Prevalence and risk factors for low birth weight in Yazd, Iran

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ABSTRACT

Introduction: Low birth weight (LBW) is a major health problem and a significant contributor to neonatal death in both industrialised and developing countries. This study examined the prevalence and risk factors for LBW in Yazd, a central city of Iran.

Methods: In this cross-sectional study, we evaluated all births that were registered in all the maternity hospitals in Yazd, Iran in 2008. LBW neonates were compared with neonates whose birth weight exceeded 2,500 g.

Results: The overall prevalence of LBW was 8.8 percent. Univariate analysis using chi-square test showed that the risk factors associated with LBW were first and second pregnancies, teenage pregnancy, maternal diseases (pregnancy-induced hypertension, chronic hypertension and urinary tract infection), childbirth interval of less than three years, especially less than one year from the previous birth, preterm labour and working mothers. In multivariate analysis, preterm labour (odds ratio [OR] 5.2, 95 percent confidence interval [CI] 4.8–6.11), working mothers (OR 2.7, 95 percent CI 1.25–3.1) and pregnancy-induced hypertension (OR 1.5, 95 percent CI 1.2–2.22) were found to be risk factors for LBW.

Conclusion: Screening for high-risk pregnancies, such as teenage pregnancies and those with short birth intervals and maternal disease, as well as making provisions for attentive prenatal care and facilities are essential to reduce the incidence of LBW.

Keywords: extremely low birth weight, low birth weight, neonate

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INTRODUCTION

Low birth weight (LBW) or birth weight < 2,500 g is significantly related to reduced neonatal survival and postnatal morbidity. Prevention of LBW is the main concern of the public health sector in Iran. LBW neonates are sub-grouped according to the weight of the neonate after birth; neonates with a moderately low birth weight weigh 1,500–2,499 g, very low birth weight (VLBW) infants weigh 1,000–1,500 g and those with extremely low birth weight (ELBW) weigh < 1,000 g. The rates of cerebral palsy, mental retardation and other sensory and cognitive dysfunctions are higher in LBW infants than in those with a normal birth weight (NBW) of 2,500–4,000 g.[1]

According to UNICEF statistics, the global rate of LBW stands at 17%, out of which 6% is observed in industrialised countries and 21% in developing ones.[2] Based on the results of two studies, the LBW rate in the Islamic Republic of Iran was reported as 10%[2] and 8.4% in Yazd, the central city of Iran.[3] LBW is caused by preterm birth, intrauterine growth retardation (IUGR) or both. The predominant cause of LBW in the United States is preterm birth, whereas in developing countries, it is more frequently caused by IUGR. Over the past two decades, we have seen an increase in the rate of LBW primarily due to an increase in preterm births.[1] LBW and prematurity are the second leading causes of infant mortality after congenital anomalies, but they contribute disproportionately to the infant mortality rate (deaths in the first year after birth).[4]

On the other hand, VLBW rate can be an ultimate measurement of infant mortality rate, in that infants with LBWs are 40 times more likely to die than those with NBW.[5] It has been observed that infants with VLBW have a 200-fold higher risk of neonatal deaths (about 50%).[1] Foetal growth and weight of newborns are influenced by many factors, from socioeconomic status to the condition of the mother during pregnancy. In order to reduce the rate of infant death, it is important to have reliable information on LBW rates, especially in developing countries. Therefore, the main objectives of this study were to determine the prevalence of LBW and to investigate the relationship between causative factors and neonatal birth weight in Yazd, Iran.

METHODS

This was a cross-sectional study conducted during the whole year of 2008, in which all births that took place

in all the maternity hospitals in Yazd were evaluated. The neonates were successively enrolled in the study and divided into two groups according to the birth weights recorded in the health records. All LBW neonates were classified as the case group, while those whose birth weight exceeded 2,500 g served as the control group. Data for both groups of infants were listed in a special questionnaire that included maternal and delivery data, as well as data about the newborn. Variables such as age, body mass index (BMI), working status and educational level of the mother, route of delivery, gender of the neonate and gestational age were carefully retrieved from the medical records of the mother and neonate. Gestational age was calculated using either the first day of the last normal menstrual period or estimated by obstetric sonography and the Dubowitz score. Births that occurred at < 37 weeks were classified as preterm. Neonatal birth weight < 2,500 g was classified as LBW.

