Original Research Article

Bacterial Profile in Sputum Samples of Pneumonia Cases in a Tertiary Care Hospital

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ABSTRACT

Background: Respiratory infections are the most frequent of all infections and lower respiratory tract infections and most common worldwide. Among them pneumonia is the commonest disease with high prevalence in the community and a cause of significant mortality and morbidity. Hospital acquired pneumonia (HAP) is currently the second most common hospital infection. Recent years have witnessed the emergence of new pathogens and also newer antibiotics designed to combat them. The present study was conducted to know the bacterial profile and their antibiogram pattern in sputum samples of pneumonia cases in a tertiary care hospital.

Materials and Methods: A total of 512 sputum samples received in the clinical microbiology lab Andhra Medical College, Visakhapatnam from Government Hospital for Chest and Communicable diseases (GHCCD) AMC, Visakhapatnam were included in the study. Isolation and identification of the organisms was done as per the standard protocol in the lab. The antibiotic sensitivity test was performed by Kirby Bauer disc diffusion method and the zones were measured as per the CLSI guidelines.

Results: In the present study out of 512 samples 67% were culture positive and 33% were sterile. Out of 343 culture positives 26.5% were Gram positive cocci, 69.4% were Gram negative bacilli and 4% were candida species. Mixed isolates of bacteria and candida species were isolated in 6 samples. MRSA strains were found in 26.7%, ESBL s was identified in 24.4%.

Conclusions: As there is increased incidence of drug resistant organisms like MRSA & ESBL's, regular culture sensitivity is needed which helps the clinicians for proper management of patients.

Keywords: Hospital Acquired Pneumonia, Drug Resistance, MRSA, Community Acquired Pneumonia, klebsiella species.

INTRODUCTION

Respiratory infections are the most frequent of all infections and lower respiratory tract infections and most common worldwide. Among them pneumonia is the commonest disease with high prevalence in the community and a cause of significant mortality and morbidity. Pneumonia is broadly defined as any infection of lung parenchyma. [1]

In the United States alone, Pneumonia and Influenza rank as the sixth leading cause of death. [2] Pneumonia is clinically divided into Community Acquired Pneumonia (CAP) and Hospital Acquired Pneumonia (HAP).

Infectious diseases society of America (IDSA) defines CAP as "an acute infection of the pulmonary parenchyma that is associated with at least some symptoms

of acute infection, accompanied by the presence of an acute infiltrate on a chest radiograph or auscultatory findings consistent with pneumonia in a patient not hospitalized or residing in a long term case facility for more than 14 days before onset of symptoms. [3,4]

Hospital acquired pneumonia (HAP) is currently the second most common hospital infection accounting for 13 to 18 percent of all nosocomial infections, with estimate of associated mortality ranging from 20 to 50 %. [5]

Aetiology of CAP is generally bacterial but the microbial pattern varies from place to place and so does the antimicrobial sensitivity and emerging resistance pattern.

Despite being a reasonably common and potentially lethal disease CAP is often under estimated by physicians and patients alike. [6]

Recent years have witnessed the emergence of new pathogens and also newer antibiotics designed to combat them. [7]

Various studies have been done in different countries for example in Gordan, [8] Thailand, [9] Newyork [10] and Chile [11] regarding the microbial etiology and bacterial resistance but there is limited published data describing microbiological causes of pneumonia in India. [12]

The present study was conducted to know the bacterial profile and their antibiogram pattern in sputum samples of pneumonia cases in a tertiary care hospital.

MATERIALS AND METHODS

The present study was conducted during the period of six months from July to December 2014. A total of 512 sputum samples received in the clinical microbiology lab, Andhra Medical College, Visakhapatnam. The samples were received from Government Hospital for Chest and Communicable diseases (GHCCD), AMC, Visakhapatnam. All the samples were processed through Gram's stain and inoculation onto Blood agar & Mac Conkey agar. Isolation and identification of the

organisms was done as per the standard protocol in the lab. The antibiotic sensitivity test was performed by Kirby Bauer disc diffusion method and the zones were measured as per the CLSI guidelines. MRSA were identified by using Cefoxitin 30 μg discs and ESBL producers by Ceftazidime 30 μg, ceftazidime and clavulanate 30+10μg discs and interpreted as per CLSI guidelines.

RESULTS

In the present study out of 512 samples, 343 (67%) were culture positive and 169 (33%) were sterile. Out of 343 culture positives 91 (26.5%) were Gram positive cocci, 238 (69.4%) were Gram negative bacilli and 14 (4%) were *Candida species*.

Among Gram positive cocci, *Staphylococcus aureus* were isolated in 15 (4.37%) samples and *Streptococcus pneumoniae* were isolated in 76 (22.2%) samples. Among Gram negative bacilli *Klebsiella species* were the predominant isolate 158 (46.1%), followed *by Escherichia coli* 42 (12.3%), *Pseudomonas species* 35 (10.2%), *Acinetobacter* 2 (0.6%) and *Proteus species* in 1 (0.3%). Candida species were isolated in pure in 14 samples and out of them 8 (2.3%) were *Candida albicans* and 6 (1.7%) were *Candida non albicans*. Mixed isolates of bacteria and Candida species were isolated in 6 samples. In the present study out of 512 samples 285 (55.7%) were received from males and 227 (44.3%) were from females. The maximum age group was between 41 to 50 years followed by 31 to 40 years.

