

Maternal Risk Factors Associated with Low Birth Weight Newborns in Mosul City (A Case Control Study)

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ABSTRACT

Background: Great importance has been offered to birth weight all over the world because it is considered as one of the best predictors of newborns survival and a good indicator of quality of life. Low birth weight is a multi-factorial problem with a wide spectrum of health related problems from its origin to later in life. It is one of the important causes of high infant's mortality and morbidity rate in developing countries.

Objectives: The aim of this study is to evaluate the main maternal risk factors associated with LBW newborns in Mosul city.

Methodology: A case-control study design was carried out in four general hospitals (Al-Khansaa, Al-Salaam, Al-Mosul and Al-Batool Teaching Hospitals) in Mosul city, Iraq. A total of 100 cases and 100 controls were collected from these four general hospitals. The period of collection of both cases and controls was from the 1st of January 2018 to the end of June 2018.

Results: This study revealed that young age was a risk factor for the mothers to have LBW newborns when compared with older ages mothers. The study revealed that primiparity, short inter-pregnancy interval, pre-term labor, mothers with <150 cm height, inadequate ANC visits, inadequate iron supplements, anemia, hypertensive disorders and passive smoking, all were found to be risk factors to LBW newborns with significant association.

Conclusions: LBW one of the best predictors of prenatal survival and a good indicator of quality of life.

Key words: birth weight, low birth weight, pre-term baby as one of the best predictors of prenatal survival and a good indicator of quality of life.

INTRODUCTION

Infant birth weight is a significant predictor of the immediate and future health status of the newborn. Low birth weight (LBW) is a major public health concern and one of the strongest single risk factors for early neonatal mortality and morbidity.⁽¹⁾

WHO estimated that about (25) million LBW babies are born each year.⁽²⁾ More than (20) million infants worldwide representing (15.5%) of all births are born with low birth weight, (95.6%) of them in developing countries.⁽³⁾ In Iraq, several reports documented an increase in the prevalence of LBW and infant mortality rate.⁽⁴⁾

“Birth weight” is the first weight of the fetus or infant obtained after birth and should be measured during the first hour after birth, before the appreciable postnatal loss of weight occurs.⁽⁵⁾ Low birth weight is defined by the WHO as a weight of baby at birth less than (2500) g.⁽⁶⁾

There are many risk factors for LBW: maternal demographic factors (which include residential area, age of mother, parity and pregnancy interval), maternal anthropometric factors (which include pre-pregnancy weight, height of mother

and weight gain during pregnancy), nutritional factors, medical factors, behavioral factors, fetal factors, environmental factors, uterine and placental factors.⁽⁷⁾

The aim of this study is to evaluate the main maternal risk factors associated with low birth weight (LBW) newborns in hospitals of Mosul city.

PATIENTS AND METHODS

A case-control study design was carried out in four general hospitals: (Al-Khansaa, Al-Salaam, Al-Mosul and Al-Batool Teaching Hospitals) in Mosul city, Iraq. A total of 100 cases and 100 controls were collected from these four general hospitals. The period of collection of both cases and controls was from the 1st of January 2018 to the end of June 2018. All mothers who delivered a live-born single baby by normal vaginal delivery and cesarean section at any gestational age, primipara and multipara, all ages were included in this study, and their participation is strictly voluntary. Mothers who had multiple births, history of placenta previa or abruption placenta and mothers who delivered baby with congenital malformation or stillbirth babies were excluded. All babies were weighed within one hour after birth. The data were entered into a standardized questionnaire after verbal consent was obtained from the mother. A questionnaire form was specially prepared in order to collect all the relevant information related to the study sample and it is approved by the supervisor. The main source of data was obtained directly from the cases and controls by the investigator through direct interview and filling the questionnaire form which is prepared to record all relevant information related to cases and controls in the sample. Height of the mothers and weight of the babies were measured by the investigator, Computer feeding and statistical analysis were carried out using Pentium IV computer with Minitab program. A two by two table was assigned, Odds ratio (OR) was calculated as a measure of association between risk factors and the disease.

RESULTS

The study sample was grouped into six age strata that covered the mother's age in the collected sample of the study population. This is shown in (Table 1). Very young age group (<18 year) carried a higher risk when compared with other age groups with significant risk (OR=7.976, P=0.007).

