



Low Birth Weight Incidence in Newborn' Neonate in Qom, Iran: Risk Factors and Complications

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Background: Low birth weight (LBW) is related with high morbidity of neonatal consequences and death. This study aimed to determine the incidence of LBW, its risk factors, and complications in born neonates in Qom, Iran 2017. **Methods:** This retrospective chart review was conducted with 602 newborns participants who were one of Qom hospitals in Iran. Data were extracted from the patients' medical records and entered into data collection sheet and were analyzed by *t*-test, Chi-square, Fisher exact, and independent *t*-tests in SPSS v. 18 software. **Results:** The overall incidence of LBW in born neonates was 9.6%, and the mean of maternal age was 28.8 years. Based on results, twin's birth (Odds ratio [OR] = 1.47), receiving corticosteroid (OR = 4.55), and premature rupture of membrane (PROM) (OR = 1.08) were the most important related factors of LBW and respiratory distress syndrome (RDS) (OR = 6.47.8), sepsis (OR = 5.36), and icterus (OR = 5.8) consequences of LBW. Nevertheless, poor feeding, hypoplasia, premature, tachypnea, meconium, intraventricular hemorrhage, hypotonic, and other neonatal complications do not show the significant relationship with LBW ($P > 0.05$). **Conclusions:** According to results, twin's births, receiving corticosteroid, and PROM are the important risk factors for LBW and RDS, sepsis and icterus were the most common complication of LBW. As a result, preventive programs for control of LBW and infant complications are essential.

Key words: Complications, factors, low birth weight, prevalence

INTRODUCTION

Low birth weight (LBW) is defined as birth of live infant that is <2500 g (up to and including 2499 g) irrespective of gestational age according to the INTERGROWTH-21st standards.^{1,2} A recent report indicates that 19% of infants in resource-limited areas are born with LBW and 22% of reported neonatal deaths occurring in infants with LBW.³ Higher prevalence of LBW has been reported in developing countries as South Asian countries (5). The prevalence of LBW is different from 5% to 7% in developed countries to 19% in developing countries.⁴ A study by the Agency for Healthcare Research and Quality found from 3.8 million births that occurred in the United States at 2011, (approximately 6.1%) were diagnosed with LBW,⁵ while it is reported 13.0% in Ghana.⁶ A systematic review in Iran showed that the LBW prevalence was 8%.⁷ Moreover, several studies showed the

LBW prevalence in Iran is 8.8%,⁸ 14.9% in Mashhad,⁹ 6.8% in Zanjan,¹⁰ and in Kerman 9.4%.¹¹

LBW is related to more than 70% of infant mortalities, and birth weight should be measured within the 1st h of life before significant postnatal weight loss has happened.¹² Neonates with LBW may be grossly handicapped at birth by virtue of their weight and in some cases associated with relative immaturity of vital organs and decrease of immunological response. Intrauterine growth restriction and preterm birth are often associated with LBW that increases neonatal complications including respiratory distress syndrome (RDS), necrotizing enterocolitis, cerebral palsy, and early neonatal and infant mortality.^{1,2} In addition, LBW is related to infectious

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diseases, anemia, hypothermia, and nutritional and health-care problems.^{2,12} Moreover, LBW is associated with higher risk of noncommunicable diseases such as coronary diseases, stroke, hypertension, and diabetes at adulthood in compare to normal birth weight.¹³

Adverse events in mothers during pregnancy have negative effect on newborn health and related to LBW. The main potential complications that related to neonates LBW are hypertension (preeclampsia and eclampsia), gestational diabetes, anemia, bleeding, preterm labor, premature rupture of membrane (PROM), and so forth.¹⁴ These factors increase LBW and other neonatal outcomes including icterus, sepsis, RDS, poor feeding, premature birth, tachypnea, and cesarean section. Early comprehensive care in LBW and unhealthy infants in primary care setting is vital because they have difficulty in eating, gaining weight, and warding off infections. Due to importance of LBW complication and the paucity of studies investigating LBW-related risk factors in Iran, the present study aimed to determine the LBW incidence and its related prognostic factors in neonates that born in Qom 2017.

METHODS

Study design and participants

This retrospective chart review was conducted with 602 newborns participants between 36 and 42 weeks who were delivered at one of Qom Hospital at 2017. The inclusion criteria were deliveries that conducted between 36 and 42-old-weeks of gestational age. The birth weight of all neonates was measured and recorded as the primary outcome. Moreover, unhealthy outcomes including icterus, sepsis, RDS, poor feeding, prematurity, tachypnea, meconium disorder, and other neonatal complications were recorded for each patient as the secondary outcome. Newborns were categorized based on birth weight into two groups including LBW (<2500 g) and normal (2500–4000 g). Exclusion criteria were congenital anomalies, birth weight >4000 g, and gestational age lower 36 weeks and higher 42 weeks. All eligible newborns were selected during the study period, and data was extracted from patients' medical records and entered into data collection sheet. Data were recorded by gynecologists immediately after delivery in medical records.

