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Original Article

Occurrence and Risk Factors of Low Birth Weight in Sana'a, Yemen

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Abstract

Background: Low birth weight (LBW) remains prevalent and represents a public health problem in developing countries.

Objective(s): The aim of present study was to estimate the occurrence and risk factors of low birth weight in Sanaa', Yemen.

Methods: A case-control study was conducted at Al Kuwait University Hospital, Sana'a over a year. The study included all 181 women who delivered LBW single neonates ≥37 weeks of gestation. One hundred-eighty women who delivered babies ≥ 2500 g were taken as a control group. A questionnaire was prepared and included all maternal demographic and obstetric information. The maternal antenatal records were reviewed and birth weight was recorded.

Results: The occurrence of LBW was 18%. The mean birth weight was 2215.8±162.5 g. The majority of mothers giving birth to LBW infants were in the age group 20 to less than 30 (73.5%), and about 60% were from rural areas and low socioeconomic level. Also, 79.6% of the mothers giving LBW infants were anemic, compared to only 16.1% of the control group; in addition 35.4% of them were chewing Khat, compared to only 20.6% of the control group, the differences were statistically significant. About 68% of LBW infants needed neonatal ICUs, 43% were delivered by caesarean section and 8.8% were still births. Maternal education significantly increased the mean birth weight by an average of 244 g for primary level, 270 g for secondary level and 348 g for university level when compared to non-educated mothers (P=0.001). It was also found that parity has significantly increasing effect on the mean birth weight among the group of LBW of plus 50 g for mothers with 3 parities when compared to mothers with single parity (P= 0.05).

Conclusion: Maternal education was found as one of the determining factors significantly associated with increasing birth weight of neonates. Occurrence of low birth weight can be reduced by increasing the education level.

Keywords: Low birth weight, occurrence, risk factors

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INTRODUCTION

Low birth weight (LBW) is defined by the World Health Organization (WHO) as weight at birth less than 2500 g (5.5 Ib).[1] The prevalence of LBW infants is between 5-30% in underdeveloped or developing countries with significant variation across countries.[2]

The magnitude of this health problem is underestimated and mostly runs unrecognized. The primary reason is that more than 40% of babies are born at home and without skilled attendants and in these circumstances, babies are rarely weighed immediately after birth. Moreover, it is reported that in many developing countries, the registration of births is incomplete with only 60% of births registered worldwide.[3] Also, it is reported that accurate birth weight recording and reporting are not always correct, which further limit the reliable data on birth weight.[3] The causes of low birth weight are complex and interdependent, but the anthropometry of the mother and the nutritional intake are thought to be among the most important ones. Pre pregnancy weight, body mass index (BMI) and gestational weight gain all have strong, positive effect on fetal growth, suggesting that energy balance is an important determinant of birth outcomes.[4] However, low socioeconomic status, low education, lack of micronutrient supplementation, anemia, maternal infection, and complications during pregnancy are all considered risk factors for LBW.[4]

It was reported that significant association between maternal education and LBW has been found. Suzuki et

al., found that a maternal education less than high school was a significant risk factor for delivering a LBW infant.[5] Low birth weight continues to be a significant public health problem globally and is associated with a range of both short and long term consequences.[6] Low birth weight leads to impaired growth of the infant with its attendant risk of a higher mortality rate, increased morbidity, impaired mental development and the risk of non-communicable diseases.[7] Infants who weight 2000-2499 g at birth have a four fold higher risk of neonatal death than those who weight 2500-3499 g.[8] The more severe the growth restriction within the LBW category, the higher is the risk of death.[6] LBW is the result of preterm birth, intrauterine growth restriction, or a combination of both pathophysiologic conditions.

The aim of present study was to estimate the occurrence and risk factors of LBW among neonates in Sanaa', Yemen.

METHODS

A case-control hospital-based study was carried out in the obstetrics department of Al Kuwait University hospital, Sana'a, Yemen from January to December 2014.

All 181 women who delivered a single baby with LBW with an accurate gestational age of ≥ 37 completed weeks at the hospital were included in the study. LBW was defined as infant weight below 2500 grams. The gestational age was evaluated depending on the last menstrual period and/ or first trimester ultrasonography. All women with unknown gestational ages, those who delivered prior to 37 completed weeks, mothers with chronic medical illnesses such as diabetes mellitus or gestational diabetes and those who delivered neonates with congenital anomalies were excluded. One hundred-eighty women who delivered babies ≥ 2500 g with comparable age and parity were taken as a control group.

