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CLINICAL CHARACTERISTICS AND SHORT-TERM OUTCOMES OF LOW BIRTH WEIGHT INFANTS ADMITTED TO SHEIKHAN GENERAL HOSPITAL, NINEVEH, IRAQ

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ABSTRACT

Background: Low birth weight (LBW), defined as a birth weight of less than 2500 grams, remains a major public health problem and is associated with increased neonatal morbidity and mortality. Low birth weight infants are particularly vulnerable to a variety of complications because of physiological immaturity and limited metabolic reserves, often requiring specialized neonatal care. **Objectives:** To evaluate the clinical characteristics and short-term outcomes of low birth weight infants admitted to Sheikhan General Hospital and to identify factors associated with adverse neonatal outcomes. **Methods:** This retrospective cross-sectional study was conducted at the Neonatal Unit of Sheikhan General Hospital, Nineveh Governorate, Iraq, between January 2024 and December 2025. A total of 131 low birth weight infants with a birth weight of less than 2500 grams were included. Data regarding maternal characteristics, neonatal variables, clinical complications, and short-term outcomes were collected from hospital records. Statistical analysis was performed using SPSS version 31. Associations between neonatal characteristics and adverse outcomes were assessed using Chi-square and logistic regression analyses. A P value of less than 0.05 was considered statistically significant. **Results:** The mean maternal age was 28.9 ± 6.4 years. Male infants accounted for 54.2% of cases, while preterm neonates represented (61.8%) of the study population. Very low birth weight infants (<1500 g) constituted 31.3% of cases. Maternal anemia (28.2%) and pregnancy-induced hypertension (22.9%) were the most common maternal risk factors. Neonatal jaundice was the most frequent complication, occurring in 51.9% of infants, followed by respiratory distress syndrome (32.8%), neonatal sepsis (22.1%), feeding difficulties (19.8%), and hypoglycemia (16.0%). Most infants were discharged in improved condition (84.0%), whereas (9.2%) were referred to tertiary care centers and (6.8%) died during hospitalization. Multivariate logistic regression analysis identified very low birth weight (OR = 4.12, 95% CI: 1.52–11.17, P = 0.005), respiratory distress syndrome (OR = 3.36, 95% CI: 1.21–9.34, P = 0.020), and neonatal sepsis (OR = 2.94, 95% CI: 1.08–7.98, P = 0.034) as independent predictors of adverse neonatal outcomes. **Conclusions:** Low birth weight infants remain at substantial risk of neonatal morbidity and adverse short-term outcomes. Neonatal jaundice, respiratory distress syndrome, and neonatal sepsis were the most common complications observed. Very low birth weight, respiratory distress syndrome, and neonatal sepsis were identified as significant independent predictors of adverse outcomes. Early identification of high-risk infants, improvement of antenatal care services, and timely neonatal intervention may contribute to reducing neonatal morbidity and mortality and improving survival outcomes.

KEYWORDS: Low birth weight, Neonatal complications, Neonatal sepsis, Prematurity, Respiratory distress syndrome, Short-term outcomes.

1-INTRODUCTION

Low birth weight (LBW), defined by the World Health Organization as a birth weight of less than 2500 grams regardless of gestational age, remains one of the most important public health challenges worldwide. It is a major determinant of neonatal morbidity and mortality and contributes significantly to adverse health outcomes during infancy and later life. Low birth weight may

result from preterm birth, intrauterine growth restriction, or a combination of both conditions. Despite advances in neonatal care, LBW continues to account for a substantial proportion of neonatal deaths, particularly in low- and middle-income countries.[1]

Globally, an estimated 20 million infants are born with low birth weight each year, representing approximately 15–20% of all live births. The burden of LBW is disproportionately higher in developing countries, where maternal malnutrition, inadequate antenatal care, infections, and socioeconomic factors remain prevalent. Infants with low birth weight are at increased risk of respiratory distress, hypothermia, hypoglycemia, sepsis, feeding difficulties, prolonged hospitalization, and death during the neonatal period.[2]

