Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2017/27

Original Article

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

Usha Rani Hasthi[1], Neetika Ashwani[2], C Suresh Kumar[3], Suguna Reddy Chejeti[1]

[1]DM Resident, Department of Pediatrics, Neonatal Intensive Care Unit, Niloufer Hospital, Osmania Medical College, Hyderabad, Telangana, India, [2]SNCU Medical Officer, Special Newborn Care Unit, Niloufer Hospital, Osmania Medical College, Hyderabad, Telangana, India, [3]Head, Professor of Neonatology, Niloufer Hospital, Osmania Medical College, Hyderabad, Telangana, India

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

Access this article online

www.ijss-sn.com

Month of Submission : 11-2016
Month of Peer Review : 12-2016
Month of Acceptance : 12-2016
Month of Publishing : 01-2017

Corresponding Author: Dr. Usha Rani Hasthi, Flat no. G1, A Block, Brindavan Apartment, Red Hills, lakdi ka pul, Hyderabad - 500004. Mobile: +91 8985750632. E-mail: ushamahesh1302@gmail.com

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.[2] 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.[3,4] 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%.[5,6] Especially with high incidences for LBW and IUGR-LBW in India (28%, 21%), respectively.[7]

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 hypocalcaemia.[8] 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 (26.31%).

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

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

*Depicts statistically significant with $P<0.05$, *Random blood glucose level <45 mg/dl, **Total serum calcium level <7 mg/dl, ***Hb<9 g/l, †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

(65.2% vs. 87.8%), (26.1% vs. 8.2%), (6.5% vs. 2.04%), and (58.7% vs. 34.7%), respectively. The difference in the rates of other morbidities was not statistically significant. NNJ 84 (88.4%) was the most common morbidity in preterm followed by RDS 73 (76.8%). The duration of hospital stay was higher in SGA babies compared to AGA babies (18.04 vs. 16.73 days, respectively). The mortality trends for the "very preterm babies" are presented in Table 1. Considering the outcomes, the overall mortality for the "preterm babies" included in the study was 4 (4.2%). There was a significantly lower mortality in the "AGA group as compared to 'SGA group' (2.04% vs. 6.5%, respectively)". Two of the 15 ELBW neonates required LASER for ROP and none of the VLBW babies required treatment for ROP. Two in ELBW group and one in VLBW group did not pass the otoacoustic emissions test and were further advised to do brainstem evoked response audiometry.

All the babies in the ELBW group (100%) and 3/4th of babies in the VLBW group (74.7%) developed RDS. ELBW babies required more C-pap support compared to VLBW babies which was statistically significant (74.6 vs. 35.6%, respectively). The risk of all the morbidities was noted to be higher in ELBW group than in the VLBW group, but the difference was statistically significant only for hypoglycemia, hypocalcemia, sepsis, ICH/IVH, and requirement of higher antibiotics (50 vs. 13.8%, 37.5 vs. 6.9%, 87.5 vs. 42.5%, 62.5 vs. 13.8%, 62.5 vs. 23.0%, respectively). The difference in deaths (20% in ELBW and 5% in VLBW) was also statistically significant. Babies with gestational age <28 weeks had more risk of all the morbidities. Those with gestational age >34 weeks had lesser risk of all the morbidities.

DISCUSSION

Our study showed that the risk of neonatal mortality was highest among preterm SGA compared to AGA babies. However, different studies presented conflicting reports on the outcomes of the prematurity in the SGA and AGA newborns. While some studies reported increased mortality and morbidity rates in the SGA preterm neonates,[9,10] a number of other studies demonstrated decreased rates in this regard.[11] Furthermore, there are several studies reporting no changes in the mortality and morbidity of the preterm SGA neonates, compared to their AGA peers.[12,13]

As the findings of the current study indicated, RDS was less prevalent in the SGA neonates, compared to the AGA ones. These findings are consistent with those observed in some of the previous studies.[11] The most common morbidity in the patients in this study was jaundice followed by respiratory problems which were similar to previous studies.[14-16] Sepsis was also reported[14,17] 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.*[18] 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.[19]

