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Scenario of the low birth weight babies delivered in Patna Medical College and Hospital with respect to maternal and neonatal risk factors

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Abstract
The primary cause of LBW is premature birth, being born before 37 weeks of gestation; and another cause of low birth weight is intrauterine growth retardation. However, there are other factors that can also contribute to the risk of low birth weight. These includes: race, mother's age, multiple birth, mother's health, low socio-economic status. Hence the present study was planned to assess the maternal and neonatal risk factors of low birth weight.

The present study was planned in the Upgraded Department of Paediatrics (Neonatology) in Patna Medical College and Hospital, Patna from April 2017 to December 2017. Total 50 cases of newborns delivered and referred to Department were enrolled in the present study. The enrolled cases were divided in the two study groups based on the weight of the new borns at the time of delivery.

Globally, more than 20 million infants are born with Low Birth Weight. The major challenge in the field of public health is to identify the factors influencing low birth weight and to institute remedial measures. The study was attempted to assess prevalence of low birth weight and its risk factors affecting low birth weight. Preterm labour, neonate female sex, low parity, pregnancy age <18 and >35 years old, delivery by caesarean section, maternal medical risk factors in current pregnancy, lower maternal education level, living in the rural area, consanguinity, delivery by untrained personnel were identified as significant factors associated with LBW in this study.

Keywords: low birth weight babies, LBW, maternal factor, neonatal factors

Introduction

Of the 20 million low birth weight infants born globally every year, about 8 million are in India. Over 80% of neonatal deaths occur among small infants - 65% are attributable to preterm infants and 19% to term small for gestational age, (SGA) (Lawn Every Newborn Lancet Series 2014). India has the highest number of preterm births and also accounts for maximum number of neonatal deaths due to prematurity. Incidence of LBW in India is about 27% of total live births [1].

LBW is either caused by preterm birth (that is, a low gestational age at birth, commonly defined as younger than 37 weeks of gestation) or the infant being small for gestational age (that is, a slow prenatal growth rate), or a combination of both. In general, risk factors in the mother that may contribute to low birth weight include young age, multiple pregnancies, previous LBW infants, poor nutrition, heart disease or hypertension, untreated coeliac disease, drug addiction, alcohol abuse, and insufficient prenatal care. Environmental risk factors include smoking, lead exposure, and other types of air pollutions [2].

Four different pathways have been identified that can result in preterm birth and have considerable evidence: precocious fetal endocrine activation, uterine overdistension, decidual bleeding, and intrauterine inflammation/infection [3]. From a practical point a number of factors have been identified that are associated with preterm birth, however, an association does not establish causality. Being small for gestational age can be constitutional, that is, without an underlying pathological cause, or it can be secondary to intrauterine growth restriction, which, in turn, can be secondary to many possible factors. For example, babies with congenital anomalies or chromosomal abnormalities are often associated with LBW. Problems with the placenta can prevent it from providing adequate oxygen and nutrients to the fetus. Infections during pregnancy that affect the fetus, such as rubella, cytomegalovirus, toxoplasmosis, and syphilis, may also affect the baby's weight.

While active maternal tobacco smoking has well established adverse perinatal outcomes such as LBW, that mothers who smoke during pregnancy are twice as likely to give birth to low-birth weight infants. Review on the effects of passive maternal smoking, also called environmental tobacco exposure (ETS), demonstrated that increased risks of infants with LBW were more likely to be expected in ETS-exposed mothers [4].

Regarding environmental toxins in pregnancy, elevated blood lead levels in pregnant women, even those well below 10 ug/dL can cause miscarriage, premature birth, and LBW in the offspring. With 10 ug/dL as the Centers for Disease Control and Prevention's "level of concern", this cut-off value really needs to arise more attention and implementations in the future [5].

The combustion products of solid fuel in developing countries can cause many adverse health issues in people. Because a majority of pregnant women in developing countries, where rate of LBW is high, are heavily exposed to indoor air pollution, increased relative risk translates into substantial population attributable risk of 21% of LBW [6].

One environmental exposure which has been found to

increase the risk of low birth weight is particulate matter, a component of ambient air pollution [7]. Because particulate matter is composed of extremely small particles, even nonvisible levels can be inhaled and present harm to the fetus []. Particulate matter exposure can cause inflammation, oxidative stress, endocrine disruption, and impaired oxygen transport access to the placenta, all of which are mechanisms for heightening the risk of low birth weight [8]. To reduce exposure to particulate matter, pregnant women can monitor the EPA's Air Quality Index and take personal precautionary measures such as reducing outdoor activity on low quality days, avoiding high-traffic roads/intersections, and/or wearing personal protective equipment (i.e., facial mask of industrial design). Indoor exposure to particulate matter can also be reduced through adequate ventilation, as well as use of clean heating and cooking methods [9].

