Medical Journal of South Punjab
Volume 4, Issue 2, 2023; pp: 111–116
Original Article

Mean Birth Weight and the Risk Factors for Low Birth Weight among Delivery at Term

Samra Kashif Lone[1*], Sarwat Laqa[2], Saeeda Begum[3], Sana Rahman[4], Rahat Aamir[5], Rida Iqbal[6]
[1-4]Memon Medical Institute Hospital, Karachi, Pakistan
[2]Nishtar Medical University, Multan, Pakistan
[*]**Corresponding Author Email:** samra.lone@gmail.com

ABSTRACT

Objective: *The objective of this study is to assess the frequency of Low Birth Weight (LBW) specifically at term, and concurrently, to investigate the prevalence of various associated risk factors contributing to LBW occurrences.*

Methods: *This cross-sectional study, carried out at the Department of Obstetrics and Gynaecology, Nishtar Hospital, Multan, spanned from January 2023 to July 2023. The inclusion criteria comprised singleton pregnancies with a gestational age of ≥37 completed weeks, while exclusion criteria encompassed multiple pregnancies, in-utero death, fetal abnormalities, and maternal medical conditions such as renal disease, diabetes, hypertension, antepartum hemorrhage, cardio-respiratory disease and preterm deliveries.*

Results: *It was seen that majority of the patients 74.1% gave births to LBW babies had age between 20-30 years. (p=0.514). The patients 7.4% who had BMI ≥25 kg/m^{2}and gave birth to LBW babies. (p=0.663). It was also seen that 44.4% patients had >3 parity and gave birth to LBW babies. (p=652). Majority of patients 68.5% who did not had get antenatal care and gave birth to LBW babies. (p=0.845). The patients 68.5% who had mild and moderate anaemia gave birth to LBW babies. (p=0.023). Further, the male sex had predominant to LBW. (p=0.373).*

Conclusion: *Women with a high risk for low birth weight (LBW) can be identified based on factors such as maternal anemia, and inadequate weight, all of which have shown significant associations with LBW.*

Keywords: *Mean Birth weight, Term delivery, Low Birth weight, Anemia, Antenatal Care.*

1. INTRODUCTION

Low birth weight defines by world health organization as birthweight below 2500g, contributing to various adverse health outcomes[1]. In low-income countries, the primary cause of LBW is intrauterine growth restriction (IUGR), whereas high-income countries predominantly attribute it to preterm birth[2]. The elusive causes of prematurity often include acute infections, maternal high blood pressure, anxiety; gender based violence, psychological factors, strenuous physical labor, multiple births, stress, and psychological factors[3].

On the other hand, IUGR is linked to factors such as poor maternal nutritional status at conception, lack of dietary intake and inadequate weight gain during antenatal period or increased caloric expenditure (such as hard physical work)[4], short maternal height resulting from early under-nutrition and infections[5], as well as anemia and various acute and chronic infections leading to under-nutrition and subsequent adverse pregnancy outcomes, including LBW[6].

Infants born with low birth weight (LBW) face a recognized disadvantage, as 60 to 80%[7] of neonatal deaths are attributed to LBW, making it a significant contributor to pregnancy outcomes like short and long term and prenatal morbidity in infancy and childhood[8]. LBW infants have a mortality rate up to 40 times higher than those with birthweights of at least 2500 g, and they are markedly more prone to developing long-term handicapping conditions[9,10].

The study specifically focuses on deliveries at term (gestational age of 37 weeks or more) to differentiate from preterm births and identify factors influencing birth weight in a more mature fetal environment.

2. METHODOLOGY

This cross-sectional study, carried out at the Department of Obstetrics and Gynaecology, Nishtar Hospital, Multan, spanned from January 2023 to July 2023. The inclusion criteria comprised singleton pregnancies with a gestational age of ≥37 completed weeks, while exclusion criteria encompassed multiple pregnancies, in-utero death, fetal abnormalities, and maternal medical conditions such as renal disease, diabetes, hypertension, antepartum hemorrhage, cardio-respiratory disease and preterm deliveries.

During the study period, eligible patients who underwent delivery and satisfied the inclusion criteria were enrolled in the research by the assigned postgraduate present in the labor ward. Informed consent was obtained from all participating patients. Various variables, such as age, family income, maternal weight and height, parity, hemoglobin (Hb) levels, birth weight, and fetal sex, were recorded using a pre-designed questionnaire.