Instruments

A data collection sheet was a valid checklist that including demographic characteristics and clinical outcomes/factors in neonates and his/her mothers. The instrument validity has been approved by several experts including gynecologist and methodologist at Qom University of Medical Sciences. The reliability of this tool was estimated by Cronbach alpha as

0.76. Mother's clinical factors including pregnancy problems; gestational age; mode of delivery; age; type of anesthesia; gravidity, parity, and abortions; receiving antibiotics or corticosteroid; and duration of membrane rupture until delivery. The newborn factors were neonate gender, Apgar score at 1st and 5th min after delivery, neonatal weight, and unhealthy outcomes/complications were recorded in checklist.

Data collection

Maternal parameters including maternal age, singleton or twin pregnancy, gestational age as well as the neonate parameters including infant weight and Apgar score at 1st and the 5th min after delivery, were reviewed and recorded in checklists. In addition, the mode of delivery and neonate complications were recorded and investigated. Birth weight and fetal complications such as fetal distress and major neonatal conditions (including RDS, tachypnea, icterus, hypoplasia, hypotony, premature, meconium, intraventricular hemorrhage [IVH], and sepsis) were also assessed.

Data analysis

Descriptive statistics were used to explore data. Independent sample test was used to compare the LBW and normal neonates regarding age of mothers, infant birth, and Apgar score. The Chi-square test was used for comparing two groups regarding neonate complications. Data analysis was conducted (SPSS, Chicago, IL, USA). $P < 0.05$ was considered statistically significant in all analyses.

Ethical considerations

The study proposal was approved by the Deputy of Research, Qom University of Medical Sciences. The Medical Ethics Committee of Qom University of Medical Sciences approved the study protocol. All information of mother and newborn is protected, and the study results are published overall.

RESULTS

Among 602 patients, 9.6% (58/602 neonates) were of newborns had affected to LBW. Of all patients, 85.2% (513 cases) were Iranian and 12.6% (76 cases) have an affected to some clinical outcomes including overt diabetes 2.8% (17 cases), gestational diabetes 0.7% (4 cases), preeclampsia 0.3 (2 cases), abruption 0.3% (2 cases), and 8.3% (50 cases) other complications. The mean maternal age was 28.8 years (range: 16–51 years). In all studied cases, 39.4% (237 neonates) were female and 60.6% (365 neonates) were male. In addition, 3.5% (21 cases) were twin birth with <37 weeks of gestational age and 37.4% (225/602 cases)

had a cesarean section. The maternal characteristics of the study participants were shown in Table 1.

Based on the results presented in Table 2, independent *t*-test showed that mean of maternal age was not related to LBW ($P = 0.431$). However, infant weight ($P < 0.001$) and Apgar score at 1st min ($P < 0.001$) and 5th min ($P < 0.001$) after delivery were statistically significant between LBW and normal weight groups.

Table 3 shows that there was a significant difference in the percentage of neonates with LBW with normal weight regarding twins birth, receiving corticosteroid, icterus, sepsis, and RDS. However, two groups were different regarding to studied consequences as twin birth (13.8% vs. 2.4%), receiving corticosteroid (55.2% vs. 17.6%), premature (1.7% vs. 0.7%), RDS (15.5 vs. 2.8%), tachypnea (3.4% vs. 1.3%) and sepsis (15.5% vs. 3.3%), and meconium (0% vs. 0.6%) and icterus (5.2 vs. 0.9%). Based on the results, odds ratio (OR) and 95% confidence interval for these factors are presented in Table 3. The OR for twin's birth (OR = 1.47), receiving corticosteroid (OR = 4.55), RDS (OR = 6.47.8),

sepsis (OR = 5.36), icterus (OR = 5.8), and PROM (OR = 1.08) were calculated. However, other outcomes such poor feeding, hypoplasia, premature, tachypnea, meconium, IVH, hypotonic, and other neonatal complications do not show significant difference in LBW and normal group ($P > 0.05$).

DISCUSSION

LBW is the birth of live infant <2499 g irrespective of gestational age.¹² LBW can cause serious infant morbidity and mortality. The prevalence of LBW was 9.6% in Qom Province. It was similar to national reports and unhealthy birth in the present study reported 10.5%. The prevalence of LBW in this study was similar to Momeni *et al.* studies.¹¹ Some studies¹⁵ reported that the incidence of LBW is 10%–13% and was greater than our estimation. However, another study showed the LBW incidence lower than 7%.¹⁶ A systematic review study showed that the LBW prevalence is between 5% and 12% in Iran.¹⁰ According to results, only five variables of twin birth, receiving corticosteroid, sepsis, RDS, and PROM showed significant association with LBW.

