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Early Morbidities & Mortality among SGA and AGA Preterm Neonates in South India

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ABSTRACT

Introduction: Pre-term birth is the main determinant of neonatal morbidity and mortality with long-term adverse health consequences. Infants born pre-term compared to term infants experience more difficulty with temperature instability, feeding intolerance, blood glucose regulation, jaundice, apnea, respiratory distress (RDS) and sepsis.

Aim: To study the early neonatal morbidities of all pre-term neonates admitted in NICU and to know the immediate outcome during their stay. Also to compare rate of early morbidities and mortality among SGA and AGA pre-term neonates.

Material and method: It's a prospective observational study carried out in a NICU of a Medical college in South India, for a period of 18 months. Preterm babies(less than 37 weeks gestation using Modified Ballard score) divided into SGA and AGA using growth charts. Total 100 preterm babies included of which SGA and AGA were 50 each. Neonates with TTN(Transient Tachypnea of the Newborn), Birth asphyxia, Neonatal sepsis, Hypoglycemia, Hypothermia, Neonatal hyperbilirubinemia, Respiratory insufficiency, Feed intolerance were included in present study.

Results: Hyperbilirubinemia constituted 61% of morbidities, among which 47.5% are AGA neonates and 52.5% are SGA neonates. 24 newborns presented with sepsis, 15 newborns with feed intolerance. 80 newborns had hypoxia at admission. RDS was commonly seen in AGA neonates when compared to SGA neonates. 6 babies among AGA and 8 among SGA had mortality. One baby was discharged against medical advice.

Conclusion: Most common morbidities among the SGA neonates were sepsis, hyperbilirubinemia, feed intolerance, hypoglycemia, Apnea, PDA, hypoxia. AGA neonates had metabolic disorders and RDS.

Keywords: Hyperbilirubinemia, Small for gestational age, SGA, Appropriate for gestationalAge, AGA.

INTRODUCTION

Preterm babies are major determinant of neonatal morbidity and mortality with significantly high risk for adverse medical, psychosocial behavioural outcome in the long term[1,2]. When compared to term infants, preterm infants are at increased risk for various complications such as jaundice, feed intolerance, blood glucose control, apnea, Respiratory distress syndrome, either singly or in combination because of their physiological immaturity[3,4,5]

Morbidity and mortality among SGA and AGA preterm are compared by number of studies which has shown high mortality in SGA preterm infant compared to AGA preterm infant but differences

regarding respiratory and non-respiratory morbidities are not clear. Lower incidence of RDS among SGA infant and longer hospital stay among AGA infant is shown by many studies [6,7,9]. Information regarding the mortality and morbidity patterns of pre-term babies from developing countries is sparse. Hence, studying these pre-term babies becomes mandatory for proper and timely management and also for formulation of intervention plan to improve survival of preterm infants. As disease patterns vary among preterm infant in terms of place and time, present study was done at a NICU of Medical college in South India, to know the morbidity and mortality pattern among all preterm and comparison of early morbidities among SGA and AGA preterm neonates.

METHODS

Study Design: It is a prospective observational study done for a period of 18 months. All the preterm babies admitted in NICU during the study period were included in the study. Babies who had surgical conditions, congenital malformations, genetic disorders, which were incompatible for life and babies admitted after 5 day of life referred from other hospital were excluded.

Gestational age was assessed by Modified Ballard score and using the standard reference charts were classified into SGA and AGA. For various morbidities like hypothermia, hypoglycemia, hyperbilirubinemia, respiratory insufficiency, birth asphyxia, sepsis, feed intolerance well established definitions were used. Regarding rehospitalisation, duration considered is within one month of age. Details regarding maternal risk factors was collected by detailed history taking and the medical records with them. The newborns in the study sample were followed throughout their stay in the NICU and postnatal wards, up until hospital discharge. Data was collected from infants and mothers' medical records using a structured form covering the variables of interest and analyzed.

Sample Size: With Anticipated Mean Difference of prevalence of morbidity between the two study groups among pre-term babies as 10.1 and Anticipated SD as 13.9, the minimum sample size per group is 50 with 90% power and 5% level of significance.

