NEONATAL INTENSIVE CARE UNIT ADMISSION AND INFECTIVE MORBIDITY OF LATE PRETERM INFANTS

Evelina Kreko 1, Ermira Kola2, Festime Sadikaj2, Blerta Dardha2, Eduard Tushe3
1,3 Service of Neonatology,University Hospital of Obstetrics and Gynecology"Koço Gliozheni",Tirane,**ALBANIA**
2 Department of Pediatrics ,University Hospital Center "Nene Tereza",Tirane, **ALBANIA**

ABSTRACT

Objective: Late preterm(LP) infants are those born between 34 0/7 and 36 6/7 weeks of gestation. They are physiologically and metabolically immature , and have higher risk for overall morbidity and especially infective morbidity .The objective of this study is to analyze the incidence of LP infective morbidity, and their Neonatal Intensive Care Unit (NICU) admission in a tertiary hospital .
Methods:This is a prospective study of infants born LP , their NICU admission and infective morbidity in a 2 year period in the Tertiary hospital" Koço Gliozheni" in Tirana.We compared their NICU admission and infective morbidity with those born in term as a control group who entered the NICU with an infective diagnoses.OR and the CI 95% is calculated and the p value significant <0.05.
Results:In a 2 year period 2014 and 2015 there were 8843 births and 555 infants born Late Preterm(LP) . Of the 555 infants 336 LP were admitted to the NICU and 597 term newborns entered the NICU .LP have a significant NICU admission compared to term infants OR 19.4 (16.1-23.5) and higher morbidity for sepsis OR 23 (7.7-73) , sepsis workup OR 51.24 (32-82) and pneumonia OR 16.7 (6.4 -43.6) and the difference was significant. Only for meningitis the difference was not significant OR 7.35 (0.66-81.3) p=0.25 .
Conclusion:LP are at higher risk for NICU admission and infective morbidity compared to those born 37 0/7 -41 6/7 weeks of gestation.Predicting and treating the problems that lead to preterm birth will be a challenge in the future for lowering the LP morbidity.

Keywords: Late preterm, infective morbidity,sepsis, NICU.

1. INTRODUCTION

The number of preterm birth is raising all over the world becoming a global health problem.More than 70% of the preterm babies belong to a fast growing group that are those born between the 34 th and 37 week of gestation (1). The falling of neonatal mortality and sometimes the false obstetrical perception about their morbidity and the raising number of the elective cesarian section are some of the main causes of this growing population.On the other hand all the different studies in the developed countries show us that this is a false perception.

Late Preterm babies are considered by the clinicans as physiologicaly similar to those born in term, and often treated the same way, but their fragile physiologic response leads to many problems as : hypoglycemia , hiperbilirubinemia, respiratory morbidity and infections.(2,3,4)
The largest number of epidemiologic studies are focused in preterm babies under 33 wga or VLBW < 1500gr. The latest studies suggest that LP are diagnosed with culture positive sepsis more often than term babies and their infective morbidity and mortality is significantly higher.Late preterms are at an increased risk than term newborns of infections because of

their immature immune system. Sepsis is more common in infants born with very low gestational age or infants with very low birth weight.The majority of babies who die of neonatal sepsis are preterm.The incidence of sepsis in the neonatal period is greater than any other period of life. Studies about LP babies are lacking in Albania and this is the objective of our study as part of a bigger study to better understand and evaluate the burden of the LP infective morbidity in our country.

2. METHODS

This is a prospective cohort study of all late preterm live births during a 2 year period between January 2014 to January 2016 in our hospital (university Hospital of Obstetrics and Gynecology "Koco Gliozheni").Gestational Age is identified by the medical record of the mother where the last menstrual period is specified, and if that was unknown the gestational age was identified by the first ultrasonography and by performing the Ballard score after birth.Criteria of NICU admission were followed according to the protocols used in our NICU ; birth weight less than 1900gr, respiratory distress or requirement for oxygen, hypoglycemia,hyperbilirubiemia, neurologic complications, feeding problems .The total number of NICU admission is registered and their infective morbidity is analysed and compared to infective morbidity of term neonates. All babies with infective risk factors as: Premature rupture of membranes, maternal peripartum infections, chorioammnionitis,instrumental deliveries go under sepsis workup protocol and blood culture and blood count, I/T ratio is calculated and CRP the 12 and 36 hour of life(11).

