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Bacteriological profile and antimicrobial sensitivity pattern in sterile body fluids from a Tertiary Care Teaching Hospital in Solapur, Maharashtra

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Abstract
Sterile fluids like CSF (cerebrospinal fluid), pleural fluid, pericardial fluid, peritoneal fluid and synovial fluid can be infected with micro-organisms which can result into severe morbidity and mortality rates amongst patients. The aim of the present study is to look into the bacteriological profile and antibiogram of sterile fluids.
Material & Method: Study was conducted for a period of 6 months. All the sterile fluids sent to the Microbiology department for culture & sensitivity were included in the study. Samples were subjected to Gram stain for provisional report and inoculated on culture media and incubated at 37^0 C for 18-24 hours, identification was done on the basis of standard protocols. Antibiotic sensitivity testing was done as per CLSI guidelines.
Results: Out of total of 341 sterile fluids received for culture and sensitivity in Microbiology department, growth was seen in 104(30.50%) samples while 237(70%) samples were sterile. Peritoneal fluid showed growth in 56 (54%) sample followed by pleural fluid 38(36.52%) and CSF 10(9.61%). All other samples were sterile. Most common age group was between 15-59 years- 76(73.07%) followed by age group of more than 60 years 16(15.4%) and minimum cases were reported in 1-14 years 12(11.53%) age group. Present study shows gram negative bacteria n=99(95.2%) were most commonly isolated followed by gram positive bacteria n=5(4.80%). Amongst gram negative isolates *Acinetobacter baumannii* 29(28%) were most commonly isolated followed by *E.coli* 27(26%), *Pseudomonas aeruginosa* 19(18.3), *Citrobacter koseri* 14(13.5%) and *Klebsiella pneumoniae* 8(8%). Amongst gram positive bacteria n=5 all the strains were MRSA (4.80%). Antibiotic sensitivity pattern among gram negative bacteria shows multidrug resistance pattern with 58.33% sensitivity to Imipenem followed by Amikacin 42.53%, Cefotaxime 40.3%, and *Ceftazidime* 22.20%. Among gram positive bacteria all isolates were sensitive to Vancomycin and Linezolid, about 80% sensitivity was seen for Clindamycin, Gentamicin. High resistance was noted for Erythromycin (80%) and Ciprofloxacin (60%).

Keywords: CSF, pleural fluid, pericardial fluid, peritoneal fluid, synovial fluid

Introduction
Infection of sterile body fluids are considered to be very important, these sample have greater clinical urgency as the site from where they are obtained are usually sterile sites and infection caused by micro-organisms are often life threatening [1]. Even one colony of potentially pathogenic micro-organism may be significant [2].
The common pathogenic bacteria of concern like *E.coli, H. influenzae, N.meningitidis, S.aureus, S.pneumoniae, Klebsiella species* [3]. Commonly the major body sites are infected and hence prompt initiation of the empirical treatment is necessary [4]. Delay in identification of these organisms and their antibiotic susceptibility pattern is of utmost importance as it may result in significant decline in morbidity and mortality among patients. Present study is undertaken to study the bacteriological profile and antibiotic susceptibility pattern in sterile body fluids.

Material and Method
Study was conducted for a period of 6 months from June 2018 to December 2018. All the sterile fluids sent to the Microbiology department during the above foresaid period were included in the study. Samples were subjected to Gram stain for provisional report (except blood) and they were inoculated on culture media like blood agar and Mac Conkey agar which were incubated at 37^0 C for 18-24 hours, growth if any was noted the next day. Any sample was considered sterile only after 48 hours of incubation (except blood). Blood was reported sterile only when no growth was seen on subculture even after 14 days of incubation. Identification was done on the basis of culture characteristics, culture smear and standard biochemical test [5]. Antibiotic sensitivity testing was done as per CLSI guidelines [6].

Results
A total of 341 sterile fluids were received in the department for culture and sensitivity during June 2018 to December 2018. Growth was noted in 104(30.50%) samples while 237(70%) samples were sterile. Peritoneal fluid showed growth in 56 (54%) sample followed by pleural fluid 38(36.52%) and CSF 10(9.61%). All other samples were sterile. Infections more commonly affected males 76(73.07%) as compared to females 28 (27%). Most common age group was between 15-59 years- 76 (73.07%) followed by age group of more than 60 years 16 (15.4%) and minimum cases were reported in 1-14 years 12 (11.53%) age group.

In the present study gram negative bacteria n=99 (95.2%) were most commonly isolated followed by gram positive bacteria n=5 (4.80%). Amongst gram negative isolates *Acinetobacter baumannii* 29 (28%) were most commonly isolated followed by *E.coli* 27(26%), *Pseudomonas* aeruginosa 19(18.3), *Citrobacter Koseri* 14(13.5%) and *Klebsiella pneumoniae* 8(8%). Among gram positive bacteria n=5 all the strains were MRSA (4.80%)

Antibiotic sensitivity pattern among gram negative bacteria shows multidrug resistance pattern with 58.33% sensitivity to Imipenem followed by Amikacin 42.53%, Cefotaxime 40.3%, and *Ceftazidime* 22.20%. Among gram positive bacteria all isolates were sensitive to Vancomycin and Linezolid, about 80% sensitivity was seen for Clindamycin and Gentamicin. High resistance was noted for Erythromycin (80%) and Ciprofloxacin (60%).

Discussion

In the present study culture positivity rate is 30.5%, similar isolation rates have been reported by Rajni Sharma *et al* [7] and Sujatha R *et al* [8], however studies done by Sorlin P *et al* [9] shows lower culture positivity rate of 24%.

In the present study males (73%) are commonly affected with infections of sterile fluid as compared to females 27%. There is no significant data to support the male preponderance in such infections. Most common age group affected by infections are in the age group of 15-59 years (73%), followed by age greater than 60 years (15.4%). Age and gender wise correlation cannot be made due to scarcity of data pertaining to infections of sterile fluids so data cannot be statistically measured as significant or insignificant.

In the present study culture positivity was most commonly seen in samples of peritoneal fluid (54%) followed by pleural fluid (36.53%) and CSF (9.61%). Studies done by Sujatha R *et al* [8] showed pleural fluid to be most common sample showing growth followed by peritoneal fluid. Sorlin P *et al* [9] and Rajani Sharma *et al* [7] showed results in concordance to the present study where culture positivity most commonly seen in sample of peritoneal fluid followed by pleural fluid.

In the present study most common micro-organism isolated were gram negative bacteria n=99 followed by gram positive bacteria n=5. Amongst gram negative bacteria most common organism isolated was *Acinetobacter baumannii* (28%) followed by *E.coli* (26%), *Pseudomonas aeruginosa* (18.3%), *Citrobacter koseri* 13.5% and *Klebsiella species* (8%). Among gram positive bacteria all the isolates were MRSA. Studies done by various workers show variation in the growth spectrum. In some studies most common isolates were *E.coli* and *Klebsiella spp.*, whereas in others non fermenter gram negative bacteria predominate, variation in growth pattern may be multifactorial in nature, with reference to host factors, environmental factors and microbial factors. Variation in antibiotic susceptibility pattern attributed to difference in geographical and local factors and local prescribing habits of the physicians treating such patients.

Conclusion

As sterile fluids are important samples, it is necessary to treat body fluid infections by empirical use of antimicrobial drugs to reduce morbidity and mortality among patients. Judicious use of these antibiotics, along with strict adherence of hospital infection control may result in significant decline in morbidity and mortality among patients.

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