Summary & Conclusion
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The present study was conducted on 50 neonates, admitted in NICU of the Department of Pediatrics, M.L.B. Medical College, Jhansi from November 2003 to October 2004, with respiratory distress. The present study was undertaken with the following aims:

1. To find the causes of respiratory distress in neonates brought to our Neonatal Intensive Care unit with symptoms suggestive of respiratory disorder.

2. To evaluate clinical signs like cough, difficulty in feeding, cyanosis, respiratory rate, chest retractions, flaring of alae nasi and adventitious sounds for diagnosis of neonatal pneumonia.

3. Determine bacterial etiology of neonatal pneumonia.

4. To study the sensitivity pattern of the prevalent bacteria in neonatal intensive care unit.

The present study comprised of neonates presenting with respiratory distress delivered in the Department of Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi and elsewhere, but admitted in our Neonatal Intensive Care Unit (NICU). The study was conducted on the spectrum of respiratory distress, signs and symptoms, clinical history and investigations suggestive of four disorders, i.e. Pneumonia, Transient tachypnoea of the newborn,
Hyaline membrane disease (HMD) and Meconium aspiration syndrome (MAS).

The blood samples were taken from the peripheral vein for investigations, and were subjected to sepsis screen (TLC, DLC, Micro-ESR, CRP, Band cells and toxic granules), blood culture. The samples were send to the emergency pathology and Department of Microbiology, M.L.B. Medical College, Jhansi for investigations. The neonates were send for radiological investigations also.

- In our study, pneumonia was the leading cause of respiratory distress with an incidence of 46%, followed by Hyaline Membrane Disease (HMD) 42%, Meconium Aspiration Syndrome (MAS) 8%, and Transient Tachypnoea of Newborn (TTNB) 4% respectively. Respiratory distress formed 30% of all the admissions to our NICU.
- The male : female ratio of neonates developing respiratory distress was 2.3:1.
- The mean birth weight for neonates developing pneumonia was 2.2 Kg, 1.4 Kg for Hyaline Membrane Disease (HMD), 3.02 Kg for Meconium Aspiration Syndrome (MAS) and 2.6 Kgs for Transient Tachypnoea of Newborn (TTNB)
- 14 (60%) of our cases developing pneumonia were fullterm, while nine (40%) were preterms in this study.
In our study all the 21 neonates with Hyaline Membrane Disease (HMD) had a gestational age < 34 weeks. All the 21 neonates were low birth weight. 18 of them were less than 2000 gms and remaining 3 of them were of 2 Kg. Both weight and gestational age had the highest sensitivity (89.6%) (93.1%) and negative predictive value (89.6%) (100%) respectively for diagnosing HMD.

Cough, adventitious sounds & cyanosis had high specificity in diagnosing neonatal pneumonia, while difficulty in feeding, RR > 60/minute, flaring of alae nasi and chest retractions had high sensitivity for diagnosing pneumonia.

The mortality in non-tachypnoeic as compared to tachypnoeic cases was significant. In our study, of 23 cases of pneumonia, we found only two cases with RR < 60 (8.7%), but the mortality was 100% and both of them had gestational age < 34 weeks and weight < 2 Kg.

In our study, 11 mothers had a history of Prolonged Rupture Of Membranes (PRM) (10), maternal fever (2), leaking per vaginum (6). These factors had high specificity and positive predictive value in neonates developing pneumonia.

None of the factors like maternal fever, prolonged rupture membranes, leaking per vaginum or foul smelling liquor was found
to have any association at all with transient tachypnoea of newborn (TTNB).

- Except for a history of fetal distress, none of the factors like Prolonged Rupture of Membranes (PRM), maternal fever, leaking per vaginum (LPV) had any association at all with meconium aspiration syndrome (MAS). Fetal distress had a high specificity and negative predictive value for MAS.

- Mothers of neonates with Hyaline Membrane Disease (HMD) had association with Prolonged Rupture Of Membranes (PRM) and L P/V. In our study, 5 mothers of neonates with HMD had PRM and 5 had leaking per vaginum (L P/V). Probable explanation could be that these factors were indirectly also responsible for preterm labour and birth.

- Prolonged labour has a high specificity (88.8%) for neonates having pneumonia.

