

## ORIGINAL RESEARCH

# A case control study of feto-maternal factors influencing low birth weight among newborn in NMCH & RC, Raichur

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Received: 19 June, 2023

Accepted: 5 July, 2023

## ABSTRACT

**Background:** Low-birth-weight (LBW) is universally used as an indicator of health status and is an important subject of national concern and a focus of health policy. LBW has been associated with a higher risk for childhood mortality and morbidity. The present study was undertaken to estimate the prevalence of babies with low birth weight and to identify the Feto-maternal risk factors associated with these low birth weight babies. **Objectives:** To determine the prevalence of low-birth weight in our hospital and to ascertain the association between Feto-maternal factors and LBW. **Methods:** The present study is a hospital based case-control study conducted at NMCH & RC, Raichur on 100 samples over a period of 18 months. The study subjects include all the mothers and neonates of LBW babies. Data was collected by questionnaire method and analyzed accordingly. **Results:** The incidence of low birth weight was 25.41%. There were 50% males and 50% females in the study. 37(74%) of mothers belonged to age group 19-30 years group. 37(74%) mothers in the LBW group visited ANC centers <4 times [OR 5.42, 95% CI (2.31-13.22)]. Nearly 33(74%) of the mothers with anemia [OR 21, 95% CI (7.32-67.86)] delivered low birth weight babies. Gestational diabetes mellitus [OR 4.50, 95% CI (0.98-32.57)] was presently in 8(16%). **Conclusion:** The results of this study suggest that for reducing LBW, the strategy needs to focus attention on nutritional education to facilitate better weight gain during pregnancy, also encouraging wider birth interval and discouraging teen age pregnancy.

**Keywords:** Low birth weight; Feto-Maternal factors;

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## Introduction

LBW is one of the most serious challenges in maternal and child health in both developed and developing countries. Its public health significance may be ascribed to numerous factors - its high incidence, its association with mental retardation and a high risk of perinatal and infant mortality and morbidity (half of all perinatal and one third of all infant deaths are due to LBW), human wastage and suffering, the high cost of special care and intensive care units and its association with socioeconomic under development.

LBW is the single most important factor determining the survival chances of the child. Many of them die during their first year. The infant mortality rate is about 20 times greater for all LBW babies than for other babies. The lower the birth weight, the lower is the

survival chance. Many of them become victims of protein-energy malnutrition and infection. LBW is thus an important guide to the level of care needed by individual babies. LBW also reflects inadequate nutrition and ill health of the mother. There is a strong and significant positive correlation between maternal nutritional status and the length of pregnancy and birth weight. A high percentage of LBW therefore points to deficient health status of pregnant women, inadequate perinatal care and the need for improved care of newborn.<sup>1</sup> Thus the present study was undertaken to ascertain the association between Feto-maternal factors and LBW.

## Objectives

1. To determine the prevalence of low-birth weight in our hospital.
2. To ascertain the association between Feto-maternal factors and LBW.

## METHODOLOGY

**Study design and study setting:** A case control study was conducted in the setting of Navodaya Medical College Hospital and Research Centre, a tertiary care hospital, Raichur district, Karnataka state, India.

**Study subjects and sample size:** This was a hospital based case control study to know the maternal factors and fetal factors predisposing for Low birth weight. During my study period of 18 months from December<sup>1<sup>st</sup></sup>2019 to June<sup>30<sup>th</sup></sup>2021, a total of 1810 deliveries were conducted at NMC RC Raichur tertiary care hospital. Out these 460 of them had given birth to LBW baby. 50 LBW babies from this group were considered as cases and with age matched 50 normal weight babies from 1350 deliveries were considered as controls.

**Questionnaire and study variables:** The questionnaire had four parts, where in the first part was structured to elicit the socio-demographic profile of the study subjects. The second part of the questionnaire consisted of questions structured to elicit information related to Obstetric history of mother such as age of the mother, Gestational age, weight gain in Pregnancy and ANC visits. The third part consisted of questions related to Clinical Profile of Mothers such as Anemia, PIH, GDM, UTI, Oligohydramnios, Polyhydramnios, Placental abruption and Placental infarct. The fourth part consisted of questions about newborn information like weight of baby, length of the baby, head circumference and chest circumference.

