Original Research :

A study on maternal factors associated with low birth weight newborns.

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Abstract:

Introduction: Birth weight is not only a critical determinant of child survival, growth and development but also a valuable indicator of maternal health, nutrition and quality of life. LBW is closely associated with fetal and perinatal mortality and morbidity. The various risk factors related with term low birth weight neonates have been a subject of various studies in India. The present study was undertaken to understand the current situation of various maternal determinants which influence the birth weight of newborn in this part of country.

Materials and Methods:

A hospital based cross sectional study was done over a period of one year. 400 term neonates were selected randomly, out of them 165 were LBW and 235 were NBW. Various maternal characteristics including age, nutritional status (height, weight, haemoglobin) were noted. Data was analysed using Graph pad Instat software. P value < 0.05 was considered to be significant.

Results:

Out of total 400 term neonates studied, 165 were LBW and remaining 235 were NBW. Maternal factors found significantly associated with term low birth weight babies were age, weight and anaemia.

Conclusion:

Almost all the identified factors in our study are modifiable and thus preventable. Integrated approach incorporating medical, social, economical and educational measures to improve the overall health status of the women are needed to reduce the problem of LBW in India.

Key words: Birth weight, LBW,NBW

Introduction

Children's health is tomorrow's wealth or healthy child is the wealth of our nation" is one of the WHO slogans. We will get a healthy child when the mother is healthy; health of the child is closely related to mother's health.1

Intrauterine growth and development is a process at risk in human lifecycle and its aberrations can result in lasting profound influence in later life. Intrauterine growth has been invariably assessed by birth weight in the context of emerging countries. Birth weight is not only a critical determinant of child survival, growth and development, but also a valuable indicator of maternal health, nutrition, and quality of life.2

Low birth weight (LBW) has been defined by World Health Organization (WHO) as weight at birth of less than 2.5kg irrespective of the gestational age.3 World health organisation

estimates that globally, out of 139 million live births, more than 20 million low birth weight babies are born each year, consisting 15.5% of all live births, nearly 95.6% of them in developing countries. The level of low birthweight in developing countries (16.5 percent) is more than double the level in developed regions (7 percent).4One of the highest occurrence of LBW is in India. South Asia has the highest prevalence of LBW. In fact the latest projections indicate that more than half of world's LBW babies are born in South Asia.5 Infants who weigh less than 2.5kg at birth represent about 28% of all live births in India and more than half of these are born at term.

The high occurrence of LBW in developing countries is multi-factorial and consist of a complex interaction among foetal, placental and maternal factors, but maternal factors are probably more important causes of LBW.

LBW is the major risk factor for infant morbidity and mortality, (36% of all mortality in children <5 yrs of age), constituting about 4 million deaths per year.6Hence low birth weight is considered as a sensitive index of nation's health and development. Reducing the incidence of low birth weight is one of the most serious challenges in maternal and child health in developing countries. Therefore, studies on epidemiological factors associated with LBW are highly demanding to solve the current issue among institutional deliveries so that suitable recommendations can be made to prevent LBW.

Objectives:

The present study has been undertaken with the following aim and objective

To study the maternal risk factors associated with term low birth weight neonates.

Methods and Materials:

A hospital based cross sectional study was undertaken to study the maternal factors associated with the term low birth weight babies. The study

was done over a period of one year in Neonatal Intensive Care Unit (NICU), Gauhati Medical College and Hospital (GMCH) , Guwahati. Sample size was calculated using the formula 4pq/L2 (where P = prevalence of the disease, Q =100-p, L = allowable error). Considering p = 28% in India 18% allowable error, sample size comes out as 318. Minimum sample size was 318. We have taken 400 as the sample size. Babies delivered in our hospital during the study period, inborn babies and their mothers, singleton live births with birth weight < 2.5 kg and gestational age between 37 (completed)-41 weeks (Exact date of amennorhoea was known, to calculate the gestational age) were included in the study. Multiple gestation or still born babies and babies with major congenital anomalies were excluded. Ethical clearance was obtained and informed written consent was obtained from all the parents of the babies in the study. The data was collected in the predesigned pro forma and the statistical analysis was done using Graph pad Instat software, version 3.10.

