

## A Prospective Study on Low Birth Weight Neonates- It's Incidence and Risk Factors in a Tertiary Medical College

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**Abstract-** In a prospective hospital based study ,during the period from1<sup>st</sup> Jan 2017 -30<sup>th</sup> June 2018 ,3110 consecutively delivered live newborns werestudied for the incidence of low birth weight neonates and to evaluate the associated risk factors. Eleven hundrednewbornswere classified as low birth weight babies. The incidence expressed per 1000 live births was 353.7 (35.37%). Of these, 850 (77.27%) weresmall for gestational age neonates and 250 (22.72%) were preterm neonates. Five hundred eighty small for gestational age neonates (68.23%) were weighing between 2001 to 2500 gms. Mothers belonging to the age group of 19-24 years delivered the maximum newborn of low birth weight babies (600/1100) and of (510/600) these 86.33% were small for gestational age neonates. There were 50 neonates with lowbirth weight born to mothers below the age of 18 years. Primiparous mothers were found to contribute higher number of low birthweight neonates (400/1100). Spacing as a factor did not show any major difference. Two hundred eighty low birth weight neonates were born to mothers with significant obstetrical problems such as pregnancy induced hypertension, bad obstetricalhistory and premature rupture of membranes. The incidence of 35.37 % of low birth weight babies is high enough to ring alarmbells.

**Keywords-** Incidence, primiparous, Newborns,small for gestational age.

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### I. Introduction

Low birth weight at birth is an important underlying contributor for neonatal and infant mortality. It accounts for nearly half of all perinatal deaths. Identifying predictors of low birth weightis the first essential step in designing appropriate management strategies. Hence, this studyaimed to identify risk factors for low birth weight in hospitals. Birth weight is agood reflector of the status of maternal health. It isalso true that birth weight is the single most importantfactor that affects neonatal mortality and morbidity,infant and childhood morbidity. Low birth weight i.e.weight below 2500 gms may indicate that the baby didnot remain in the uterus long enough or it did notdevelop well enough. Neonates with weight less than10<sup>th</sup> percentile or more than 2 SD below the mean forthe gestation age are classified as small for gestationalage. This group of neonates with poor intra uterinegrowth remains the cause of concern in developingcountries including India. The incidence of low birthweight (LBW) in India varies between 25-30%and ofwhich 60-65% are because of intra uterine growth retardation (IUGR) [1]. Evidence from developing countries over time also demonstrates that the incidence of IUGR decreases as a country becomes more developed. Some of the adverse factors responsible are maternal malnutrition, anemia, inadequate prenatal care drug abuse, birth order, maternal medical problem,e.g., pregnancy induced hypertension, diabetes mellitus, cardiac diseases and chronic infections [2]. Thepresent study was undertaken to know the incidence oflow birth babies in a mixed population having a varied socio-economic background and to study the associated maternal risk factors like social, obstetric and anthropometric factors in low birth weight babies.

### II. Materials And Methods

This prospective study was carried out on Department of Obstetrics & Gynaecology at BankuraSammilani Medical College, west Bengal period from1st Jan 2017 -30th June 2018.This was a One &half year hospital based prospective study. A total of 1100 newborns were for in this study.

**Study design:** Prospective observational study.

**Study Location:** This was a tertiary care teaching Hospital based study done in Department of Obstetrics & Gynaecology at BankuraSammilani Medical College, west Bengal.

**Study Duration-**1st Jan 2017 -30th June 2018.

**Sample Size-** 1100 Newborns.

**Sample size calculation-** The sample size was calculated on the basis of a single proportion design. The target population was from a mixed population having a varied socio-economic background.

**Subject & selection method-** The study population was drawn from all patients who delivered live newborn during the study period.

**Inclusion Criteria-**

1. Pregnant women >14 years.
2. Married women.
3. Pregnant women suffering from medical morbidities like anemia, PIH, GDM, BOH etc.
4. Newborns weighing between 2-2.5kg.
5. SGA newborns.
6. Preterm babies born between 28-37 weeks.

**Exclusion Criteria-** 1.unmarried

- pregnant women.
- 2.Extremeley LBW.
- 3.Early preterm babies <28 weeks.
- 4.Intrauterine fetal Demise cases.