**Method of data collection:** Information was collected by trained interviewers using face to face interviews based on a structured, pre-tested questionnaire.

**Statistical analysis:** Data were entered into an electronic database and analysis was done to ascertain

the association between Feto-maternal factors and LBW. The study variables were subjected to univariate analysis where association between Feto-maternal factors and LBW were determined by comparing each group separately with the control subjects. For each of the study factors, risk was estimated by calculating the odds ratio (OR) with 95% confidence intervals (CI), by using Epi Info version-7 software package.

## Results

There were total 1810 deliveries conducted in a period of 18 months and 460 were found to be Low Birth Weight (LBW) babies. So the Prevalence of LBW is 25.41%.

Young age mothers and advanced maternal age were associated with increased risk of LBW wherein the mothers aged less than 19 years [OR 10.38, 95% CI (1.56-241.3)] and mothers aged more than 30 years [OR 10.07, 95% CI (1.08-316.7)] had higher odds of having LBW babies and this association was found to be statistically significant. There was no significant association between Sex of the baby and the LBW. Gestational age less than 37 weeks [OR 9.61, 95% CI (3.39-31.48)] had higher odds of having LBW babies. Which was statistically significant ( $p < 0.001$ ). Whereas weight gain in pregnancy is negatively associated with LBW that is more the weight gain in pregnancy lesser the chance of having LBW babies. But this finding was not statistically significant. Mothers who had <4 visits [OR 5.42, 95% CI (2.31-13.22)] were found to have higher odds of having LBW babies than the mothers who had completed 4 visits or more.

Pregnant women's who had anemia [OR 21, 95% CI (7.32-67.86)] had higher odds of having LBW babies than those with normal hemoglobin. This finding was statistically significant ( $p = 0.0$ ). And women's who had Pregnancy Induced Hypertension (PIH) [OR 6.9, 95% CI (2.25-25.7)] had higher odds of having LBW babies than those with normal Blood Pressure. This finding was also statistically significant ( $p = 0$ ). The odds of having LBW babies was more in Pregnant mothers who had Gestational Diabetes Mellitus GDM [OR 4.50, 95% CI (0.98-32.57)] and Oligohydramnios [OR 3.85, 95% CI (0.80-28.37)].

**Table no.1**

Prevalence of Low Birth Weight	
Total number of Deliveries	1810
Low Birth Weight	460
Prevalence	25.41% (23.4 – 27.4)

**Table no.2**

<b>Feto-Maternal Factors influencing LBW</b>				
Variable	LBW(N=50)	NBW(N=50)	OR(95%CI)	P Value
<b>Sex of the Baby</b>				
Male	25(50%)	29(58%)	0.73(0.33-1.61)	0.422
Female	25(50%)	21(42%)		
<b>Age of the Mother</b>				
<19 years	8(16%)	1(2%)	10.38(1.56-241.3)	0.01
19-30years	37(74%)	49(98%)	1	
>30years	5(10%)	0 (0%)	10.07(1.08-316.7)	0.041
<b>Gestational age</b>				
<37Weeks	27(57%)	5(10%)	9.61(3.39-31.48)	<0.001
37-40 Weeks	23(46%)	42(84%)	1	1
>40Weeks	0 (0%)	3(6%)	0.75(0.026-8.35)	0.87
<b>Weight Gain in Pregnancy</b>				
<5kgs	11(22%)	5(10%)	6.04(0.93-56.8)	0.061
5-7kgs	22(44%)	23(46%)	2.81(0.53-22.15)	0.211
7-9kgs	15(30%)	16(32%)	2.7(0.49-22.4)	0.269
10-11kgs	2(4%)	6(12%)	1	
<b>ANC Visits</b>				
<4visits	37(74%)	17(34%)	5.42(2.31-13.22)	<0.001
≥4 visits	13(26%)	33(66%)		

