

Incidence and Determinants of Low birth weight babies at Rural Tertiary Care Hospital in Central Uttar Pradesh

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Abstract

Background: An infant's birth weight is a reliable index of intrauterine growth and a sensitive predictor of newborn chances of survival, growth and long-term physical and psychosocial development. Low birth weight has been defined as birth weight <2.5 kg regardless of gestational age. The incidence of low birth weight (LBW) in India varies between 25–30% and of which 60–65% are because of intrauterine growth retardation.

Aim & Objective: To determine the incidence and various determinants of low birth weight among babies delivered at rural tertiary care hospitals in central Uttar Pradesh.

Methods and Material: The study was conducted at UPUMS, Saifai, Etawah, among pregnant women who delivered babies from 1st January 2018 to 31st December 2018. Details regarding age of the mother, gravida, parity, gestation period, presence of complications, the procedure for delivery and birth weight of the newborn were recorded and analyzed using SPSS software (version 23)

Results: A total of 7615 deliveries were conducted (53.2% were males, 46.8% were females). The mean birth weight of babies was 2.65 Kg with S.D ± 0.52. Preterm babies were 32% while 67% were term babies and 23% of babies were low birth weight. There was a statistically significant association between birth weight of babies and factors like age of mother, parity of mother, gestation period, and presence of complications during the antenatal period.

Conclusions: Prompt identification of high-risk factors, prevention of premature delivery, increasing the use of health services during pregnancy and management of the risk factors would reduce the incidence of low birth weight.

Keywords: Low birth weight, Incidence, Determinants of LBW, Tertiary care hospitals.

INTRODUCTION

Low birth weight (LBW) is a major public health problem in developing countries like India. LBW has been defined by the World Health Organization (WHO) as birth weight less than 2,500 g.^[1] On epidemiological observations, infants weighing less than 2,500 g are approximately 20 times more likely to die than heavier babies.^[2] It defines a heterogeneous group of infants: some are born early, some are born with restricted

growth, and others are born both early and with restricted growth. Monitoring of smaller babies are more important for or her growth in the weeks after birth.

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Low birth weight babies are either the result of preterm (< 37 weeks of gestation) or of restricted fetal (intrauterine) growth and they are closely associated with fetal and neonatal morbidity and mortality, inhibited growth and cognitive development, and chronic diseases later in life.^[3,4] The shorter the gestation period, the smaller the baby and the higher the risk of death, morbidity and disability. It has been shown that the mortality range can vary 100-fold across the spectrum of birth weight and rises continuously with decreasing weight.^[5]

Globally, more than 20 million infants are born with low birth weight.^[6] The number of low birth weight babies is concentrated in two regions of the developing world: Asia and Africa. As 72% of low birth-weight infants in developing countries are born in Asia where most of the births also take place, and 22% are born in Africa. India alone accounts for 40% of low birth weight births in the developing world and more than half of those in Asia.^[7] More than 1 million infants are born with low birth weights in China and nearly 8 million in India.^[8] The incidence of LBW in India varies between 25–30, 60–65% because of intrauterine growth retardation.^[9]

Many factors affect the duration of gestation and of fetal growth, and thus, the birth weight, these factors vary according to geographical location and the study population. They relate to the infant, the mother or the physical environment and play an important role in determining the infant's birth weight and future health.^[10]

LBW is an important indicator of maternal health, health care delivery, nutrition and poverty. LBW babies are at higher risk of mortality and morbidity as compared to infants of normal birth weight. It is imperative that periodic monitoring should be undertaken to evaluate the impact of preventive health services. Most of the studies conducted earlier has been done in ANC clinics, PHC/CHCs and rare studies has been conducted in Etawah district of Uttar Pradesh, hence this study was planned and carried out to identify maternal factors associated with low birth weight in tertiary care centre situated in rural area of Etawah.

AIM AND OBJECTIVE

To determine the incidence of low birth weight and various determinants associated with it in a rural tertiary care centre.

METHODOLOGY

A cross-sectional study was conducted from 1st January 2018 to 31st December 2018. The study subjects were all the pregnant women admitted for delivery in the obstetrics and gynecology department of Uttar Pradesh University of Medical Sciences (UPUMS), a tertiary care hospital in rural setting at Saifai in Etawah district of central Uttar Pradesh. Prior ethical clearance was taken from the university's ethical clearance committee for conducting the study. Informed written consent was taken after explaining the purpose of the study in detail from the study subjects or her relatives in cases where the mother was not in a position to provide the required information. Confidentiality and anonymity was assured