The etiology of low birth weight is multifactorial and involves maternal, fetal, and environmental factors. Maternal risk factors include young or advanced maternal age, poor nutritional status, anemia, hypertension, diabetes, smoking, multiple pregnancies, and inadequate prenatal care. Fetal factors such as congenital anomalies and intrauterine infections may also contribute to impaired fetal growth and reduced birth weight. In addition, socioeconomic conditions and limited access to healthcare services play an important role in determining pregnancy outcomes.[3]

Low birth weight infants often require specialized medical care because of their physiological immaturity and limited metabolic reserves. These infants are particularly vulnerable to respiratory complications, thermoregulatory instability, neonatal jaundice, and infectious diseases. Advances in neonatal intensive care, early feeding strategies, infection prevention measures, and respiratory support have significantly improved survival rates among LBW infants. Nevertheless, short-term complications remain common and continue to pose considerable challenges to healthcare providers.[4]

Several studies have demonstrated that birth weight is closely associated with neonatal outcomes. Infants with very low birth weight and extremely low birth weight are at substantially greater risk of morbidity and mortality compared with infants weighing between 1500 and 2499 grams. Furthermore, gestational age, sex, mode of delivery, Apgar score, and maternal health conditions may influence neonatal outcomes and survival. Early identification of high-risk infants is therefore essential for improving clinical management and reducing neonatal mortality.[5]

Assessment of short-term outcomes among low birth weight infants is important for evaluating the quality of neonatal care and identifying factors associated with adverse outcomes. Information regarding the frequency of complications and predictors of poor prognosis can assist healthcare professionals in developing preventive strategies and optimizing neonatal management. Although numerous studies have investigated low birth weight infants worldwide, regional data from Iraq remain limited, particularly in smaller healthcare facilities serving rural and semi-urban populations.[6]

In Nineveh Governorate, low birth weight remains a significant contributor to neonatal admissions and healthcare utilization. Understanding the clinical characteristics and outcomes of these infants is essential for improving neonatal services and guiding healthcare planning. However, local studies addressing this issue are scarce. Therefore, this study was conducted to evaluate the clinical characteristics and short-term outcomes of low birth weight infants admitted to Sheikhan General Hospital and to identify factors associated with adverse neonatal outcomes.

2-PATIENTS AND METHODS

This retrospective cross-sectional study was conducted at the Neonatal Unit of Sheikhan General Hospital, Nineveh Governorate, Iraq, to evaluate the clinical characteristics and short-term outcomes of low birth weight infants. The study period extended from January 1, 2024, to December 31, 2025. A total of 131 low birth weight infants admitted during the study period were included in the study.

Ethical approval was obtained from the Scientific and Ethical Committee of Nineveh Health Directorate before commencement of the study. Patient confidentiality was maintained throughout the study by using anonymous data collection forms, and all collected information was utilized solely for scientific research purposes.

Data were collected retrospectively from neonatal admission records, delivery records, maternal medical files, and hospital electronic databases. Low birth weight was defined according to the World Health Organization criteria as a birth weight of less than 2500 grams regardless of gestational age. All neonates meeting this criterion and admitted during the study period were eligible for inclusion.

The study included neonates with complete medical records and documented birth weight measurements. Neonates with major congenital anomalies, chromosomal abnormalities, or incomplete clinical records were excluded from the study.

Data collected included maternal characteristics such as maternal age, parity, antenatal care status, mode of delivery, pregnancy-induced hypertension, and gestational diabetes mellitus. Neonatal variables included sex, gestational age, birth weight, Apgar score at 5 minutes, singleton or multiple pregnancy, and duration of hospital stay.

Clinical outcomes assessed during hospitalization included neonatal jaundice, respiratory distress syndrome, neonatal sepsis, hypoglycemia, feeding

difficulties, hypothermia, and other documented complications. Short-term outcomes were categorized as discharged improved, referred to a tertiary care center, or death during hospitalization.

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 31. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between neonatal characteristics and adverse outcomes were assessed using the Chi-square test or Fisher's exact test where appropriate. Multivariate logistic regression analysis was performed to identify independent predictors of adverse neonatal outcomes. A P value of less than 0.05 was considered statistically significant.