**Procedure & Methodology-**

The population of the study included mothers attending regular antenatal clinics. The hospital being a tertiary referral government hospital included women from the very low income strata of the society of class 1-4 employees of the central government who were authorized free medical care. Newborn babies were weighted on a beam type weighing scale within one hour of birth to the closest of 20 gms. Gestational age was determined by the Dubovitch criteria [1]. All consecutively born low birth weight babies were included and evaluated. Low birth weight (LBW) is defined as a birth weight less than 2500g and LBW infants are at greater risk of death and disability [3]. Small for gestational age (SGA) newborns were defined as those with weight less than the 10th percentile [1]. Incidence of low birth weight babies was calculated by the following formula:

a) 
$$\frac{\text{Live LBW babies born during the study period} \times 1000}{\text{Total live births during the study period}}$$

b) expressed as per 1000 live births

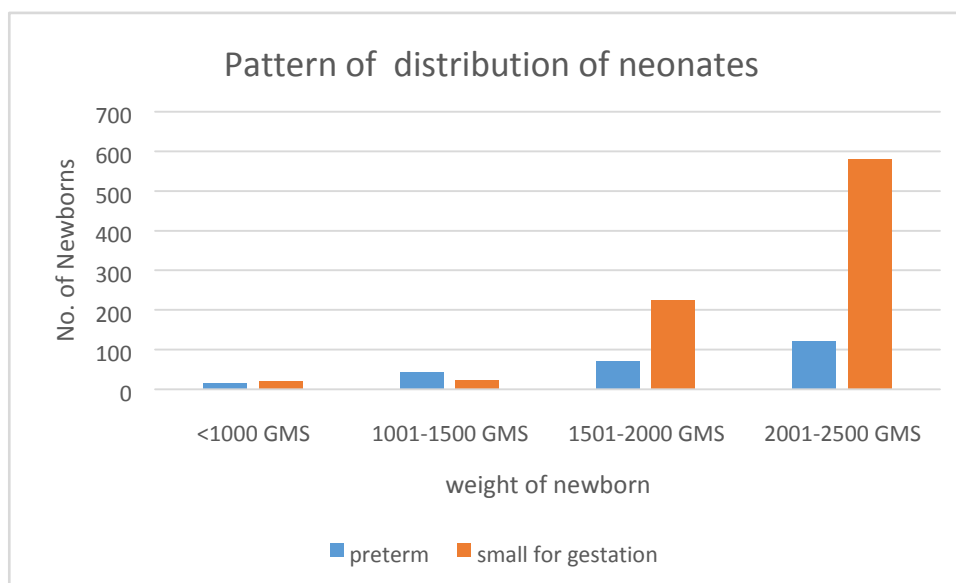
b) 
$$\frac{\text{Live LBW babies born during the study period} \times 100}{\text{Total live births during the study period}}$$
 and expressed as percentage

Detailed maternal data were recorded for all low birth weight neonates studied based upon direct questioning and review of the antenatal card. Maternal malnutrition for the study was defined as weight <45 kgs and height <145 cms. Maternal anemia was defined as Hb <11 g/dl [4]. Bad obstetrical history (BOH) was considered when there was previous history of one or more abortions, one or more stillbirths or one or more neonatal deaths. Low birth weight babies were further segregated into small for gestational age and preterm babies in relation to their maternal data.

### III. Result

During the period of study (Jan 2017 to June 2018), 3110 consecutively delivered live newborn babies were studied. Out of these 1100 were classified as low birth weight babies. The incidence expressed, as per 1000 live births was 353.7. Of the total 1100 LBW babies, 850 (77.27%) were small for gestational age neonates and 250 (22.72%) were preterm neonates. There were 580 female low birth weight neonates out of the total 1100.

