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low birth weight and associated risk factors in Neonate

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Abstract

Background: Birth weight is an important determinant of child survival and development. It is also a subject of clinical and epidemiological investigations. This study was planned to find out the epidemiological factors associated with low birth weight (LBW) among institutional deliveries so that suitable recommendation can be made to prevent LBW.

Objectives: The present study was therefore undertaken to fi nd out some maternal factors that may have their association, if any with LBW.

Materials and Methods: This cross-sectional study was carried out at Al- Batool Teaching Hospital between January 2022 to March 2022 among 150 mothers delivering live born neonate in study place. All babies were weighed within 24 hours after the birth. Low birth weight was defined as a birth weight of <2500 gram. All mothers interviewed within 24-72 hours after delivery and findings were recorded.

Results: Study of Socio economic and maternal characteristics show there is significant differences ($p<0.05$) among socio demographic characteristics of mothers, except residence character.While study of Maternal risk factors show there is significant differences ($p<0.05$) among maternal risk factors, except infants sex. In addition to these The study of Disorders that associated with mothers show there is significant differences ($p<0.05$) among disorders that associated with mothers.

Conclusion: Our study indicates that Maternal socio-economic status, maternal risk factors, and mothers disorders are significant determinants of low birth weight in Diyala province. Prevalence of Low Birth Weight can be reduced by increased visit of ANC with good educational status and present in good socioeconomic stratum

Key words: low birth weight, maternal factors

1.Introduction

Weight of a baby at term depends on gestational age and rate of fetal growth in uterus. Babies born may be appropriate for gestational age but are small because of preterm delivery. Babies who are small for gestational age may be born preterm or term. A baby is said to be small for gestational age when the gender specific birth weight is below the 10^{th} percentile for the appropriate gestational age. More than 70% of these Low Birth Weight (LBW) babies are small due to constitutional and environmental factors[1]

Low birth weight is one of the main risk factors for infant morbidity and mortality. When considering a foetus that is small for its gestational age, it is important to differentiate whether this is due to intra-uterine growth restriction (IUG7R), prematurity or other constitutional factors. Although prematurity has historically been defined as the birth of a live infant weighing 2500 g or less, experience in clinical practice showed that many of these infants were not actually premature, but rather full-term Foetuses from a pregnancy in which growth had been limited due to different factors. In 1967 the World Health Organization (WHO) recognized this fact, designating infants weighing 2500 g or less as ‘‘low birth weight [2]

Growth disorder, cognitive development defects, and chronic diseases later in life are the other adverse effects of LBW. The risk of some diseases such as coronary diseases, stroke, hypertension, and diabetes are higher in adults with a history of LBW than normal birth weight (NBW) [3]

Maternal age at delivery <18 and >35 years old was associated with increased risk of LBW. A large number of epidemiological studies have shown that LBW occurs in young and old mothers. There are social disadvantages such as low socioeconomic status, low education, poor nutrition, and low body mass index responsible for these results in younger mothers; however, in the older mothers, biological factors such as chromosomal anomalies, preeclampsia, and diabetes are responsible for this issue [4] There are a lot of studies in literature about the risk factors for LBW in developed countries but few and scarce regarding developing countries.Thus, in this study, we will determine the risk factors for low birth weight in developing countries.

1.1 Aim of study

To identify the risk factor of Low Birth Weight

2. Method and Material

2.1 Subjects

This cross-sectional study was carried out in pediatric department at Al Batool Teaching Hospital between January 2022 to March 2022 among 150 mothers delivering live born neonate in study place. All mothers were interviewed within 24-72 hours after delivery and findings were recorded. Target population was the new born of institutional deliveries and study population was babies born in hospital during the study period. Institutional ethical clearance was obtained. Unit of study were all mothers delivering live born neonate in study place.

2.2 Samples collection

Data was collected using a structured form that involve the maternal age , maternal hight ,maternal weight (pregnancy and during pregnancy) ,maternal hemoglobin, Educational status, Occuptional status, Residence ,Sex of infant, Gestional age, Parity, ANC visit, Take iron during pregnancy, any disease during pregnancy, 3rd trimester bleeding ,Inter pregnancy interval , Previous low birth weight History of abortion and History of smoking.