**Table no.3**

<b>Feto-Maternal Factors influencing LBW</b>				
Variable	LBW(N=50)	NBW(N=50)	OR(95%CI)	P Value
<b>Anemia</b>				
Present	33(75%)	6(12%)	21(7.32-67.86)	<0.001
Absent	11(25%)	44(88%)		
<b>PIH</b>				
Present	19(38%)	4(8%)	6.9(2.25-25.7)	<0.001
Absent	31(62%)	46(92%)		
<b>GDM</b>				
Present	8(16%)	2(4%)	4.50(0.98-32.57)	0.053
Absent	42(84%)	48(96%)		
<b>UTI</b>				
Present	4(8%)	9(18%)	0.39(0.10-1.38)	0.076
Absent	46(92%)	41(82%)		
<b>Oligohydramnios</b>				
Present	7(14%)	2(4%)	3.85(0.80-28.37)	0.047
Absent	43(86%)	48(96%)		
<b>Polyhydramnios</b>				
Present	5(10%)	4(8%)	1.27(0.30-5.64)	0.74
Absent	45(90%)	46(92%)		
<b>Placental abruption</b>				
Present	3(6%)	0	4.94(0.42-169.1)	0.11
Absent	47(94%)	50(100%)		
<b>Placental infarct</b>				
Present	0	1(2%)	1.63(0.03-78.85)	0.78
Absent	50(100%)	49(98%)		

This finding was also statistically significant ( $p=0.047$ ). Most of the pregnant women did not have UTI and only 8% of them who had UTI [OR0.39, 95%CI(0.10-1.38)] gave birth to LBW babies. Although this finding was not statistically significant. And out of 100 mothers only 10% of them had Polyhydramnios [OR1.27, 95%CI(0.30-5.64)] and gave birth to LBW babies, which was not statistically significant.

Similar finding was seen with mothers with Placental abruption and Placental infarct where only 6% of mothers had Placental abruption [OR4.94, 95%CI(0.42-169.1)] and who gave birth to LBW babies. Also none of the mother had Placental infarct [OR 1.63, 95%CI(0.03-78.85)]. Both the findings were not statistically significant.

## DISCUSSION

**Prevalence of LBW:** In the 18 months of my study period number of deliveries in our hospital are 1810 deliveries and number of low birth weight babies are 460 therefore the incidence of low birth weight in my study is 25.41% which is more than prevalence of low birth weight (21.5%) observed in National Family Health Survey(NFHS-3).<sup>2</sup>Nirmali Gogoi et al<sup>3</sup> found that prevalence of low birth weight was found as 26.0% in 300 samples in cross sectional study design. Sarika M et al<sup>4</sup> carried out a hospital-based prospective, observational study, at Kamineni Hospital, LB Nagar, Hyderabad. Out of 286 new-born's 77 new-born's were of low i.e prevalence of 26.9%.

**Factors influencing LBW:** 37(74%) mothers in the LBW group visited ANC centre's less than 4 times and this finding was statistically highly significant. It shows that <4 ANC visits is associated with normal birth weight of the child. Study by Nirmali Gogoi et al<sup>3</sup> show that low birth weight was significantly associated with history of ANC visit <3. Singh et al<sup>5</sup> support the finding of this study that LBW was found to be significantly associated with the total number of ANC visits. Provision of ANC is expected to reduce the risk of LBW. It creates health awareness and timely identification of complications. Emphasis should be given to nutritional counseling and, specific ANC provision by skilled health professionals and tradition of feeding of pregnant mothers.

**Weight Gain/Nutrition:** In this study, 22(44%) mothers gained 5-7 kgs during pregnancy followed by 15(30%) gained 7-9 kgs. In LBW group and this finding was statistically not significant. Rajashree et al<sup>6</sup> The significant determinants associated with the mothers who delivered LBW babies were as follows: weight gain during pregnancy <6.5 kg(92.9%), Kayode et al<sup>7</sup> reported a high incidence of LBW babies among women living in rural areas with low coverage of safe

water supply. This could be because of increased episodes of gastrointestinal infections impairing normal fetal development. Severe maternal starvation during pregnancy has a major impact on fetal growth.