Table1: Distribution of study population according to maternal age

Age groups (years)	Cases (n=100)		Controls (n=100)		OR	95% CI	P*-Value
	NO.	%	NO.	%			
<18	14	14.0	2	2.0	7.976	1.762-36.096	0.007
18-22	20	20.0	21	21.0	0.9405	0.473-1.869	0.861
23-27	9	9.0	24	24.0	0.313	0.137-0.714	0.0058
28-32	22	22.0	30	30.0	0.6581	0.347-1.245	0.198
33-37	30	30.0	20	20.0	1.714	0.894-3.285	0.104
>37	5	5.0	3	3.0	1.701	0.395-7.320	0.475

* x²-test was used

This study showed that primiparity is associated with the occurrence of LBW with no significant risk (P= 0.0647) as shown in (Table 2), also the study showed that short birth interval of associated with LBW, and more risky than others to have LBW as shown in (Table3).

Table 2: Distribution of study population according to parity

Parity	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
Primi	28	28.0	17	17.0	1.8987	0.9616-3.7489	0.0647
Multi	72	72.0	83	83.0			

Table 3: Distribution of study population according to inter pregnancy interval*

Inter Pregnancy Interval	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
< 12 months	26	36.1	5	6.02	8.817	3.166-24.553	0.0001
12-24months	21	29.1	29	34.9	0.766	0.388-1.512	0.443
>24 months	25	34.7	49	59	0.3691	0.192-0.7093	0.0028
Total	72	-	83	-	-	-	-

* excluding primigravidas

The study revealed that mothers of preterm babies(<37 week) were more risky than mothers of full term babies(>=37 week) to developed LBW with significant association (OR= 13.5 , P= 0.0001) see (Table4), also the study revealed that mothers with inadequate ANC visits during pregnancy (less than 8), were significantly 4 times more prone to deliver LBW neonates than other mothers (OR=4.095, P=0.0001) as shown in (Table 5).

Table 4: Distribution of study population according to Gestational age

Gestational age	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
<37 wk	36	36.0	4	4.0	13.5	4.5829-39.767	0.0001
>=37 wk	64	64.0	96	96.0			

Table 5: Distribution of study population according to ANC visits

ANC	Cases (n=100)		Controls (n=100)		OR	95% CI	P*-Value
	NO.	%	NO.	%			
<8	59	59.0	26	26.0	4.0957	2.2506-7.4533	0.0001
>=8	41	41.0	74	74.0			

The results revealed that mothers of less than(150) cm in height were more risk to have LBW with significant association (OR=4.432, P=0.0002), see (Table 6).

The results revealed that mothers with Hb of less than (11)g/dl during pregnancy were more risky than others with significant association (OR=5.19, P=0001)as shown in (Table7),also inadequate taking of iron during pregnancy increases the risk of LBW with significant association(OR=2.63, P=0.0019)as shown in (Table8).

The results revealed that hypertensive mothers during pregnancy were prone to have LBW babies more than others with significant association(OR=3.43, P=0.012),see (Table9). The study revealed that smoker mothers carried a higher risk when compared with non smoker mothers with significant association (OR=2.25, P= 0.005) as shown in (Table10).

Table 6: Distribution of study population according to height of mother

Height (in cm)	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
<150	33	33.0	10	10.0	4.4320	2.0423-9.6217	0.0002
>=150	67	67.0	90	90.0			

Table 7: Distribution of study population according to Hb status

Hb status (in g/dl)	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
< 11	70	70.0	31	31.0	5.1935	2.8443-9.4832	0.0001
>= 11	30	30.0	69	69.0			

Table 8: Distribution of study population according to taking Iron

Iron Supplement	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
Inadequate	44	44.0	23	23.0	2.6304	1.4284-4.8440	0.0019
Adequate	56	56.0	77	77.0			

Table 9: Distribution of study population according to history of hypertensive disorders during pregnancy

HT during pregnancy	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
Present	18	18.0	6	6.0	3.4390	1.3033-9.0743	0.0126
Absent	82	82.0	94	94.0			

Table 10: Distribution of study population according to history of smoking

smoking	Cases (n=100)		Controls (n=100)		OR	95% CI	P-Value
	NO.	%	NO.	%			
Active	0	-	0	-	-	-	-
Passive	59	59.0	39	39.0	2.2508	1.2781-3.9639	0.005
Non smoker	41	41.0	61	61.0			

DISCUSSION

Great importance has been attributed to birth weight all over the world because it is considered as one of the best predictors of prenatal survival and a good indicator of quality of life. ⁽⁸⁾

In this study, the association between the infant's weight and mother's age was highly significant. In other words, the likelihood of the infants with the weight of <2500 g increased for the mothers under 18 years old, this result was similar to the finding of study in Iran (2017), that revealed there was a highly significant increase in the prevalence of LBW with mothers of teenage old ($P < 0.001$), ⁽⁹⁾ the explanation could relate to maternal nutritional depletion that presence normally in teenage pregnancy.

