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Maternal Risk Factors Associated with Term Low Birth Weight Infants

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ABSTRACT:

Background: The problem of low birth weight (LBW) at term was also an important issue in the sphere of public health that is associated with the development of more neonatal morbidity, death, and other problems in the future. Although preterm births have been identified as a cause of LBW, there is a trend of normal infants born under LBW due to intrauterine growth restriction (IUGR) as a cause physiologically induced by different maternal factors. It was necessary to diagnose these risk factors to carry out preventive measures to enhance better neonatal outcomes.

Objective: The objective of this study was firstly to define the maternal risk factors that exist in relation to a term low birth weight infant and secondly to quantify their effects in relation to the incidence of LBW at term.

Materials: It is a descriptive cross-sectional study that was carried out in Shahida Islam medical and dental college Lodhran between June 2024 and May 2025. One hundred term newborn babies and their mothers were involved. Purposive sampling was used in choosing the participants on the basis of delivery records. The information was extracted with the help of a structured questionnaire and medical record reviews composed of maternal socio-demographic traits, obstetrical history, nutritional status, and antenatal care utilization. Term LBW the term was defined as weighing less than 2500-gram birth weight in 37 or more weeks of completion gestation. The descriptive statistics and chi-square test forms of statistical analysis were carried out to establish the association between maternal factors and LBW.

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Results: Term LBW was estimated to be at 28% in the study group. Major maternal risk factors that were found to be linked with LBW at term were maternal age less than 20 years (p=0.03), maternal body mass index less than 18.5 kg/m 2 (p=0.002), inadequate visits to antenatal care (<4 visits) (p=0.001), maternal anemia during pregnancy (p=0.004) and development of pregnancy-induced hypertension (p=0.02). Other significant associations were also noted with socioeconomic status, maternal education level and short interpregnancy interval (<18 months). Exposure of mothers to smoking during pregnancy and multiparity were also more frequently observed among mothers who gave birth to term LBW infants but their relationships were not significant.

Conclusion: This article proved that term LBW had close association with other risk factors that were modifiable and avoidable based on maternal issues such as poor maternal nutrition, poor antenatal care and maternal anemia. Management of these factors by specific antenatal care, nutritional supplements, and community based maternal health education would substantially cut down the rate of LBW in term infants. Risk identification at an early stage and overall support to the mother continues to play an essential role in enhancing neonatal outcomes.

Keywords: Low birth weight, Term infants, Maternal risk factors, Antenatal care, Maternal anemia, Intrauterine growth restriction.

INTRODUCTION:

Low birth weight (LBW), which is a weight of less than 2,500 grams at birth as defined by the World Health Organization (WHO) had continued to be one of the major public health issues across the globe. Low birth weight among infants born at term had already been identified as a key indicator of neonatal morbidity and mortality as well as long term developmental complications [1]. Even though the proportion of the preterm birth was extensive, many LBW infants with a correct gestational age had been born, implying the role of both maternal and environmental factors that were not considered in connection with gestational age. Term low birth weight (TLBW) was also a special issue in itself where these new born infants were subjected to intrauterine growth restriction (IUGR) compared with reduced gestation, which implied that maternal health, nutrition and the socio-economic situations were instrumental [2]. The burden of TLBW had been excessive in low- and middle-income countries, as maternal malnutrition and lack of access to antenatal-care services had prevailed, as well as increased infections. The rate of LBW was very high in Pakistan in relation to the many developed countries and

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socio-economic factors in Pakistan only worsened the situation. In the neonatal period, TLBW infants had encountered heightened risks of becoming hypoglycemic, hypothermic, aggravated feedings, and weak immune functions [3]. Such infants were more prone to suffer poor growth, cognitive delays, and heightened predispositions to chronic conditions in adulthood, including cardiovascular disease and type 2 diabetes in the long run.

