

Pattern of Low Birth Weight and Early Outcome of Neonates Admitted at Neonatal Unit in Omdurman Maternity Hospital from December 2019 to May 2020

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ABSTRACT

Background: The birth weight of an infant is the first weight recorded after birth, ideally measured within the first hours after birth, before significant postnatal weight loss has occurred. Low birth weight is defined as a birth weight of less than 2500g (up to and including 2499g), as per the World Health Organization. Low birth is considered as the single most important predictor of neonates' mortality, especially of deaths within the first months of life

Objective: To study pattern of low birth weight and early outcome of neonates admitted to neonatal unit at Omdurman maternity hospital from December 2019 to May 2020

Methods: Cross sectional hospital-based study conducted at Omdurman maternity hospital within the period from December 2019 to May 2020 which covered neonates with birth weight less than 2500 gm admitted to neonatal unit. Data collected, prepared, entered and analyzed using SPSS version 25.0.

Results: This study covered 150 neonates of whom 70 (46.7%) with low birth weight, 63 (42%) with very low birth weight and only 17 (11.3%) were extreme low birth weight. The most common low birth weight risk factors identified were prematurity (76.7%) and high-risk pregnancy such as premature rupture of membrane (41.6%) and pregnancy induced hypertension (29.2%). The most common identified clinical presentation and complications were respiratory distress (82%) followed by sepsis (54.7%), hypothermia (48.7%), hyperbilirubinemia (38%), hypoglycemia (37.3%) and electrolyte disturbances (32%) mainly hypocalcemia (17.3%). The mortality was (52%) more than half among study group.

Conclusion and recommendations: Based on our results, low birth weight among neonates in Sudan is associated with adverse perinatal outcomes and high mortality so, early identification of the risk factors for low birth weight through prenatal surveillance of high-risk pregnant women and accurate management after delivery and hospitalization may help to prevent these adverse perinatal outcomes in Sudan.

Keywords: Low birth weight (LBW), Very low birth weight (VLBW), Extremely low birth weight (ELBW), Prematurity, Premature rupture of membranes (PROM), Antenatal care, Antepartum hemorrhage

INTRODUCTION

Globally, it is estimated that 15–20% of all births, or >20 million newborns annually, are low birth weight infants. An estimated 13 million babies are born before 37 completed weeks of gestation. This figure is high among middle and low income countries¹. Low birth weight continues to be a significant public health problem globally and is associated with a range of both short- and long-term consequences. Overall, it is estimated that 15% to 20% of all births worldwide are low birth weight, representing more than 20 million births a year. Incidence of LBW ranged from 6% to 18% across the globe with sub-Saharan Africa accounting 13% to 15%. The goal is to achieve a 30% reduction in the number of infants born with a weight lower than 2500 g by the year 2025. This would translate into a 3% relative reduction per year between 2012 and 2025 and a reduction from approximately 20 million

to about 14 million infants with low weight at birth². LBW is closely associated with fetal and perinatal mortality and Morbidity, inhibited growth and cognitive development, and chronic diseases later in life. At the population level, the proportion of babies with a LBW is an indicator of a multifaceted public-health problem that includes long-term maternal malnutrition, ill health, hard work and poor health care in pregnancy. On an individual basis, LBW is an important predictor of newborn health and survival and is associated with higher risk of infant and childhood mortality³.

Low birth weight constitutes as sixty to eighty percent of the infant mortality rate in developing countries. Infant mortality due to low birth weight is usually directly causal, stemming from other medical complications such as preterm birth, poor maternal nutritional status,

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lack of prenatal care, maternal sickness during pregnancy, and an unhygienic home environment⁴⁻⁶.

According to a large study, which was done in Madani, Sudan in 2010, about 12.7 % of all deliveries was of low birth weight [14]. While according to the safe motherhood survey in 1999, the prevalence of low birth weight in Sudan was 31%⁷.

There are many risk factors leading to LBW i.e. multiple gestations, mothers' body composition during conception, maternal short stature, maternal nutrition during pregnancy including lifestyle (substance or drug abuse) and medical disorders during pregnancy including hypertensive disorders were risk factors of LBW babies. Additionally, mothers with low socio-economic status are prone to infections from poor nutrition, thus birth weight will decrease⁸. Other risk factors have been associated with LBW including maternal diseases such as maternal anemia, chronic hypertension, renal diseases and heart diseases, alcohol, smoking, drug use during pregnancy, parity, low maternal education, maternal occupation, extreme maternal age, induced labor or elective caesarean section physical, sexual and emotional abuse⁸⁻¹⁶.