This study revealed that primiparity associated with LBW with no significant risk and this is the same result of a case-control study conducted in Kuala Lumpur, Malaysia (2012) on 180 cases and 180 controls and revealed that parity had no significant risk on LBW ($OR=1.47, P=0.101$). ⁽¹⁰⁾

This study revealed that there was very high significant association between spacing with the last child and LBW, this results was in agreement with the finding of case-control study that conducted in Sheikh Zaid Women Hospital, UAE (2009), that revealed short inter-pregnancy interval was in strong association with LBW ($P=0.009$). ⁽¹¹⁾

Short inter-pregnancy intervals are thought to affect fetus through a maternal depletion syndrome, when the mothers does not have enough time between pregnancies to recover micro- and macronutrient stores. ⁽¹²⁾

The study revealed a very high significant association between pre-term labor and LBW, our result goes with a case-control study conducted in Kuala Lumpur, Malaysia (2012), that showed a significant association between pre-term labor and LBW ($P=0.001$), ⁽¹⁰⁾ whereas the preterm babies are usually small because they delivered prematurely and whereas gestation age advance the growth and weight of the fetus increase.

Regular ANC is important factor in lowering incidence of LBW due to regular fetal monitoring and evaluation at all levels of care ⁽¹³⁾, the study revealed that inadequate ANC visits considered as high risk to develop LBW with very highly significant association.

As observed in the present study, the association between the infant's weight and mother's height was highly significant. In other words, the likelihood of giving birth to the infants with the weight of <2500 g increased for the mothers less than (150) cm height ($OR=4.432, P=0.002$), this results could be explained by the fact that mothers shorter than 150cm are highly associated with lower uterine volume and blood flow and this is directly associated with risks of fetal growth restriction, ⁽¹⁴⁾ this result goes with a case-control study done in KSA (2014), and found that there was very high significant association between mother's height and LBW ($OR=3.3, P=0.0001$). ⁽¹⁵⁾

In our study, the association between the hemoglobin level of mothers and LBW was very highly significant ($P=0.0001$); this result goes with the result of a case-control study which was done in Erbil city 2014 ($P=0.001$), ⁽¹⁶⁾ also inadequate taking of iron during pregnancy was a risk factor to mothers to have LBW neonates with high significant association ($OR=2.63, P=0.0019$); and this is the same result of study conducted in Eastern Nepal 2012 ($P=0.001$), ⁽¹⁷⁾ this could be explained by the fact that maternal anemia in pregnancy contributes to intergenerational cycle of poor growth in the fetus, also immune depression due to anemia and consequent increased morbidity due to infection, especially urinary tract infection, might be one of the factors responsible for LBW babies in anemic pregnant women. ⁽¹⁸⁾

This study revealed a significant association between hypertensive disorders during pregnancy and LBW ($P=0.0126, OR=3.439$), this result goes with another similar studies were done in Erbil (2014), ⁽¹⁶⁾ these results indicated that hypertensive disorders might play a critical role in the incidence of LBW, this is may be due to reduced placental blood flow that leads to decreased fetal growth, with an increased risk of IUGR and LBW. ⁽¹⁹⁾

As observed in the present study, the association between smoking habit and LBW was highly significant, the effect of smoking during pregnancy was well studied as smoking will reduced placental perfusion leading to IUGR. ⁽²⁰⁾

CONCLUSIONS

This study clarified that very young age group mothers carried a higher risk to have LBW newborns when compared with other age groups. Also primiparity, short birth interval, mothers with preterm babies and mothers of less than 150 cm height carried a higher risk to have LBW babies.

The mothers with inadequate ANC visits, history of anemia and inadequate iron supplements, hypertensive disorders, passive smoking during pregnancy were more prone to deliver LBW babies with significant association.

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