Study of Risk Factors Influencing Low Birth Weight of Babies among Institutional Deliveries at RIMS Teaching Hospital, Raichur

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ABSTRACT

Background and Objectives: The birth weight of an infant is one of the most important determinants of its chances of survival, healthy growth, and development. One of the principal causes for infant mortality in India is low birth weight (LBW). The infant mortality rate is about 20 times greater for LBW babies than for normal birth weight babies. The prevalence of LBW continues to be high despite the adoption of National Health Policy in 1983. The magnitude of LBW infants in developing countries is enormous. There are about 22 million LBW infants in the world, out of which India has about 7–10 million. LBW constitutes about 30% of live births in India. Now according to the revised National Health Policy - 2002, the goal is to reduce proportion of LBW babies from 30% to 10% by 2010. This study is undertaken to find out the proportion of LBW babies in institutional deliveries and to study sociodemographic and maternal factors influencing the birth weight of baby. Materials and Methods: A hospital-based cross-sectional study was undertaken in the postnatal care wards of Raichur Institute of Medical Sciences and Teaching Hospital, Raichur. The study subject constitutes 714 postnatal mothers with singleton live-born babies delivered during the study period. Data were collected by interviewing mothers with the help of pre-tested semi-structured questionnaire and data were analyzed. Results: Proportion of LBW was found 25.1%. A significant association was found between birth weight and various factors such as mother’s education, socioeconomic status, age at first conception, interpregnancy interval, antenatal care visits, anemia, tobacco consumption, and obstetric complications. Interpretation and Conclusion: The proportion of LBW was found to be 25.1% compared to national average of 28%. LBW can be prevented through good prenatal care and intervention programs.

Key words: Antenatal care, birth weight, education, maternal age, socioeconomic status

INTRODUCTION

Low birth weight (LBW) is a prospective marker of future growth and development and a retrospective marker of mothers nutritional and health status.\(^1\)

LBW is an important indicator of reproductive health and general health status of population. LBW is considered the single most important predictor of infant mortality, especially of deaths within the 1st month of life.\(^2\) It continues to remain a major public health problem worldwide, especially in the developing countries. The prevalence of LBW in India was found to be 28%.\(^3\) As per the WHO estimation about 25 million LBW babies are born each year, nearly 95% of them in developing countries.\(^3\) Across the world, neonatal mortality is 20 times more likely for LBW babies compared to heavier babies (≤2.5 kg).\(^4\)

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LBW is a result of preterm birth, intrauterine growth restriction, or a combination of both pathophysiologic conditions. There are numerous factors contributing to LBW both maternal and fetal. Weight at birth is directly influenced by general level of health status of the mother. Maternal environment is the most important determinant of birth weight, and factors that prevent normal circulation across the placenta cause poor nutrient and oxygen supply to the fetus, restricting growth. The maternal risk factors are biologically and socially interrelated; most are, however, modifiable. By international agreement, “An LBW baby is one with a birth weight <2.5 kg, the measurement being taken preferably within the 1st h life: Before significant, postnatal weight loss occurred.”\(^5\) With improvement in health services, though there is reduction in infant mortality in India by about fifty percent during the past century, the incidence of low birth weight has not changed much.\(^5\) Now according to Revised National Policy 2002, the goal is to bring it down to 10% by 2010.\(^6\)
Wide interregional, socioeconomic, and urban versus rural differences in the prevalence of LBW have been recorded. In India, disparity has ranged from a prevalence of 10% for the privileged high socioeconomic class to 56% for the poor slum community. The factors vary from one area to another, depending on geographic, socioeconomic, and cultural factors. Thus, it is necessary to identify factors prevailing in a particular area responsible for LBW, so as to plan the strategy to tackle this important problem.

Raichur is among the most underprivileged district of state which is situated in North Karnataka region and figure at the bottom of the list in terms of all health-related indices. 90% of deliveries are conducted in health institutions either private or government. Hence, there is highest opportunity to know the proportion of LBW babies and its association with risk factors such as sociodemographic and maternal factors. In such backward areas, after studying the risk factors, we can suggest possible preventive measures for reduction of LBW babies. No study has been done on this topic in this area. Hence, modest attempt will be made to study the prevalence and risk factors of LBW babies among institutional deliveries at Raichur Institute of Medical Sciences and Teaching hospital, Raichur.

