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CLINICO-BACTERIOLOGICAL PROFILE OF LOWER RESPIRATORY TRACT INFECTIONS IN PATIENTS ATTENDING TRIPURA MEDICAL COLLEGE AND DR. BRAM TEACHING HOSPITAL, TRIPURA.

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ABSTRACT **Background:** Lower Respiratory Tract Infection(LRTI) is one of the commonest health problem which is not a single disease but a group of specific infections with varying etiology and symptomatology. This study was undertaken to determine bacterial etiology of LRTI and associated risk factors **Methodology:** 250 samples from patients with suspected LRTI were collected and processed by standard microbiological procedure. Risk factors relating to LRTI were also further evaluated from clinical history of the patient. **Results:** Total 100 isolates were recovered where Klebsiella pneumoniae(57%) was predominant followed by Pseudomonas aeruginosa(19%), Acinetobacter spp.,(9%), Citrobacter freundii(7%), Staphylococcus aureus(3%), and Streptococcus pneumoniae(2%). Multiple co-morbidities are more associated with LRTI than single risk factor like Diabetes mellitus, Smoking, Alcohol, Hypertension and COPD. **Conclusion:** Knowledge of bacterial agents causing LRTI and prevalent risk factors in our geographical area is to be required for better treatment and prevention of the disease.

KEYWORDS : LRTI, Risk factors of LRTI, Clinicobacteriological profile.

Introduction: Lower respiratory tract infections(LRTIs) are leading cause of illness and death in children and adults across the world. Acute lower respiratory tract infections include pneumonia(infection of lung alveoli), as well as infections affecting the airways such as acute bronchitis and bronchiolitis, influenza and whooping cough.[1] LRTIs are responsible for 4.4% of all hospital admissions and 6% of all general practitioner consultations.[2] The etiology and symptomatology varies with age, gender, season, type of population at risk and other factors. A variety of organisms are usually implicated in etiology of LRTI. Gram positive bacteria like Staphylococcus aureus, Streptococcus pneumoniae etc. and Gram negative bacteria like Klebsiella spp., Pseudomonas spp., Hemophillus influenzae, Acinetobacter spp., have been recovered from LRTIs.[3]

Clinically. LRTI is defined as an acute illness usually for a period of 1-3 wks, presenting with symptoms of cough, expectoration, dyspnoea, wheeze & chest pain/discomfort.[4] Various predisposing factors which may lead to LRTI are smoking, alcohol, immunosuppressive conditions. Diabetes mellitus, COPD, Bronchial asthma etc.[5]

The present study was conducted to know the prevalence of bacterial agents causing LRTI and to find out the associated risk factors if any. Better understanding of the causative agents responsible for LRTI is recognized as a requirement which should allow a more logical approach for treatment.

Methodology: This cross sectional study was conducted in the department of Microbiology, Tripura Medical College and DR BRAM Teaching Hospital after getting approval from the institutional ethical committee. All adult patients presenting with symptoms of LRTI in various clinical department were included in this study. Patients with pulmonary Tuberculosis, atypical pneumonia were excluded from this study. Microbial pathogens other than Bacteria were also excluded from this study. Total 250 lower respiratory tract samples including expectorated sputum and Endotracheal tube(ET) aspirates were collected from both OPD and admitted patients with clinically diagnosed LRTI after taking detailed history of the patient. Expectorated sputum was collected into a sterile container with a screw cap that is tightly secured following proper instructions given to the patient. ET aspirates were transferred to a sterile screw cap container with the cap tightly secured before transport. After collection of the sample, it was transported to Bacteriology section of Microbiology department as soon as possible preferably within 2(two) hrs.[6] Procedure: 1. Direct microscopy by Gram stain.[7] 2. Criteria for assessing quality sputum sample: less than 10 squamous epithelial cells per low power field in gram stained smear was accepted for future laboratory processing.[6] 3. Culture & isolation: a) All the specimens were inoculated onto presterile blood agar, MacConkey agar and Chocolate agar by semiquantitative method. b) Blood agar and chocolate agar plate was incubated at 370c for 18- 24 hrs with 5 – 10% CO2 , on the other hand MacConkey agar plate was incubated at 37oc for 18 - 24 hrs. c) Next day morning colony morphology was observed and gram stain was performed from pure colony.[8] d) Identification of bacteria: Batteries of biochemical tests were performed as per gram stain findings. For gram positive cocci: Catalase, Coagulase, Optochin disc test, Mannitol fermentation test were performed as per standard protocol. For gram negative bacilli Catalase, Oxidase, Sugar fermentation, Triple sugar iron(TSI), Indole, Methyl red, Voges proskeur, Citrate utilization, Urease were performed as per standard protocol.[9] Internal quality control and disposal methods of generated biological wastes were maintained as per standard operative procedures of Microbiology department.

