

Original Article

Complications of Pre-Term Infants in the Neonatal Unit

1. Aneela Shaheen 2. Saima Batool 3. M. Arshad Mahmood 4. Muhammad Naeem
5. Abdul Raheem

1. Assoc. Prof. 2. Asstt. Prof. Dept. of Pediatrics, The University of Lahore 3. Asstt. Prof. of Ophthalmology, SSTH, Lahore 4. 2. Asstt. Prof. Dept. of Pediatrics, The University of Lahore 5. Medical Officer Shaikh Zayed Hospital, Lahore.

ABSTRACT

Objective: To assess the complications of preterm infants in neonatal intensive care unit and compare that with those faced by preterm infants in western neonatal intensive care unit.

Study Design: A prospective comparative study

Place and Duration of Study: This study was conducted at Paediatrics Department, Shaikh Zayed Hospital Lahore from 1st December 1997 to 30th November 1998.

Patients and Methods: All neonates delivered before 37 weeks and admitted to the neonatal Intensive care unit (NICU, SZH) were included in the study. It was a prospective study conducted over a period of one year from 1st December 1997 to 30th November 1998. The study population included 170 preterm neonates. For the purpose of study, these infants were divided into three gestational age groups i.e. < 30 weeks gestational age, 30 to 35 weeks gestational age, and > 35 weeks gestational age. These neonates were then prospectively followed till discharge from NICU.

Results: Out of the 170 preterm infants admitted to NICU, 128 infants survived and were discharged under stable conditions, while 42 infants expired.

Conclusion: Maximum number of complications and highest mortality i.e. 87% was seen among the most premature group, i.e. below 30 weeks gestational age. Mortality in the gestational age group 30 to 35 weeks was 43%, while it was 9% in the gestational group >35 weeks.

Key Words: Pre-term infants, Neonatal, Perinatal mortality, Infant morbidity.

INTRODUCTION

A premature infant is defined as a live born infant delivered before 37 weeks from the 1st day of the last menstrual period. Although rapid advance in perinatal & neonatal medicine has improved survival of preterm infants, however prematurity still carries high morbidity and mortality especially in developing countries like Pakistan. The only solution to this problem is to provide best of neonatal care to these tiny infants and improve their survival. Premature infants are prone to certain complications because of their low birth weight and also because of the immaturity of their various organ systems. Recently there has been found that morbidity as well as mortality relates more to gestational age than to weight at birth.¹ Preterms make a large share to the total number of admissions to NICU. In one analysis of 4 years admission to NICU in Peshawar, it was seen that 39.4% admissions were of preterms.² Even after discharge from Nursery, preterms require rehospitalization more than the term infants.³ Infants born preterm are at increased risk for Sudden Infant death Syndrome, hypoglycemia, hypothermia, hypocalcaemia preterms are also reported to be at highest risk for developing intraventricular hemorrhage,

ischemic brain injury, retinopathy of prematurity as well as developmental disabilities.⁴ Thus prematurity is a major cause of perinatal mortality and infant morbidity.⁵ So measure should be done to improve our neonatal services. In Pakistan facility of well-equipped NICU is available in very few tertiary centers.

PATIENTS AND METHODS

This study was carried out at the neonatal intensive care unit (NICU) in Sheikh Zayed Hospital, Lahore. It was a prospective study conducted over a period of one year from 1st December 1997 to 30th November 1998. All preterm neonates admitted to Intensive care unit Sheikh Zayed Hospital were included, 170 preterm neonates. For the purpose of study, these neonates were divided into three groups according to gestational age group, i.e. below 30 weeks, 30-35 weeks and 35-37 weeks. A detailed antenatal record of each patient was obtained and a detailed physical examination was carried out within twenty-four hours of birth. Based upon this examination, each child was assigned initial diagnosis at the time of admission to NICU. Each baby was followed closely till discharge and the complications, the outcome developed by neonate was also recorded.

Relevant laboratory tests were also recorded. Later this information was correlated to assess the course & outcome of preterms in our set up. For retinopathy of prematurity infants were assessed and followed up by department of ophthalmology.

RESULTS

Out of the total 170 patients included in our study 16 (9%) belonged to gestational age group of less than 30 weeks, 56 (33%) patients belonged to gestational age group 30-35 weeks, 98 (58%) were more than 35 weeks gestational age, 47% were male, and 53% were females. 138 preterm neonates (81%) were delivered in SZH, and 32 (19%) were delivered elsewhere and referred to NICU Shaikh Zayed Hospital. 148 (87%) infants in our study population were appropriate for gestational age (AGA), 7 (14%) infants were large for gestational age (LGA), while 15 (9%) were small for gestational age (SGA). Analysis of the study population showed, that 50 (29%) preterm infants had the primary diagnosis of sepsis, 15 (9%) infants had

