Determination of Factors Associated with Low Birth Weight among Babies Born in Sulaimania City, Kurdistan-Iraq

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Abstract:

**Background:** Low birth weight (LBW) is the main leading cause of infant death. It is contributing to a variety of short and long term poor health outcomes. Determination of risk factors associated with LBW is important to select a suitable action to prevent or reduce this outcome. Studies on LBW and maternal risk factors in the Kurdistan region of Iraq are scarce.

**Objectives:** This study aimed to determine risk factors associated with Low birth weight in Sulaimania city, Kurdistan region of Iraq.

**Cases and Methods:** This study was carried out in the Maternity Hospital in Sulaimania from first of July, 2019 to first of February, 2020. Participants were 300 randomly selected mothers who gave a live birth. The questionnaire form, which contains information about factors associated with low birth weight (infant’s weight at birth lower than 2.5 kg) were filled by collectors. Infants were weighed immediately after delivery, and the weight was recorded in addition to sex of the infants, gestational age (weeks), age of the mother, job of the mothers, mother’s educational levels, antenatal care attendance, gravidity, residency, exercise and history of chronic diseases of mothers were recorded.

**Results:** The results of the present study indicate that LBW was reported in 44.7% of the participants. For the LBW group, 48.5% were males and 51.5% were females. The highest percentage of LBW was among those born preterm 75.4% and the lowest was among full term 24.6%. Many factors such as an employed mother (85.8%), no exercise during pregnancy (88.1%), residency in urban (61.9%), mothers with chronic diseases (86.6%) and low level of education (illiterate and primary) (67.9%) were found as the significant risk factors of LBW. However, other factors such as prenatal care visits, age of mothers and gravidity were not found to be associated with LBW.

**Conclusion:** The current study concludes that multiple risk factors may be associated with LBW in Sulaimania city. Kurdistan region of Iraq. Gestational age (preterm delivery), working mothers, no regular exercise, urban residence, low level of education and mother’s diseases such as hypertension, respiratory conditions, chronic infections and diabetes mellitus were considered as the risk factors associated with LBW.

**Keywords:** Low birth weight, maternal risk factors, preterm delivery, full term delivery, Sulaimania city.

Introduction:

Low birth weight (LBW) is defined by the World Health Organization (WHO) as infant’s weight at birth lower than 2.5 kg. It is estimated that 15% - 20% of all births worldwide are LBW, representing more than 20 million births a year (1). In some communities LBW may be a major health problem and is related to a variety of both short- and long-term consequences. Globally, LBW is a main contributing factor to neonatal deaths (2). Short term complications may include problems such as enterocolitis, retinopathy, late onset sepsis and problems of the respiratory tract (3, 4). Long term outcomes may include hypertension in young adult life (5), neurodevelopmental outcomes at age two and five years (6), high risk of cognitive impairment (7), and type-2 Diabetes mellitus (8). One study found that a long term consequence among LBW female children is a likelihood of developing obesity (9). Moreover, children with very low birth weight (VLBW) are also at high risk of undergoing progressive or delayed-onset hearing loss (10). Two main conditions contribute to LBW, which are premature delivery (11) and/or a poor perfusion between the placenta and uterus due to the restriction in the intrauterine growth (12). The risk factors associated with LBW according to many studies are maternal weight, age, malnutrition, inadequate health care, chronic infection, and gestational diabetes mellitus. Furthermore, smoking, drinking large amount of alcohol during pregnancy and genetic factors may be causes of LBW (13, 14). There is a very scarce research regarding maternal risk factors and LBW in Kurdistan region of Iraq.

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Therefore, this study was carried out in a Sulaimania maternity hospital with the aim of identifying risk factors associated with LBW.

**Cases and Methods:**
Location and participants: This study was carried out in Sulaimania city/ Kurdistan region of Iraq. Sulaimania is located in the north east of Iraq with a population of nearly one million. Three hundred mothers who were admitted to Sulaimania Maternity Hospital and have delivered live born neonates were included in this study.

Data collection: The cases were enrolled between the first of July 2019 and first of February 2020. Participants were selected randomly and the questionnaire form, which covers information about factors associated with LBW (infant’s weight at birth lower than 2.5 kg), was filled. The information included: infant’s weight immediately after delivery, infant’s sex, gestational age at delivery which is taken from the beginning of the mother’s last menstrual period, mother’s age, job, mother’s educational level, antenatal care attendance, gravidity, residency, exercise and medical history (hypertension, all types of respiratory conditions, chronic infections and others).

