COMPARATIVE STUDY OF MATERNAL RISK FACTORS INFLUENCING LOW BIRTH WEIGHT BABIES DELIVERED IN A TERTIARY CARE TEACHING HOSPITAL

B. Ramesh Kumar¹, A. Thirupathi Reddy², D. Ramesh Krishna³

¹Assistant Professor, Department of Paediatrics, Guntur Medical College, Guntur.
²Associate Professor, Department of Paediatrics, Guntur Medical College, Guntur.
³Junior Resident, Department of Paediatrics, Guntur Medical College, Guntur.

ABSTRACT

BACKGROUND
India is one of the leading countries with more Low Birth Weight (LBW) babies in the world contributing significantly to more neonatal and infantile mortality rates. This study aims to identify the various maternal and obstetric risk factors leading to low birth weight in babies.

MATERIALS AND METHODS
This is a retrospective case control hospital-based comparative study conducted at neonatal intensive care unit, Department of Paediatrics and labour room, Department of Obstetrics attached to Guntur Medical College and Hospital, Guntur, Andhra Pradesh, India from Sept. 2015 to Aug. 2016 over a period of 1 year. Anthropometric data and maternal risk factors of 250 LBW (< 2500 gm) babies and 250 normal birth weight (> 2500 gm) babies were selected randomly by using systematic randomisation method and compared after analysing the data recorded in a predesigned proforma by using the appropriate statistical methods, i.e. %, CH² and regression statistics with SPSS 16 Software and results were documented in a tabular form using Fisher tables. Sample size was taken by using formula \( n = \frac{4 \times q^2}{p^2} \) where \( n = \) sample size, \( p = \) incidence (18.3), \( q = 100 - p \) (81.7), \( l = \) allowable error that is 5%. So here \( n = 239 \), that is why we have taken 250 as a sample size for easy calculations.

RESULTS
Our study shows that the Incidence of LBW is 18.03%. The statistically significant risk factors of mothers with LBW babies identified in our study are: Out of 250 mothers of LBW babies, 134 (53.6%) were aged < 20 years; 151 (60.4%) were < 145 cm by height; 32 (12.8%) were found to have preconception weight < 40 kg; maternal weight gain of < 7 kg was found in 59 (23.6%); 152 (60.8%) were anaemic; 42 (16.8%) had Pregnancy Induced Hypertension (PIH) and 19 (7.6%) had urinary tract infection.

CONCLUSION
The overall prevalence of low birth weight in our study was 18%. The factors observed to be significantly associated with low birth weight in our study include maternal age < 20 years, maternal height < 145 cms, preconception weight < 40 kg, maternal weight gain < 7 kg during pregnancy and anaemia in the mother. The results of this study suggest that to reduce the low birth weight, health programme should focus on maternal nutrition and nutritional education to facilitate better weight gain during pregnancy and discourage pregnancy at early age. Early identification of anaemia and other maternal risk factors and their interventions with good antenatal care will decrease the low birth weight in India.

KEYWORDS
Low Birth Weight, Maternal Risk Factors, Anthropometry, Prevalence, India.


BACKGROUND
Newborn care always has been a challenge to paediatrician and more so with the Low Birth Weight (LBW) babies. Low birth weight has been defined by the World Health Organisation (WHO), as weight at birth of less than 2500 gm. There is no indicator in human biology, which tell us so much about the past events and future trajectory of life as the weight of the baby at birth.¹ Low birth weight is considered to be the single most important predictor of infant mortality, especially deaths within the first month of life.² It continues to remain a major public health problem worldwide, especially in the developing countries. More than 20 million low birth weight babies are born every year throughout the world, in spite of considerable efforts to improve the maternal and child health quality. About half of all deaths in perinatal period are directly or indirectly related to low birth weight.³ Low birth weight is the strongest determinant of infant morbidity and mortality in India. By NFHS-3 report, proportion of low birth weight babies were found to be 23% for rural and 19% for urban population.⁴ India alone has more than 7 million low birth weight babies. In countries where the population of low birth weight infants is less, short gestational period is the major cause. In countries where the proportion is high (e.g., India), the majority of cases can be attributed to foetal growth retardation.⁵ The causes of low birth weight are complex and interdependent and various
maternal factors are known to influence the birth weight of neonates. Maternal age, anthropometric parameters such as maternal height, weight, weight gain during pregnancy, anaemia, nutritional status and socioeconomic status are some of the well-established determinants of birth weight of the neonates.6

