**Original Research Article**

# Microbial profile of neonatal intensive care unit isolates and changes in the pattern of antibiotic sensitivity

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## Abstract

**Background:** Neonatal Sepsis is most frequent cause for admission in Neonatal Intensive Care Unit (NICU). This is a major cause of neonatal mortality and morbidity worldwide.

**Aim and objectives:** To study microbial profile of isolates from sample of NICU, to determine the susceptibility pattern of commonly encountered pathogens.

**Materials and methods:** Retrospective evaluation of Laboratory data of samples from NICU of Dhiraj General Hospital for microbial profile and antibiotic sensitivity patterns from June 2014 to September 2015 was done. Standard procedures for isolation, identification and antibiotic sensitivity testing were followed.

**Results:** Total 141 samples were tested, out of which 37 were culture positive. A total of 41 isolates were obtained which included Klebsiella - 10, Acinetobacter - 7, Pseudomonas - 5, E. Coli - 4, S. Aureus - 4, CONS - 6, Enterococcus - 2, and Candida – 3. Among Gram negative organisms, most frequently encountered organisms were Klebsiella and Acinetobacter.

**Conclusion:** In present study, frequently encountered organisms were Klebsiella and Acinetobacter which showed sensitivity to mainly Imipenem. Sensitivity to other routinely used antibiotic was variable. Changing sensitivity patterns should be monitored continuously and guidelines should be revived. Early identification of organism and appropriate antibiotic usage minimizes mortality and morbidity.

## Key words

NICU, Microbial profile, Antibiotic sensitivity.

## Introduction

Neonatal Sepsis is most frequent cause for admission in Neonatal Intensive Care Unit (NICU). This is a major cause of neonatal mortality and morbidity worldwide. In India, incidence rate of neonatal sepsis is around 30/1000 live births. Neonatal sepsis can be early onset or late onset. Early diagnosis and choice of antibiotic is most important factor in management [1, 2].

## Aim and objectives

- To study microbial profile of isolates from sample of NICU.
- To determine the susceptibility pattern of commonly encountered pathogens.

## Material and methods

Retrospective evaluation of Laboratory data of samples from NICU of Dhiraj General Hospital for microbial profile and antibiotic sensitivity patterns from June 2014 to September 2015 was done. Standard procedures for isolation, identification and antibiotic sensitivity testing were followed.

Early onset sepsis (EOS) – 44 (<7 days age of the baby)

Late onset sepsis (LOS) - 97 (>7, up to 28 days age of the baby)

## Results

Total 141 samples were tested, out of which 37 were culture positive. A total of 41 isolates were obtained which included Klebsiella - 10, Acinetobacter - 7, Pseudomonas - 5, E. Coli - 4, S. Aureus - 4, CONS - 6, Enterococcus - 2, and Candida – 3. Among Gram negative organisms, most frequently encountered organisms were Klebsiella and Acinetobacter (**Graph – 1** and **Graph – 2**). Distribution of early onset (EOS) and late onset (LOS) positivity was as per **Table – 1**. Microbial isolates in EOS and LOS samples were as per **Table – 2**. Antibiotic sensitivity pattern of gram positive isolates was as per **Table – 3**. Antibiotic sensitivity pattern of gram negative isolates was as per **Table – 4**.