- Prolonged / precipitate / traumatic labour or a history of poor cry failed to show any association at all in neonates with Transient Tachypnoea of Newborn (TTNB).

- Prolonged labour and a history of poor cry or resuscitation in newborn have a high specificity for Meconium Aspiration Syndrome (MAS). History of poor cry in natal history had a 100% positive
predictive value (PPV) for neonates developing respiratory distress due to MAS.

- Prolonged / precipitate / traumatic labour or a history of poor cry failed to show any association at all in neonates with Hyaline Membrane Disease (HMD) in our study.

- 28% of all neonates with respiratory distress were delivered at home, while 43.5% of all cases with pneumonia were delivered outside by Dais or P/V in hospitals by untrained staff having meager facilities.

- We also found that 3 out of 4 neonates (75%) having MAS were delivered by emergency LSCS, the indication was prolonged labour in all three of them. Both the neonates with TTNB in our study were delivered in the hospital by emergency LSCS. 18 cases of HMD were delivered in hospital, because most of them had to be delivered by emergency LSCS.

- History of difficulty in feeding in the post natal period with fever had a high specificity for diagnosing pneumonia. Fever, absence of post maturity also had a high specificity, but 0% sensitivity, in the case of post maturity.

- In our study meconium staining of cord, liquor and nails had a 100% sensitivity, specificity and predictive value for MAS. Post
maturity (n=2 out of 4) also had a 100% specificity and positive predictive value in cases diagnosed as MAS.

- Apart from a difficulty in feeding (50%), none of the other post natal factor could be associated with TTNB.
- 100% cases later diagnosed as TTNB presented with respiratory distress within 4 hours of birth.
- We found the values for sensitivity (60%), specificity (92.6%), PPV (87.5%) and NPV (73.5%) for CRP. In comparison to other indicators of infection, CRP is the single best indicator after blood culture in diagnosing early onset sepsis (EOS).
- Specificity for Micro-ESR was 100% and sensitivity 26%.
- With band cells and toxic granules, our specificity was > 90% but sensitivity was very low 13%.
- In the present study, the percentage of definitive pneumonia (based on isolation of bacteria) and probable pneumonia (blood culture negative) were 39.1 and 34.8% respectively.
- In 8.7% cases of pneumonia only sepsis screen was positive.
- Amongst 17 x-ray chest positive cases in pneumonia, 11 cases showed alevolar infiltrates (47.8%), 4 cases showed diffuse haziness (17.3%), 2 cases showed lobar consolidation (8.6%), while 6 cases had chest x-ray clear (26.1%).
Chest x-ray and clinical signs alone would have missed the diagnosis of pneumonia in 26% cases and these had to be corroborated with sepsis screen and blood culture.

X-ray chest was positive in 50% cases of TTNB. Chest x-ray showed changes pertaining to Meconium aspiration syndrome (MAS) in 50% cases. In HMD, only 33.3% cases turned out to be chest x-ray positive. Rest of the blood investigations were negative in all these three disorders i.e. Hyaline Membrane Disease (HMD), Transient Tachypnoea of newborn (TTNB) and Meconium aspiration syndrome (MAS).

The bacterial isolates in our study suggest an increasing trend of Klebsiella (61.5%).

In the present study Staphylococcus aureus was found only in 2 cases (15.4%), while E.coli was responsible for pneumonia in 3 cases (23.1%).

Respiratory distress was responsible for 28.7% of all deaths. The mortality figures were 52% for HMD in our study and 75% for Meconium Aspiration Syndrome (MAS).

There were 39% low birth weights (< 2.5 Kg) in pneumonia. They comprised 57.1% mortality amongst total fatality due to pneumonia. Since, there were 2 neonates with birth weight less than 2 Kg having pneumonia and both of them expired the mortality rate was
100%. 11 (52.4%) neonates out of 21 with HMD expired in our study, all of them were of low birth weight.

❖ The best coverage in our study, has been shown by ciprofloxacin (84.62% cases) followed by ofloxacin and chloramphenicol 76.92% and 61.5% respectively. Amikacin was effective in only 23.08% cases.

❖ Further long-term studies have to be done before our studies on the efficacy and long-term complications of Ciprofloxacin in treating neonates with pneumonia could be finally established.