After delivery, all newborns were promptly weighed in the labor room following the clamping and cutting of the umbilical cord, occurring within the first hour of birth. Infants were categorized as having a normal weight if their birth weight fell within the range of 2.5 to 4 kg. Those with a birth weight less than 2.5 kg were classified as having low birth weight (LBW), while babies weighing more than 4 kg were termed macrosomic.

The assessment of anemia was based on hemoglobin levels, with infants classified as having no anemia if their hemoglobin concentration was above 10 g/dl. Mild to moderate anemia was diagnosed if the hemoglobin level ranged between 7 and 10 g/dl, and severe anemia was identified if the hemoglobin concentration was less than 7 g/dl.

The data underwent analysis using SPSS version 27, wherein numerical variables including age, parity, and gestational age were summarized as Mean ± SD. Varisbles that were categorical characteristics were

presented as frequencies like fetal gender, monthly income, anemia, weight, maternal age, parity.

3. RESULTS

Overall, 350 live births were included, in this study. All the live births were weighted and the average weight at birth was 2.91±0.49 kg and in which low birth weight live births were 54 (15.4%). (Figure. I). The mean age of patients was 28.03±3.84 years. Most of the patients 239 (68.3%) were between 20-30 years of age. The mean BMI of the patients was 22.25±2.28 kg/m^2. Majority of the patients 298 (85.1%) had 18.5-24.9 kg/m^2, whereas 6 (1.7%) patients had <18.5 kg/m^2. Most of the patients 139 (39.7%) had greater than 3 parity. The mean gestational age of the patients was 37.97±1.25 weeks. Anaemia was severe in 56 (16.0%) patients. Further, 26 (7.4%) patients were smokers. The distribution of fetal sex was observed as 174 (49.7%) males and 176 (50.3%) females. (Table. I).

It was seen that majority of the patients 40 (74.1%) gave births to LBW babies had age between 20-30 years. (p=0.514). The patients 4 (7.4%) who had BMI ≥25 kg/m^{2}and gave birth to LBW babies. (p=0.663). It was also seen that 24 (44.4%) patients had >3 parity and gave birth to LBW babies. (p=652). Majority of patients 37 (68.5%) who did not had get antenatal care and gave birth to LBW babies. (p=0.845). The patients 37 (68.5%) who had mild and moderate anaemia gave birth to LBW babies. (p=0.023). Further, the male sex had predominant to LBW. (p=0.373). (Table. II).

Table. I
Demographic and baseline characteristics of the study patients

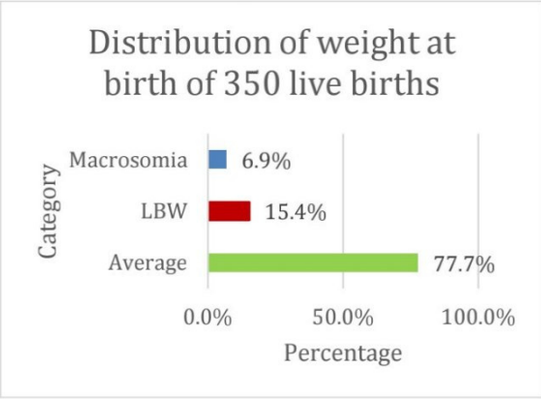
Variable	Presence
Age (years)	28.03±3.84
<20	11 (3.1)
20-30	239 (68.3)
>30	100 (28.6)
BMI (kg/m^2)	22.25±2.28
<18.5	6 (1.7)
18.5-24.9	298 (85.1)
≥25	46 (13.1)
Parity	3.15±1.74
Primigraviga	80 (22.9)
1-3	131 (37.4)
>3	139 (39.7)
Gestational age (weeks)	37.97±1.25
Anaemia	
Normal	87 (24.9)
Mild-moderate	207 (59.1)
Severe	56 (16.0)
Smoking status	26 (7.4)
Sex of fetal	
Male	174 (49.7)
Female	176 (50.3)
N (%), Mean±S.D	

Table. II
Association of splenomegaly grades with possible risk factors of the study patients

Variable	Weight at birth			
	Average N (%)	Low N (%)	Macrosomia N (%)	p-value
Age (years)				
<20	10 (3.7)	1 (1.9)	0 (0.0)	0.514
20-30	180 (66.2)	40 (74.1)	19 (79.2)	
>30	82 (30.1)	13 (24.1)	5 (20.8)	
BMI (kg/m^2)				
<18.5	5 (1.8)	1 (1.9)	0 (0.0)	0.663
18.5-24.9	229 (84.2)	49 (90.7)	20 (83.3)	
≥25	38 (14.0)	4 (7.4)	4 (16.7)	
Parity				
Primigraviga	62 (22.8)	10 (18.5)	8 (33.3)	0.652
1-3	104 (38.2)	20 (37.0)	7 (29.3)	
>3	106 (39.0)	24 (44.4)	9 (37.5)	
Antenatal care				
Yes	80 (29.4)	17 (31.5)	6 (25.0)	0.845
No	192 (70.6)	37 (68.5)	18 (75.0)	