A pretested questionnaire was used and included all information about maternal age, parity, gestational age, antenatal care visits, and complications during the current pregnancy, maternal habits, past medical and obstetrical histories, and demographic data. Also, maternal pre pregnancy body weight, weight at term, mode of delivery, neonates' sex and postpartum events were recorded. The results of investigations carried out during pregnancy were also recorded, which were complete blood count and urine analysis. Infants were weighed on an electronic metric scale immediately after delivery, and fully assessed by the pediatrician in-charge and findings were recorded.

Data were analyzed using SPSS version 21 (IBM, Chic, Ill, USA). The data were presented as mean ± standard deviation (SD) or proportion as appropriate. For comparison between various characteristics of the study and control groups, either Chi-square test or Fisher's Exact test were used as appropriate for categorical variables and Student's t-test for continuous variables. To assess the magnitude of the association between maternal variables and LBW, linear regression with birth weight as the dependent variable was used. Initially all maternal variables were included into the model and then variables with no explanatory power of variance were removed. A P value of < 0.05 was considered statistically significant.

Ethical Considerations

This study protocol was approved by the Institutional Review Board and the Ethics Committee of Sana'a University. The study conformed to the International Guidelines for Research Ethics. Before an individual was included in the study, a verbal consent was obtained after explanation of the purposes and benefits of research.

RESULTS

There were 1002 deliveries during the study period. Of these, 181 women delivered LBW infants. The overall occurrence of LBW was 18%.

Table 1 shows the maternal characteristics of LBW and control groups. The majority of mothers giving LBW infants were in the age group 20 to less than 30 (73.5%). More than half (58%) were of parity 2-4. About 60% were from rural areas and of low socio-economic status. About two thirds were of low educational level, either illiterate or just received primary education. About 51 % received antenatal care and 8.8% were smokers. Also, 79.6% of the mothers giving LBW infants were anemic, compared to only 16.1% of the control group, the difference was statistically significant (P<0.000). In addition, 35.4% of them were chewing Khat, compared to only 20.6% of the control group, the difference was also statistically significant (*P*=0.001).

The mean pre pregnancy maternal weight of the study group was 55.07±7.3 kg and the mean height was 159.5±4.8 cm versus 56.09±4.3 kg and 160.1±3.9 cm for the control group. The difference between the two groups was statistically insignificant (*P*> 0.05). The mean maternal weight at term was 66.7±6.3 kg for the study group compared to 68.9±5.6 kg of the control group. The difference between the two groups was statistically significant (*P*= 0.001).

Table 2 shows the outcome results. The mean birth weight of the neonates was 2215.8±162.5 g for the study group compared to 2868.5±112.4 g for the control group. Among the study group, 43% of the mothers delivered by cesarean section compared to 17.2% of the control group, and the difference was statistically significant (*P*=0.000). The still birth rate was 8.8% for the study group compared to 2.2% for the control group, and the difference was statistically significant (*P*=0.005). About 68% of the LBW infants needed admission to neonatal intensive care units (NICU).

The results of linear regression were shown in table 3. It shows that the education has a significantly increasing effect on birth weight with an average of 244 g for the primary level, 270 g for the secondary level, and 348 g for university educated mothers when compared to non-

educated mothers (*P*=0.001). It was also found that parity has a significantly increasing effect on the mean birth weight among the LBW group of plus 50 g for mothers with 3 parities when compared to mothers with a single parity (*P*= 0.05).

Table 1: Maternal characteristics of the LBW and control groups

Variable	LBW group (n= 181) No. (%)	Control group (n= 180) No. (%)	Total	P value
Age (in years)				
<20	14 (7.7)	12 (6.7)	26	0.631
20-	133 (73.5)	141 (78.3)	274	
30-	32 (17.7)	24 (13.3)	56	
≥40	2 (1.1)	3 (1.7)	5	
Parity				
1	51 (28.2)	46 (25.6)	97	0.235
2-4	105 (58.0)	97 (53.9)	202	
≥5	25 (13.8)	37 (20.6)	62	
Residence				
Urban	72 (39.8)	106 (58.9)	178	0.000*
Rural	109 (60.2)	74 (41.1)	183	
Socioeconomic status				
Low	107 (59.1)	88 (48.9)	195	0.145
Middle	52 (28.7)	63 (35)	115	
High	22 (12.2)	29 (16.1)	51	
Education				
Illiterate	55 (30.4)	26 (14.4)	81	0.000*
Primary	62 (34.3)	56 (31.1)	118	
Secondary	33 (18.2)	54 (30.0)	87	
University	31 (17.1)	44 (24.4)	75	
Antenatal care	92 (50.8)	107 (59.4)	199	0.06
Smoking	16 (8.8)	8 (4.4)	24	0.07
Khat chewing	64 (35.4)	37 (20.6)	101	0.001*
Anemia	144 (79.6)	29 (16.1)	173	0.000*
Previous history of:				
Stillbirth	3 (1.7)	2 (1.1)	5	0.50
LBW	7 (3.9)	4 (2.2)	11	0.231