**OBJECTIVES OF THE STUDY**

The objectives of this study were as follows:
1. To find out the proportion of LBW babies among institutional deliveries.
2. To study the influence of sociodemographic and some maternal factors on the birth weight of babies.

**MATERIALS AND METHODS**

Study Design

The present study was a hospital-based cross-sectional study undertaken to find out the proportion of LBW babies in institutional deliveries and its association with sociodemographic and some maternal factors.

Table 1: Proportion of LBW among institutional deliveries

<table>
<thead>
<tr>
<th>Birthweight</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBW</td>
<td>179 (25.1)</td>
</tr>
<tr>
<td>Normal birth weight</td>
<td>535 (74.9)</td>
</tr>
<tr>
<td>Total</td>
<td>714 (100)</td>
</tr>
</tbody>
</table>

Table 2: Distribution of LBW with other variables

<table>
<thead>
<tr>
<th>Socioeconomic status</th>
<th>LBW (%)</th>
<th>Normal birth weight (%)</th>
<th>Total (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>5 (10.9)</td>
<td>41 (89.1)</td>
<td>46 (6.5)</td>
<td>$\chi^2=11.754$ $P=0.019$</td>
</tr>
<tr>
<td>II</td>
<td>11 (16.9)</td>
<td>54 (83.1)</td>
<td>65 (9.1)</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>42 (23.6)</td>
<td>136 (76.4)</td>
<td>178 (25)</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>50 (25.5)</td>
<td>146 (74.5)</td>
<td>196 (27.4)</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>71 (31)</td>
<td>158 (69)</td>
<td>229 (32)</td>
<td></td>
</tr>
</tbody>
</table>

Mother’s education

| Illiterate | 143 (29.4) | 343 (70.6) | 486 (68) | $\chi^2=16.699$ $P=0.005$ |
| Primary school | 15 (18.5) | 66 (81.5) | 81 (11.3)|         |
| Middle school  | 12 (16.2) | 62 (83.8) | 74 (10.4)|         |
| Higher       | 9 (12.3)  | 64 (87.7) | 73 (10.3)|         |

Antenatal care visits

| <3          | 110 (31) | 243 (69) | 353 (49.5)| $\chi^2=13.285$ $P=0.000$ |
| ≥3          | 69 (19)  | 292 (81) | 361 (50.5)|         |

IFA consumed (days)

| <100        | 114 (22) | 242 (78) | 356 (49.9)| $\chi^2=17.732$ $P=0.000$ |
| ≥100        | 65 (18.2)| 293 (81.8)| 358 (50.1)|         |

Mothers hemoglobin (Hb%)

| <7 g        | 19 (50)  | 19 (50)  | 38 (5.4)| $\chi^2=15.691$ $P=0.001$ |
| 7–10 g      | 129 (34.8)| 370 (65.2)| 499 (69.8)|         |
| 10–11 g     | 20 (18.3)| 89 (81.7) | 109 (15.3)|         |
| >11 g       | 11 (16)  | 57 (84)  | 68 (9.5)|         |

LBW: Low birth weight
Setting
The study was undertaken in the postnatal care wards of Raichur Institute of Medical Sciences and Teaching Hospital, Raichur.

Period of Study
The study covered a period of 1 year from January 2013 to December 2013 as per the following schedule:
- Data collection: January 2013–October 2013 (10 months)
- Data analysis and write up of report: November–December 2013.

Sample Size
Sample size is calculated using the formula $n = \frac{4pq}{L^2}$, where “P” is probability of occurrence, “q” is probability of non-occurrence, and L is limit of error. Based on National incidence of LBW, i.e., 28%,[3] sample size at 95% confidence level with 12% allowable error is 714. In the present study, 714 subjects were studied.

Selection of Study Subjects
The study subjects comprised 714 postnatal mothers along with singleton live-born baby delivered during the study period.

Exclusion Criteria
The following criteria were included in the study:
- Postnatal mothers with multiple pregnancies.
- Postnatal mothers with stillborn babies.
- Mothers having chronic systemic diseases such as diabetes mellitus, tuberculosis, and RHD.
- Mothers not willing to participate in the study.

