RISK FACTORS OF LOWBIRTHWEIGHT NEONATES IN GOVERNMENTAL HOSPITALS IN BASRAHCITY

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ABSTRACT

Background: **Low birthweight (less than 2500 gm) is a reliable indicator in monitoring and evaluating the success of maternal and child health programs. Low birthweight neonates are at greater risk of having disability and diseases such as cerebral palsy, visual problems, learning disabilities and respiratory problems.**

Objectives: **To assess the risk factors affecting the delivery of low birthweight neonates at the Maternity Hospitals in Basrah City.**

Methods: **This study was a hospital-based case-control study by collecting and investigating the data by direct interview, antenatal care record, and medical records, during the period from 1st November 2010 to the 29th April 2011. A total of 510 live births neonates were studied, 255 low birthweight neonates (50%) compared with 255 normal birthweight neonates (50%).The data were collected by direct interview with the mothers, medical records and some anthropometric measurements taken from both mother (prepartum) and her neonate after birth, by using specially designed questionnaire form for this purpose.**

Results: **The results showed that the overall mean birthweight/gm and standard deviation were (1998.6±313.0) for the Low birthweight group. Highly significant risk factors identified in this study, which include type of delivery, weight of mothers prepartum less than 60 kilograms with height less than 150 cm and mother with history of preterm delivery, complications during pregnancy such as pregnancy-induced hypertension, pre-eclampsia, urinary tract infection, premature rupture of membrane and hemorrhage, stressful life events and decrease of hemoglobin level with P-value <0.0001. While significant risk factors identified with p-value <0.05 included multiparity and placenta previa. Other factors that didn't show significant association include age of mother, education, occupation, with p-value > 0.05.**

Conclusions and recommendations: **This study suggests that low birthweight could be the result of preterm or intrauterine growth retardation. Factors amenable to intervention, such as birth interval, maternal nutrition, maternal weight and smoking habits, appeared to have a role in low birthweight. Extended community-based studies, preferable on national basis, are recommended to evaluate the actual picture of the problem of Low birthweight in Iraq.**

INTRODUCTION

Low birthweight (LBW) has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500 gm. This practical cut-off for international comparison is based on epidemiological observations that infants weighing less than 2,500 gm are approximately 20 times more likely to die than heavier babies. More common in developing than developed countries, a birthweight below 2,500 g contributes to a range of poor health outcomes. The goal of reducing LBW incidence by at least one third between 2000 and 2010 is one of the major goals in 'A World Fit for Children, the Declaration and Plan of Action adopted at the United Nations General Assembly Special Session on Children in 2002. The reduction of LBW also forms an important contribution to the Millennium Development Goal (MDG) for reducing child mortality. Activities towards the achievement of the MDGs will need to ensure a healthy start in life for children by making certain that women commence pregnancy healthy and well nourished, and go through pregnancy and Child birth safely. LBW is therefore an important indicator for monitoring progress towards these internationally agreed-upon goals.[1] In Iraq, according to the annual report of Ministry of Health(MOH) for year 2009, the births weighed less than 2500 gm with exclusion of Iraqi-Kurdistan Territory were 144 births in Primary Health Care Centres which contains Obstetrical Departments, 41922 births in Governmental Hospitals, 5838 births in

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Private Hospitals, 13014 births in out of Governmental institutes and the total number was 60918 births. The numbers for Basrah governorate were 1, 3320, 276, 497, and 4104 births respectively.[2]The aim of the present Study was to assess the risk factors associated with LBW like current and previous obstetric history, chronic morbidities (hypertension, diabetes and asthma), and complications during current pregnancy, smoking habits, socio-economic and demographic risk factors affecting the delivery of LBW neonates in maternity hospitals in Basrah city and to determine the mean birthweight of the studied sample.

