Research Article

Survey of the Relationship Between Mother's Chronic Diseases and Low Birth Weight in Infants, Ahvaz, South of Iran, 2014

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Abstract

Background: Birth weight is the most important indicator of infant's health, and this critical index is directly related to mother's health. Hence, knowledge of the maternal chronic disease before and during the pregnancy can be considered as an effective factor in maintaining the infant's ideal weight. Babies with low birth weight are more susceptible to risks such as disabilities of neurological, respiratory diseases and sudden infant death syndrome. Therefore, identifying and modifying the risk factors can control and prevent low birth weight.

Objectives: This study was performed to determine the association between mothers' chronic diseases and low birth weight in infants.

Methods: In this descriptive study, 1500 infants from 12 health centers in east and west areas of Ahvaz were selected using the random cluster sampling method. The developed researcher checklist was used for data gathering. The data was analyzed with SPSS version 20, using descriptive indexes and Chi-square, t-test and ANOVA while P ≤ 0.05 was considered as significant.

Results: The prevalence of LBW in Ahvaz from the beginning to the end of the year 2015 has been 9.5%. There is a significant relationship between the cardiovascular disease before pregnancy (P ≤ 0.003), anemia before pregnancy (P ≤ 0.001), hypertensive pregnancy (P ≤ 0.001), urinary tract infection during pregnancy (P ≤ 0.001), gestational diabetic in the mother (P ≤ 0.003) and LBW.

Conclusions: Our study showed that many mothers' schronic disease such as cardiovascular disease, anemia, hypertensive, gestational diabetic and UTI have relationship with LBW. Therefore it seems essential to design and implement a detailed antenatal care program for mothers with chronic disease to reduce LBW, infant mortality and defects.

Keywords: Low Birth Weight, Maternal Chronic Diseases, Gestational Chronic Diseases, Infant, Ahvaz

1. Background

Birth weight is the most important indicator of infant's health, and this critical index is directly related to mother's health. Birth weight plays an important role in the health of the baby, the family and the community (1). According to the definition of low birth weight provided by world health organization (WHO), low birth weight (LBW) refers to the birth weight less than 2500 grams (2, 3). Due to greater sensitivity, lower immunity and an increased risk family and community, impose great costs on different diseases (4). Studies have shown that more than 20 million babies, 15.5% of all the births worldwide, are annually born with low weight, and that amount is 18.6% in underdeveloped countries, 16.5% in developing countries, and 7% in the developed countries (2). Babies born with LBW are more likely to have health problems and slower development from immediately after birth to later in life

(5). They suffer from extremely high rates of morbidity and mortality from infectious diseases and underweight, and stunting or wasting beginning in the neonatal period and lasting through childhood (6). LBW is a multi-causal phenomenon that economic, social, and cultural factors contribute to its development, but the factors associated with the mother and the baby are the most important ones (4). Many researchers consider the following factors very effective on LBW which have many negative consequences: maternal age less than 20 years and more than 35 years, maternal smoking during the pregnancy, gestational age less than 37 weeks, lack of weight gain during the pregnancy (5), multiple pregnancy, birth interval of less than 3 years, lack of supplements during the pregnancy (6), maternal chronic diseases (7-9), preeclampsia (10-13), birth of children with low weight (3), premature birth (14, 15), growth retardation intra uterine (16), anemia during

