

Prevalence and Related Factors of Low Birth Weight in Mashhad, Iran

*Nayyereh Davoudi¹, Maryam Khezri², Masoumeh Asgarpour², Seyed Mohammad Khatami³, Mahnaz Hoseinpour⁴, Amir Abbas Azarian⁵

¹Department of Medical Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran. PhD student of nursing, Tehran University of Medical Sciences.

²BSc in Nursing, Hasheminejad Hospital, Mashhad, Iran.

³Pediatrician, Hasheminejad Hospital, Mashhad, Iran.

⁴BSc in Midwifery, Hasheminejad Hospital, Mashhad, Iran.

⁵Statistician, Mashhad University of Medical Sciences, Mashhad, Iran.

Abstract

Introduction:

Low birth weight (LBW) is one of the main factors for neonatal mortality and morbidity. Many factors are related with low birth weight. The present study was conducted to identify the prevalence and related factors of LBW at Mashhad, in northeast of Iran.

Materials and Methods:

This cross-sectional study was performed in all medical health centers of Mashhad during the first six months of 2010. Data collection was performed by scale, meter, and a questionnaire including two sections of neonatal factors and maternal factors. The questionnaire was completed by measuring neonate's height and weight, interviewing with mother, and investigating mother's and neonate's health files. Data was analyzed by descriptive statistics, chi-square, Fisher, independent T, and Man-witney tests by SPSS (11.5).

Results:

Among 2674 alive births, 297 neonates had the weight <2500 gr. Therefore the prevalence of LBW was 11.1%. The factors related to LBW were maternal age <18 yrs (P=0.019), gestational age <37 weeks (P=0.000), multi-pregnancy (P=0.000), first delivery (P=0.029), addiction to narcotics (P=0.001), smoking during pregnancy (P=0.007), history of LBW neonate (P=0.000), irregular visits during pregnancy (P=0.02), Using drugs during pregnancy (P=0.029), psychological disorders of mother (P=0.024), PROM (P=0.000), anomalies of placenta (P=0.01), oligohydramnios (P=0.01), bleeding during pregnancy (P=0.000), and preeclampsia (P=0.001).

Conclusion:

The prevalence of LBW in our study suggests a greater emphasis should be placed on related factors of LBW for the early detection and prevention of them.

Keywords:

Prevalence, Low birth weight, Neonate, Related factors.

Introduction

Low birth weight (LBW) is the weight at birth less than 2500 gr according to the definition of World Health Organization

(1,2). LBW is known as one of the most important indicators of public health because it is associated with fetal and neonatal mortality. The neonates with weight less than 2500 gr are approximately 20 times more likely to die than the neonates with normal weight (3). Some LBW neonates are prone to develop recurrent infections, malnutrition and

**Corresponding Author: Department of Medical Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Ebn-e Sina Street, Mashhad, Iran.*

E-mail: davoudin@mums.ac.ir,

Received: 25 May 2012; Accepted: 24 June 2012

neurodevelopmental handicaps. There are some evidences that show low birth weight is associated with subsequent risk of adult onset hypertension, cardiovascular disease, type 2 diabetes, and stroke, also LBW infants will have poor growth in childhood. Therefore, LBW is considered as an important risk factor to cause undesirable results at future (1,3,4).

Studies show that more than 20 millions neonates (15.5% of all births worldwide) are born with LBW and the rate of LBW is 16.5% in developing countries and 7% in developed countries, half of all LBW neonates are born in South central Asia and more than 27% of all neonates in these countries are LBW. Also, it is estimated that 8% of LBW neonates are born in East Mediterranean including Iran. According to the reports of World Health Organization at 1995, the prevalence of LBW neonates in Iran was 7% (1), also Prizadeh et al. in 2002 reported that the rate of LBW in Khorasan was 11.1% (5).

Since LBW increases the risk of mortality and is a key risk factor for adverse outcome in life, it is important to diagnose the factors affecting on LBW and try to preventing of them. Many researchers studied factors related to LBW such as maternal age <20 yrs and >35 yrs, smoking during pregnancy, gestational age <37 weeks, weight loss during pregnancy, multiple gestations, birth intervals <3 yrs, not using of supplements during pregnancy, inadequate prenatal care visits, maternal diseases, preeclampsia, and the history of a previous child with LBW (6-12).

