Content available at: https://www.ipinnovative.com/open-access-journals

IP International Journal of Medical Microbiology and Tropical Diseases

Journal homepage: https://www.ijmmtd.org/

Original Research Article

Isolation of *Acinetobacter Spp*. and its antimicrobial resistance pattern in all lower respiratory samples from ICU

Chesta Rani[1], Shweta R Sharma[1,*], Umar Farooq[1], Sudhir Singh[1], Vasundhara Sharma[1], Imran Ahamad[1]

[1]*Dept. of Microbiology, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, Uttar Pradesh, India*

ARTICLE INFO

Article history:
Received 14-03-2022
Accepted 24-03-2022
Available online 07-06-2022

Keywords:
Acinetobacter
ICU's
AST pattern

ABSTRACT

Introduction: *Acinetobacter spp*. are found in moist natural environment and hospital settings. In ICU *Acinetobacter spp*. is the most common cause of Respiratory tract infection. *Acinetobacter spp*. has evolved from a minor infection to one of the most virulent and multidrug-resistant, pathogens in intensive care units. Overuses of the antibiotics patients drug resistant pattern are increase and immune compromise patient are not recover early. This research will help in better infection control and a better knowledge of antibiotic resistance patterns in our area. The aim and objective of this study is isolation of *Acinetobacter spp*. and its antimicrobial resistance pattern in all lower respiratory samples from ICU.

Materials and Methods: All lower respiratory samples were collected (Sputum, BAL, ET etc.) samples was inoculated on MacConkey and blood agar. At 37 degrees Celsius, culture plates were incubated aerobically for 24 hours. Gram staining and biochemical test were used to identify the Acinetobacter species. All species was isolate further processed on the basis of AST by automated through vitek2 compact.

Result: Among 151 samples, 71 (47.01%) were culture positive. *Acinetobacter spp.* was isolated in 31 (43.66%). The number and percentage of *Acinetobacter* in various clinical sample were sputum 14 (45.20%), ET 12 (38.70%), pleural fluid 3 (9.60%), BAL 2 (6.50%). The strains showed maximum resistance to Ampicillin (100%) and pipracilline\tazobactum (94.0%), Ceftazidime (86%) followed by gentamycin (77%), Ciprofloxacin (72%). All the strains were sensitive to colistin and Polymyxin B (100%).

Conclusion: The rise of resistant *Acinetobacter infection* strains has resulted in fewer treatment choices. Because of the limited therapeutic options, infection prevention and control methods, including not only standard measures but also antibiotic management strategies in the ICU, are important.

1. Introduction

Acinetobacter spp. is widely dispensed in wet natural and clinical environment. It can be found on fomites, soil, water and animal food products.[1] Member of this genus is becoming increasingly concerned with medical community because of the speed with which, it become resistant to antibiotics. Some strains are resistant to most antibiotics that are available. *A.baumannii* primarily is an opportunistic pathogen found in a medical environment. The antibiotic resistant of the pathogen mixed with the weakened health of the infected hospital patients has resulted in an unusually excessive mortality rate. *A.baumannii* is basically a respiratory pathogen but it additionally infects skin and gentle tissues, wound and now again invades the bloodstream.[2]

Acinetobacter spp. is gram negative coccobacilli form the Moraxellaceae family that have been found all over the

* *Corresponding author*.
E-mail address: drshwetamicro@gmail.com (S. R. Sharma).

https://doi.org/10.18231/j.ijmmtd.2022.024

world.[3] It is an aerobic and catalase positive, saprophytic, non-fastidious and Oxidase negative organism.[4] There are 34 species in the genus twenty five of which have valid nomenclature and 9 of usually documented in human infection.[3] Some species are known to persist in hospital enviroment.[5] After *pseudomonas aeruginosa*, it has being the second most common gram negative bacteria found in clinical samples.[6] *Acinetobacter baumannii* is a pathogen that can cause in persons respiratory tract infection and soft tissues infection. UTI has become a prevalent by *A.baumannii* in health care centers.[7]

It causes of nosocomial infection, which can lead to septicemia, endocarditis, meningitis, pneumonia, wound infection and urinary tract infection.