In general, the lower a baby's birth weight, the greater are the risks for complications. However, some complications of prematurity (e.g., risk of RDS) are lessened by the stress of mild to moderate intrauterine growth restriction. Clinical problems associated with VLBW and ELBW include; hypothermia, hypoglycemia, fluid and electrolyte disturbances especially in VLBW and ELBW and the disturbances include excess extracellular fluid, hyperkalemia, hyper and hyponatremia. Other associated complications are nutritional problems, hyperbilirubinemia, respiratory distress and chronic lung disease. Infection also remains as a major contributing factor to the morbidity and mortality of infants with VLBW and ELBW^{17-19,21-23,29}. Necrotizing enterocolitis, anemia, parental emotional effects and neurodevelopmental delays are also recognized complications that may need interventions²⁴⁻²⁶.

A study in northern Tanzania (2016) Concluded that Low birth weight is associated with adverse perinatal outcomes. Early identification of risk factors for low birth weight through prenatal surveillance of high-risk pregnant women may help to prevent these adverse perinatal outcomes²⁷. A similar study in Ethiopia (2018) Concluded that: Health education and information on maternal nutrition, use of psychoactive substances and providing social support during pregnancy are important interventions to improve birth weight in Ethiopia²⁸.

A Review article done in America by Jaima Gonzalez, Anderson Rocha- Buelvas (2018) looking for risk factors associated with low birth weight Concluded that: Most of the studies agree on the association of sociodemographic, biological and behavioral factors. Those studies that refer to the association of LBW with environmental risk factors are growing in strength²⁹.

Neonatal mortality rate of Sudan fell gradually from 46.4 deaths per 1,000 live births in 1969 to 28.6 deaths per 1,000 live births in 2018³⁰. LBW is one of the commonest causes of neonatal morbidity and mortality, it accounts for approximately one third of neonatal mortality, so reducing LBW help in reducing neonatal mortality rate, and infant mortality rate. LBW is considered as the single most important predictor of neonates mortality, especially of deaths within the first months of life³¹.

The general objective was to study pattern of low birth weight and early outcome of neonates admitted to Neonatal Unit at Omdurman Maternity Hospital from December 2019 to May 2020

The specific objectives were to determine pattern of low-birth-weight babies and their sub classification as low birth weights, very low birth weights and extremely low birth weights neonates, and to identify risk factors that may be associated with the occurrence of different types of low birth weights, the clinical presentation of different types of low-birth-weight neonates, and the early complications that happen to them within the first weeks of admission to neonatal unit.

MATERIAL AND METHODS

Study Design: This is an Observational descriptive analytical cross-sectional hospital-based study.

Study Area: The study conducted in neonatal unit at Omdurman maternity hospital in the Centre of Omdurman town. This hospital was established in 1957, it provide services for large population in the greater Khartoum area and different parts of Sudan. Facilities in the hospital include, antenatal and postnatal ward, labor room, operation room and well-established neonatal unit. which composed of three parts, one for preterm with vacancy of 40 incubators, other for term with vacancy of 20 beds and critical area with 16 beds, two mechanical ventilators and three CPAPs. The neonatal unit covered by 2 units, 6 consultants, duty is covered by 4 pediatric registrars and 4 medical officers. The hospital is considered the biggest delivery hospital in Sudan, it is receiving about 95 deliveries daily and 32.638 per year.

Study Duration: Conducted within the period from 1st of December 2019 to 31 of May 2020.

Study Population: All neonates with birth weight less than 2500 gm admitted to neonatal unit of Omdurman Maternity Hospital

Inclusion Criteria: All neonates term and preterm admitted to neonatal unit of OMH with birth weight less than 2500 gm in the determined study period

Exclusion Criteria the following excluded:

1. Neonates with body weight equal or more than 2500
2. Neonates not admitted to neonatal unit of OMH

Sampling Techniques: All patients who fulfil inclusion criteria in study area during study period were selected.