the pregnancy (17-19), renal and heart disease (20, 21), diabetes (22), sex of the neonate, inadequate antenatal care service utilization and unwanted pregnancy (23, 24). The mortality rate of these infants is 40 times more than that of normal-weight infants. In addition, the normal-weight infants compared to these infants are more exposed to dangers such as cerebral palsy, mental retardation, neurological disabilities, respiratory diseases, sudden death syndrome and complications of hospitalization in the intensive care unit (3, 15, 25). Low birth weight is also associated with immune system disorder, malnutrition, poor cognitive development and increased risk of diarrhea or acute pneumonia (4). According to the findings, these infants have poor growth in childhood, and are more susceptible to diseases such as hypertension, cardiovascular disease, type 2 diabetes stroke (2, 4), obesity and chronic disease (26), after puberty. LBW is a multi-causal phenomenon among which different economic, social, and cultural factors as well as the factors associated with the mother and the baby are the most important ones. According to what was mentioned and the importance of low birth weight in mortality and the cost of care and the maintenance of it, and the fact that low birth weight is one of the most important health indicators to assess prenatal care and the scale that determines the health of infants and is considered as an important indicator of health in the community, the identification and mitigation or controlling the risk factors associated with it can prevent low birth weight in infants (18). The identification of the factors affecting underweight in disposed mothers and the elimination of them during prenatal care, should be done. These risk factors can be prevented by a lifespan approach (before, during, and after the child birth) to the health of the women that take full account of socioeconomic and environmental as well as medical issues, and also by public educational campaigns (27) and, more, by some key preventive interventions (27). Despite the presence of these prevention options and efforts, LBW remains a formidable public health challenge in the 21st century, and more research is needed to illuminate how the many factors affecting LBW interact, because there are numerous unanswered questions for every clear finding (27, 28). Since culture and values shape the perception of health, and the culture of each society is one of the factors that affect lifestyle and because health implications in groups based on race and ethnicity are different and there are many disputes about high rates of low birth weight among different ethnic groups and races, because it is associated with many socioeconomic factors (29), it seems essential to identify the most important factor or factors affecting LBW in different societies and, afterwards, by eliminating or reducing these factors, the rate of such births can be deceased and the huge investment of abun-

dant financial resources to decrease the disability in the future, and the rise in death rate which is one of the important health factors of any country can be prevented. Therefore, it is essential to evaluate these factors in various areas. Thus, no study, at least in recent years in Ahvaz, has yet been conducted on the relationship between mothers with chronic diseases and LBW.

2. Objectives

The aim of this study was to determine the association between the mothers' chronic diseases and low birth weight in infants.

3. Methods

This is a descriptive-analytic study whose population consisted of all the children covered by health centers affiliated with the Jundishapur University of Medical Sciences in Ahvaz, with where and based on the results of the previous studies P = 0.1 and d = 0.02 were considered. The required population size was estimated at 865 people. According to the cluster sampling method and in order to modify the sample size, design effect was applied 1.73 and the final sample size was estimated at 1497 people and finally 1500 were selected. To choose the sample using random cluster sampling, first, 12 health centers among the health centers covered by east and west areas of Ahvaz were selected, then, by systematic random sampling of the recorded cases of infants born in 2014, covered by the corresponding health center, 1500 infants were selected for the study according to the inclusion criteria.

The inclusion criteria were as follows: 1. mothers with a recorded case of health care in the pregnancy period; 2. infants with a recorded case of health care after birth in the health centers. As the checklist was completed by the researcher, the study did not have exclusion criteria. The data was collected through a survey checklist which had been developed by the author and its validity had been checked by the faculty members of the nursing faculty. As the instrument of the data gathering was checklist, it did not need reliability. The checklist consisted of information about the mother such as maternal age, maternal height, weight and body mass index, family size, location, maternal education, maternal employment, use of medication during the pregnancy, a record of chronic diseases before pregnancy (diabetes, cardiovascular disease, anemia, hypertension), a record of using drugs before pregnancy, the mother's weight gain during pregnancy, gestational age, mother's suffering from chronic diseases during pregnancy (gestational diabetes, gestational hyperten-

sion in recent pregnancy, mother's recent infection of genitourinary tract), a record of having a baby with low birth weight, maternal record of infertility, and information on the infant including the infant's gender and any congenital defects. Having examined the mother's and the infant's recorded health case, the researcher completed the checklist. Finally, after the examination of the health records was completed during April to May of 2014, the analysis was done using the Statistical Package for Social Science (SPSS) version 20.