2. Aim

To study isolation of *Acinetobacter spp*. and its antimicrobial resistance pattern in all lower respiratory samples from ICU.

3. Objectives

Objective of this study is to determine occurrence of *Acinetobacter spp*. and their antimicrobial sensitivity pattern isolated from lower respiratory samples.

4. Materials and Methods

A observational study was carried out for one year in the Teerthanker Mahaveer medical college & research centre (TMMC&RC) Moradabad from January 2021 to November 2021after approval CRC & IEC. All the lower respiratory samples were collected on the basis of inclusion criteria.

4.1. Inclusion criteria

All respiratory samples from MICU were included in this current study.[8,9]

4.2. Exclusion criteria

All respiratory samples from other ICUs were excluded from the study.

4.3. Ethical approval

Ethics approval was obtained from TMMC Moradabad institutional ethical committee (TMMC-IEC) ref. no. TMMC & RC/IEC/0-21/102.

4.4. Sample collection and processing

According to the inclusion criteria, 151 samples received in microbiology department of T.M.U hospital during study period. Sample was tested to isolate Acinetobacter spp., which included all lower respiratory samples from MICU bronchoalveolar alveolar lavage, sputum, endotracheal secretion and pleural fluid. All of the samples came from people who were suspected of having lower respiratory infections. The direct examination was done to see if pus cells, epithelial cells and bacteria were present using gram staining.[10] Direct Smear was formed from specimen on clean slides and followed the gram staining technique. Inoculations of the sample plates were incubated in presence of oxygen for 24 hrs at 37 degree Celsius. Smear will be prepared from colonies for gram staining.for isolation of *Acinetobacter spp*. All species isolate was further processed on the basis of antibiotic susceptibility testing by automated culture through vitek-2 compact.

5. Result & Observation

In this study observed and analysis the resistant profile of *Acinetobacter spp*. in patients admitted the MICUs. A total number of 151 samples are collected in lower respiratory as like Endotracheal aspirate sputum bronchoalveolar lavage pleural fluid. Out of 151(100%) samples 71(47.01%) were seen growth and 81(53.64%) no growth. whereas *Acinetobacter spp*. isolate in 31(43.66%) cases and 40 (56.34%) other isolates. Our result was observed by various factors in total received samples and followed by distribution on the basis of culture growth or no growth *Acinetobacter spp*. isolated in growth positive samples distribution of *Acinetobacter* in various clinical samples age and gender wise distribution and resistance pattern of *Acinetobacter spp*. in ICU patients by AST automated. Number of total positive 71 samples whereas 9(12.67%) gram positive, 61(85.91%) gram negative and 1(1.40%)yeast isolated.(Figure 1) *Acinetobacter spp*. were show maximum in (22.58%) 61-70 year group of patients and followed by 31-40 year, 51-60 year, 18-30 year, 41-50 year, 71-80 year and 81-90 year group of patients were show minimum number of infections.(Figure 2) *Acinetobacter* was seen maximum in sputum sample 45.16% followed by ET secretion 38.70% and pleural fluid 9.67%. Minimumwas show in BAL fluid 6.4543.6%, Pseudomonas 10, *staphylococcus aureus* 5, CONS in out of total 71 isolate. *Acinetobacter spp*.to Ampicillin was 100% and followed by pipracilline\tazobactum 94.0%, Ceftazidime 86.0%, gentamycin 77.0%, Ciprofloxacin 72.0%, Meropenem 63.0%, Amikacin 63.0%, Doripenem 56.0%, Levofloxacin 44.0%, Minocycline 37%, Ceferoparazone\Sulbactam 2 *Acinetobacter spp*. 100% sensitivity was show to colistin & Polymyxin B. (Figure 4)[11–15]

6. Discussion

In our study 151 samples were received out of which 71samples shows positive growth and 80 cultures were negative. Out of 71 positive growths culture 31(43.6%) *Acinetobacter spp*. was isolated. Age wise distribution of