The data was collected with the help of a structured questionnaire from all the females with gestation period of more than 28 weeks (age of viability) delivered in the hospital of UPUMS, irrespective of their outcome of delivery with a consent to participate in study. Those females not giving consent and who left against medical advice before delivery were excluded from the study. The information regarding age, parity, gravida, gestation period, presence of complications at the time of delivery, the procedure used for delivery, end result of the delivery, gender of the born child and the birth weight of the newborn was collected by the researcher. The baby's birth weight was taken within half an hour after birth. Help of the records maintained in the delivery register in the labor room of the hospital was also taken to collect the required information. The data thus collected was entered in the excel sheet and a master table was prepared. The results were represented in tables and the Chi-square test used for statistical analysis to know the association between maternal factors and birth weight. The data was analyzed by using SPSS software (version 23).

Some Operational Definitions

Newborn weight is the first weight of obtained after birth. As significant postnatal weight loss seen after few hours, birth weight should preferably be measured within the first hour of life.

Low birth weight is defined as weight less than 2,500 g.

Very low birth weight is less than 1,500 g.

Extremely low birth weight is less than 1,000 g.

RESULTS

In our study incidence of LBW babies was found to be 20.9%. Out of a total 7615 deliveries conducted, 53.2% were male and 46.8% were females (Table 1). Among them 2.1% were very low birth weight (<1.5 kg) and 76.9% were normal birth weight babies. The mean birth weight of babies was 2.65 ± 0.52 kg (Table 2).

The incidence of extremely low birth weight babies was observed to be higher (71.4%) in male babies as compared to female babies (Table 3).

Out of total deliveries, preterm babies were 32% while 67% were term babies and babies post term were 1% (Table 1). Mean age of mothers was found to be 25.2 ± 3.8.

In present study 30.2% of females underwent NVD and 32.7% underwent NVD with episiotomy, caesarean section in 33.5%, forceps/ventouse supported delivery were 3.6%. (Table 1) A complication during pregnancy was reported in 53.4%. Pregnant women's and mothers who delivered live babies were 92.8%, still birth were 5.2 and 2.0% had intrauterine death (Table 1).

In the present study the association between the mother's age and the baby's birth weight was found to be significant ($p = 0.007$). The percentage of LBW babies was 30.2% in the maternal age group of <20 years, followed by 26.5% in ≥ 30 years maternal age group. The least percentage of LBW that is

Table 1: Distribution of study subjects according to some descriptive characteristics

S. no.	Variable	N(%)=7615(100)
1.	Age of Mothers	
	≤30 years	6955(91.3)
	>30 years	660(8.7)
	Total	7615(100.0)
2.	Parity	
	≤2	6023(79.1)
	≥3	1592(20.9)
	Total	7615(100.0)
3.	Gestation Period	
	Preterm(<37 weeks)	2433(32.0)
	Term(37–41 weeks)	5099(67.0)
	Post term(≥42 weeks)	83(1.0)
	Total	7615(100.0)
4.	Presence of complications	
	Yes	4069(53.4)
	No	3546(46.6)
	Total	7615(100)
5.	Procedure of delivery	
	NVD	2299(30.2)
	NVD with Episiotomy	2492(32.7)
	Caesarean Section	2550(33.5)
	Forceps/Ventouse with episiotomy	274(3.6)
	Total	7615(100)
6.	End result of delivery	
	Live	7070(92.8)
	Still birth	396(5.2)
	Intrauterine death	149(2.0)
	Total	7615(100)
7.	Gender of baby	
	Male	4054(53.2)
	Female	3561(46.8)
	Total	7615(100)

21.7% was noted in the age group of 25–29 years of maternal age. As the maternal age increases or at lower ages (<20) the chances of having LBW baby was increased. Lower parity of the mother (≤2) had low incidence (22.0%) of low birth weight as compared to increase in parity (≥3) having 27.3% of LBW babies and was found to be statistically significant ($p=0.001$) (Table 4).

In our study, the mother's gestation period and the incidence of low birth weight were statistically significant (p -value=0.001). High incidence (41.1%) of LBW babies seen in preterm birth (<37 weeks), but with increase in the gestation period, incidence decreased drastically as 14.6% in

Table 2: Distribution of babies according to birth weight

Birth weight	N (%)
Very LBW Babies (<1.5 Kg)	152 (2.1)
LBW Babies (<2.5 Kg)	1595 (20.9)
Normal Birth weight Babies (≥2.50-4.00 Kg)	5861(76.9)
Total	7615 (100)

