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# Low birth weight and risk factors among neonates delivered in Khartoum Teaching Hospital in January – February 2007

**Aisha, A.M.B.[1]; Merghani,T.H.[2]; Mohammed, E.J.[1]; Hafsa, A. H.[1]; Rabab, K.H.[1]; Nihal A. E[1].**

1 Department of Physiology- Faculty of Basic Medical Science- Omdurman Islamic University, Khartoum-Sudan
2 Department of Physiology- Faculty of Medicine – University of Khartoum, Khartoum-Sudan

**Abstract**

The aim of this study was to investigate prevalence and possible risk factors for LBW in Khartoum Teaching Hospital, Sudan.

Fifty pregnant women, 14-45 years old, were selected randomly from those admitted to the labor ward of Khartoum Teaching Hospital during the period from January to February 2007. A structured questionnaire was administered to each woman to gather social and medical information. Neonates were weighed immediately using a standardized weight scale to the nearest 50 g. LBW was considered when birth weight was less than 2500g.

The percentage of LBW among neonates of the study group was 12%, normal birth weight was 78%, whereas high birth weight was 10%. Cigarette passive smoking was found to be significantly related to LBW ($p<0.05\%$). Other risk factors like, age, education, occupation, parity, past history of twins and anemia had no effect on LBW.

The proportion of LBW among neonates delivered in Khartoum Teaching Hospital was found to be 12%. The relation of passive smoking to low birth weight was found to be highly significant.

**Correspondence to:**
Dr. Aisha Mohammed Bello Ahmed (Ph.D. in Physiology)
Assistant Professor- Head Department of Physiology- Faculty of Basic Medical Science- Omdurman Islamic University. Email: Bello.aisha73@yahoo.com.

## Introduction:

Low birth weight (LBW) is defined by the WHO as the weight of an infant at birth of less than 2.5 kg, irrespective of gestational age. Although about one half of all LBW infants in industrialized countries are born preterm (<37 wk gestation), most LBW infants in the developing countries are born at term and are affected by intrauterine growth restriction that may begin early in pregnancy [(1)]. LBW is a key determinant of infant survival, health and development [(2)]. It is found to be one of the major causes of high mortality and morbidity rates [(3)]. The Birth weight is governed by two major processes: duration of gestation and intrauterine growth rate. LBW is thus caused by either a short gestation period or retarded intrauterine growth or a combination of both. Prematurity is usually defined as a gestational age of less than 37 weeks whereas intrauterine growth retardation (IUGR) has generally no standard definition [(4)]. Low birth weight infants are at greater risk of having disability and diseases such as cerebral palsy, visual problems, learning disabilities and respiratory problems [(2, 4)]. Premature

infants, especially those weighing less than 1500g (also known as very low birth weight infants) have a far greater risk of developing hyaline membrane disease, aponea, intrauterine haemorrhage, sepsis, retrolental fibroplasia, and other conditions related to physiological immaturity. IUGR infants are far more likely to exhibit growth deficiencies, which appear to be permanent [(4)]. Many factors are thought to be associated with higher incidence of LBW. These include female neonates, maternal age (<20 or >35 years), primiparity and preterm live births [(5)]. On the other hand, pregnancy maternal body mass index, unbooked status, preeclampsia and bad obstetric history are significant maternal factors resulting in LBW babies [(2)]. Additional factors are related to socioeconomic status, calorie intake, urinary tract infection, quality of antenatal care [(6)], ethnicity, marital status, birth interval and educational level [(2)]. Fetal factors include genetic and/or chromosomal aberrations [(2)]. In addition to all these factors, a close association is found between LBW and medical conditions during pregnancy such as hypertension, diabetes, malnutrition, bleeding, anemia, infections, placental or fetal anomalies and multiple pregnancies [(7)].

A multi-factorial inter-relationship exists between environmental factors and the growth rate of the fetus [(8)]. One of these factors is the tobacco smoke, the factor most often cited [(9)]. Both active and passive smoking were found to be highly associated with low birth weight and premature births [(10)]. Smoking causes fetal hypoxia which arises as a consequence of increased carboxyhemoglobin levels, attenuated blood oxygen unloading and vasoconistriction of maternal blood supply to the placenta [(11, 12)]. Fetal oxygen deprivation results in growth retardation and weight reduction in the new born [(12)].