Respiratory distress and sepsis were occurred more in LBW neonates compared to normal birth weight in our study. Simiyu *et al.* in Kenya conducted similar study and revealed that respiratory distress and sepsis are leading complications of LBW.¹⁷ Our results showed that LBW is associated with some neonatal consequences comparing to normal weight neonates, including twin birth (13.8% vs. 2.4%), receiving corticosteroid (55.2% vs. 17.6%), premature (1.7% vs. 0.7%), RDS (15.5 vs. 2.8%), tachypnea (3.4% vs. 1.3%) and sepsis (15.5% vs. 3.3%), meconium (0% vs. 0.6%), and icterus (5.2 vs. 0.9%). These results were similar to Kacerovsky study,¹⁸ and Hibbard *et al.*,¹⁹ and Wang *et al.* studies.²⁰

The term “advanced maternal age” is used for women who are aged 35 years or greater at time of delivery. Advanced maternal age is considered as major risk factor for poorer pregnancy and perinatal outcomes.²¹ Several studies showed that infants born from younger women (10 to 19 years) compared to older women were more likely to suffer from LBW.²² Moreover, Sauer study showed that advanced maternal age is an underlying factor for increased LBW prevalence in women.²³ However, based on our results, the reported age of LBW diagnosis is 28 years.

Delivery type is relative factor of LBW, and higher LBW rate is reported in women undergoing cesarean delivery. In the other hand, the risk of LBW is higher among women undergoing cesarean delivery.²⁴ Cesarean delivery in our study was 46.6% and was lower than reported in other studies such as Kamala *et al.* that cesarean delivery was performed in 55% of all deliveries.²⁵ Moreover, the prevalence of LBW is higher in boy gender in compared to girl (65.5% vs. 57.1%).

Table 1: Demographic characteristics of the studied patients

Demographic bibliography	Total neonate, n (%)	LBW, n (%)	
		Yes, n (%)	No, n (%)
Mothers problems	76 (12.6)	9 (15.5)	67 (12.3)
Nationality			
Iranian	513 (85.2)	50 (86.2)	463 (85.1)
Non-Iranian	89 (14.8)	8 (13.8)	81 (14.9)
Infant gender			
Boy	365 (60.6)	38 (65.5)	327 (60.1)
Girl	237 (39.4)	20 (34.5)	217 (39.9)
Cesarean section	225 (37.4)	27 (46.6)	198 (36.4)
Twins birth	21 (3.5)	8 (13.8)	13 (2.4)
Receiving corticosteroid	128 (21.3)	32 (55.2)	96 (17.6)
PROM history	6 (1)	1 (1.7)	5 (0.9)

LBW=Low birth weight

Table 2: Comparing the mean and standard deviation of maternal age, infant weight, and Apgar Score between neonates in low birth weight and normal groups

Mother and neonate bibliography	Mean±SD		P
	Yes	No	
Maternal age	29.07±5.70	28.7±5.80	0.431
Infant weight	2256±186.8	3128±347.4	<0.001
1-min Apgar score	8.28±1.24	8.86±0.594	<0.001
5-min Apgar score	9.50±0.822	9.88±0.373	<0.001

SD=Standard deviation

Table 3: Comparing the percentage of qualitative-related variables between neonates in low birth weight and normal groups

Neonate' bibliography	LBW, n (%)		P	OR (95% CI)
	Yes, n (%)	No, n (%)		
Twins birth	8 (13.8)	13 (2.4)	<0.001	1.47 (1.05-2.06)
Receiving corticosteroid	32 (55.2)	96 (17.6)	<0.001	4.55 (2.8-7.3)
Icterus	3 (5.2)	5 (0.9)	0.034	5.8 (1.36-25.2)
Sepsis	9 (15.5)	18 (3.3)	<0.001	5.36 (2.28-12.5)
RDS	9 (15.5)	15 (2.8)	<0.001	6.47 (2.69-15.5)
Poor feeding	0 (0)	2 (0.4)	0.816	1.10 (1.07-1.13)
Premature	1 (1.7)	4 (0.7)	0.398	2.36 (0.26-21.5)
Tachypnea	2 (3.4)	7 (1.3)	0.212	2.74 (0.55-13.5)
Meconium	0 (0)	3 (0.6)	0.738	1.10 (1.07-1.13)
Other neonatal complications	0 (0)	3 (0.6)	0.738	1.10 (1.07-1.13)
PROM	40 (69)	260 (47.8)	0.002	1.08 (1.02-1.14)

CI=Confidence interval, PROM=Premature rupture of membrane, RDS=Respiratory distress syndrome, OR=Odds ratio, CI=Confidence interval, LBW=Low birth weight

The incidence of maternal outcomes, including overt diabetes, gestational diabetes, preeclampsia, abruption, and other complications in our study was 2.8%, 0.7%, 0.3%, 0.3%, and 0.2%, respectively, as similar to results of Bener *et al.* study.¹⁴ No significant relationship was observed between gravidity and parity of women with LBW in our study, but Hinkle *et al.* study showed that gravidity and parity was significant associated factors of LBW.²⁶ Conducting this study in the referral hospital of gynecology and prenatal care as well as defects in data of patients' medical records were the limitations of the current study.

CONCLUSIONS

Various factors are related to LBW incidence, but according to our results, twin's births, receiving corticosteroid, and PROM are the important risk factors for LBW and RDS, sepsis, and icterus were the most common complications of LBW. Therefore, implementing a comprehensive program for decreasing neonatal complications is necessary in mothers with LBW neonates. Moreover, people should be encouraged to increase the prenatal care and have balanced lifestyle through education by health-care providers.

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Conflicts of interest

There are no conflicts of interest.

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