Results of many studies in different countries show that the prevalence of LBW and related factors are different in various populations and different social and health conditions. Therefore, it is necessary to assess this problem and its related factors in different areas independently. So, we can decrease preventable factors and effectively reduce the rate of these births and then decrease the rate of neonates' mortality

because the birth of healthy neonates with normal weight develops public health. Searching in database, books, and published studies didn't show any study about the prevalence of LBW in Mashhad. Thus, we aimed to perform this study to identify the prevalence and related factors of LBW in Mashhad, a city in northeast of Iran.

Materials and Methods

This cross-sectional study was performed in all medical health centers of Mashhad which had delivery facilities. Then during the first six months of 2010, for sampling from each center, some days were randomly selected from each month and all alive neonates were born in each day entered to the study; abortions or dead-borns and the neonates of mothers who were not resident in Mashhad were excluded from the study. Data collection was performed by scale, meter, and a questionnaire including two sections:

- 1- Neonatal factors: weight, sex, and height.
- 2- Maternal factors: A: Demographic characteristics (age, height, BMI, job, working hours in a week, level of education, place of residence). B: Obstetrical history and conditions (gestational age, birth order, type of delivery, weight of mother before pregnancy, weight gain during pregnancy, pregnancy intervals, time of the first prenatal care visit, regular prenatal visits, using food supplements and nutritional education during pregnancy, history of LBW, fetal death, abortion delivery or infertility, using drugs or exposing to X-ray during pregnancy, multi-pregnancy). C: Medical history and conditions (alcohol consumption during pregnancy, cigarette smoking, passive smoker, addiction to narcotics, valvular heart diseases, respiratory, renal, thyroid and autoimmune diseases, hepatitis, epilepsy, psychological disorders, hypertension, anemia or diabetes before and/or during pregnancy, PROM¹, oligohydramnios,

¹ Premature Rupture Of Membranes

polyhydramnios, eclampsia, preeclampsia, placental anomalies, ovarian disorders, uterine diseases, bleeding, infection and trauma to abdomen during pregnancy).

For determining the validity of questionnaire, content validity was used and reliability of the questionnaire was confirmed using intra-rater reliability ($r=0.8$). Neonates were weighed by using a standardized calibrated scale (Misaki, Japan) with a precision of 50 g. Neonate's weight and height was measured by researcher immediately after delivery when the neonate is lying down with no clothes. For completing the questionnaire, after delivery when physical status of mother was stable, the researcher introduced herself to the mother and after explaining the aims of the study and obtaining the mother's consent; data was collected by interviewing with mother and investigating mother and neonate's health files.

To calculating the prevalence of low birth weight, the proportion of LBW to all neonates was considered and to assessing related factors, LBW neonates (<2500 gr) was considered as case group and the neonates with weight more than 2500 gr as control group. Data was analyzed by SPSS version 11.5 by the use of descriptive statistics, chi-square, Fisher, independent T, and Mann-witney tests, also $P<0.05$ was considered statistically significant.

Results

Among 2674 alive births, 297 neonates were LBW; therefore the prevalence of LBW in this study was 11.1% with confidence interval 95% (0.099, 0.12). Also in LBW neonates mean birth weight (2.12 ± 0.37) and height (45.90 ± 3.1) was significantly lower than mean birth weight (3.28 ± 0.42) and height (50.11 ± 2.07) in non LBW neonates ($P=0.000$). Totally, mean weight and height of neonates in this study was 3.15 ± 0.55 kg and 49.66 ± 2.56 cm, respectively and 50.3% of births were female. Mean age of mothers was

26.69 ± 5.68 yrs, 94% of mothers were housewife with education of diploma and lower than diploma (86%), and 85.3% live in urban areas. More than half of neonates in this study were born by cesarean (50.3%) at governmental hospitals (71.3%). Results showed that, maternal age was related to LBW ($P=0.019$) as the frequency of LBW was more in mothers less than 18 years old. Moreover, the frequency of LBW was significantly higher in mothers with gestational age <37 weeks ($P=0.000$), with a history of LBW neonates ($P=0.000$), had irregular visits during pregnancy ($P=0.02$), multipregnancies ($P=0.000$) and in first deliveries ($P=0.029$). Also the frequency of LBW was more in mothers who had used special drugs during pregnancy (other than food supplements and vitamins) ($P=0.029$) (Table 1).