Since this is a cross sectional hospital-based study with simple random sampling methods, the size of the study can be determined through the following formula

$$n = \frac{Z^2 \times (p \times q)}{e^2}$$

- n: sample size required by the study

- Z: the determined area under the normal curve by the desired confidence interval (CI: 95%)

- P: the proportion of the main attribute of the study (the expected prevalence of low birth weight among NICU neonates in Sudan (11%) (29) Then, P = 0.11

- q=1-p = 1 - 0.11 = 0.89

- e=the desired precision (e=0.05)

$$n = \frac{(1.96)(1.96)(0.11)(0.89)}{(0.05)(0.05)} = 150.3 \text{ or } 150 \text{ study participants}$$

Research Tools: Specially designed data including classifications according to WHO, risk factors, clinical presentations and early outcome in first weeks were obtained from all neonates whom fulfill

inclusion criteria in study area during study period, patient records were used and all neonates were reweighed using an accurate baby weighing scale. General and systemic examination were performed to them, then followed during study period, also questionnaires data were obtained from patient records and caregivers.

Study Variables: These are classified in the following table:

Pattern of LBW (Independent variable)	- LBW (low birth weight) - VLBW (very low birth weight) - ELBW (extremely low birth weight)
Personal data regarding neonates (Independent variable)	- Sex - Gestational age - Duration of hospitalization since birth
Maternal socio-demographic factors (independent variable)	- Age - Residence - Occupation - Socioeconomic status - Parity - Weight - Height
Mode of delivery (Independent variable)	- NVD (normal vaginal delivery) - EMCS (emergency cesarian section) - ELCS (elective cesarian section)
Other factors (Independent variables)	- ANC (antenatal care) - PROM (premature rupture of membranes) - PIH (pregnancy induced hypertension) - DM (diabetes mellitus) - APH (ante-partum hemorrhage) - Malaria - Congenital anomalies
Early complications (Independent variable)	- Hypothermia - Hypoglycemia - Infection - Jaundice - Anemia - Electrolytes disturbances - NEC (necrotizing enterocolitis)
Outcome (dependent variable)	- Discharge - Death - DAMA (discharged against medical advice)

Data Entry, Analysis and Presentation:

Data was entered and analyzed using SPSS version 25.0 Descriptive statistics in term of frequency tables with percentages and graphs. Means and standard deviations were presented with relevant graphical representation for quantitative data.

Bi-variable analysis to determine the associations between the main variables (risk factors and outcome) with Chi square test (for categorical variables) and t- test (quantitative variables) statistical tests.

P value of 0.05 or less is considered statistically significant. Data was represented after analysis in form of unit-variable tables, cross tabulation (bi variable tables), figures and narrative illustration.

Expected Outcome: This study is expected to provide an updated information regarding pattern of LBW risk factors complications and early outcome The results which drawn improving, complications or death.

Ethical Considerations: Written ethical clearance and approval for conducting this research were obtained from Sudan Medical Specialization Board Ethical Committee. Written permissions were obtained from the administrative authority of Maternity Hospital, Khartoum state, Sudan.

Study data/information was used for the research purposes only. The privacy issues were intentionally considered.

RESULTS

This study covered 150 study participant LBW neonates of almost equal gender distribution (male to female ratio of 1:1.1). Nearly half of them 70 (46.7%) reported birth weight 1500 – 2500 gm, 63 (42%) with weight 1000 – 1500gm, and only 17 (11.3%) reported weight less than 1000 gm as detailed in figure 1

The preterm represented more than three quarters of the participants 115 (76.7%). Nearly half of them 70 (46.7%) were moderate preterm, 37 (24.7%) late preterm and only 8 (5.3%) were classified as extreme preterm. Nearly one quarter of them 33 (22%) were twins. The majority of them 108 (72%) stayed in hospital for less than one week.

The most common reported presentation and early complication in our study were respiratory distress 123 (82%), sepsis 82 (54.7%), hypothermia (48.7%), Hyperbilirubinemia 57 (38%), hypoglycemia 56(37.3%), electrolytes disturbance 49 (32.7%) and anemia among 9 (6%). The most common isolated agent among patients with sepsis was Klebsiella 12 (8%), Pseudomonas 3 (2%) and Staph aureus 1 (0.7%). The most common form of electrolytes disturbance was hypocalcemia among 48 (32%). Other complications reported were acute kidney injury 8 (5.3%) and Hypoxic-ischemic encephalopathy (grade I) among only 1 (0.7%) as detailed in **Table 1**.

