



Maternal Risk Factors for Low Birth Weight Infants: A Hospital based study in Lucknow

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Abstract: *Low Birth Weight is a serious public health problem and is a major issue of concern in maternal and child health. About 50 % of all neonatal deaths occur only due to Low Birth weight and survivors may also have to suffer greater risk of malnutrition, infection, neuro- developmental disorders and chronic health problems in adult life. Low Birth Weight is the single most important predictor of infant's mortality, morbidity and disability in early life as well as important indicator of reproductive and general health status of population. The incidences of low birth weight and mortality rates can be reduced if the factors identified and managed as early as possible. So it is necessary to identify and correct the responsible factors to reduce the burden of low birth weight.*

Objectives: *The objectives of the study were to find out the prevalence of low birth weight in study area and to determine the risk factors responsible for low birth weight in infants.*

Methodology: *A study on maternal biosocial determinants and mean actual birth weight was conducted on 310 mother-infants pairs in the maternity wards of two hospitals. Respondents were interviewed and information thus collected was entered in SPSS. Chi square test was applied to determine the association of various factors with birth weight of infants.*

Results: *Among the 310 respondent studied a total of 61.3% (190) new born were low birth weight, and rest 38.7 % were normal. 48.1 % (149) of low birth weight was due to preterm birth and only 19.7 % were due to IUGR. The Mean birth weight found in the study was about 2.350 gms. A large percentages of respondents were found undernourished (67.4%) and are unaware of the nutritional information regarding health and pregnancy due to lack of proper education (65.8%). Birth weight was found significantly associated with birth interval, previous history of prematurity, pre-pregnancy weight, hemorrhage, stress and depression, chronic illness of mother, hemoglobin status and pre-pregnancy BMI of mother.*

Conclusion: *We concluded that the prevalence of low birth weight in the study area was 61.3 % . Results indicated that a large proportion of respondents was under nourished and even they were unaware of the role of nutrition in keeping themselves healthy We recommended that improvement in nutritional status, knowledge and life style by increasing access and utilization of policies and programs provided by the government may contributes on a great level in reducing the problems occurred due to prematurity and low birth weight.*

Keywords: *Survivors, Bio-Social, Policies, Mortality, Morbidity, Disability, Birth weight.*

Introduction

Since birth weight is a strong predictor of infants growth, development and survival and infant born with low birth weight begins life with disadvantages and faces serious problems and have poor growth rates, low birth weight is one of the important issue of concern of birth outcomes to the W.H.O. The reduction of incidences in low birth weight is an important component of “Millennium Development Goal” on child health and achievement of MDGs will need to ensure health status of population by improving the health status of woman so as she can start pregnancy healthily and well nourished and go through easily and safely.

Low birth weight is a major public health problem especially prevalent in most of the developing country. The prevalence of low birth weight was currently found to be 26 % worldwide ⁽¹⁾. As per W.H.O. estimation about 25 million low birth weight are born annually and about 95 % of them in developing countries, where the burden of malnutrition and infection is high and the incidences is estimated to be more than twice that of developed countries.⁽²⁾

Global Burden of Low Birth Weight

There is significant differences in the incidences of low birth weight. Global data on low birth weight indicates that the incidences of low birth weight is highest in South Asian countries which are very populous and about 50 % of global low birth weight infants are found in this region.⁽³⁾ India is the most populous country in south Asian region contributing a higher percentage of low

birth weight infants. East Asia Pacific has the lowest percentages at 7%.

Prevalance of low birth weight in India

Out of an estimate 25 million (23.8% of all births) low birth weight babies born annually worldwide and India accounts for about 7-10 millions. That means nearly 40% of all low birth weight in developing world are borne in India. ⁽⁴⁾ Low birth weight babies contributes about 33 % of all live birth in India. The average birth weight of an Indian baby is about 2.800 grams and in developed countries it is 3000 grams. Usually a birth weight of 2000 grams is used as a cutoff point to provide special NICU care.

Estimates based on available data from institutional deliveries suggested that nearly one third of all Indian infants have birth weight less than 2.5 kilograms. There has hardly been any changes in birth weight pattern in past some decades, but there are differences in birth weight between economic groups, the higher incidences were found in low income groups.