The most used drugs by mothers with LBW neonates were antibiotics (18.2%), and anti-hypertensive drugs (18.2%).

The results of this study showed that the frequency of LBW was more in mothers who had medical problems; as PROM ($P=0.000$), placental anomalies ($P=0.01$), oligohydramnios ($P=0.01$), bleeding during pregnancy ($P=0.000$), preeclampsia ($P=0.001$), psychological disorders during pregnancy ($P=0.024$), addiction to narcotics ($P=0.001$), and smoking during pregnancy ($P=0.007$) were significantly related to low birth weight (Table 2).

There was no significant relation between other variables and the frequency of low birth weight.

Discussion

According to the results of this study, the prevalence of LBW neonates was 11.1% in Mashhad. The studies performed in different cities and hospitals of Iran reported that the prevalence of LBW neonates was 8.6% to 13.75% (5,9-12). Some other studies performed in Africa and Europe reported that the prevalence of LBW neonates was 8.1% to 22.5% (7,8,13).

Table 1: Neonates' frequencies with respect to birth weight and mothers' age, obstetrical history and conditions.

Variable	Group	<2500 gr		>2500 gr		Total		Chi square test
		Number	Percent	Number	Percent	Number	Percent	
Mother's age (year)	<18	25	8.5%	125	5.3%	150	5.6%	$\chi^2= 7.937$ df= 2 P= 0.019
	18-35	255	86.7%	2060	87.0%	2315	87.0%	
	>35	14	4.8%	183	7.7%	197	7.4%	
Gestational age (week)	<37	165	56.5%	173	7.4%	338	12.8%	$\chi^2= 560.31$ df= 1 P= 0.000
	>37	127	43.5%	2170	92.6%	2297	87.2%	
Birth Order	1	150	51.4%	1011	43.4%	1161	44.3%	$\chi^2= 7.060$ df= 1 P=0.029
	2-4	131	44.9%	1235	53.0%	1366	52.1%	
	>4	11	3.8%	83	3.6%	94	3.6%	
History of LBW	Yes	20	6.7%	51	2.1%	71	2.7%	$\chi^2= 21.505$ df= 1 P= 0.000
	No	277	93.3%	2326	97.9%	2603	97.3%	
Regular prenatal visits	Yes	252	84.8%	2119	89.3%	2371	88.8%	$\chi^2= 5.251$ df= 1 P=0.022
	No	45	15.2%	254	10.7%	299	11.2%	
Using drugs during pregnancy	Yes	51	17.2%	300	12.6%	351	13.1%	$\chi^2= 4.782$ df= 1 P=0.029
	No	246	82.8%	2076	2.1%	71	86.9%	
Multi-pregnancy	Yes	38	12.8%	22	0.9%	60	2.2%	$\chi^2= 169.560$ df= 1 P=0.000
	No	259	87.2%	2355	99.1%	2614	97.8%	

Table 2: Neonates' frequencies with respect to birth weight and medical history and conditions of mother.

Variable	Group	<2500 gr		>2500 gr		Total		Chi square test
		Number	Percent	Number	Percent	Number	Percent	
Addiction to narcotics	Yes	14	4.7%	44	1.9%	58	2.2%	$\chi^2= 10.196$ df= 1 P= 0.001
	No	283	95.3%	2333	98.1%	2616	97.8%	
Cigarette smoking	Yes	8	2.7%	19	0.8%	27	1.0%	$\chi^2= 9.478$ df= 1 P= 0.007
	No	289	97.3%	2358	99.2%	2647	99%	
Psychological disorders	Yes	4	1.3%	9	0.4%	13	0.5%	$\chi^2= 5.115$ df= 1 P=0.024
	No	293	98.7%	2368	99.6%	2661	99.5%	
PROM	Yes	72	24.2%	308	13.0%	380	14.2%	$\chi^2= 27.578$ df= 1 P=0.000
	No	225	75.8%	2069	87.0%	2294	85.8%	
Placental anomalies	Yes	8	2.7%	25	1.1%	33	1.2%	$\chi^2= 5.839$ df= 1 P=0.016
	No	289	97.3%	2352	98.9%	2641	98.8%	
Oligohydramnios	Yes	9	3.0%	28	1.2%	37	1.4%	$\chi^2= 6.639$ df= 1 P=0.010
	No	288	97.0%	2349	98.8%	2637	98.6%	
Bleeding during pregnancy	Yes	36	12.1%	140	5.9%	176	6.6%	$\chi^2= 16.673$ df= 1 P=0.000
	No	261	87.9%	2237	94.1%	2498	93.4%	
Preeclampsia	Yes	40	13.5%	182	7.7%	222	8.3%	$\chi^2= 11.712$ df= 1 P=0.001

