Low Birth Weight and Its Related Risk Factors in Northeast Iran

Reza Chaman[1], MD,PhD; Mohammad Amiri[2], PhD; Mehdi Raei[3], MSc; Mohammad-Esmaeil Ajami[4], MD;

Afsaneh Sadeghian[5], MD; Ahmad Khosravi*[6], MSc

1. Department of Community Medicine, School of Medicine, Yasuj University of Medical Sciences, Yasuj, Iran
2. Department of Health Services Management, School of Public Health, Shahroud University of Medical Sciences, Shahroud, Iran
3. Department of Biostatistics, Qom University of Medical Sciences, Qom, Iran
4. Department of Midwifery, Shahroud University of Medical Sciences, Shahroud, Iran
5. Department of Pediatrics, Imam Hossein Hospital, Shahroud University of Medical Sciences, Shahroud, Iran
6. Center for Health Related Social and Behavioral Sciences Research, Shahroud University of Medical Sciences, Shahroud, Iran

Abstract

Objective: This study was conducted to determine the prevalence of low birth weight (LBW) and its related risk factors in an appropriate sample of neonates in Shahroud, northeast Iran.

Methods: At this study, a random sample of 1000 neonates were selected of which 72 neonates were LBWs. We used univariate and multivariate logistic regression methods to evaluate the LBW risk factors in LBWs compared to normal weight infants.

Findings: 7.2% of neonates were LBWs and 6.1% born before 37 weeks of gestation. Prematurity, high-risk pregnancy and maternal age have significant statistical association with LBW. Odds Ratio (OR) for prematurity was 42.82 (95%CI; 21.93-83.57), for high risk pregnancy 2.76 (95%CI; 1.47-5.19) and for maternal age group more than 35 years in comparison to 19-35 years age group 0.2 (95%CI; 0.05-0.71).

Conclusion: Based on this study; prematurity and high risk pregnancy were the most important risk factors for LBW. There was also a reverse association between maternal age and LBW.

Introduction

The prevalence of low birth weight (LBW) is different from 5 to 7 percent in developed countries and 19 percent in developing countries[1]. A systematic review in Iran showed the prevalence of 7% and its increasing during 1991-2010[2]. After the establishment of health care networks in Iran and the approximately 98 percent access to health care services, over the past three decades, the life expectancy has improved and infant mortality has decreased in this country, the birth of infants weighing less than 2500 g, however, is still considerable[3]. Decrease in life expectancy, increase in infectious and respiratory diseases, anemia, hypothermia, chromosomal abnormalities, and nutritional and health care problems are among the low birth weight consequences[4]. LBW plays a direct or indirect role in more than 70% of infant mortalities[5]. Due to the importance of this subject and the paucity of studies investigating LBW-related risk factors in Iran; the present study was carried out in Shahroud to determine the prevalence of LBW and its related risk factors.

* Corresponding Author;
 Address: Faculty Member, Center for Health Related Social and Behavioral Sciences Research, Shahroud University of Medical Sciences, Shahroud, Iran
 E-mail: Khosravi2000us@yahoo.com

Subjects and Methods

This study was conducted 2011 in Fatima Hospital, the main maternity unit in Shahroud, northeast Iran. The first stage of research was a cross sectional study for determination of LBW prevalence. Sample size calculation was estimated to be about 1000 subjects based on classic formula assuming of 10% of prevalence for LBW (P=10%), precision of 2% (d=2%), 4500 annual births (n=4500) and α=5%. Therefore, we entered 1000 neonates in the study to measure their birth weight (Approximately 25% of the total number of births during a year). In the second stage, we compared the Normal Birth Weight (NBW) group with birth weight ≥2500g (control group) to LBW group with birth weight <2500g (case group).

A range of factors influence fetal growth, although they can be grouped into several general categories, we categorized them in two groups. First, maternal risk factor group consisting of high risk pregnancy, type of delivery, maternal age, mothers' level of education, pregnancy interval, parity and mother's smoking. The second group are neonate risk factors consisting of sex and gestational age. High risk pregnancy included history of chronic diseases (e.g. gestational hypertension, diabetes), history of abortion, preeclampsia, multigravity and multiple pregnancies.

Data were analyzed using univariate and multivariate logistic regression methods.

were premature with less than 37 weeks of gestational age and 46.2% of mothers had a normal vaginal delivery. Only 3 subjects (2 in case and 1 in control group) had smoked during pregnancy. In case group 44 (55.6%) subjects and in control group 366 (39.4%) lived in villages, a significant relationship between mothers' place of residence and LBW was not evident.

Comparison between variables of maternal age, education and occupation, inter-pregnancy interval, infant's gender, delivery type, gestational age, parity and high risk pregnancy with the responding variable of infant's LBW, the results showed significant relationships between four variables of delivery type (OR=2.05, 95%CI: 1.22-3.44), pregnancy interval (OR=2.35, 95%CI:1.18-4.68), gestational age (OR=43.97, 95%CI: 23.64-81.81), pregnancy status (OR=3.71, 95%CI: 2.18-6.32) (high risk vs low risk) and low birth weight. There was significant statistical association between LBW and prematurity (P<0.001).