A correlation between maternal exposure to CO and low birth weight has been reported that the effect on birth weight of increased ambient CO was as large as the effect of the mother smoking a pack of cigarettes per day during pregnancy. It has been revealed that adverse reproductive effects (e.g., risk for LBW) were correlated with maternal exposure to air pollution combustion emissions in Eastern Europe and North America. Mercury is a known toxic heavy metal that can harm fetal growth and health, and there has been evidence showing that exposure to mercury (via consumption of large oily fish) during pregnancy may be related to higher risks of LBW in the offspring [10].

It was revealed that, exposure of pregnant women to airplane noise was found to be associated with low birth weight. Aircraft noise exposure caused adverse effects on fetal growth leading to low birth weight and preterm infants [11].

Low birth weight (LBW) as a significant public health indicator is defined as weight at birth lower than 2500 g by the World Health Organization [12-13]. LBW is one of the main causes of infant mortality including around 40% of all death among children under 5 years old which occurs in neonatal or newborn [12]. The mortality rate of LBW is approximately twenty times more than heavier infants [13]. Totally, about 15.5% of all birth is LBW while 95.6% of it occurs in developing countries. In addition, the incidence of LBW in low-income societies is more than twice in compare to middle incomes [13-14].

The primary cause of LBW is premature birth, being born before 37 weeks of gestation; and another cause of low birth weight is intrauterine growth retardation. However, there are other factors that can also contribute to the risk of low birth weight. These includes: race, mother's age, multiple birth, mother's health, low socio-economic status. Hence the present study was planned to assess the maternal and neonatal risk factors of low birth weight.

Methodology

The present study was planned in the Upgraded Department of Paediatrics (Neonatology) in Patna Medical College and Hospital, Patna from April 2017 to December 2017. Total 50 cases of newborns delivered and referred to Department were enrolled in the present study. The enrolled cases were divided in the two study groups based on the weight of the new borns at the time of delivery.

Information related to mother such as age, height, weight, socio-economic status (SES), parity, gestational age, diseases during pregnancy and information related to baby such as birth weight and sex were extracted from the records.

All the cases were informed consents to the parents. The approval of the institutional ethical committee was taken prior to conduct of the study. The standardised questionnaire was prepared and after the informed consent the data was gathered.

The deliveries with incomplete records, congenital anomalies, multiple births and parents who were not giving consent were excluded from study.

Results & Discussion

Maternal nutritional status both before and during pregnancy is a well-recognized determinant of birth outcomes [15]. BMI is a simple, useful index for evaluating pre pregnancy nutritional status. Although pre pregnancy BMI has a genetic as well as nutritional component, a low pre pregnancy BMI is considered a marker for minimal tissue nutrient reserves [16]. Women with low pre pregnancy weight for height or BMI are at increased risk for a number of adverse pregnancy outcomes, including preterm birth and IUGR [17].

The mechanisms of association between pre pregnancy BMI and IUGR and preterm delivery are not clear, but probably the relationship between a low pre pregnancy BMI and adverse pregnancy outcomes is mediated by protein energy availability. One explanation for the lower mean neonate birth weight in women with low pre pregnancy weight may be that the fetus was prevented from receiving an adequate supply of nutrients from the mother because of changes in maternal hemodynamic status [18]. These studies suggested that in malnourished underweight women, lower volume expansion related to decreased micronutrient status might be associated with reduced fetal growth.

Table 1: Demographic Data of mothers

Group of Cases with Birth Weight	less than 2499 gm	more than 2499 gm
Total Cases enrolled	25	25
Age of mother (years)	19 – 28	20 – 32
Height cm	145 – 158	149 – 160
Pre pregnancy weight kg	44 – 58	47 – 60
Mean Weight gain in pregnancy kg	2.3 – 4.7	3.3 – 5.6

Table 2: Different Factors in study group

Group of Cases with Birth Weight	less than 2499 gm	more than 2499 gm
Socio-economic status		
▪ Lower class	20	18
▪ Middle class	5	7
Maternal education		
▪ Illiterate	10	12
▪ primary	15	13
Pre pregnancy weight < 45 kg	7	5
Spacing < 2years	12	15
Primigravida	11	15
Bad obstetrics history	9	8
Maternal Infections	3	2
History of infertility	2	3
Tobacco consumption	3	2
Heavy physical activity	12	14
Pregnancy Induced Hypertension	6	5
Anaemia	8	12
Caesarean section delivery	13	16