Birth weight is an important determinant of success and duration of breast feeding, which is a well-known protective asset against infant deaths in developing countries,7 neurodevelopmental sequelae of birth asphyxia are three times high in low birth weight babies compared to their normal weight counterparts.8 These low birth weight babies are more vulnerable to develop atherosclerotic coronary artery disease, hypertension and diabetes mellitus during adult life.9 Small for date babies may remain stunted throughout life.10 If the maternal risk factors associated with low birth weight are detected early and addressed properly, the low birth weight and the consequences thereof can be reduced in India.11

So there is an urgent need to know the local prevalence of low birth weight babies and various maternal risk factors contributing to it. The present study is required to carry out at our institute to identify the local maternal risk factors responsible for low birth weight babies in our area, so as to provide better preventive maternal and neonatal health services so that the morbidity and mortality can be reduced to a significant level in low birth weight babies.

MATERIALS AND METHODS

The present study was conducted in neonatal intensive care unit, Department of Paediatrics and labour room, Department of Obstetrics, Guntur Medical College and Government General Hospital, Andhra Pradesh, India. The study was approved by Institutional Ethical Committee and parental informed consent was taken. The present study conducted from Sept. 2015 to August 2016, over a period of 1 year recorded the data of 250 low birth weight babies and their mothers along with 250 normal birth weight babies and their mothers were collected retrospectively by systematic randomisation. The weight of the neonate was recorded nude on electronic weighing scale within first hour of birth and other anthropometric parameters like length, head circumference, chest circumference were recorded. Gestational age assessment of the newborn was done by using modified Ballard score. Height of the mother, preconceptional weight, weight gain during pregnancy was recorded along with elaborate history, presence of risk factors, socioeconomic status and clinical examination details were documented in a predesigned proforma. The data that was collected was analysed using standard statistical methods (Percentage, P value, chi square by using regression statistics with SPSS 16.0 Version) and the results were documented in a tabular form by using Fisher tables. Sample size was taken by using formula n = 4pq/l2 n = sample size, p= incidence (18.3), q = 100-p (81.7), l = allowable error that is 5%. So here n = 239, that is why we have taken 250 as a sample size for easy calculations.