SUBJECTS, MATERIALS AND METHODS

This study was a hospital-based case-control study. The collected data were by direct interview, antenatal care (ANC) chart and medical records. During the six-month study period, a total of 5^{10} live birth neonates were studied, 255 Low birthweight neonates compared with 255 NBW neonates, the rest 11 twins were excluded to avoid bias. The study was conducted in all the governmental hospitals in Basrah city, center of Basrah Governorate, that provides delivery services these include Ibn-Ghazwan, AL- Mawani, Basrah General Hospital and AL-Faihaa Maternity basic-comprehensive and Obstetric Hospitals which drain most patients from urban and rural areas. The Study Duration was over a period of 6 months from the 1st November 2010 to the 29th April 2011.Subjects in this study included mothers admitted to obstetrical department during labor (pre-partum) and neonatesafter birth at the study hospitals. The method of collecting information depends on direct interview by one of the investigators with the pregnant women before being admitted to the delivery room, using the questionnaire formwhich includes information on [current obstetric history, previous obstetric history and complications during current pregnancy, affecting the delivery of LBW neonates].The anthropometric measurements were taken from the mothers during the time of the interview (pre-partum) and for the neonates after birth:

- ***Weight for mothers and their neonates.***
- ***Height for mothers and length for neonates.***
- ***Head circumference (fronto-occipital diameter) for neonates only.***

The sample size was calculated using Steven Thompson's formula,[3] as following:

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

N=community size.
z=standard degree=1.96
d=error ratio=0.05
P=rate of availably of property=0.50

Sampling technique: For LBW neonates, the cases were selected by random sampling technique from mothers delivered babies with LBW (less than 2500 gm), and the controls were chosen by pick up NBW babies next to LBW neonate at the same period of time. Criteria for selection of cases and controls:

1) Inclusion criteria:

- **Cases:** mothers who delivered a single neonate weighing < 2500 gm.
- **Controls:** mothers who delivered a single neonate weighing ≥ 2500 gm.

(Cases and controls were selected from the hospital at the same day)

2) Exclusion criteria:

- Mothers who delivered twin or multiple pregnancies and stillbirths were excluded from the study.
- Neonates weighed less than 1000 gm (extremely LBW).

For the mother, the weight was measured while the mother standing without shoes using the same scale for all mothers (Tanita scale, model 1801, Japan, max. 135 kg ± 0.1 kg). Weight of mother was taken from ANC chart at beginning of pregnancy (during the first irrespective of the time of the visit), and weight of mother prepartum (at time of admission to the delivery room) to calculate weight gain by subtracting

weight of mother at beginning of pregnancy. For the neonates, the weight was measured within the first hour after birth; neonates were weighed to the nearest 50 gm. The neonate was accurately weighed in grams by placing the nude neonate on sensitive machine that was done by the investigator in the delivery room using weighing scale (Tanita scale, model 1583, Japan, max. 20 kg ±10 gm). birthweight consists of three categories:- LBW (<2500 kg), very LBW (<1500 kg) and extremely LBW (<1000 kgs) at birth.[4]Gestational age was calculated as the period between the date of the mother's last menstrual period (LMP) and infant's date of delivery, as recommended by US National Centre for health statistics,[5]alsocalculated by ultrasound reports. In neonates whose mothers were unsure of date of LMP, the GA assessment of neonates was based on the new Ballard Score.[6]Anemia refers to a condition in which the hemoglobin content of the blood is lower than normal as a result of a deficiency of one or more essential nutrients (usually iron, less frequently folate or vitamin B12), regardless of the cause of such deficiency.[7]The information regarding each case was transferred into code sheets and data entry was done using computer Pentium IV and statistical analysis was done using the SPSS package version 17. The approach to data consisted of two steps (descriptive and analytic statistics).For analysis; newborn babies were classified according to their birthweight into two groups, the LBW group and normal birthweight (NBW) group. Distributions of both groups according to various variables were studied and Chi-square test for contingency tables was used to find the statistical association or differences between the two groups, for the presence or absence of significance, p-value of <0.05.Odd ratio (OR) is one of a range of statistics used to assess the risk of a particular outcome if a certain factor is present. And 95% CI for the OR was calculated.[8] Odd Ratio (OR) was calculated from the 2×2 table. OR=ad/cb.[9]

RESULTS

(Table-1), shows the mean±SD of birthweight, length and head circumference of the neonates. The mean birthweight was (1998.6±313.0, range: [1000-2450]) for the LBW group and was (3284.3±574.8, 2500-5200) for the NBW group.

