AN ANALYTIC STUDY ON NORMOGRAM OF BIRTH WEIGHT AND PERIOD OF GESTATION IN PREGNANCY

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ABSTRACT: OBJECTIVE: This study aims at determining the normogramme of birth weight for preterm, full term, post term births and also for SGA, AGA, LGA domain. The objective is to identify the group of infants who need intensive neonatal care. **METHODS:** Retrospective analytic study was conducted on 2,627 new born which are screened by birth weight and their gestational age Other variables like sex & NICU admission for different AGA, SGA, LGA domain were also analyzed. **RESULTS:** Study includes 68 % full term, 28% preterm and 4% post mature newborn. Infant category AGA were 57%, SGA 40% and LGA 2%. SGA domain infant maximum was 54% and 59% in full term & post term respectively. However for preterm infants AGA domain was maximum of 61%. NICU admission of LGA and SGA domain was 30-31 % and only 25% for AGA infants which was significant. **CONCLUSION:** 44% of preterm infants, 30% of SGA & LGA need critical observation at birth.

KEY WORDS: Birth weight, NICU admission, SGA, Preterm newborn

INTRODUCTION: A healthy new born at 38-42 weeks of gestation, average weight for country usually exceeds >2500 grams. Cries and adapts to the environment immediately after birth. It initiates independent rhythmic respiration¹. However survival outcome of preterm or low birth weight new born depends upon gestational age, as well as birth weight. Low birth Weight has been a time tested and traditionally used indicator of adverse neonatal and infant outcome.

WHO has defined low birth weight babies as babies weighing less than 2500gms (up to and including 2499 gm) at birth² In developing countries low birth weight is reported between 25-36% of total births as compared with developed countries where it is less than 10%^{3,4} Small for gestational age new born are prone for adverse neonatal outcome at birth.

Birth weight is an important determinant of neonatal survival the birth weight is variable from country to country. There may be variation in data of birth weight from state to state. Hence the aim is to identify the normogramme of birth weight for preterm, full term, post term new born. The aim is to predict possibility of risk of SGA in preterm, full term and post mature infants. This group may reflect the need for admission to NICU.

Next purpose of this study is, to identify sex-specific local population-based reference are also considered in the present study. Apart from newborn anthropometrics, NICU admission may be a new variable added to the revised birth certificate to monitor subsequent growth.

There is a need to identify the neonate at birth required intensive neonatal care and support at birth. With this background the present study is being conducted at our institute.

METHODOLOGY: A retrospective analytic study was conducted in hospital based population, at PCMS & RC Bhopal M.P. All birth records from January 2011 to June 2013 were analyzed. Relevant

variables like gestational age at birth, domain of newborn like SGA, AGA, LGA sex and need for NICU admission was documented.

In this study 2,627 newborns were registered. Gestational age was largely based on early ultrasound estimates and menstrual history. Distributions of birth weight at the corrected gestational age was then statistically smoothed. Birth weight for serial gestational age was plotted for three domains of new born like AGA, SGA, and LGA. A small-for-gestational-age cutoff (10th percentile) was used. Large-for-gestational age cutoffs (90th percentile) was used. AGA domain range was in between the two cut offs.

Data analysis was conducted to assess the independent association of variables like sex and NICU admission along the entire birth weight spectrum. The aim was to predict possibility of risk of SGA in preterm, full term and post mature infants. Hypothesis was this group may reflect the need for admission to NICU.

RESULTS: 2,627 newborns were delivered during the period of two years & six months. Out of them 1,798 (68%) were full term 736(28%) were preterm and 93 (4%) were post term births. Percentage of births within the domain of appropriate size for gestational age (AGA) and Small for gestational age (SGA) was equal 49%. LGA infants were only 2 %.

In full term births, maximum 54% constituted SGA domain, 45% were AGA and least 0.7 % LGA. In preterm births maximum 61% births were of AGA domain and 33% and 6% were of SGA and LGA domain respectively. SGA was highest in the Post term births 59 %.