Congenital anomalies were reported among only 6 (4%) such as hydrocephalus 2 (1.2%), congenital heart disease 1 (0.7%), and Macroorchidism 1 (.07%) as detailed in **Table 2**

Moreover, dysmorphic features were reported among only 3 (4%) of the study participants such as Down syndrome 1 (0.7%), Prune Belly Syndrome 1 (0.7%) and Collodion Baby 1 (0.7%). Concerning the early outcome (within the first two weeks, the study showed that the mortality was 78 (52%) as detailed in **Figure 2**.

In regards the maternal characteristics, most of the mothers 107 (71.3%) aged 31 – 40 years with mean age 32.8 ± 3.8 years. Most of them 144 (96%) were from residential area in Khartoum state, while 125 (83.3%) were housewives and only 7 (4.7%) did not received any form of formal education. Moreover, one third of mothers 50 (33.3%) were thin and only 18 (12%) were overweight Nearly half of mothers 67 (44.7%) delivered with normal vaginal delivery, and 70 (46.7%) with emergency caesarian section while only 43 (28.7%) were Primiparous and 91 (60.6%) were multiparous. Two thirds of mother 100 (66.7%) were of low socioeconomic status. More than three quarters 115 (76.7%) reported regular antenatal care. The study found that 35 (23.3%) reported positive history of low birth weight. Most of them 27 (18%) were alive and well and only 8 (5.3%) reported as early neonatal death. Nearly half of them 67 (44.7%) reported consanguinity between parents. The most common disorders during the pregnancy reported in the study were Premature rupture of membrane 37 (41.6%), followed by Pregnancy induced hypertension 26 (29.2%), Malaria 17 (19.1%), Antepartum hemorrhage 10 (11.2%), and Diabetes Mellitus 6 (6.7%) as detailed in **Table 3**.

In this study, cross tabulation was done to assess the association between the degrees of low birth weight with clinical presentation and with the early outcome using chi square statistical test. The analysis found significant association between hypothermia with the extreme degree of low birth weight ($p < 0.001$). Moreover, a significant association was reported between hypocalcemia with the extreme degree of low birth weight ($p = 0.0026$) as detailed in **Table 4**. Furthermore, the analysis realized a significant association between the outcomes (mortality) with the extreme degree of low birth weight ($p < 0.001$) as displayed in **Table 5**.

Table 1: Distribution of the study participants according to their major clinical presentation and early complications (n = 150)

Clinical presentation and early complications		Frequency	Percent (%)
Respiratory distress		123	82.0
Klebsiella		12	8.0
Pseudomonas		3	2.0
Staph aureus		1	0.7
Sepsis (n = 82, 54.7%)		Streptococcus	1
Entrococcus facialis		1	0.7
MRSA		1	0.7
Not documented *		63	42.0
Hypothermia		73	48.7
Hyperbilirubinemia		57	38.0
Hypoglycemia		56	37.3
Hypocalcaemia		48	32.0
Anaemia		12	8.0
Others (9, 6%)		Acute kidney Injury	8
Hypoxic-ischemic encephalopathy (grade I)		1	0.7
Total		150	100

Table 2: Distribution of the study participants according to the presence of congenital abnormalities (n = 150)

Congenital abnormalities		Frequency	Percent (%)
Hydrocephalus		2	1.2
Congenital heart disease		1	0.7
Yes (n = 6, 4%)		Cystic hygroma	1
Empty scrotum		1	0.7
Macroorchidism		1	0.7
No		144	96.0
Total		150	100.0

Table 3: The distribution of the study participants according to the disorders during the pregnancy (n = 150)

Disorders during the pregnancy		Frequency	Percent (%)
Premature rupture of membrane		37	41.6
Pregnancy induced hypertension		26	29.2
Malaria		17	19.1
Antepartum haemorrhage		10	11.2
Diabetes Mellitus		6	6.7
Yes		Oligohydramnios	5
(n = 89, 59.3%)		Anhydramnios	2
Urinary tract infection		2	2.2
Chorioamnionitis		2	2.2
Other		Hepatitis B virus	2
(n = 13, 8.7%)		Polyhydramnios	1
Abruptio placentae		1	1.1
Asthma		1	1.1
Cord prolapse		1	1.1
No		61	40.7