The results of this study revealed that the frequency of LBW was more in mothers <18 yrs. This finding is similar to the results of some other studies (9,12). Valero and et al., believed that young mothers have inadequate prenatal care with low antenatal maternal weight, also there are intrinsic biological factors that may lead to low birth weight (17). In addition, the findings of present study indicated that 56.6% of mothers with LBW neonates and 7.4% of mothers with non LBW neonates had gestational age <37 weeks. In similar studies the frequency of LBW was more in mothers who had gestational age <37 weeks (11,18). Also the frequency of LBW neonates in this study was significantly increased at first pregnancy which was similar to that of other studies (10,12,14,18-21). Valero and et al., explained that first pregnancy possibly will be made to improve the vascular structures of uterus and at the subsequent pregnancies due to these improved conditions, nutrition will be provided for the fetus better than previous pregnancy and weight will be increased (17).

This study indicated that the frequency of LBW is more in mothers who had a history of LBW neonates that this was mentioned in other studies (11,12). Researchers write that the history of LBW predicts the risk of LBW at present pregnancy (17), indeed the risk of recurrent preterm delivery in a mother whose first delivery was preterm is 3 times more than a mother whose first neonate was born at term (22).

According to the findings from this study, frequency of LBW neonates was lower in mothers who had regular visits during pregnancy. Some studies showed that there was significant relation between low birth weight and low number of visits, also delay in first visit during pregnancy (7,9,13). Since prenatal visits are freely performed at health centers of Iran, it seems that mothers' unawareness of importance of these visits leads to irregular referring. During regular

prenatal visits, it is emphasized on narcotics and cigarette cessation; also LBW risk factors such as urogenital infections and hypertension are better and quickly diagnosed and treated. Therefore receiving enough prenatal cares through prevention and identification of risk factors avoids from LBW births.

In the present study, the frequency of LBW was more in mothers who had received drugs during pregnancy. This result was similar to the study of Tootoonchi (11). Since, most drugs that were used by mothers in this study was antihypertensive drugs and antibiotics, it seems that hypertension and infections which led to the use of drugs, indirectly affected on LBW. Moreover, Fanaroff and colleagues believe that treatment of hypertension during pregnancy with antihypertensive drugs may result in IUGR (4).

Various studies indicated that multi-pregnancy is an important risk factor of LBW (9,10,11). In the present study, the frequency of LBW in mothers who had multi-pregnancy was 14.2 times more than single pregnancy. Cuningham and colleagues believe that multifetal gestations due to restricted fetal growth and preterm delivery are more likely to be low birth weight than singleton pregnancies (22).

The relation of LBW and addiction is well documented in many studies. In this study, the frequency of LBW neonates was more in addicted mothers which is possible due to cellular toxic effects of narcotics on cell replication and growth (4). In addicted mothers, cigarette smoking, malnutrition, polydrug abuse, poor maternal health, and infectious disease can lead to IUGR or LBW (22). In the study of Mohammadzadeh, no significant relation was observed between mother's addiction and LBW. She says in her study the answer of mothers to this question were not reliable due to some social problems (10). In the present study, 2.7% of mothers with LBW neonates and

0.8% of mothers with neonates >2500 gr were smoker. In the studies of other researchers the frequency of LBW was higher in mothers who were smoker (7,11,23). The researchers showed that smoking causes LBW through different mechanisms: Tobacco increases carboxihemoglobin and then decreases the oxygen transport capacity. On the other hand, deviation to the left of hemoglobin dissociation curve decreases passage of oxygen to the tissues. Also nicotine with vasoconstrictive effect decreases blood flow to fetus and leads to fetal hypoxia (4, 22, 24).