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

1. UNICEF, WHO. Low Birthweight: Country, Regional and Global Estimates. New York: UNICEF, WHO; 2004.
2. Lee AC, Katz J, Blencowe H, Cousens S, Kozuki N, Vogel JP, *et al*. Born too small: National and regional estimates of term and preterm small-for-gestational-age in 138 low-income and middle-income countries in 2010. Lancet Glob Health 2013;1:e2-36.
3. Kramer MS, Demissie K, Yang H, Platt RW, Sauvé R, Liston R. The contribution of mild and moderate preterm birth to infant mortality. Fetal and Infant Health Study Group of the Canadian Perinatal Surveillance System. JAMA 2000;284:843-9.
4. Marchant T, Willey B, Katz J, Clarke S, Kariuki S, ter Kuile F, *et al.* Neonatal mortality risk associated with preterm birth in East Africa, adjusted by weight for gestational age: Individual participant level meta-analysis. PLoS Med 2012;9:e1001292.
5. Wu LA, Katz J, Mullany LC, Khatry SK, Darmstadt GL, LeClerq SC, *et al.*

The association of preterm birth and small birthweight for gestational age on childhood disability screening using the Ten Questions Plus tool in rural Sarlahi district, Southern Nepal. Child Care Health Dev 2012;38:332-40.
6. Osendarp SJ, van Raaij JM, Arifeen SE, Wahed M, Baqui AH, Fuchs GJ. A randomized, placebo-controlled trial of the effect of zinc supplementation during pregnancy on pregnancy outcome in Bangladeshi urban poor. Am J Clin Nutr 2000;71:114-9.
7. de Onis M, Blössner M, Villar J. Levels and patterns of intrauterine growth retardation in developing countries. Eur J Clin Nutr 1998;52 Suppl 1:S5-15.
8. Muhammad T, Khattak AA, Shafiq-ur-Rehman. Mortality and morbidity pattern in small-for-gestational age and appropriate-for-gestational age very preterm babies: A hospital based study. J Ayub Med Coll Abbottabad 2009;21:16-21.
9. Simchen MJ, Beiner ME, Strauss-Liviathan N, Dulitzky M, Kuint J, Mashiach S, *et al.* Neonatal outcome in growth-restricted versus appropriately grown preterm infants. Am J Perinatol 2000;17:187-92.
10. Bardin C, Zelkowitz P, Papageorgiou A. Outcome of small-for-gestational age and appropriate-for-gestational age infants born before 27 weeks of gestation. Pediatrics 1997;100:E4.
11. Procianoy RS, Garcia-Prats JA, Adams JM, Silvers A, Rudolph AJ. Hyaline membrane disease and intraventricular haemorrhage in small for gestational age infants. Arch Dis Child 1980;55:502-5.
12. Schiff E, Friedman SA, Mercer BM, Sibai BM. Fetal lung maturity is not accelerated in preeclamptic pregnancies. Am J Obstet Gynecol 1993;169:1096-101.
13. Owen J, Baker SL, Hauth JC, Goldenberg RL, Davis RO, Copper RL. Is indicated or spontaneous preterm delivery more advantageous for the fetus? Am J Obstet Gynecol 1990;163:868-72.
14. Khan MR, Maheshwari PK, Shamim H, Ahmed S, Ali SR. Morbidity pattern of sick hospitalized preterm infants in Karachi, Pakistan. J Pak Med Assoc 2012;62:386-8.
15. Onalo R, Olateju KE. Trend and seasonality in admissions and outcome of low birthweight infants in Gwagalada Abuja, Nigeria. Int J Trop Dis Health 2013;3:190-8. Available from: http://www.journalrepository.org/media/journals/IJTDH_19/2013/May/1368421110-Onalo332013IJTDH3416.pdf.
16. Aucott SW, Donohue PK, Northington FJ. Increased morbidity in severe early intrauterine growth restriction. J Perinatol 2004;24:435-40.
17. Onwuanaku CA, Okolo SN, Ige KO, Okpe SE, Toma BO. The effects of birth weight and gender on neonatal mortality in North Central Nigeria. BMC Res Notes 2011;4:562.
18. Kramer MS, Olivier M, McLean FH, Willis DM, Usher RH. Impact of intrauterine growth retardation and body proportionality on fetal and neonatal outcome. Pediatrics 1990;86:707-13.
19. Kc A, Wrammert J, Nelin V, Ewald U, Clark R, Målqvist M. Level of mortality risk for babies born preterm or with a small weight for gestation in a tertiary hospital of Nepal. BMC Public Health 2015;15:877.

How to cite this article: Hasthi UR, Ashwani N, Kumar CS, Chejeti SR. 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. Int J Sci Stud 2017;4(10):133-136.

Source of Support: Nil, **Conflict of Interest:** None declared.