal VS et al 2012 [10].

CONCLUSION

In our region, frequent pathogenic isolates from the body fluids are Escherichia coli, Pseudomonas spp, Staphylococcus aureus, Acinetobacter spp and Klebsiella spp, while the less common agents are Enterobacter spp, Citrobacter spp, Proteus mirabilis, CoNS, Streptococcus spp and Enterococcus spp.

On the basis of the antibiogram of common isolates, we recommend the aminoglycosides and monobactams among the first line agents and carbapenems, colistin and tigecycline among the second line drugs as empirical therapeutic agents in cases of gram negative bacilli infection. For Staphylococcus aureus infection, aminoglycosides and macrolides can be used as empirical therapy.

Regular monitoring of prevalent pathogenic organisms and their antimicrobial sensitivity pattern should be done, which will definitely guide and help the clinicians in appropriate selection of antibiotic therapy prior to the availability of the culture and sensitivity report from the microbiology laboratory. This in turn will also help in curbing the alarmingly expanding menace of drug resistance. Also, the sample collection must be done prior to administration of any Antibiotic, which would help in better yield of the pathogens. The possibility of presence of different fastidious organisms must be kept in mind and the samples must be processed accordingly so that we may not miss any such pathogen.

Table I – Total number of samples received

Type of Samples	Total number of samples	Number of isolates
Ascitic Fluid	387	32
Pleural Fluid	39	07
Cerebrospinal Fluid (CSF)	14	02
Bile	40	20
Synovial Fluid	04	00
Pus	293	23
Percutaneous Nephrostomy Fluid (PCNF)	06	03
	Total - 783	Total – 87 (11.11%)

Table II – Total number of different isolates

GNB (80.45 %)		
Escherichia coli	28	32.18 %
Pseudomonas spp	17	19.54 %
Acinetobacter spp	09	10.34 %
Klebsiella spp	07	8.04 %
Enterobacter spp	05	5.74 %
Citrobacter spp	03	3.44 %
Proteus mirabilis	01	1.14 %
GPC (19.54 %)		
Staphylococcus aureus	13	14.94 %
CoNS	02	2.29 %
Streptococcus spp	01	1.14 %
Enterococcus spp	01	1.14 %

Table – III Antibiotic susceptibilities (in percentage) of commonly isolated Gram Negative and Gram Positive bacteria from Aspirated body fluids in a Tertiary care hospital in Patna,Bihar

Antibiotics	E.coli	Klebsiella spp	Enterobacter spp	Acinetobacter spp	Pseudomonas spp	Staph. aureus
Ciprofloxacin	7	28	40	33	29	61
Gentamicin	46	43	20	44	41	NT
Ceftazidime	10	28	00	11	35	46
Amikacine	64	43	60	67	53	92
Amoxyclav	7	14	00	00	NT	NT
Cefipime	7	43	00	33	29	NT
Piptazo	46	14	40	55	47	NT
Tobramicin	43	43	40	55	53	NT
Aztreonam	43	28	60	55	41	NT
Imipenem	89	86	100	66	41	NT
Tigecycline	100	100	100	89	NT	NT
Colistin	93	100	100	100	NT	NT
Piperacillin	NT	NT	NT	NT	35	NT
Cefoperazone	NT	NT	NT	NT	29	NT
Ceftriaxone	NT	NT	NT	NT	23	NT
Cefpodoxime	NT	NT	NT	NT	6	NT
Tetracyclin	NT	NT	NT	NT	NT	84
Erythromicin	NT	NT	NT	NT	NT	69
Doxycycline	NT	NT	NT	NT	NT	84
Clindamycin	NT	NT	NT	NT	NT	77
Cefuroxime	NT	NT	NT	NT	NT	100
Cefotaxime	NT	NT	NT	NT	NT	100
Teicoplanin	NT	NT	NT	NT	NT	77
Vancomycin	NT	NT	NT	NT	NT	100
Linezolide	NT	NT	NT	NT	NT	100

NT- Not Tested

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