Sepsis diagnosis is made by clinical and laboratory alterations. Sepsis :Probable sepsis :positive septic screen (two of the five parameters, total white blood count <5000/mm3or >15000/mm3, immature to total polymorph ratio >=0.2, absolute neutrophil count less than 1750/mm3 or > 7200/mm3, C reactive protein > 1mg/dl, platelets < 100.000/mm3), and proven sepsis :Isolation of pathogens from blood or Cerebrospinal fluid .

Pneumonia diagnosis is confirmed by radiological typical findings and clinical respiratory symptoms (6) and meningitis as well is diagnosed by clinical alterations confirmed by changes in CSF and its positive culture(7).

Statistical data were collected into the database .The difference in morbidity between the two groups is compared by calculating the OR and confidence interval 95% using the Fisher exact test for statistical analysis . The result is considered significant at $p<0.05$.

3. RESULTS

There were 555 late preterm babies born in the 2 year period 2014 and 2015 of a total of 8843 births. Late preterm infants accounted for 79 % of all preterm newborns in the 2 year period. Of the 555 LP infants 336 LP or 60% were admitted to the NICU and from 8147 term newborns 597or 7.3% entered the NICU , where a total of 1237 newborns are treated . Late preterm babies are in much higher risk for nicu admission compared to term neonates , and the difference is significant OR 19.4 (16.1-23.5).They have a higher morbidity for sepsis OR 23 (7.7-73) , sepsis workup 51.24 (32-82) and pneumonia 16.7 (6.4 -43.6) and the difference is significant. Only for meningitis the difference was not significant 7.35 (0.66-81.3) p=0.25 . The LP babies diagnosed with sepsis had all risk factors like perinatal infections, premature rupture of membranes and birth depression. In the control group severe

birth depression was a major risk factor for sepsis , pneumonia and meningitis. There is one death registered in the late preterm group and none in the term group.

	LP	Term	OR	CI 95%	p value
Sepsis work up	73 21%	24 4%	51.24	32-82	p<.00001
Sepsis	8 2.3%	5 0.84%	23	7.7-73.0	
Pneumonia	9 2.6%	8 1.3%	16.7	6.4-43.6	
Meningitis	1 0.2%	2 0.3%	7.35	0.66-81.3	p=0.25
Nicu admission	336	595	19.4	16.1-23.5	p<.0001

4. DISCUSSION

This study showed that in our hospital with a level 3 NICU there are 8843 births in a two year period , and 555 were late preterm infants .The incidence of late preterm birth is 6.2% and it ranged between 7.5% in 2014 and 4.9% in 2015.The rate of LP infants among all preterm in our study resulted 79%, and it is near the study performed in the USA where it resulted 71.4% (7). LP infants consist of 27% of newborns entering the NICU . In our study 60% of LP and 7.3% of term infants entered the NICU. Engle et al (8) reports similar NICU admission rates to our study(55.6% vs 60%).In a similar study this rates were found to be quite low for the LP group 36.8 % and 7.24%(2). The reason for this discrepancy is not clear , but may be due to different NICU admission policies of different centers .Infection risk is increased in preterm infants , due to immaturity of the immunological system and increased interventions in these infants(14). On the other hand the infective morbidity of Late preterm infants is significantly higher than term neonates except for meningitis .Hospitalisation rate of infants born to mothers with premature rupture of membranes is 5 times more in late preterm than term neonates(11). Compared to a systemic review Teune et al(5) there are a larger number of LP who undergo sepsis workup in our study , raising a question for the reasons , and perhaps a revision of the criteria of sepsis control protocol we use in our NICU.Sepsis rate of LP infants resulted triple the rate of term infants (2.3% to 0.8%).These rates are compared to Sinha et al(9). The cases of pneumonia in both LP and term infants result mostly of invasive mechanical ventilated newborns born with severe birth depression (apgar score <7 , 5^{th} minute)(10). And these are the babies diagnosed with sepsis and meningitis . We did isolate only two cases of early onset sepsis in LP infants , a result this correlating with the EOS incidence 0.4% in our case(13,14,15).

5. CONCLUSION

Late preterm infants have a higher NICU admission compared to term neonates and are more likely to develop severe infections like sepsis, pneumonia and meningitis than term neonates(12). The late preterm infants constitute a significant proportion of preterm births and it is important to monitor and evaluate the medical and other factors that lead to this fast growing population(13).A re assessment of optimal obstetric and neonatal care is needed so that clinical management can be better done toward optimal outcomes.

