

A PROSPECTIVE OBSERVATIONAL STUDY OF SHORT TERM MORBIDITY PATTERN IN PRETERM NEWBORNS DELIVERED IN A TERTIARY CARE HOSPITAL

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ABSTRACT: OBJECTIVE: To study the short term morbidity pattern in preterm new born babies delivered in a tertiary care hospital with level III neonatal intensive care unit (NICU). **MATERIAL AND METHODS:** A prospective observational study was conducted in a level III NICU between November 2009 to July 2010 at Grant medical college and JJ Group of hospitals, Mumbai. All the in born preterm babies were assessed for morbidity pattern from the time of admission till discharge or death. **RESULT:** 156 preterm babies were included in the study. 83(54.21%) were male and 73(46.79%) were female. The major morbidities observed in the preterm neonates were hyperbilirubinemia in 50.54%, Respiratory distress syndrome (RDS) in 25.64% and severe birth asphyxia in 13.46%. Other common morbidities seen were retinopathy of prematurity in 12.17%, apnoea in 11.54% and anaemia in 10.9%. Preterm neonates also had in 9.62% culture proven sepsis, in 8.33% hypoglycaemia, in 7.05% Intraventricular haemorrhage (IVH) and in 6.41% various congenital anomalies. **CONCLUSION:** Hyperbilirubinemia, respiratory distress syndrome and severe birth asphyxia are major preterm morbidity.

KEYWORDS: Infant, Preterm, Morbidity, Neonatal morbidity, Short term morbidity.

INTRODUCTION: Preterm birth is a major unmet challenge in perinatal health care. Prematurity by itself is a high risk factor not only for perinatal mortality and morbidity but also for neurodevelopmental disabilities as well as adverse respiratory outcome. It affects both the neonates and their families in addition to important implications on the health services as these babies may have to spend several weeks in the intensive care unit.

About two-thirds of low birth weight (LBW) babies in the developed countries and one-third of LBW babies in India are born prematurely.⁽¹⁾ It has been further reported that in our country about two-thirds of the babies below 2 kg at birth are premature. According to NNPD 2002-03 data, 62 % of all neonatal deaths were in premature babies. Perinatal asphyxia, sepsis, congenital mal formations and hyaline membrane disease are the common causes of neonatal mortality in premature babies.⁽¹⁾ The disease patterns in preterm babies vary from place to place and even from time to time in the same place.⁽²⁾ Hence it is necessary to carry out regular neonatal audit on major preterm morbidities so that we can develop strategies to handle them effectively. Present study was one such attempt.

MATERIALS AND METHODS: This study was a prospective observational study conducted in a level III NICU between November 2009 to July 2010 at Grant medical college and JJ Group of

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hospitals, Mumbai. This data was collected for postgraduate dissertation and ethical clearance was obtained. All the live preterm babies born in our hospital during the study period requiring admission to NICU as per the hospital protocol were included in the study. Preterm neonates who were discharged against medical advice were excluded from the study. Preterm neonate is one whose birth occurs through the end of the last day of 37th week (259th day i.e., 36^{+6/7}) following onset of the last menstrual period (LMP). If LMP was not available age according to new Ballard's scoring was taken. Small, appropriate and large for gestational age babies (SGA/AGA/LGA) were classified by using Lubchenco chart. Detailed clinical examination including new Ballard's scoring was done on all these babies. They were closely followed up on day to day basis for development of any short term problems due to prematurity. Preterm neonates with hyperbilirubinemia requiring phototherapy as per AAP charts were included in the study. Preterm with severe birth asphyxia (APGAR score ≤ 3) were included in the study. HIE staging was done by Sarnat and Sarnat staging. Respiratory distress syndrome (RDS) was defined as presence of respiratory symptoms (e.g.; grunting, flaring, tachypnea, and retractions) in a preterm baby requiring supplemental oxygen along with typical chest radiography. Necrotizing enterocolitis grading was done by modified Bell's staging. Cranial ultrasound was done in all the preterm (<32 weeks, weight <1500 grams and high risk preterms >32 weeks) by a radiologist using a portable ultrasound machine present at NICU. Grading of IVH has been done as per the criteria suggested by Papile. All babies (<32 weeks, weight <1500 grams and high risk preterms >32 weeks) were regularly screened by ophthalmologist for Retinopathy of prematurity (ROP). Staging of ROP was done by international classification of ROP (ICROP) and laser done when ever indicated. Echocardiography was done by cardiologist using portable echocardiography machine as and when required. Surgical problems related to these neonates were operated by pediatric surgeon. Hypoglycemia was defined as less than 40mg/dl using glucometer. Only cultures proven sepsis were included in the study, similarly preterm babies with anemia requiring blood transfusions were included in the study. All these details were entered in a predesigned performa and they were analysed using standard statistical methods. Morbidity pattern was assessed according to Manual of Neonatal Care, John P Cloherty, 6th edition, 2008. Necessary investigations were done as and when a preterm baby required and managed appropriately. No active intervention was done during the study. Babies were assessed and treated according to the existing guidelines.

