

Short Communication

Study of Factors Affecting and Causing Low Birth Weight

M. W. Khan^{*}, M. Arbab, M. Murad, M. B. Khan, and S. Abdullah

Department of Biotechnology & Informatics, Faculty of Life Sciences & Informatics, Balochistan University of Information Technology Engineering & Management Sciences Quetta, Pakistan

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Abstract

Low birth weight in new born is major reason of neonatal deaths resulting in severe short term and long term effect on babies. Descriptive study conducted with the help of questionnaires to study factors contributing to deliver low birth weight babies, investigating interrelationships among different factors effecting LBW and increasing awareness of LBW among expecting mothers. Data was collected from June to September 2013. A total of 140 questionnaires were filled from three tertiary care hospitals after taking informed consent form participants. Outcomes of the study included that maternal BMI, maternal education, mal-nutrition, and infections and diseases during pregnancy had positive impact on delivering LBW babies. Mothers with familial vertical history of LBW, inter-pregnancy interval of less than one year and those having previous LBW babies were more likely to deliver LBW baby. Mothers belonging to higher socioeconomic class, those using multivitamins and folic acid during pregnancy had less chances of having LBW.

Keywords: Birth weight; Preterm birth; Growth retardation; Gestational age, Inter-pregnancy interval.

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1. Introduction

Low birth weight (LBW) defined as weight at birth which is less than 2500 grams, usually measured in the first hour of life irrespective of the gestational age [1]. LBW is a major cause and contributes to about 60% to 80% of all neonatal deaths [2]. Based on epidemiological studies, infants weighting less than 2500g are 20% more likely to expire than normal weight babies. Global occurrence of LBW is 15.5%, which amounts to about 20 million low birth weight infants born each year, 96.5% of them in developing countries [3]. Globally about half of the LBW's are born in south central Asia, where 27% of all babies born weight less than 2500 grams at birth. The occurrence of LBW is double in

^{*} *Corresponding author:* mwaseem.tareen@yahoo.com

under developing countries 16.5% as compared to developed countries 7% [4]. In addition, the LBW rates are unequal among different countries, depending upon many factors such as socioeconomic conditions, poor nutrition, education level, and health conditions [2]. The prevalence of LBW from 2005 to 2010, in some of these countries is India 28%, Bangladesh 22%, Ethiopia 20%, Niger 27%, Mauritania 34%, Nepal 21% and Pakistan 32% [5].

Infant's low weight at birth is the result of many interrelated causes. The primary cause for the LBW infants is the preterm birth. Other determinates for the LBW are poor maternal nutrition status, low gestational weight gain, genetic composition of mother, and short maternal stature due to mother's own childhood diet [6].

Socioeconomic conditions, poverty, education level, violence during pregnancy, and early marriages are also essential contributing factor for low birth weight infants. Infectious agents have potential to penetrate through uterus and causes inflammations in uterus and placenta [7]. Cytokines are released in response to inflammation by the body immune system resulting in preterm initiation of labour which results in LBW. Adolescents when become pregnant before their own growth is completed, faces difficulty in fulfilling their own and infants nutritional requirements [8].

LBW individuals experience many health complications thorough out their lives which can cause long and short term consequences including hypothermia, hypoglycaemia, perinatal asphyxia, respiratory problems, hyperbilirubinemia, anaemia [9], impaired nutrition, infection, neurological problem, ophthalmologic complications, hearing defects, sudden infant death syndrome, coronary heart diseases and Immune system problems [10].

LBW infants have increased risks of multiple problems throughout their lives. To avoid these birth defects an expected mother can take important steps to reduce the chances of bringing a LBW baby. The most essential thing a mother can do is to have regular check-up and follow nutritional diet, as deficiency of micronutrients can cause serious problems in infant's growth and maternal health conditions. In addition, expecting mother should avoid smoking, illicit drugs, other medications and alcoholism, as they are another leading cause for LBW [11]. They can cause serious placental problems leading to insufficient transport of nutrients and oxygen to foetus resulting in poor foetal growth and weight gain.