Table 3: Distribution between birth weight and gender of the baby

Categories	Gender		Total N (%)
	Male N (%)	Female N (%)	
Extremely LBW Babies (<1.00 Kg)	5 (71.4)	2 (28.6)	7 (100)
Very LBW Babies (<1.5 Kg)	73 (48.0)	79 (52.0)	152 (100)
LBW Babies (<2.5 Kg)	763 (48.0)	832 (52.0)	1595 (100)
Normal Birth weight Babies (≥2.50–4.00 Kg)	3213 (55.0)	2648 (45.0)	5861 (100)
Total	4054 (53.0)	3561 (47.0)	7615 (100)

37–41 weeks and 10.8% in ≥ 42 weeks and was found to be statistically significant (p -value = 0.001). With complications incidence of LBW was found to be higher 29.3% compared to the absence of complications which was 15.8% and this relation was also significantly associated (p -value=0.001). Babies delivered through caesarean section were more prone for LBW (24.6%) as compared to vaginal and assisted delivery (22.3%) which is found to be statistically significant ($p=0.022$) (Table 4).

Majority of the twins (77.2%) and stillbirth (58.1%) were low birth weight babies which is very much high as compared to normal live birth (19.9%) and was found to be statistically significantly (p -value 0.001). Higher percentages of female babies were found to be LBW. Among female newborns, 913 (25.6%) were LBW as compared to 814 (20.7%) males and the difference was found to be significant statistically (p -value 0.001) (Table 4)

DISCUSSION

Globally birth weight has been accepted as single most important determinant of future chances of survival, healthy growth, freedom from morbidities & mortalities of infants. The incidence of LBW in the present study was found to be 23% which was below the national average (27%). Similarly, a cross-sectional study which Radha Kumari conducted. P *et al.*^[11] (2015) at King George Hospital, Visakhapatnam, was found to be 21.3%. However, a study conducted by Sarika M *et al.*^[12] in Kamineni Hospital, LB Nagar, Hyderabad LBW prevalence was found 26.9% and Gupta RD *et al.*^[13] (2019) in Afghanistan was found to be 15.5%. Incidence in the present study was low compared to other studies conducted by Manna N *et al.*^[14] at Kolkata (30.9%), Malik S *et al.*^[15] at Mumbai (28.3%) and by Choudhary *et al.*^[16] 36.2%. This could be due to a variety of factors, e.g., differences in socioeconomic conditions and

Table 4: Association between maternal factors and low birth weight babies

S. No.	Maternal Factors	LBW n (%)	NBW n (%)	TOTAL n (%)	p-value
	Age group(Years)				
1.	<20	16(30.2)	37(69.8)	53(100.0)	p=0.007
	20–24	787(22.9)	2654(77.1)	3441(100.0)	
	25–29	639(21.7)	2303(78.3)	2942(100.0)	
	≥30	312(26.5)	867(73.5)	1179(100.0)	
	Total	1754(23.0)	5861(77.0)	7615(100.0)	
	Parity				
2.	≤2	1320(22.0)	4703(78.0)	6023(100.0)	p=0.001
	≥3	434(27.3)	1158(72.7)	1592(100.0)	
	Total	1754(23.0)	5861(77.0)	7615(100.0)	
	Gestation period				
3.	<37 weeks	1001(41.1)	1432(58.9)	2433(100.0)	p=0.001
	37–41 weeks	744(14.6)	4355(85.4)	5099(100.0)	
	≥42 weeks	9(10.8)	74(89.2)	83(100.0)	
	Total	1754(23.0)	5861(77.0)	7615(100.0)	
	Presence of complications				
4.	Present	1194(29.3)	2875(70.7)	4069(100.0)	p=0.001
	Absent	560(15.8)	2986(84.2)	3546(100.0)	
	Total	1754(23.0)	5861(77.0)	7615(100.0)	
	Delivery procedure				
5.	Vaginal and Assisted delivery	1127(22.3)	3938(77.7)	5065(100.0)	p=0.022
	Caesarean section	627(24.6)	1923(75.4)	2550(100.0)	
	Total	1754(23.0)	5861(77.0)	7615(100.0)	
	End result of delivery				
6.	Live	1409(19.9)	5661(80.1)	7070(100.0)	p=0.001
	Stillbirth	230(58.1)	166(41.9)	396(100.0)	
	Twins	115(77.2)	34(22.8)	149(100.0)	
	Total	1754(23.0)	5861(77.0)	7615(100.0)	
	Gender of baby				
7.	Male	841(20.7)	3213(79.3)	4054(100.0)	p=0.001
	Female	913(25.6)	2648(74.4)	3561(100.0)	
	Total	1754(23.0)	5861(77.0)	7615(100.0)	

dietary patterns of women covered in the studies, study design (community-based or hospital-based), errors in recording the weight of newborns (machine/human error) etc.

