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Burden and risk factors associated with low birth weight among newborns in a tertiary care hospital Karachi, Pakistan

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ABSTRACT

Background: Birth weight is one of the significant determinants of perinatal survival and infant morbidity and illnesses during early childhood. The burden of LBW neonates in the developed world is around 7%, whereas it is more than double at around 16.5% in developing countries.

Methods: The retrospective cross-sectional study was conducted at the Indus Hospital and Health Network, Karachi, Pakistan. Data was extracted through the Electronic Medical Record (EMR) with specific coding related to LBW from 1st January 2019 to 31st December 2020.

Results: Our study showed LBW Disease burden of 7.61% equated to 7% in the developed world while, in contrast with LBW prevalence in the developing countries, 16.5%. Gestational diabetes and pregnancy-induced hypertension are the major maternal risk factors associated with LBW.

Conclusions: In conclusion, we identified key risk factors associated with LBW, all of which are controllable with minimal effort and determination. The situation of LBW in Pakistan requires immediate attention, and prompt interventions in order to reduce the burden of morbidity and mortality in neonates.

Keywords: Antenatal care, Low birth weight, Morbidity, Mortality, Neonates

INTRODUCTION

Pakistan ranks highest in relation to neonatal mortality globally, 1 in 22 neonates is at risk of dying in the neonatal period. Leading causes of neonatal death in Pakistan are sepsis, hypoxic-ischemic encephalopathy, prematurity, and low birth weight (LBW). Birth weight is one of the major determinants of perinatal survival and infant morbidity, as well as illnesses during early childhood. Birth weight is the first weight of a newborn after birth, and LBW is defined as weight less than 2500 grams. ²

The burden of LBW in the developed world is around 7%, whereas, in developing countries, it is more than

double at about 16.5%. Globally, 20 million infants are born with LBW representing 15.5% of all births, majority (95.6%) of them occur in developing countries.² Zenebe et al reported a cohort from India that describes the overall prevalence of LBW as 17.4%, which is significantly high, ultimately influencing the overall higher infant and childhood mortality neurodevelopment morbidities like mental retardation and constrained intellectual capabilities.3 Nearly half of all perinatal deaths and one-third of infantile deaths are directly or indirectly related to LBW. Mortality and low birth weight are inversely proportional; a LBW infant has a 40 times higher chance of dying in the neonatal period than appropriate for gestational age.⁴

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There are multiple factors responsible for LBW in term gestation. By improving antenatal care, one can prevent these factors and achieve a good outcome. These are diabetes mellitus, pregnancy-induced gestational hypertension, severe anemia including thalassemia, low maternal weight at conception, maternal age, parity, family income, degree of illiteracy, and less than three years birth interval and chronic maternal illness. Gulnaz et al found maternal anemia is a strong association with LBW. The study percentage of maternal risk factors causing LBW were 78.88% with anemia, 61.49% with hypertension, 13.6% with preeclampsia, 12.19% with hypothyroidism, 8.69% with diabetes.⁵

This study aimed to determine the burden and associated factors of LBW in babies born at full-term gestation. By the estimation of LBW, one can plan early detection and prompt interventions against this problem that would lead to the decreased burden of morbidity and mortality in neonates and infants.

METHODS

A retrospective cross-sectional study was conducted at the Department of Neonatology, Indus Hospital and Health Network, Karachi, over a two-year period from 1st January 2019 to 31st December 2020. The study was conducted after obtaining ethical approval from the Institutional Review Board (IRD-IRB # 2020_02_020). All babies of either gender who were born at term gestation (37-42 weeks) were included through consecutive sampling. However, babies born with syndromic facies, congenital anomalies, IUGR with reduced placental blood flow of fetus on Doppler ultrasound, multiple gestations (twin, triplet, etc.) were excluded from the study.

The data was extracted through EMR with specific coding related to LBW. Preformed proforma was filled for biodata that included gestational age, gender, date of birth, intrauterine growth restriction, mode of delivery and birth weight. The maternal data had parity, gestational diabetes, pregnancy-induced hypertension, anemia, asthma, thalassemia minor, thyroid dysfunction (hypo-/hyperthyroidism).

The data was entered and analyzed through SPSS (Statistical Package for the Social Sciences) version 25. Mean±standard deviation (SD) was computed for quantitative variables where appropriate. All the categorical variables were presented as frequencies and percentages. The frequency of LBW in full-term gestation is calculated by dividing the number of neonates with LBW over the study period by the total number of live births.