By using the formula:

$$n = \frac{(z_\alpha + z_\beta)^2 \, 2 \, SD^2}{MD^2}$$

Where Z= Z statistic at a level of significance

MD= Anticipated mean difference

SD= Anticipated Standard deviation

Details of statistical analysis: All characteristics were summarized descriptively. Data was analyzed by Chi square test for association, comparison of means using t test and ANOVA

RESULTS

Out of total 100 pre-term neonates, 50 pre-term neonates were grouped into SGA and 50 pre-term neonates were grouped into AGA. 56.4 % were male in AGA and 43.6% were male in SGA group. Statistically significant mean weight difference of pre-term neonates in AGA and SGA was found, with high mean weight in AGA neonates compared to SGA neonates. Significant differences were noted in frequency distribution of birth week in SGA and AGA groups, with 21 pre-terms born in 28-30 weeks in SGA, 15 on 31-32 weeks in SGA. Whereas, in AGA group, majority pre-terms were born in gestational age of 33-34week.

Over all morbidities in pre-term newborns were represented with 62% hyperbilirubinemia, 24 % with sepsis, 20% with respiratory distress syndrome, and 6% with hypoglycemia and 8% with apnea. 80% of the pre-term neonates required oxygen support at the hospital stay, and 22% required ventilator support. 17% presented with surfactant insufficiency. 11 newborns were diagnosed with presence of Patent Ductus Arteriosus and 53% required continuous positive airway pressure. At the time of discharge from the hospital 85% of pre-term newborns improved in their health condition. (Table 1 and Figure 1)

Neonates with SGA had more morbidities compared to the AGA neonates. Incidence of Apnea, and Hypoxia was significantly more in the SGA pre-term neonates compared to AGA. Others which include, sepsis, hyperbilirubinemia, hypoglycemia, Patent Ductus Arteriosus (PDA) was more in SGA pre-term neonates than the AGA neonates. Whereas, Respiratory Distress Syndrome and metabolic disorders which include metabolic acidosis, respiratory acidosis and respiratory alkalosis was

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more in AGA than SGA pre-term neonates. There was only one case of Intra ventricular hemorrhage(IVH) among SGA baby, none of the AGA babies had a IVH.(Table 2, Figure 2)

DISCUSSION

The study comprised of 100 pre-term neonates. Our study has shown risk of morbidity is highest among preterm SGA compared to AGA with no significant outcome difference among AGA and SGA. Though there is limited published data from India with respect to morbidities based on AGA and SGA, few studies have shown that there is increased risk of morbidity and mortality rate in SGA[6,7], whereas few other studies have shown decreased rate with respect to morbidities and mortality risk among SGA and AGA[8]

Our present study has shown hyperbilirubinemia was major morbidity among all preterm with more prevalence in SGA compared to AGA. Overall morbidities like sepsis, hypoxia, apnea are more in SGA when compared to AGA. RDS is most common morbidity in AGA when compared to SGA. These findings are consistent with study done by Usha et.al[9] (Table 3)

In present study over all morbidities related to sepsis, hypoglycaemia, feed intolerance, hyperbilirubinemia was comparable to study done by Teune MJ et.al[10] (Table 3)

These morbidities could be minimized with proper intervention like monitoring for signs of infection and supportive care with oxygen, ventilation for RDS, with an extra support for feeding and KMC (Kangaroo mother care). There was no readmission of the babies during the study period. Other morbidities like Acute kidney injury was not observed in the study population.

Limitation of our study was lack of long term follow up and study population in present study may not be representative of large population. However, objective of present study was to assess pattern of morbidities and mortality in tertiary hospital setting which varies from place to place so that in future to provide improved quality of care for these infants and to minimize or prevent morbidity.