2.3 Statistical analysis

The parameters of conducted were given as percentage frequencies,and significant differences between frequencies were assessed by Pearson-Chi-square test or two-tailed Fisher exact probability (p). The statistical package SPSS version 25.0 was employed to carry out these analyses. A p-value ≤ 0.05 was considered significant.

3. Results

3.1 Socio economic and maternal characteristics

Present study show there is significant differences ($p<0.05$) among socio demographic characteristics of mothers, except residence character. The mothers scored highest percentage as following; 20-34 years (60.0%), tall mothers (44.7%), >50 kg in pre-pregnancy (69.3%) and during pregnancy (80.0%), no educational (38.7%), no empolyers (72.7%), and <2 times of inter-pregnancy interval (70.7%) (table 1).

Table 1; Distribution of mothers by socio demographic characteristics

		Count	Percent	*P value*
Maternal Age (years)	>19	24	16.0%	*P<0.001***
	20-34	90	60.0%	
	35-49	36	24.0%	
Maternal height (cm)	Short	34	22.7%	*P<0.001***
	Average	49	32.7%	
	Tall	67	44.7%	
Maternal weight pre-pregnancy (Kg)	>50	104	69.3%	*P<0.05**
	<50	46	30.7%	
Maternal weight during – pregnancy (Kg)	>50	120	80.0%	*P<0.001****
	<50	30	20.0%	
Mothers educational	No	58	38.7%	*P<0.05**
	Primary	55	36.7%	
	High	37	24.7%	
Mothers occupational	Employers	41	27.3%	*P<0.001****
	No employers	109	72.7%	
Residence	Rural	69	46.0%	*P>0.05*
	Urban	81	54.0%	
Inter-pregnancy interval	>2	44	29.3%	*P<0.001****
	<2	106	70.7%	

3.2 Maternal risk factors

Present study show there is significant differences ($p<0.05$) among maternal risk factors, except infants sex. The maternal risk factors scored highest percentage as following; <37 weeks gestation age (62.0%), 2- 3 parity (50.7%), >3 ANC visit (48.0%), no bleeding at third trimester (74.7%), no previous low birth weight (62.7%), no history abortion (62.0%), and no history smoking (78.7%) (table 2).

Table 2; Distribution of maternal risk factors

		Count	Percent	*P value*
Sex of infants	Male	69	46.0%	*P>0.05*
	Female	81	54.0%	
Gestation age (weeks)	>37	57	38.0%	*P<0.05**
	<37	93	62.0%	
Parity	First	20	13.3%	*P<0.001***
	2-3	76	50.7%	
	>3	54	36.0%	
ANC visit	1	37	24.7%	*P<0.05**
	2-3	41	27.3%	
	>3	72	48.0%	
Third trimester bleeding	Yes	38	25.3%	*P<0.001****
	No	112	74.7%	
Previous low birth weight	Yes	56	37.3%	*P<0.05**
	No	94	62.7%	
History of abortion	Yes	57	38.0%	*P<0.05**
	No	93	62.0%	
History of smoking	Yes	32	21.3%	*P<0.001****
	No	118	78.7%	

3.3 Disorders that associated with mothers

Present study show there is significant differences ($p<0.05$) among disorders that associated with mothers. The disorders that associated with mothers scored highest percentage as following; <12 mother hemoglobin (62.7%), take iron during pregnancy (68.7%), take drugs during pregnancy (64.0%), and no diseases during pregnancy (68.0%) (table 3).

Table 3; Distribution of disorders that associated with mothers

		Count	Percent	*P value*
Mother hemoglobin (mg/dl)	<12	94	62.7%	*P<0.05**
	>12	56	37.3%	
Take iron during pregnancy	Take	103	68.7%	*P<0.05**
	No take	47	31.3%	
Take Any drug during pregnancy	Take	96	64.0%	*P<0.05**
	No take	54	36.0%	
Any diseases during pregnancy	DM	9	6.0%	*P<0.001****
	Hypertension	12	8.0%	
	Hypertension and DM	17	11.3%	
	Other diseases	10	6.7%	
	No	102	68.0%	

4. Discussion

Weight of baby reflects the maternal health and nutritional status of mother before conception and during pregnancy. Growth of the baby in utero is determined by maternal, fetal and placental factors. Low birth weight can be influenced by various factors that occur prior to and during pregnancy including the household environmental conditions where the mothers live. Therefore; this study identified the risk factors for low birth weight which is important for proper, immediate and sustainable intervention to improve maternal health for better pregnancy outcome (Lakshmi, 2012). [5].

