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Study of factors concomitant with low birth weight babies

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Abstract
The study has been planned to study the factors prevailing in a particular area responsible for low birth weight. With this background in mind the objective of the present study was to identify the maternal risk factors associated with LBW.
The study had been done in Nalanda medical college and hospital, patna. Total 100 cases and 100 control cases who delivered the babies by vaginal delivery or caesarean section were selected in the study. The cases study includes the new born having the weight less than 2499 gm and control group includes the new born having the weight of more than 2499 gm.
Thus findings of this study emphasizes the need for improving the quality and utilization of antenatal care, nutritional education to improve the weight gain during pregnancy, spacing, avoidance of tobacco, alcohol and substance abuse, and prevention and proper management of risk factors like anemia and hypertension.

Keywords: low birth weight, risk factors, case control study

Introduction
Low birth weight (LBW) is defined by the World Health Organization as a birth weight of an infant of 2,499 g or less, regardless of gestational age. Subcategories include very low birth weight (VLBW), which is less than 1500 g (3 pounds 5 ounces), and extremely low birth weight (ELBW), which is less than 1000 g (2 pounds 3 ounces). Normal weight at term delivery is 2500-4200g (5 pounds 8 ounces - 9 pounds 4 ounces) [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 ages, 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 over distension, 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 attentions 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. One environmental exposure which has been found to increase the risk of low birth weight is particulate matter, a component of ambient air pollution [11]. Because particulate matter is composed of extremely small particles, even nonvisible levels can be inhaled and present harm to the fetus [6]. 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. 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 [7].

Low birthweight, pre-term birth and pre-eclampsia have been associated with maternal periodontitis exposure. But the strength of the observed associations is inconsistent and vary according to the population studied, the means of periodontal assessment and the periodontal disease classification employed. However the best is that the risk of low birth weight can be reduced with very simple therapy. Treatment of periodontal disease during gestation period is safe and reduction in inflammatory burden reduces the risk of preterm birth as well as low birth weight [8].

LBW is closely associated with fetal and Perinatal mortality and Morbidity, inhibited growth and cognitive development, and chronic diseases later in life. At the population level, the proportion of babies with a LBW is an indicator of a multifaceted public-health problem that includes long-term maternal malnutrition, ill health, hard work and poor health care in pregnancy. On an individual basis, LBW is an important predictor of new born health and survival and is associated with higher risk of infant and childhood mortality [9].

Low birth weight constitutes as sixty to eighty percent of the infant mortality rate in developing countries. Infant mortality due to low birth weight is usually directly causal, stemming from other medical complications such as preterm birth, poor maternal nutritional status, lack of prenatal care, maternal sickness during pregnancy, and an unhygienic home environment [25, 26]. According to an analysis by University of Oregon, reduced brain volume in children is also tied to low birth-weight [10].

A study by the Agency for Healthcare Research and Quality (AHRQ) found that of the 3.8 million births that occurred in the United States in 2011, approximately 6.1% (231,900) were diagnosed with low birth weight (<2,500 g). Approximately 49,300 new borns (1.3%) weighed less than 1,500 grams (VLBW). Infants born at low birth weight are at a higher risk for developing neonatal infection.

Hence study has been planned to study the factors prevailing in a particular area responsible for low birth weight. With this background in mind the objective of the present study was to identify the maternal risk factors associated with LBW.

Methodology

The study had been done in Nalanda medical college and hospital, Patna. Total 100 cases and 100 control cases who delivered the baby by vaginal delivery or caesarean section were selected in the study. The cases study includes the new born having the weight less than 2499 gm and control group includes the new born having the weight of more than 2499 gm.

The standardised questionnaire was prepared and after the informed consent the data was gathered.

Study variables were maternal age, height, pre-pregnancy weight, education, occupation, socioeconomic status, type of family, parity, interval between birth of the new born baby and the previous delivery, Antenatal care (ANC) during current pregnancy, iron and folic acid tablets consumed and strenuous physical activity during pregnancy.

Results and Discussion

The data from the two study groups were gathered and presented and discussed below.

