



BACTERIOLOGICAL PROFILE IN PLEURAL FLUID AND ITS ANTIBIOTIC SUSCEPTIBILITY PATTERN AMONG PATIENTS ADMITTED AT J.L.N. HOSPITAL, AJMER, CENTRAL RAJASTHAN, INDIA.

Microbiology

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ABSTRACT

Pleural fluid of infectious etiology is major cause of morbidity & mortality among patients. Aim of the study is to study bacteriological profile in Pleural fluid and to know its antibiotic susceptibility pattern. **Material & Method:** Pleural fluid sample were collected by standard procedure using aseptic precautions. All specimens of Pleural fluid from Oct 2019 to Sept 2020 that came for culture & sensitivity to Microbiology department in J.L.N. hospital Ajmer, were included in the study. All the fluids were subjected to gram staining for provisional report and then inoculated on culture media and incubated overnight at 37°C. Growth if any was noted and isolate was identified using standard protocols. Antibiotic susceptibility testing was done using Kirby bauer disk diffusion method. **Results:** Total sample of Pleural fluid received from Oct 2019 to Sept 2020 were 124 out of which 44 (35.4%) showed growth while 80 (64.5%) samples were sterile. Culture positivity rate was 35.4%. Majority of isolates were Gram negative bacilli 31 (70.4%) of which most common was *Pseudomonas aeruginosa* 9 (20.4%) followed by *Klebsiella pneumoniae* 8 (18.1%), *Acinetobacter* spp 7 (15.9%), *Enterobacter aerogenes* 4 (9%), and *E. coli* 3 (6.8%). Among gram positive spectrum, *Staphylococcus aureus* were the most frequent organism isolated from 4(9%) samples. Of which MRSA were 1(2.2%) and MSSA were 3(6.8%). Males 35(79.5%) were more commonly affected than females 9 (20.4%). Overall among gram negative bacilli maximum resistance was noted for Cefazolin 100%, Ampicillin 90.3%, Ciprofloxacin 64.5%, Cefotaxim 61.2% followed by Imipenem 25.8%. High sensitivity was seen for Amikacin 64.5% followed by Piperacillin-tazobactam 51.6%. Among gram positive organisms (*Staphylococcus aureus* n=4) 100% sensitivity was seen for Vancomycin. Sensitivity for Clindamycin was 75%, Ciprofloxacin 50% and Gentamicin 25%. No isolate was sensitive to Erythromycin and Cotrimoxazole. Resistance to Cefoxitin was noted in 50% of *Staphylococcal* isolates.

KEYWORDS

MRSA- Methicillin Resistant *Staphylococcus Aureus*, MSSA- Methicillin Sensitive *Staphylococcus Aureus*

INTRODUCTION

Sterile body sites if infected with microorganisms can lead to severe morbidity and mortality among patients. These infections have greater clinical urgency as these infections are often life threatening. Different types of microorganisms like bacteria, fungi, virus & parasites are implicated as infectious etiology in pleural effusion. For potentially pathogenic organism even a single colony may be significant. Pleural effusion and empyema are the primary manifestation of intra thoracic disease and are associated with poor outcome. There has been change in the trend of spectrum of pathogens causing pleural space infections. Studies in the past shows that majority of the pleural space infections were due to gram positive organisms but over the time there has been studies showing contrasting results. The present study undertaken to study the bacteriological profile in Pleural fluid and to know its antibiotic susceptibility pattern.

Material and Methods

Pleural fluid sample were collected by thoracocentesis using aseptic precautions. All specimens of Pleural fluid from Oct 2019 to Sept 2020 that came for Culture & sensitivity to Microbiology department in J.L.N. hospital, Ajmer were included in the study. All the fluids were subjected to wet mount and gram staining for provisional report and then inoculated on culture media like blood agar, Chocolate agar and MacConkey medium and incubated overnight at 37°C. Growth if any was noted and the isolate was identified using standard conventional biochemical tests along with standard ATCC positive and negative

controls for better interpretation of results and quality assurance. Antibiotic susceptibility testing was done using Kirby Bauer disk diffusion method using CLSI guidelines.

RESULTS

Total sample of Pleural fluid received from Oct 2019 to Sept 2020 were 124 out of which 44 (35.4%) showed growth while 80 (64.5%) samples were sterile. Culture positivity rate was 35.4%. Majority of isolates were Gram negative bacilli 31 (70.4%) of which most common was *Pseudomonas aeruginosa* 9 (20.4%) followed by *Klebsiella pneumoniae* 8 (18.1%), *Acinetobacter* spp 7 (15.9%), *Enterobacter aerogenes* 4 (9%), and *E. coli* 3 (6.8%). Among gram positive spectrum, *Staphylococcus aureus* were the most frequent organism isolated from 4(9%) samples. Of which MRSA were 1(2.2%) and MSSA were 3(6.8%). Males 35(79.5%) were more commonly affected than females 9 (20.4%). Overall among gram negative bacilli maximum resistance was noted for Cefazolin 100%, Ampicillin 90.3%, Ciprofloxacin 64.5%, Cefotaxim 61.2% followed by Imipenem 25.8%. High sensitivity was seen for Amikacin 64.5% followed by Piperacillin-tazobactam 51.6% as shown in Table 1.

