



Original Article

A Study of Bacterial Respiratory Tract Infections and Their Antimicrobial Susceptibility Pattern Among Outpatients Attending a Tertiary Care Hospital in Puducherry

Dr. Shanthi V¹, Dr. Kavitha V²

^{1,2}Assistant professor, Department of Microbiology SLIMS, Puducherry

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Corresponding Author:

Dr. Abarna V

Professor & Head, Department of
Microbiology SLIMS, Puducherry

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ABSTRACT

BACKGROUND: Respiratory tract infections usually cause increase morbidity and mortality and its one of most common disease affecting humans. In this lower respiratory infections are common one which requires frequent consultations

OBJECTIVES: This study aims at finding the presence of bacterial isolates from respiratory samples and their antimicrobial susceptibility pattern among the outpatients attending a tertiary care hospital.

METHODS: A hospital based Retrospective study were conducted in tertiary care hospital (SLIMS) Puducherry among the patients attending OPD from May 2025 to Oct 2025. Upper respiratory tract infections manifest as infections in nasal cavity, pharynx and larynx whereas the lower respiratory tract infections manifest as chest pain, prolonged cough, productive sputum, difficulty in breathing, fever and weight loss. A total of 180 sputum sample and throat swab were collected from patients with clinical suspicion of respiratory infections (LRI) were subjected to Gram stain based on Barlett score & cultured into blood agar, MacConkey agar and Chocolate agar were incubated aerobically at 37⁰ C for 24 hrs. The Bacterial isolates were identified by Gram stain Colony morphology and its further confirmed by biochemical test. Antimicrobial susceptibility pattern were determined by using kirby-bauer disc diffusion method. the specimens yielding heavy bacterial growth of pathogenic organism was considered positive. the specimens with scanty growth was considered negative.

RESULTS: Out of 180 both sputum sample & throat swab 100(55%) showed the growth of various species of bacteria. The predominant pathogens were klebsiella pneumoniae 75/100 (75%), Pseudomonas aeruginosa 20/100(20%), E.coli 3/100(3%) & Acinetobacter 2/100(2%). Multidrug resistant (MDR) seen in 50/75(50%) in klebsiella

CONCLUSION: Klebsiella pneumoniae and pseudomonas aeruginosa were the most predominant isolates. High level of antibiotic resistance seen in majority of the klebsiella isolates. Therefore antibiotic susceptibility testing is needed for treating the patients and for better outcomes.

Keywords: Bacterial Respiratory, Antimicrobial, Infections.

INTRODUCTION

Lower respiratory infections were one of the leading cause for severe morbidity and mortality around the world, mainly in developing countries. the results of LRI worldwide data shows 488.9 million cases & 2.4 million deaths. These infections cause higher mortality burden among other infectious disease which includes HIV/AIDS malaria, and Tuberculosis⁽¹⁾. Depending upon the severity of infections the symptoms will be varied in case of young adults symptoms are non-pneumonic or pneumonia like symptoms or the patient present with exacerbation of COPD ie already existing

The common pathogens causing LRTIs other than M. tuberculosis and Streptococcus pneumoniae are Klebsiella species, Pseudomonas species, Staphylococcus species, Acinetobacter species, H. influenza. K. pneumoniae, M.pneumoniae, B.pertussis, and M.catarrhalis can cause significant community-acquired as well as hospital-acquired LRTIs, which

includes bronchitis, and lung abscess especially in elderly individuals .apart from bacteria some viruses also will cause LRI ⁽²⁾ the following factors predispose for causing LRI which includes advancing age, smoking, alcoholism, pulmonary disease, heart disease, neurological disorders, cystic fibrosis⁽¹⁾

Antibiotics forms one of the important tool in treating this infections and its complications ,currently antibiotic resistance forms an alarming situation . In Unite kingdom government which was reported by O' Neill the death due to antibiotic resistance is around 7,00000 and it could reach 2 million by the year 2050³ Antibiotic resistance is mainly due its overuse , Taking antibiotic for viral infections, prolonged antibiotic course , their will be transmission of resistant bacteria among the patient and from health care workers to patient and vice versa, bacteria acquire resistance to antibiotics by following mechanism like efflux of antibiotics, decreased permeability across the cell membrane , modification of target site or inactivation of antibiotics following poor guidelines while prescribing antibiotics

This study was conducted to identify the common pathogens which is involved in patients infected with LRI and their antibiotic susceptibility pattern among the patients undergoing tertiary care hospital , Puducherry

MATERIALS AND METHODS

Study type and Study design – Hospital based retrospective study was carried over for a period of 6 months.