Table 1. Distribution of neonate's anthropometric measurements.

Neonate variables	LBW (N=255)		NBW (N=255)	
	Mean ± SD	Range	Mean ± SD	Range
Weight (gm)	1998.6±313.0	1000-2450	3284.3±574.8	2500-5200
Length (cm)	44.5±2.6	33-51	48.0±2.3	37-52
HC (cm)	31.0±1.8	23-35	34.9±1.5	33-43

(Table-2), shows higher percentage (about half) of the mothers were in age group (20-29) and lowest percentage in the age group ≥40 years. The highest percentage of mothers in this study, were housewives (89.4%) in the LBW group and (94.5%) in the NBW group, only 0.8% of mothers were students in both groups and 9.8% and 4.7% were employed in the LBW group and NBW group respectively, with p-value >0.05. The highest percentage of educational level attainment among the LBW group and the NBW group was 38.8%, 36.9% respectively for primary educated mothers with no significant association (p>0.05). The highest percentage of whose fathers were in the self-employed group (71.4%), but it was not reached a significant association. In this study, the highest percentage of maternal educational level attainment among the LBW group and the NBW group was 38.8%, 36.9% respectively was for the primary educated mothers while the lowest percentage of educational level attainment among the LBW group and the NBW group was 4.7%, 8.2% respectively for the illiteracy level of education with not significant association with birthweight (p>0.05).

Table 2. Distribution of study population according to the Socio-demographic factors.

Socio-demographic factors	LBW(n=255)		NBW(n=255)		P-value
	No.	%	No.	%	
Maternal age at delivery (years)					
< 20 y	57	22.4	48	18.8	**0.464**
20-29 y	123	48.2	133	52.2	
30-39 y	73	28.6	69	27.1	
≥40	2	0.8	5	2.0	
Maternal occupation					
Housewife	228	89.4	241	94.5	**0.08**
Employed	25	9.8	12	4.7	
Student	2	0.8	2	0.8	
Paternal occupation					
Self-employed	182	71.4	178	69.8	**0.592**
Employed	56	22.0	65	25.5	
Unemployed	13	5.1	4	1.6	
Retired	4	1.6	4	1.6	
Student	0	0.0	4	1.6	
Maternal education					
Illiterate	12	4.7	21	8.2	**0.062**
Write &read	45	17.6	27	10.6	
Primary	99	38.8	94	36.9	
Intermediate	52	20.4	71	27.8	
Secondary	19	7.5	19	7.5	
University	28	11.0	23	9.0	
Paternal education					
Illiterate	15	5.7	15	5.9	**0.244**
Read & Write	26	10.3	24	9.4	
Primary	85	33.6	77	30.2	
Intermediate	53	20.7	77	30.2	
Secondary	35	13.5	26	10.2	
University	41	16.2	36	14.1	

(Table-3), shows that the percentage of mothers who delivered neonates before 37 weeks of gestation (preterms) was 53.3% in the LBW group compared to 0.0% among NBW group. In this study, the percentages of the normal vaginal deliveries (NVD) were 66.3% and 75.3% in the LBW and the NBW groups respectively ($p<0.0001$).

Table 3. Distribution of study population according to gestational ageand type of delivery.