Analysis of different domains –Maximum 77 % of SGA infants and 63% of AGA infants were full term. 74 % of LGA infants were preterm

Out of 2627 newborns 739 required NICU admission. Admission rate was highest 44% for preterm newborns. 27% of post term and 22% of full term were admitted to NICU. $\chi^2 = 133.341^a$ p VALUE =0.000 (Significant). As per domain of newborn SGA admissions were maximum to extent of 54 % of 739 infants. (Chi-Square Tests =11.732^a p VALUE =0.003 Significant)

Among 739 NICU admissions 45% were male and 55% were female. Pearson Chi-Square of 0.032 statistically significant.

DISCUSSION: In the present study of 2627 births, 28% were preterm and 4 % post term comprising high risk group. NICU admission rate as highest 44% for preterm it reduced to 22 % for full term births. Lakhkar et al⁵ conducted study on 113 births where 57 % of preterm 43% term newborn were shifted to NICU. Their study did not include births above 2000 gram and sample was very small.

Graphic record of percentage of SGA from 28 weeks to 33 weeks of pregnancy starting value was 10-28% First peak of NICU admission was 32% & 53%, identified at 36 weeks and 38 weeks respectively. Subsequently percentage of SGA domain reached maximum up to 50% at 39 weeks and 58 % at 40-43 weeks of pregnancy GRAPH 1.

The data was further analyzed to predict the need of admission to intensive care unit reflecting the risk of serious outcome in the newborn NICU admissions were 739 (28%) among all births.

For preterm infants 44%, post term 27% and full term infants 22%. Only 25% was the admission rate for AGA infants. 30-31 % were admitted to NICU of LGA and SGA domain.

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CHI SQ=11.732^a p VALUE =0.003 (Significant)

STRENGTH & LIMITATION: The unique feature of the study is that need for NICU admission is analyzed in domain-wise & gestation wise also. Condition of newborns after NICU admission requires further extensive workup stands as a limitation of the study.

IMPACT OF THE STUDY: Birth weight, NICU admission & domain of the baby may be a new variable added in the birth certificate. It may be practiced in future as per other developed countries.

CONCLUSION: Need for NICU admission percentage of SGA babies increased step wise manner with advancement of gestation. SGA domain reached maximum up to 50% at 39 weeks and 58 % at 40-43 weeks of pregnancy. 44% of preterm infants, 30% of AGA & LGA need critical observation at birth. The significant variant of NICU admission 30-31 % for LGA, SGA domain was identified This group requires attention in clinical practice.

Domain	Gestational Age					
	Pre Term	%	Full Term	%	Post Term	%
SGA 1273	244/1273	19%	974/1273	77%	55/1273	4%
AGA 1292	446/1292	35%	810/1292	63%	36/1292	3 %
LGA 62	46/62	74%	14/62	23%	2/62	3%
Total	736/2627 (28%)		1798/2627 (68%)		93/2627 (4%)	

TABLE 1: Relation of SGA, AGA & LGA in preterm,full term and post term births

N=2627	NICU Admission		NICU Admission %	Total	NICU admission %	CHI SQ p VALUE
	No	Yes 739				
Pre Term 736	410	26/739	44%	326/736	44%	133.341 0.000 (Significant)
Full Term 1798	1410	388/739	53%	388/1798	22%	
Post Term 93	68	25/739	3%	25/ 93	27%	
	1888	739	100%	739/2627	100%	
SGA 1273	877	396/739	54%	396/1273	31%	11.732 0.003 (Significant)
AGA 1292	968	324/739	44%	324/1292	25%	
LGA 62	43	19/739	3%	19/62	30%	
Total	1888	739	100%	739/2627	100%	

TABLE 2: Relation of Gestational Age and SGA,AGA,LGA domain of baby * NICU Admission

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GRAPH 1: Distribution of NICU admission in SGA,AGA,LGA domain

Graph 2: Gestational Age and Percentile of Birth Weight.

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