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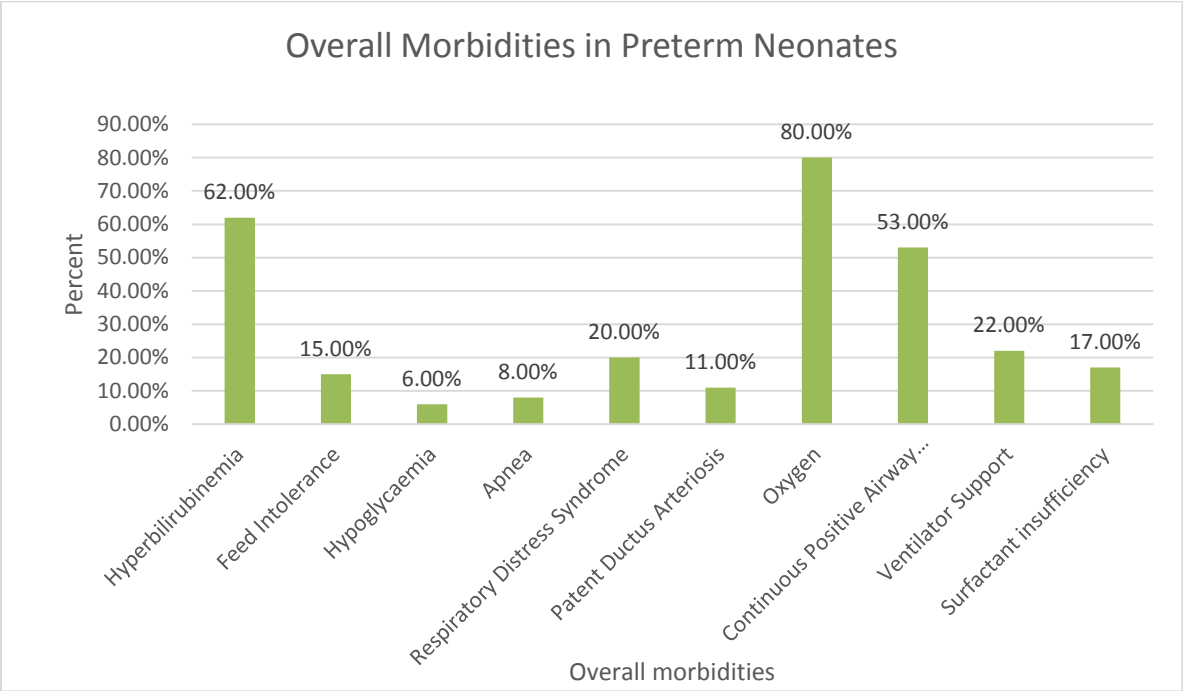

