Morbidity and Mortality Patterns in Small for Gestational Age versus Appropriate for Gestational Age Preterm Neonates Admitted in Level II Neonatal Intensive Care Unit: A Observational Study

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Abstract

Introduction: Preterm birth is a significant public health problem across the world because of associated neonatal (first 28 days of life) mortality and short- and long-term morbidity and disability in later life. Currently, prematurity is the leading cause of death among children under five around the world, and a leading cause of disability and ill health later in life.

Objective: To study and compare the morbidity and mortality patterns in preterm small for gestational age (SGA) babies in relation to preterm appropriate for gestational age (AGA) babies admitted to level II Neonatal Intensive Care Unit (NICU) in Niloufer Hospital.

Methods: An observational retrospective study was conducted in level II NICU in Niloufer Hospital. The study was conducted for a 6 month period. Neonates born with a weight of <1.5 kg were included in the study. Data regarding morbidities and demographic parameters were obtained from the casesheets of the admitted neonates. The data obtained was analyzed using IBM SPSS statistics version 19.0 and P < 0.05 was considered statistically significant.

Results: A total of 95 babies were studied. The risk of respiratory distress syndrome (RDS) was lower in SGA babies compared to AGA babies. SGA babies had more risk of hypoglycemia and sepsis compared to AGA babies. The duration of hospital stay and mortality was also more in SGA babies compared to AGA babies. The most common morbidity was neonatal jaundice followed by RDS. The extremely low birth weight (ELBW) group had higher rates of all the morbidities. The morbidities were also commoner in lower gestational ages.

Conclusion: SGA neonates have high morbidities and mortality rate compared to AGA neonates. The mortality and morbidities are higher in ELBW and at lower gestational ages. The prognosis of these babies can further be improved by antenatal steroids to eligible pregnant with risk of preterm delivery. The inclusion of prenatal education and screening for medical disorders in antenatal care guidelines will help in curtailing the incidence of preterm deliveries.

Key words: Appropriate for gestational age, Morbidity, Mortality, Preterm neonates, SGA

INTRODUCTION

Preterm birth is a significant public health problem across the world because of associated neonatal (first 28 days of life) mortality and short- and long-term morbidity and disability in later life. Currently, prematurity is the leading cause of death among children under five around the world, and a leading cause of disability and ill health later in life.

An estimated 20 million infants every year are born with low birth weight (LBW; <2500 g)¹ and these infants have an increased risk mortality in the first year of life. The primary causes of LBW are preterm birth, intrauterine growth restriction (IUGR), or a combination of the two. Of 135 million children born in low-income and middle-income countries (LMICs) in 2010, an estimated 29.7 million...
were born both term and small for gestational age (SGA), 10.9 million were born preterm and appropriate for gestational age (AGA), and 2.8 million were born preterm and SGA. Risk factors and interventions to reduce the number of babies born SGA might differ from those to reduce the number of babies born preterm. Few studies in LMICs have investigated differences in mortality by extent of prematurity, IUGR, or the two in combination. Examination of the mortality risk by degree of prematurity and SGA as a proxy for IUGR might be crucial in understanding the attributable disease burden, because regions such as South Asia have a reported SGA prevalence of about 40%. Especially with high incidences for LBW and IUGR-LBW in India (28%, 21%), respectively.

The preterm babies (SGA or AGA) also carry increased risk of neonatal morbidity or complications. These complications include respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), sepsis, necrotizing enterocolitis (NEC), patent ductus arteriosus (PDA), hyperbilirubinemia, feeding difficulties, temperature instability, hypoglycemia, and hypocalcemia. Such mortality risk estimates and attributable burden could enable the specific targeting of these disorders with appropriate interventions to more effectively save lives.

This study was conducted to evaluate the mortality and morbidity pattern at level II Neonatal Intensive Care Unit (NICU) in Niloufer Hospital in relation to SGA versus AGA preterm. Once the baby is hemodynamically stable, the mothers are trained to take care of their babies.

**MATERIALS AND METHODS**

A retrospective observational analysis was conducted at level II NICU, tertiary care center, Niloufer Hospital, Hyderabad, to study and compare the morbidity and mortality pattern in SGA versus AGA preterm. Retrospectively babies admitted in the 6 months period from January to June 2015 were included in the study. We included intramural and extramural neonates born to singleton mothers with gestation age <37 weeks and birth weight <1.5 kg. Birth weight below 10th centile was defined as SGA neonates and between 10th and 90th centile as AGA neonates on Fenton charts used in our hospital. We excluded infants with major malformations.

Case records of neonates were scrutinized for antenatal and postnatal data. The demographic parameters and morbidities were collected in a predesigned pro forma. The morbidities included were RDS, apnea of prematurity, NEC, PDA, hypoglycemia, hypocalcemia, sepsis, requirement of higher antibiotics, intracerebral hemorrhage (ICH)/IVH, anemia, neonatal jaundice (NNJ), etc., were studied and a comparison of the morbidities was made between birth weight and gestational age among SGA and AGA babies.

Data were analyzed using SPSS statistics version 19.0. For descriptive statistics, frequencies were tabulated and Chi-square test was done to see significance between the groups. A P < 0.05 was considered statistically significant.