RDS, 8 (5%) infants had birth asphyxia, 5 (3%) infant where cases of meconium aspiration 3 (2%) infants had jaundice neonatorum, and 1% had multiple congenital anomalies while 88 (51%) infants were otherwise healthy, at the time of admission and were admitted for preterm care and observation. The incidence of complication among our study population and their distribution among these gestational age groups. As for as outcome of our study infant related to gestation age is concerned, a total of 128 (75%) infants survived and Discharged under stable condition. while 42 (25%) infant expired. Mortality in the gestational group < 30 weeks was 87% (14 infants died). 43% (24 infants) in gestational group 30 to 35 weeks survived and 4% infants mortality was observed in gestational group more than 35 weeks. Septic shock, disseminated intravascular coagulation, intracranial hemorrhage, hypoxic ischemic encephalopathy and Respiratory Distress Syndrome were among the common causes of death in our study group (Table No. 1).

Table No. 1: Frequency of complications according to age

Complications	Total (n = 170)		<30 weeks (n = 16)		30 – 35 weeks (n = 56)		>35 weeks (n = 98)	
	No.	%	No.	%	No.	%	No.	%
Sepsis (presumed)	73	43.0	16	100.0	37	66.0	20	20.0
RDS	15	9.0	7	44.0	8	14.0	-	-
Apnea	12	7.0	5	31.0	7	12.0	-	-
Pulmonary hemorrhage	8	5.0	4	25.0	4	7.0	-	-
Meconium aspiration	5	3.0	-	-	-	-	5	5.0
Pneumothorax	4	2.0	2	12.5	2	4.0	-	-
PDA	7	4.0	4	25.0	3	5.0	-	-
Anemia	23	14.0	12	75.0	11	20.0	-	-
Jaundice Neonatorum	124	73.0	16	100.0	45	80.0	63	64.0
DIC	14	8.0	7	44.0	5	9.0	2	2.0
Necrotizing enterocolitis	11	6.0	4	25.0	06	11.0	1	1.0
Hypoglycemia	19	11.0	7	44.0	9	16.0	3	3.0
Hypothermia	12	7.0	8	50.0	4	7.0	-	-
Hypocalcemia	55	32.0	13	81.0	27	48.0	15	15.0
Hyponatremia	6	4.0	4	25.0	1	2.0	1	1.0
Intraventricular Haemorrhage	22	13.0	9	56.0	10	18.0	3	3.0
Hypoxic ischemic encephalopathy	6	4.0	-	-	3	5.0	3	3.0
Neonatal Seizures	13	8.0	7	44.0	5	9.0	1	1.0

DISCUSSION

During the past few decades improvement in the neonatal intensive care has led to marked improvement in neonatal mortality.⁶ A large share of improved neonatal mortality is due to the increasing survival among premature infant. Unfortunately reduced mortality among preterm infants is accompanied by increase in morbidity. So the emphasis has now been shifted from concerns of mortality towards a better understanding of the scope and nature of morbidity.

Results of our study showed that the prominent group of patients admitted to NICU was more than 35 weeks gestation age and very few preterm i.e. 9% with gestational age less than 30 weeks were brought to NICU. This could be partly due to improved obstetrical strategies to prevent or at least delay preterm labor and the other reason might be that in our setup mortality increases sharply below 30 weeks gestation. Analysis of our study reveal that 51% preterms were brought to NICU for care and monitoring, while 29% had the

primary diagnosis of sepsis. Among the other infant admitted prominent diagnosis was RDS 9% , birth asphyxia 5%, JNN 2% , meconium aspiration 3%, and multiple congenital anomalies 1% .During stay in NICU 43% infants had presumed sepsis either as a primary diagnosis or after wards (Culture proven 32%). The highest incidence of sepsis was seen in the gestational group <30 weeks i.e. 100%. This high percentage can be explained on the fact that suspicion of early onset of sepsis is almost universal to the very low birth weight preterm infants.⁷

The over all incidence of RDS was found to be 9%, it was 44% in infants below 30 weeks, which compares favorably to the incidence of RDS given 60-80% below 28 weeks gestational age and 15-30% below 32 –36 weeks.⁸ The overall mortality for preterms with RDS was quite high i.e. 9%. The results of our study showed 5% incidence of pulmonary hemorrhage and 2% incidence of pneumothorax with the highest incidence again seen in infants below 30 weeks gestational age i.e. 25% and 12% respectively. The incidence of anemia was 14% among our study population and about 75% infants below 30 weeks gestational age developed anemia requiring blood transfusion. 8% infant developed disseminated intravascular coagulation, which proved fatal in all the infants.

A total of 22(13%) infants developed intraventricular hemorrhage, however an other study conducted in Pakistan codes an overall incidence of 75% PVH-IVH in infants less than 34 weeks gestation⁹, which is very high as compared to our study.