Most of the Gram positive cocci were sensitive to Vancomycin (100%), Linezolid (100%), Imipenem (100%), Levofloxacin (94%), Cefoxitin (73.3%), Azithromycin (58%), Amoxyclav (52%).

Most of the Gram negative bacilli were sensitive to Ceftazidime + clavulanic acid (100%), Imipenem (100%), Piperacillin+ Tazobactam (78%), Amikacin (74%), Ceftriaxone (62%), Ceftazidime

(60%), Azithromycin (56%) Cefotaxime (54%).

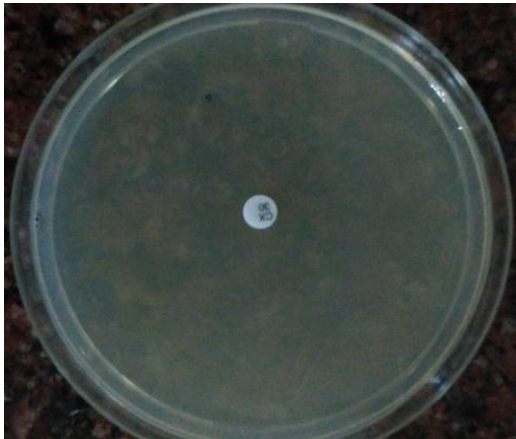MRSA (Figure 1) strains were found in 26.7%, ESBL s (Figure 2) was identified in 24.4%.
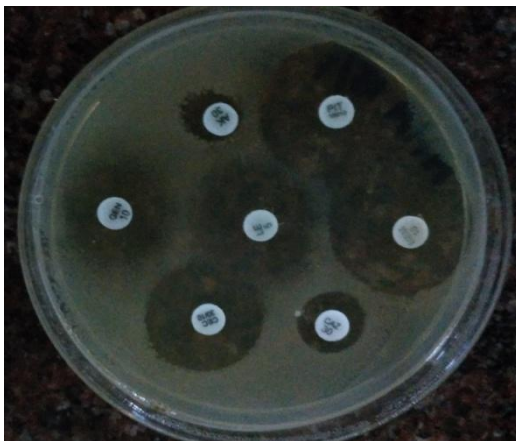

Figure 1: MRSA

Figure 2: ESBL

Table 1: Age Wise and Sex Wise Distribution (N=512)

S. No	Age	Male	Female	Total
1.	0-10 Years	2	4	6
2.	11-20 Years	26	44	70
3.	21-30 Years	49	44	93
4.	31-40 Years	49	41	90
5.	41-50 Years	63	38	101
6.	51-60 Years	51	31	82
7.	> 60 Years	45	25	70
	Total	**285**	**227**	**512**

Table 2: Distribution of Bacterial and Fungal Isolates (N=343)

S. No			Percentage
1.	Staphylococcus aureus	15	4.37%
2.	Streptococcus pneumoniae	76	22.2%
3.	Klebsiella Species	158	46.1%
4.	Escherichia coli	42	12.3%
5.	Pseudomonas aeruginosa	35	10.2%
6.	Acinetobacter species	2	0.6%
7.	Proteus species	1	0.3%
8.	Candida species	14	4%

DISCUSSION

In the present study culture positivity was obtained in 66.99% which correlates with Gurjeet Singh et al [13] who reported 65.59%, Nithya Chinnusamy et al [14] 63% and Mythri S. et al [15] 72% whereas Vishak K Acharya et al reported 39% of culture positivity. As per Gupta et al [17] National Pneumonia guidelines, yield of sputum culture varies from 34% to 86%.

Out of 512 sample 55.7% were from the males and 44.3% from females in the present study which correlates with Gurjeet Singh et al who reported 59.46% and 40.5%, Vishak K Acharya et al [16] reported 64% and 36%.

In the present study, 26.5% were Gram positive cocci, 69.4% were Gram negative bacilli and 4% were candida species.

Streptococcus pneumoniae were the predominant isolates (22.2%) among Gram positive cocci which correlates with Mythri S et al 26.3%, Vishak k Acharya et al 31%. [18-21]

Staphylococcus aureus was isolated in 4.37% in the present study which correlates with Mythri S. et al 2.6% where as Nithya Chinnusamy et al reported 13.4%.

Among Gram negative bacilli, *Klebsiella species* were the predominant isolate 46.1% followed by *E.coli* 12.3% and *Pseudomonas species* 10.2% in the present study which correlates with Nithya Chinnusamy et al who reported 31.7%, 12.2% and 14.63% respectively where as Vishak K Acharya et al reported *Klebsiella species* in 13% and *Pseudomonas species* in 15% and Mythri S. et al reported *Klebsiella species* in 55.3% and *Pseudomonas* in 10.5%.

Acinetobacter species and *Proteus species* were reported in 0.6% and 0.3% of samples in the present study and Vasuki V et al reported in 7.7% and 6.9% of Hospital Acquired Pneumonias.

Candida species were isolated in 4% of samples with 2.3% of Candida albicans and 1.7% of Candida non albicans in the present study.

The sensitivity pattern of Gram positive cocci and Gram negative bacilli in the present study correlates with Nithya Chinnusamy et al.

In the present study MRSA were isolated in 26.7% of *Staphylococcus aureus* strains and ESBL s were identified in 24.4% of Gram negative bacilli.

CONCLUSION

As there is increased incidence of drug resistant organisms like MRSA & ESBL s, regular culture and sensitivity is needed which helps the clinicians for proper management of patients.

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