Variables		LBW (n=255)		NBW (n=255)		OR	95%CI	P-value	Fisher's exact test
		No.	%	No.	%				
Gestational age (weeks)	<37	136	53.3	0	0.0	-	-	-	0.088
	≥37	119	46.7	255	100.0				
	Total	255	100%	255	100%				
Type of delivery	NVD	169	66.3	192	75.3	-	-	0.0001 *	-
	C/S	75	29.4	31	12.2	2.75*	1.69-4.54		
	Assisted	11	4.3	32	12.5	0.39*	0.17-0.83		
	Total	255	100%	255	100%				

**** Statistically significant***

(Table-4), shows the association of birthweight and mothers' height and weight. Proportion of mothers with height less than 150 cms was 20.8% in the LBW group and was 4.3%in the NBW group. Prepartum maternal weight less than 60 Kgs was 23.9% in the LBW group and 6.7% in the NBW group. Mothers with prepartum weight less than 60 Kgs had 4.40 times greater risk of delivering LBW neonates than mothers with prepartum weight 60 and more kilograms.

Table 4. Distribution of study population according to mothers' height and weight.

Mother's anthropometric measurements	LBW(n=255)		NBW(n=255)		OR	95%CI	P-value
	No.	%	No.	%			
Height of mother(cm)							
<150 cm	53	20.8	11	4.3	5.82*	2.9-12.65	0.0001*
≥150 cm	202	79.2	244	95.7	-	-	
Mean±SD (Range)	158.1±7.6(141-173)		161.9±6.6(145-176)				
Weight of mother (prepartum in kg)							
<60	61	23.9	17	6.7	4.40*	2.44-8.29	0.0001*
≥60	194	76.1	238	93.3	-	-	
Mean±SD (Range)	69.5±12.0(44-116)		77.1±12.1(44-110)				

**** Statistically significant***

(Table-5), shows most of the mothers with gravidity of 2-4 constitute 42.7% in the LBW group and 52.2% in the NBW group, followed by multigravida (≥5) constitute 29.0% in the LBW group and 19.6% in the NBW group. The risk of giving birth to LBW significantly increased 19.92 times in the mothers with history of two previous pretermdeliveries (P<0.0001).

Table 5. Distribution of study population according to obstetric history

Variables		LBW (N=255)		NB (N=255)		OR	95% CI	P-value
		No.	*%*	*No.*	*%*			
Gravidity	1	72	28.2	72	28.2	1.22	0.79-1.88	0.030*
	2-4	109	42.7	133	52.2	-	-	
	≥ 5	74	29.0	50	19.6	1.81*	1.14-2.87	
Parity	Nulliparous	85	33.3	82	32.2	1.30	0.85-1.99	0.046*
	Parous	95	37.3	119	46.7	-	-	
	Multiparous	75	29.4	54	21.2	1.74*	1.09-2.77	
No. of preterms	None	125	49.0	166	65.0	-	-	0.0001*
	1	26	10.1	6	2.3	5.75*	2.22-17.54	
	2	15	5.8	1	0.3	19.92*	2.97-843.5	
	≥ 3	4	1.6	0	0.0	-	-	
	Missing cases	85	33.5	83	32.4			

**Statistically significant*

(Table-6), shows that complications in this study constitute 92.2% and 31.8% in the LBW and the NBW group respectively. The risk of giving birth to LBW significantly increased (25.24 times) in the mothers with complications during pregnancy (P<0.0001).The commonest complications encountered during current pregnancy among the LBW group were: oligohydramnios (42.3%), pregnancy induced hypertension(31.0%), urinary tract infection (25.1%), premature rupture of membrane (23.9%) and pre-eclampsia (14.9%). Significant associations were found between giving birth to LBW and PROM P<0.0001, oligohydramnios (P<0.0001), PIH (P<0.0001), pre-eclampsia (P<0.0001), UTI (P<0.0001) and placenta previa (P<0.05).