LBW babies need to be monitored and treated in the first few days of life. This treatment can extend and last for weeks and months depending upon the weight of the baby at birth. Unfortunately, during pregnancy the only treatment of less weight foetus is monitoring with the help of regular ultrasound and waiting till birth. At times, premature low birth weight baby need to be born to save mother's or infant's life due to other complications [2, 12]. In contrast, treatment after birth for the LBW infants differ according to the severity of the disease, infants own potential of survival, gestational age, medical history and baby's tolerance for specific medications [13, 14].

The aims and objectives of this study were to pinpoint the factors contributing to deliver low birth weight babies and risks associated with low birth weight, exploring short

term and long term effects of being born low birth weight and later life health problems and to create awareness among study participants about risks of LBW in particular and the whole population in general.

2. Material and Methods

Descriptive research study was conducted to study the factors and risks contributing to LBW with the aim of obtaining current knowledge about the issue and also to create awareness among study participants in particular and the whole population in general. Total of five tertiary care hospitals of District Quetta, Pakistan were selected for the study. Application was written to the medical superintendent of each hospital requesting for the permission to collect data from patients admitted in their hospital. The permission was granted by three hospitals *i.e.* Civil Hospital Quetta, Bolan Medical Complex and General Hospital Quetta, whereas the other two Hospitals rejected the application. The families in these hospitals were found to be of different socioeconomic level and life styles which proved advantageous in comparing different factors. After taking informed consent from the participants data was collected with the help of the questionnaires. A total of 140 mothers with their LBW infants were included in the study. The complete survey took 4 months period from June 2013 to September 2013. The participants were selected from different families and different backgrounds admitted at the hospital. The data was collected with the help of convenience sampling. Mostly the participants included were mothers aged between 18–35 years and their new born with the body weight less than 2500 g. History was collected from each participant, her family members and the physician.

Questionnaire included five sections and a total of 50 questions, inquiring about general personal information, maternal eating habits and behaviour, maternal health abnormalities during pregnancy, violence during pregnancy and new born health. All questionnaires were written in English. Structured interviews were conducted from each participant in private setting. Mothers and their new born IDs were kept same, to elude confusions later in the research. Every question and biological terminologies were well explained to mother before they would come to a conclusion. In cases, where mothers were uneducated and were not able to explain their conditions during pregnancy, than physicians and nurses were asked for assistance. Collected data was analysed and interpreted using SPSS.

3. Results and Discussion

The study conducted to analyse various parameter causing and effecting low birth weight determined that preterm birth was the most important determinant of the LBW. According to the results, 66% of the babies born were preterm whereas normal births were 34%. These percentages make preterm birth an obvious reason of LBW babies. The above statistics could be due to the reason that preterm babies are born early and has less time in

the mother's womb to gain weight as much of the weight is gained in the later stages of the pregnancy. Mother's weights during pregnancy were calculated and it was found that overweight and obese mothers were at higher risk of having LBW infants as compared to the underweight and normal mothers. 25.7% of the totals were found overweight and 70% of the totals were found obese. These statistics could be due to the reason that overweight and obese mothers had an increased risk of developing gestational diabetes, high blood pressure, chronic conditions and infections during pregnancy which leads to preterm birth and all these results in LBW.

LBW frequency decreases with the increase in the maternal education. 43.5% were uneducated and were at a higher risk of delivering LBW babies. In contrast 56.4% were educated and were less likely to deliver LBW infants. Further it was found that as the level of education of mother increases, the occurrence of the LBW successively decreases i.e. 27.8% were educated up to middle, 15% were qualified up to matriculation, 7.8% were qualified to intermediate, (5%) were qualified up to bachelors and only one individual had perused his education up to masters. The above statistics could be due to the reason that uneducated mother is uninformed about the prenatal care, nutritional requirements during pregnancy, essential diet, and about the effects of maternal behavior on fetus. Mal-nutrition during pregnancy leads to the occurrence of LBW babies. 90.7% being studied were mal-nourished and had a LBW baby, whereas the rest 27.8% were well-nourished. These statistics could be due to the reason that fetus needs proper nutrients, essential amino acids and energy for its growth and if the mother is mal-nourished and the fetus is deprived of these basic precursors than ultimately the newborn will be low weight and will be more prone to the diseases.