Background of the study

Low Birth Weight is associated with high neonatal and infant mortality, lowers rate of growth in childhood and adolescence age and increased risk of infectious and non communicable diseases in adult life. Studies conducted in the past few decades shows that the incidences of low birth weight continues to be high in northern India, even after adoption of several health programs conducted by CSSM(Child Survival and Safe Motherhood) and RCH (Rural child health)

,targeting the health status of mothers and children. ⁽⁵⁾ The incidences of low birth weight and mortality rates can be reduced if the factors behind the problem are identified and managed early in pregnancy. Hence it is necessary to correct and identify these responsible factors to reduce the burden of low birth weight.

LOW BIRTH WEIGHT

Low Birth Weight is result of either-
Preterm Birth , That is Birth before 37 weeks of gestation Or
IUGR (Intra Uterine Growth Restriction), due to placental dysfunction, abruption of placenta or recurrent infections.
Both of these conditions may have various different causes but mainly it occurs due to maternal risk factors which may be behavioral or Bio- Social.

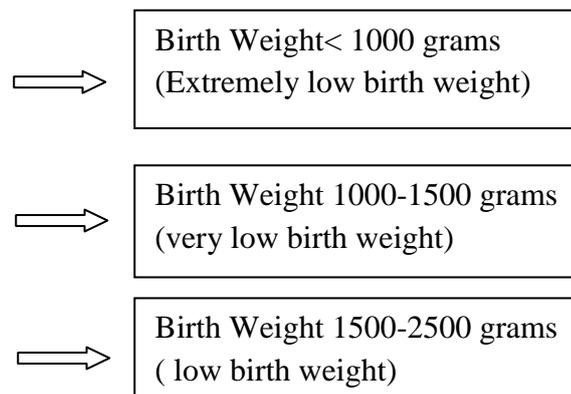
Risk factors for low birth weight in infants

There are various factors contributing to low birth weight. Weight of infant at birth is directly related to the general health status of mother and by the factors which affects normal circulation across placenta and causes poor nutrients supply to the fetus and restricts the fetal growth. M.S. Cramer has described about 43 responsible factors

Defination of low birth weight

According to WHO a birth weight of a newborn less than 2.5 kilograms (2500 grams) is considered as low birth weight.

It is further classified in to following categories:



contributing to low birth weight, depending upon geographical, socio-economic and maternal differences, some of these factors are modifiable and some are non-modifiable.⁽⁶⁾

- Maternal age below 18 years and above 35 years.
 - Inadequate weight gain in pregnancy (below 10 kilograms).
 - Low pre-pregnancy weight and low BMI (Body Mass Index < 21.5).
 - Smoking and Alcoholism.
 - History of previous prematurity.
 - Multiple pregnancies.
 - Birth spacing < 36 months.
 - Poor Dietary intake.
 - Low Hemoglobin level (< 11.5 gm/dl).
 - Infections, Hemorrhage in pregnancy.
- Social and Economic Factors-
- Low Income.

- Lower Educational Status.
- Stress and Depression.

Birth weight is influenced by the nutritional status and health status of mother. Various studies have clearly established that there is a good correlation between birth weight and maternal weight. Poor maternal weight gain under nutrition during and before pregnancy are also associated with low birth weight.⁽⁷⁾ Rate of low birth weight doubles when hemoglobin level falls below 7 milligrams/dl.⁽⁸⁾ There has not been any noticeable decline in the incidences of low birth weight over the last three decades.

Factors like maternal anemia, pregnancy induced hypertension and diabetes, poor maternal weight gain are modifiable and can be corrected with the effective management of these factors, which brings substantial decline in the incidences of both preterm deliveries and SGA (small for gestational age) neonates.

The “National Rural Health Mission” focuses on improvement in coverage concept and quality of Antenatal care and bring about a convergence with the efforts of the ICDS (Integrated Child Development Scheme) to provide supplementation and to make improvement in maternal nutrition.

Effective implementation of these interventional programs will definitely result in major reduction in the rates of low birth weight in Indian community.

The key components of NRHM (National Rural Health Mission) are as follows:

1. Screening of all pregnant woman for under nutrition and anemia.

2. Provision of appropriate intervention to reduce the onset of low birth weight and associated complications.
3. Encourage the population to have institutional deliveries, to provide optimal intra partum and neonatal care so that chances of neonatal survival can be improved among low birth weight and preterm deliveries.
4. Make the Aangan wadi workers to check the birth weight of infants as soon as possible in all home deliveries and refer the neonates of birth weight less than 2.2 kilograms to the hospital, so that these high risk infants are provided adequate care and there is reduction in neonatal death rates.