Data was analysed using the Statistical Package for the Social Sciences version 10 (SPSS, Chicago, IL, USA). Unpaired *t*-test and chi-square test were used to compare continuous-quantitative and categorical-qualitative variables between the groups, respectively. Risk factors were initially examined by univariate analysis. Multivariate logistic regression analysis was used to examine the risk of LBW after adjustment for individual risk factors. Rate ratios were calculated for individual risk factors with 95% confidence interval (CI). A p-value < 0.05 was considered to be statistically significant.

RESULTS

A total of 5,897 deliveries were reported during the year 2008. The incidence of LBW was 8.8% (n = 519). Out of these LBW neonates, eight (1.5%) and 39 (7.5%) were classified as ELBW and VLBW, respectively, representing 0.13% and 0.6% of the whole sample, respectively. 52% (271/519) of the infants in the case group (LBW) and 49% (2,635/5,378) in the control group were male, and neonatal gender distribution did not differ between the two groups (p = 0.5). The route of delivery was Caesarean section in 33% of the case group (n = 171) and 36% of the control group (n = 1936). The difference in the overall Caesarean rate was not significant between the two groups (p = 0.9).

In the LBW group, 87.3% (n = 453) were singleton, while 12.1% (n = 63) were twin and 0.6% (n = 3) were triple pregnancies. The corresponding rates in the NBW neonate group were 96.6% (n = 5,195), 3.4% (n = 182) and 0% (n = 0), respectively. Our data showed that multiple pregnancies were more prevalent in the LBW group (p = 0.001). The mean BMI was significantly higher in mothers who had NBW babies compared to those who delivered LBW babies (mean BMI 22.85 ± 3.2 kg/m^2 for LBW group vs. 24.25 ± 4.1 kg/m^2 for NBW group, p = 0.02).

The univariate analysis of some of the risk factors is shown in Table I. The findings indicate that first and second pregnancies, teenage pregnancy, maternal diseases (pregnancy-induced hypertension, chronic hypertension and urinary tract infection [UTI]), childbirth interval < 3 years, especially those < 1 year from previous birth, as well as preterm labour and working mothers were risk factors for LBW. Multivariate analysis revealed that the three factors that remained significant with logistic regression analysis were preterm labour (odds ratio [OR] 5.2, 95% confidence interval [CI] 4.8–6.11, p = 0.001), working mothers (OR 2.7, 95% CI 1.25–3.1, p = 0.02) and pregnancy-induced hypertension (OR 1.5, 95% CI 1.2–2.22, p = 0.04).

DISCUSSION

LBW, especially VLBW is a major predictor of infant morbidity and mortality. According to UNICEF statistics, the global rate of LBW stands at 17%. Of these, 6% occur in industrialised countries and 21% in developing ones. The rate in the Eastern Mediterranean region is 11%, and that in the Islamic Republic of Iran is 10%.[2] The prevalence of LBW in our study in Yazd was 8.8%, and the prevalence in other Iranian cities was reported to be 11.8% in Zahedan,[6] 8.1% in Hamadan,[7] 6.3% in Gorgan,[8] 4.2% in Tonekabon,[9] 6.2% in Babol,[10] 4.2% in Tehran[11] and 9.6% in Bushehr.[12]

In this study, 0.8% of live births were VLBW neonates, a finding that was similar to that reported in Italy.[13] In our study, an increased rate of LBW was found in preterm births, which is consistent with that of other studies.[2,5,6,14-17] Adolescent pregnancy was also associated with an increased risk of LBW, preterm births and neonatal mortality, as reported in other studies.[6,14,16-20] Some studies have also demonstrated a direct association between LBW and the education level of the mother.[6,19] However, we found no statistically significant relationships between LBW and mothers' educational level. This could be attributed to our small sample size.