REFERENCES

1. March of Dimes Perinatal Data Center, "Late preterm birth: every week matters. 2005," National Center for Health Statistics, final natality data, January 2008, http://www.marchofdimes.com/peristats/
2. T. N. K. Raju, R. D. Higgins, A. R. Stark, and K. J. Leveno, "Optimizing care and outcome for late-preterm (near-term) infants: a summary of the workshop sponsored by the national institute of child health and human development," Pediatrics, vol. 118, no. 3, pp. 1207–1214, 2006.
3. V. K. Bhutani and L. Johnson, "Kernicterus in late preterm infants cared for as term healthy infants," Seminars in Perinatology, vol. 30, no. 2, pp. 89–97, 2006. View at Publisher · View at Google Scholar ·View at PubMed · View at Scopus
4. C. K. Shapiro-Mendoza, K. M. Tomashek, M. Kotelchuck, W. Barfield, J. Weiss, and S. Evans, "Risk factors for neonatal morbidity and mortality among "healthy," late preterm newborns," Seminars in Perinatology, vol. 30, no. 2, pp. 54–60, 2006. View at Publisher · View at Google Scholar · View at PubMed · View at Scopus
5. Teune MJ, Bakhuizen S, Gyamfi Banneman C, Opmeer BC, van Kaam AH, van Wassenaer AG, et al. A Systematic review of severe morbidity in infants born late preterm. Am J Obstet Gynecol. 2011;205:374.e1–9.PubMed
6. Whitsett JA, Rice WR, Warner BB, Wert SE, Pryhuber GS. Acute respiratory disorders. In: MacDonald MG, Mullet MD, Seshia MMK, editors. Avery's Neonatology.6th ed. Philadelphia, USA: Lippincott Williams and Wilkins; 2005. pp. 569–76
7. Edwards MS. Postnatal bacterial infections. In: Martin RJ, Fanaroff AA, Walsh MC, editors. Fanaroff and Martin's Neonatal Perinatal Medicine. Diseases of the Fetus and Infant. 9th ed. St. Louis, USA: Elsevier; 2011. pp. 793–830.
8. Engle WA, Tomashek KM, Wallman C, Committee on Fetus and Newborn, American Academy of Pediatrics "Late preterm" infants: A population at risk. Pediatrics. 2007;123:1390. http://dx.doi.org/10.1542/peds.2007-2952. [PubMed]
9. Sinha A, Yokoe D, Platt R. Epidemiology of neonatal infections: experience during and after hospitalization. Pediatr Infect Dis J. 2003;22:244–51.http://dx.doi.org/10.1097/01.inf.0000059560.81687.f6. [PubMed]
10. Lee AC, Mullany LC, Tielsch JM, Katz J, Khartry SK, LeClerq SC, et al. Risk factors for neonatal mortality due to birth asphyxia in southern Nepal. A prospective, community based cohort study. Pediatrics. 2008;121:e1381–90.http://dx.doi.org/10.1542/peds.2007-1966. [PMC free article] [PubMed]
11. Jackson GL, Rawiki P, Sendelbach D, Manning MD, Engle WD. Hospital course and short term outcomes of term and late preterm neonates following exposure to prolonged rupture of membranes and/or chorioamnionitis. Pediatr Infect Dis J. 2012;31:89–90. http://dx.doi.org/10.1097/INF.0b013e31822fb15d. [PubMed]
12. Haroon A, Ali SR, Ahmed S, Maheen H. Short term neonatal outcome in late preterm vs. term infants. J Coll Physicians Surg Pak. 2014;24:34–8. [PubMed]
13. McIntire DD, Leveno KJ. Neonatal mortality and morbidity rates in late preterm births compared with births at term. Obstet Gynecol. 2008;111:35–41.http://dx.doi.org/10.1097/01.AOG.0000297311.33046.73. [PubMed
14. Khashu M, Narayanan M, Bhargava S. et al. Perinatal outcomes associated with preterm birth at 33 to 36 weeks' gestation: a population-based cohort

study. Pediatrics. 2009;123:109–13. doi: 10.1542/peds.2007-3743. [PubMed][CrossRef

15. Cohen-Wolkowiez M, Moran C, Benjamin DK. et al. Early and late onset sepsis in late preterm infants. Pediatr Infect Dis J. 2009;28:1052–6. doi: 10.1097/INF.0b013e3181acf6bd. [PMC free article] [PubMed] [CrossRef]