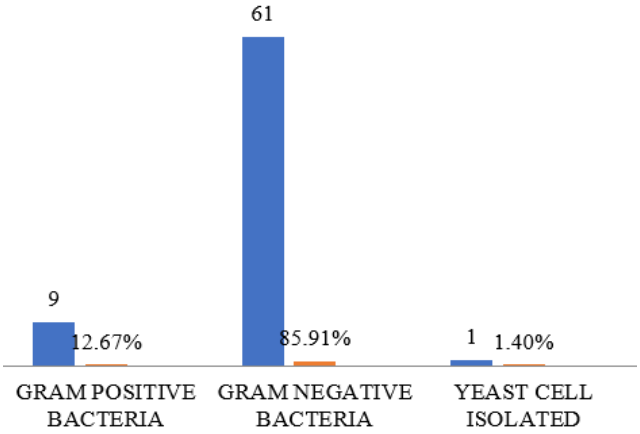

Fig. 1: Isolated Organism from lower respiratory samples

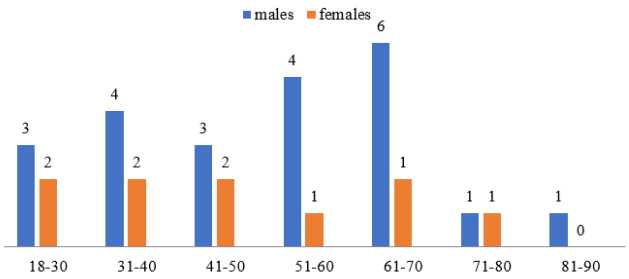

Fig. 2: Age wise distribution of male and female patients

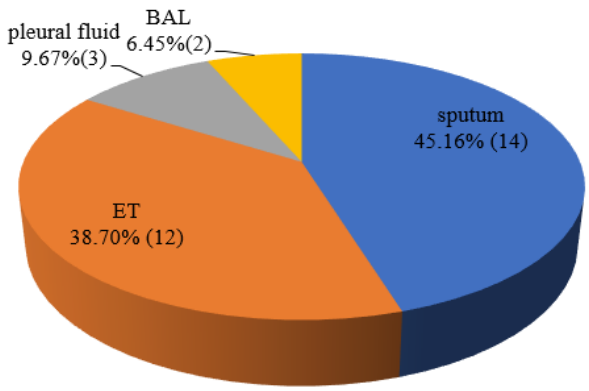

Fig. 3: Percentage of *Acinetobacter* various clinical samples

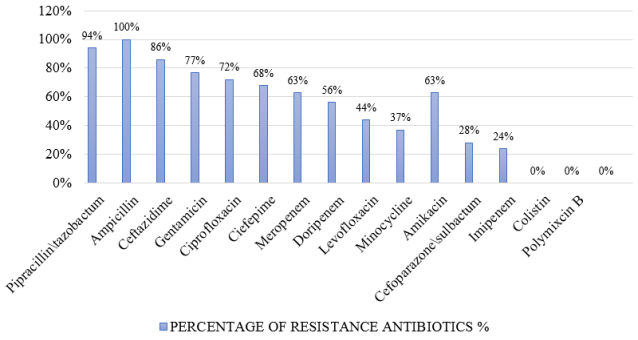

Fig. 4: Resistance pattern of *Acinetobacter* spp.

Acinetobacter shows that the maximum isolates was from the older population falling in the 22.58% (61-70) years group of age contribute the majority of lower respiratory infection in patient followed by 81-90 year group of age 3.22% which has less contributed of this infection. In present study males 70.96% were commonly affected as compared to females 29.03% and which correlated with the studies of Prasad A et al.[10] who also reported male's preponderance in their study whereas males 56.58% are commonly affected as compared to females 43.42%.