In the present study, multiple births was a risk factor for LBW in some cities of Iran (Zahedan,[6] Hamadan,[21] Babol[10] and Jiroft[9]), Italy[14] and Japan.[15] Our study also demonstrated that working mothers are at increased risk of having LBW infants, a finding that was also reported in Nobile et al's study.[14] However, Dickute et al reported that maternal unemployment during pregnancy significantly

Table I. Risk factors for low birth weight using univariate analysis.

Factor	No. (%)		p-value
	LBW	NBW	
Birth order			0.01
First	258 (50.0)	368 (35.0)	
Second	112 (21.5)	184 (18.0)	
Third	62 (12.0)	130 (12.0)	
Fourth	24 (4.5)	122 (12.0)	
Fifth or more	63 (12.0)	237 (23.0)	
Maternal age (yrs)			0.02
< 20	143 (27.5)	168 (16.0)	
20–35	343 (66.0)	745 (71.7)	
> 35	33 (6.5)	128 (12.3)	
Maternal education level			0.5
Illiterate	64 (12.0)	133 (12.8)	
Primary/secondary school	254 (49.0)	496 (47.6)	
High school	170 (33.0)	362 (34.8)	
Higher education	31 (6.0)	50 (4.8)	
Maternal disease			
Pregnancy-induced hypertension			0.01
Yes	45 (8.7)	82 (1.5)	
No	474 (91.3)	5,296 (98.5)	
Cardiac disease			0.99
Yes	3 (0.5)	22 (0.4)	
No	516 (99.5)	5,356 (99.6)	
Hypertension			0.03
Yes	29 (5.6)	72 (1.4)	
No	490 (94.4)	5,306 (98.6)	
Diabetes mellitus			0.99
Yes	2 (0.4)	19 (0.4)	
No	517 (99.6)	5,359 (99.6)	
Asthma			0.4
Yes	9 (1.7)	33 (0.6)	
No	510 (98.3)	5,345 (99.4)	
Urinary tract infection			0.02
Yes	77 (15.0)	335 (6.3)	
No	442 (85.0)	5,043 (93.7)	
Interval from previous childbirth (yrs)			0.03
< 1	33 (13.0)	40 (6.0)	
1–3	133 (51.0)	316 (47.0)	
> 3	94 (36.0)	315 (47.0)	
Interval from previous abortion (yrs)			0.4
< 1	16 (27.6)	31 (20.0)	
1–3	16 (27.6)	44 (29.0)	
> 3	26 (44.8)	77 (51.0)	
Preterm labour			0.0001
Yes	161 (31.0)	258 (4.8)	
No	358 (69.0)	5,120 (95.2)	
Maternal employment status			0.001
Office employee	44 (8.5)	248 (4.6)	
Manual labourer	8 (1.5)	21 (0.4)	
Housewife	467 (90.0)	5,109 (95.0)	

LBW: low birth weight; NBW: normal birth weight

increases the risk of bearing infants with LBW.[19] In our study, low maternal BMI was significantly associated with LBW in neonates; this was consistent with the results of other studies.[18,22-26] The present study also demonstrated that maternal preeclampsia significantly increases the risk of LBW in infants, which was in agreement with findings from other studies.[6,18,27,28] Short birth intervals were found to increase LBW rate, as reported by two other Iranian studies.[6,29]

Hypertension causes blood vessel stenosis in some pregnant women, which may result in neonates with LBW. The adverse effect of hypertension on birth weight

was also observed in two other Iranian studies.[6,8] The blood pressure of pregnant women should be monitored during pregnancy, for their own health and the health of their foetus. For this reason, community health workers (behvarz) in Iran pay regular prenatal visits to women during pregnancy. These include monthly visits in the first six months of pregnancy, up to two visits per month in the seventh and eighth months, and four visits during the last month of pregnancy. Since UTIs have been shown to increase the risk of LBW in pregnant women,[6] routine urine tests should be carried out during pregnancy to check for UTIs.

In conclusion, birth weight is a sensitive indicator for predicting infant survival and morbidity. It is necessary to screen pregnant mothers who are at risk of having infants with LBWs. Therefore, physicians should be vigilant to check for factors such as low birth interval and low BMI in mothers, teenage pregnancy, maternal disease and twin pregnancies. We highly recommend that mothers who are at risk be provided with adequate prenatal care and facilities.

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