Forward stepwise logistic regression method was used for multivariate analysis and after adjustment of prematurity effect as a confounder, multivariate analysis showed significant associations for high-risk pregnancy (P=0.002) and maternal age (P=0.01) (Table 1). Odds Ratio for prematurity was 42.82 (95%CI; 21.94-83.57), for high risk pregnancy was 2.76 (95%CI; 1.47-5.19) and for maternal age group more than 35 in comparison to 19- 35 age group was 0.2 (0.95%CI; 0.05-0.71).

Findings

Among 1000 subjects, 48% (n=480) were females and 52% (n=520) males. Seventy-two (7.2%) of newborns had birth weight <2500 g, 6.1% of them

Discussion

The ratio of boys to girls was 1.08. The prevalence of LBW and prematurity in the studied population was 7.2% and 6.1%, respectively. In the final

Table 1: Results of multiple logistic regression method for risk factors of low birth weight*

Variables		Weight ≥2500 g (n=928)	Weight <2500 g (n=72)	OR	CI (95%)	P. value
Maternal Age	18-35 years	8.17 (92.9)	62 (7.1)	1	--	--
	<18 years	39 (86.7)	6 (13.3)	1.75	0.6 -5.06	0.3
	> 35 years	72 (94.7)	4 (5.3)	0.2	0.06- 0.71	0.01
High Risk Pregnancy	No	546 (96.5)	20 (3.5)	1	1.47-5.19	0.002
	Yes	382 (88)	52 (12)	2.76		

* Prematurity is adjusted as a confounding factor; OR: Odds Ratio; CI: Confidence Interval

model, only three variables of gestational age, pregnancy status and maternal age showed significant association with birth weight.

The prevalence of LBW in this study was similar to several other studies[2,6]. Some studies reported it to be greater than our estimation (10%-13%)[7,8]. However, there were studies with lower than 7% of LBW[3]. Improving the health care during pregnancy, the income level and the density of the sub-population can be a reason for different results.

In this study, there were significant relationships between the prematurity and LBW, this finding is close to other studies [1,3-7]. The baby's low weight at birth is the result of preterm birth (before 37 weeks of gestation).

The odds ratio of giving birth to infants weighing less than 2500 g in mothers >35 years old was 0.2 compared to mothers with an age of 19-35 years. This is inconsistent with the results of the study by Zahed Pasha and colleagues which indicated a higher odds ratio (OR=2.3) of low-birth weight infants in mothers with >35 years of age[9]. A large number of epidemiological studies have reported that the incidence of LBW increases in the extremes of women's reproductive life; that is, between 15 and 19 years[10] and between 35 and 40 years of age[11]. It is widely believed that women older than 35 years have a higher incidence of LBW, although there is some debate about the latter. Some authors suggest that the risk is related, not with age itself, but rather with complications of other diseases such as the larger number of chronic diseases (hypertension, diabetes)[12].

No significant relationship was observed between maternal level of education and birth weight which is consistent with the results of studies by, Zeyghami et al[4] and Delaram[6]. Inconsistent with our finding, some studies suggest the possibility of an important relation between maternal educational level and LBW[7] so, with an increased risk of LBW being associated with decreasing educational level of the mother.

There was significant association between LBW infants and high risk pregnancy (OR=2.76), according to extremes of pregnancy interval, medical history of disease, preeclampsia, history of abortion and multigravity. Chronic hypertension and renal disease, as well as some maternal diseases, may provoke alterations in fetal growth, perhaps as a consequence of reduced uteroplacental fluid[1]. Primiparity seems to be associated with preterm births and LBW infants. It is well known that second and third children weigh more than the first[13]. Beginning with the fourth pregnancy, this increased birth weight is inverted, so that the risk of LBW again increases with the fourth and subsequent children[14]. In one study carried out in women with a history of previous miscarriages, it was observed that a previous miscarriage doubled the risk of a preterm birth and of LBW[15].

There was a relationship between delivery type and low birth weight so that the probability of birth weight <2500 g in neonates born through C-section was 2.05 times greater than that in neonates born through natural method which is not consistent with the findings of Delaram[6]. After adjusting for gestational age, maternal age, parity, pregnancy interval and other variables, the relationship between delivery type and LBW was not significant. As cesarean section occurred frequently in most very low birth weight groups[16] and complicated pregnancies.

A significant relationship was observed between LBW and inter-pregnancy interval so that with the decrease in pregnancy interval, the probability of LBW increased. This is consistent with the findings of other studies[3,7]. Short birth intervals, varying from 3 to 6 months in developing countries and from 1 to 2 years in the developed countries, may lead to an increased tendency toward low birth weight and prematurity in subsequent pregnancies[17].

There was also a significant relationship between gestational age and LBW so that there was a greater risk of LBW in preterm neonates than the term ones. This finding is also consistent with the results of other studies[3-6].

Conclusion

Based on this study findings; prematurity and high risk pregnancy are the most important risk factors for LBW. There was also a reverse association between maternal age and LBW. Despite the health care services provided via network system, the mean national prevalence of low birth weight

is still high. Prevention of preterm delivery, educational interventions for high risk groups especially those with maternal age less than 18 years, and setting appropriate inter-pregnancy intervals, proper nutrition during pregnancy and reducing high risk pregnancies can play a major role in preventing and reducing the birth of low weight neonates.

Acknowledgment

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