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Original Research Article

Study of Bacterial and Fungal Etiology of Lower Respiratory Tract Infections in a Tertiary Care Hospital

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ABSTRACT

Background: Lower respiratory tract infections are most common worldwide both in developed and developing countries. Management of both community & Hospital acquired LRTI's depends on proper clinical and laboratory diagnosis with current antibiotic sensitivity patterns. The present study was conducted to know the current bacterial & fungal etiology & antibiotic sensitivity patterns in a tertiary care hospital.

Materials & Methods: A total of 100 Sputum samples received in the clinical microbiology lab, King George Hospital, Andhra Medical College, were included in the study. Isolation & 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 & the zones were measured as per CLSI guidelines.

Results: In the present study, out of 100 samples, 54% were culture positive & 46% were culture sterile. Out of 54 culture positives, 29.6% were gram positive cocci, 46.3% were gram negative bacilli & 24% were candida species. Mixed isolates were isolated in 3 samples.

Most of the Gram positive bacteria were sensitive to Linezolid 94%, followed by Vancomycin 88%, imipenem 78.6%, Levofloxacin 92%, Ciprofloxacin 60%, Clindamycin 60%, Azithromycin 46% and Amoxyclav 42%.

Most of the Gram negative bacteria were sensitive to colistin 94%, followed by imipenem 92%, Piperacillin Tazobactam 80%, Cefoperazone+ sulbactam, Amikacin, Tobramycin 72% each and Cefotaxime 64%. ESBL's were identified in 29.6% of Gram negative bacteria and Staphylococcus aureus isolated was MRSA.

Conclusion: As the drug resistant microbes are increasing, it is imperative to regularly evaluate the etiology & antibiotic profile & formulate regional guidelines for the management of patients suffering from LRTIs.

Key words: Lower Respiratory Tract Infections (LRTI's), Etiology of LRTI's, multi drug resistance, antibiotic sensitivity pattern, patient management.

INTRODUCTION

Lower respiratory tract infections (LRTI's) are amongst the most common cause of morbidity and mortality arising from infectious diseases both in the developed and developing countries. LRTI's may be defined as those infections presenting with symptoms including cough, expectoration, dyspnoea, wheeze and or chest pain/ discomfort usually for a period ranging from 1-3 weeks. [1]

Among LRTI's, 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. [2] In the United States alone, Pneumonia and Influenza rank as the sixth leading cause of death. [3]

Aetiology of LRTI's depend on various demographic age (young/middle/old), other predisposing factors including hospitalization. Nosocomial and community acquired LRTI's have been on the rise as is the case with other debilitating conditions that include compromised respiratory tract (Asthma, COPD), diabetes, chronic kidney disease CKD. [4-6] LRTI's have been attributed to account for almost 20% mortality among the infectious disease deaths in India as reported by World Health Organization (WHO). [7] It has been reported that diagnostic laboratories and clinical microbiologists have a critical role to play in the diagnosis and management of LRTI's. [8,9]

In the era of emerging antimicrobial resistance, regular monitoring of antimicrobial susceptibility patterns, changing prescription patterns, cautious and judicious use of antibiotics will be of extreme importance in better patient care. [10-12] There are only a few studies of antimicrobial susceptibility patterns of the LRTI's. The aim of the present study is to evaluate the aetiological agents and the antimicrobial susceptibility patterns of LRTI's in a tertiary care teaching hospital, KGH, Andhra Medical College, Visakhapatnam, Andhra Pradesh, South India.

MATERIALS & METHODS

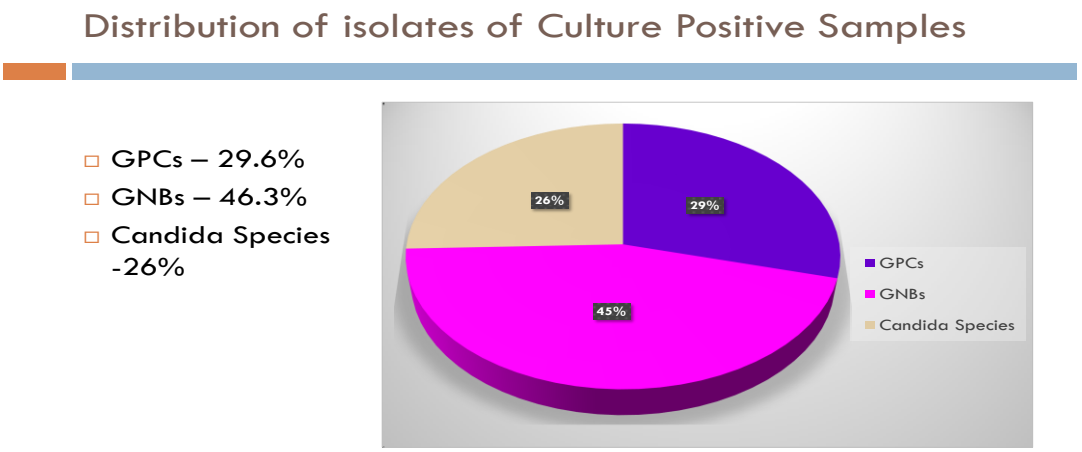
The present study was conducted in the department of clinical microbiology, Andhra Medical College, Visakhapatnam, Andhra Pradesh. A total of 100 clinically suspected LRTI's patient's sputum samples received from July to September 2017 from various wards in King George Hospital, Andhra Medical College, were included in the study. Samples from both out patients and in patients were included. Samples from less than 10 years of age group and known cases of Tuberculosis were excluded. All the samples were processed for Gram's stain, KoH mount and inoculated on to blood agar, chocolate agar, MacConkey agar & SDA with gentamicin. Isolation & 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 and ESBL producers by ceftazidime and clavulanate 30+10 µg discs and interpreted as per CLSI guidelines.