The classification and pattern of birth weight is reflected in Fig I

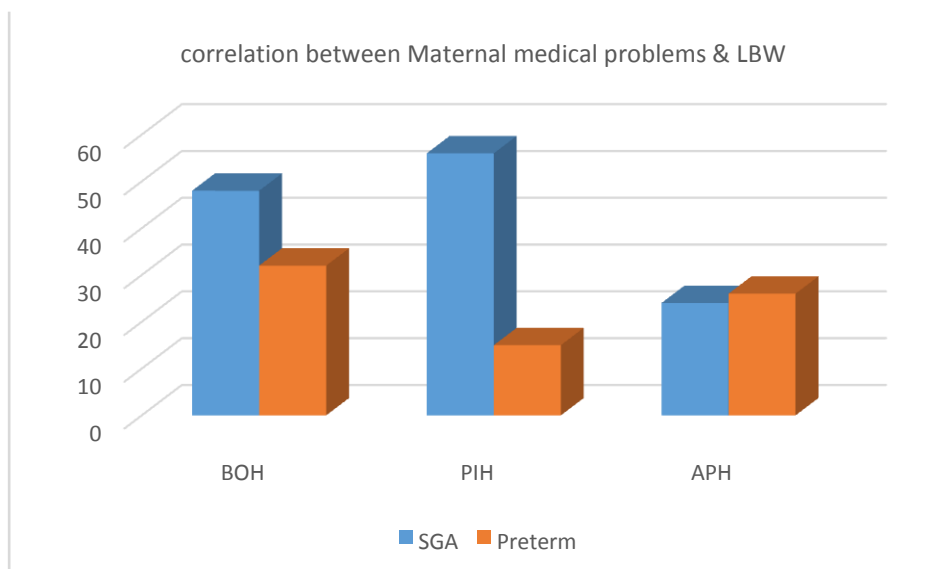


Eight hundred fifty neonates were small for gestational age out of the total 3110 live births (27.33%). Of these majority (580/850 i.e. 68.23%) were weighing between 2001 to 2500gms. The correlation between maternal age, height, weight and parity and low birth weight neonates is highlighted in Table I. The maximum number of LBW babies (54.54%) were born to mothers in the age group of 19-24 years. Of these 60 per cent were SGA neonates. Significantly 105 LBW neonates were born to mothers below the age of 19 years. Table 2 highlights the correlation between maternal parity, spacing between pregnancy and family income. Primiparous mothers were found to contribute significantly higher number of LBW neonates (36.33%) and of these 85 per cent were SGA neonates. Spacing as a factor did not show major difference in the incidence of LBW neonates. Mothers belonging to the income group of Rs 1000 –Rs3000 per month gave birth to higher number of LBW neonates (780/1100). Of these 79.48 per cent were SGA neonates.

**TABLE I- Correlation between maternal anthropometry and low birth weight neonates (n=1100)**

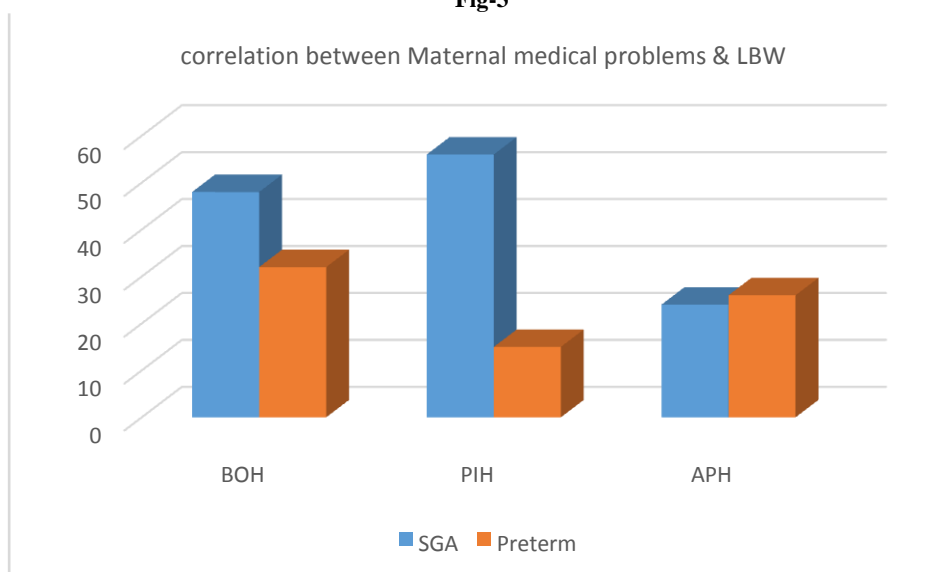
Factors	Small for Gestation	Preterm	Total
<b>Maternal age in years</b>			
>35	20	5	25
30-35	60	15	75
25-30	250	45	295
19-24	510	90	600
<19	10	95	105
<b>Maternal Heights in (cms)</b>			
>155	140	30	170
145-155	700	140	840
<145	10	80	90
<b>Maternal weight (kg)</b>			
<45	190	40	230
45-55	600	150	750
>55	60	60	120