It was evident from analysis that mothers from lower social class were more likely to have LBW newborn than those who came from higher social class. The mother with the family income of less than 15 thousand were 57.8% and were at higher risk of delivering LBW baby (see Fig. 1). As the socioeconomic level increases the occurrence of the LBW decreases.

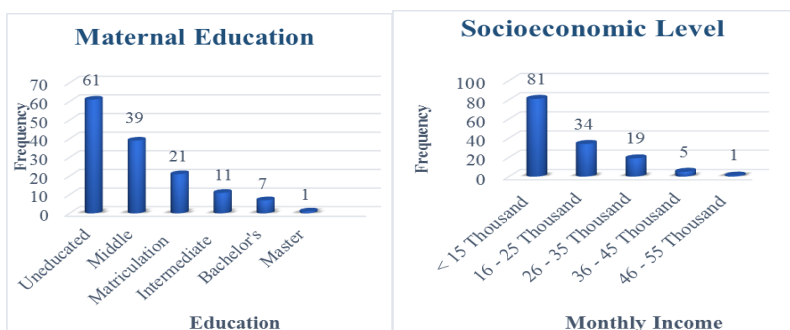


Fig. 1. (left panel) Maternal ducation versus low birth weight, (right panel) socioeconomic level versus low birth weight.

These statistics could be due to the reason that mother in higher socioeconomic class were having healthy surroundings and had healthy diet to produce heavier babies whereas the mothers in deprived socioeconomic level *i.e.* unhygienic environment and improper diet were at higher risk of having a low birth weight baby. Mothers who were not using supplements during pregnancy were more prone to delivering LBW babies. 68.5% of participants included in the study were not using any supplementations during pregnancy; remaining 31.4% of the totals were using supplements during pregnancy (see Fig. 2). Specifically 40 mothers were using folic acid and 20 mothers were using multivitamins. While 4 were using both of them. The reason for the above statistics could be that although macronutrient supplementation is required in small amounts yet it is very essential for growth, development and formation of baby in womb and also very important for mother. During pregnancy mother body needs a slight extra quantity of multiple macronutrient supplements as compared to preconception stages. In addition, folic acid helps in prevention abnormalities in baby such as neural tube defects, brain defects like anencephaly, spinal cord defects like spine bifida and certain types of anemia.

It was analyzed that mothers with inter-pregnancy interval of less than a year were at higher frequency of delivering a low weight as compared to mothers with longer inter-pregnancy interval. 69.2% of the total, delivering LBW babies had inter-pregnancy interval of one or less than one year, 10% of the participants included in the study were found with the inter-pregnancy interval of two years, only 2% of the total had inter-pregnancy of 3 years and were least frequently found to deliver LBW newborn. The reason could be that, during short interval during pregnancy mothers cannot recover from the biological stresses imposed by the previous pregnancy resulting in depletion of macronutrient supplementation in maternal body and anemia, therefore these increases the risks of certain other factors effecting pregnancy outcomes. Mothers with the familial vertical history of LBW were having more chances of delivering a LBW newborn. 49.2% of the total was not having LBW familial history, whereas 50.7% of the totals were found with familial vertical history of LBW. Among these 50% of mother, 76.8% were themselves LBW at birth and 22.5% of grandmothers were found to be LBW. While the rest 1% were other members found LBW in the family. LBW is an intergenerational problem where LBW infants grow up undernourished in there early developmental stages resulting in stunted and weak adolescent. In addition, genetic predisposition of mother and infant also plays a vital role in controlling the placental and fetal membrane growth which contributes to the initiation of labor by controlling the contractions of myometrium. Therefore, genetic makeup could also be a reason for the early onset of contractions. This lifecycle will last and will further elevate the risks of LBW.

