

## Clinical features and drug sensitivity pattern of *Klebsiella pneumoniae* sepsis: A descriptive study in a level 2 neonatal care unit in India

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### Abstract

**Objectives:** To study the signs and symptoms of neonatal sepsis caused by *Klebsiella pneumoniae* and the antibiotic sensitivity pattern of *Klebsiella pneumoniae* in a level 2 neonatal unit in India.

**Method:** This descriptive study was conducted with neonates who were admitted in Sick Newborn Care Unit (level 2 neonatal care unit) and whose blood culture showed growth of *Klebsiella pneumoniae* in a study period of 1 year. The data was entered into a register and presented by descriptive statistics.

**Results:** Forty eight neonates were included in the study. Predominant presenting symptoms were abdominal distension (75%), petechiae, purpura (62.5%) and sclerema (50%). *Klebsiella pneumoniae* was highly sensitive to tigecycline and meropenem.

**Conclusions:** Predominant presenting symptoms of neonatal sepsis caused by *Klebsiella pneumoniae* were abdominal distension, petechiae, purpura and early sclerema. *Klebsiella pneumoniae* was highly sensitive to tigecycline and meropenem.

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(Key words: *Klebsiella pneumoniae*, drug sensitivity)

### Introduction

Blood stream infection by multi-drug resistant gram-negative bacilli is one of the most worrisome challenges in the field of health care especially in intensive care units. Their impact is mostly felt in neonatal care units. Here, outbreaks can result in high morbidity and mortality<sup>1</sup>. In recent years, *Klebsiella pneumoniae* is reported to

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be the most common cause of nosocomial infection among all Gram-negative bacteria<sup>2</sup>.

### Objective

To study the signs and symptoms of neonatal sepsis caused by *Klebsiella pneumoniae* and the antibiotic sensitivity pattern of *Klebsiella pneumoniae* in a level 2 neonatal unit in India.

### Method

**Study design:** Descriptive study checked by STROBE checklist for observational study.

**Setting:** Study was conducted at Sick Newborn Care Unit (level 2 neonatal care unit) of College of Medicine and JNM Hospital, Kalyani, India. The unit has average bed occupancy rate 30.

**Study Period:** One year (1<sup>st</sup> March 2015 to 29<sup>th</sup> February 2016).

**Participants:** Subjects of the study were neonates (age under 28 days) who were admitted in sick newborn care unit and whose blood cultures showed growth of *Klebsiella pneumoniae*.

**Exclusion criteria:**

1. Babies whose blood culture report showed growth of some other organism with *Klebsiella*.
2. Babies who were admitted with severe sepsis because initial clinical features were missed.

**Data collection:** The data was collected from case records.

**Data analysis:** The data was entered into a register and presented by descriptive statistics. All numeric values were expressed in exact number and percentages. Categorical variables were compared using X<sup>2</sup> test. P <0.05 was considered as statistically significant.

### Results

Forty eight newborns were included in the study who were admitted in Sick Newborn Care Unit due to some cause other than sepsis during the study period. Their blood culture report showed only growth of *Klebsiella pneumoniae*. Of these 48 newborns, 24 (50%) were preterm very low birth weight babies, 06 (12.5%) were preterm low birth weight and 18 (37.5%) were term appropriate for gestational age babies. No baby was term small for gestational age or preterm extremely low birth weight. Thirty (62.5%) newborns were male and 18 (37.5%) were female. Of these 48 newborns, 16 (33.3%) were admitted

due to perinatal asphyxia, 08 (16.7%) for meconium aspiration syndrome, and 24 (50%) were preterm very low birth weight babies. All of them were admitted on day 1 of life. Time of onset of symptoms is shown in Table 1.

**Table-1**  
*Time of onset of symptoms (n=48)*

Age when symptoms occurred	Number (%)
Day 1 and Day 2	0 (0)
Day 3	12 (25)
Day 4	24 (50)
Day 5 to Day 7	08 (16.7)
After Day 7	04 (08.3)

The symptoms and signs of neonates with blood culture positive for *Klebsiella pneumoniae* are shown in Table 2.

**Table 2**  
*Symptoms/Signs of neonates with blood culture positive for Klebsiella pneumoniae (n=48)*

Symptom/Sign	Number (%)
Poor feeding	20 (41.7)
Abdominal distension	36 (75.0)
Petechiae, purpura	30 (62.5)
Sclerema	24 (50.0)
Gastrointestinal bleeding	18 (37.5)
Shock	20 (41.7)
Respiratory distress	12 (25.0)
Vomiting	08 (16.7)

The drug sensitivity pattern of neonates with blood culture positive for *Klebsiella pneumoniae* are shown in Table 3.

**Table 3**  
*Drug sensitivity pattern of Klebsiella pneumoniae*

Drug	Neonates with <i>Klebsiella pneumoniae</i> sensitive to drug - Number (%)
Tigecycline	48 (100)
Meropenem	44 (91.7)
Amikacin	40 (83.3)
Gentamicin	40 (83.3)
Levofloxacin	36 (75.0)
Imipenem	08 (16.7)
Teicoplanin	08 (16.7)
Cefotaxime	0 (0)
Ceftriaxone	0 (0)
Cefepime	0 (0)
Amoxicillin-clavulanate	0 (0)
Piperacillin-Tazobactam	0 (0)
Linezolid	0 (0)
Vancomycin	0 (0)

In this study *Klebsiella pneumoniae* was resistant to cefotaxime, ceftriaxone, cefepime, amoxicillin-clavulanate, piperacillin-tazobactam, linezolid and vancomycin, had intermediate sensitivity to amikacin, gentamicin, levofloxacin, imipenem and teicoplanin and was highly sensitive to meropenem and tigecycline (Table 3).

Regarding the outcome, 12 (25%) newborns expired and 36 (75%) recovered. Clinical improvement was assessed by commencement of feeding. On an average, feeds were started on day 5 of treatment. However, intravenous antibiotics to which the bacteria were sensitive, were continued for 14 days.

### Discussion

In a previous study neonatal sepsis caused by *Klebsiella pneumoniae* has been shown to present with non-specific features like fever or hypothermia, tachypnoea, apnoea and feed intolerance<sup>3</sup>. However, in our study, abdominal distension (75%) and petechiae, purpura (62.5%) were the most common presentations. Sclerema also developed in a high number of cases (50%). In contrast, respiratory distress occurred at presentation in only 25% of babies. Most children developed symptoms on day 3 (25%) or day 4 (50%). The mortality (25%) is almost the same or slightly higher than that found in other studies<sup>3,4</sup>. In other studies, *Klebsiella pneumoniae* was sensitive to piperacillin-tazobactam, cefotaxime and imipenem. However, in our setup, *Klebsiella* was resistant to all of them but highly sensitive to meropenem (91.7%), tigecycline (100%) and levofloxacin (75%).

Currently available studies on multidrug resistant *Klebsiella* are predominantly based on intensive care units. There is a paucity of information about outbreaks in intermediate risk neonatal units<sup>5</sup>. Here we describe the clinical features and drug sensitivity pattern of *Klebsiella pneumoniae* infection in an intermediate risk, level 2 neonatal care unit (Sick Newborn Care Unit)<sup>6</sup>.

### Conclusions

Predominant presenting symptoms of neonatal sepsis caused by *Klebsiella pneumoniae* were abdominal distension, petechiae, purpura and early sclerema. *Klebsiella pneumoniae* was highly sensitive to tigecycline and meropenem.

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