RESULTS

The data of 250 normal birth weight babies and their mothers along with 250 low birth weight babies and their mothers were collected and analysed by standard statistical methods.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Maternal Risk Factors</th>
<th>Low Birth Weight Babies</th>
<th>Normal Birth Weight Babies</th>
<th>(X²) Value with 1 Degree Freedom</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age &lt; 20 years</td>
<td>134 (53.6%)</td>
<td>113 (45.2%)</td>
<td>&lt;0.0001 (X²) value = 94.287</td>
<td>Significant</td>
</tr>
<tr>
<td>2</td>
<td>Height &lt; 145 cm</td>
<td>151 (60.4%)</td>
<td>45 (18%)</td>
<td>&lt;0.001 (X²) value = 94.287</td>
<td>Significant</td>
</tr>
<tr>
<td>3</td>
<td>Preconceptional Weight &lt; 40 kg</td>
<td>32 (12.8%)</td>
<td>3 (12%)</td>
<td>&lt;0.0001 (X²) value = 25.837</td>
<td>Significant</td>
</tr>
<tr>
<td>4</td>
<td>Weight gain during pregnancy &lt; 7 kg</td>
<td>59 (23.6%)</td>
<td>4 (1.6%)</td>
<td>&lt;0.0001 (X²) value = 54.938</td>
<td>Significant</td>
</tr>
<tr>
<td>5</td>
<td>Maternal anaemia (Hb% &lt; 10 gms)</td>
<td>152 (60.8%)</td>
<td>75 (30%)</td>
<td>&lt;0.0001 (X²) value = 94.287</td>
<td>Significant</td>
</tr>
<tr>
<td>6</td>
<td>P.I.H</td>
<td>42 (16.8%)</td>
<td>8 (3.2%)</td>
<td>&lt;0.0001 (X²) value = 54.938</td>
<td>Significant</td>
</tr>
<tr>
<td>7</td>
<td>U.T.I</td>
<td>19 (7.6%)</td>
<td>0 (0%)</td>
<td>-</td>
<td>Not Significant</td>
</tr>
<tr>
<td>8</td>
<td>Other medical complication (heart diseases, renal disease, connective tissue diseases)</td>
<td>10 (0%)</td>
<td>0 (0%)</td>
<td>-</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Table 2. Relative Proportions of various Maternal Risk Factors
Relation between Maternal Age and Birth Weight
Out of 250 mothers of low birth weight babies, 134 (53%) were aged less than 20 years compared to 113 (45.2%) mothers with normal birth weight.

Relation between Maternal Height and Birth Weight
151 (60.4%) mothers of low birth weight were less than 145 cm by height, whereas only 45 (18%) out of 250 mothers of normal birth weight babies were less than 145 cm in height.

Relation between Preconceptional Weight and Birth Weight
32 (12.8%) out of 250 mothers of low birth weight babies and 3 (1.2%) out of 250 mothers of normal birth weight babies were found to have preconceptional weight less than 40 kg.

Relation between Maternal Weight Gain during Pregnancy and Birth Weight
59 (23.6%) out of 250 mothers of low birth weight babies gained weight less than 7 kg during pregnancy compared to 4 (1.6%) out of 250 mothers with normal birth weight.

Relation between Maternal Anaemia and Birth Weight
Out of 250 mothers of low birth weight babies 152 (60.8%) are anaemic, whereas 75 (30%) mothers of normal birth weight babies are anaemic.

Relation between Pregnancy-Induced Hypertension and Birth Weight
42 (16.8%) mothers of low birth weight babies had pregnancy-induced hypertension, whereas only 8 (3.2%) mothers of normal birth weight babies had pregnancy-induced hypertension.

Relation between Urinary Tract Infection and Birth Weight
In the present study 19 (7.6%) mothers of low birth weight babies had UTI, which was not at all observed in mothers of normal birth weight babies.

Relation between Systemic Medical Conditions and Birth Weight
Only 10 (4%) out of 250 mothers with low birth weight babies had heart disease, renal disease and connective tissue disease. None of the mothers of normal birth weight babies suffered from any systemic disease.

Relation between Other Risk Factors and Birth Weight
15 (6%) mothers of low birth weight babies had previous history of low birth weight babies; 12 (4.8%) mothers of low birth weight babies had premature rupture of membranes; 6 (2.4%) mothers of low birth weight babies had bleeding per vagina. Such risk factors were not observed in mothers of normal birth weight babies in our study.

DISCUSSION
The data from present study are compared for discussion with previous studies done.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Author of Study</th>
<th>Incidence of Low Birth Weight</th>
<th>Our Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KS Nagi, SD Kandpal, M Kukreti (1998)</td>
<td>23.8%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Trivedi et al (1996)</td>
<td>20.37%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Kamaladas et al</td>
<td>24.6%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mukes K Sharma, Dinesh Kumar, Anju Huria, Prakash Gupta, Chandigarh (2007)</td>
<td>23.8%</td>
<td>18.03%</td>
</tr>
<tr>
<td>5</td>
<td>SK Kapoor et al</td>
<td>8.8%</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>National Family Health Survey- 3</td>
<td>21.5%</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Prevalence of Low Birth Weight

The overall incidence of low birth weight in our study was 18.03%. It is closely co-relating with other studies.

