Research Article

Study of some risk factors of small for gestational age in term babies

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Abstract

Background: The most common definition of small for gestational age newborns refers to a birth weight below the 10th percentile for gestational age. Intrauterine growth retardation may be caused by maternal, placental, or fetal factors, however no underlying etiology can be identified in at least 40% of those infants.

Objectives: To assess some of the risk factors of small for gestational age in full term neonates.

Patients and methods: A case control study extended over seven months from 1st June 2012 to end of December 2012, which was performed in the delivery rooms and neonatal special care baby unit in AL-Yarmouk Teaching Hospital in Baghdad. Data was collected by direct interview of the mothers, including different variables of newborns gestational age, weight, sex, presence of congenital anomalies and multiple gestation. Mother's age, residency, parity, employment, smoking, family history of small for gestational age, history of still birth, antepartum hemorrhage, antenatal care visit, presence of urinary tract infection, chronic hypertension or gestational hypertension, diabetes mellitus and anemia were evaluated. In this study, 100 small for gestational age newborns and 100 appropriate for gestational age newborns were evaluated within the first day of life.

Results: There was significant relationship between small for gestational age and mother's age ≤16year (p=0.004), employed mothers (p=0.039) and primipara (p=0.002). Deliveries of small for gestational age had a significant relationship with irregular antenatal care visit (p=0.0001), and with family history of small for gestational age (P=0.0001).

Newborns of small for gestational age had a significant relationship with maternal history of antepartum hemorrhage (p=0.010), still birth (p=0.017), maternal history of urinary tract infection (P=0.036), maternal history of hypertension (p=0.003) and history of maternal anemia (p<0.001).

Conclusions: There was a significant relationship between small for gestational age births and: maternal age, employment, antenatal care visit, parity, family history of small for gestational age, antepartum hemorrhage, still birth, maternal history of hypertension, urinary tract infection and anemia, but no significant relationship with the newborn's sex, residency and diabetes mellitus of mothers.

Keywords: gestational age, small for gestational age, low birth weight

INTRODUCTION

Normal term infants typically weigh more than 2500 g by 37 weeks gestation completed. Small for gestational age(SGA) refers to a birth weight below the 10th percentile for gestational age.[1] Approximately 9% of neonates are of low birth weight (<2500g).[2] Approximately 80-85% of fetuses identified as being intrauterine growth retardation (IUGR) are constitutionally small but healthy, 10-15% are 'true' IUGR cases, and the remaining 5-10% of fetuses are affected by chromosomal or chronic intrauterine infections.[3] According to estimates, the rate of IUGR in developing countries is about 6 times higher than that in developed countries. The etiology of pathological SGA can be broadly divided into 3 categories**;** maternal factors, fetal factors and placental factors. Intrauterine growth retardation fetus is at increased risk of intrauterine death, fetal distress in labor and asphyxia at birth.[4] Other important complications are; hypoglycemia in about 30% of full term SGA newborns (due to reduced glycogen deposit and reduced glycogenolysis caused by reduced catecholamine response to hypoglycemia), hypothermia, polycythemia, hyperviscosity, thrombocytopenia and neutropenia. About (3-6%) of SGA babies have congenital abnormalities i.e. chromosomal abnormalities and congenital infection.[5] Congenital malformations, perinatal asphyxia and transitional cardio-respiratory disorders contribute to increasing mortality in term infants, while complications of prematurity play a greater role as gestational age decreases in the high mortality rate of premature infants.[6]

Aim of Study

To evaluate some risk factor of SGA birth term newborns in neonatal care unit (NCU) of AL-Yarmouk Teaching Hospital in Baghdad.

PATIENTS AND METHODS

A case control study extended over seven months period from 1st of June 2012 to end of December 2012, which was performed in delivery rooms and NCU of AL-Yarmouk Teaching Hospital in Baghdad. Data was collected by direct interview of the mothers. In this study, 100 SGA newborns and 100 appropriate for gestational age (AGA) newborns as control group were evaluated within the first day of life and fulfilled two criteria:

Being singletons and term babies (≥37 wk - <42wk). The assessment of gestational age of newborn is through mother's menstrual history, prenatal ultrasonography, and external physical criteria using new Ballard score for neuromuscular and physical maturity.[7] Birth weight was measured after delivery, with naked newborn, using standard beam scale (Seca 16 kg. maximum weight, Germany made). Birth weight was plotted on growth charts after assessment of gestational age. Term newborns with birth weight less than 2500 g (<10th centile) are considered SGA newborns, and of ≥2500 - 4500g (10-90th centile) are considered AGA newborns. Exclusion criteria from the study included newborns with congenital anomalies.