*Note: some study participants reported more than one disorder(s). therefore; the total of the table above may appear higher than expected

Table 4: Relationship between the different types of low birth weight with the clinical presentation (n = 150)

Clinical presentation		Degree of low birth weight (grams)								P value
		Low BW < 2,500 – > 1,500 (n = 70)		Very low BW 1,000 – 1,500 (n = 63)		Extreme low BW < 1,000 (n = 17)		Total (n = 150)		
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Respiratory distress	Yes	55	78.6	51	81.0	17	100.0	123	82.0	0.3349
	No	15	21.4	12	19.0	0	0.0	27	18.0	
Sepsis	Yes	33	47.1	41	65.1	8	47.1	82	54.7	0.0929
	No	37	52.9	22	34.9	9	52.9	68	45.3	
Hypothermia	Yes	20	28.6	38	60.3	15	88.2	73	48.7	< 0.001
	No	50	71.4	25	39.7	2	11.8	77	51.3	
Hyperbilirubinemia	Yes	24	34.3	27	42.9	6	35.3	57	38.0	0.5788
	No	46	65.7	36	57.1	11	64.7	93	62.0	
Hypoglycemia	Yes	23	32.9	25	39.7	8	47.1	56	37.3	0.4878
	No	47	67.1	38	60.3	9	52.9	94	62.7	
Electrolyte disturbance	Yes	9	12.9	9	14.3	8	47.1	26	17.3	0.0026
	No	61	87.1	54	85.7	9	52.9	124	82.7	
Anaemia	Yes	3	4.3	8	12.7	1	5.9	12	8.0	0.1915
	No	67	95.7	55	87.3	16	94.1	138	92.0	

Table 5: Relationship between the different types of low birth weight with the outcome with the first two weeks (n = 150)

Outcome with the first two weeks		Degree of low birth weight (grams)								P value
		Low BW < 2,500 – > 1,500 (n = 70)		Very low BW 1,000 – 1,500 (n = 63)		Extreme low BW < 1,000 (n = 17)		Total (n = 150)		
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Discharge		49	70.0	23	36.5	0	0.0	72	48.0	< 0.001
Death		21	30.0	40	63.5	17	100.0	78	52.0	

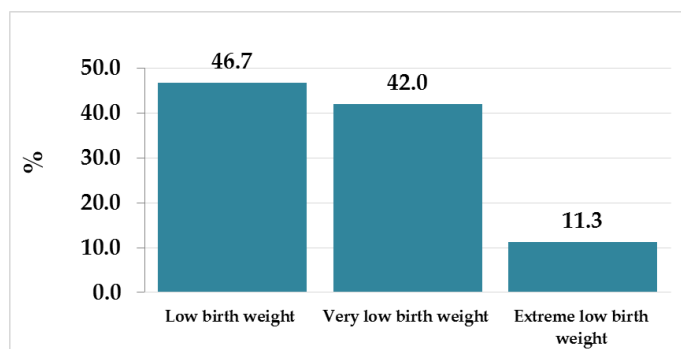


Figure 1: Classification of the LBW in the study group

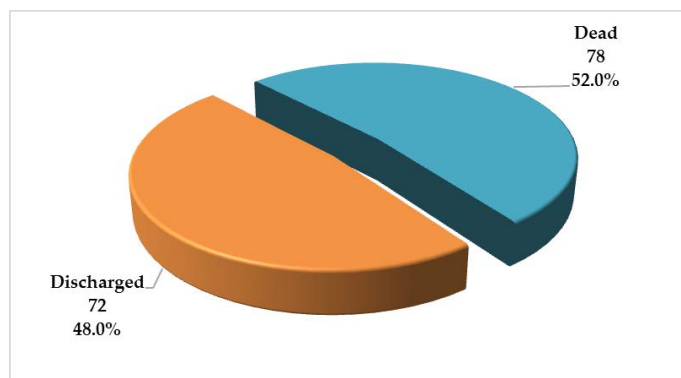


Figure 2: Distribution of the study participants according to their outcome within the first two weeks (n = 150)

DISCUSSION

This study reported that nearly half of the patients 70 (46.7%) reported birth weight of 1500-2500 gm, 63 (42%) with weight 1000 – 1500gm, and only 17 (11.3%) reported weight less than 1000 gm. Similarly, in Saudi Arabia, Faisal O. et al reported that extremely low-birthweight (ELBW) neonates (<1000 g) comprised 11%³². In India, NASKAR N et al found that mortality was higher among males (20.43%) than females (12.9%) with low birth weight³³. Furthermore, in Saudi Arabia, Al Hazzani F et al found that Seventy-six (40.9%) were male³⁴.