In this study, we identified potential determinants of the prevalence of LBW in Diyala province . Our findings demonstrated that advanced maternal age (>19 to 49 years), lack of ANC, primiparity, illiteracy, later conception, and being in the poorest socioeconomic stratum were significantly associated with LBW. Previous studies have likewise found that women with advanced maternal age are more likely to give birth to LBW babies (Mahmoud et al., 2017) [6]. Pregnant women aged 20-34 years are more likely to increase the probability of risk having pregnancy complications compared with younger women, like as, gestational diabetes, placenta praevia, breech presentation, that might be cause of delivering babies with LBW .

The present study found that receiving insufficient ANC was a significant contributor to LBW. Specifically, in women who failed to receive any ANC or had inadequate ANC than recommended, the risk of LBW was higher than in women attending the standard number of ANC visits (Tellapragada et al., 2016) [7] . Similar results have also been reported in previous studies conducted in developing countries, although the magnitude of risk appears to vary substantially in different settings depending on the ANC system and the degree of attendance (Kayode et al., 2014) [8] . Comparing our findings to those of prior studies, the evidence suggests that the degree of risk may be diluted in settings with a standard frequency of ANC. Women living in rural communities had a greater risk of LBW than urban mothers. Similar results have been found in other studies (Mahmoud et al., 2017) [6].

Lack of ANC was reported as significantly associated with LBW. Lin-Lin–Dal suggested number of antenatal visits had a U trend effect on LBW. He reported increasing number of prenatal visits decrease risk of LBW (Dai et al., 2014) [9]. Kotelchuck, (1994) [10] reported a relative risk of LBW as 1.47 in patients with inadequate antenatal visits and risk of 0.56 in women with adequate ante natal visits. Provision of ANC is expected to reduce the risk of LBW. It creates health awareness and timely identification of complications.

This study showed that some of the socio-economic conditions affect the weight of new born negatively. In this regard, mothers who resided in urban areas were more likely to deliver low birth weight babies. This finding is in disagreement with study done in India, that showed mothers who resided in rural areas were more likely to deliver low birth weight babies (Demelash et al., 2015) [11] . The difference might be due to inadequate rest and continuous hard working during pregnancy among mothers live rural area.

In agreement with previous studies, maternal education emerged as a strong determinant for LBW. In our results, women with 'no education' had the greatest odds of giving birth to an infant with LBW followed by women with "primary education", and these results compatible to results (Kader and Perera, 2014) [12] . Agreeing with previous studies, birth weight of the bay is greatly influenced by mother's level of education and having some kind of maternal education (oppose to no education) have a protective effect against LBW (Khatun and Rahman, 2008) [13] . It is likely that women with no or low level of education and/or knowledge may practice poor health habits (e.g., smoking, drug or substance uses, etc.).

Our results showed the no employers mothers are more likely to LBW than employers mothers, and these results not matched with results (Khan et al., 2016) [14] that showed the ers mothers are more likely to LBW. Short inter-pregnancy intervals may result in depletion of maternal nutrient stores and lead to reduced birth weight. However, significant association between short inter-pregnancy intervals and LBW was not evident in this study. Perhaps it is logical to assume that if a woman regain her nutritional status before conception of another fetus, even in a short period it may possible to have a normal weight baby (Kader and Perera, 2014). [12] .

The risk estimates for having an infant with LBW was significantly elevated for women with tall stature (height <150 cm) in our study . Height of a mother is an outcome of several factors including nutrition during her childhood and adolescence. Targeted public health interventions to improve nutrition status of women in childbearing age as well as female children are imperative to reduce prevalence of LBW in India. The cut-off point for height below which a woman can be identified as nutritionally at risk varies across populations and ethnic origins. For example, previously identified cut-off points were 145 cm in India, 155 cm in United Kingdom, 156 cm in Ethiopia (Mulu et al., 2020) [15].