Maternal history, clinical examination and relevant investigations included; maternal age, residency, parity, employment, smoking, family history of SGA, still birth, antepartum hemorrhage (APH) and antenatal care (ANC) visit. If there was urinary tract infection (UTI) documented by clinical features and general mid stream urine examination, with culture and sensitivity if needed. Chronic hypertension or gestational hypertension (pregnancy induced hypertension in whom blood pressure 140/90 in 2nd half of pregnancy, or systolic blood pressure increased 30mmHg and or diastolic increased 15 mmHg over baseline on two occasions in addition to edema and confirmed albuminuria.[8] Gestational diabetes mellitus (DM) was diagnosed by oral glucose tolerance test (with 75 g glucose, with two or more positive values of plasma glucose; fasting ≥95 mg/dL, 1 hour ≥180 mg/dL, 2 hours ≥155 mg/dL).[9] Anemia was considered present when Hb <11gm/dl till 12 wk of gestation or <10.5 gm/dl and clinical features afterwards).

Statistical analysis was performed using SPSS version 20. Data was presented through simple frequency distribution tables for each variable in the study that have been considered the (odd ratio) for SGA births. The P value is statistically significant if below (0.05) using Fisher exact test.

RESULTS

Total numbers included in this study was 200 cases term newborn infants, 100 SGA newborns and 100 AGA newborns who were delivered at hospital either by normal vaginal delivery (NVD) or cesarean section (C/S).

In this study; 44(52%) of newborns were SGA females and 56(48%) were SGA males, the ratio of male: female was (1.27:1). The mean birth weight of SGA cases was 2000 ± 258.2g (Range 1650g - 2480g), and the mean birth weight of AGA was 3168 ± 556.4g (Range 2600 - 4500g).

Regarding gender of newborn; female newborns had 1.179 time risk to get SGA, but was not a significant association.

It was found that mothers whose age ≤16 year were 2.064 time at risk to get SGA and (P 0.004). Mean mother's age who had delivered SGA newborns was 20.8yr ± 4.5 year (Range 15-35), and who were delivered AGA was 23.8 ± 5.2 year (Range 17-35 year).

Regarding residency of the family; we found that a rural area had no impact to get SGA (P 1.000). While employed mothers showed 2.204 time higher risk to get SGA (P 0.039).

Primiparus mothers showed 3.47 time risk to get SGA (P 0.003). Also mothers with irregular antenatal care (ANC) showed 5.532 time risk to get SGA and (P 0.0001). Mothers with family history of SGA showed 17.471 time risk to get SGA newborn with (P 0.0001), findings are shown in table (1).

Table 1. Relationship between SGA and non-pathological parameters of newborn and mother

		STUDY GROUPS				TOTAL No.	TOTAL %	P value	OR (95%CI)
		SGA		AGA					
		No.	%	No.	%				
Gender	Female	44	52%	40	48%	84	100%	0.667	1.179 (0.672-2.068)
	Male	56	48%	60	52%	116	100%		
	Total No.	100		100		200	200%		
Maternal age	≤16 yr	6	100%	0	0%	6	100%	0.004	2.064 (1.785-2.386)
	>16-35yr	94	48%	100	52%	194	100%		
	Total No.	100		100		200	200%		
Residency	Rural	8	47%	9	53%	17	100%	1.000	0.879 (0.335-2.310)
	Urban	92	51%	91	49%	183	100%		
	Total No.	100		100		200	200%		
Employed mothers	Yes	28	65%	15	35%	43	100%	0.039	2.204 (1.101-4.407)
	No	72	45%	85	55%	157	100%		
	Total No.	100		100		200	200%		
Parity	Primi	30	86%	11	14%	41	100%	0.002	3.47 (1.55-8.19)
	Multi	70	42%	89	58%	159	100%		
	Total No.	100		100		200	100%		
ANC	Irregular	43	78%	12	22%	55	100%	0.0001	5.532 (2.688-11.384)
	Regular	57	39%	88	61%	145	100%		
	Total No.	100		100		200	100%		
Family history	Yes	15	93%	1	7%	16	100%	0.0001	17.471 (2.259-135.09)
	No	85	46%	99	54%	184	100%		
	Total No.	100		100		200	100%		

The Pearson Chi-square statistic is significant at 0.05 level.