According to the results the frequency of LBW was more in mothers with psychological disorders. It seems that psychological disorders by decreasing maternal food intake or inappropriate caring during pregnancy lead to LBW of neonates. Also, the study revealed that PROM was a related factor for LBW, which this is similar to the finding of Mohamadzadeh (10). Kliegman et al. reported that PROM increases the risk of fetal infection and premature birth (2).

In present study, significant relation was found between LBW and placental anomalies that similar to the Bortman's study (25). Moreover, the frequency of LBW was more in the mothers with oligohydramnios. Kliegman and et al. write that oligohydramnios indicate high risk pregnancy and is associated with intrauterine growth restriction (2). Also bleeding during pregnancy presents a related factor for LBW, as found in prior studies (11,23). The researchers believe that bleeding during pregnancy is an important predictor of complications in pregnancy and vaginal bleeding at first weeks of pregnancy is associated with preterm births (17). According to the results, significant relation was found between LBW and preeclampsia that this finding is similar to the study of Mohamadzadeh (10),

One of the limitations of this study was using of mother's health files for some data such as mother's weight before pregnancy and also different qualities of recording pregnant mother's information which was out of control of the researcher.

Conclusion

The results of this study showed that the prevalence of LBW during the first six months of 2010 in Mashhad was 11.1% and related factors were age <18 yrs, gestational age <37 weeks, multi-pregnancy, first delivery, addiction to narcotics, smoking during pregnancy, the history of LBW neonate, irregular visits during pregnancy, Using drugs during pregnancy, psychological disorders of mother, PROM, anomalies of placenta, oligohydramnios, bleeding during pregnancy, and preeclampsia.

The third target of World Health Organization (WHO) is healthy start in life by developing health status of newborn babies, infants and preschool children up to 2020. For the implementation of this target the number of LBW neonates should be decreased (6). In Iran at recent two to three decades social and economical developments and establishment of healthcare networks has led to accessibility of majority of Iranians to health centers. Comparison of neonatal mortality rate during 30 yrs ago to now show that neonatal mortality rate has been relatively decreased but death from prematurity, LBW and congenital abnormalities are the main factors for neonatal death (26). Therefore, since LBW is an important factor for neonatal mortality, related factors should be more noticed and it is necessary to preventing these factors. So, it is recommended to considering more educational programs for high risk groups especially young mothers. Educations should be on prevention of pregnancy at low ages, good nutrition during pregnancy and prevention of psychological disorders. It should be emphasized on narcotics and cigarette cessation and also not using drugs

during pregnancy without prescription of doctor. Health centers could be informed the mothers and emphasized on performing regular visits during pregnancy. Thus in this way complications such as bleeding, oligohydramnios, preeclampsia, placental anomalies, and PROM will be identified and prevented and then the frequency of LBW will be decreased.

Acknowledgment

The authors would like to thank from hospital staff of Hasheminejad, Qaé'm, Imam Reza, Ommolbanin, 22 Bahman, Bent al-hoda, Mehr, Aria, Javad al-Aémm'e, Imam Sajad, Pastor, Imam Zaman, Shariati, Mousa-ebné-Ja'far, and also all mothers who participated in this study. Moreover, the authors thank from Deputy of Research of Mashhad University of Medical Sciences which supported this research financially.