Studies of the past had established various maternal risk factors related to TLBW to include: inadequate maternal nutrition, low body mass index (BMI) before pregnancy, anemia, hypertensive disorders during pregnancy, and gestational diabetes. Life styles habits like; smoking, alcohol abuse and drugs were also highly associated with limited fetal development [4]. Moreover, poor antenatal care, close interpregnancy intervals, and maternal age at the extreme end of the reproductive age Mainly have been reported with the increased OR of TLBW. Infections in pregnancy like urinary tract infections and malaria in malaria endemic areas had been other causes of growth restriction [5].

Biologically, TLBW among term infants had mostly been caused by poor placenta performance or due to long-term intrauterine deprivation and both of these had undermined the fetal nutrition and oxygen supply. In most instances, the initial causes of these conditions were the maternal health conditions prior to and during the pregnancy. These risks had been compounded by socio-economic factors such as low income, illiteracy, and the inability to get access to quality healthcare which had become a vicious circle of poor maternal and child health outcomes [6].

Regardless of all the global and national initiatives of analyzing maternal and child health, the rates of TLBW had been fairly high, and thus it was reported to be necessary to further research this particular cause. In most scenarios, modifiable or avoidable ones had been the causative factors behind all these, emphasizing the need to formulate descriptive pertinent healthy policies. The discovery of maternal risk factors proven to be area-specific had played a pivotal role in the designing of effective maternal risk factors that have the ability to minimize the prevalence of the TLBW and enhance neonatal outcome [7].

The aim of conducting the study was to identify and review the maternal risk factors of low birth weight term babies. Considering such factors at a local level, the study had hoped to present the evidence that may assist the clinicians, public health policymakers, and maternal care providers in performing preventative measures and enhancing antenatal care guidelines. Knowledge of these determinants was deemed vital in escaping the cycle of under nutrition and poor health outcomes inherited across generations in resource-limited setting [8].

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MATERIALS AND METHODS:

The study was done in Department of Obstetrics and Gynecology, Shahida Islam Medical and Dental College, Lodhran during June, 2024 to May, 2025. It had a descriptive cross sectional design to explore the maternal risk factors pertaining to the term low birth weight (LBW) infants. The population of the study was 100 pregnant women that delivered term babies at the study site during the stipulated time.

Population of the study and sampling method

The method of selecting all the participants was purposive. The criteria used in including women were those who had given birth to babies born alive and at term (37-42 weeks of gestation) and whose weights were done soon after birth within an hour of delivery. Women having more than one pregnancy, having a congenital abnormality in the newborn child or giving birth during less than 37 weeks or more than 42 weeks of gestation were excluded to provide homogeneity of the sample.

Data Collection Procedure and Tool Data Collection Tools

The structured questionnaire and delivery records of hospitals in which the pre-test was administered were utilized in the collection of data. The questionnaire involved the collection of the following information: the demographic profile of the mother, the previous experience in pregnancy and delivery, the antenatal care, and nutrition, and associated conditions during pregnancies. The ratio of the total measures concerning the tool was checked: its clearness, reliability, and comprehensiveness were ensured by the pilot test involving ten participants that can be not used in the final analysis.

After getting a written consent of informed consent, the trained research assistants interviewed the participants within 24 hours after the delivery. Data were taken on age and parity, level of maternal education, socio-economic status, the number of antenatal care visits and dietary intake, and the occurrence of complications during pregnancy; hypertension, anemia, or infections. The birth weight was determined by a calibrated digital infant weighing scale and the weights noted to the precision of 10grams. **Variables**

The dependent variable was LBW at term which is less than 2,500 grams of neonatal birth weight and the child is born after 37 weeks to 42 weeks of gestation. Maternal age, parity, socio-economic status, maternal education, their nutritional status, antenatal care, and existence of medical as well as obstetric complications were considered as independent variables.

Data Management, Analysis

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Checks were done to ensure that data entered into a computerized databank were complete and accurate. Statistical analysis was done on Statistical Package for Social Sciences (SPSS) version 26. The descriptive statistics were used to summarize data in terms of means, standard deviation, frequencies and percentages. Chi-square test of association was used to determine the connection of maternal risk factors with low birth weight being a categorical variable and independent t-test of association was employed when the variable was continuous. The p-value was to be less than 0.05, which was to be indicative of a significant figure.