In the study the preterm represented more than three quarters of the participants 115 (76.7%). Nearly half of them 70 (46.7%) were moderate preterm, 37 (24.7%) near term and only 8 (5.3%) were classified as extreme preterm babies. In similar context, in Sudan, Omer A M Saeed et al reported that one of the main risk factors for low-birth-weight babies was the gestational age³⁰. Moreover, in Tanzania, Modesta Mitao et al reported that LBW neonates had increased risk of being delivered preterm²⁷. Furthermore, in Ethiopia, Bililigin N et al stated that preterm birth is one of the common risk factors for low birth weight²⁸. So, many studies showed a consensus that prematurity was the most important risk factors for LBW.

In this study most of the participants; 108 (72%) stayed in hospital for less than one week. A study by Rawlings et al from United States found that neonatal duration of hospital stay correlated with both birth weight and gestational age in positively correlated⁴⁴. Non-survivors spent more time in hospital in Scotland (26.2 days) and Finland (23.8 days) compared to other countries³⁵.

The study found that the most common reported presentation and early complications were respiratory distress 123 (82%), sepsis 82 (54.7%),

hypothermia (48.7%), Hyperbilirubinemia 57 (38%), hypoglycemia 56(37.3%), and anaemia among 9 (6%). Similarly, in Tanzania, Modesta Mitao et al reported that LBW infants had increased risk of neonatal jaundice²⁷. Moreover, in India, NASKAR N et al found that risk factors associated with birth of VLBW babies were Jaundice (43.31%), apnea (26.34%), birth asphyxia (20.43%), RDS (19.89%) and sepsis (18.82%) were found to be significant morbidities³³.

This study reported that the most common isolated agent among patients with sepsis was Klebsiella 12 (8%), Pseudomonas 3 (2%) and Staph aureus 1 (0.7%). In Germany, Piening BC et al reported that the 8 most frequently identified organisms can cause sepsis among LBW babies were Klebsiella spp., coagulase negative Staphylococci (Co. N. S.), S. aureus, E. coli, Enterobacter spp., Enterococcus spp., C. albicans, Serratia spp³⁶. While in United States, Hornik CP et al added that other gram-negative rods (66.6%), and Pseudomonas sp. (35.0%)³⁷. Other complications reported in this study were acute kidney injury 8 (5.3%). Similarly, in Lithuania, Garunkštienė R et al stated that Acute kidney injury is associated with mortality of very low birth weight infants and reduces their survival regardless of other factors³⁸.

Concerning the early outcome (within the first two weeks, the study showed that the mortality was 78 (52%). Similarly, in Tanzania, Modesta Mitao et al reported that LBW infants had increased risk of early neonatal death (RR 3.5; 95% CI2.6–4.6)²⁷. Moreover, in Saudi Arabia, Al Hazzani F et al found that (82.8%) of LBW babies survived to discharge³⁴. Furthermore, in Egypt, Mansour E et al stated that LBW babies also had increased risk of neonatal jaundice at 1 month, an increased risk of growth retardation and a much higher risk of mortality²⁸.

In regards the maternal characteristics, this study reported that the majority of mothers 107 (71.3%) aged 31 – 40 years with mean age 32.8 ± 3.8 years. In similar context, in Ethiopia, Bililigin N et al stated that the maternal age is one of the common risk factors for low birth weight³¹. Moreover, in Iran, Chaman R, et al, stated that there was also a reverse association between maternal age and LBW⁴². One third of mothers 50 (33.3%) were thin and only 18 (12%) were obese. Likewise, in Tanzania, Modesta Mitao et al reported that the maternal underweight and obesity were significantly associated with delivery of low-birth-weight neonates³⁰. Also, in Ethiopia, Bililigin N et al stated that the maternal weight and stature is among common risk factors for low birth weight³¹.

