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RISK FACTORS AND COMPLICATIONS OF SMALL FOR GESTATIONAL AGE (SGA) IN TERM NEWBORNS IN FIRST 24 HOURS AFTER DELIVERY.

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ABTRACT… Objectives: To determine the frequency of risk factors and acute complications for SGA in term new borns during first 24 hours after delivery. **Study Design:** Descriptive Case Series. **Setting:** Department of Pediatric Medicine, Nishter Hospital, Multan. **Period:** 15 Aug 2014 to 30 Apr 2015. **Material & Methods:** A total of 157 term babies, delivered in labor room in Nishter hospital Multan were evaluated in 24 hours of birth. Mother of each SGA baby was examined regarding history, clinical examination and nutritional status were noted. SGA babies were completely monitored for 24 hours in the department of pediatric medicine for complications. **Results:** There were 88 (56.1%) male and 69 (43.9%) female. Mean age and weight of the patients at the time of presentation were 12.73 + 6.65 hours and 2.03 + 0.65 Kg respectively. Among mothers, 61.1% were nulliparous, anemia was found in 47.8%, inter pregnancy intervals of less than or equal to one year in 58.6% and hypertension in 61.8%. Among SGA babies, perinatal asphyxia was found to be present in 63.7%, meconium aspiration in 51%, hypothermia in 37.6%, hypoglycemia in 24.2%, hypocalcaemia in 32.5%, polycythemia in 47.1% and thrombocytopenia in 41.4%. **Conclusion:** Maternal hypertension, nulliparity, short inter pregnancy interval and anemia were frequently encountered risk factors for SGA babies. The most frequently encountered perinatal complications observed were perinatal asphyxia, meconium aspiration, polycythemia, thrombocytopenia, hypothermia, hypocalcaemia and hypoglycemia in decreasing order of frequency.

Key words: Meconium Aspiration, Nulliparity, Perinatal Asphyxia, SGA.

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INTRODUCTION

Many descriptive terms were proposed from time to time to characterize the group of infants who have impaired fetal growth; these include pseudo premature, small for dates, dysmature, and fetal malnourished, chronic fetal distress, intrauterine growth retardation (IUGR), hypotrophic and small for gestational age (SGA).[1] Small for gestational age (SGA) has been defined as infant having birth weight less than 10th centile for gestation.[2]

This definition includes infants whose birth weight is below the 10th percentile due to fetal malnutrition or other intrauterine events, but it also includes infants who have reached their genetic growth potential, are normal, and happen to be lighter than 90% of the population. Every neonate should be compared with the population of similar social, ethinic and socioeconomic background. There are no present or old large population-based birth weight normograms available for Pakistani population. In Pakistan we used "Colorado growth chart" produced by Lubchencoet al.[3] In Pakistan 10 - 25% of newborn may be full term SGA and most are asymmetrical.[4] The mortality rate for babies who are SGA and is nine times higher than those of Appropriate for Gestational Age (AGA).[5]

Causes of low birth weight are multifactorial with genetic, placental, fetal and maternal factors interplaying with each other. A strong correlation exists between birth weight and maternal height, weight, age, antenatal care visits and risk status at pregnancy.[6] Malnourished mothers face potential complications in childbirth and the likelihood

of low birth weight babies.[7] More than 40% of Pakistani pregnant women are anemic and give birth to SGA babies. The incidence of low birth weight babies in these women is as high as 25%.[8]

A variety of acute perinatal events may occur in SGA infants. These infants are more vulnerable to perinatal complications which have harmful influences on subsequent growth and development. Among these are perinatal asphyxia, meconium aspiration syndrome, hypoglycemia, hypocalcaemia, pulmonary hemorrhage, hypothermia, polycythemia, thrombocytopenia and infections.[9-11]

There is paucity of data on this subject in Pakistani studies, so this study was planned to identify common risk factors in pregnant women resulting to the birth of SGA newborn. Study was also done to note acute complication in SGA newborn. So that based on these observations, recommendations could be made for the improvement of measures on preventive as well as on management sides to reduce morbidity and mortality in SGA newborns according to our resources and facilities.

MATERIAL & METHODS

This was a descriptive case series study carried out at the Department of Pediatric Medicine, Nishtar Hospital, Multan, from 15 Aug 2014 to 30 Apr 2015.

Total 157 children during the study period were enrolled by using non- probability consecutive sampling. All full term newborns up to age of 24hours having weight less than 10th centile & gestation confirmed by ultrasonography with cephalic presentation of fetus were included in study. However twin babies, preterm SGA and dysmorphic babies were excluded.