RESULTS: During the study period, out of 328 babies admitted to NICU 161(49.09%) were preterm. Total 156 preterm babies were included in the study (5 babies discharged against medical advice were excluded from the study). Eighty three (53.1%) were male and 73(46.79%) were female. Twenty one (13.46%) was SGA, 135 (86.54%) AGA and there were no LGA. Distribution according to gestational age and weight are shown in table 1. Mean duration of stay hospital stay was 17.13 \pm 15.44 days (range 1-84 days).

Short term morbidity pattern observed during the study is shown in table 2.

Hyperbilirubinemia, Respiratory distress syndrome (RDS) and severe birth asphyxia were common morbidities observed.

Sixty two {78.48%(62/79)} neonates with hyper bilirubinemia(n=79) requiring phototherapy belonged to <34 weeks of age and 73.41%(58/79) weighing <1500 grams. Ninety

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five per cent (38/40) cases of RDS (n=40) were seen in age <34weeks and 92.5% (37/40) weighing <1500grams. Sixteen (84.2%, 16/19) cases of retinopathy of prematurity (ROP) was seen in age <34weeks and weighing <1500grams. Nine (81.81%, 9/11) cases of Intraventricular haemorrhage (IVH) was seen in age <34weeks and weighing <1500grams. Two patients had Grade IV, one Grade III, 4 had Grade II and rest Grade I IVH.

Eight neonates <34 weeks and weighing <1500grams had NEC. Ten babies had congenital anomaly. Four had meningomyelocele with hydrocephalus, 2 had congenital heart disease (1-hypoplastic left heart, 1-complex congenital heart disease), 2 had CTEV, 1 case of renal agenesis with limb deformities and 1 had duodenal atresia (underwent surgery). Culture of 6 babies showed Klebsiella Pneumoniae, 5 had Pseudomonas aeruginosa, 2 had Staphylococcus Aureus and one each was positive for Candida and citrobacter species.

DISCUSSION: Preterm babies are more prone to mortality and various morbidity due to inherent immaturity of different organs for being born early, resulting in prolonged stay at NICU as well in the hospital.

Mean duration of stay in our study was 17.13±15.44 days (Range 1-84 days). The duration of stay in the hospital ranged from 1 to 72 days with a mean duration of 13.33±12.05 days in study done by Onyaye et al.⁽²⁾

In this study hyperbilirubinemia (50.54%), RDS (25.64%), severe birth asphyxia (13.46%), ROP (12.17%) were major factors contributing to morbidity. Culture proven sepsis was found in 9.62%, apnoea in 11.54%, anaemia in 10.9%, hypoglycaemia in 8.33%, IVH in 7.05% and congenital anomaly in 6.41%. Less common morbidities were PDA (5.77%), pneumonia (5.13%), polycythaemia (5.13%) and NEC (5.13%), meningitis (3.85%), seizures (3.85%), pulmonary haemorrhage (3.85%), and HDN(2.56%).

A study done by Onyaye E. Kunle-Olowu et al (January 2010 to December 2012, total 138 preterm) showed commonest medical conditions seen in preterm babies were respiratory problems in 95(68.8%), jaundice in 94(68.1%) followed by sepsis in 54 (39.1%). Other problems in descending order were asphyxia (29%,40), anaemia (20.3%,28), bleeding disorder (10.9%, 15), NEC (8.7%, 12), acyanotic congenital heart disease (5.8%, 8), birth defect (5.8%,8), birth trauma (5.1%,7), hypoglycaemia (5.1%,7) and seizures (2.2%,3). This is similar to reports by Khan et al. in Karachi, Pakistan who reported jaundice and sepsis as the commonest morbidities in their preterm patients.⁽²⁾

Morbidity pattern as reported by different studies were highly variable depending on health care facilities and practicing methods. In a study by Onalo and Olateju in Abuja, Nigeria reported jaundice as the commonest morbidity in their preterm patients whereas another study by Onwuanaku et al. in Jos University Teaching Hospital Nigeria, reported sepsis as the commonest morbidity, followed by jaundice.⁽²⁾ Yet another study by⁽³⁾ EF Ugochukwu et al (may 1988 to Oct 2000) reported sepsis, asphyxia, jaundice, anemia and hemorrhagic disease of newborn as major morbidities.

In these places morbidity pattern information helps to develop infection control programmes in the management of preterm babies who are at high risk for neonatal sepsis. Hyperbilirubinemia is a common morbidity and the hospitals should be able to manage effectively by photo therapy and or exchange transfusion.