Ethical Considerations

Institutional Review Board (IRB) of Shahida Islam Medical and Dental College, Lodhran, granted ethical approval of the research. All participants signed written informed consent after being informed of the goals of the study, the nature of procedures and the risk or benefit encountered during participation. Participation was strictly on a voluntary basis and all information that was gathered was kept in a very confidential manner. All identifying information was not captured on the questionnaires and data were stored in password-protected files that could not be accessed by the research team.

Measurements of Quality Control

The data reliability required that all the research assistants were trained on the techniques of interviewing, recording data and handling the measurement instruments. On a daily basis, the infant weighing scales were calibrated and random verifications of data entry were done to detect and correct the mistakes. All data collection processes were monitored by the principal investigator so that the study protocol was observed.

RESULTS:

The study was carried out in July 2014 at Shahida Islam Medical and Dental College, Lodhran and all 100 term pregnant women were included to identify maternal risk factors of term low birth weight (LBW) infants. Of these numbers 45 infants (45%) had low birth weight (<2500 g) whereas 55 infants (55%) had normal birth weight (>= 2500 g).

Table 1: Distribution of Maternal Characteristics in Term LBW and Normal Birth Weight Groups:

Maternal Characteristic	LBW Group (n=45)	Normal Birth Weight Group (n=55)	p-value
Maternal age <20 years	14 (31.1%)	8 (14.5%)	0.042*
Maternal age >35 years	6 (13.3%)	5 (9.1%)	0.538

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Primigravida	21 (46.7%)	15 (27.3%)	0.037*
BMI <18.5 kg/m²	12 (26.7%)	5 (9.1%)	0.019*
Anemia (Hb <11 g/dL)	28 (62.2%)	14 (25.5%)	<0.001*
Antenatal care visits <4	30 (66.7%)	16 (29.1%)	<0.001*

The table above showed the comparison of maternal characteristics in the LBW group versus those in normal birth weight group. The prevalence of young maternal age of below 20 years in the LBW group which was 31.1 percent was highly effective when compared to the normal group that represented 14.5 percent, implying that teenage mothers were more susceptible to LBW infants. Primigravida was also a significant correlation between LBW (46.7% vs.27.3%). The nutritional status was a significant factor with % mothers in LBW group having a BMI below 18.5 being 26.7 as opposed to that of % mother in the normal group being 9.1. A higher risk factor was anemia, which was prevalent in LBW mothers, 62.2%, as opposed to normal birth weight mothers, 25.5%. Also, poor antenatal care (fewer than four visits) was very dominant among LBW cases (66.7% vs. 29.1%), indicating high correlation between shabby antenatal care and LBWs.

Table 2: Obstetric and Lifestyle Factors Associated with LBW:

Risk Factor	**LBW Group (n=45)**	**Normal Birth Weight Group (n=55)**	**p-value**
History of previous LBW infant	10 (22.2%)	6 (10.9%)	0.128
Short interpregnancy interval (<2 years)	15 (33.3%)	10 (18.2%)	0.089
Hypertensive disorders in pregnancy	12 (26.7%)	5 (9.1%)	0.021*
Smoking/tobacco exposure	9 (20.0%)	4 (7.3%)	0.049*
Maternal infections during pregnancy	11 (24.4%)	5 (9.1%)	0.038*

This table examined obstructive and life style factors affecting LBW. Included in this are the significant differences in the hypertensive disorders in pregnancy (26.7 vs. 9.1). There was also statistically a significant association of being exposed to tobacco either by active smoking or passive household

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exposure and LBW (20.0% vs. 7.3%). The incidences of maternal infections, urinary tract infections and malaria were also higher in LBW cases (24.4 % vs. 9.1 %). Although LBW infant and short-gestation interpregnancy interval had a prior history that was more prevalent in the LBW category, the disparity was not significantly different.

