

## Short Communication

**Morbidity pattern of sick hospitalized preterm infants in Karachi, Pakistan**

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**Abstract**

Despite recent advances, prematurity is associated with high morbidity and mortality in developing countries. We conducted a descriptive case series to identify frequency of various morbidities in premature neonates at Aga Khan University Hospital (AKUH), Karachi, from November 2008 to April 2009. All inborn premature  $\leq 37$  weeks gestation were included in study. The frequency of preterm birth during study period was 13.3% (251/1885) of which 58% (n=145) required admission in Neonatal Intensive Care Unit (NICU). Mean gestational age was  $33 \pm 2.4$  weeks and mean birth weight, was  $1.88 \pm 0.5$  kg. 25% of patients were small for gestational age (SGA) while 75% appropriate for gestational age (AGA). Metabolic derangement was the most common morbidity, observed in 93% of patients followed by sepsis, seen in 43.6% neonates. Respiratory distress syndrome was observed in 35.5% of neonates while intraventricular haemorrhage was seen only in 3.5% patients. Mean length of stay for preterm infants in NICU was  $11.5 \pm 9.6$  days, 14% (n=20) preterm neonates expired during NICU stay.

**Keywords:** Prematurity, Morbidity, NICU, Neonates, CRP.

**Introduction**

It has been estimated that about 4 million babies die worldwide during the neonatal period annually.<sup>1</sup> Only 2% of these neonatal deaths occur in the developed countries while remaining 98% of the neonatal deaths occur in less developed countries in south Asia and Sub-Saharan Africa. Prematurity is one of the leading causes of neonatal deaths, accounting for about 24-28% of neonatal deaths.<sup>2,3</sup> Although recent advances in the perinatal care, use of antenatal corticosteroids, postnatal surfactant therapy and availability of modern ventilatory techniques have led to markedly improved survival of premature infants during the last two decades, disorders related to short gestation and low birth weight are still significant causes of infant morbidity and mortality.<sup>4</sup> These preterm infants require a prolonged stay in the neonatal intensive care units to allow sufficient organ maturation so that they can survive independent of the intensive care. Consequently, as more survivors are spending time in newborn intensive care units, morbidities of prematurity are becoming common.<sup>5</sup> Despite the high economic burden and clinical significance of prematurity, there is paucity of data regarding the morbidity pattern of premature neonates in the

developing countries like Pakistan. This study is aimed to look at the epidemiological trends and morbidity patterns in neonates admitted in NICU.

**Methods and Results**

We conducted a descriptive prospective case series at the neonatal intensive care unit (NICU) of Aga Khan University Hospital, Karachi over a period of six months (Nov 2008- April 2009). Aga Khan hospital is a tertiary care facility with well-equipped, state of the art NICU. All inborn premature neonates admitted in NICU during the study period were included in the study. The patients with congenital syndromes and congenital cardiac anomalies were excluded from the study.

Demographic profile was recorded including gestational age, gender, birth weight and length of stay in NICU. Further subgroups were made for gestational age and birth weight to assess the frequency of various morbidities in each group. Gestational age was classified into four groups i.e. extremely preterm (born before 28 weeks of gestation), severe preterm (born between 28 to 31 weeks of gestation), moderate preterm (born at 32 to 33 weeks of gestation) and late preterm (born between 34 weeks to  $\leq 37$  weeks of gestation) as described in literature.<sup>6</sup> Birth weight was also divided into normal birth weight ( $>2.5$  Kg), low birth weight (1.5-2.5 kg),

**Table-1: Descriptive Characteristics of Neonates Admitted in NICU.**

Characteristics	Percentage
Gender	
♦ Male	57
♦ Female	43
Mean Gestational age in weeks	$32.9 \pm 2.4$
Gestational age categories	
♦ Extremely preterm	3.6
♦ Severely preterm	30
♦ Moderately preterm	35.4
♦ Late preterm	31
Mean Birth weight in kilograms	$1.88 \pm 0.5$
Birth weight categories	
♦ Normal	16.4
♦ Low birth weight	51.8
♦ Very low birth weight	26.4
♦ Extremely low birth weight	5.4
Birth weight and gestational age categories	
♦ Small for gestational age	25
♦ Appropriate for gestational age.	75
Mean Length of stay in NICU in days.	$11.5 \pm 9.6$

**Table-2: Morbidities of Premature Neonates in NICU.**

Morbidity		RDS	IVH	Sepsis	Metabolic Abnormalities
Frequency		35.5%	3.5%	43.6	93.7%
Gender	Male	59%	25%	52%	59%
	Female	41%	75%	48%	41%
Mean Gestational Age (weeks)		32 ± 3	30 ± 3.9	32 ± 2.7	33 ± 2.5
Mean Birth Weight (Kg)		1.68 ± 0.6	1.2 ± 0.3	1.7 ± 0.6	1.8 ± 0.6
Mean APGAR Score (at 1 minute)		5.7 ± 1.5	4 ± 1.4	5.8 ± 1.5	6.2 ± 1.5
Mean APGAR Score (at 5 minutes)		7.8 ± 1.0	6.7 ± 0.5	7.9 ± 0.9	8.1 ± 0.9
Mean Length of Stay in NICU (days)		16 ± 13.3	21.5 ± 4.3	16 ± 12.5	11.8 ± 9.8

RDS: Respiratory Distress Syndrome. IVH: Intraventricular Haemorrhage.

very low birth weight (1.0-1.5 Kg) and extremely low birth weight ( $\leq 1.0$  Kg).<sup>6</sup> The registered neonates were followed throughout their stay in the NICU to identify various common morbidities. The collected data was analyzed using SPSS 18.