Our study found that male gender has a protective effect against LBW, and these results matched with results (Mahumud et al., (2017) [6] that showed the females more likely to LBW. The biological mechanism by which the sex of the fetus influences birth weight is not clear. On average, the weight of a male infant is 150 g greater than that of a female infant and this difference in weight starts to appear after 28 weeks of gestation. It is hypothesized that the activity of androgen causes difference in maternal fetal antigen, or genetic material on the Y chromosome carrying genetic material for fetal growth (Roy et al., 2014) [16].

Among premature infants, mortality risks are the highest and survival is uncertain in the extremely preterm infants with gestational age (GA) < 28 weeks and extremely low birth weight infants (ELBWIs) with birth weight (BW) < 1000 g (Park et al., 2018) [17] and these results matched with our results that showed the extremely preterm infants with gestational age (GA) < 37 are mor likely to LBW. Therefore, neonatologists taking care of these ELBWIs and their parents often face difficulties in making decisions—during each stage of the neonatal intensive care—such as whether resuscitation, mechanical ventilation, or other invasive treatments should be initiated, as well as when these treatments should be withdrawn.

Pregnancy is a life threatening condition in a majority of developing countries, Its anomalous outcome reduces the life expectancy of new borns and their mothers. In conducted study, mothers who encountered pregnancy related health problems during current pregnancy were at higher risk to deliver low birth weight baby than mothers who didn't. This result is similar with a study done in India that showed mothers with any health problem during pregnancy were two times more likely to give low birth weight babies (Ogawa et al., 2022) [18].

Antenatal visits of the pregnant mothers are very important as they provide chances for monitoring the fetal wellbeing and allow timely intervention for feto-maternal protection including nutritional counseling that a mother might receive. Likewise, birth spacing had significant association with LBW. Mothers with birth spacing of 2 years and below were more likely to deliver low birth weight baby than mothers who delivered with birth interval of 2 or more years. This finding is in-line with a study done in India that showed birth interval of < 2 years were at higher risk to deliver LBW baby (Nagargoje, 2007) [19]. These findings were also consistent with similar study done in Iran (Golestan, and Fallah, 2008) [20].

A baby's birth weight is related to birth weight of both parents and more strongly through the maternal line . Women born with LBW have a higher risk of also having LBW babies. When these female babies enter motherhood they are at risk of having hypertension, diabetes and delivering babies with LBW. The intergenerational transmission of birth weight and its delayed effects later in life are a matter of concern (Mahmoud et al., 2017) [6].

The adverse effects of maternal smoking for human pregnancy are well known. Use of smoking and illicit drugs during pregnancy is associated with pregnancy complication and Low birth weight. Maternal smoking reduces mean birth weight by about 150-200 gm and doubles the risk of LBW associated with restriction of intra uterine growth. Moreover a dose response effect has been described with occurrence of low birth weight increasing with the number of cigarettes smoked per day. The risk of LBW was reported 4.1 times high in women who are addicted to any tobacco product as compared to those who were not exposed to any tobacco. Not only cigarette smoking, tobacco chewing is also a risk factor for LBW . In contrast to these reports only 5% of women in current study gave history of smoking (Dessì et al., 2018) [21].

Anaemia is the commonest medical disorder in pregnancy. 56% of pregnant women in developing countries are anaemic. Risk of anaemia in Pakistan ranges from 8-33%. Anaemic mothers tend to deliver small babies. A strong relationship exists between maternal anaemia and LBW babies. Badshah has reported a significantly higher incidence of LBW babies among anaemic as compare to non anaemic mothers (Figueiredo et al., 2018) [22]. (Khan, et al., (2016) [1] reported risk of LBW babies in anaemic population as 1.9 time higher in Pakistan, and that indicated there is strong relationship between anaemia and LBW.

5. Conclusions

Maternal socio-economic status, maternal risk factors, and mothers disorders are received were identified in this study as important determinants of LBW in Diyala province. These key mediating factors that need to be considered to improve birth weight of infants and targeted public health interventions are needed to improve these factors.

6. Recommendation

To reduce the prevalence of Low Birth Weight , the mother should receive sufficient ANC visit during pregnancy , And should woman regain her nutritional status before conception of another fetus, even in a short period it may possible to have a normal weight baby ,Also should take enough supplements during pregnancy and if you smoker should stopped it during pregnancy.

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