Table 1: Demographic Data of mothers

Variable	Cases	Control
Age years	22.5 ± 2.2	23.2 ± 1.9
Height cm	151. ±5.6	153.8 ± 4.9
Pre pregnancy weight kg	49.2 ± 6.5	53.2 ± 5.5
Mean Weight gain in pregnancy kg	4.5 ± 1.5	5.8 ± 1.8
Mean weight of new born	1840 ± 420	2890 ± 301

Table 2

Variable	Cases = 100	Control = 100
Age(years)	15	10
Height	13	6
Lower socio-economic status	26	18
Maternal occupation farm labourer	24	10
Maternal education-illiterate/primary	34	24
Nuclear family	52	48
Pre pregnancy weight< 45 kg	23	6
Spacing < 2years	56	42
Primigravida	35	26
No ANC registration/late ANC registration	41	23
Inadequate ANC	52	28
Bad obstetrics history	16	10
Maternal Infections	4	4
History of infertility	5	5
Tobacco consumption	12	2
Heavy physical activity	7	3
PIH	10	3
Anaemia	42	23
Caesarean section delivery	30	31

Factors associated with low birth weight, often termed as ‘‘risk factors" and their presence in an individual woman indicates an increased chance, or risk, of bearing a low birth weight infant. Globally, LBW as indicator is a good summary measure of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work and poor pregnancy health care. In present case control study from rural area, lower socioeconomic status, maternal education, maternal occupation farm labourer and having heavy physical activity during antenatal period were significantly associated with low birthweight. However maternal age, having nuclear family and parity has not identified as significant risk factors for LBW babies. Krammer [11], Hirve and Ganatra [12] Deshmukh *et al* [13] also found significant association between socioeconomic status and birth weight of baby. The percentage of illiterate and primary education was more in cases (35.5%) as compared to control group (24.5%). Hirve and Ganatra [12] found that the adjusted odds ratio for delivering LBW decreases significantly with increasing education status of the mother. In rural area women from lower socioeconomic status often continue strenuous physical work through pregnancy. In our study, maternal age had no significant association with LBW. Our findings on maternal age as a risk factor is consistent with studies conducted by Mavalankar *et al* [14] in India and Fikree *et al* [15] in Pakistan. Anand and Garg [16] also found nosignificant relationship between maternal age and LBW. Proportion of prim gravida was high among cases as compared to control but the difference was not statistically significant. In contrast, previous studies have revealed that prim parity is significantly associated with LBW [13, 17]. This study has shown that low birth weight was significantly associated with inadequate antenatal care, pre-delivery weight ≤45 kg, height ≤145 cm, bad obstetrics history, tobacco consumption, PIH and anemia. These findings are consistent with Kramer's meta-analysis. 4Malik *et al* 14 found a strong correlation between birth weight and maternal height. Maternal height < 145 cm contributed significantly to a high rate of L.B.W. Effects of pre pregnancy maternal weight; bad obstetrics history (previous abortions) and anaemia were consistent with another study in Ahmadabad [14]. In a hospital-based study in Calcutta Pahari *et al* [18] reported abortion as one of the main-causes of adverse pregnancy outcomes in addition to anaemia and hypertensive disorder. Anemia was one of the common problems in the present study from rural area. Almost 42.5% of mothers who delivered LBW babies were anaemic. Deshmukh *et al* [13] also found that anaemia was significantly associated with LBW. Similarly, Mavlankar *et al* [14] observed that pre pregnancy maternal weight, and anaemia was important determinant of low birth weight. The association of tobacco consumption with low birth weight observed in this study has also been reported by Deshmukh *et al*. [13] and Gupta *et al*. [19] Antenatal care had a strong influence on birth weight. In present study it was found that most of mothers from rural area start attending ANC clinics in their sixth to seventh months of gestation. Deswal *et al* [21] also reported that low maternal weight, under nutrition, lack of antenatal care, short inter-pregnancy interval, toxaemia of pregnancy were independent factors increasing the risk of low birth weight significantly. Rural women from lower socio-economic status are more susceptible to poor diet and infection and more likely to undertake physically demanding work during pregnancy. Large number of mothers from rural area are not utilising or inadequately utilising antenatal care services. Antenatal care for pregnant mothers is an established factor to improve pregnancy outcome, appropriate nutritional education and food supplements must be given to the mothers with poor weight gain. Access to quality antenatal care should be viewed as potentially important since it also offers opportunities for counselling and risk detection apart from its necessity for maternal health. It is generally recognised that the etiology of LBW is multifactorial. Special attention of health care professionals is necessary for identification of these risk factors for low birth weight. Various factors are clearly and consistently linked to low birth weight. Numerous opportunities exist before pregnancy to reduce the incidence of low birth weight, yet these are often overlooked in favour of interventions during pregnancy.

Conclusion

Thus findings of this study emphasises the need for improving the quality and utilization of antenatal care, nutritional education to improve the weight gain during pregnancy, spacing, avoidance of tobacco, and prevention and proper management of risk factors like anemia and hypertension.

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