RESULTS

In the present study, out of 100 samples, 53.7% of samples were from males and the maximum age group with culture positivity was between 41-60 years. Out of 100 samples 54% were culture positive. Among the 54% culture positive samples, 29.6% (16) were Gram positive cocci and 46.3% (25) were Gram negative bacilli and 24% (13) were candida species. Mixed isolates were isolated in 3 samples. Out of 29.6% (16) Gram positive cocci, 15 were Streptococcus pneumonia and one isolate was methicillin resistant Staphylococcus aureus. Out of 25 (46.3%) Gram negative bacteria, 16 were Klebsiella pneumonia and 9 were Pseudomonas aeruginosa. Among 13 Candida species, 7 were candida albicans and 6 were non albicans.

Most of the Gram positive bacteria were sensitive to Linezolid 94% followed by Vancomycin 88%, imipenem 78.6%, Levofloxacin 92%, Ciprofloxacin 60%, Clindamycin 60%, Azithromycin 46% and Amoxyclav 42%.

Most of the Gram negative bacteria were sensitive to colistin 94%, followed by imipenem 92%, Piperacillin Tazobactam 80%, Cefoperazone+ sulbactam, Amikacin, Tobramycin 72% each and Cefotaxime 64%. ESBL's were identified in 29.6% of Gram negative bacteria and Staphylococcus aureus isolated was MRSA.



Distribution of Isolates in Culture Positive samples (n=54)

Organism	Number
Streptococcus pneumoniae	15
MRSA	01
Pseudomonas aeruginosa	09
Klebsiella	16
Candida albicans	07
Non albicans	06
total	54

DISCUSSION

In India, acute lower respiratory tract infection (ARI) is responsible for one million deaths. There is inadequate information from India on various lower respiratory tract bacterial pathogens and their resistance patterns in hospital settings. In addition, the emergence of resistance as a major problem has drawn attention to a need for better diagnostic techniques and newer drugs to allow more specific therapy. [13]

At present the therapy for community acquired lower respiratory tract infections (LRTI) is often empirical and how to choose an effective antimicrobial agent is a new challenge to the clinicians as the composition and the resistance to antimicrobial agents of infectious pathogens was changing frequently. The knowledge of likely prevalent strains along with their antimicrobial resistance pattern will help in better management of patients and framing the antibiotic policy. [14]

In the present study, the culture positivity was 54% which correlates with Salman Khan et al [15] (49.29%), K.V. Ramana et al [16] who reported 52.83%, Nithya Chinnu Swamy et al [17] (63%), Gurjeeth Singh et al [18] (65.59%) and Koripella RL et al [19] (66.9%). Mythri S et al [20] reported high culture positivity (72%) and Visak K Acharya et al [21] reported lower culture positivity (39%).

Out of 100 samples 53.7% were males and 46.3% were females in the present study which correlates with Salman khan et al (53.2% &46.7%), Preeti Srivastava et al [22] (55% &45%), Koripella RL et al (55.7% &44.3%), Gurjeeth Singh et al (55.7% & 40.5%), Visak K Acharya et al (64% & 36%).

The preponderance of males could be due to more prevalent associated risk factors eg: smoking, chronic alcoholism seen in males than females, similar findings were reported by other investigators. [23,24]

In the present study, Gram positive cocci were isolated in 29.6% and Gram negative bacteria in 46.3% which correlates for Gram positive cocci with Koripella RL et al 26.5% & 69.4%, Salman Khan et al 22.39%& 77.61% and Wang Y et al [25] 20.65%&% 69%.

Streptococcus pneumonia were the predominant isolate among Gram positive cocci in the present study which correlates with Mythri S et al, Vishaka K Acharya et al, Salman Khan et al and Koripella RL et al. Out of 16 Gram positive cocci, one isolate was MRSA which correlates with K.V. Ramana et al.

Among Gram negative bacteria, out of 25 isolates, Klebsiella pneumonia were the predominant isolates (16) followed by

pseudomonas aeruginosa which correlates with Nithya Chinnuswamy et al, Vishaka K Acharya et al, Mythri S et al, Salman Khan et al and Koripella RL et al.

In the present study candida species were isolated in 26% of culture positive samples which correlates with Jithendra Khandati et al [26] (34%) where as Shailaja et al [27] and Jha et al [28] reported lower incidence (12.8% & 12.2% respectively).

In the present study mixed isolates were obtained from 3 of the culture positive samples which correlate with Preeti Srivastava et al. [22]

The antibiotic sensitivity pattern of Gram positive cocci and Gram negative bacteria in the present study correlates with Nithya Chinnuswamy et al [17], Mythri S et al [20], Koripella RL et al [19] & Vishak K Acharya et al. [21]

In the present study, out of 46.3% Gram negative bacteria, 29.6% were ESBLs which correlates with Koripella RL et al[17] where as K.V. Ramana et al [16] reported higher incidence of 75%. Among Gram positive cocci one isolate was Staphylococcus aureus and it was MRSA.

CONCLUSION

Considering the fact that occurrence of multidrug resistance is increasing and the etiology of LRTI's varies between different geographical regions and the antimicrobial susceptibility pattern also shows variability, there is a need for regular update of etiology and antibiogram of LRTI's. Continuous and judicious use of antimicrobial agents by formulating regional antibiotic policies will reduce the burden of multidrug resistance and thereby enabling better patient management and limiting the resultant morbidity & mortality arising from LRTI's.

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