Study setting-the study was conducted in department of Microbiology SLIMS Puducherry

Study duration: The study was conducted a period of 6 months (From May to Oct 2025)after obtaining institutional ethical clearance.

Study sample: Culture and sensitivity reports of respiratory secretions in the form of sputum, throat swab were reviewed. Only positively cultured sample reports of respiratory secretions and throat swab samples were included in the study

Inclusion criteria and exclusion criteria

Positive samples of respiratory secretions in form of sputum, throat swab were included in this study, negative samples were excluded

Data collection: Pathogens involved and antibiotic sensitivity, resistance for commonly involved pathogens were observed. **Data analysis:** Statistical analysis was done in the form of descriptive statistics as percentages and tabulations.

RESULTS

Total of 180 samples 100 (55%) shows positive growth of varies species of bacteria. The most predominant pathogens were Klebsiella pneumoniae shows 75 (75%) growth, Pseudomonas aeruginosa shows 20(20%), Escherichia coli shows 3 (3%) and Acinetobacter 2(2%) in klebsiella out of 75 (55%) were multidrug resistant

Table 1. Showing distribution of samples included in the study

Type of positive culture sample	Sample size	Percentage
Total sample	180	100%
Positive	100	55.5%
Sputum	100	55.5%
Throat swab	(commensal)	0

Among 100 positive sample klebsiella was the most common organism which accounts for 75% followed by Pseudomonas aeruginosa shows 20% followed by E.coli shows 3% and Acinetobacter 2%.

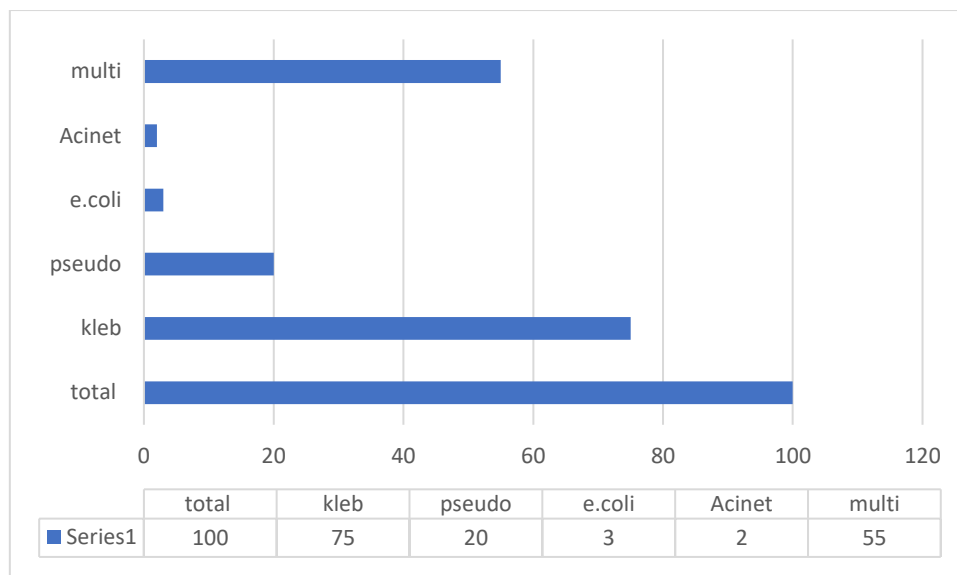


Figure 1. Distribution of organisms found in positive respiratory secretion culture and sensitivity report. Sputum

Antibiotic sensitivity and resistance were observed for Klebsiella, as it was the most common organism found in the culture of respiratory secretions. Klebsiella was found out of 75%

13.3% sensitive to ceftriaxone and amikacin, 6.6% sensitive to ciprofloxacin and piperacillin & tazobactam, 10.6% sensitive to gentamycin, and 100% sensitive to meropenem & colistin. ampicillin and amoxiclav shows 100% resistant