Methodology
Approval of ethical committee of Raichur Institute of Medical Sciences, Raichur, was taken and the permission from the Head of the Department of Obstetrics and Gynaecology was taken before the start of the study.

Sampling and Data Collection
As the sample size is 714 and study period 10 months, hospital was visited on alternate days. On the day of visit, five cases were selected by systematic sampling from all the cases admitted and delivered between this visit and previous one to achieve the desired sample size. Data were collected by interviewing of PNC mothers using pre-tested, predesigned semi-structured questionnaire. Physical examination was undertaken after the interview. The information regarding the study variables was recorded on predesigned, pre-tested semi-structured questionnaire. The available health records were also reviewed. The investigations such as hemoglobin, blood group, VDRL, HIV, HbsAg, and urine sugar and albumin were recorded from the case sheets.

Study Variables
Birth weight of the baby was studied with the following study variables: Maternal age, education and occupations, fathers education, socioeconomic status, type of family, type of residence, mothers age at first conception, parity, interpregnancy interval, antenatal care, iron and folic acid tablets consumed, physical activity during pregnancy, rest received in afternoon, diet intake, consumption of tobacco, bad obstetric history, obstetric complications during pregnancy, anemia, and mothers height.

RESULTS
Of total 714 live newborns, 179 were LBW babies. Thus, the proportion of LBW found was 25.1%.

Factors which were significant in bivariate analysis (Chi-square test) were considered in multivariate analysis. Binary logistic regression with Wald’s backward method was used to find out the most significant predicted factors. Factors which were significant with bivariate analysis were the variables entered in step 1, which had significance <0.05. The least significant factor was removed from each step. It was found that among the various factors considered, Hb% status, IFA tablets, number of ANC visits, and socioeconomic status were significant predictors of LBW.

DISCUSSION
A total of 714 singleton live newborns; 179 were LBW babies and 535 were normal birth weight babies [Table 1]. Thus, the proportion of LBW was found 25.1%. In the present study,
Prasad et al.,[7] Sharma et al.,[3] Maibali-Babeli et al.,[8] Muula et al.,[9] and Khanal et al.[10] found lower proportion of LBW than in the present study. Malik et al.,[11] Deswal et al.,[12] and Mumbare et al.[13] found similar proportion to the present study. The present study shows that 59.5% of babies were born in families belonging to lower socioeconomic status (Class IV and V) and 34% belonged middle class (Class II and III) and <7% belonged to upper class. The percentage of LBW babies was low (10.9%) in upper class. It increased with decrease in socioeconomic status and was highest (67%) in lower class. Percentage of LBW was inversely proportional to socioeconomic status.[Table 2]. A significant association was found between socioeconomic status and birth weight of baby (P < 0.05). Anand and Garg[14] and Joshi and Pai[15] found that the incidence of LBW decreased with an increase in socioeconomic status. The correlation between birth weight and socioeconomic status was found to be significant. Elshibly and Schmilsich[16] did not find socioeconomic status to influence birth weight statistically OR = 1.01 (0.72–1.40).

Of 714 mothers in the present study, 486 (68%) were illiterate [Table 2]. The percentage of LBW babies of mothers who were illiterate was high (29.4%). The LBW percentage decreased as educational standard increased. The percentage of LBW was inversely proportional to educational standard. A significant association was found between mothers’ education and birth weight of babies (P < 0.05). Joshi and Pai[15] observed that education had a significant effect on the birth weight of newborn. The percentage of LBW was as much as 52% in illiterate women. The incidence of LBW decreased rapidly in women who were educated up to secondary level (19%) and higher. Anand and Garg[14] and Khanal et al.[10] found maternal education to be statistically significant for LBW (P < 0.05).

Of 714 postnatal mothers delivered of the present study, 353 (49.5%) had inadequate antenatal visits. The percentage of LBW was maximum (31%) in mothers with inadequate visits and it decreased to 19% when visits were increased to 3 or more (P < 0.000) [Table 2]. Negi et al.[17] found that those mothers who had <2 ANC checkup had 42% LBW babies compared to 30% with 2–4 ANC checkup and were statistically significant (P < 0.001). Khanal et al.[10] found that with increase in number of ANC checkups the birth weight of babies increased and found to be statistically significant (P < 0.001).