Table 6. Distribution of study population according to mother's medical illness and complications during pregnancy

Variables		LBW (n=255)		NBW (n=255)		OR	95%CI	P-value
		No.	%	No.	%			
Complications	***Yes***	235	92.2	81	31.8	25.24*	14.58-44.9	0.0001*
	No	20	7.8	174	68.2	-	-	
PIH	***Yes***	79	31.0	15	5.9	7.18*	3.93-13.85	0.0001*
	No	176	69.0	240	94.1	-	-	
Pre-eclampsia	***Yes***	38	14.9	9	3.5	4.79*	2.21-11.49	0.0001*
	No	217	85.1	246	96.5	-	-	
UTI	***Yes***	64	25.1	28	11.0	2.72*	1.64-4.58	0.0001*
	No	191	74.9	227	89.0	-	-	
PROM	***Yes***	61	23.9	1	0.4	79.9*	13.5-3218	0.0001*
	No	194	76.1	254	99.6	-	-	
Oligohydramnios	***Yes***	108	42.3	10	3.9	17.67*	8.83-38.93	0.0001*
	No	147	57.7	245	96.1	-	-	
Placenta previa	***Yes***	18	7.1	6	2.4	3.15*	1.17-9.85	0.012*
	No	237	92.9	249	97.6	-	-	

**Statistically significant*

(Table-7), shows Percentages of mothers with hemorrhage due to unknown causes was 34.5% and 3.9% among mothers who delivered LBW and NBW neonates respectively. The risk of giving birth to LBW significantly increased (12.91) times in the mothers with hemorrhage during current pregnancy (p<0.0001). Stressful life events (The body's response to a threat or demand arising from a new or changing situation),[8] and physical stress constituted 18.4% and 7.8% in the LBW group respectively, and 3.5% and 0.4% in the NBW group respectively (P<0.0001).Maternal anaemia (<11 g/dl) in this study constitutes 71.0% and 55.3% in the LBW and the NBW groups respectively (P<0.0001).

Table 7. Distribution of study population according to mother's hemorrhage, stress and Hb% during current pregnancy

Variables		LBW (n=255)		NBW (n=255)		OR	95%CI	P- value
		No.	%	No.	%			
Hemorrhage	*Yes*	88	34.5	10	3.9	12.91*	6.43-28.56	0.0001*
	No	167	65.5	245	96.1	-	-	
Stressful life events	*Yes*	47	18.4	9	3.5	6.18*	2.90-14.64	0.0001*
	No	208	81.6	246	96.5	-	-	
Physical stress	*Yes*	20	7.8	1	0.4	21.6*	3.39-899.4	0.0001*
	No	235	92.2	254	99.6	-	-	
Hb% (g/dl)								
Not measured		4	1.6	4	1.6	-	-	
<11		181	71.0	141	55.3	2.02*	1.37-2.98	0.0001*
≥11		70	27.5	110	43.1	-	-	

Statistically significant

DISCUSSION

In present study, the mean birthweight and standard deviation (SD) of neonates were 1998.6±313.0 (range: 1000-2450 kgs) for the LBW group and were 3284.3±574.8 (2500-5200 kg) for the NBW group. These results disagree with the study of Sahib, 2006 in Nineveh[10] and Ede, 2008 in Indonesia.[11] They found that the mean birthweight and SD for LBW group were 1891.5±311.0 and 1790.6±302.0 respectively. In the present study no significant association was found between maternal age and the risk of LBW. The finding of the present study is in contrast with findings reported by Sahib, 2006 in Nineveh[10] and Khatun, *et al.,* 2008 in Bangladesh.[12] They found that mother's age has independent significant effect on birth weight with p-value <0.001. In the present study, maternal employment was not risk factors for giving LBW neonates. This result agrees with the finding of Fadhil, 2007 in Baghdad [13] and Cita *et al.,* 2010 in East Jakarta, Indonesia.[14]