3-RESULTS

A total of 131 low birth weight infants were included in this study. Table 1 presents the maternal and demographic characteristics of the studied low birth weight infants. The majority of mothers were aged between 20 and 34 years (64.1%), while mothers aged 35 years or older and those younger than 20 years accounted for 22.2% and 13.7%, respectively. Male infants represented 54.2% of the study population, whereas females constituted 45.8%, resulting in a male-to-female ratio of approximately 1.18:1. Cesarean section was the predominant mode of delivery, accounting for (58.8%) of births, while vaginal delivery represented (41.2%). Inadequate antenatal care was documented in more than one-third of mothers (35.1%), suggesting that suboptimal prenatal follow-up may have contributed to adverse pregnancy outcomes and the occurrence of low birth weight.

Table 1: Maternal and demographic characteristics of low birth weight infants (n=131).

Variable	Number (%)
Maternal age <20 years	18 (13.7%)
20–34 years	84 (64.1%)
≥35 years	29 (22.2%)
Male	71 (54.2%)
Female	60 (45.8%)
Cesarean section	77 (58.8%)

Table 2 demonstrates the neonatal characteristics of the study population. Preterm infants constituted 61.8% of all cases, indicating that prematurity was a major contributor to low birth weight. Most infants (68.7%) had a birth weight between 1500 and 2499 grams, whereas very low birth weight infants weighing less than 1500 grams accounted for 31.3% of the study population. Apgar scores below seven at five minutes were observed in 26.7% of infants, reflecting varying degrees of neonatal compromise at birth. Singleton pregnancies represented the majority of cases (88.5%), while multiple pregnancies accounted for 11.5%. These findings indicate that prematurity and very low birth weight were common among the studied neonates and may have influenced subsequent clinical outcomes.

Table 2: Neonatal characteristics of the studied infants (n=131).

Variable	Number (%)
Preterm	81 (61.8%)
Term	50 (38.2%)
1500–2499 g	90 (68.7%)
<1500 g	41 (31.3%)
Apgar <7	35 (26.7%)

Table 3 summarizes the maternal risk factors identified among mothers of low birth weight infants. Maternal anemia was the most common risk factor, occurring in 28.2% of mothers, followed by pregnancy-induced hypertension in 22.9%. Premature rupture of membranes was documented in 16.0% of pregnancies, while gestational diabetes mellitus was present in 12.2%. Multiple pregnancy was reported in 11.5% of cases. These findings suggest that maternal medical and obstetric complications may play an important role in the development of low birth weight and adverse neonatal outcomes.

Table 3: Maternal risk factors associated with low birth weight (n=131).

Variable	Number (%)
Maternal anemia	37 (28.2%)
PIH	30 (22.9%)
Gestational diabetes	16 (12.2%)
PROM	21 (16.0%)

Table 4 presents the frequency and distribution of neonatal complications among low birth weight infants. Neonatal jaundice was the most common complication, affecting 51.9% of infants, followed by respiratory distress syndrome, which occurred in 32.8% of cases. Neonatal sepsis was documented in 22.1% of infants, while feeding difficulties were reported in 19.8%. Hypoglycemia and hypothermia occurred in 16.0% and 12.2% of infants, respectively. These findings demonstrate that low birth weight infants are highly vulnerable to a variety of medical complications that frequently require specialized neonatal care and close monitoring.

Table 4: Clinical complications among low birth weight infants (n=131).

Variable	Number (%)
Neonatal jaundice	68 (51.9%)
RDS	43 (32.8%)
Neonatal sepsis	29 (22.1%)
Feeding difficulties	26 (19.8%)
Hypoglycemia	21 (16.0%)

Table 5 demonstrates the short-term outcomes of the studied low birth weight infants. The majority of infants (84.0%) were discharged from the hospital in improved

clinical condition following appropriate management. Referral to tertiary neonatal care centers was required in 9.2% of cases because of the need for advanced medical support and specialized neonatal services. Overall mortality during hospitalization was 6.8%, indicating that despite advances in neonatal care, low birth weight remains associated with a significant risk of adverse outcomes. These results reflect generally favorable short-term outcomes while highlighting the continued vulnerability of this patient population.

Table 5: Short-term outcomes of low birth weight infants (n=131).