Fig 2 reflects the correlation between maternal medical morbidity including anemia, medical illness and obstetrical problems and low birth weight babies. Nine hundred and ninety low birth weight babies were born to mothers whose hemoglobin levels were below 10 g/dl. Further of these 30 per cent (330) of low birth weight neonates were delivered by mothers with Hb per cent below 8 gm per cent. Medical illness including rheumatic heart disease [5], urinary tract infection and other episodic illness were observed in mothers with LBW babies in the present study. Obstetrical problems included premature rupture of membranes (PROM), pregnancy induced hypertension (PIH), bad obstetrical history (BOH) and ante-partum hemorrhage (APH). Fig-2



The details of correlation between obstetrical problems and low birthweight-neonates highlighted in Fig 3. Out of total 1100 LBWneonate. 262 cases had significant antenatal obstetric problems intheir mother. Bad obstetric history and PIH were two importantfactors.

**Fig-3**



n-262

BOH-bad obstetrics history  
 PIH-Pregnancy Induced hypertension  
 APH-Antepartum Hemorrhage

**TABLE II**-Correlation between LBW and maternal parity, spacing and family income (n=1100)

Factors	Small for Gestation	Preterm	Total
<b>Parity</b>			
Primipara	330	90	420
2 <sup>nd</sup> Para	310	60	370
3 <sup>rd</sup> Para	140	40	180
>3	70	60	130
<b>Spacing</b>			
<2 years	510	120	630
>2 years	340	130	470

Family income (Rs/mth)			
>5000	25	10	35
>3000-5000	22	10	32
2000-3000	240	70	310
1000-2000	380	90	470
<1000	183	70	113

#### IV. Discussion

Low birth weight is one of the leading causes of neonatal mortality and is influenced by various socio-economic, maternal and environmental factors [6]. This study identified some socioeconomic, obstetric and environmental risk factors for low birth weight in the study area.

Pierre Budin introduced the most basic concepts in the care of low birth weight babies in 1895. He stated 'with weaklings we shall have to consider three points, one, their temperature and their chilling, two, their feeding and three, the diseases to which they are prone'. Of the low birth weight babies, small for gestational age neonates are the cause for concern, given their long-term consequences. It shall not be wrong to say that the vicious cycle of malnourished mother giving birth to a small for gestational age girl neonate who will in turn deliver a low birth weight child continues in our country. The incidence of low birth weight neonates in India varies between 25-30 per cent [1]. In the present study the incidence was 35.37 per cent. In a study by ICMR, wherein the criterion for low birth weight was taken to be <2000 gm, the incidence was reported to be 5.5 per cent [7]. The argument was based on the assumption that the mean birth weight of the mature Indian baby is about 500 gms less than that of the American infant and hence the WHO definition of LBW babies wherein 2500 gms is the sake of economics shall we lower our standards. Small for gestational age neonates contribute the maximum to the incidence of LBW babies in India vis a vis the developed countries. In the present study 77.27 per cent of the LBW neonates were SGA infants. In a national collaborative study, the authors have given similar observation [8]. Parity was significantly associated with birth weight in northwest Ethiopia and the Gambia and London [9, 10, 11]. Another hospital based study in London [12] showed association of parity with low birth weight. A cross-sectional study conducted in Central Africa revealed that adolescent women had significant risks of delivering a low birth weight baby [13]. This might be due to the effect of placental factors as gravidity/parity increases. A systematic review and meta-analysis revealed an association between nulliparity with low birth weight [14]. This shows the need of universal and quality prenatal care, nutritional counselling to all pregnant women. Additionally, early marriage and teenage pregnancy should be discouraged to prevent low birth weight in this group of women.