References

- White JL, Labarba RC. The effects of tactile and Wardlaw T, Blanc A, Ahman E. LBW: country, regional and global estimate. New York: United Nations Children's Fund and World Health Organization. 2004, pp: 1,3,13.
- Kliegman RM, Behrman RG, Jenson HB, Stanton BF. Nelson text book of pediatrics. 18th ed. Philadelphia: Saunders Elsevier; 2007.
- Paul VK, Deorari AK, Singh M. Management of low birth weight babies. In: Parthasarathy A. IAP text book of Pediatrics. 3rd ed. New Delhi: Jaypee; 2006. P: 58.
- Fanaroff AA, Martin RJ. Neonatal perinatal Medicine disease of the fetus and infant. Philadelphia: Mosby Elsevier; 2006.
- Parizadeh MJ, Saberiferd A, Abasalti Z. The prevalence of LBW in hospitals of Khorasan 2002. Available at: <http://www.mums.ac.ir/sheikh/fa/parizadeh4>. Access date: 17 June 2011. [in Persian]
- Dičkutė J, Padaiga Ž, Grabauskas V, Nadišauskienė RJ, Basys V, Gaižauskienė A. Maternal socio-economic factors and the risk of low birth weight in Lithuania. Medicina (Kaunas). 2004; 40(5): 475-82.
- Nobile CGA, Raffaele G, Altomare C and Pavia M. Influence of maternal and social factors as predictors of low birth weight in Italy. BMC Public Health. 2007; 7:192.
- Tema T. Prevalence and determinants of low birth weight in Jimma Zone, Southwest Ethiopia. East Afr Med. 2006; 83(7): 366-71.
- Roudbari M, Yaghmaei M, Soheili M. Prevalence and risk factors of low birth weight infants in Zahedan, Islamic Republic of Iran. East Mediterr Health J. 2007; 13(4):838-45.
- Mohamadzadeh A. Risk factors for low birth weight infants. Iranian Journal of Obstetrics, Gynecology and Infertility. 2002; 5(10): 64-71. [in Persian]
- Tootoonchi P. Low Birth Weight among Newborn Infants at Tehran Hospitals. Iran J Pediatr. 2007; 17 (Suppl 2): 186-192.
- Karimian S, Molamohamadi M, Jandaghi GH. Prevalence and related factors with low birth weight in Qom. Feiz. 2000; 27: 76-80. [in Persian]
- Onyiriuka AN. Trends in incidence of delivery of low birth weight infants in Benin City, Southern Nigeria. Niger Postgrad Med J. 2006; 13(3): 189-94.
- Deshmukh JS, Motghare DD, Zodpey SP, Wadhva SK. Low birth weight and associated maternal factors in an urban area. Indian Pediatr. 1998; 35(1):33-6.
- Wannous S, Arous S. Incidence and determinants of low birth weight in Syrian government hospitals. East Mediterr Health J. 2001; 7(6): 966-74.
- Chhabra P, Sharma AK, Grover VL, Aggarwal OP. Prevalence of low birth weight and its determinants in an urban resettlement area of Delhi. Asia Pac J Public Health. 2004; 16(2):95-8.
- Valero de Bernabe J, Soriano T, Albaladejo R, Juarranz M, Calle ME, Martinez D, Dominguez-Rojas V. Risk factors for low birth weight: a review. Eur J Obstet Gynecol Reprod Biol. 2004; 116: 3-15.
- Ershadi A, Eslami a, Sharif M. Status of low birth weight infants in Kashan. The Scientific Journal of Zanjan University of Medical Sciences. 2000; 8(30): 54-60. [in Persian]
- Aghamolae T, Yoosefi H. Frequency and predisposing factors of low birth weight (LBW) in Bandar Abbas. Hormozgan Medical Journal. 2001; 5(4): 14-18. [in Persian]

20. Hjian K. Prevalence of Low Birth Weight and Risk Factors in Babol in 1998. *Journal of Mazandaran University of Medical Sciences*. 2000; 10(26): 49-56. [in Persian]
21. Muula AS, Siziya S, Rudatsikira E. Parity and maternal education are associated with low birth weight in Malawi. *Afr Health Sci*. 2011; 11(1): 65–71.
22. Cuningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY. *Williams Obstetrics*. 23rd ed. New York: Mc Graw Hill; 2010.
23. Eghbalian F. Low birth weight causes survey in neonates. *Iranian Journal of Pediatrics*. 2007; 17 (suppl 1): 27-33.
24. Aronson RA, Uttech S, Soref M. The effect of maternal cigarette smoking on low birth weight and preterm birth in Wisconsin. *Wis Med J*. 1993; 92 (11): 613-17.
25. Bortman M. Risk factors for low birth weight. *Rev Panam Salud*. 1998; 3(5):314-21.
26. Naghavi M. Health Transition in Iran. *Iran J Epidemiol*. 2006; 1(3): 13-25. [in Persian]