Approval from ethical committee and an informed consent from the attendant were taken. All the term babies who were delivered in labor room in Nishter Hospital Multan were evaluated in 24 hours of birth. Birth weight was recorded in baby weight scale, gestational age was calculated by using ballard score. If baby fulfills the criteria then he/she was enrolled in study. Mother of each SGA baby was examined and her data was reviewed, complete history and examination was done. Obstetric history was obtained with special reference to age, parity, duration of gestation and interpregnancy interval from mother. Nutritional status of mother, any previous SGA baby, history of hypertension and record during pregnancy was checked. All enrolled SGA babies were completely monitored for 24hrs in department of pediatric medicine and noted for any complications especially perinatal asphyxia (deprivation of oxygen to a newborn infant that lasted long enough during the birth process to cause harm to the brain), hypoxic ischemic encephalopathy (abnormal neurological function), meconium aspiration syndrome (meconium-stained amniotic fluid (MSAF) and meconium within lungs), hypothermia (temperature below 36.5°C), hypoglycemia (blood glucose < 70 mg/dl), hypocalcaemia (total serum calcium concentration < 8 mg/dL in term infants or < 7 mg/dL in preterm infants), thrombocytopenia (platelet count less than 150 x 10^9/L), polycythemia (central venous Hct over 65% or a hemoglobin value above 22 g/dL) and infections. All relevant investigations along with the demographic data were recorded in proforma.

All the data were analyzed through Statistical Package for Social Sciences (SPSS) version 16. All quantitative variables like age and weight were presented as mean and standard deviation while qualitative variables like gender, maternal factors and neonatal complications were presented as frequency and percentages. Chi square test was applied with 95% confidence interval & p-value≤0.05 was taken as significant.

RESULTS

There were 157 patients in total. Males were 56.1% while females were 43.9%. Mean age of the patients was 12.73 + 6.65 hours at presentation. Mean weight of the patients was 2.03 + 0.65 kg. Among the mothers, 61.1% were nulliparous while 38.9% were multiparous. Anemia was found to be present in 47.8% however inter pregnancy intervals was found to be one year in 58.6% while it was more than one year in 41.4%.

Out of 157 in 61.8% hypertension was present. Among the small for gestational age babies, perinatal asphyxia was found to be present in 63.7%, meconium aspiration was present in 51%, hypothermia was found in 37.6%, hypoglycemia was present in 24.2%, hypocalcaemia was present in 32.5% polycythemia was present in 47.1%, thrombocytopenia was present in 41.4%.

Table-II shows evaluation of maternal risk factors and neonatal complications with respect to gender, all variables turned out to be insignificant (p-value > 0.05) except inter pregnancy interval of less than one year (p-value < 0.035).

Table-III shows effect of weight on various maternal risk factors and neonatal complications, all factors turned out to be statistically insignificant (p-value > 0.05).

Total Patients	157
Males	88/157 (56.1%)
Females	69/157 (43.9%)
Mean age (hours)	12.73 + 6.65
Mean weight	2.03 + 0.65
Nulliparous	96/157 (61.1%)
Multiparous	61/157 (38.9%)
Anemia in mothers	75/157 (47.8%)
Inter pregnancy interval one year	92/157 (58.6%)
Inter pregnancy interval more than one year	65/157 (41.4%)
Hypertension in mothers	97/157 (61.8%)
Perinatal asphyxia	100/157 (63.7%)
Meconium aspiration	80/157 (51%)
Hypothermia	59/157 (37.6%)
Hypoglycemia	38/157 (24.2%)
Hypocalcaemia	51/157 (32.5%)
Polycythemia	74/157 (47.1%)
Thrombocytopenia	65/157 (41.4%)

Table-I. Characteristic of Patients.

Maternal Risk Factors	Males	Females	P-Value
Nulliparous	57/88 (64.8%)	39/69 (56.5%)	0.325
Multiparous	31/88 (35.2%)	30/69 (43.5%)	
Anemia in mothers	43/88 (48.9%)	32/69 (46.4%)	0.872
Inter pregnancy interval one year	45/88 (51.1%)	47/69 (68.1%)	0.035
Inter pregnancy interval more than one year	43/88 (48.9%)	22/69 (31.9%)	0.411
Hypertension in mothers	57/88 (64.8%)	40/69 (58%)	0.098
Neonatal Complications			
Perinatal asphyxia	51/88 (58%)	49/69 (71%)	0.098
Meconium aspiration	44/88 (50%)	36/69 (52.2%)	0.872
Hypothermia	33/88 (37.5%)	26/69 (37.7%)	0.999
Hypoglycemia	21/88 (23.9%)	17/69 (24.6%)	0.999
Hypocalcaemia	28/88 (31.8%)	23/69 (33.3%)	0.865
Polycythemia	34/88 (38.6%)	22/69 (31.9%)	0.406
Thrombocytopenia	35/88 (39.8%)	30/69 (43.5%)	0.744

Table-II. Maternal risk factors & neonatal complications with respect to gender.