Data analysis: Data was entered into statistical package for social sciences “SPSS” version 26 for storage and statistical analysis. The Chi-square test was applied to test for association, with a P value of 0.05 or less considered as significant.

**Results:**
Among 300 live born neonates, 134 (44.7%) (65 males and 69 females) weighed less than 2.5 kg (LBW), 160 (53.3%) (74 males and 86 females) were between 2.5−4.5 kg (normal birth weight) and 6 (2%) (4 males and 2 females) were over 4.5 kg (high birth weight). Statistically, there was no significant association between sex and birth weight (P value=0.596), table 1.

| Birth weight (Kg) | Sex of infants - No. (%) | Statistics |
|-------------------|--------------------------|------------|
|                   | Male | Female | Total | Chi-square | P value |
| < 2.500           | 65   | 69     | 134   | 44.7       | 0.135   |
| 2.500 - 4.500     | 74   | 86     | 160   | 53.3       |         |
| > 4.500           | 4    | 2      | 6     | 2.0        | 0.596   |
| Total (100%)      | 143  | 157    | 300   |            |         |

Among mothers who have delivered LBW infants, 101 mothers (75.4%) had a gestational age of less than 37 weeks (preterm birth). Statistically there was a significant association between preterm birth and LBW (P value=0.01). The results show a statistically significant association between employment status of mothers and the occurrence of LBW. Among 134 LBW infants, 115 mothers (85.8%) were employed and only 19 (14.2%) were housewives, P value=0.001. A significant association was found between practicing exercises and LBW. Out of 134 LBW infants, 118 (88.1%) were born to non-exercising mothers and only 16 (11.9%) were born to exercising mothers (P value < 0.001). A similar association was found for residence of the mothers, with more LBW infants being born to urban mothers 83 (61.9%) than those born to rural mothers 51 (36.1%), (P value < 0.01). For mothers with diseases such as hypertension, asthma, diabetes, chronic infections, the incidence of LBW infants was 116 (86.6%) compared to 18 (13.4%) among mothers who had no history of such diseases, P value < 0.001). A significant association was found between mother’s level of educations and LBW. LBW infants were 55 (41.0%), 36 (26.9%), 23 (17.7%) and 20 (14.9%) among mothers whose level of educations were illiterate, primary, secondary and university respectively, P value=0.001, table 2.

**Table 2: Distribution of LBW infants according to some maternal factors**

| Variable                        | Category          | No. (%) | LBW , (%) | LBW , (%) | Total | P Value |
|---------------------------------|-------------------|---------|-----------|-----------|-------|---------|
| Gestational age at birth (weeks)| < 37              | 101     | 75.4      |           |       |         |
|                                 | 37+               | 33      | 24.6      | 134       |       | 0.01    |
| Mother’s employment             | Employed          | 115     | 85.8      |           |       |         |
|                                 | Housewife         | 19      | 14.2      | 134       |       | 0.001   |
| Exercise                        | Yes               | 16      | 11.9      | 134       |       | 0.001   |
|                                 | No                | 118     | 88.1      |           |       |         |
| Residency                       | Urban             | 83      | 61.9      | 134       |       | 0.006   |
|                                 | Rural             | 51      | 36.1      |           |       |         |
| Mother’s diseases               | Yes               | 116     | 86.6      | 134       |       | 0.001   |
|                                 | No                | 18      | 13.4      |           |       |         |
| Mother’s educational level      | Illiterate        | 55      | 41.0      | 134       |       | 0.001   |
|                                 | Primary           | 36      | 26.9      |           |       |         |
|                                 | Secondary         | 23      | 17.2      |           |       |         |
|                                 | University        | 20      | 14.9      |           |       |         |

Factors like gravidity, mother’s age and regular prenatal health care were not found to be statistically significant, table 3.

