

Study on The Prevalence of Imipenam Resistant Acinetobacter Species in A Tertiary Care Hospital At Madurai

¹Dr.Jhansi Charles*, ²Dr. Rajendran **,³Dr. Vithiya***⁴Dr. Ramesh****

¹Professor and Head * ²Assistant Professor ** ³Assistant Professor*** ⁴Associate Professor****

Department of Microbiology, Velammal Medical college, Madurai.¹²³⁴

Corresponding author: Dr.Jhansi Charles*,

Introduction: Acinetobacter species are aerobic gram negative coccobacilli. They are the most important nosocomial pathogens especially in critical care patients with mechanical or other artificial supports.^{1,2,3} The important nosocomial infections are blood stream infections, surgical site infections, pneumonia and urinary tract infections. As these organisms are becoming resistant to aminoglycosides, fluoroquinolones, ureidopenicillins and third generation cephalosporins, Carbapenams are used to treat these infections caused by Acinetobacter species. Recently, it has been noted that these organisms show resistant for Carbapenams also.⁴ This may limit the options for effective therapy for infections caused by this organism which may lead to outbreaks of Carbapenam resistant Acinetobacter species in the institution. Hence this study was designed to determine the prevalence of Imipenam resistant Acinetobacter species in varied samples received in the Microbiology laboratory at Velammal Meical College Hospital, which is a newly started tertiary care Medical college hospital at Madurai, Tamilnadu.

Key words: Acinetobacter, Imipenam, Isolates, ventilator associated pneumonia)

Abbreviation: IRAB/IRA –Imipenam resistant Acinetobacter, MDRA-Multi drug resistant Acinetobacter

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I. Aims And Objectives

This study was conducted on 193 acinetobacter isolates from sputum, blood, pus and urine samples collected from the patients admitted at Velammal Medical college from January 2015 to December 2015 to know the following:

1. The incidence of imipenam resistant isolates.
2. Monthwise distribution of these isolates
3. The common age group and sex involved in the resistant isolates.
4. The specimen, the type of infection and the wards from where these isolates were commonly isolated.
5. The relationship of these isolates with the multidrug resistant isolates.

II. Materials And Methods

A total of 193 Acinetobacter isolates were included in this study. These isolates were from the sputum, blood, pus and urine samples collected from the patients admitted in the hospital during the period from January 2015 to December 2015. The Acinetobacter genus was identified by standard conventional techniques like gram staining, cell and colony morphology, positive catalase test, negative oxidase test and absence of motility. The antibiotic susceptibility test was done for 10 antibiotics, ampicillin, cephaloxin, ceftriaxone, ceftazidime, gentamycin, kanamycin, chloramphenicol, trimethoprim, ciprofloxacin and Imipenam by Kirby Bauer Disc diffusion method. The imipenam resistant isolates were analysed for their distribution monthwise, specimenwise, agewise, sexwise and wardwise and also for their relationship with the multiple drug resistant isolates. All the results were analysed by the computer software system, Statistical Package for the Social Sciences (SPSS)

III. Results

Out of 193 acinetobacter isolates, 120 were imipenam resistant(62.5%) and 99 were multi drug resistant(51.6%). The monthwise distribution of the isolates showed that out of 120 samples, 4 were present in January(3.3%), 10 in February(8.3%), 9 in March (7.5%), 6 in April (5%), 10 in May (8.3%), 17 in June (14.1%), 9 in July (7.5%), 3 in August (2.5%), 8 in September(6.6%), 20 in October(16.7%), 10 in November(5.1%), 14 in December(11.6%). This is given below:

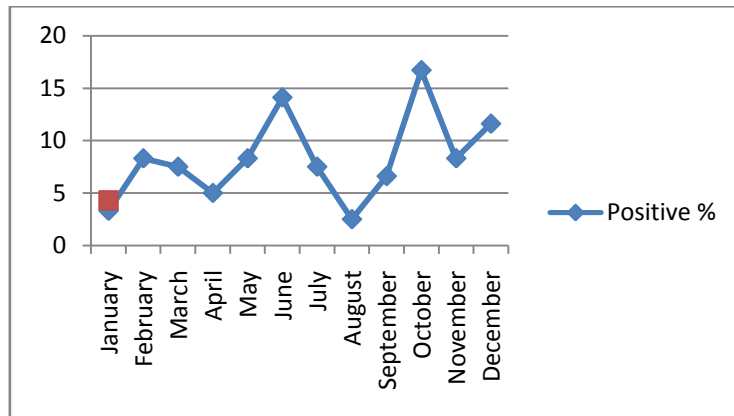
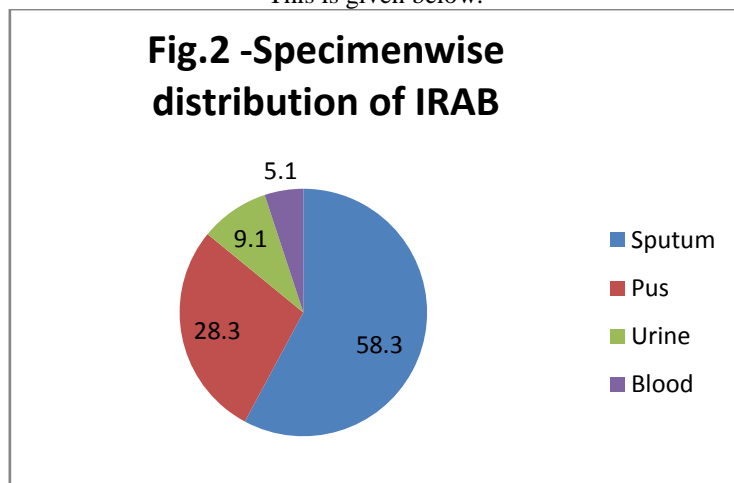


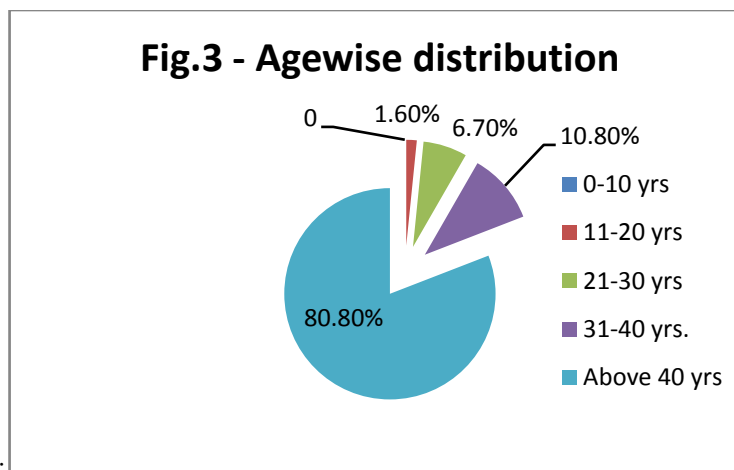
Fig.1 Monthwise Distribution of IRAB

It is seen from the graph that the incidence of Imipenam resistant Acinetobacter was more in the month of October. Imipenam resistant Acinetobacter was further analysed according to the specimens and found that 70 out of 120 were present in sputum samples (58.3%), 34 out of 120 in pus (28.3%), 11 out of 120 in urine (9.1%) and 5 out of 120 in blood (4.1).

This is given below:

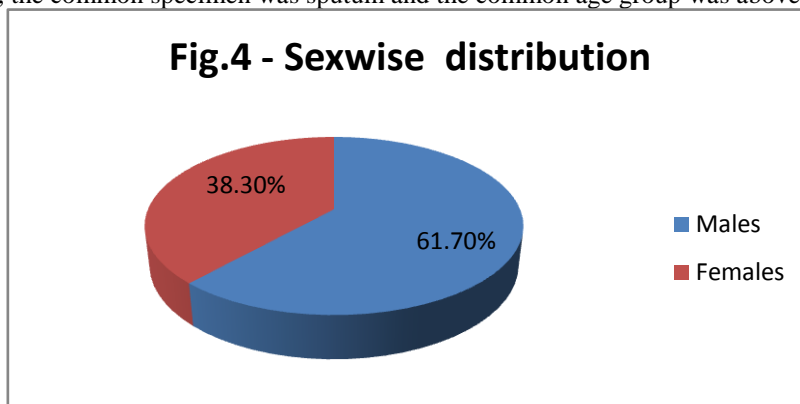


It is noted from the figure that Imipenam resistant Acinetobacter were more commonly seen in the sputum samples. The age-wise distribution of Imipenam resistant acinetobacter showed that 97 out of 120 were in the age group more than 40 years (80.8%), 13 out of 120 in the age group 31-40 years (10.8%), 8 out of 120 in the age group 21-30 yrs (6.7%) and 2 out of 120 in the age group 11-20 yrs, 0 out of 120 in the age group 0-10 yrs. This is given below:



It is noted from the figure that Imipenam resistant Acinetobacter was **common in the age** group above 40 yrs. ie in adult groups.

The sexwise distribution of Imipenam resistant Acinetobacter showed that 74 out of 120 were males(61.7%) and 46 out of 120 were females(38.3%). Thus it was shown that the **males were** predominantly involved. In both sexes, the common specimen was sputum and the common age group was above 40 yrs.



The relationship of Imipenam resistant Acinetobacter with Multidrug resistant Acinetobacter showed that 99 out of 120 Imipenam resistant Acinetobacter were resistant for other drugs like CL / PIT / CTR / AK, 9 out of 11 in urine (81.8%),30 out of 34 in pus(88.2%), 5 out of 5 in blood(100%) and 55 out of 74 in sputum samples. This is given below:

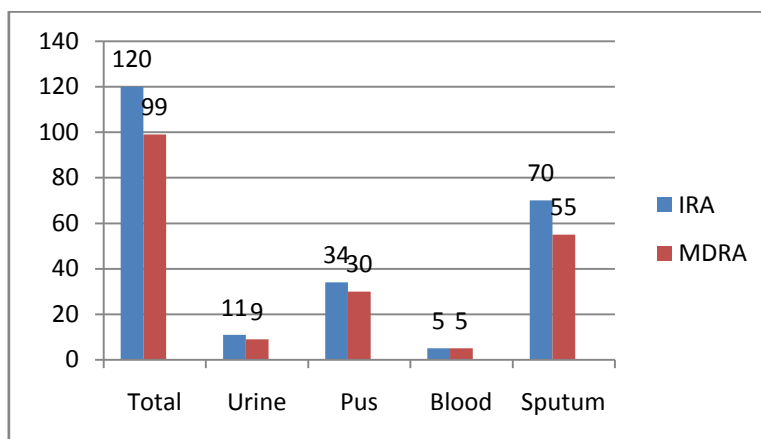
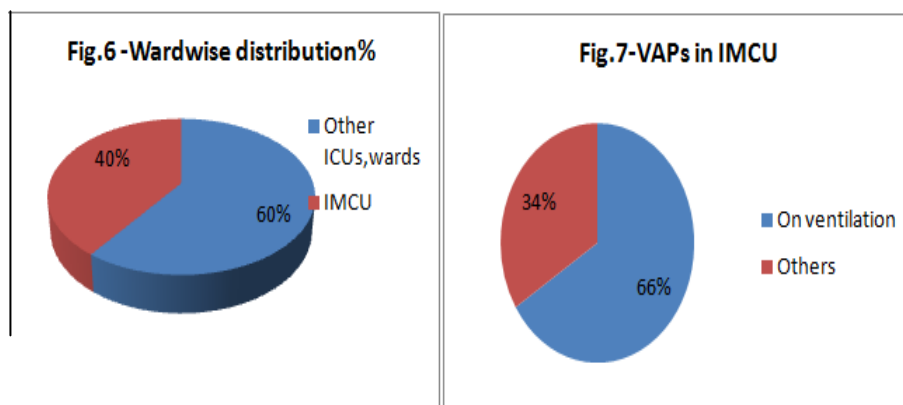


Fig.5 -Relationship of Imipenam resistant Acinetobacter and Multi drug resistant Acinetobacter

It is observed that 82.5% of imipenam resistant acinetobacter were resistant for other antibiotics also. Both imipenam resistant acinetobacter and multi drug resistant acinetobacter were common in **sputum samples**.