Results:

Study Population:

Table 1: Distribution of study population

Population	Number
Low birth weight	165
Normal birth weight	235
Total	400

Mean Birth Weight	
Lbw	1.80 kg
Nbw	2.84 kg

Table 1 shows the distribution of our study population. Out of total 400 study population, we had 165 term LBW babies and 235 NBW babies. The mean birth weight of LBW babies was 1.80 kg and of NBW babies was 2.84 kg.

Maternal Age:

In our study we found that out of total 86 teenage mothers i.e< 20 years of age, 49 mothers (56.9%) were seemed to deliver LBW babies and rest 37 (43.1%) delivered NBW babies, whereas 90 mothers (35.9%) of age group 20-30 years mothers produced LBW babies and 161(64.1%) produced NBW ba-bies. And out of total of 63 mothers whose age was ? 30 years, 26 (41.3%) mothers gave birth to LBW babies and remaining 37 (58.7%) had NBW babies. Our report on this age factor revealed that proportion of LBW was higher in teenage mothers and it progressively decreased as the age increases till 30 years. Further we observed that LBW babies proportion start increasing after the age of ? 30 years.

On statistical analysis(Table 3) we found that p value was 0.0066 which was less than 0.05. This value signify that the association between the maternal age and birth weight in our study is significant.

Maternal Weight:

From the analysis of above table 4 showing impact of maternal weight on birth weight of babies, we ob-served that out of total 400 mothers, 118 had weight of <45 kgs and 282 mothers had weight of ? 45 kgs. 67(56.8%) mothers with weight <45 kgs produced LBW babies and remaining 98(34.8%) delivered NBW babies whereas 51(43.2%) mothers out of 282 with weight of ? 45 kgs gave birth to LBW new-borns and rest 184(65.2%) had NBW babies.

Applying the statistical test on the above data we found that maternal weight was significantly associated with LBW newborns. The p value was found to be 0.0001.

Maternal Height:

Table 6 shows the effect of maternal height on birth weight of babies. We observed that out of a total of 400 mothers 22 mothers were of < 145 cm in height. 12 of them delivered LBW and rest 10 delivered NBW babies. The proportion of LBW in them was 54.5% and whereas out of 378 mothers with height ?145 cm, 153 gave birth to LBW babies and 225 had NBW babies. The proportion of LBW among mothers with height ?145 cm was 40.5%.

On performing the statistical test on the above data table18, we found that maternal height was not asso-ciated with weight of newborns. The p value was found to be 0.19

Table 2: Distribution of low birth weight and normal birth weight on the basis of maternal age

Characteristics	Mothers of low birth weight infants (LBW)	% LBW	Mothers of normal birth weight infants (NBW)	% NBW	Total mothers
< 20 Years	49	56.9	37	43.1	86
20-30 Years	90	35.9	161	64.1	251
≥30 Years	26	41.3	37	58.7	63

Table 3: Association between the maternal age and of low birth weight

Characteristics	Mothers of low birth weight infants (LBW)	Mothers of normal birth weight infants (NBW)	Chi square	P value
< 20 Years	49	37		
20-30 Years	90	161	10.042	0.0066
≥30 Years	26	37		

Table 4: Distribution of low birth weight and normal birth weight on the basis of weight of the mother

Characteristics	Mothers of low birth weight infants (LBW)	% LBW	Mothers of normal birth weight infants (NBW)	% NBW	Total mothers
<45 kgs	67	56.8	51	43.2	118
≥45 kgs	98	34.8	184	65.2	282

Table 5: Association between the weight of the mother and of low birth weight

Characteristics	Mothers of low birth weight infants (LBW)	Mothers of normal birth weight infants (NBW)	Chi square	P value
<45 kgs	67	51	16.65	0.0001
≤45 kgs	98	184		

Table 6: Distribution of low birth weight and normal birth weight on the basis of height of the mother

Characteristics	Mothers of low birth weight infants (LBW)	% LBW	Mothers of normal birth weight infants (NBW)	% NBW	Total mothers
<145 cm	12	54.5	10	45.5	22
≤145 cm	153	40.5	225	59.5	378

Table 7: Association between the maternal height and of low birth height

Characteristics	Mothers of low birth weight infants (LBW)	Mothers of normal birth weight infants (NBW)	Chi square	P value
<145 cm	12	10	1.69	0.19
≤145 cm	153	225		

Anaemia:

Table 8: Distribution of low birth weight and normal birth weight on the basis of Anaemia in the mothers.