**Table 3: Distribution of LBW infants according to some maternal variables**

| Variable                      | Category          | No. (%) | LBW, (%) | LBW, (%) | Total | P Value |
|-------------------------------|-------------------|---------|----------|----------|-------|---------|
| Prenatal health care visits   | Regular           | 63      | 47.0     |          |       | 0.490   |
|                               | Irregular         | 71      | 53.0     |          | 134   |         |
| Gravidity                     | 1-2               | 65      | 48.5     |          |       | 0.510   |
|                               | 3-4               | 58      | 43.3     |          |       |         |
|                               | 5+                | 11      | 8.2      |          |       |         |
| Age of mother (years)         | ≤ 25              | 64      | 47.8     | 134      |       | 0.282   |
|                               | > 35              | 13      | 9.7      |          |       |         |

**Discussion:**
The present study investigated many factors known to be associated with LBW infants in a group of neonates born in Sulaimania Maternity Hospital.
Gestational age at birth, mother’s employment, exercising, residency, diseases and educational level showed a statistically significant association with LBW. On the other hand, neonate’s sex, prenatal health care, gravidity and mother’s age were not significant associated with LBW. The current study showed that the prevalence of LBW was 44. 7% which is very high compared to the other developing countries. Previous studies found that the prevalence of LBW in the developing countries ranged between 9-35.1% (15). However, our result was consistent with another study done in a Maternity and Pediatrics Hospital in Baghdad / Iraq, which found that half of all neonates were born with LBW (16). Our study did not find a significant association between the sex of the neonate and LBW, in consistent with a previous study done in Al-Diwaniyah governorate, Iraq (17). However, a study from Afghanistan reported that female infants had a higher probability of being born with a LBW (18), which was attributed to the effects of androgen hormone and / or the Y chromosome on the male intrauterine growth and hence on birth weight. The current study found that the main cause of LBW infants was preterm delivery where contributed to 75.4% of all LBW infants. This is in parallel with a study that confirmed LBW primarily resulted from preterm delivery and intrauterine growth restriction or both (19). The level of mother’s education had a strong association with LBW, with mothers who were illiterate or below secondary level of education had a higher risk of delivering a LBW infants compared to mothers who had secondary or university levels of education. This may be explained by a lower access to health and nutrition information by mothers of low levels of education, with a negative effect on fetal growth. This finding is consistent with a study conducted in 12 European countries and found that low mother’s education was associated with preterm and LBW infants (20). Urban residence of mothers was found to be a risk factor for LBW, which may be due to a healthier environment in rural areas of Sulaimania and better access to prenatal care than the overcrowded urban environment. However, this result is in disagreement with that of Kayode et al., who found that rural residency contributed to a higher risk for LBW. They suggested that mothers who live in rural area are deprived from good health care, amenities or parities (21). The current study found a higher percentage of LBW infants among working mothers than housewives, in consistence with a study done in Northern Ethiopia which found that mothers who have a history of physical working during pregnancy have a high risk for LBW infants (22). Another study from Baghdad confirmed that working mothers have a high risk than housewives to have LBW infants (23). The current study found an association between regular exercise and LBW. Mothers with regular exercise during pregnancy have a much lower chance to have LBW infants compared to mothers with no exercise. This finding disagree with a previous study which suggested that exercise during pregnancy was not associated with a reduction of LBW or preterm delivery, but they did not find a negative effects of exercise on gestational age or prematurity (24). Mother’s diseases such as hypertension, asthma or chronic infections were found to be associated with LBW. This is consistent with a study done in a developed region in China, where anemia and hypertension of mothers contributed to LBW (25). Another study suggested that asthma, heart disease, hypertension, anemia and urinary tract infection in mothers were associated with LBW (16, 26). Factors like maternal age, prenatal health care and gravidity had no significant association with LBW. However, previous studies have confirmed that maternal age was a risk factor for LBW. A study in Nigeria found that maternal age was an important risk factor for LBW (27). A study from Italy showed that younger mothers were more likely to deliver LBW infants specially those who smoked and had irregular prenatal care visits (28). Prenatal care visits in our study result is inconsistent with a study performed in Brazil which showed an association between LBW and number of prenatal health care visits (29). Conversely, a study conducted in Afghanistan found no association between antenatal care visits and LBW (18).

Conclusion:
Multiple factors were found to be associated with LBW in Sulaimania city, Kurdistan region of Iraq. Preterm delivery, working mothers, no regular exercise, living in urban areas, low level of education and mothers diseases such as hypertension, respiratory conditions, chronic infections and diabetes mellitus were found to be associated with LBW. Early detection and suitable control and management of the mentioned factors would possibly reduce the incidence of LBW and therefore prevent its short and long term consequences.