Maternal Risk Factors	Weight < 2 kg	Weight > 2 kg	P-Value
Nulliparous	48/81 (59.3%)	48/76 (63.2%)	0.101
Multiparous	33/81 (40.7%)	28/76 (36.8%)	
Anemia in mothers	41/81 (50.6%)	34/76 (44.7%)	0.447
Inter pregnancy interval one year	48/81 (59.3%)	44/76 (57.9%)	0.742
Inter pregnancy interval more than one year	33/81 (40.7%)	32/76 (42.1%)	
Hypertension in mothers	48/81 (59.3%)	49/76 (64.5%)	0.131
Neonatal Complications			
Perinatal asphyxia	50/81 (61.7%)	50/76 (65.8%)	0.410
Meconium aspiration	43/81 (53.1%)	37/76 (48.7%)	0.294
Hypothermia	29/81 (35.8%)	30/76 (39.5%)	0.101
Hypoglycemia	15/81 (18.5%)	23/76 (30.3%)	0.146
Hypocalcaemia	28/81 (34.6%)	23/76 (30.3%)	0.122
Polycythemia	29/81 (35.8%)	27/76 (35.5%)	0.809
Thrombocytopenia	31/81 (38.3%)	34/76 (44.7%)	0.450

Table-III. Effect of weight on the frequency of various maternal risk factors and neonatal complications.

DISCUSSION

Small-for-gestational-age (SGA) babies comprise approximately 50% of stillbirths, and survivors are at increased risk of cardiovascular disease and diabetes in adulthood. Historically, SGA has most commonly been defined using population birth weight centiles, but the use of customized centiles has enabled the identification of small babies at higher risk of morbidity and mortality than those identified by population centiles.

In the present study, we noted that 61.1% patients were born to nulliparous mothers. In one study[12] which assessed the relationship of parity with risk of small for gestational age babies it was found that Nulliparous, age <18 year women, compared with women with parity 1-2 and age 18-35 years had the highest odds of SGA (pooled adjusted OR: 1.80), preterm (pooled aOR: 1.52), neonatal mortality (pooled aOR: 2.07), and infant mortality (pooled aOR: 1.49). Increased odds were also noted for SGA and neonatal mortality for nulliparous/age 18-35 years, preterm, neonatal, and infant mortality for parity ≥ 3/age 18-<35 years, and preterm and neonatal mortality for parity ≥ 3/ ≥ 35 years. It was concluded that Nulliparous women <18 years of age had the highest odds of adverse neonatal outcomes. Family planning has traditionally been the least successful in addressing young age as a risk factor; a renewed focus must be placed on finding effective interventions that delay age at first birth.

In the present study, 47.8% babies were having mothers who had anemia. A meta-analysis performed to pool associations, categorized by the hemoglobin cutoffs presented by the authors.[13] They identified 12 studies reporting associations between maternal anemia and SGA. For the meta-analysis, there were 7 associations with a hemoglobin cutoff <110 g/L, 7 with a cutoff <100 g/L, and 5 with a cutoff <90 or <80 g/L. Although the <110- and <100-g/L categories showed no significant relationship with SGA, the <90- or <80-g/L category was associated with a 53% increase in risk of the newborn being SGA [pooled OR = 1.53 (95% CI: 1.24-1.87); P < 0.001]. Moderate to severe, but not mild, maternal anemia appears to have an association with SGA outcomes, but the findings must be viewed with caution due to the great heterogeneity of the studies. Further examination should be conducted using datasets with better standardized definitions and measurements of exposure and outcome.

In the current study, we noted that 58.6% babies were born to mothers whose inter pregnancy interval was less than one year. In one[14] study birth interval of shorter than 18 months had statistically significant increased odds of SGA

(pooled aOR: 1.51, 95% CI: 1.31-1.75), preterm (pooled aOR: 1.58, 95% CI: 1.19-2.10) and infant mortality (pooled aOR: 1.83, 95% CI: 1.19-2.81) after controlling for potential confounding factors (reference 36-<60 months). It was also significantly associated with term-SGA, preterm-appropriate-for-gestational-age, and preterm-SGA. Birth interval over 60 months had increased risk of SGA (pooled aOR: 1.22, 95% CI: 1.07-1.39) and term-SGA (pooled aOR: 1.14, 95% CI: 1.03-1.27), but was not associated with other outcomes. It was found that birth intervals shorter than 18 months were significantly associated with SGA, preterm birth and death in the first year of life. Lack of access to family planning interventions thus contributed to the burden of adverse birth outcomes and infant mortality in LMICs.