A similar study was done in Punjab which shows drug resistance in *Acinetobacter* from intensive health care unit conducted by Kaur T et al. concluded that *Acinetobacter spp.* were more isolated in hospital 42.02% out of 69 samples as similar to our study.[11]

Other study was done in Bharatpur medical college in Nepal antibiogram of *Acinetobacter spp.* identify in out of culture positive 11.49% as resulted conducted by Rajkumari S et al. and Devi PG et al. in 2015 observed in their study that out of 452 patients 18.14% were isolate *Acinetobacter infection* in ICU.[7,12] Prasad A et al. who also reported 15.68%.[10]

In our study out of total samples were culture positive in various clinical samples *Acinetobacter spp.* were isolate in 31 samples whereas sputum 45.20%, ET 38.70% pleural fluid 9.60% BAL 6.50%. Which correlate with the studies of Rajkumari S et al.[12] who reported the isolated *Acinetobacter spp.* were maximum from sputum 31.88% followed by ET 61.66%. This is invariance with others studies in Punjab by Oberoi A et al.[16]

Some other parameters on isolated organism in total culture positive in our research *Acinetobacter spp.* 43.6%, *pseudomonas spp.* 21.1%, *Klebsiella pneumoniae* 14.0%, *staphylococcus aureus* 8.45%, *E. coli* 7.04% and distributed on the basis positive bacteria 11.2% & negative bacteria 85.9% this finding of other similar studies done by Kaur T et al.[11] *Acinetobacter spp.* 42% followed by *Pseudomonas spp.* 15%, *Klebsiella pneumoniae* 14.0%, *E. coli* 13.04% and *Staphylococcus aureus* 4.34%. The aggregate percentage for gram positive isolates 10.14% and

gram negative 89%. Other study done by Ferdous Jet al.[8] in 2016.

Our study also revealed about the antimicrobial resistance pattern of *Acinetobacter spp*. high level of resistance was seen for Ampicillin 100% and Pipracilline\ Tazobactum 94.0% Ceftazidime 86.0% Gentamycin 77.4%, Ciprofloxacin 72.0% Cefepime 68.0% Amikacin 63.0% Meropenem 63.0%. Kaur Tetal.[11] and Rajkumari S et al.[12] also reported high level of resistance towards Ampicillin 100%, Pipracilline\Tazobactum 89.65%, Ceftazidime 90.58%, Gentamycin 74.64%, and Ciprofloxacin 75.36%.

Taneja N et al.[13] found that *Acinetobacter* resistance to Gentamycin and Ciprofloxacin was 79.5% and 72.8% respectively in their investigation which is consistent with our findings. Meropenem resistance was calculated to be 44.93% 79. Shareek P S[14] and Raina D et al.[15] observed Carbapenems resistance in 75% and 74.1% of the strains respectively which is greater than our finding.

In our finding 100% sensitivity was reported for colistin and Polymyxin B. Raina D et al.[15] also recorded 100% for colistin. Other study done by Kaur A et al.[17]

7. Conclusion

My present study was concluding that current antimicrobial resistance pattern of *Acinetobacter spp*. in all lower respiratory samples from hospital. All tests were performed in the department of microbiology by culture on MacConkey or blood agar, gram staining, biochemical's test and antibiotics sensitivity automated by vitek-2 compact for species isolation. It was done on total 151 samples out of which 71 came to be culture positive 31 being *Acinetobacter spp*. seen in clinical sample sputum, ET, BAL fluid and pleural fluid was collected from 21 males & 10 females and remaining other organism were isolate in culture positive growth. Aim of our study was isolation of *Acinetobacter spp*. and its anti-microbial resistance pattern in all lower respiratory samples from ICU. The objective of this study was occurrence & frequency of *Acinetobacter spp*. and antimicrobial resistance in our hospital.

8. Acknowledgment

I would like to thanks entire Microbiology department, TMMC & RC for their guidance and cooperative behavior.

9. Conflict of Interest

The authors declare no relevant conflicts of interest.

10. Source of Funding

None.