**Graph – 1:** Distribution of positive organism in total sample.
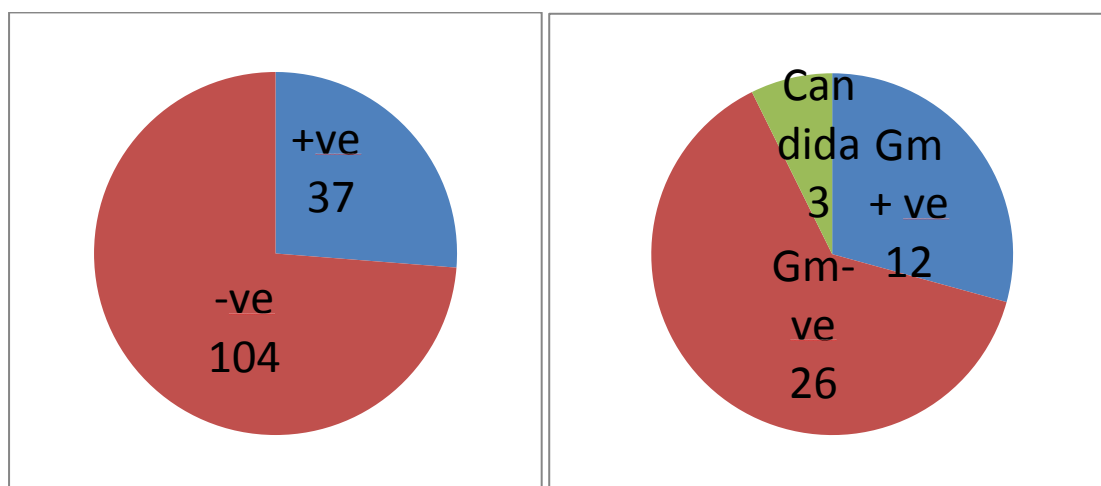


## Discussion

Comparison of microbial profile from neonatal samples with other studies [3-5] was as per **Table**

– **5**. Predominant organism was Klebsiella spps in other studies including our study. Comparison of sensitivity pattern of neonatal isolates with other studies [3-5] was as per **Table – 6**. Gram

positive organisms had sensitivity to Linezolid and Vancomycin as per our study which was comparable to other studies. Gram negative had sensitivity to Imipenem as per our study which was comparable to other studies.

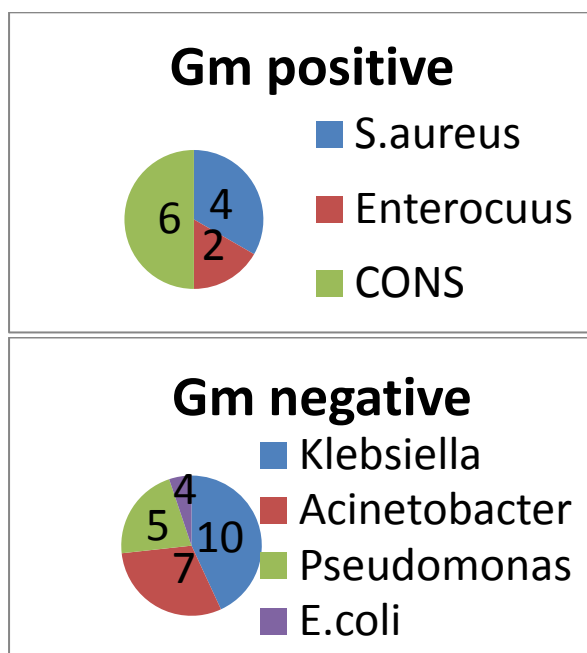**Graph – 2:** Distribution of various micro organisms in positive sample.



**Table – 1:** Distribution of early onset (EOS) and late onset (LOS) positivity.

|          | EOS | LOS | Total |
|----------|-----|-----|-------|
| Sample   | 44  | 97  | 141   |
| Positive | 11  | 26  | 37    |
| Negative | 33  | 71  | 104   |

**Table – 2:** Microbial isolates in EOS and LOS samples.

| Organism          | EOS | LOS | Total |
|-------------------|-----|-----|-------|
| Klepsiella spps.  | 4   | 6   | 10    |
| Acinetobacter spps. | 1 | 6   | 7     |
| Pseudomonas spps  | 0   | 5   | 5     |
| CONS              | 2   | 4   | 6     |
| E. coli           | 2   | 2   | 4     |
| S. aureus         | 1   | 3   | 4     |
| Enterococcus spps. | 0  | 2   | 2     |
| Candida           | 2   | 1   | 3     |

## Conclusion

In this present study, frequently encountered organisms were Klebsiella and Acinetobacter which showed sensitivity to mainly Imipenem. Sensitivity to other routinely used antibiotic was variable. Total 3 Candida isolates were obtained. Changing sensitivity patterns should be monitored continuously and guidelines should be revived. Early identification of organism and appropriate antibiotic usage minimizes mortality and morbidity.