In this study, GA variable strongly associated with LBW (p<0.0001). The adjusted odds ratio for GA reported by Badshah *et al.,* 2008 in North West Frontier Province Pakistan [15] was that the neonates born before 37 weeks of gestational period had risk 6.4 times higher than neonates with gestational period of 37 weeks and more with p-value <0.0001. Mohsin *et al.,* 2003 in Australia [16] confirmed that premature birth (less than 37weeks gestation) was the

single most important determinant of LBW for both singleton and multiple births. The mothers who had C/S delivery had 2.75 times greater risk to deliver LBW neonates than the mothers who had NVD (P<0.0001). These disagree with Riskin *et al.,* 2004 in Palestine [17]; they found that delivery mode did not affect neonatal birthweight of singleton vertex-presenting preterm LBW infants. Regarding the anthropometric measurements, maternal height revealed significant association with LBW, mothers whose height was less than 150 cms appeared to be significantly at higher risk of having LBW neonates (P-value<0.0001). This result is in accordance with the finding of abdul-latif *et al.,* 2005 in Diyala (north-east Baghdad).[18] He found that significant association between giving birth to LBW and height of mother less than 150 cms with p-value <0.001. Mothers with prepartum weight less than 60 kgs had 4.40 times greater risk for delivering LBW neonates than mothers with prepartum weight 60 and more kilograms (P<0.0001).This result agrees with the finding of abdul-latif *et al.,* 2005 in Diyala.[18] He found that significant association between giving birth to LBW and weight of mother less than 60 kgswith p-value <0.001. Gravidity and parity have significant association with LBW (P<0.05) for both. This result was similar to the study of Bhuiyan, 2000 in Bangladesh,[19] he found that the mothers of parity one had 1.44 times and parity more than three had 2.19 times higher risk of having LBW neonates compared to mothers who were parity two. The risk of giving birth to LBW significantly increased (19.92) times in the mothers with history of two previous pretermdeliveries (P<0.0001). This significance coincide with Abu Hamad, *et al.*, 2007 in Palestine,[20] they found a significant relationship between previous histories of preterm delivery, with a higher prevalence for cases (34.2%) than controls (8.5%). Concerning oligohydramnios and PROM, the present study demonstrated an increased risk of having LBW neonate of about 17.69 and 79.9 times among mothers with oligohydramnios and PROM during current pregnancy with significant association (P<0.0001). This finding was similar to that of abdul-kadir.[21] he found that significant association between giving birth to LBW and increased risk of oligohydramnios (OR=11.3) and PROM (OR=61.7) with p-value<0.001.This study demonstrated an increased risk of having LBW neonate about 7.18 and 4.79 times among mothers with PIH or pre-eclampsia respectively during current pregnancy. These results goes with the findings obtained by Rafati *et al.,* 2005, in Tehran,[22] he found that uteroplacental blood flow decreased in pregnancies complicated by PIH or pre-eclampsia. Urinary tract infection (UTI) was one of the most important risk factors for LBW. This result agrees with Roudbari *et al.,* 2007 in Zahedan, Islamic Republic of Iran[23]; who found the presence of maternal UTI increased the risk of LBW by 2-folds.The risk of giving birth to LBW significantly increased in mothers with placenta previa during pregnancy. This result goes with the findings obtained by Siza et al., 2008 in Tanzania.[24] A considerable risk of giving LBW neonate was evident among mothers with history of vaginal bleeding in their current pregnancy. This was in agreement with the results of Singh, *et al.,* 2009 in Canada [25], who found that vaginal bleeding was significant maternal factors resulting in low birth weight babies with p-value <0.001. The risk of giving birth to LBW significantly increased in the mothers with stressful life events and physical stress during current pregnancy. The result goes with the findings obtained by Nasree, *et al.,* 2010 in Bangladesh.[26] The risk of giving birth to LBW significantly increased in mothers with anemia during current pregnancy. This result is consistent with Shih-Chen *et al.,* 2003 in USA,[27] who found that hemoglobin more than 11.0 g/L during the second and third trimester significantly decreased the risk of low birth weight. Low hemoglobin level could lead to decreased oxygen support to the fetus and might be a marker of some other risk factors such as

poor nutrition or infection that may independently cause LBW.[28]

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