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In a prospective analysis of etiology and outcome of preterm labour done by Singh Uma et al (2005), septicaemia, RDS and birth asphyxia were important contributors to preterm morbidity.⁽⁴⁾ A few studies on ELBW and VLBW by Shegal et al who retrospectively studied (August 2000- 2001) immediate outcome in these babies showed neonatal hyperbilirubinemia (78%) and RDS (65%) were most common causes of morbidity.⁽⁵⁾ Arias et al (1982) reported apnea (30%), RDS (64%), IVH (27%), NEC (8%) sepsis in (30%) in his study.⁽⁶⁾

In this study hyperbilirubinemia requiring phototherapy, RDS, ROP, IVH and NEC were seen more in babies weighing <1500grams and gestational age <34 weeks.

In a retrospective by K. K. Roy et al (2001-04) on immediate outcome in ELBW and VLBW babies, the common complications seen in both groups were neonatal jaundice (47.2% in ELBW and 24.2% in VLBW) and RDS (38.8% in ELBW and 17.1% in VLBW). Other morbidities were ROP (33.3% in ELBW and 15.7% in VLBW), culture proven sepsis (25% in ELBW and 14.2% in VLBW), birth asphyxia (16.6% in ELBW and 12.8% in VLBW), PDA in (16.6% in ELBW and 5.6% in VLBW) and IVH (16.6% in ELBW and 2.8% in VLBW).⁽⁷⁾

In a retrospective study by Parappil et al done on 28(+1) to 32 (+0) weeks babies found IVH Grade III (0.84%), IVH Grade IV (0.5%), cystic PVL (0.5%), ROP >/=stage 3 (5.69%).⁽⁸⁾ Tommiskal et al (1996-1997) study of short term follow up in ELBW babies showed, RDS (76%), blood culture positive septicaemia (22%), IVH Grade 2 to 4 (20%) and NEC with bowel perforation (9%).⁽⁹⁾ In our study one baby with NEC had bowel perforation. Shankar Narayan et al reported hyperbilirubinemia (65%), RDS (65%), sepsis (52%), IVH (29%), pneumonia (25%) and ROP (24%) in a study on ELBW babies.⁽¹⁰⁾

The reported incidence of RDS in our country varies from 6.8% to 14.1% in preterm live births with incidence being about 58% in <30 weeks, 32% in 31-32 weeks and 10% in 33-34 weeks of gestational age in preterm (KarthikNagesh,2003).⁽¹¹⁾

In prospective study by Swarna Rekha et al (1996), incidence of ROP was 46%. The incidence of ROP was 73.3% in <1000 grams birth weight babies, and 47.3% among <1500gram babies. The incidence of ROP among 28-29 weeks, 30-31 weeks and 32-33 weeks was 83%, 60% and 50% respectively.⁽¹²⁾ At PGI (Chandigarh, 2006), only 10(2.6%) of 383 survivors <32 weeks of gestational age required treatment for ROP. IVH of severe grade (grade 3 and more) occurred in 23(4.6%) babies out of 500 live births in babies <32 weeks gestation (Bhakoo et al).⁽¹⁾ Four babies in our study required laser photocoagulation for ROP.

CONCLUSION: Present major preterm problems in our country are hyperbilirubinemia respiratory distress, neonatal sepsis and severe birth asphyxia.

Updating the morbidity pattern by regular national neonatal audits helps to plan diverse national health programmes and facilitates their implementation by providing optimum health care facilities and adequate training of health care personnel.

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Gestational age (weeks)	Number (percentage)
25-26	2 (1.28%)
27-28	8 (5.13%)
29-30	14 (8.97%)
31-32	25 (16.03%)
33-34	39 (25%)
35-36	68 (43.59%)
Birth Weight in Grams	Number (percentage)
Less than 1000	24(15.8%)
1000-1499	45(28.85%)
1500-2499	87(55.77%)
Total	156

Table 1: Distribution according to gestational age and birth weight

Morbidity Profile	Number (percentage)	Morbidity Profile	Number (percentage)
Hyperbilirubinemia (requiring phototherapy)	79(50.54%)	Congenital Anomaly	10(6.41%)
Respiratory distress syndrome (RDS)	40(25.64%)	Patent DuctusArteriosus(PDA)	9(5.77%)
Severe Birth Asphyxia	21(13.46%)	NEC	8(5.13%)
Retinopathy of Prematurity (ROP)	19(12.17%)	Polycythemia	7(4.49%)
Apnoea	18(11.54%)	Seizures	6(3.85%)
Anaemia	17(10.9%)	Meningitis	6(3.85%)
Culture proven sepsis	15(9.62%)	Pulmonary Haemorrhage	6(3.85%)
Hypoglycaemia	13(8.33%)	Haemorrhagic disease of new born (HDN)	4(2.56%)
Intraventricular Haemorrhage (IVH)	11(7.05%)	-	-

Table 2: Distribution of short term morbidity pattern in preterm babies

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