Figure 1: Overall Morbidities in Preterm Neonates

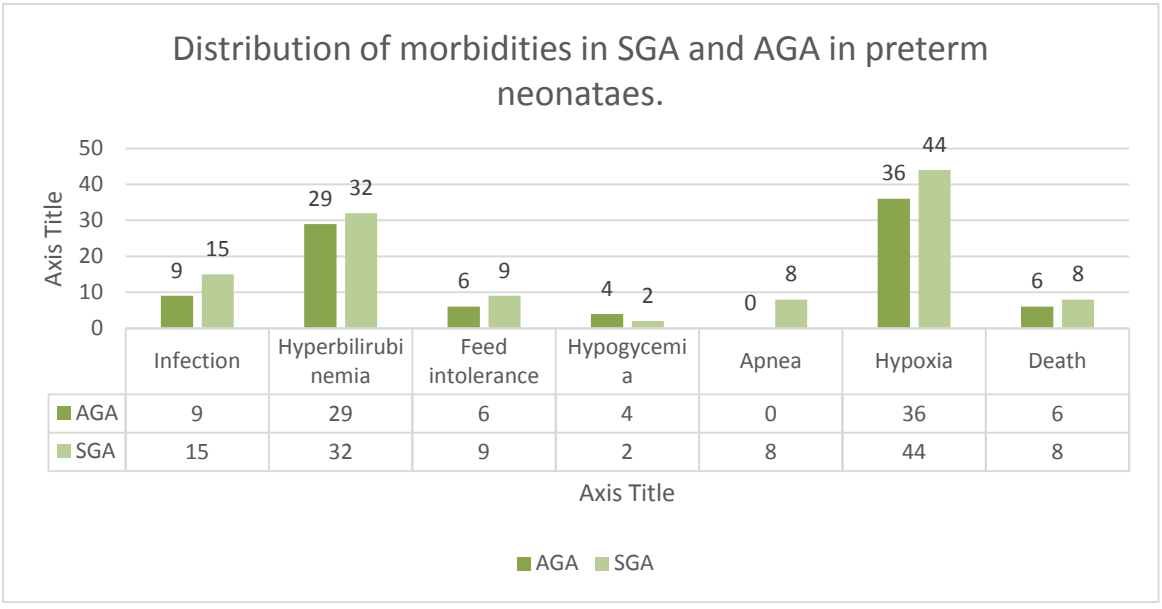

Figure 2: Neonatal Morbidities in SGA and AGA pre-term neonates

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Table 1: Showing overall morbidities in pre-term neonates in present study.			
Morbidities		Pre-term neonates	
		Frequency	Percent
Infection		24	24.0%
Hyperbilirubinemia		62	62.0%
Feed Intolerance		15	15.0%
Hypothermia		0	0.0%
Metabolic Issues	Metabolic Acidosis	11	11.0%
	No Metabolic imbalance	87	87.0%
	Respiratory Acidosis	1	1.0%
	Respiratory Alkalosis	1	1.0%
Hypoglycemia		6	6.0%
Apnea		8	8.0%
Respiratory Distress		20	20.0%
Patent Ductus Arteriosus		11	11.0%
Oxygen		80	80.0%
Continuous Positive Airway Pressure		53	53.0%
Ventilator Support		22	22.0%
Hyaline membrane disease		17	17.0%
Outcome	Discharge Against Medical Advice	1	1.0%
	Improved	85	85.0%
	Died	14	14.0%
Table showing the frequency and percent of overall morbidities in pre-term neonates included in the present study.			

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Table 2: Distribution of overall morbidities in SGA and AGA newborns and compared using Chi-square test.

Presence of morbidities		Appropriate for Gestational Age (AGA)	Small For Gestational Age (SGA)	Chi-square
		N (%)	N (%)	p-value
Infection		9 (37.5)	15 (62.5)	.160
Hyperbilirubinemia		29 (47.5)	32 (52.5)	.535
Feed Intolerance		6 (40)	9 (60)	.401
Hypothermia		0 (0)	0 (0)	-
Intra ventricular hemorrhage (IVH)		0	1	
Metabolic Disorders	Metabolic acidosis	7 (63.6)	4 (36.4)	.376
	Respiratory acidosis	1 (100)	0 (0)	
	Respiratory alkalosis	1 (100)	0 (0)	
Hypoglycemia		4 (66.7)	2 (33.3)	.400
Apnea		0 (0)	8 (100)	.003**
Respiratory Distress Syndrome		14 (70)	6 (30)	.046*
Patent Ductus Arteriosus		4 (36.4)	7 (63.6)	.338
Hypoxia		36 (45)	44 (55)	.046*
Mortality		6 (42.9)	8 (57.1)	

*p<.05 is statistically significant; **p<.001 is statistically high significant.

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Table 3: Comparison of morbidities associated with AGA and SGA in various studies.

		HYPOGLYCEMIA	SEPSIS	JAUNDICE	HYPOTHERMIA	NEC	RDS	IVH	PDA
ANJALI et. Al[11]	AGA	6(7.14%)	30(35.71%)	31(36.90%)	9(10.71%)	10(11.90%)	14(16.66%)	3(3.57%)	7(8.33%)
	SGA	12(19.04%)	21(33.33%)	25(39.68%)	6(9.52%)	4(6.34%)	20(31.74%)	1(1.56%)	2(3.17%)
	P-VALUE	0.0412	0.80	0.78	0.823	0.28	0.059	0.47	0.21
TAJ MUHAMMAD et.al[12]									
	AGA	27(27%)	9(9%)	51(51%)			47(47%)		4(4%)
	SGA	15(15%)	11(11%)	67(67%)			37(37%)		4(4%)
	P-VALUE	0.03	0.6	0.02			0.15		1.0
HASTI et.al[9]									
	AGA	4(8.2%)	17(34.7%)	44(89.8%)		1(2.04%)	43(87.8%)	9(18.4%)	8(16.3%)
	SGA	12(26.1%)	27(58.7%)	40(87%)		3(6.5%)	30(65.2%)	8(17.4%)	4(8.7%)
	P-VALUE	0.019	0.016	0.455		0.007	0.009	0.558	0.210
OUR STUDY									
	AGA	4 (66.7)	8(16%)	29(47.5%)	0(0%)	1(2%)	14(70%)	0(0%)	4(36.4%)
	SGA	2 (33.3)	13(26%)	32(52.5%)	0(0%)	0(0%)	6(30%)	1(2%)	7(63.6%)
	P-VALUE	0.400	0.160	0.535			0.046		0.21

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