The prevalence of low birth weight according to NFHS-3 was 21.5%.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Author of Study</th>
<th>Percentage of Mothers</th>
<th>Our Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S. Ganesh Kumar et al 17</td>
<td>14%</td>
<td>53.6%</td>
</tr>
<tr>
<td>2</td>
<td>Lt. Col. G. Singh et al 16</td>
<td>36.4%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Deepa H Velankar 19</td>
<td>67%</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Maternal Age and Birth Weight

Maternal age < 20 years is a risk factor for low birth weight.

In the present study among the mothers of low birth weight babies, 53.6% were aged < 20 years which was higher when compared to previous studies (G. Ganesh Kumar et al 14%, Lt. Col. G. Singh et al 36.4%). But the value is less when compared to the study of Deepa H. Velankar (67%).

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Author of Study</th>
<th>Percentage of Risk</th>
<th>Our Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hirve SS, Ganatra BR 20</td>
<td>29.5%</td>
<td>60.4%</td>
</tr>
<tr>
<td>2</td>
<td>S Ganesh Kumar et al 17</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Deepa H Velankar 19</td>
<td>60.6%</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Maternal Height and Birth Weight

Maternal height of < 145 cm is a known risk factor for low birth weight babies.

In the present study, maternal height of < 145 cm was found in 60.4% of mothers of low birth weight babies, which was similar to Deepa H. Velankar studies. Other studies (Hirve SS, Ganatra BR is 29.5%, Ganesh Kumar et al 18%) reported lesser value when compared to our study.

Preconceptional weight less than 40 kg in our study is 32 (12.8%) of mothers with low birth weight babies, which was less than other studies (Ganesh Kumar et al 33%, Mukes K Sharma et al 50%, KS Nagi et al 47%).

The maternal weight gain of less than 7 kg during pregnancy in our study was found to be 59 (23.6%) in mothers with low birth weight babies, which is similar to J. S Deshmukh et al.
A haemoglobin of 10 gm% as anaemia is a maternal risk factor for low birth weight.

In the present study, 60.8% of the mothers of low birth weight babies are anaemic. Other studies reported lesser incidence of anaemia in mothers of low birth weight babies (Lt. Col. G Singh et al 18%, S Ganesh Kumar et al 36%, J S Deshmuk et al 54%), as our Government Institute serves more poor people suffering from malnutrition and anaemia.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Author of Study</th>
<th>Incidence of Anaemia</th>
<th>Our Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K Dhal and R Banga22</td>
<td>8%</td>
<td>60.8%</td>
</tr>
<tr>
<td>2</td>
<td>S Ganesh Kumar et al17</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hendrics CH, Brenner WE (1971)23</td>
<td>13.4%</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Maternal Anaemia and Birth Weight

In the present study, 8% of mothers of low birth weight babies had pregnancy-induced hypertension. Some studies show comparatively more incidence of pregnancy-induced hypertension.

Regarding urinary tract infection with birth weight, there appears to be significant effect of UTI on birth weight of new born babies as evidenced from other studies.24,25 In our study, it is around 4% of mothers with low birth weight babies.

CONCLUSION

Low birth weight is still the major risk factor for infant mortality and morbidity in developing countries like India. The present study was done to know the incidence of low birth weight babies and the various maternal risk factors contributing to low birth weight.

The overall prevalence of low birth weight in our study was 18%. The maternal factors observed to be significantly associated with low birth weight in our study include maternal age < 20 years, maternal height < 145 cms, preconceptional weight < 40 kg, weight gain < 7 kg during pregnancy, maternal anaemia and pregnancy-induced hypertension.

The results of this study suggest that to decrease the incidence of low birth weight babies is by various health programmes, which should focus on early identification of various maternal risk factors and appropriate management during the antenatal period by using the existing health services effectively are important for reducing burden of low birth weight babies in India.

REFERENCES