Anaemia				
Normal	68 (25.0)	16 (29.6)	3 (12.5)	0.023
Mild-moderate	154 (56.6)	37 (68.5)	16 (66.7)	
Severe	50 (18.4)	1 (1.9)	5 (20.8)	
Smoking status				
Yes	21 (7.7)	5 (9.3)	0 (0.0)	0.329
No	251 (92.3)	49 (90.7)	24 (100.0)	
Sex of fetal				
Male	133 (48.9)	31 (54.7)	10 (41.7)	0.373
Female	139 (51.1)	23 (42.6)	14 (58.3)	

Figure. I



4. DISCUSSION

Women who are born with low birth weight (LBW) face an elevated risk of giving birth to infants with LBW themselves, and as they transition into motherhood, they are also at an increased susceptibility for developing hypertension and diabetes, potentially leading to the delivery of babies with LBW, thereby highlighting the worrisome intergenerational transmission of birth weight and its consequential effects in later stages of life[11,12].

Women who are born with low birth weight (LBW) face an elevated risk of giving birth to infants with LBW themselves, and as they transition into motherhood, they are also at an increased susceptibility for developing hypertension and diabetes, potentially leading to the delivery of babies with LBW, thereby highlighting the worrisome intergenerational transmission of birth weight and its consequential effects in later stages of life[11,12].

Studies conducted by Mumbare et al[14] on Indian population reported proportion of low birth weight (LBW) in India ranges from 21.5% to 26.8%, while the National Nutritional Survey data previously published in a study by Khan N et al[15] indicates a frequency of 12-25% for LBW in Pakistan.

In this study it was seen that majority of the patients 40 (74.1%) gave births to LBW babies had age between 20-30 years. Authors report varying perspectives on the relationship between age and low birth weight (LBW). Some findings suggest a significant association, as indicated by Banerjee et al[16] a higher incidence of LBW (65.52%) in the group of teenage mothers. Similarly, Viengsaahone et al[17] identified that young maternal age as a significant risk factor for low birth weight, reporting an odds ratio (OR) of 8.6 with a 95% confidence interval (CI) ranging from 2.4 to 30.7.

Association between anemic mothers and low birth weight is also observed. In this study patient 68.5% who had mild and moderate anemia gave birth to LBW babies. (p=0.023). Lone et al[18] found that the risk of low birth weight (LBW) babies was 1.9 times higher in anaemic populations in Pakistan, while Ahmed et al[19] reported an association between maternal anemia and an increased risk of LBW. Consistent findings were also observed in other literature in Pakistan.

Similarly lack antenatal care consultation with qualified gynecologists is also a risk factor for low birth weight in terms deliveries. In present study majority of patients 68.5% who did not had get antenatal care and gave birth to LBW babies. In Mumbai, India, a reported 62.4%[20] of

mothers who delivered low birth weight (LBW) babies did not receive antenatal care. This aligns with the current study's findings, where 68.5% of mothers with LBW babies failed to seek antenatal care.

The well-established detrimental impacts of maternal smoking on human pregnancy include associations with pregnancy complications and low birth weight. Maternal smoking has been found to diminish mean birth weight by approximately 150-200[21] grams and doubles the risk of low birth weight linked with intrauterine growth restriction. The risk of low birth weight was reported to be 4.1 times higher in women addicted to any tobacco product compared to those unexposed to tobacco[22]. Not only cigarette smoking but also tobacco chewing is emerged as a risk factor for low birth weight. Despite these findings, only 7.4% of women in the current study reported a history of smoking.

Limitations: It can be challenging to isolate the specific impact of individual risk factors on birth weight, as there may be confounding variables that were not adequately controlled for. Failure to account for all relevant variables could lead to spurious associations. Practical Implications: The study may highlight gaps in understanding and areas requiring further research. This can guide future investigations to deepen our understanding of the factors influencing birth weight and develop more effective interventions.

5. CONCLUSION

Women with a high risk for low birth weight (LBW) can be identified based on factors such as maternal anemia, and inadequate weight, all of which have shown significant associations with LBW; addressing these risk factors through interventions such as correcting anemia and enhancing antenatal care utilization is anticipated to contribute to a reduction in the incidence of LBW babies and a decrease in perinatal mortality.

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