It was also noticed that 48 out of 120 (40%) IRAB isolates were from IMCU(Intensive medical care unit)and the remaining from other ICUs and wards. In the IMCU, out of 48 isolates, 32 isolates (66.6%)were from the sputumof patients on ventilators. Hence **ventilator associated IRAB**



were common in this hospital especially in **high risk areas like IMCU**.

IV. Discussion

This study showed that 62.5% of the acinetobacter isolates were imipenam resistant which is similar to the study by Gulseran Baran et al ⁸ who showed that 53.7% were imipenam resistant in their study due to colonisation of these organisms in the devices used on these patients. This study revealed that Imipenam resistant acinetobacter was very common in June which is post summer and October which is post monsoon. Kalina et al ¹⁰ in their study revealed that Acinetobacter was common during post summer which is in supportive of this study. They explained that Summer weather affects the natural and hospital environment promoting nosocomial transmission of acinetobacter species. Ambient temperature may promote a biofilm in tap water which is used for various purposes in the hospital. These may be the reasons for the presence of acinetobacter in this study also. Being a hydrophilic organism, acinetobacter colonises aquatic environment hence survives in hospital environment during post monsoon season which was seen in this study. In this study it was shown that imipenam resistant acinetobacter were commonly isolated from the sputum samples of patients (58.3%) which was supported by the studies of Namita et al ¹¹ and Villers et al ⁹ who had shown 57.4% and 48.8% respectively. As Acinetobacter is a fast colonising organism in respiratory tract, higher rate of isolation is possible in sputum samples. It was shown in this study, that 61.7% of imipenam resistant acinetobacter isolates were from males which is contrary to the findings of Anuradha et al ¹² who showed that females were commonly involved. Male preponderance may be due to non modifiable risk factors making them prone for more infection.

It was proved in this study that 80.8% were above 40 yrs. Similar study by Anuradha et al ¹² showed more than 60 yrs. was the common age involved. The involvement of old age group is mainly due to co morbid conditions and waning immunity which are commonly seen in the aged. Among the sputum samples, 40% were from patients admitted in ICUs. Namita et al showed 59.6% patients in their study were from ICUs and Siau et al ¹⁴ showed 43.8% were from ICUs. More incidence of Acinetobacter in ICU was due to very sick uncompromised patients with indwelling devices and poor adherence rates of hand hygiene shown by the health care workers. In this study, 66.6% patients in ICU were on ventilators showing that Acinetobacter was common in VAP cases as it involves organ system with high fluid content i.e. the respiratory tract. As it is a colonising organism it is easily get attached to ventilators which are in close proximity to the respiratory tract. In this study, 83.5% IRAB were resistant for other antibiotics also. This is similar to the results shown by Navon et al (76%)¹³ and Bijayini Behara (82%)¹⁵. It is mainly due to injudicious use of antibiotics in ICUs and lack of regulation in the antibiotic policy of our set up.

V. Summary

The study on the prevalence of Imipenam resistant acinetobacter showed that 62.5% isolates collected during January 2015- December 2015 were from imipenam resistant acinetobacter species. From the isolates, 14.1% were isolated in the month of June and 16.7% in October. Among the isolates, 80.8% were isolated from age group more than 40 years predominantly in males (61.7%) and 58.3% isolates were from sputum samples and 40% of the isolates from sputum samples were from the patients admitted in the IMCU. In the IMCU, 66.6% patients were on ventilators. Among the IRAB, 82.5% were multi drug resistant.

VI. Conclusion

The study on the prevalence of Imipenam resistant Acinetobacter species in a tertiary care hospital at Madurai revealed that IRAB was common during June and October in the sputum samples of males more than 40 yrs. old admitted in IMCU with ventilator support. Most of these isolates are multi drug resistant.

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