The current study showed that younger mothers (less than 20) were more likely to deliver LBW babies than older mothers. Other previous studies by Dickute J *et al.*^[17] (2002), Cam HH *et al.*^[18] (2020) have also shown that younger mothers are more likely to have LBW babies. In the present study percentage of LBW babies was 30.2% in less than 20 years of age, followed by 26.5% in ≥30 years' age group. Similarly, many other studies by Agarwal A *et al.*^[19] (2000), Amin N *et al.* (1993),^[20] Khatun S *et al.*^[21] (2008), have also shown that the age of the mother to be significantly associated with the birth of LBW babies. Efforts towards preventing early marriage

would contribute significantly in reducing the prevalence of low birth weight. Probable reasons for younger aged mothers were their low awareness or no experience, along with poor nutritional status of the adolescent girls with underdeveloped reproductive organs.

Parity is also an important determinant of birth weight. In this study lower parity of the mother (≤2) had low incidence of low birth weight as compared to an increase in parity (≥3) and this association was found to be statistically significant. For elderly mothers, it might be due to increased parity with less spacing leading to depletion of the mother's health and nutritional status. Similarly, Joshi SM and NP Pai^[22] (2000) also reported a similar finding in slum area of Greater Mumbai. Our study revealed that a history of preterm delivery

(<37 weeks) was significantly associated with LBW in babies. High incidence (41.1%) of LBW babies were seen in preterm (<37 weeks), but with an increase in the gestation period, the incidence decreased drastically as 14.6% in 37 to 41 weeks and 10.8% in ≥ 42 weeks and was found to be statistically significant. A study by Agarwal N *et al.*^[23] showed a similar impact on birth weight as 34.7% of mothers had low birth weight babies with a POG (gestation period) of less than 37 weeks compared to only 25.3% of mothers delivering LBW babies with complete POG. A highly significant association of history of premature delivery with LBW in this study indicated that mothers with history of premature delivery may need special care during pregnancy in terms of diet and health check-ups.

In the present study, incidence of LBW with any sign of complications in pregnancy was found to be higher 29.3% as compared to the absence of complications which was half 15.8% and it was found to be statistically significant. Babies delivered through caesarean section were more prone for LBW (24.6%) as compared to normal vaginal and assisted delivery (22.3%). Deshpande Jayant D *et al.*^[24] (2011) had shown that low birth weight was significantly associated with inadequate antenatal care, pre-delivery weight ≤ 45 kg, height ≤ 145 cm, bad obstetrics history, pregnancy-induced hypertension (PIH) and anemia. These findings are consistent with Kramer's meta-analysis.^[25]

Effects of pre-pregnancy maternal weight, bad obstetrics history (previous abortions) and anemia were consistent with another study by Mavlankar DV *et al.*^[26] in Ahmadabad. In a hospital-based study in Calcutta by Pahari *et al.*^[27] reported abortion as one of the main causes of adverse pregnancy outcomes in addition to anemia and hypertensive disorder.

In the current study majority of the twins (77.2%) and stillbirth (58.1%) were low birth weight babies which is very much high as compared to normal live birth (19.9%) and was found to be statistically significant. Higher percentages of female babies were found to be LBW. Among female newborns, 913 (25.6%) were LBW compared to 814 (20.7%) males, and the difference was statistically significant. A study by Onyiriuka AN *et al.*^[28] also found overall higher incidence of LBW twin infants 51.7% with a female preponderance.

It is generally recognized that the etiology of LBW is multifactorial. Health care professionals' special attention is necessary to identify these risk factors for low birth weight. Various factors are clearly and consistently linked to low birth weight. Numerous opportunities exist before pregnancy to reduce the incidence of low birth weight, yet these are often overlooked.

CONCLUSION

In the present study few LBW babies were noted in the age group of 25–29 years of maternal age with parity ≤ 2 . Hence society should be motivated to avoid early marriage, and awareness of mothers should be done about the best time to

conceive. Delay in pregnancy after age of 30 years of age should be avoided and limiting the family to two children. Prompt identification of causes and prevention of premature delivery, with identification of high-risk mothers and management of the risk factors, would reduce the incidence of low birth weight. Maternal nutrition, and increasing the use of health services during pregnancy are all important for reducing pregnancy complications, which will lessen the LBW babies.

Limitation of the Study

In spite of large sample size, efficient sample design, and robust analysis, this study also has certain limitations. The findings of this study might be influenced by the selection of study area purposively and study design bias. Other limitations like recall bias while determining the gestational age and the inability to include women who delivered at home. In the present study, other threats like maternal psychological stress, toxic exposures, and quality of antenatal care that may have some consequences for low birth weight were not considered.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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