Characteristics (Anaemia)	Mothers of low birth weight infants (LBW)	% LBW	Mothers of normal birth weight infants (NBW)	% NBW	Total mothers
Present	115	51.8	107	48.2	222
Absent	50	28.1	128	71.9	178

The above table 8 shows the effect of anaemia on birth weight of new born. We had total of 222 mothers with anaemia out of which 115 mothers (51.8%) delivered LBW babies and remaining 107(48.2%) deliv-ered NBW babies. 178 mothers found to show no anemia and 50(28.1%) of them produced LBW babies and the rest 128(71.9%) gave birth to NBW babies. We can see clearly from the above analysis that the high proportion of LBW babies were born to anaemic mothers.

with more than >30 years age in our study 41.3 % delivered LBW babies (Table 2 and 3)

We observed that the relationship between maternal age and birth weight in our finding correlates with the U shaped curved pattern i.e. low birth weight increases in teenage pregnancies then it progressively decreases till 30 years and again increases in >30 years age as explained by Murthy et.al.7and Gawandeet.al (1994).8 Our findings

Table 9: Association between the maternal anaemia and of low birth weight

Characteristics (Anaemia)	Mothers of low birth weight infant (LBW)	Mothers of normal birth weight infants (NBW)	Chi square	P value
Present	115	107	22.9	0.0001*
Absent	50	128		

Performing a statistical test on the above data on the presence of anemia or its absence on mothers in rela-tion to birth weight of babies we found that the p value (0.0001) was significant. Therefore maternal anemia and low birth weight are significantly associated in our survey.

Discussions:

In our study we found that maternal age was significantly associated with low birth weight babies. It was observed that in the < 20 years mothers 56.9% babies were < 2.5 kg and the rest 43.1% was more than 2.5 kg. Total 251 mothers were in 20-30 yrs age group and the proportion of LBW in them was 35.9 %. And out of 63 mothers

were similar to the study by Joshi et al. (2010)9, Kiran Agarwal et al. (2011).10Ravikumar et al. (2016)11.

We also found that weight of mother is risk factor for the weight of the baby(Table 4 and 5). It have been clearly understood from the table 15 and 16 that mothers with low weight produced more number of LBW babies in comparison to other group. Out of total of 400 mothers 118 had weight of <45 kgs and the proportion of LBW among them was 56.8%. 34.8 % of mothers with weight of ? 45 kgs delivered LBW. The results, we achieved in our study was found to be similar with Anand and Garg (2000)12, Acharya et al. (2010)13, Ravikumar et al.(2016)11

In our study we found a significant association between maternal weight and birth weight of newborn (p <0.001) which was similar to other studies done by Amin et al.(1993)14, Anand and Garg(2000)12, Ravi kumarbhaskar et al.(2015)15, and Prudhivi and Bhosgi(2015)16.

We found no association between height of the mother and low birth weight (Table 6 and 7). We had 400 mothers out of which 22 were of < 145 cm height and the proportion of LBW in them was 54.5% where-as mothers with height ? 145 cm produced 40.5 % of LBW babies. We observed that though we could-not find any association between maternal height and LBW, but the proportion of LBW was high in mothers with height < 145 cm in comparison to mothers with height ?145 cm. This could be because we had less number of women in the study with height < 145 cm. Our findings were similar to the study done by Kamaldoos et al.(1992)17, Thomre et al.(2007)18

In our study we found that anaemia in the mother has a significant effect on birth weight of newborn. From the table 8 and 9 it is clearly understood that mothers with anaemia gave birth to more number of LBW babies in comparison to those without anaemia. We observed that proportion of LBW in mothers with anaemia was 58.8% and those with no anaemia was 28.1%. Our results were similar to the study by Thomre et al.(2007)18, Kiran Agarwal et al.(2011)10, KotabalRajashree et al.(2015)1

Conclusion:

Almost all the identified risk factors in our study are modifiable and thus preventable. The prob-lem of LBW being multi dimensional, we need an integrated approach incorporating medical, so-cial, economical and educational measures to deal with this issue. As mentioned by UNICEF" Children can be ensured a healthy start in life if women start pregnancy healthy and well nourished, and go through pregnancy and child birth safely." Focus should be on:

✓ Care of the girl child beginning right from the birth

✓ Improving the diet of the girl child

✓ Discouraging early marriage and culture of marrying the daughters of less than 18 years.

Author contribution - Niru Prabha Saharia- Data collection, Write-up, Arati Deka -Concept, Guidance,Ankita Bihani-Statistical Analysis

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