Maternal infections elevate the frequency of LBW. 22.8% of the totals were having no infection. While the rest 77.1% were found with at least one infection. Among the infected mothers, 53.7% had UTI, 32.4% had bacterial vaginitis, 12.96 % had kidney infection, 9.25% had STI, 2.77% had PID and 0.925% had chest infection. Acute or chronic infections such as UTI, STI and BV during pregnancy result in direct intrauterine growth leading to LBW. In addition, certain infectious agents have potential to penetrate

through uterus and causes inflammations in uterus and placenta in response to inflammation cytokines are released by the immune system, high levels of cytokines is accountable for preterm initiation of labor which results in LBW. It was clearly seen that mothers who had LBW baby, were found to have at least one of the above diseases. 57.1% of the total had anemia during pregnancy, 40.7% of the total had malaria during pregnancy and 15.7% of the total had heart diseases. Mother with diseases like heart disease tends to have more difficult pregnancies. The diseases cuts off essentials nutrients to fetus and can cause deadly seizures in mothers. In that case immediate delivery is the only sure way to save both the mother and the baby. In addition, malaria during pregnancy causes decreased placental growth and nutritional transport across placenta as a result IUGR occurs resulting in LBW. Malaria here further leads to anemia and are associated with poor pregnancy outcomes.

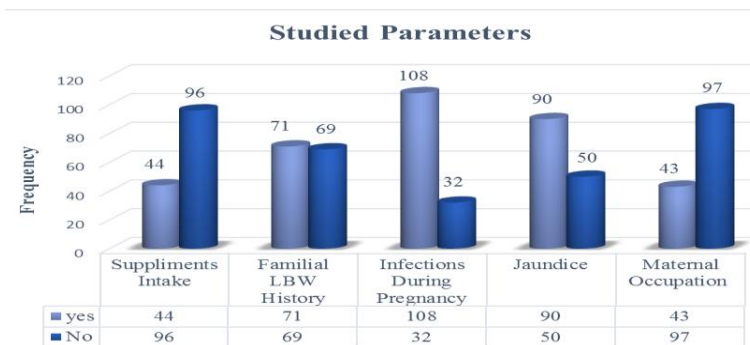


Fig. 2. Prevalance of studied parameters.

Majority of the LBW newborn were having jaundice at birth. Most babies with extremely low birth weight (ELBW) suffer from clinically significant hyperbilirubinemia that needs treatment. 64% of the total infants were having jaundice at birth. There could be several reasons for this. It can be because of increased levels of red blood cells turnout and destruction in the liver. Secondly, physiological jaundice occurs, which is a mild jaundice and is due to the immaturity of the baby's liver, which leads to a slow processing and removal of bilirubin pigment from the body. Mothers with stunted height were at a higher risk of having low birth weight baby. 50.7% of the total were having height of less than or equal to 5.2 feet and were more frequently found to have LBW. 35% of the totals were found to have a height of 5.3 to 5.6 feet while the rest 14.2% of the total were least frequently found to have LBW baby.

4. Conclusion

Various factors such as maternal education level, socioeconomic level, certain infections such as UTI, BV, malaria, kidney infection, chest infections, some maternal chronic

conditions which were anaemia, hypertension, cardiac problems, antenatal visits, jaundice at birth, familial vertical history, maternal BMI score, interval during pregnancy, macronutrient supplementation, maternal nutritional state during pregnancy and previous LBW deliveries were mainly associated with LBW. It was found that some factors were positively affecting the occurrence of LBW which include preterm birth that was observed to be a major cause for LBW, BMI was an important determinant for LBW, lower social class were more likely to have LBW new-born than those who came from higher social class, maternal education was strongly related with increased frequency of LBW, inter-pregnancy interval less than one year was an important factor leading to LBW, mothers with familial vertical history of LBW were more likely to deliver low weight baby, infections during pregnancy was one of the major causes of LBW, anaemia was frequently found in mothers having LBW babies, mal-nourished women compared to well-nourished ones were at high risk of delivering LBW, mothers using multivitamins and folic acid during pregnancy had less chances of having LBW, female babies were more frequently found among LBW babies compared to males babies and most of the LBW babies were suffering from jaundice at birth.

The conclusions pointed out some main limitations in the scope of our analysis which include lack of resources, unavailability of some study parameters with organizations and low response rate as some participants were not willing to share their personal information.

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