OR odd ratio, SGA small for gestational age, AGA appropriate for gestational age, ANC antenatal care

Table 2. Relationship between SGA and pathological conditions of mother

		STUDY GROUPS				TOTAL No.	TOTAL %	P value	OR (95%Cl)
		SGA		AGA					
		No.	%	No.	%				
APH	Yes	12	86%	2	14%	14	100%	0.010	6.682 (1.455-30.685)
	No	88	47%	98	53%	186	100%		
	Total No	100		100		200	100%		
Still birth	Yes	8	89%	1	11%	9	100%	0.017	8.608 (1.056-70.170)
	No	92	48%	99	52%	191	100%		
	Total No	100		100		200	100%		
UTI	Yes	33	63.5%	19	36.5%	52	100%	0.036	2.100 (1.101-4.002)
	No	67	45%	81	55%	148	100%		
	Total No	100		100		200	100%		
DM	Yes	4	44%	5	56%	9	100%	1.000	0.792 (0.206-3.039)
	No	96	50.2%	95	49.8%	191	100%		
	Total No	100		100		200	200%		
Hypertension	Yes	10	90%	1	9%	11	100%	0.003	11 (1.381-87.641)
	No	90	47.5%	99	52.5%	189	100%		
	Total No	100		100		200	100%		
Anemia	Yes	31	86%	5	14%	36	100%	<0.001	8.536 (3.159-23.07)
	No	69	42%	95	58%	164	100%		
	Total No	100		100		200	100%		

The Pearson Chi-square statistic is significant at 0.05 level.
OR odd ratio, SGA small for gestational age, AGA appropriate for gestational age, APH antepartum hemorrhage, UTI urinary tract infection, DM diabetes mellitus

The study showed that mothers with antepartum hemorrhage (APH) showed 6.682 time higher risk to get SGA and (P 0.01). It was also found that mothers with history of still birth showed 8.608 time higher risk to get SGA and (P 0.017).

Mothers with a history of UTI had 2.100 time higher risk to get SGA (P 0.036). While mothers with a history of DM showed 0.792 time risk to get SGA and (P 1.000). Hypertension was found in 10 (90%) of SGA babies and 1(9%) of AGA babies so hypertensive mothers had 11 time higher risk to get SGA and (P 0.003). Anemic mothers showed 8.536 time risk to get SGA and (P <0.001).

DISCUSSION

The frequency of SGA in males is (48%) and females is (52%), with no significant association (P 0.667) and this agrees with Hameed N.et al,[10] and Peleg FD. et al.[11]

Mothers with age ≤16 year were at high risk to get SGA babies (P 0.004), this agree with Makki study,[12] Jisuk B. et al[13] and Ferraz EM et al.[14]

A non-significant difference in percentage of SGA newborns (P 1.000) occurs in urban areas (51%) and rural areas (47%), probably explained by the small studied sample. This finding is not consistent with the study done by AL-Ani[15] showing the frequency of SGA is more in mothers in rural areas.

The employed mothers were more prone to deliver SGA babies, with no significant association, this result confirm the finding of Mi-Jin Park[16] and disagree with Amine T[17] and Hameed N et al;[10] this is partially explained by lack of time needed to mother to take rest time and visit ANC.

The primipara mothers were at high risk for SGA births, and this agreed with a Peleg FD et al,[11] Makki AW[12] and Forman L study.[18] This might be explained by the fact that multiparous women know more about how to deal with their pregnancy and aware of previous serious complications of pregnancy.

Mothers with history of APH were at high risk of SGA babies, this might be attributed to placental insufficiency during pregnancy and agrees with Hameed N et al[10] and with Makki AW study.[12]

Mothers with irregular ANC visits were prone to deliver SGA babies, this finding is in agreement with that of Hameed N et al,[10] Peleg FD,[11] and Rodriguez study.[19] Adequate regular ANC may identify problems early, allowing treatment that may reduce risk of SGA newborns.

Mothers with family history of SGA have strong risk of a newborn with SGA, this is compatible with Hameed N et al,[10] Peleg FD,[11] Tsukamoto M. et al[20] and Shukria S.et al,[21] this is probably due to same risk factors endangering previous pregnancies.

Mothers with history of Still birth show significant association with SGA, this finding is compatible with studies by Shukria S.et al[21] and Sheridan C.[22]

Mothers with history of UTI show significant association and this agreed with Hameed N et al[10] and Makki study.[12] This most likely due to persistence of UTI in successive pregnancies.

Mothers with history of DM show no significant association, which agrees with Hameed N et al[10] and Moses study[23] this result is expected unless there are micro-vascular complications.

Mothers with history of hypertension show increasing association with SGA, a finding similar to Hameed N et al[10], Thompson study[24] and also agreed with Hanoudi B. et al.[25] This association may be explained by decreased placental blood flow as suggested by Zetterstrom K. et al.[26]

Mothers with history of anemia show increasing risk of having SGA babies, a similar finding obtained by Hameed N et al[10], Makki[12] and Lone FW et al,[27] this might be due to the fact that anemia may limit the amount of oxygen available for placental exchange.[28]

In conclusion; this study shows a significant association between SGA births and mothers not attending ANC regularly, family history of SGA, hypertensive and anemic mothers, primiparus, maternal history of APH, SGA, still birth and mother's employment, UTI and advancing maternal age.

There was no significant association between SGA births, newborn's sex, residency of mothers, and maternal diabetes.

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