Objectives

- To study the birth weight pattern in study area.
- To investigate the effect of maternal health on birth weight.
- To find out current status of incidence of low birth weight in study area.

Methodology

A total of 310 mother-infant pairs delivered in two sub-district hospitals of Lucknow and Ghaziabad were interviewed. An elaborated questionnaire/schedule was prepared before undertaking the study to record the information. Birth weight was recorded in grams. LBW, one of the response variable in the analysis was defined as a weight of a newborn baby at birth <2500 gms.

Anthropometric measurements, including maternal weight, height, body-mass –index , total weight gain in pregnancy and infants birth weight were recorded and all mothers were interviewed for their bio-social variables, previous history of prematurity or low birth weight, complications and illness during pregnancy, details of antenatal care, dietary routine, type of physical activity and any morbid condition during and before pregnancy. Birth weight and sex of the new born, hemoglobin level of mother during and before pregnancy, pre- pregnancy weight and total maternal weight gain were sourced from the delivery register available in the hospital.

Statistical analysis was done by using SPSS method to compare the risk factors and to analyze the effect on birth weight. A chi-square test was used to determine whether there was a significant association between various factors and birth weight. P-value of less than 0.05 was considered statistically significant.

Results

Among the 310 respondent studied a total of 61.3% (190)new born were low birth weight, and rest 38.7 % were found to be normal, based on the cut-off level of birth weight given by WHO(World Health Organization).

Table:1 Distribution of Birth weight according to low birth weight

| Birth Weight of Infants | Frequencies (f) | Percentages (%) |
|-------------------------|-----------------|-----------------|
| <2000 Grams | 13 | 4.2 % |
| 2000-2500Grams | 177 | 57.1 % |
| >2500 Grams | 120 | 38.7 % |
| Total | 310 | 100% |

Mean Birth Weight= 2.350 grams

Among the low birth weight a very small percentage (4.2%) of infants were found in the weight category of less than 2000 grams. and majority of infants were in the range of birth weight between 2001-2500 grams.

The Mean birth weight found in the study was about 2.350 gms. About 48.1 %(149) of low birth weight was occurred due to preterm birth and only 19.7 % were due to IUGR. I also found

that about 63.2 % mothers have low hemoglobin level (<11mg/dl) during pregnancy and 67.4 % were undernourished. More than half of the mothers of low birth weight babies had low body mass index during and before pregnancy. A large proportion of respondents were uneducated or not having higher education. In case they do not have knowledge and awareness about importance of good nutrition.

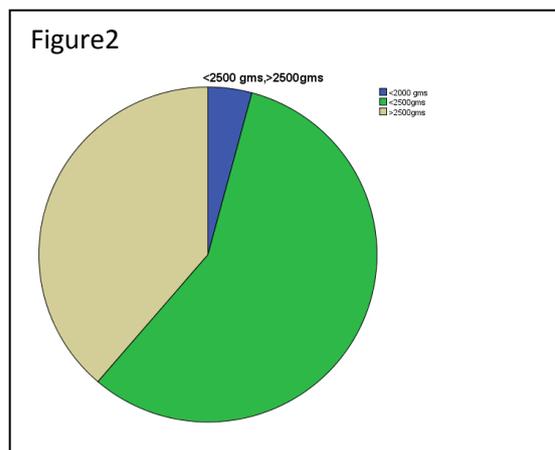
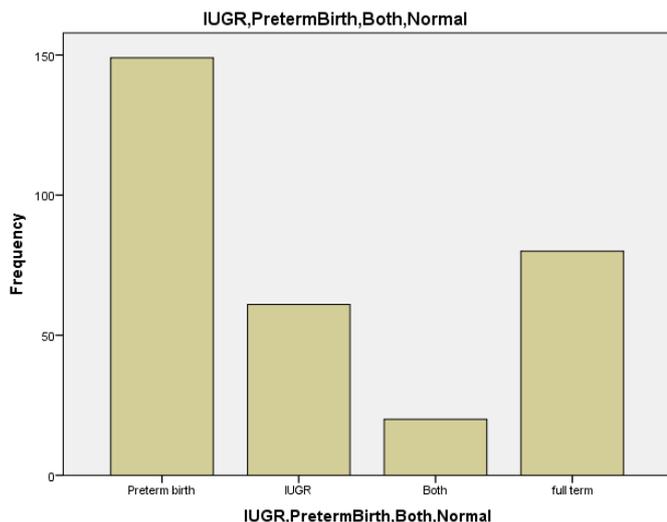


Figure: 1 Distribution of infants according to type of Low Birth Weight.