The overall mortality of our study infants was 25% as expected max. survival was seen among infants more than 35 weeks gestational age i.e. 96% and survival was lowest among infants less than 30 weeks gestational i.e. 13%. While survival rate for infants 30-35 weeks gestational age was 55% this survival rate is quite low when we compare it with study conducted in The West. One study has given 95% survival rate for 30-31 weeks gestation¹⁰ another study has coded 25% mortality for infants less than 32 weeks gestation¹¹, which is in sharp contrast to our study which showed a 87% mortality in infants below 30weeks gestation and 45% mortality at 30-35 weeks gestation.

There are a number of factors that contribute to the marked difference observed in mortality of preterm infants between our hospitals and the west. Umbilical and arterial catheterization and central venous lines are used in the west for providing nutrition, as well as for taking blood samples, which may minimize infection. However in our set up peripheral veins and small arteries are used for the purpose of phlebotomy tests and for providing nutrition, repeated pricking leads to increased chances of infection. The nurse to neonate ratio works to a disadvantage when compared to the developed countries thus septicemia remains a major

cause of neonatal morbidity and mortality in the developing world.^{12,13}

The important inference from our study is that a premature baby is a catastrophe emotionally for the parents, psychologically for the Obstetrician, economically for the nation and challenge for the paediatrician. Shorter gestational age is usually associated with a need for invasive procedures, mechanical ventilation and prolonged hospital stay. More immature the infant, greater are the chances of developing complications like RDS, IVH, sepsis and NEC etc. All these factors contribute to high morbidity and mortality seen among the preterms. Another important inference from our study is the high incidence of sepsis which as already discussed is due to the lack of resources, limited number of nursing staff and very frequently done arterial pricks and putting intravenous branulas daily or every second or third day. Thus we need to improve the quality of our neonatal intensive units and neonatal services in order to reduce the high morbidity and mortality associated with prematurity.

CONCLUSION

Maximum number of complications and highest mortality i.e. 87% was seen among the most premature group, i.e. below 30 weeks gestational age. Mortality in the gestational age group 30 to 35 weeks was 43%, while it was 9% in the gestational group >35 weeks.

REFERENCES

1. Wariyar U, Richmond S, Hey E. Pregnancy outcome at 24-31 weeks gestation: neonatal survivors. *Arch Dis Child* 1989; 64: 678-86.
2. Mehr TR, Tufail M. Neonatal disease profile in NWFP. An analysis of four year admission 1977-1980. *Pak Pediatr J* 1983; 11: 7-22.
3. Cunningham CK, McMillan JA. Rehospitalization for respiratory illness in infants of less than 32 weeks gestation. *Pediatrics* 1991; 88: 527-32.
4. Msall ME, Buck C, Roger BT, et al. Risk factors for the major development impairment and need for special education resources in extremely premature infants. *J Pediatr* 1991;119:606-14.
5. Papernick E, Baryer J, Dreyfus J, et al. Prevention of preterm births. A perinatal study in Haguenau, France. *Pediatrics* 1985; 76: 154 8.
6. Richardson DK, Gray JE, Gortmaker SL, Goldmann DA, Pursley DM, McCormick MC. Declining severity adjusted mortality: evidence of improving neonatal intensive care. *Pediatrics* 1998; 102: 893-9.
7. Stoll BJ, Gordon T, Korones SB, et al. Early onset sepsis in very low birth weight neonates: a report from the National Institute of Child Health and

- Human Development neonatal Research, New York. J Pediatr 1996; 129: 72-80
8. Kliegman RM. Respiratory tract disorders: hyaline membrane disease. In: Behrman RB, Kliegman RM, Arvin AM, editors. Nelson text book of pediatrics. 15th ed. Philadelphia: WB Saunders Company;1996.p.478-84.
 9. Mahfooz-ur-Rehman, Rasul G, Khan HI. Prevalence of periventricular intraventricular hemorrhage in premature and low birth weight infants. Pak Pediatr J 1998; 22: 145-7.
 10. Cartlidge PH, Stewart JH. Survival of very low birth weight infants in a geographically defined population. Scta Paediatr 1997; 86 : 105-10.
 11. Thea M, VanZeban Van der AA, Verloove-Vanhorick PS, Jan RH. Child Health Morbidity of very low birth weight infants at corrected age of two years, in a geographically defined population. Lancet 1989; 4: 253-5.
 12. Ashiq B, Jamil M. A study of neonatal aerobic bacterial septesemia. JCPSP 1996; 6: 18-21
 13. Bhutta ZA, Yousf K. Neonatal sepsis in Karachi: Factors determining outcome and mortality. J Trop Pediatr 1997; 43: 65-70.

Address for Correspondence Author:

Aneela Shaheen,
Associate Professor,
Department of Pediatrics,
Faculty of Health Sciences,
The University of Lahore.