* significant (p<0.05)

Table 2: Outcome of deliveries of the LBW and control groups

Variable	LBW group (n=181)	Control group (n=180)	*P* value
	No. (%)	No. (%)	
Birth weight (in grams)*	2215.8±162.5	2868.5±112.4	< 0.001*
Mode of delivery			
Vaginal	103 (56.9)	149 (82.8)	0.000*
Cesarean	78 (43.1)	31 (17.2)	
Outcome:			
Live born	165 (91.2)	176 (97.8)	0.005*
Stillbirth	16 (8.8)	4 (2.2)	
Sex			
Male	88 (48.6)	77 (42.8)	0.157
Female	93 (51.4)	103 (57.2)	
Management			
Healthy and discharged	42 (23.6)	153 (85)	0.001*
Needed NICU	123 (67.9)	27 (15)	

a Data presented as mean ± SD

* significant (p<0.05)

Table 3: Linear regression results of the study group

Variable	Coefficient	*P* value
Constant	2008.574	0.000
Education		
Primary	244.369	0.001
Secondary	269.678	0.001
University	348.166	0.001
Parity 2	5.136	-
Parity 3	49.776	0.05

DISCUSSION

Low birth weight is an important health outcome and has direct implications for infant morbidity and mortality as well as long-term effects on health outcome in adult life. The present study revealed that the occurrence of LBW was 18%. The rate was similar to that reported in Nigeria in 2011,[9] but higher than that reported in two different studies in Turkey (8.5% and 10% respectively).[10]. In India, 30-35% of babies were of LBW.[11]

There are several determinants of LBW and one of the most relevant is the maternal socioeconomic status, which has a close and direct association with the maternal level of education.[12] The maternal education may be considered as a proxy for the socioeconomic status of the household as well as for the characteristics of the community of residence.[13] The present study revealed that the education of mothers has a significantly increasing effect on birth weight. It has been found in previous studies that the mothers who had finished university or had a higher level of education had children of birth weight up to 82g higher than those who completed only high school or had a lower level of education.[12] Muula et al., (2011) found that women with no formal education were more likely to deliver a LBW baby compared to those with at least primary education in Malawi.[14] In Iran, it was reported that the prevalence of LBW in infants of non educated mothers was 16.9% compared to 5.4% for women with high level of education.[15] The association between maternal education and low rate of LBW could be related to the fact that education can result in a wide range of favorable behaviors mostly connected with pregnancy care which plays a role in improving fetal growth. Being more educated, the family income is improved which has a substantial influence on good diet intake including iron, folate and vitamins as well as following the recommended prenatal care visits.[9] Even in developed countries, unfavorable socioeconomic status and low education present great vulnerability to LBW.[12]

In contrast, a study from Brazil has shown an increase in LBW among more privileged social groups and in regions with higher economic growth.[16] Silva et al.,(2005) observed a higher rate of LBW among the region of higher development compared to less developed region and represented an epidemiological paradox.[17] However, the explanation and stability of these data are not clear and not yet tested in other countries.

The current study shows that the highest proportion of LBW was among women aged 20-29 years. A similar study reported that less than 18 years are more prone to deliver LBW babies due to nutritional, as well as physical and emotional maturity issues.[19] One study concluded that maternal age could be a protective factor for LBW and one year age increase showed a 4% reduction of the risk of LBW.[20]

It was reported that primi-parity and parity of > 5 are associated with LBW.[21] The results of the present study revealed that LBW was highest among parity 2-4 (58%). Independently, it was found by linear regression that parity has a significant increase on the mean birth weight among the LBW group of plus 50 g for mothers with 3 parities when compared to mothers with a single parity. This finding could be attributed to the possibility that with increasing parity, the women experience more knowledge about their healthy diet and care utilization during pregnancy.

The results of present study revealed that a significantly higher proportion of mothers giving birth to LBW infants were chewing Khat, compared to the control group. Both smoking and Khat chewing are risk factors for LBW[20] and mostly reflecting maternal illiteracy. The highest proportion of the study sample was from rural areas, which are characterized by illiteracy, poverty, scanty of health care centers and underutilization of the available health services.

It was reported that mothers' socioeconomic factors affect the adequacy of antenatal care utilization and such adequacy cannot be achieved unless the women's overall social, political and economic status are jointly considered.[22]

CONCLUSION & RECOMMENDATIONS

In Conclusion, this study supports the view that maternal education has a fundamental influence on pregnancy outcome particularly LBW. Maternal parity was also correlated with LBW.

Reducing the occurrence of LBW is the most important issue that should be addressed focusing on better education.

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