3.1. Statistical Analyses

To describe the variables of the study, the researcher ran descriptive statistics including frequency tables, graphs and indicators of central tendency and dispersion. Then, using chi-squared tests, the relationship between qualitative variables, and using the t-test and ANOVA, the means of two or several groups were compared, respectively. In order to control the possible confounding factors, logistic regression was used. Significance of these tests was less than 0.05.

3.2. Ethical Consideration

This study was approved by the ethics committee of Jundishapur University of Medical Sciences with ethic code No 1393.368.

4. Results

The results of the present study showed that the prevalence of LBW infants in Ahvaz from the beginning to the end of the year 2014 has been 9.5%. Age mean in mothers having infants with normal weight was 28.02 years, and in mothers with LOW it was 28.08 years. 754 (50.3%) of mothers had one pregnancy, 944 (63%) of them had normal BMI, 1266 (84.4%) of them were not well-educated and did not even have a high school diploma, 1460 (97.4%) of them were housewives, 748 (49.9%) of them had a three-member family, and 10 (0.7%) of them previously had an infant with low birth weight (Table 1). Out of 1500 examined mothers, only 3 (0.2%) of them had diabetes, 4 (0.3%) mothers suffered from cardiovascular disease, 8 (0.5%) of them had hypertension, and 106 (1.7%) mothers had anemia before pregnancy. Out of 1500 studied mothers, 30 (2%) of mothers had a record of gestational hypertension, 80 (3.5%) of them were reported to have gestational diabetes and 92 (1.6%) mothers had a record of genitourinary infections (Table 2). The results of the study showed that there was no statistically significant difference between the two groups. That is, LBW group and normal weight group in the mean and the standard deviation of the record of gestational

diabetes in mothers showed: $P \geq 0.001$, diabetes during pregnancy in mothers: $P \geq 0.003$, and cardiovascular disease and hypertension before pregnancy: $0.003 \geq P$. However, according to the obtained results, there is a statistically significant relationship between maternal anemia ($P \leq 0.001$), hypertensive pregnancy in mothers ($P \leq 0.003$), and urinary tract infection in the mothers ($P \leq 0.001$) and LBW (Table 3).

5. Discussion

The aim of this study was to determine the association between maternal chronic diseases and low birth weight in infants. The prevalence of low birth weight was 9.5%. Rates of the prevalence of LBW are different in different cities of Iran, for example in Hamedan it is %19.1, Tehran 7.5% - 16%, Isfahan 9.5%, Shahr-e Kord %8.5, and Ardebil 6.4% (30). This difference may be due to the influence of ethnicities, cultures and races on the incidence of low birth weight in each region and the lack of generalizability to other areas. There is no statistically significant difference between the mean age of the mothers in both groups of low birth weight and normal weight.

To explain the factors that affected LBW in the present study, it should be noted that several maternal factors are involved, like Preeclampsia which is in line with the study of Feresu et al. (9) Jammeh et al. (13), Mitao et al. (19), Takito et al. (10), Kattah et al. (11) and Scantlebury (12). Because Preeclampsia reduces the blood flow to the fetus, it will affect the growth of the fetus and low birth weight will follow. And other factors involved are: gestational diabetes which is in line with a study conducted by Demelash et al. (8), and UTI during pregnancy which is in line with a study by Delzell et al. (31). Schieve et al. (32) found that the presence of UTI was associated with premature labor, hypertensive disorders of pregnancy (such as pregnancy-induced hypertension and preeclampsia), anemia and amnionitis. In addition, acute pyelonephritis has been associated with anemia. The spacing pregnancies between the current birth and the previous birth, the use of iron supplements and Folic Acid in line with the studies of Gebremedhin et al. (14) and Feresu et al. (9) and Misra et al. (6), weight gain during pregnancy and gestational age in line with the results of Demelash et al. (8) and Misra et al. (6), record of LBW infants in line with Feresu et al. (9), are also influential. In this study, the probability of low birth weight with maternal anemia record was 5 times more, for the increase of each level it increased to about 1.5 times more, in infants with spacing pregnancies under 3 years it increased to about 18 times more, in the cesarean delivery it was more than 2 times more, in twin delivery it was approximately