Outcome	Number (%)
Discharged improved	110 (84.0%)
Referred	12 (9.2%)
Died	9 (6.8%)

Table 6 shows the relationship between selected neonatal characteristics and adverse outcomes, defined as referral to a tertiary center or death during hospitalization. Infants with very low birth weight (<1500 g) experienced significantly higher rates of adverse outcomes compared with infants weighing between 1500 and 2499 g (31.7% versus 8.9%, P value = 0.003). Similarly, preterm infants demonstrated significantly higher rates of adverse outcomes than term low birth weight infants (22.2% versus 6.0%, P value = 0.011). These findings indicate that both very low birth weight and prematurity are important determinants of neonatal prognosis and may substantially increase the risk of unfavorable clinical outcomes.

Table 6: Association between neonatal characteristics and adverse outcomes.

Variable	Adverse	Favorable	P value
<1500 g	13 (31.7%)	28 (68.3%)	**0.003**
1500–2499 g	8 (8.9%)	82 (91.1%)	
Preterm	18 (22.2%)	63 (77.8%)	**0.011**
Term	3 (6.0%)	47 (94.0%)	

Table 7 presents the results of multivariate logistic regression analysis performed to identify independent predictors of adverse neonatal outcomes among low birth weight infants. Very low birth weight (<1500 g) was associated with a 4.12-fold increased risk of adverse outcomes (OR = 4.12, 95% CI: 1.52–11.17, P value = 0.005), making it the strongest predictor identified in this study. Respiratory distress syndrome increased the risk of adverse outcomes by approximately 3.4-fold (OR = 3.36, 95% CI: 1.21–9.34, P value = 0.020), while neonatal sepsis was associated with a nearly threefold increase in risk (OR = 2.94, 95% CI: 1.08–7.98, P value = 0.034). Although preterm birth was associated with increased risk, it did not remain statistically significant after adjustment for confounding factors (P value = 0.126). These findings indicate that very low birth weight, respiratory distress syndrome, and neonatal sepsis are the most important independent predictors of adverse short-term outcomes among low birth weight infants.

Table 7: Multivariate logistic regression analysis of predictors of adverse outcomes.

Variable	OR	95% CI	P value
Birth weight <1500 g	4.12	1.52–11.17	0.005
RDS	3.36	1.21–9.34	0.020
Neonatal sepsis	2.94	1.08–7.98	0.034
Preterm birth	2.11	0.81–5.51	0.126

4- DISCUSSION

The present study evaluated the clinical characteristics and short-term outcomes of low birth weight infants admitted to Sheikhan General Hospital. The findings demonstrated that low birth weight remains an important contributor to neonatal morbidity and mortality, with neonatal jaundice, respiratory distress syndrome, and neonatal sepsis representing the most common complications. Furthermore, very low birth weight, respiratory distress syndrome, and neonatal sepsis were identified as significant predictors of adverse neonatal outcomes.

In the current study, male infants constituted 54.2% of the study population, slightly exceeding the proportion of female infants. Similar observations were reported by **Kumar *et al***., who found a slight male predominance among low birth weight neonates admitted to neonatal care units.[7] This finding may reflect the natural sex distribution at birth and differences in neonatal vulnerability to perinatal complications.[7]

Prematurity was observed in 61.8% of the studied infants and represented one of the major contributors to low birth weight. This finding is consistent with the well-established relationship between preterm birth and reduced birth weight. Similar findings were reported by **Goldenberg *et al***., who demonstrated that prematurity remains one of the leading causes of low birth weight and neonatal morbidity worldwide.[8]

In the present study, nearly one-third of infants (31.3%) had a birth weight below 1500 grams. Infants in this category experienced substantially higher rates of adverse outcomes compared with infants weighing between 1500 and 2499 grams. Comparable findings were reported by **Mukhopadhyay *et al***., who observed significantly increased morbidity and mortality among very low birth weight infants because of physiological immaturity and increased susceptibility to complications.[9]

Maternal anemia was the most common maternal risk factor identified in the current study, followed by pregnancy-induced hypertension. Similar observations were reported by **Rahman *et al***., who found that maternal anemia adversely affects fetal growth and significantly increases the risk of delivering a low birth weight infant. Likewise, **Kader and Perera** reported a

strong association between hypertensive disorders of pregnancy and impaired fetal growth.[10,11]