Results: Among the 250 samples processed, sputum and ET aspirates were 235 and 15 respectively. Out of these 98(38.2%) samples yielded significant growth and rest of 152(60.8%) showed either no growth or commensal growth which was considered as no growth. Sputum culture positive cases were 88(37.44%) and ET aspirates culture positive cases were 10(66.67%)[Figure 1]. Age and gender wise distribution showed highest number,36(36.37%) of culturally confirmed LRTI cases were in the 59 – 69 years of age group. Overall 73.46% cases were found in Male, whereas in female it was 26.54%.

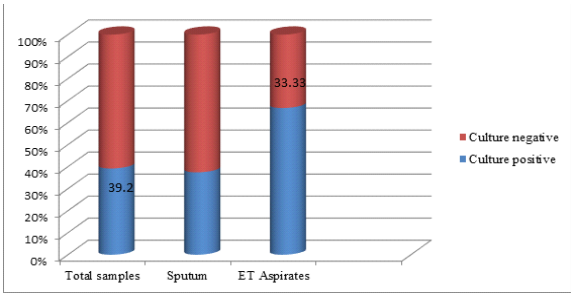

Figure 1: Comparison of culture positivity rate between sputum and ET aspirates .

Single gram negative bacilli was isolated in 92.86% cases, while single gram positive cocci was isolated in 5.10% cases. In two cases more than one organism was isolated which accounted for rest of 2.04%.

Therefore, from 98 culture positive samples a total of 100 isolates were recovered, out of which Klebsiella pneumoniae(57%) was the predominant pathogen, followed by Pseudomonas aeruginosa(19%), Acinetobacter spp.,(9%), Citrobacter freundii(7%), Staphylococcus aureus(3%), Streptococcus pneumoniae(2%) and 1% each of Enterobacter spp., Edwardsiella spp., Escherichia coli. On further analysis of sample wise distribution of bacterial isolates, Klebsiella pneumoniae was found to be predominant in both sputum and ET aspirates samples.[Table 1]

Table 1: Distribution of Bacterial isolates from Sputum and ET aspirates

Bacteria	Sputum(N)	ET aspirates(N)	Total(%)
Klebsiella pneumoniae	53	04	57(57%)
Pseudomonas aeruginosa	15	04	19(19%)
Acinetobacter spp.	09	Nil	09(9%)
Citrobacter freundii	06	01	07(7%)
Staphylococcus aureus	01	02	03(3%)
Streptococcus pneumoniae	02	Nil	02(2%)
Enterobacter spp	01	Nil	01(1%)
Edwardsiella spp.	01	Nil	01(1%)
Escherichia coli	01	Nil	01(1%)

34.69% (34/98) culturally confirmed LRTI cases were associated with either single risk factor or multiple comorbidities i.e more than one risk factor. Out of which Multiple comorbidities(13.26%) were predominant followed by Hypertension(9.18%), Diabetes(5.10%), Smoking(4.08%), COPD(2.04%) and Alcohol(1.02%)[Figure 2].

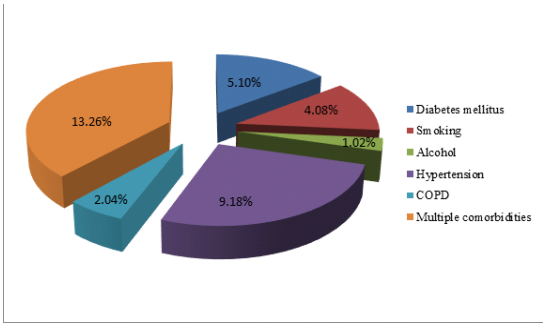

Figure 2: Risk factors associated with culturally confirmed LRTI cases(n=98)

Discussion: A total of 250 sample including sputum(235) and ET aspirates(15) were collected from patients with LRTI within a span of 3 months and processed in bacteriology section of Microbiology department as per standard protocol. Overall culture confirmed cases were found to be 39.2% of which ET aspirates(66.67%) showed higher positivity rate than sputum(37.44%). Previous studies from various places reported culture positivity rate ranges from 21.5% to 83%.[2,10] Mishra S et al.2012 also showed greater positivity in ET aspirates than sputum samples.[11] In this present study LRTI cases are more common in Male(73.46%) as compared to females(26.54%) which are similar to other studies done by Panda S. et al. 2012 and Akingbade OA. et al. 2012.[2,12] Male preponderance may be attributed to extensive exposure to environment and associated risk factors. Highest percentage of LRTI cases were found to be in 59 – 69 yrs age group whereas Tripathi P. et al 2014 and Panda S. et al 2012 showed 51 – 60 years age group had highest prevalence.[2,3]