Figure:2 Distribution of Birth Weight

Table :2 BMI of respondents

| Body-Mass- Index of Mother | Frequencies (f) | Percentages % |
|--------------------------------|-----------------|---------------|
| <21.1 kilogram/m ² | 209 | 67.4 % |
| 21.1-24kilogram/m ² | 86 | 27.7 % |
| >24 kilogram/m ² | 15 | 4.8 % |
| Total | 310 | 100 % |

Table. 3 Maternal Health parameters and Birth weight.

| Health Parameters | Birth Weight | | | Total | df | χ ² cal. | χ ² tab |
|-----------------------------|--------------|----------|----------|-------|----|---------------------|--------------------|
| | <2000gms | <2500gms | >2500gms | | | | |
| Birth-Interval | | | | | | | |
| <36 months | 9 | 123 | 85 | 217 | 2 | .065 | 10.597 |
| >36 months | 4 | 54 | 35 | 93 | | | |
| Previous Prematurity | | | | | | | |
| Yes | 7 | 49 | 23 | 79 | 2 | 8.480 | 10.597 |
| No | 6 | 128 | 97 | 231 | | | |
| Pre-pregnancy Wt. | | | | | | | |
| <40 kgs | 2 | 11 | 2 | 15 | | | |
| 40-45 kgs | 4 | 48 | 26 | 72 | | | |
| 46-50 kgs | 6 | 90 | 67 | 163 | 8 | 16.112 | 21.955 |
| 51-55 kgs | 0 | 20 | 23 | 43 | | | |
| 56-60 kgs | 1 | 8 | 8 | 17 | | | |
| Wt.gain in Pregnancy | | | | | | | |
| <12 kgs | 11 | 108 | 46 | 165 | 2 | 20.151 | 10.597 |

| | | | | | | | |
|--------------------------|----|-----|-----|-----|---|--------|--------|
| >12 kgs | 2 | 69 | 74 | 145 | | | |
| Infection | | | | | | | |
| Yes | 13 | 112 | 51 | 176 | 2 | 22.910 | 10.597 |
| No | 0 | 65 | 69 | 134 | | | |
| Hemorrhage | | | | | | | |
| Yes | 5 | 47 | 23 | 235 | 2 | 3.634 | 10.597 |
| No | 8 | 130 | 97 | | | | |
| Stress/Depression | | | | | | | |
| Yes | 5 | 53 | 24 | 82 | 2 | 4.641 | 10.597 |
| No | 8 | 124 | 96 | 228 | | | |
| Chronic Illness | | | | | | | |
| Yes | 0 | 6 | 4 | 10 | 2 | .453 | 10.597 |
| No | 13 | 171 | 116 | 300 | | | |
| Total | 13 | 177 | 120 | 310 | | | |

P- value .005

Table .4 Nutritional Parameters and Birth Weight

| Nutritional Parameters | Birth Weight | | | Total | Df | χ^2 cal. | χ^2 tab |
|------------------------------|--------------|----------|----------|-------|----|---------------|--------------|
| | <2000gms | <2500gms | >2500gms | | | | |
| Dietary Routine | | | | | | | |
| Normal | 4 | 97 | 76 | 177 | 4 | 27.930 | 14.860 |
| Good | 1 | 3 | 16 | 20 | | | |
| Poor | 8 | 77 | 28 | 113 | | | |
| Hb level in Pregnancy | | | | | | | |
| <11mg/dl | 12 | 117 | 67 | 196 | 2 | 8.179 | 10.597 |
| >11mg/dl | 1 | 60 | 53 | 114 | | | |
| Pre-pregnancy Hb | | | | | | | |
| <11mg/dl | 11 | 168 | 102 | 281 | 2 | 8.873 | 10.597 |
| >11mg/dl | 2 | 9 | 18 | 29 | | | |
| BMI in Pregnancy | | | | | | | |
| <21.1kg/m ² | 3 | 9 | 3 | 15 | 4 | 22.695 | 14.860 |
| 21.1-24 kg/m ² | 7 | 76 | 33 | 116 | | | |
| >24kg/m ² | 3 | 92 | 84 | 179 | | | |
| Pre-pregnancy BMI | | | | | | | |
| <21.1kg/m ² | 11 | 123 | 75 | 209 | | | |
| 21.1-24 kg/m ² | 1 | 46 | 39 | 86 | 4 | 4.435 | 14.860 |
| >24kg/m ² | 1 | 8 | 6 | 15 | | | |
| Total | 13 | 177 | 120 | 310 | | | |