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تحديد عوامل المرتبطة بالانخفاض وزن الطفل عند الولادة في مدينة السليمانية، كردستان العراق

د. سردار محمد ولي

الخلاصة:

الخلفية: انخفاض الوزن عند الولادة هو السبب الرئيسي لوفيات الرضع. وهو يساهم في مجموعة من النتائج الصحية السيئة قصيرة وطويلة الأجل. من المهم تحديد عوامل الخطر المرتبطة بالانخفاض الوزن عند الولادة لإتخاذ الإجراء المناسب لمنع أو تقليل العواقب. ومع ذلك، فإن الدراسة بشأن انخفاض الوزن عند الولادة وعوامل الخطر الأمومية في إقليم كردستان العراق قليلة جدا.

الأهداف: هدف هذه الدراسة إلى تحديد عوامل الخطر المرتبطة بالانخفاض الوزن عند الولادة في مدينة السليمانية، إقليم كردستان العراق.

الطريقة: أجريت هذه الدراسة في مستشفى الولادة في السليمانية من الأول من تموز 2019 واستمرت حتى الأول من شباط 2020. شملت الدراسة 300 وفاء مع ولدات أطفالاً أحياء تم اختيارهن عشوائياً لملء نموذج الاستبيان الذي يحتوي على معلومات حول العوامل المرتبطة بالانخفاض الوزن عند الولادة وشملت المعلومات عن الرضيع بعد الولادة مباشر، وجنسي الرضيع، ومدة الحمل، وعمر الأم، ووظيفة الأمهات، والمستويات التعليمية للأمهات، والحضور المنتظم في مركز رعاية الحمل، وعدد مرات الحمل، ومكان السكن، والتمارين الرياضية، والمرض المزمن للأمهات.

النتائج: كشفت النتائج الدراسة الحالية أن من بين 300 مشاركة، كانت نسبة انخفاض الوزن عند الولادة 44.7% بين الأطفال في مجموعة انخفاض الوزن عند الولادة كان 48.5% ذكور و51.5% إناث. كانت أعلى نسبة من انخفاض الوزن عند الولادة بين الولادات قبل الأولان، 75.4% إذن. نسبة كانت 24.6% في الموالدين بعد ذلك. عوامل كثيرة مثل الأمهات العاملات (85.8%) وعدم ممارسة الرياضة بانتظام (88.1%) وเพศ نموذج الإسبان الذي يحتوي على معلومات حول العوامل المرتبطة بالانخفاض الوزن عند الولادة وشملت المعلومات عن الرضيع بعد الولادة مباشر، وجنس الرضيع، ومدة الحمل، وعمر الأم، ووظيفة الأمهات، والمستويات التعليمية للأمهات، والحضور المنتظم في مركز رعاية الحمل، عند مرات الحمل، ومكان السكن، والتمارين الرياضية، والمرض المزمن للأمهات.

الخلاصة: خلصت الدراسة الحالية إلى أن من بين 300 مشاركة، كانت نسبة انخفاض الوزن عند الولادة 44.7% بين الأطفال في مجموعة انخفاض الوزن عند الولادة كان 48.5% ذكور و51.5% إناث. كانت أعلى نسبة من انخفاض الوزن عند الولادة بين الولادات قبل الأولان، 75.4% إذن. نسبة كانت 24.6% في الموالدين بعد ذلك. عوامل كثيرة مثل الأمهات العاملات (85.8%) وعدم ممارسة الرياضة بانتظام (88.1%) وเพศ نموذج الإسبان الذي يحتوي على معلومات حول العوامل المرتبطة بالانخفاض الوزن عند الولادة وشملت المعلومات عن الرضيع بعد الولادة مباشر، وجنس الرضيع، ومدة الحمل، وعمر الأم، ووظيفة الأمهات، والمستويات التعليمية للأمهات، والحضور المنتظم في مركز رعاية الحمل، عند مرات الحمل، ومكان السكن، والتمارين الرياضية، والمرض المزمن للأمهات.

كلمات المفتاحية: انخفاض الوزن عند الولادة، عوامل الخطر الأمومية، الولادة المبكرة، الولادة الكاملة، مدينة السليمانية.