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Bacteriological Profile And Sensitivity Pattern Of Pleural Fluids From A Tertiary Care Hospital.

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Abstract

Background information:

Pleural space is normally sterile but it gets colonized when fluid accumulates. Fluid accumulation occurs due to many causes of which infection is the most common cause. Pleural effusion when occurs in the setting of pneumonia increases the morbidity and mortality rates in patients if antibiotic therapy is delayed or improper. Identification of prevalent pathogenic organisms and their sensitivities is important in guiding antimicrobial therapy. The aim of the study was to determine the bacteriological profile and their sensitivity pattern.

Material and methods:

A total of 500 pleural fluid samples were processed. The isolates were identified by standard procedures and their antibiotic sensitivity determined.

Results:

12.8% of the samples had an identifiable etiology with gram negative bacteria as the predominant isolates. The organisms isolated were; Pseudomonas. aerugenosa, Klebsiella pneumonia, Escherichia coli, Staphylococcus aureus and Protues. Pseudomonas spp were the most common among gram negatibe bacteria. Imipenem, piperacillin-tazobactum, ciprofloxacin were most sensitive drugs.

Conclusion:

Continuous epidemiological monitoring and knowledge of sensitivity pattern of the organisms is a prerequisite in formulation of antibiotic policy which further helps in early and appropriate institution of the antibiotics and in controlling the antibiotic resistance

Introduction:

Pleural effusion is the accumulation of excess quantity of fluid within the pleural space due to excess formation or when there is decreased fluid removal by the lymphatics. [(1,2)] This may be due to many causes including thoracic diseases, trauma, and iatrogenic injury, but the most common among these is infection. The pleural space is normally sterile but readily colonized once pleural fluid is accumulated. [(3,4)] Parapneumonic effusions (PPE), account for a large percentage of pleural effusions. As many as 40% of hospitalized patients with bacterial pneumonia have an accompanying pleural effusion. The morbidity and mortality rates in patients with pneumonia and pleural effusions are higher than those in patients with pneumonia alone. Most pleural effusions associated with pneumonia resolve without any specific therapy directed towards the pleural fluid, but approximately 10% of patients require operative intervention. Delay in instituting proper therapy for these effusions is responsible for the morbidity associated with parapneumonic effusions[(5)].

Identifying the causative organism is important to guide antimicrobial therapy. The bacteriology of pleural infection has been changing in recent years since the introduction of antibiotics inthe 1940'sand or hospital acquired -varies with several clinical factors, including underlying diseases, community d surgical conditionsinfections, an[3]. Hence the present study was conducted to determine the bacteriological profile of pleural fluid and their sensitivity pattern, from patients diagnosed with pleural effusion.

Materials and methods:

The study was conducted at a tertiary care centre, Hyderabad, from July 2020 to December 2020. All hospitalised patients, who were clinically diagnosed to be suffering from pleural effusion, were included in the study.

A total number of 500 pleural fluid samples were studied, which were subjected to standard aerobic bacteriological culture including gram staining, microscopy, studying the cultural characteristics and biochemical reactions for isolation and identification of the etiological agent and their antimicrobial susceptibility was done usingthe ybriK' Bauer DiskDiffusion Method' , as per standard .protocol

Drugs for Gram Positive Cocci:

Cefoxitin, Ciprofloxacin, Gentamicin, Cefotaxime, Cefepime, Co trimoxazole, Amoxycillin Clavulanate, Linezolid and Vancomycin.

Drugs for Gram Negative Bacilli: Ampicillin, Amoxyclav, Cefotaxime, Ceftriaxone, Cefepime, Ceftazidime, Amikacin, Gentamicin, Imipenem, Cotrimoxazole.,Piperacillin tazobactum.

Results:

Of the 500 samples received, 12.8% had an identifiable etiology. Altogether 5 organisms were isolated, *Pseudomonas.aeruginosa* (35.9%), *Klebsiella.pneumoniae* (28.12%), *Escherichia.coli* (23.4%), *Staphylococcus. aureus* (10.9%), *Proteus* (1.56%). In our study gram negative bacteria were predominant isolates. (table 1)

Organisms	**No. of isolates**	**Percentage**
Pseudomonas.aeruginosa	23	35.9%
Klebsiella.pneumoniae	18	28.12%
Escherichia.coli	15	23.4%
Proteus	7	1.56%
Staphylococcus. aureus	1	10.9%

Table 1: no of isolates from pleural fluid and their percentage.