**Materials and methods:**

**Study design:** This is a descriptive, cross sectional hospital based study.

**Study population and study area:** The population studied composed of 50 pregnant women selected randomly from those admitted to Khartoum Teaching Hospital (KTH) for delivery, during the period from 1st January to 2nd February2007. Their ages ranged between 14 and 45 years old and they all live in Khartoum State.

**Methods of data collection:**

**Questionnaire:** The selected ladies responded to the interviewer who administered a questionnaire requiring information about maternal age, educational level, occupation, parity clinical profile, date of the last menstrual period and outcome of previous pregnancy (delivery and miscarriage). The date of the last menstrual period was used to determine gestational age. They were asked about active smoking and whether or not they were exposed for at least two hours per day during pregnancy to passive smoking, either at home or at work. The modes of delivery, past history of twins and presence or absence of anemia were recorded.

**Measurement of neonatal body weight:** Immediately after birth, the weight of each newborn was taken using standardized weight scale to the nearest 50g. LBW was considered when the birth weight was less than 2500 g.

**Ethical consideration:** Approval was taken from the consultants and doctors supervising the labor

ward in the hospital. Informed consents were taken from the pregnant women before entry into the study.

**Statistical analysis:** The collected data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 14. The chi square test was used to test distribution of categorical variables and student's *t* test was used for continuous variables. Statistical significance was accepted when P value is less than 0.05.

**Results:**

Age distribution of the mothers is shown in figure 1. It was found that more than half (52%) of all mothers in the study group were within the age group from 25-34 years.

**Figure (1):** Age distribution of pregnant women in the study group

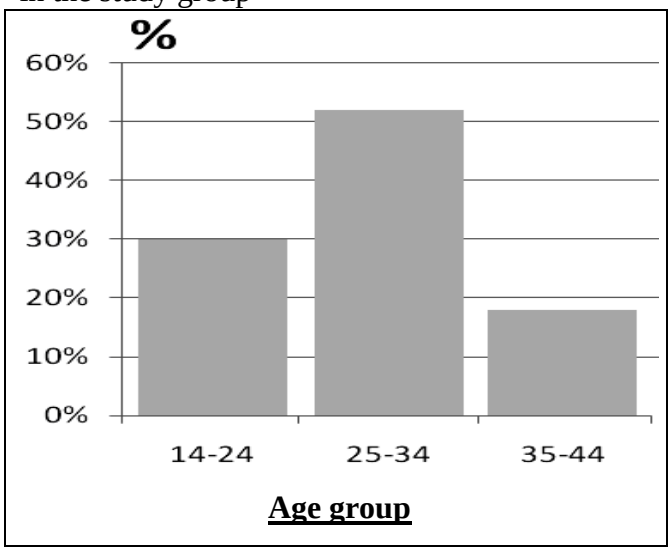


Table 1 showed that the majority of the mothers (86%) were house wives.

**Table 1:** Occupation of mothers in the study group:

| Occupation | Frequency | Percent |
|---|---|---|
| House wife | 34 | 86 % |
| Employee | 3 | 6 % |
| Worker | 4 | 8% |
| Total | 50 | 100% |

P=0.4388 not significant

Educational attainment is described in **table 2.** It shows that 32% of the mothers attained primary school education, 34% attended higher secondary school education and 30% attended university education.

**Table 2: Educational attainment among the mothers:**

| Education | Frequency | Percent |
|---|---|---|
| Not Educated | 2 | 4 % |
| Primary Education | 16 | 32 % |
| Secondary Education | 17 | 34% |
| University Level | 15 | 30 % |
| Total | 50 | 100% |

P=0.5161not significant

Table 3 describes the distribution of birth weight in relation to different age groups. Neonates with low birth weight were (12%), normal birth weight( 78%) and high birth weight (10%). The relation between birth weight and different age groups was statistically insignificant.



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**Table 3:** Distribution of birth weight in relation to age of pregnant women

| Total | High birth weight | Low birth weight | Normal birth weight | Age group |
|---|---|---|---|---|
| 14 - 24 | 26 % | 30 % | 4 % | 0 |
| 25 - 34 | 34 % | 46 % | 4 % | 8 % |
| 35 - 45 | 18 % | 24 % | 2 % | 4 % |
| Total | 78 % | 100% | 10 % | 12 % |

Not significant (p>0.05)

Modes of deliveries are shown in table 4. About 60% of all deliveries were cesarean sections. The difference of the modes of delivery in the study group was found to be statistically insignificant (P=0.9080).