Neonatal jaundice was the most common complication observed in the present study, affecting more than half of the infants. This finding is expected because low birth weight infants have immature hepatic function and reduced bilirubin metabolism. Similar findings were reported by **Maisels *et al***., who demonstrated that hyperbilirubinemia occurs more frequently among preterm and low birth weight neonates than among term infants.[12]

Respiratory distress syndrome was the second most common complication, occurring in 32.8% of infants. The high frequency of respiratory distress syndrome may be attributed to the large proportion of premature infants included in the study. Comparable findings were reported by **Sweet *et al***., who identified prematurity as the principal risk factor for neonatal respiratory distress syndrome because of surfactant deficiency and pulmonary immaturity.[13]

Neonatal sepsis was documented in 22.1% of infants and represented one of the major causes of adverse outcomes. Low birth weight infants are particularly susceptible to infection because of immature immune function and prolonged hospitalization. Similar observations were reported by **Shane *et al***., who found that low birth weight and prematurity significantly increase the risk of neonatal sepsis and sepsis-related mortality.[14]

The majority of infants in the present study were discharged in improved condition, while the overall mortality rate was 6.8%. This relatively favorable outcome may reflect improvements in neonatal care, early diagnosis, and supportive management. Similar findings were reported by **Liu *et al***., who demonstrated a progressive improvement in survival rates among low birth weight infants with advances in neonatal healthcare services.[15]

A significant association was observed between very low birth weight and adverse neonatal outcomes. Infants weighing less than 1500 grams experienced markedly higher rates of referral and mortality compared with heavier infants. Furthermore, very low birth weight remained the strongest independent predictor of adverse outcomes in multivariate analysis. Similar findings were reported by **Stoll *et al***., who demonstrated that decreasing birth weight is strongly associated with increased neonatal morbidity and mortality.[16]

Respiratory distress syndrome and neonatal sepsis also emerged as independent predictors of adverse outcomes in the current study. These complications contribute substantially to neonatal instability and often necessitate intensive medical intervention. Comparable findings were reported by **Patel *et al***., who identified respiratory complications and sepsis as major determinants of mortality among low birth weight infants**.**[17]

Although prematurity was significantly associated with adverse outcomes on univariate analysis, it did not remain statistically significant after multivariate adjustment. This finding suggests that the effect of prematurity may be mediated through associated complications such as respiratory distress syndrome and very low birth weight. Similar observations were reported by **Glass *et al***., who concluded that birth weight and neonatal complications are often stronger predictors of outcome than gestational age alone.[18]

This study has several limitations that should be considered when interpreting the findings. The retrospective design depended on the accuracy and completeness of hospital records, which may have resulted in missing or incomplete data. In addition, the study was conducted at a single hospital with a relatively limited sample size, which may restrict the generalizability of the results to other healthcare settings. Maternal socioeconomic factors, nutritional status, and long-term developmental outcomes of the infants were not assessed because of limitations in the available records. Despite these limitations, the study provides valuable local data regarding the clinical characteristics and short-term outcomes of low birth weight infants and identifies important factors associated with adverse neonatal outcomes.

5- CONCLUSION AND RECOMMENDATION

The present study demonstrated that low birth weight infants remain at increased risk of neonatal morbidity and adverse short-term outcomes. Neonatal jaundice, respiratory distress syndrome, and neonatal sepsis were the most common complications observed among the studied infants. Although the majority of infants were discharged in improved condition, adverse outcomes including referral and mortality were more frequent among very low birth weight infants. Very low birth weight, respiratory distress syndrome, and neonatal sepsis were identified as significant independent predictors of adverse neonatal outcomes. Strengthening antenatal care services, early identification of high-risk pregnancies, prevention of preterm birth, and timely neonatal intervention are essential for improving neonatal survival and reducing complications. Special attention should be directed toward infants with very low birth weight through close monitoring and appropriate neonatal support. Further multicenter prospective studies with larger sample sizes and longer follow-up periods are recommended to evaluate long-term growth, neurodevelopmental outcomes, and factors influencing survival among low birth weight infants.

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