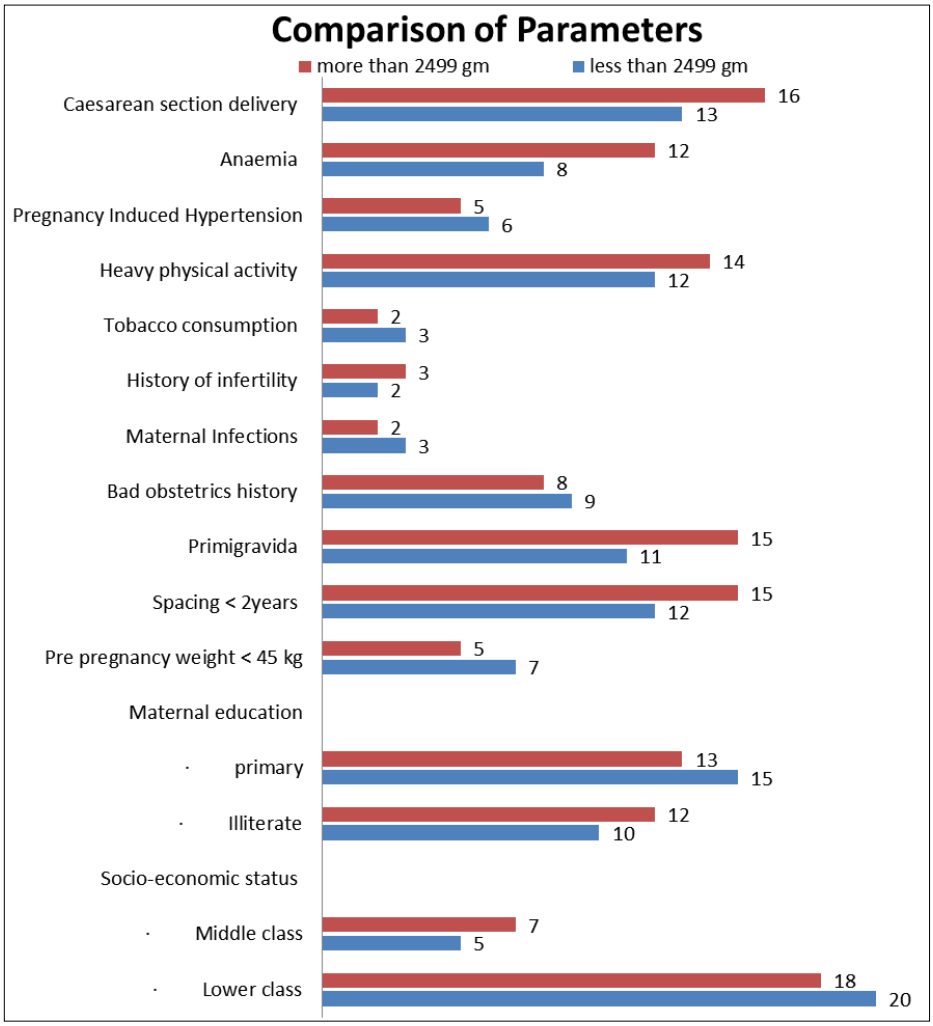

Fig 1

Maternal age at delivery <18 and >35 years old was associated with increased risk of LBW. A large number of epidemiological studies have shown that LBW occurs in young and old mothers. There are social disadvantages such as low socioeconomic status, low education, poor nutrition, and low body mass index responsible for these results in younger mothers; however, in the older mothers, biological factors such as chromosomal anomalies, preeclampsia, and diabetes are responsible for this issue [19].

Maternal medical risk factors including gestational hypertension, gestational diabetes mellitus (GDM), and anemia were found significantly associated with LBW. A large number of epidemiological and biological evidence support this fact. Gestational hypertension leads to reduce uteroplacental flow, which increases the risk of LBW. GDM can lead preterm labour and other complications as well. Furthermore, conventional treatment for GDM increases the risk of LBW [20].

Multivariate analysis shows that maternal age, pregnancy type, history of abortion, hemoglobin status, iron folic acid intake, and HIV status were significantly associated with term low birth weight. Also mothers less than 20 years of age delivering at the hospital were most likely to have term low birth weight, which is in agreement with studies done in Nepal [21] and India [22] but contrasts with study done in Gujarat [23].

The study shows that the type of pregnancy was significantly associated with term low birth weight. Newborns from unwanted and unplanned pregnancies were more likely than those from wanted and planned pregnancies to have LBW. This is similar to study done in Axum [24]. These mothers with unwanted pregnancy may not have proper nutritional status. Other predictor for term low birth weight was normal hemoglobin and shows that anemic mothers were likely to have low birth weight babies compared to nonanemic mothers. This is similar to results of studies from in India [22] and Pakistan [24].

Good sample size and collecting data from hospitals province are the strength of this study. Due to using secondary data, researchers cannot measure some risk factors of LBW including health-care service, behavioural, environmental, and nutritional factors. Future studies can be designed with adequate sample size for measuring above-mentioned factors.

The best way of prevention of low birth weight is prevention of preterm births. Prenatal care is a key factor in preventing preterm births and low birth weight babies. Maternal health like proper nutrition and weight gain are linked with fetal weight gain and birth weight. Mother should avoid alcohol, cigarettes and illicit drugs, which can contribute to poor fetal growth, among other complications.

Conclusion

Globally, more than 20 million infants are born with Low Birth Weight. The major challenge in the field of public health is to identify the factors influencing low birth weight

and to institute remedial measures. The study was attempted to assess prevalence of low birth weight and its risk factors affecting low birth weight. Preterm labour, neonate female sex, low parity, pregnancy age <18 and >35 years old, delivery by caesarean section, maternal medical risk factors in current pregnancy, lower maternal education level, living in the rural area, consanguinity, delivery by untrained personnel were identified as significant factors associated with LBW in this study.

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