During the study period, a total of 1885 babies were delivered at Aga Khan University (AKU). Out of these, 13.3% (251/1885) were preterm. Of the total preterm babies born, 58% (145/251) were admitted in NICU. About 57% of neonates were male and 43% were females. Mean gestational age of the premature neonates was  $33 \pm 2.4$  weeks. In the study group, only 3.6% neonates were extremely preterm while 30% were severe preterm, 35.4% were moderate preterm and 31% were late preterm. Mean birth weight of the premature neonates was  $1.88 \pm 0.5$  kg. Neonates 16.4% had normal birth weight, 51.8% had low birth weight 26.4% had very low birth weight and 5.4% had extremely low birth weight which preterm neonates were 25% with small for gestational age (SGA) and 75% were appropriate for gestational age (AGA).

Metabolic abnormalities were the most commonly seen complication in premature neonates during NICU stay. 93% of patients had one or more metabolic abnormalities. Hyperbilirubinemia was the most common metabolic abnormality seen in 72% neonates followed by hypocalcaemia seen in 35%. Hypoglycaemia, hypothermia and hyponatraemia were observed in 34%, 32% and 26% patients respectively during NICU stay. Respiratory distress syndrome (RDS) was seen in 35.5% of the premature neonates in NICU. In extremely preterm neonates group, all patients developed Respiratory Distress Syndrome (RDS). In severe preterm group, 39%, in moderate preterm group, 30.7% while in late preterm group, 29.4% neonates developed RDS.

Intraventricular hemorrhage (IVH) was seen in only 3.5% of the premature neonates in NICU. Only one patient had grade II IVH while others had grade I IVH. The mean gestational age of patients who developed IVH was  $30 \pm 3.9$  weeks.

Sepsis was seen in 43.6% of the premature neonates in NICU. Out of the patients having sepsis, only 4.2% patients had leucopenia and 23% patients had leukocytosis as a marker

of sepsis. High C reactive protein (CRP) was seen in 64.6% and thrombocytopenia in 73% of the patients having sepsis. Positive blood cultures were seen only in 23 (16%) of patients. Staphylococcus epidermidis and klebsiella pneumoniae were the most common organism identified.

The mean length of stay for all preterm neonates in NICU was  $11.5 \pm 9.6$  days. Overall mortality of preterm neonates during NICU stay was 14% (20/143).

## Discussion

Preterm births have continued to increase despite years of research into its epidemiology, causes and management of preterm labour. Regardless of the cause, the burden of prematurity is enormous for the infant, family, health care system and the society. Depending upon degree of prematurity and development of various morbidities, these premature neonates require prolonged hospital stay which is a great health problem.<sup>4</sup> In a recent review on epidemiology and causes of preterm birth, it has been described that about 5% of preterm births occur at  $<28$  weeks of gestation, about 15% occur at 28-31 weeks of gestation, about 20% occur at 32-33 weeks of gestation while 60-70% preterm births occur at 34-36 weeks of gestation.<sup>7</sup> In our study, the proportion of extremely premature neonates was 3.6% which is almost consistent with the proportion described in literature, but the proportion of severely preterm neonates (30%) and moderately preterm neonates (35.4%) was considerably high while that of late preterm neonates (31%) was considerably low as compared to figures described in literature. This difference can be due to poor antenatal care and poor nutritional status of mothers in our part of the world which can lead to early delivery of babies rather than carrying the pregnancy to term or late preterm group.

There was a rising trend in the frequency of RDS and IVH with decreasing gestational age and birth weight in our study. Similar trends have been described in literature.<sup>8,9</sup> Different laboratory markers are used for early identification of sepsis in clinically septic neonates in addition to blood cultures. Out of the various markers of sepsis, high CRP and thrombocytopenia were more

sensitive markers of sepsis in our study. Thrombocytopenia was seen in about 70% of preterm neonates while high CRP was seen 65 % of the neonates with culture proven sepsis. Similar results are shown in a local study in which high CRP was found to be the most sensitive marker of sepsis (seen in 80-85%) while thrombocytopenia was seen in 64% of the neonates.<sup>10</sup>

### Conclusion

Despite the advent of modern techniques and state of the art NICU facilities, preterm neonates are still at high risk for the development of various complications like RDS, IVH, sepsis and metabolic abnormalities. The prematurity and its associated complications are not only associated with high morbidity and mortality but also lead to the prolonged stay of these preterm neonates in NICU, leading to a great burden on the health care system. In addition to these immediate morbidities, the prematurity can lead to adverse neurodevelopmental outcome of these babies, which is the area of greatest concern for the individual, the family and the society in future.

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