P-Value .005

As the above results shows, among the maternal risk factors studied –Birth interval, previous history of prematurity, Pre- pregnancy weight of

mother, Hemorrhage in pregnancy, maternal stress or depression, Chronic illness, Hemoglobin level of mother and Pre-pregnancy BMI of mother was

found to be associated with Birth weight of infants. The result shows no significant relationship between birth weight of infant and dietary routine of mother, infection and BMI in Pregnancy.

Discussion

Maternal Nutritional status is known to be as an important risk determinant of child survival and well being (9) So the main purpose of this study was to provide background and conceptual information for the evaluation of public health importance of good nutrition of woman during and before pregnancy because it is strongly associated with fetal growth and development, complications of pregnancy and also of infancy and overall maternal and infant’s health and well being.

More than half of the respondents (65.8 %) were unaware about the role of nutrition and they don’t have proper education. Poor health status of mother during and before pregnancy can greatly interfere with the results of pregnancy.(10)

Table : 5 Total Weight gain in pregnancy

| Total Maternal Weight Gain (kg) | Frequency (f) | Percentages (%) |
|---------------------------------|---------------|-----------------|
| < 12 Kilograms | 165 | 53.2% |
| >12 Kilograms | 145 | 64.8 % |
| Total | 100 | 100 % |

Globally much progress has been made in last few decades in the area of maternal and child survival and well being and of course improvement in health facilities has greatly reduces the burden of child mortality. Therefore efforts to further reduce

the infants mortality and morbidity rates in developing countries will definitely need public health awareness as well as planning and policy making focusing on understanding and addressing the causes and prevention of neonatal and prenatal mortality and morbidity. Results show significant association of birth weight with birth spacing. At least birth interval of 36 months is recommended, so as the mother can replenish the nutritional store and provide a good care to her former child.

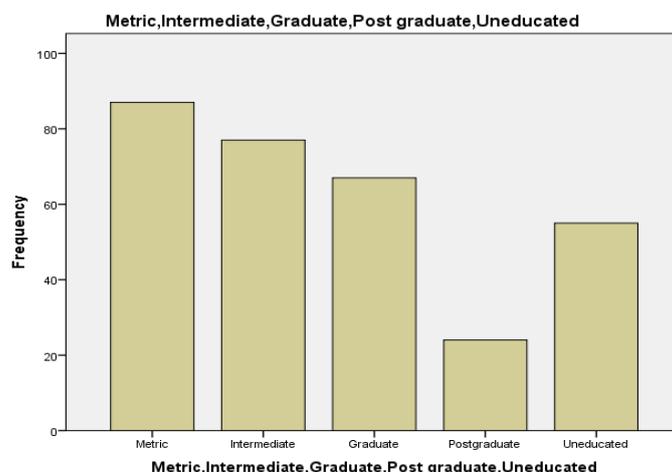


Figure: 3 Level of education of respondents

The figure 3 shows the level of education of respondents. Basically in rural areas of the city normally women are supposed to take care of family and early marriage is also responsible for the ends of schooling. Women are tending to ignore their health even in pregnancy due to the lack of proper education, which costs to the health of their infants and themselves.

Respondents were ask about their dietary routine and intake of food to figure out their food pattern and the hemoglobin status of respondents were noticed which shows dramatic improvements in the hemoglobin status in pregnancy which probably due to some improvement in diet in pregnancy.(Table 4)

Conclusion

We concluded that the prevalence of Low Birth weight is High in the study area. (61.3%) As the results indicates, A large number of respondents were found to be undernourished ,mainly due lack of knowledge and access to the health care facilities, We concluded that proper knowledge of health and nutrition and easy utilization of policies and programs of National Health Schemes will definitely help in combating the problem of low birth weight on National level. It is also suggested to encourage the population to get prenatal care as early as possible and to seek medical care for any type of signs and symptoms of complicated pregnancy.

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