References

1. Tille P. Acinetobacter stenotrophomonas and similar organisms. In: Bailey & Scott's Diagnostic Microbiology, 15th Edn. London: Elsevier health sciences; 2013. p. 329–363.
2. Tortora GJ, Funke BR, cummings CB. The Prokaryotes Domains Bacteria and Archaea. In: Microbiology: an introduction. New York; 2010. p. 299–309.
3. Kauffman C. Acinetobacter species; 2017. Available from: https://www.infectiousdiseaseadvisor.com/infectiousmdiseases/Acientobacterspecies/article/609604.
4. Ochei J, Kolhatkar A. Medical Laboratory Science: Theory and Practice. 1st Edn. New Delhi: Tata McGraw-Hill Publishing Company Limited; 2000. p. 712.
5. Doughari HJ, Ndakidemi PA, Human IS, Benade S. The ecology, biology and pathogenesisof Acinetobacter spp. An overview. *Microbe Environ*. 2011;26(2):101–12.
6. Gautam V, Singhal L, Ray P. Burkholoderiacepacia complex: Beyond Pseudomonas and Acinetobacter. *Indian J Med Microbiol*. 2011;29(1):4–12.
7. Devi PG, Rani VA, Saileela K. Isolation of Acinetobacter spp. in ICU: to study antimicrobial resistance pattern in a tertiary care hospital. *Der Pharmacia Letter*. 2015;7(7):49–51.
8. Ferdous J, Murshed M, Shahnaz S, Duza SS, Siddique PR. Siddique R. isolation of Acinetobacter speciesand their antimicrobial resistance pattern in a tertiary care hospital in dhaka, Bangladesh. *Bangladesh J Med Microbiol*. 2016;10(1):18–21.
9. Kumar S. Identification of bacteria. In: Textbook of microbiology 11th Edn. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2012. p. 229–39.
10. Prasad A, Priyadarshini V, Sharma AK, Kumar M, Priyadarshini M, Seema K, et al. Antibiotic susceptibilitypattern of Acinetobacter Spp. Isolate from ICU at tertiary care hospital. *Int J Med Res prof*. 2018;4(2):273–6.
11. Kaur T, Putatunda C, Oberoi A, Vyas A, Kumar G. Prevalence and drug resistance in Acinetobacter Spp. from intensive care unit patients in Punjab. *India Asian J Pharm clin Res*. 2018;11(2):88–93.
12. Rajkumaris S, Pradhan S, Sharma D, Jha B. prevalence and antibiogram of Acinetobacter species isolated from various clinical samples in a tertiary care hospital. *JCMS*. 2020;16(1):1–6. doi:10.3126/jcmsn.v16i1.28224.
13. Taneja N, Singh G, Singh M, Sharma M. Emergence of tigecycline & colistin resistant Acinetobacter baumannii in patients with complicated urinary tract infections in north India. *Indian J Med Res*. 2011;133(6):681–4.
14. Shareek PS, Sureshkumar D, Ramagopalankrishna S, Ramasubramanian V, Abdul G, Thirunarayanan MA, et al. Antibiotic sensitivity pattern of blood isolate of Acinetobacter species in a tertiary care hospital, A retrospective analysis. *Am J Infect Dis*. 2012;8(1):65–9.
15. Raina D, Sharma N, Khanduri A. Speciation and antibiotic resistance pattern of Acinetobacter spp. in tertiary care hospital in Uttarakhand. *Int J Med Res Health Sci*. 2016;5(4):89–96.
16. Oberoi A, Aggarwal A, Lal M. A decad of an underestimated nosocomial pathogen Acinetobacter in a tertiary care hospital in Punjab. *Biology Med*. 2009;11(1):24–6.
17. Kaur A, Kaur GA, Singh S, Kaur N, Mahajan A, Mittal V, et al. Prevalence and Antibiogram of Acinetobacter spp. Isolated from Various Clinical Samples in a Tertiary Care Hospital, Bathinda. *Int J Health Sci Res*. 2016;6(6):84–9.

Author biography

Chesta Rani, Student

Shweta R Sharma, Associate Professor

Umar Farooq, Professor and Head

Sudhir Singh, Professor

Vasundhara Sharma, Associate Professor

Imran Ahamad, Assistant Professor

Cite this article: Rani C, Sharma SR, Farooq U, Singh S, Sharma V, Ahamad I. Isolation of *Acinetobacter Spp*. and its antimicrobial resistance pattern in all lower respiratory samples from ICU. *IP Int J Med Microbiol Trop Dis* 2022;8(2):118-122.