Among gram positive organisms (*Staphylococcus aureus* n=4) 100% sensitivity was seen for Vancomycin. Sensitivity for Clindamycin was 75%, Ciprofloxacin 50% and Gentamicin 25%. No isolate was sensitive to Erythromycin and Cotrimoxazole. Resistance to Cefoxitin was noted in 50% of *Staphylococcal* isolates.

Table 1: Antibiotic sensitivity pattern of gram negative isolates

Organism	AMP (S)	AMK(S)	PT (S)	CIP (S)	CTX (S)	IMP (S)	Gen(S)	Tobra(S)	Cz(S)
<i>Pseudomonas aeruginosa</i> (n=9)	0	9	8	6	6	9	9	8	0
<i>Klebsiella pneumoniae</i> (n=8)	0	5	2	0	0	4	1	2	0
<i>Acinetobacter</i> (n=7)	1	4	0	2	1	4	2	2	0
<i>Enterobacter aerogenes</i> (n=4)	2	2	3	1	3	3	2	2	0
<i>E. coli</i> (n=3)	0	0	3	2	2	3	0	0	0

Gen- Gentamicin, Tobra- Tobramycin, Cz- Cefazolin, PT- Piperacillin-tazobactam, AMK- Amikacin, IMP- Imipenem, CIP- Ciprofloxacin, CTX- Cefotaxim, AMP- Ampicillin, (S)- total no. of sensitive isolates.

DISCUSSION

Total sample of Pleural fluid received from Oct 2019 to Sept 2020 were 124 out of which 44 (35.4%) showed growth while 80 (64.5%) samples were sterile. Culture positivity rate was 35.4%. Study done by Anu Sharma *et al.* showed higher culture positivity rate i.e. 35%, present study is in concordance to the results, thus we report higher culture positivity rate. However study by Shaifali Sharma *et al.* showed

culture positivity rate of 28.8% and study done by Mahanty *et al.* showed culture positivity rate of 15.8% which is less as compared to our studies. There is variation in the culture positivity rate many factors may attribute to this like population under study, antibiotic administration practices. In the present study majority of isolates were Gram negative bacilli 31 (70.4%) of which most common was *Pseudomonas aeruginosa* 9 (20.4%) followed by *Klebsiella pneumoniae* 8 (18.1%), *Acinetobacter* spp 7 (15.9%), *Enterobacter aerogenes* 4 (9%), and *E. coli* 3 (6.8%). Among gram positive spectrum, *Staphylococcus aureus* were the most frequent organism isolated from 4(9%) samples. Of which MRSA were

1(2.2%) and MSSA were 3(6.8%). Anu Sharma et al reviewed the microbiology of 120 patients of pleural effusion at a hospital in Solapur, Maharashtra and reported similar results. The results in the present study contradicts with the studies done by various workers like Vikramjeet Dutta *et al.*, Soniya Saxena *et al.* where majority of isolates were gram positive organism mainly *Streptococcus pneumoniae* followed by *Staphylococcus aureus*. Present study is hospital based study and may show variation but the present study contradicts findings with majority of other studies so reporting is unnecessary to reflect changing bacteriological profile in pleural fluid. Males 35(79.5%) were more commonly affected than females 9 (20.4%). Studies done Soniya Saxena *et al.* shows males more commonly affected than females (M:F = 2.57: 1) which coincides with the present study. Antibiotic susceptibility pattern in gram negative bacilli showed maximum resistance for Cefazolin 100%, Ampicillin 90.3%, Ciprofloxacin 64.5%, Cefotaxim 61.2% followed by Imipenem 25.8%. High sensitivity was seen for Amikacin 64.5% followed by Piperacillin-tazobactam 51.6%. Among gram positive organisms (*Staphylococcus aureus* n=4) 100% sensitivity was seen for Vancomycin. Sensitivity for Clindamycin was 75%, Ciprofloxacin 50% and Gentamicin 25%. No isolate was sensitive to Erythromycin and Cotrimoxazole. Resistance to Cefoxitin was noted in 50% of Staphylococcal isolates. Variation in antibiotic susceptibility patterns has been noted in the studies done by various workers from the present study this can be attributed to population under study, geographical differences, institution based variation, socio economic status of the patient, local pattern of antibiotic resistance in the area, local hospital based antibiotic policy and hospital infection control practices of health care workers. The present study shows variation in the bacteriological profile and antibiotic susceptibility pattern of pleural fluid it may reflect the local trends of bacterial prevalence and antibiotic sensitivity pattern in our area, since it is a hospital based study there may be multifactorial facets that should be kept in perspective. However it is important to report differences in our study from the previous studies done by other research scholars as it may reflect recent trends of shift in the bacteriological profile in pleural fluid and antibiotic sensitivity pattern though it cannot be generalized.

CONCLUSION

Injudicious use of antibiotics has led to increase in antimicrobial resistance in both gram positive as well as gram negative spectrum of bacteria. It is essential to increase awareness among patients about deleterious effect of overuse/misuse of antimicrobials and empirical treatment should be encouraged also there is need to develop efficient hospital based antibiotic policy with special reference to sterile fluids like pleural fluid which may guide treating physician for efficient and prompt treatment which may decrease mortality and morbidity significantly. There is also need to follow strict antibiotic stewardship program to prevent spread of antibiotic resistance.

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