Few studies to date have examined the effect of severe pre-eclampsia, pre-eclampsia, and gestational hypertension on birth weight according to gestational age. In a population-based retrospective cohort study[15] of 16,936 pregnant women in Suzhou, China, analysis of variance and multivariable linear regression were performed to compare the mean birth weights of babies born to mothers with gestational hypertension, pre-eclampsia, and severe pre-eclampsia with birth weights of infants born to mothers with normal blood pressure at each week of gestation. The birth weights were statistically significantly lower in women with severe pre-eclampsia than in women with normal blood pressure for gestational age categories < or = 35 and 36 weeks. In this Chinese population, most babies born to mothers with severe pre-eclampsia or pre-eclampsia and gestational hypertension had similar fetal growth to those born to normotensive mothers.

In one study among[16] 376 (10.7%) SGA infants, 281 (74.7%) were normotensive-SGA and 95 (25.3%) were hypertensive-SGA. Independent risk factors for normotensive-SGA were low maternal birth weight, low fruit intake pre-pregnancy, cigarette smoking, increasing maternal age, daily vigorous exercise, being a tertiary student, head and abdominal circumference of less than the tenth centile and increasing uterine artery Doppler indices at the 20-week scan.

In another randomized controlled study[17], all SGA infants studied had a birth weight below the 2.5th percentile in our fetal growth curve and the control infants were matched for gestational age and mode of delivery. In another study[18], compared with AGA controls, significant (P < .05) maternal risk factors for SGA status included single marital status (59% versus 53%), lower pre pregnancy weight (144 +/- 41 lbs versus 153 +/- 40 lbs), lower weight gain during pregnancy (29 +/- 15 lbs versus 33 +/- 15 lbs), smoking (25% versus 17%), hypertension (14% versus 7%), and multiple gestation (9% versus 2%).

In our study there were 157 patients in total with a slight predominance of males as 88/157 (56.1%) while females were 69/157 (43.9%). Mean age of the patients was 12.73 + 6.65 hours at presentation. Mean weight of the patients was 2.03 + 0.65 Kg. Among various maternal risk factors, the hypertension was the most frequently encountered problem seen in 97/157 (61.8%) followed by nulliparous which was present in 96/157 (61.1%). %). Inter pregnancy interval one year was the next most frequent maternal risk factor found in 92/157 (58.6%) followed by anemia which was present in 75/157 (47.8%). Among the small for gestational age babies perinatal asphyxia was found to be the most frequent complication which was present in 100/157 (63.7%) followed by Meconium aspiration present in 80/157 (51%), polycythemia present in 74/157 (47.1%), thrombocytopenia in 65/157 (41.4%), hypothermia in 59/157 (37.6%). Hypocalcaemia was present in 51/157 (32.5%) while Hypoglycemia was present in 38/157 (24.2%).

In the study conducted by Chandra Dey et al[19], among 200 SGA cases, 114 were male and 86 were female. All cases were included within 24 hours of age. The anthropometric analysis of the SGA babies showed more than 80% of the SGA babies were normal in length whereas 19.5% fell below 10th percentile of normal. Seventy three percent of SGA babies were asymmetrically (disproportionate) and 27% of babies were symmetrically (proportionate) growth retarded. The main problems associated with the SGA

babies were perinatal asphyxia (65.5%), sepsis (54%), jaundice (42.0%), hypothermia (31%), apnea (29%), hypoglycemia (25%), and bleeding manifestations (9%).

CONCLUSION

Maternal hypertension, null parity, short inter pregnancy interval and anemia are all frequently encountered risk factors for small for gestational age babies in our patient population and these patients should be closely followed up with frequent antenatal visits and specialized peri-partum facilities to avoid the perinatal complications in the newborns. The most frequently encountered perinatal complications observed in our population of small for gestational age babies include perinatal asphyxia, meconium aspiration, polycythemia, thrombocytopenia, hypothermia, hypocalcaemia and hypoglycemia in decreasing order of frequency.

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2	M. Azam Khan	Supervision, Methodology, Discussion.	
3	Zahid Ahmad	Data analysis, Drafting.