RESULTS

During the 2-year study period, a total of 5605 term babies were born, of which 427 (7.61%) were classified

as low birth weight (birth weight <2.5kg). Females constituted 61.3% (n=262) of the LBW babies. Mean gestational age of LBW babies was 37.48 ± 0.75 weeks and the mean birth weight was 2.26 ± 0.16 kilograms. Most common mode was normal vaginal delivery (n=245, 57.4%). Most of the babies were born to primigravida mothers (n=220, 51.5%) (Table 1).

Table 1: Characteristics of low birth weight (LBW) babies.

Characteristics	N (%)
Weight (in kg)	
Mean±SD	2.26±0.16
Gestational age (in weeks)	
Mean±SD	37.48±0.75
Gender	
Males	165 (38.6)
Females	262 (61.4)
Mode of delivery	
SVD	245 (57.4)
C-section	182 (42.6)
Gravida	
1	220 (51.5)
2	114 (26.7)
≥3	93 (21.8)
Maternal associated conditions	
Gestational diabetes	109 (54.5)
Pregnancy induced hypertension	34 (17)
Thalassemia	3 (1.5)
Others	36 (18)
Unknown	18 (9)
Weight (in kg)	
Mean±SD	2.26±0.16
Gestational age (in weeks)	
Mean±SD	37.48±0.75

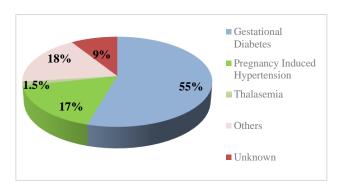


Figure 1: Factors associated with low birth weight (n=427).

*Others include epilepsy, anemia, asthma, thyroid diseases, and hepatitis.

Most common maternal condition associated with low birth weight babies was gestational diabetes mellitus (n=109, 54.5%), followed by pregnancy-induced hypertension 17% (N=34). Other associated conditions

were epilepsy, asthma, thyroid dysfunction, and hepatitis, etc., as shown in Figure 1.

DISCUSSION

Pakistan has one of the highest rates of LBW ranging from 19% to 32%, which contributes significantly to the overall burden of neonatal mortality and morbidity and plays a key role in restricting the country's progress towards Sustainable development goals. ^{5,6} In comparison to the previous studies in Pakistan, our study demonstrates the burden and risk factor for LBW among term newborns delivered in a tertiary care neonatal setup with appropriate antenatal care in a developing country. We observed LBW burden of 7.61%, which is much lower than the average rate of 16.5% reported in developing countries and nearly equals what has been reported from the developed world (7%). The observed variances could be a reflection of likely differences in antenatal care in our population.

Gestational diabetes and pregnancy-induced hypertension were consistently related to LBW in our study. Female gender was predominantly associated with LBW. Our study has also pointed out that primigravida mother is more expected to have a LBW baby and the chances of low birth weight decrease with increasing parity.

Lack of antenatal care was reported as significantly associated with LBW. Studies have proposed that number of antenatal visits had a direct consequence on LBW. 7.8 Similarly, the cumulative increase in the number of prenatal visits reduces the risk of LBW. 9 Studies from the Indian subcontinent reported 62.4% of mothers who delivered LBW babies did not receive antenatal care. 10.11 Our study did not find any association to LBW with maternal anemia contrary to the risk described in previous studies from Pakistan and Bangladesh, which had shown an anemia prevalence of up to 33% resulting in LBW babies. 12 The negligible incidence of anemia in our study reflects antenatal care, health awareness, and timely identification of complications, which decreased the incidence of LBW.

Limitations in our study are a possible underestimate of the study population conducted in a single-center tertiary care setup with appropriate antenatal care and follow-up, which may not reflect the general population. Our study also has limitations in identifying placental risk factors for LBW as well as the implication of intrauterine infections.

CONCLUSION

In conclusion, we identified key risk factors associated with LBW, all of which are controllable with minimal effort and determination. The situation of LBW in Pakistan requires immediate attention, and research needs innovative methods in an attempt to discover protective factors among high-risk women. Therefore, government,

non-governmental organizations, and civil society should take a holistic approach to ensure proper education and counselling sessions for women, timely and adequate provision of antenatal care, provision of iron and folic acid supplementation throughout pregnancy, and an improvised family planning program that includes reversible long-acting contraceptives as a critical component.

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