**Table 4:** Modes of delivery in the study group

| Percent | Frequency | Mode of delivery |
|---|---|---|
| 40 % | 20 | Vaginal |
| 60 % | 30 | Cesarean Section |
| 100% | 50 | Total |

P=0.9080 not significant

The percentage of mothers exposed to cigarette smoke during pregnancy was about 54%. The relation between passive smoking and LBW was found to be statistically significant (P<0.05). (Table 5)

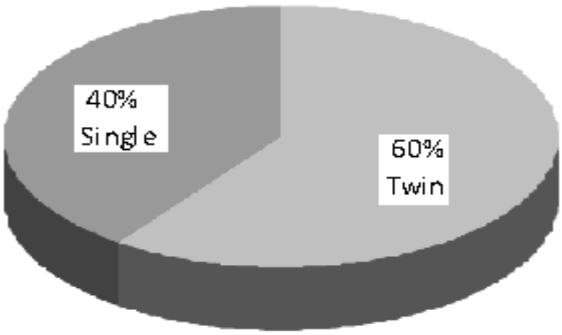
**Table 5**: Passive smoking in relation to low birth weight in the study group

| Percent | Frequency | Passive Smoking |
|---|---|---|
| 54 % | 27 | Yes |
| 46 % | 23 | No |
| 100% | 50 | Total |

P=0.0085 highly significant

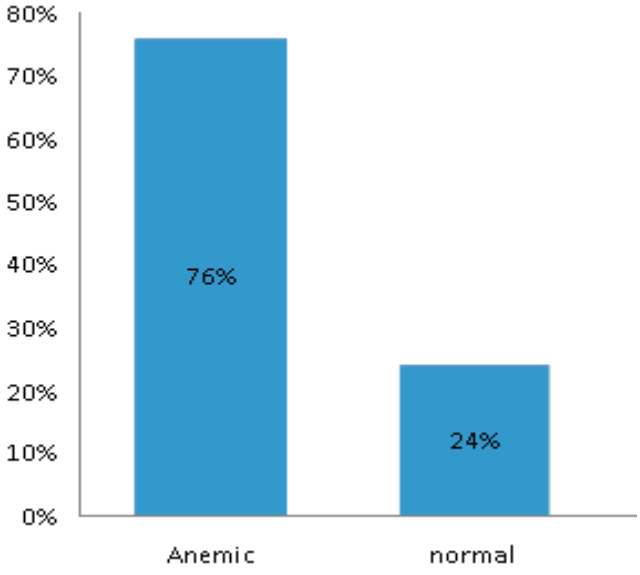
The percentage of mothers with past history of twins was 60% (figure 2).

**Figure 2:** Past history of pregnancy with twins in the study group:




Anemia was found in 76% of pregnant ladies (figure 3).

**Figure 3:** Percentage of anemia among pregnant ladies in the study group




**Discussion:**

Birth weight is an important indicator for future growth and development of children, hence periodical studies had been conducted to detect the prevalence of LBW. The documented



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prevalence of LBW in Sudan (UNCEF-1992) was 15%. More recently, a prevalence of 12.6% was found in central Sudan [13] and 15.3% in eastern Sudan [14]. Although the sample size in this study was small, the estimated prevalence in Khartoum teaching hospital was very similar to the previous studies conducted in other parts of the Sudan.

Complete duration of pregnancy (full term) was about 88% of all pregnancies and incomplete (preterm) was about 12% with a ratio of (7:3). This finding is quite different from findings in central Sudan where the ratio was (2:9) in the community and only (1.3) in the hospitals [15]. The higher ratio of term to preterm deliveries in Khartoum may reflect better antenatal follow up in Khartoum compared to other parts in the country. In this study, no significant relation was found between mother age and LBW. This finding is consistent with other findings in Sudan which found insignificant association between the young age of mothers and LBW[13]**.** However, international studies confirmed presence of strong association between LBW and this factor [5]. In addition to maternal age, other factors like educational attainment, history of anemia, past history of twins and medical insurance were found to have insignificant correlation with low birth weight. These findings are quite different from previous findings in other parts of the Sudan which confirmed a close association between LBW and many other factors like low socio-economic status, lack of antenatal care, short birth intervals, poor obstetric history, complications of pregnancy and malaria infection [13-16]**.** It is worth noting that the majority of mothers in this study were educated. University graduates were about 30%.