## References

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**Table – 3:** Antibiotic sensitivity pattern of gram positive isolates.

| Antibiotic | CONS | S. aureus | Enterococcus | Total |
|---|---|---|---|---|
| Gentamicin | 2 | 2 | 1 | 5 |
| Co-trimoxazole | 2 | 0 | 1 | 3 |
| Levofloxacin | 2 | 2 | 1 | 5 |
| Doxycycline | 3 | 2 | 1 | 6 |
| Erythromycin | 1 | 0 | 1 | 2 |
| Cefoxitin | 1 | 3 | 0 | 4 |
| Vancomycin | 6 | 4 | 2 | 12 |
| Linezolid | 6 | 4 | 2 | 12 |
| Clindamycin | 3 | 1 | 0 | 4 |
| Penicillin | 1 | 0 | 1 | 2 |
| Total | 27 | 18 | 10 | |

**Table – 4:** Antibiotic sensitivity pattern of gram negative isolates.

| Antibiotic | Klebsiella spps | Acinetobacter spps | Pseudomonas spps | E.coli | Total |
|---|---|---|---|---|---|
| Amoxycillin+ Clavulinic acid | 3 | 1 | - | 0 | 4 |
| Amikacin | 6 | 1 | 0 | 1 | 8 |
| Gentamicin | 7 | 1 | 0 | 1 | 9 |
| Ciprofloxacin | 5 | 2 | 3 | 1 | 11 |
| Cefotaxim | 2 | 2 | - | 0 | 4 |
| Cefepime | 4 | 1 | 1 | 1 | 7 |
| Piperacillin | - | - | 3 | - | 3 |
| Ceftazidime | - | - | 3 | - | 3 |
| Piperacillin+ Tazobactam | - | - | 3 | - | 3 |
| Cefuroxime | 2 | 1 | - | 0 | 3 |
| Aztreonam | - | - | 2 | - | 2 |
| Imipenem | 4 | 2 | 5 | 4 | 15 |
| Total | 33 | 11 | 20 | 8 | |

**Table – 5:** Comparison of microbial profile from neonatal samples.

| Study | Year | Positivity | Gram –Ve/ Gram +Ve | Predominant organism |
|---|---|---|---|---|
| Rao Pooja, et al. [3] | 2015 | 170 | 79.94%/ 18.17% | Burkholderia cepecia complex, Klebsiella spp. |
| Maimoona Mustafa, et al. [4] | 2014 | 62 | 63.9%/ 35% | Klebsiella spps, S. aureus |
| Bhatt Sima, et al. [5] | 2012 | 500 | 63%/ 37% | Klebsiella spps, E. coli |
| Present Study | 2015 | 37 | 70.27%/ 32.4% | Klebsiella spps, Acinetobacter spps |

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**Table – 6:** Comparison of sensitivity pattern of neonatal isolates.

| Study | Year | Organism | Sensitivity |
|---|---|---|---|
| Rao Pooja, et al. [3] | 2015 | Gram –Ve | Imipenem , PIT, Meropenem |
| | | Gram +Ve | Netillin, Vancomycin |
| Maimoona Mustafa, et al. [4] | 2014 | Gram –Ve | Meropenem |
| | | Gram +Ve | Linezolid, Vancomycin |
| Bhatt Sima, et al. [5] | 2012 | Gram –Ve | Carbapenem, PIT |
| | | Gram +Ve | Vancomycin, Linezolid |
| Present Study | 2015 | Gram -Ve | Imipenem, Ciprofloxacin, Gentamycin |
| | | Gram +Ve | Linezolid, Vancomycin |