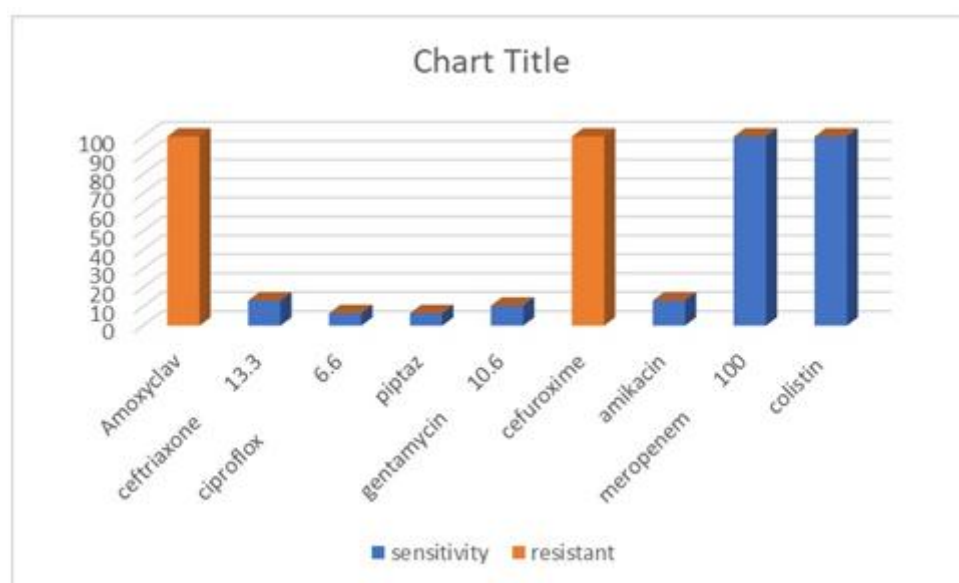


Figure 2. Showing distribution of antibiotic sensitivity and resistance in Klebsiella

DISCUSSION

The current study included 100 respiratory secretions culture and sensitivity reports. Major pathogens involved were klebsiella(75%), pseudomonas (20%), E.coli(3%), Acinetobacter(2%), multidrug resistant strains (55%).

Klebsiella showed significant 100% resistant to cefuroxime, and amoxiclav, 13.3% sensitive to ceftriaxone & amikacin. 6.6% sensitive to both ciprofloxacin & piptaz, 10.6% sensitive to gentamycin and 100% sensitive to meropenem and colistin. Our study is in accordance with the study done by Miriti et al. which stated that the common isolated pathogens from respiratory samples were Gram negative pseudomonas species which was found to be the most resistant isolate to most of the tested antimicrobial agents⁽²⁾

The study by Mathur N, et al the common isolates is pseudomonas and it was resistant to first line antibiotics like piperacillin-tazobactam, meropenem, amikacin, ciprofloxacin and levofloxacin. Most of the isolates were 100% sensitive to colistin and polymyxin B⁽³⁾.

A study done by Hussain A et.al highest number of patients were of age group 51-60 (21.28%) followed by 61-70 years (16.5%) their results corroborate with another study conducted by Barlett et al that reported the greatest number of incidences of LRTI among patients more than 50 years of age. This can be due to the decreased immunity present in elderly patients⁽⁴⁾.

Our study showed a significant resistance for cephalosporin group of drugs among klebsiella isolates. A study by Bajpai Tet al showed higher degree of resistance might be due excessive cephalosporin coverage also showed similar results⁽⁵⁾. Considering comparison with other studies the current study results suggest that in the case of respiratory infections Klebsiella is fairly sensitive to meropenem and colistin but has significant antibiotic resistance to, amoxiciav and cephalosporins .

CONCLUSION

Awareness and knowledge of the current pattern of pathogen involvement and antibiotic resistance may help significantly in reducing morbidity and mortality. Sensitization and awareness of clinicians about antibiotic resistance is needed. Unethical and use of irrational antibiotic should be inhibited legally. Promotion of hygiene practices like hand washing should be promoted in the general population.

Recommendation

The study highlights the necessity of updated empirical antibiotic guidelines to combat rising antimicrobial resistance. Improved awareness among clinicians and the public can reduce morbidity and mortality from resistant infections. Strengthening infection control measures, including hand hygiene, is crucial in preventing the spread of resistant pathogens.

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