Of the total samples received, 370 (74%) were from male patients of which 43 (11.6%) were culture positive and 130 (26%) were from female patients of which 21 (16.15%) showed culture positivity, with male to female ratio of 2:1(Figure 1)

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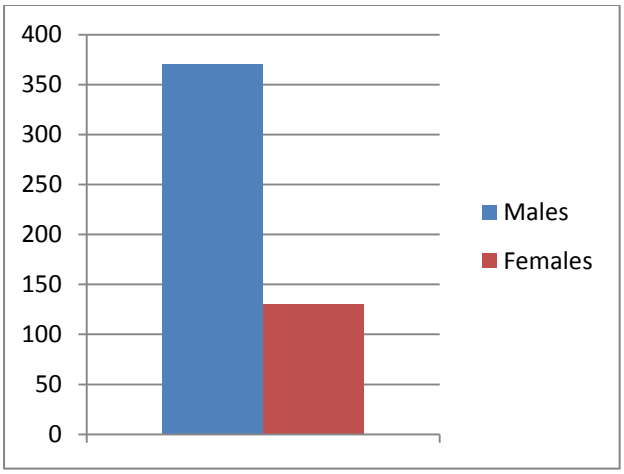

Figure 1: gender wise distribution

Highest number of participants were seen in the age group of 26-40years (148), while the least number was seen in 86-100 years age group (1). (figure 2)

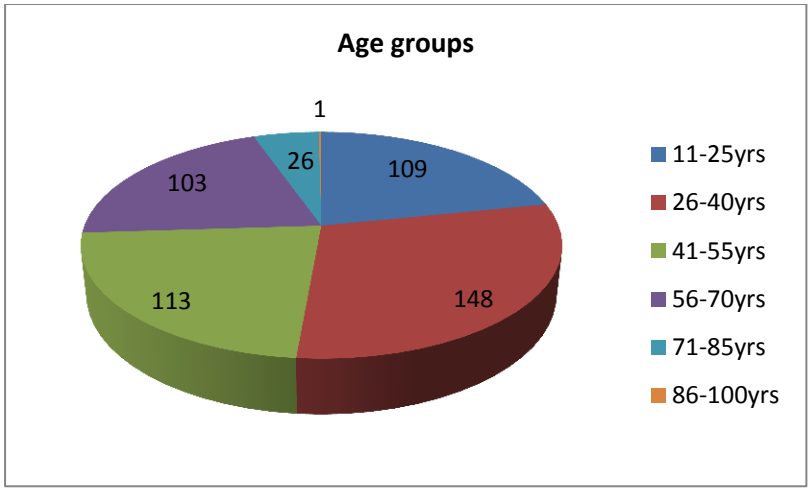

Figure 2: Age wise distribution

Imipenem was 100% sensitive against *Pseudomonas sps, Escherichia.coli, Proteus species*, while 95% of *Klebsiella* isolates were sensitive to it. Ciprofloxacin was 76.9%, 87%, and 80% sensitive among *Pseudomonas sps, Klebsiella pneumonia, Escherichia.coli*. Piperacillin-Tazobactum was 84%, 86%, 71% among *Pseudomonas sps, Klebsiella pneumonia, Escherichia.coli.* Least sensitivity was noted with ampicillin among the gram negative bacilli. *Proteus* species were sensitive to Imipenem, Piptaz, ceftriaxone, cefepime, amikacin, gentamycin, and resistant to ampicillin (figure 3-6)

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Antibiograms of the isolates:

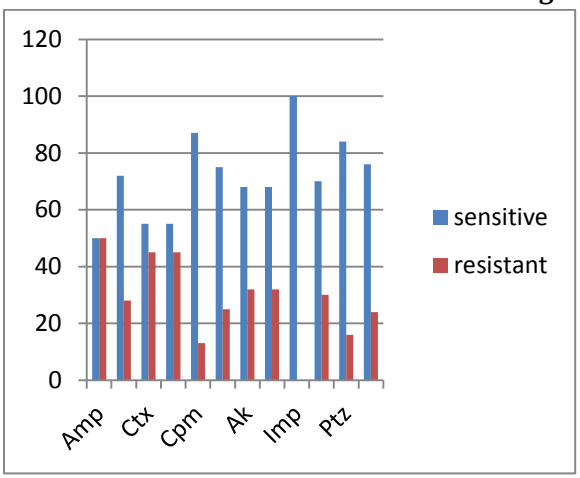

Figure 3:Pseudomonas aeruginosa isolates

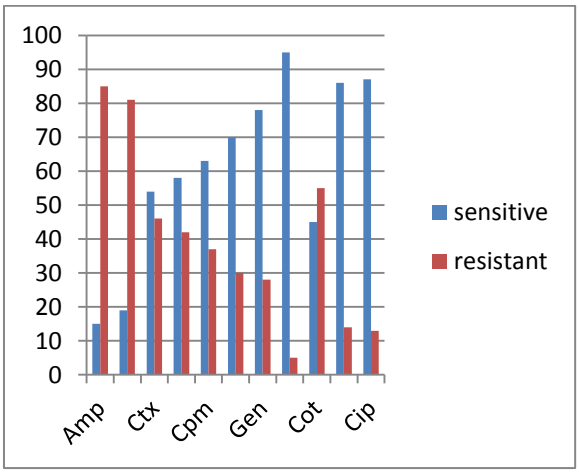

Figure 4: Klebsiella. pneumonia isolates

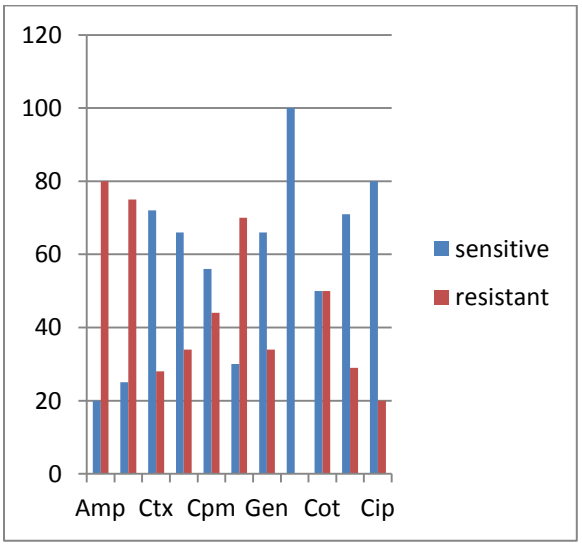

Figure 5: E.coli isolates

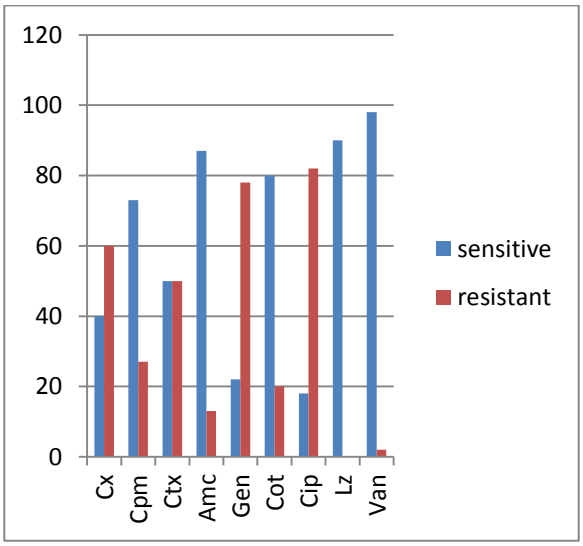

Figure 6: Staphylococcus aureus isolates

The isolates of *Staphylococcus.aureus* were highly sensitive to Vancomycin(98%), Linezolid(90%), Cotrimoxazole(80%) and Amoxyclav(87%). They were least sensitive to Ciprofloxacin(18%).

Discussion:

In the present study, the most common age group affected was 26-40 yrs, males were more (74%) commonly affected than their female (26%) counter-parts. This is in correlation with the study by Dr. Soniya saxena et al, with the common age group of 26-45 yrs and 72% were male participants, 28% were female [(6)].

Gram negative bacteria were the predominant pathogens (89.06%) isolated in our study. Gagneja et al[(7)] (91.07%) and jain sonali et al[(8)] (88.4%) also showed similar results.

Pseudomonas species (35.9%) was the most common organism isolated in the present study. This correlates with various previous studies by Jain sonali[(8)] et al, Dorobat OM et al[(9)], Madigubba et al[(10)] and Pulle MV[(11)] who showed 55.2%, 49.6%, 23.6% and 29.8% isolation rate of pseudomonas respectively.

Our findings are in contrast with Sujata R[12] et al where in E.coli, S.pneumoniae and Staphylococcus aureus were the most common isolates. Study by Kundu et al[13] has shown gram positive cocci as the commonly cultured organism with 50% isolation.

Imipenem was the most sensitive drug in this study, Jain sonali et al[8] has shown similar results. Next most sensitive drug among GNB isolates were piperacillin-tazobactum, ciprofloxacin and ceftazidime.

In study by Dr. Soniya Saxena et al[6], gram negative isolates were sensitive to Meropenem, followed by Imipenem and cefepime. They were resistant to Gatifloxacin and ampicillin.

Staphylococcal isolates were 100% sensitive to Linezolid, 98% sensitive to Vancomycin. They showed good sensitivity to Amoxyclav (87%), Cotrimoxazole (80%) and Cefepime (73%). Our results are in agreement with Harshika Y K et al[14].

Conclusion:

Pleural infection is prevalent in our country especially in lower socio economic groups due to inappropriate antibiotics dosages and duration of treatment. Therefore knowledge of bacteriological profile and antibiogram of pleural fluids is necessary, as this will help in effective and accurate treatment of the life threatening infections, in formulating the hospital antibiotic policy and thus prevents indiscriminate use of unnecessary antibiotics and antimicrobial resistance associated with such infections.

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