In this study, Klebsiella pneumoniae(57%) was found to be predominant isolated organism followed by Pseudomonas aeruginosa(19%), Acinetobacter spp.,(9%), Citrobacter freundii(7%). Other studies done by Tripathi P. et al 2014, Shrivastava P. et al 2013, Biswas P. et al 2013 were also showing Klebsiella pneumoniae as major isolates causing LRTI.[3,13,14] Percentage of Staphylococcus aureus and Streptococcus pneumoniae were 3% and 2% respectively. Mannur S et al 2015 reported occurrence of Staphylococcus aureus as 5%, on the other hand findings of occurrence of Streptococcus pneumoniae in studies done by Biswas P et al. 2013 and Mishra S et al. 2012 were 8.5% and 8.6% respectively.[5,13,11] Pseudomonas aeruginosa(19%) was second highest isolates in our study which are similar to Mishra S. et al 2012.[11] Low number of gram positive cocci in our study may be due to hospital based study and difficulty in isolating such a delicate organisms like Streptococcus pneumoniae even though gram stain findings show gram positive diplococci. Other gram negative organisms isolated in this study were Enterobacter spp,(1%) Escherichia coli(1%), Edwardsiella spp.,(1%) which are also now increasing the spectrum of bacteria responsible for LRTI. The risk factors associated with LRTI cases are Diabetes, Hypertension, Smoking, Alcohol, COPD and multiple comorbidities. On further analysis of the associated risk factors, it has been found that multiple co-morbidities i.e patient having more than one risk factor was showing highly prevalent among LRTI cases.

Conclusion: LRTIs are mostly diagnosed clinically, but etiological diagnosis could be done by culturing various samples from patients which will help clinician to start specific therapy. Therefore regular surveillance is necessary in our hospital as there is a probability of changing trends of etiological agents and associated predisposing factors. Short duration might be the limitation of the study which could not determine the exact prevalence as well as the risk factors of LRTI.

References :

1. Europeanlung.org/Acute-Lower – Respiratory Tract Infections.
2. Panda S, Prema Nandini B, Ramani TV. Lower respiratory tract infection bacteriological profile and antibiogram pattern. Int J Cur Res Rev 2012;4(21):149-55.
3. Tripathi Purti C, Dhote K. Lower Respiratory Tract Infection: Current Etiological Trends and Antibiogram. J Pharm Biomed Sci. 2014; 04(3): 249 – 55.3
4. Woodhead M, Blasi F, Ewig S, Huchon G, Ieven M, Schaberg T et al. Guidelines for the management of adult lower respiratory tract infections.EurRespir J, 26: 1138- 1180, (2005).
5. Mannur S, BR A, et al. Study of risk factors, chest X- ray findings, Aetiological Agents and Their sensitivity pattern among patients with lower respiratory tract infection. Int J Pharm Bio Sci. 2015 ;6(3): 336 – 41.
6. Henry D. Isenberg. Clinical Microbiology Procedure Handbook. Second Edition(2007). 3.11.2: Lower respiratory tract cultures.
7. Henry D. Isenberg. Clinical Microbiology Procedure Handbook. Second Edition(2007).3.2.1: Gram stain.
8. Colle JG, Dugoid JP,Fraser AG,Marimion BP, Simmons A, Laboratory strategy in the diagnosis of infective syndrome . In: Colle JG, Dugoid JP,Fraser AG,Marimion BP, Simmons A(Editors). Mackie and Mc Cartney Practical Medical Microbiology. 14th edition.Churchill Livingstone. Inc: London; 1996.P. 53 – 94.
9. Bailey & Scott's Diagnostic Microbiology, 12th edition, Chapter 13: Overview of Bacterial Identification Methods and strategies.
10. Taura D. W., Hassan A., Yayo A. M. and Takalmawa H. (2013). Bacterial isolates of the respiratory tract infection and their current sensitivity pattern among patients attending Aminu Kano Teaching Hospital Kano-Nigeria. Int. Res. J. Microbiol. 4(9):226-231
11. Mishra SK, Kattel HP, Acharya J, et al. Recent trend of bacterial aetiology of lowerrespiratory tract infections in a tertiary care centre of Nepal. Int J Infect Microbiol2012;1(1):3 8.
12. Akingbade OA, Ogiogwa JI, Okerentugba PO, Innocent-Adiele HC, Onoh CC, Nwanze JC, Okonko IO. Prevalence and Antibiotic Susceptibility Pattern of Bacterial Agents Involved In Lower Respiratory Tract Infections in Abeokuta, Ogun State, Nigeria. Rep Opinion 2012;4(5):25-30]. (ISSN: 1553-9873). http://www.sciencepub.net/report.
13. Biswas P, Tukaram P. Bacterial causes of lower respiratory tract infection in patientsattending central referral hospital, Gangtok with reference to antibiotic resistance pattern.J of Evolution of Medicine & Dental Sciences. 2013;2(42): 8126-35.
14. Srivastava P, Kumar P, Nirwan P, Sharma M. Bacteriological profile and antibiogrampattern of lower respiratory tract infections in a tertiary care hospital in northern India.International journal of pharmaceutical research and bioscience. 2013;2(3): 225 – 233.