



## Emergence of Multi Drug Resistant Microorganisms from Various Sterile Body Fluids in a Teaching Hospital of a Developing Country

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### Abstract

Sterile body sites, if infected by micro-organisms can lead to severe morbidity and mortality. Infections caused by multidrug resistant (MDR) bacteria remain a public health threat. Hence, early diagnosis and prompt initiation of empiric treatment is necessary. Thus, this present study was undertaken to evaluate the prevalence of Multi drug resistant (MDR) organisms in different sterile body fluid. This study was done on a retrospective basis for a period of one year from January 2017 to February 2018 in Department of Microbiology of a tertiary care hospital, New Delhi. A total of 2000 sterile body fluid samples were analyzed and all were processed within 2 hours of collection. Out of which 20% (400/2000) were shown bacterial growth and 85% were sterile after 48 hours of incubation. Out of 400 samples in our study, most commonly received fluid is as Pleural (46.60%). In our study, the predominant Gram negative organisms were *E. coli* (87), *Klebsiella* spp. (65), *Pseudomonas* spp. (41), *Acinetobacter* spp. (34), *Citrobacter* spp. (26) and in Gram positive *S. aureus* (34),  $\alpha$  *Streptococcus* (28), *Enterococcus* spp. (23), *Pneumococcus pneumoniae* (18) and CONS (16). Among *Staphylococcus aureus* 59% were MRSA. *E. coli* isolates showed highest resistance to Fluoroquinolones, Cephalosporins, and moderate resistance to beta-lactam beta-lactamase inhibitors. This high MDR level may be due to inappropriate use of commonly prescribed antibiotics.

**Keywords:** Sterile Body Fluid; Multi Drug Resistant; Gram Negative; Gram Positive

### Introduction

Body fluids are important in transporting nutrients as well as waste products into the human body [1]. Different pathogenic bacteria like *Enterobacteriaceae*, *Streptococcus pneumoniae*, *Neisseria meningitidis*, *Group B Streptococci*, *Listeria monocytogenes*, *Haemophilus influenzae*, *Staphylococcus aureus*, *Acinetobacter* and *Pseudomonas* spp. Invading pathogenic organisms to human body [2-6]. Antibiotic resistance against commonly used antibiotics is becoming a great challenge for clinicians to treat the patients [7]. Thus, the present study was undertaken to evaluate the prevalence of Multi drug resistant (MDR) organisms in different sterile body fluid.

### Material and Method

This study was done on a retrospective basis for a period of one year from January 2017 to February 2018 in Department of

Microbiology of a tertiary care hospital, New Delhi. A total of 2000 samples were analyzed. Different sterile body fluids like pleural, peritoneal, cerebrospinal fluid (CSF), synovial and pericardial fluids were drawn using proper aseptic precautions and sent to Department of Microbiology. Within 2 hours of collection all body fluids were collected and cultured on Blood agar, MacConkey agar and chocolate agar then incubated aerobically and micro-aerobically (in a candle jar to provide 5 - 10% CO<sub>2</sub> concentration). Organisms isolated were identified by standard identification procedures [8] and their antimicrobial susceptibility testing were done for the isolates by Kirby Bauer's Disk Diffusion method and interpreted as per Clinical Laboratory Standard Institution (CLSI) guidelines [9].

### Results and Discussion

Out of which 20% (400/2000) were shown bacterial growth and 85% were sterile after 48 hours of incubation. Out of 400 samples

in our study, most commonly received fluid is as Pleural (46.60%) followed by ascitic fluid (32.80%), cerebrospinal fluid (28.80%) and synovial fluid (15.70%). In our study, the predominant Gram negative organisms were *E. coli* (87), *Klebsiella* spp. (65), *Pseudomonas* spp. (41), *Acinetobacter* spp. (34), *Citrobacter* spp. (26) and in Gram positive *S. aureus* (34),  $\alpha$  *Streptococcus* (28), *Enterococcus* spp. (23), *Pneumococcus pneumoniae* (18) and CONS (16).

Bacterial isolate (no.)	GN	CIP	CTX	CRO	CTZ	CPR	AMK	IMP	MRP	CFS	PIT	COL
<i>E.coli</i> (87)	60	78	56	40	33	68	20	18	15	10	9	0
<i>Klebsiella</i> spp (65)	55	82	58	42	23	78	35	20	19	22	25	0
<i>Pseudomonas</i> spp. (41)	78	46	89	70	45	23	25	21	11	15	20	0
<i>Acinetobacter</i> spp. (34)	66	58	45	55	32	45	20	14	10	7	9	0
<i>Citrobacter</i> spp. (26)	78	66	88	54	49	78	38	23	21	17	11	0

**Table 1:** Percentage wise antimicrobial resistance pattern of gram-negative bacterial isolates (n = 400) from body fluids samples.

Bacterial isolate (no.)	AM	P	CIP	ERY	CLN	CPR	COT	OX	C	VA	LZ
<i>S. aureus</i> (34)	70	90	78	56	76	56	43	59	-	0	0
<i>Enterococcus</i> spp. (23)	13	-	65	75	66	34	-	-	41	0	0
CONS (16)	28	59	46	55	47	29	33	-	-	0	0
<i>Pneumococcus pneumoniae</i> (18)	0	0	2	7	4	2	15	-	-	0	0
$\alpha$ <i>Streptococcus</i> (28)	11	10	12	19	14	23	28	-	-	0	0

**Table 2:** Percentage wise antimicrobial resistance pattern of gram-positive bacterial isolates from body fluids samples.

Among *Staphylococcus aureus* 59% were MRSA. *E. coli* isolates showed highest resistance to Fluoroquinolones, Cephalosporins, and moderate resistance to beta-lactam beta-lactamase inhibitors. In a study done by Tullu, *et al.* study majority of the isolates were highly resistant (66% - 100%) to Cephalosporins [10]. The high level of MDR resistance (50 - 75%) in this study in respect to commonly used antibiotics is in agreement with study conducted in India and outside India [7].

## Conclusion

This high MDR level may be due to inappropriate use of commonly prescribed antibiotics. Surveillance of antibiotic resistance pattern of sterile body fluids infections in a particular population should be an essential part for the selection of the most appropriate empiric antibiotic regimen.

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