Hirve SS et al [2] in their prospective study have reported primiparas contributing significantly to the incidence of LBW neonates. In the present study, 38.8 per cent of SGA neonates were born to primipara mothers as compared to 36.47 per cent to 2nd para and 31.67 per cent to 3rd para. Another Indian study [16], has observed that newborn of primiparae were 150 gms lighter than those of second para. Short spacing interval between pregnancies is a confounding factor to nutritional deficiency and inadequate physiological recovery [17]. In the present study 510/850 neonates with SGA were born to mothers with spacing interval less than 2 years. It has also been observed that outcome of previous pregnancy is an important confounding factor. If the previous gestation resulted in a preterm or SGA neonate or still birth, the mother will be at an increased risk for both shorter pregnancy interval and a repeat preterm or SGA neonate [17]. Maternal undernutrition does play an important role in outcome of pregnancy in terms of fetal growth. Adopting the definition criteria for maternal malnutrition to be weight < 45 kg and or height < 145 cms, 320/1100 of total LBW were born to malnourished mothers in the present study. In a recent study to evaluate the scoring system for predicting the risk of a preterm baby, previous history of preterm delivery and low prepregnancy weight were the most predictive risk factors in multiparous and nulliparous mothers [18].

Anemia in mothers is a major determinant for increased morbidity both for the mother and the growing fetus. Anemia if severe could impair oxygen delivery to the fetus and thus interfere with normal intrauterine growth or pregnancy duration. Iron deficiency without anemia might affect key enzymes and thereby also lead to adverse outcome [17]. Two studies [3, 8] have noticed the relation between low birth weight and low maternal hemoglobin levels. In the present study, 990 (90%) neonates with SGA were born to mothers with anemia. Failure of the hemoglobin concentration to fall during pregnancy was associated with a five to seven fold increase in the incidence of low birth weight and preterm birth.

Closely related factor is income and the economic status of the family. Two studies analyzing the social factors related to low birth weight babies, has observed the direct relation between family income and birth weight [8, 14]. In the present study, 470 (55.29) percent of low birth weight neonates were born to mothers in the family income bracket of less than Rs 2000 per month.

Maternal illness like rheumatic heart disease, chronic infections and other episodic illnesses such as respiratory tract infection, diarrheal disorder and short febrile episodes were the contributing factors in the present study for low birth weight babies. Among cardiac problems, rheumatic heart diseases is the

commonest cause complicating pregnancy and resulting in smaller babies in our country [19]. Obstetric problems complicating third trimester of pregnancy like PIH, BOH and PROM are important in contributing to the chances of premature delivery and poor growth of the fetus. Several authors have observed the increased incidence of low birth weight babies in these morbidity states [8,17]

The present study has strengthened the fact that a significant percentage of neonates are born with the disadvantage of low birth weight. The maternal factors were found to be working in unison and to reach any logical conclusion regarding the causative or etiological effect of these maternal factors on low birth weight, they should be properly controlled to prevent confounding.

## V. Conclusion

Adoption of 'At risk approach' to include all those mothers with social, natural and medical adverse factors. The 'risk approach' is a managerial tool for improved MCH care. Apart from professional health workers, involvement of community health workers and social women's organizations required to be incorporated in the health delivery system [2]. Correction of three interrelated conditions, viz. maternal malnutrition, infections and unregulated fertility through direct intervention programmes, including dietary improvements through the existing ICDS scheme, identifying and controlling infections and early detection and treatment of medical disorders complicating pregnancies. Nutritional counselling during ANC visits for pregnant mothers and health information about obstetric complications should be advocated. Health professionals should be vigilant in early detection and management of complications during pregnancy. Additionally, efforts should be done to improve living standards and lifestyles of mothers. Community based studies are needed to better address household and environmental factors with observation.