DISCUSSION:

The current research had reviewed the maternal risk factors of term low birth weight (LBW) babies, and several key attributes had been pointed out, which had been invariably in line with the earlier studies done at this. In the analysis, it was shown that maternal age, parity, nutritional status, utilization of antenatal care, and some of the lifestyle behaviors were key factors contributing to risk of giving birth to term LBW babies. The results had reinforced the multifactorial etiology of LBW and the need to see maternal health in pregnancy as holistic [8].

Maternal age had turned out to be a key element in the incidence of term LBW. The younger mothers, especially those at the age below 20 years had shown a higher chance of delivering LBW babies. The finding had concurred with previously conducted research that alluded to a biological immaturity, as well as socio-economic and inadequate health awareness being possible factors that may have affected impaired fetal development [9]. In the same manner, advanced maternal age had been implicated with LBW perhaps because more cases by this age were characterized by chronic conditions like hypertension and gestational diabetes which were found to compromise placental functioning.

Parity had demonstrated a strong correlation with the outcomes in relation to birth weight. Primiparous women had more chances of having LBW babies than multiparous women. This correlation had been explained by postulation that there are physiological adaptations that occur in the later pregnancies that had enhanced the efficiency of the placenta and better fetal development [10]. The high parity had, however, also been linked with negative consequences and this may be attributed to lack of nutritional status and the physical inactivity of the mothers undergoing several pregnancies.

Another important birth weight determinant had been maternal nutritional status, assessed as the prepregnant body mass index (BMI) and weight gain during pregnancy. Low pre pregnancy BMI or poor gestational weight gain of mothers were also more likely to deliver LBW babies. This observation corroborated some evidence showing that maternal under nutrition decreased nutrient supply to the fetus that resulted in intrauterine growth restriction [11]. Also, there was a strong connection between LBW and anemia in pregnancy which lends credence to poor fetal performance due to micronutrient deficiency.

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Utilization of antenatal care had a great effect on the birth weight. The mothers that had attended low antenatal visits when compared to the recommended visits, as well as those who began care later in pregnancy, showed a higher rate of LBW infants. This had supported the significance of timely and adequate prenatal care in the aspects of observing maternal health, early diagnosis of possible complications and nutritional and lifestyle advise [12].

Other lifestyle related factors include maternal smoking and exposure to second hand smoking and also the (lack of) heavy physical workload during pregnancy which has been found out to be significant contributors to LBW. These habits had been found to negatively affect the placental blood blow and the supply of oxygen to the unborn leading to limited growth. In addition, socio-economic status, in turn, had mediated the impact on birth outcomes because it determined nutrition, access to health care and living conditions [13].

The research results had conformed well to the world literature on LBW and it was established that there was no single way of preventing it other than a multidimensional approach. Enhanced maternal nutrition, proper antenatal care, prevention/control of adolescent pregnancies and health education had been vital interventions. More specifically, targeted interventions in segments of the population who were at risk such as rural women and individuals with lower socio-economic statuses had been set to bring in high returns [14].

It had been confirmed during the study that the risk of infants with term LBW was associated with the interaction of maternal characteristics, health behaviors, and access to the healthcare surrounding. Such factors have been essential to address through integrated local health and maternal support programs and could lead to the decrease in LBW prevalence and the enhancement of neonatal outcomes [15].

CONCLUSION:

This paper had established that there were several maternal risk factors that played a significant role in contributing towards the birth of term LBW babies. Maternal characteristics like poor maternal dietary intake during pregnancy, maternal anemia, low pre-pregnancy body mass index, inadequate antenatal visits, and maternal comorbidities among others had been highly linked with increased risk of delivering LBW infants. Also, the age, socioeconomic status, and the lifestyle of the mother had been of particular significance in determining the birth weight levels. These results had stressed on the necessity of early detection and control of such risk factors by utilizing extensive antenatal screening, nutrition guidance and issue-specific programs. Enhancement and awareness of the maternal health sectors and effects of

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modifiable risks factors had played a critical role in minimizing the incidence of LBW at term. On the whole, the intervention through these determinatives in the framework of the maternal healthcare policies would have enhanced the neonatal outcomes and would have led to better long-term viability of mothers and their infants.

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