**Anemia:** our study 33(75%) of the mothers of low birth weight babies are anaemic during pregnancy. Anaemia during pregnancy have shown highly significant p value and 6(12%) of them are anaemic in normal birth weight group. Study by Mrudul Kumar et al<sup>8</sup> showed anemia was present in 99 (44.595%) mothers. Study by Suprava Patel et al<sup>9</sup> concluded that maternal anemia was considered as independent risk factor for LBW. In a study conducted by Vinayaka Mission's Medical college and Hospital, Karaikal have not shown any association between anemia and birth weight. But in contrast to our results and many other studies, have shown significant association with low birth weight.<sup>10</sup> In a hospital based study done by Dasgupta et al<sup>11</sup> in Kolkata, it was observed that 52.6% babies were LBW in case of mothers with Haemoglobin level less than 10gms% measured in 3<sup>rd</sup> trimester of pregnancy.

## PIH

In our study, PIH in LBW babies was 19 (38%) among mothers with obstetric complications as compared to normal weight group 4(8%). This finding was statistically highly significant. Agarwal A et al<sup>13</sup> study found that it was seen that mothers who had pregnancy associated with PIH, had high incidence of low birth weight babies. Metgud C Setal<sup>14</sup> found PIH to be a statistically significant contributor for low birth weight  $p < 0.05$ . Taylor LK et al<sup>15</sup> found that mothers with PIH had 8% small for gestational age babies compared to non-small for gestational age with OR 0.71(0.59-0.87). A study by Rahman et al<sup>16</sup> revealed that pregnancy induced hypertension was an independent risk factor for low birth weight. Prematurity, restricted intrauterine growth, and low birth weight were the outcomes found. Premature delivery was more frequent among women with severe pre-eclampsia.

**UTI:** Urinary tract infection was absent in maximum of the mothers. Only 4(8%) were presented with UTI and the finding was not significant. Poor fetal nutrition has been suggested to explain this association.

In a study conducted by Sharma et al<sup>17</sup> there is a relatively strong association between urinary tract infection and premature labour. pregnant women with UTI identified a rate of preterm births of 7.44%. and 13.82% of the new-born's had a low birth weight, with no statistically significant association with UTIs.

**Oligohydramnios:** In our study, oligohydramnios was absent in 87% of the total mothers. Oligohydramnios was present in only 7(14%) and absent in 43(86%) in

LBW. This was not statistically significant. Agarwal A et al<sup>13</sup> Oligohydramnios had high incidence of low birth weight babies. But in studies by Youssef et al<sup>18</sup>, the incidence of low birth weight babies was as high as 56%. In another study conducted by Madhavi et al<sup>19</sup> significant association was found between LBW and oligohydramnios, where incidence of low birth weight was 36%. Small size of the sample maybe the limitation in our study.

**Polyhydramnios:** Polyhydramnios was absent in 91% of the total mothers. Polyhydramnios was present in only 5 (10%) and absent in 45(90%) in LBW. This was not statistically significant. In a study conducted by Andrea Pantingeta<sup>20</sup> among pregnancies complicated by idiopathic polyhydramnios did not observe any increases in preterm deliveries, low birth weight, low Apgar scores at 5 minutes, neonatal intensive care unit admissions, or perinatal mortality rate. However, idiopathic polyhydramnios was associated with significantly higher rates of malpresentation, macrosomia, and primary caesarean delivery.

**Placental factors:** Placental abruption was present in only 3(6%) and absent in 47(94%) in LBW. This was not statistically significant. Placental infarct was absent in 99% of the total mothers. This was not statistically significant. In our study placental factors are not statistically associated with low birth weight but Placental causes are important because they cause alterations in the placenta and the umbilical cord, such as chronic abruption placentae, Valerode Bernabe placental infarcts, placental haemangioma's and vascular anomalies are associated with IUGR. Pardi et al<sup>21</sup> comment that the association between LBW and placenta previa is mainly due to the higher frequency of prematurity and, to a lesser extent, to IUGR.

## CONCLUSION

In our study prevalence is found to be 25.41% which is more than prevalence of low birth weight (21.5%) observed in National Family Health Survey (NFHS-3)<sup>2</sup>. Increasing age of Mother, less number of ANC visits, Presence of Anemia and High risk Conditions such as PIH, GDM, show association with low birth weight. However Sex of the baby, weight gain in pregnancy, UTI, oligohydramnios, polyhydramnios, placental abruption and placental infarcts though did not show association with low birth weight.

Limitations: the recruited study participants were less in number, this could have been planned in large sample size and found out the risk factors.

**Source of support:** Nil

**Conflicts of interest:** None declared

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