The study found that only 43 (28.7%) were Primiparous and 91 (60.6%) were multiparous. Likewise, in Ethiopia, Bililigin N et al stated that the parity is among common risk factors for low birth weight²⁸. Moreover, in India, NASKAR N et al found that one of risk factors associated with birth of VLBW babies was primiparity³³. So, many studies concluded that Nulliparity was associated with a significantly increased unadjusted risk of LBW/SGA birth, whereas grand multiparity and great grand multiparity were not associated with increased risk of pregnancy outcomes³⁹.

This study showed that more than three quarters 115 (76.7%) reported regular antenatal care. On contrary, in Sudan, Omer A M Saeed et al reported that Adequacy of antenatal care (ANC) visits, was found to be statistically not significant risk factors²⁹. Moreover, in similar context, in Ethiopia, Bililigin N et al stated that the irregular antenatal care visits are among the common risk factors for low birth weight³¹.

The study found that the most common disorders reported during the pregnancy were Premature rupture of membrane 37 (41.6%), followed by pregnancy induced hypertension 26 (29.2%), Malaria 17 (19.1%),

Antepartum hemorrhage 10 (11.2%), and Diabetes Mellitus 6 (6.7%). In similar context, in Sudan, Omer A M Saeed et al reported that one of the main risk factors for low-birth-weight babies were the presence of hypertension, renal disease, bleeding during pregnancy and presence of moderate or severe anemia³⁰. On contrary, they reported that diabetes during pregnancy was found to be statistically not significant risk factors³⁰. Moreover, in Tanzania, Modesta , Mitao et al reported that pre-eclampsia, eclampsia, maternal anemia and PROM were significantly associated with delivery of low-birth-weight neonates²⁷. Comparable maternal factors were also found in studies in India and Iran^{33,40}.

In this study, the analysis found significant association between hypothermia with the extreme degree of low birth weight ($p < 0.001$). Similarly, Miller SS et al agreed that hypothermia by WHO criteria is prevalent in VLBW infants and is associated with IVH and mortality. Use of WHO criteria could guide the need for quality improvement projects targeted toward the most vulnerable infants⁴¹. Moreover, in the study, a significant association was reported between hypocalcemia with the extreme degree of low birth weight ($p = 0.0026$). These findings were explained by Vuralli D et al by the fact that hypocalcemia generally presents within the first 72 h of life of LBW baby⁴².

Furthermore, the analysis realized a significant association between the outcomes (mortality) with the extreme degree of low birth weight ($p < 0.001$). Lower rate were documented in China, Lin HJ et al The overall mortality rate at discharge was 50.0%. While in developed countries – such as Germany, Jeschke E et al stated that (10.9%) died within 180 days among extreme low birth weight babies⁴³.

This study had some limitations. The relatively limited number of study geographical areas (150 study participants from Omdurman maternity hospital in Khartoum state only) may affect negatively the probability of finding significant association regarding the other factors and presentations addressed in the study with the degrees of low birthweight in Sudan.

CONCLUSIONS

This study aimed to study pattern of low birth weight and early outcome of neonates admitted at neonatal unit of Omdurman Maternity Hospital from December 2019 to May 2020 and covered 150 neonates nearly half of them were LBW followed by those with VLBW and the least one were ELBW (11%). The most common LBW risk factors identified were prematurity and high-risk pregnancies such as PROM and PIH. The most common identified clinical presentation and complications were respiratory distress followed by sepsis, hypothermia and electrolyte disturbances mainly hypocalcemia (especially in ELBW). Vast majority of mothers were on regular antenatal care with nearly half of them had average weight while those who were thin comprised (33.3%). Two third (62%) of LBW neonates born to families of low socioeconomic status. Concerning the early outcome (within the first two weeks, the study showed that the mortality was (52%).

RECOMMENDATIONS

1. To ensure that our newborn units / intensive care units are fully prepared with the necessary relevant resources/equipment, in a manner that provide respiratory support, oxygen therapy with adequate training for the medical team concerned in Sudanese public hospitals.
2. More efforts should be done to reduce their occurrence of nosocomial infection for the vulnerable LBW neonates.

3. Early identification of risk factors for low birth weight through prenatal surveillance of high-risk pregnant women may help to prevent the adverse perinatal outcomes in Sudan as many of the risk factors are modifiable According to our evidence in this study
4. Early detection of long-term complications by visual and hearing assessment on discharge with regular follow-up and regular neurological assessment especially for extreme low birth weight are important
5. Studies are required in the future to look for long term complications.

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Competing Interest: None.

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