## Reference

- [1]. Singh Mehrban. Disorders of weight and gestation. In: Singh Mehrban (ed). Care of the newborn. 4th edn. New Delhi, Sagar Publication 1991 : 112-25.
- [2]. Glass HC, Costarino AT, Stayer SA, Brett CM, Cladis F, Davis PJ: Outcomes for extremely premature infants. *Anesthesia and analgesia* 2015, 120(6):1337–1351.
- [3]. Hivre SS, Gantra BR. Determinants of low birth weight A community based prospective cohort study. *Indian Pediatr* 1994; 31: 1221-5
- [4]. Park JE. Preventive medicine in obstetrics, pediatrics and geriatrics. In: Park K (ed). Park's textbook of Preventive and Social Medicine. 14th edn Jabalpur, Banarsidas Bhanot. 1994 : 313-43.
- [5]. WHO expert committee. Nutrition in pregnancy and lactation; report of a WHO expert committee. *World Health Organ Tech Rep Ser* 1965; 305: 5-19.
- [6]. UNICEF, WHO: United Nations Children's Fund and World Health Organization, Low Birthweight: Country, regional and global estimates. UNICEF, New York In. Geneva, Switzerland UNICEF and WHO; 2004
- [7]. Growth pattern of Indian children. *Bull ICMR* 1983; 13: 10.
- [8]. Bhargava SK, Singh KK, Saxena BN. A national collaborative study of identification of high risk families. mothers and outcome of their offspring with particular reference to the problems of maternal nutrition, low birth weight. *Perinatal and infant morbidity and mortality in rural and urban slum communities. Indian Pediatr* 1991; 28: 1473-80.
- [9]. Jammeh A, Sundby J, Vangen S: Maternal and obstetric risk factors for low birth weight and preterm birth in rural Gambia: a hospital-based study of 1579 deliveries *OJOG* 2011, 1(3)
- [10]. Berihun Megabaw Zeleke, Meseret Zelalem, Mohammed N: Incidence and correlates of low birth weight at a referral hospital in Northwest Ethiopia *Pan African Medical Journal* 2012. Awoke Adane Akilew, Awoke Ayele Tadesse, Gedefaw Ararsa Leta, Bitew BD3, Zeleke BM: Adverse birth outcomes among deliveries at Gondar University Hospital, Northwest Ethiopia. *BMC Pregnancy and Childbirth* 2014, 14(90).
- [11]. Poon LCY, Volpe N, Muto B, Syngelaki A, Nicolaides KH: Birthweight with Gestation and Maternal Characteristics in Live Births and Stillbirths. *Fetal Diagn Ther* 2012, 32:156–165
- [12]. Kurth F, Iard SB, GM-N, Schuster K, Adegnika AA, et.al: Adolescence As Risk Factor for Adverse Pregnancy Outcome in Central Africa—A Cross-Sectional Study. *PLoS ONE* 2010, 5(12 e14367)
- [13]. Muthayya S: Maternal nutrition & low birth weight—what is really important? *Indian J Med Res* 2009, 130:600–608. Kurth F, Iard SB, GM-N, Schuster K, Adegnika AA, et.al: Adolescence As Risk Factor for Adverse Pregnancy Outcome in Central Africa—A Cross-Sectional Study. *PLoS ONE* 2010, 5(12 e14367).
- [14]. Sethi GR, Sachdev HPS, Puri RK. Women's health and fetal outcome. *Indian Pediatr* 1991; 28: 1379-93.
- [15]. Kramer MS. Determinants of delivering low birth weight. *Methodological assessment and meta-analysis. Bull WHO* 1987; 65: 663-737.
- [16]. Owen J, Goldenberg RL, Oweis RO, Kick KA, Copper RL. Evaluation of risk scoring system: A predictor of preterm birth in an 14. Kumari S, Jain S, Kamodia K, Jain R, Mallik ON. Outcome of low birth weight babies with special reference to natural factors. *Indian Pediatr* 1989; 26: 12-30 immigrant population. *Am J Obstet Gynaecol* 1990; 163: 873-8
- [17]. Mane SY, Gharpure YP, Merchant RA. Maternal heart disease and perinatal outcome. *Indian Pediatr* 1993; 30: 1407-II.

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