The percent of active smoking was zero and this is a good finding which is different from level of active smoking in the developed countries. Most probably because in Sudan, smoking practice is religiously and socially unacceptable, especially among females. On the other hand, positive history of passive smoking was found in 54%. This is a serious finding because it indicates lack of knowledge about the negative effects of passive smoking on growth and development of the fetus during intra-uterine life. A highly significant relation was found between passive smoking and LBW in this study ($P<0.05$). Similar results were found in other countries [12]. In addition to the LBW, neonates exposed to passive smoking during pregnancy may develop other complications like asthma and reduced lung function [17].

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**References:**

1.Villar, J; and Belizan, J. (1982). The relative contribution of prematurity and fetal growth retardation to low birth weight in developing and developed societies. Am. J. Obestet. Gynecol .,143(7):793-8.

2.Singhy, L.C; Chouhan, C.R; and Sidhu, M.K. (2009). Maternal factors for low birth weight babies. M.J.A.F.I, 65:10-12.

3.Schlep, F.P; and Pongpaew, P. (1985). Analysis of LBW rates and associated factors in a rural and an urban hospital in Thialand. J Trop. Paedtr. 31:5-8.

4.Kraemer, M.S. (1987). Determinants of delivering LBW. Methodological assessment and metaanalysis. Bull .WHO. Org., 65:663-737.

5.Feleke, Y; and Eniquoselassie, F. (1999).Maternal age, parity and gestational age on the size of the newborn in Addis Ababa. East. Afr. Med .J , 76(8):468-71.

6.Hart, N. (1993). Maternal nutrition and infant mortality: a re-examination of the Dutch Hunger Winter. Popul. Stud. (camb) , 47:27-46.

7.Zlot, A. (1999). The massachusetts LBW project: the level of agreement of LBW status between managed care claims data and birth certificates .Abstr. Book Assoc. Health Serv. Res .Meet, 16:67.

8.Negi, K.S; Kandpal, S.D; and Kukreti, M. (2006). Epidemiological factors affecting LBW. J. K. Sci. 8(1):31-4.

9.Badlissi, D; Guillemette, A; and Fadin, A. (2001). Prematurity and low birth weight: effects of active and passive smoking during pregnancy. Can. J. Public Health. 92(4):272-5.

10. United States Surgeon General. (1980). The health consequences of smoking for Women: report Washington: US Department of Health and Human Services, Public Health Service, Office of the Assistant Secretary for Health, Office on Smoking and Health.

11. Abel, E. (1980). Smoking during pregnancy. A review of effects on growth and development of offspring. Human Biol. , 52:593-625.

12. Terry, R; and Michael, B. (1986). Association of LBW with passive smoke exposure in pregnancy. American J. of Epidemiology, 124(4):633-642.

13. Elhassan, E.M; Abbaker, A.O; Haggaz, A.D; Abubaker, M.S; and Adam, I. (2010). Anaemia and low birth weight in Medani, Hospital Sudan. BMC. Notes. 3: 181.

14. Adam, I; Babiker, S; Mohammed, A.A; Salih, M.M; Prins, M.H; and Zaki, Z.M.(2008). Low body mass index, anaemia and poor perinatal outcome in a rural hospital in eastern Sudan. J. Trop .Paedtr. 54(3):202-4.

15. Taha, T.E; Gray, R.H; Abdelwahab, M.M; and Abdelhafeez, A.(1995). Distribution and determinants of low birth weight in Central Sudan. Paediatric and Perinatal Epidemiology, 9(2):185-200.

16. Taha, T.E; Gray, R.H; and Mohamedani, A.A. (1993).Malaria and Low Birth Weight in Central Sudan. Am .J .Epidemiol, 138:318–25.

17. Lodrup, Carlsen, K.C; Jaakkola, J.J; Nafstad, P; Carlsen, K.H. (1997). In utero exposure to cigarette smoking influences lung function at birth. Eur. Respir .J. 10:1774–9.