The present study shows 714 mothers, 356 (49.9%) consumed iron and folic acid tablets for <100 days and others 50.1% of mothers consumed iron and folic acid tablets >100 days. Percentage of LBW was more (32%) in mothers who consumed <100 days of iron and folic acid tablets compared to other groups (18.2%). A significant association was found (P < 0.000) [Table 2]. Sanghvi et al. [18] and Malhotra et al.[19] found that iron and folic acid consumption resulted in increased hemoglobin percentage which, in turn, resulted in reduction in proportion of LBW babies.

Maximum number of mothers were moderately anemic (69.8%) in the present study. Nearly half of the mothers with severe anemia delivered LBW babies as compared to only 16% and 18% with mild anemia and non-anemic mothers, respectively. Percentage of LBW decreased as hemoglobin percentage increased. The percentage of LBW was inversely proportional to the percentage of hemoglobin. The difference in delivery of LBW babies in severe and moderate anemia with mild and normal hemoglobin percentage is statistically significant (P = 0.001) [Table 2]. Ghate et al.[20] found that the babies of moderately anemic mothers (Hb 8–10 g%) had a mean birth weight higher than babies of severely anemic mothers. The difference in mean birth weight was statistically significant.

Factors which were significant in bivariate analysis (chi-square test), were considered in multivariate analysis. It was found that, among the various factors considered, Hb% status, IFA tablets, number of ANC visits and Socio-economic status were significant predictors of low birth weight [Tables 3 and 4]. Khandait et al.[21] applied multivariate analysis for factors such as maternal age, lower socioeconomic status, illiteracy, parity, spacing, caloric intake, vegetarian diet, unemployment of women, and history of worm infestation in the past 6 months. On multivariate analysis, the significant association found for all the factors except the type of diet, illiteracy, and age with anemia in pregnancy.

Out of total 714 mothers in the present study, 79 (11%) mothers had some obstetric complication (PIH) during pregnancy. The percentage of LBW babies was higher (39.2%) in mothers with obstetric complications as compared to mothers having no obstetric complications (23.3%). A highly significant association was found (P = 0.002).

Badshah et al.[22] found maternal hypertension to influence birth weight of babies and it was statistically significant.

CONCLUSION

The proportion of LBW was found to be 25.1% in the present study. A number of factors such as teenage pregnancy, illiteracy of the mother, lower socioeconomic status, short birth spacing, inadequate antenatal care, less weight gain during pregnancy, tobacco consumption, and obstetric complications were found to be significantly associated with LBW.

Apart from these, other factors such as religion, caste/category, area of residence, family type, and mothers’ occupation though did not show any significant difference statistically, but they may have an important role in influencing the birth outcome.

The present study predicts the role of sociodemographic and maternal factors on LBW.
LIMITATIONS

• The present study is a hospital-based study limited only to postnatal mothers and LBW babies delivered in RIMS Teaching Hospital; hence, the findings cannot be generalized at community level.

• The health status of women before pregnancy has not taken into consideration.

RECOMMENDATIONS

1. There are several factors identified and interplaying which lead to LBW babies. Sociodemographic factors (maternal age, educational level, socioeconomic status, etc.) and maternal factors (number of ANC visits, birth spacing, anemia, weight gain during pregnancy, etc.) are important.

2. The present study suggests that improvement in maternal nutrition during pregnancy, avoiding close birth spacing, delayed childbearing in young females (<19 years), coverage of adequate antenatal care, early recognition of maternal illness, and complications are essential for reducing the LBW in newborns.

3. Antenatal care for pregnant mothers is an essential factor to improve pregnancy outcome, appropriate nutritional education, and food supplementation must be given to mothers with poor weight gain.

4. Access to quality antenatal care should be viewed as potentially important since it also offers opportunities for counseling and risk detection when a number of antenatal visits are more.

5. To strengthen MCH services by giving more emphasis on the factors identified in the present pregnancy at hospital level as well at community level.

REFERENCES