Table 1. Frequency of Demographic Maternal Factors

Maternal Demographic Factors	No. (%)
Occupation	
Housewife	1461 (94.7)
Practitioner	39 (2.6)
Total	1500 (100)
Family size	
2	3 (0.2)
3	748 (49.9)
4	482 (32.1)
5	177 (11.8)
6	71 (4.7)
7	17 (1.1)
8	2 (0.1)
Total	1500 (100)
BMI	
Low weight	4 (0.3)
Normal	944 (63)
Overweight	250 (16.7)
Obese	301 (20.1)
Total	1500 (100)
Education	
high school	1266 (84.4)
Diploma	226 (15.1)
Bachelor Graduate	8 (0.5)
Total	1500 (100)
Number of pregnancy	
1	754 (50.3)
2	482 (32.1)
3	175 (11.7)
4	70 (4.7)
5	17 (1.1)
6	2 (0.1)
Total	1500 (100)

98 times more, and in preterm deliveries compared to full-term deliveries it was 438 times more. Maternal weight gain during the pregnancy decreased the chance of LBW infants by about 30%. In this study, no significant relationship was found between maternal age, maternal education, maternal employment, birth abnormalities, record of stillbirth, and mother's BMI and LBW. Considering the results of this study, it seems essential to design and implement a detailed program to reduce infant mortality and defects.

5.1. Conclusion

In this study, the prevalence of LBW infants in Ahvaz from the beginning to the end of the year 2014 has been 9.5%. There was a statistically significant relationship between maternal anemia, Preeclampsia, Gestational dia-

Table 2. Frequency of Mothers' Chronic Disease[a]

	Before Pregnancy	During Pregnancy
Diabetic	3 (0.2)	80 (5.3)
Blood pressure	8 (0.5)	30 (2)
Cardiovascular	4 (0.3)	0
Anemia	106 (7.1)	0
Urinary tract infection	0	92 (6.1)
The absence of chronic disease	1379 (91.9)	1288 (86.6)
Total	1500 (100)	1500 (100)

[a]Values are expressed as No. (%).

Table 3. The Relationship Between Mothers' Chronic Diseases and Birth Weight Infants

Disease	Weight, g		P Value
	More than 2500	Less than 2500	
Before pregnancy			
Cardiovascular disease			003 ≥
There	1	3	
Does not	1356	140	
Anemia			001 ≥
There	73	33	
Does not	1283	110	
Diabetes			044 ≤
There	3	0	
Does not	1354	143	
During pregnancy			
Urinary tract infection			≥ 001
There	67	25	
Does not	1210	118	
Blood pressure	10	20	≥ 001
There			
Does not	1346	123	
Diabetic			≥ 003
There	80	0	
Does not	1276	143	

betes and urinary tract infection in the mother and LBW. Birth weight is one of the most important health indicators to assess prenatal care. It is also the scale that determines the health of the infants, and is an important indicator of health in the community, and the identification and

mitigation or controlling the risk factors associated with it can prevent LBW. Therefore, health care workers should consider the importance of planning for prenatal care programs for pregnant mothers to prevent the morbidity rate of LBW and many negative consequences after birth. Since our study was performed only in Ahvaz, maybe generalizability of findings is limited, because LBW is a multi-causal phenomenon that economic, social, and cultural factors contribute to its development.

5.2. Implication for Practice

The results can be used as guidance for nurse managers and practitioners to design appropriate educational programs, and also as an early intervention to prevent and reduce LBW in mothers with chronic diseases. For the future studies, researchers recommend that complications during pregnancy such as nutrition, placenta and fetal membranes disorders, quality of prenatal care, and other environmental factors be studied.

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Footnotes

Authors' Contribution: Shahnaz Rostami: study concept and design; Mehrnaz Moradi: study conception and design and supervision; Bahman Cheraghian: analysis and interpretation of data; Marzieh Monjezi: acquisition of data and drafting the manuscript.

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