**RESULTS**

A total of 95 neonates were enrolled in the study. Of these 47 (48.5%) were males and 48 (49.5%) were females. Inborn babies were 24 (24.7%) and outborn were 71 (73.2%). Mean birth weight 1205.29 g (±180.8g) and mean gestation age 30.92 weeks (±2.3 weeks). Extremely LBW (ELBW) (<1000 g) constituted 15 (15.6%) and very LBW (VLBW) (1000-1499 g) 80 (84.3%) neonates. Proportion of babies who were SGA was 46 (48.4%) and AGA 49 (51.6%). 37 babies (38.5%) were delivered by LSCS and 58 babies (60.4%) were delivered by vaginal route. The underlying cause of prematurity in the majority of the cases was pregnancy induced hypertension (26.3%).

Only 6 (6.3%) babies received complete course of antenatal steroids.

The morbidities of neonates based on weight with respect to AGA/SGA are as follows (Table 1).

RDS, hypoglycemia, NEC, and sepsis were statistically significant among the SGA and AGA groups.

**Table 1: Morbidities/mortality among SGA in relation to AGA preterm**

<table>
<thead>
<tr>
<th>Variables</th>
<th>SGA n=46 (%)</th>
<th>AGA n=49 (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDS</td>
<td>30 (65.2)</td>
<td>43 (87.8)</td>
<td>0.009*</td>
</tr>
<tr>
<td>CPAP</td>
<td>5 (10.9)</td>
<td>12 (24.5)</td>
<td>0.071</td>
</tr>
<tr>
<td>Mech vent</td>
<td>3 (6.5)</td>
<td>8 (16.3)</td>
<td>0.120</td>
</tr>
<tr>
<td>AOP</td>
<td>17 (37)</td>
<td>19 (38.8)</td>
<td>0.512</td>
</tr>
<tr>
<td>ICH/IVH</td>
<td>8 (17.4)</td>
<td>9 (18.4)</td>
<td>0.558</td>
</tr>
<tr>
<td>NEC</td>
<td>3 (6.5)</td>
<td>1 (2.04)</td>
<td>0.007*</td>
</tr>
<tr>
<td>PDA</td>
<td>4 (8.7)</td>
<td>8 (16.3)</td>
<td>0.210</td>
</tr>
<tr>
<td>Hypoglycemia*</td>
<td>12 (26.1)</td>
<td>4 (8.2)</td>
<td>0.019*</td>
</tr>
<tr>
<td>Hypocalcemia**</td>
<td>3 (6.5)</td>
<td>6 (12.2)</td>
<td>0.276</td>
</tr>
<tr>
<td>Sepsis†</td>
<td>27 (58.7)</td>
<td>17 (34.7)</td>
<td>0.016*</td>
</tr>
<tr>
<td>Higher antibiotics</td>
<td>32 (69.6)</td>
<td>38 (77.6)</td>
<td>0.288</td>
</tr>
<tr>
<td>Anemia***</td>
<td>7 (14.8)</td>
<td>8 (16.3)</td>
<td>0.553</td>
</tr>
<tr>
<td>NNJ</td>
<td>40 (87)</td>
<td>44 (89.8)</td>
<td>0.455</td>
</tr>
<tr>
<td>Mean hospital stay</td>
<td>18.04 days</td>
<td>16.73 days</td>
<td></td>
</tr>
<tr>
<td>Deaths</td>
<td>3 (6.5)</td>
<td>1 (2.04)</td>
<td>0.007</td>
</tr>
</tbody>
</table>

*Depicts statistically significant with P<0.05, †Random blood glucose level <45 mg/dl, **Total serum calcium level <7 mg/dl, ***Hb<9 g/dl, *Signs of respiratory distress developing within 6 h of birth and/or radiological evidence, †Based on septic screen/positive blood culture. SGA: Small for gestational age, AGA: Appropriate for gestational age, NNJ: Neonatal jaundice, IVH: Intraventricular hemorrhage, PDA: Patent ductus arteriosus, ICH: Intracerebral hemorrhage
The most common morbidity in the patients in this study was jaundice followed by respiratory problems which were similar to previous studies. Sepsis was also reported as one of the common morbidities blood calcium and glucose levels were significantly low in SGA than AGA babies, a finding again similar to those reported by Kramer et al. These complications could potentially be prevented, or minimized, with interventions such as Kangaroo Mother Care and extra-support for feeding, case management of babies with signs of infection, safe oxygen management and supportive care for RDS, hospital care of babies with RDS, use of continuous positive airway pressure (CPAP) and surfactant, or intensive neonatal care.

The limitation of this study was focusing on the short-term morbidity outcomes in the SGA and AGA neonates. Future studies are recommended to investigate the late morbidity outcomes in the SGA and AGA newborns using long-term follow-ups. Finally, this is a hospital-based study, and the population coming to this tertiary referral hospital may not be representative of the larger population. However, the objective of this paper was to assess the pattern of morbidities/mortality of the level II NICU care in a tertiary hospital setting so that in the future, the quality of care provided for these infants can be improved.

**CONCLUSION**

This study is one of very few research studies on this topic from developing countries. More than three-quarters of preterm/premature babies can be saved with often inexpensive care such as good antenatal care, antenatal steroid injections, essential care during child birth, increasing use of CPAP, aseptic precautions during hospital stay, improving breast feeding rates, involving mothers in the neonatal care, and kangaroo mother care. Identification of risk factors in women with improved care before, between and during pregnancies; better access to contraceptives and increased empowerment/education can further decrease the preterm birth rate.

**REFERENCES**


