

## Comparison of biological characteristics of mothers of infants with low birth weight (LBW) with mothers of infants with optimal weight

Shokoohifar S.<sup>1\*</sup>, Zhinous Malekzadeh F.<sup>2</sup>

### Abstract

**Introduction:** The birth weight of infants is an indicator indicated by health organizations. This study attempts to compare the biological characteristics of mothers of infants with low birth weight (LBW) with mothers of infants with normal weight.

**Methods:** This work was a comparative-causal study conducted on 325 infants and their mothers in Gorgan from 2018 to 2019. For this, a total of 171 infants with LBW and 154 infants with normal weight and their mothers were selected from the study population by random sampling. The research tool was a questionnaire on the biological, psychological, and social characteristics of parents (Afrooz, 2004). The Chi-square method and Phi coefficient were used to analyze the data in IBM SPSS Statistics V22.0.

**Results:** The results of the chi-square ( $\chi^2$ ) test showed a meaningful difference between the two groups, i.e., mothers of infants with LBW and mothers of infants with normal weight in terms of the history of abortion ( $P < 0.001$ ), bleeding during pregnancy ( $P < 0.001$ ), optimal mobility and rest ( $P < 0.001$ ) and nutritional status ( $P < 0.001$ ). However, no significant difference was observed between them in terms of the history of hypertension ( $P > 0.001$ ).

**Conclusion:** From the results, some biological characteristics of mothers exert a meaningful impact on LBW and can be given more attention in LBW prevention programs.

**Keywords:** Biological characteristics" pregnant mothers" low-birthweight (LBW) infants" normal-weighted infants

**Citation:** Shokoohifar S., Zhinous Malekzadeh S.. Comparison of biological characteristics of mothers of infants with low birth weight (LBW) with mothers of infants with optimal weight, family and health, 2021; 10(4): 121-131

<sup>1</sup> -Master of General Psychology; Department of Psychology, Azadshahr Islamic Azad University, Golestan, Iran (Corresponding Author), saharshokoohi@yahoo.com, <https://orcid.org/0000-0003-0465-5349>.

<sup>2</sup> -Master of General Psychology; Department of Psychology, Azadshahr Islamic Azad University, Golestan, Iran, zhinousmalekzadeh@gmail.com, <https://orcid.org/0000-0001-6998-4114>.

## **Introduction:**

Pregnancy is a distinct physiological and natural process in women. But the presence of underlying diseases and/or unexpected conditions of the mother or fetus can cause disability or even death of the mother and fetus. A high-risk pregnancy is a condition in which the life, health, and comfort of the mother and the growing fetus are threatened due to some conditions and factors. Risk factors for high-risk pregnancies can be classified into maternal and fetal factors. Maternal factors include age less than 18 and over 35 years, weight less than 45 kg, height less than 150 cm, five pregnancies and more, history of difficulties in previous pregnancies, bleeding, genital abnormalities, hypertension, RH incompatibility, infections, chronic diseases and more. Fetal factors include abnormalities, infections transmitted through the placenta, exposure to teratogenic drugs or narcotics, low birth weight (LBW), and more [1]. Since LBW leads to mortality, disability, and disease in infants, it is essential to identify factors and conditions influencing LBW and find solutions to this problem [3]. LBW infants are born occasionally. LBW infants weigh less than 2.5 kg, regardless of gestational age, that is whether they are born after nine months of pregnancy or before the 37th week [4]. LBW is associated with several factors, including pregnancy at low ages, pregnancy at short intervals, mother's weight and height, low economic and social level, improper nutrition, various diseases, less hygienic cares during pregnancy, drugs, complications of midwifery and abortion [5], insufficient rest by mother or excessive activity by her [6], hypertension [7], and bleeding during pregnancy [8]. LBW is one of the most serious health conditions for infants worldwide and a leading cause of death during infancy [9]. As a key indicator of countries' progress toward the Millennium Development Goals (MDGs), LBW reveals that more than a quarter of the world's children under the age of five are still underweight, while the prevalence of LBW in developing countries is reported at 26 percent. South Asia faces the greatest prevalence of LBW (40%) among developing countries, with half of the world's LBW children that are in India, Bangladesh, and Pakistan. The overall prevalence of LBW in Iranian children is reported at 15.5 percent [11]. According to UNICEF, around 60 to 80 percent of deaths during infancy occur in LBW children [10]. One of the goals of the WHO in developing countries is that at least 90% of infants shall weight 2.5 kg at birth, which requires training mothers for hygienic and nutritional aspects during pregnancy and avoiding repeated parturition. Thereby, LBW can be avoided and/or diminished by controlling risk factors that are under the influence of biological, social, and mental circumstances.

Studies conducted by Eghbalian [19] and Rajabpour et al. [17] showed that the history of abortion in mothers of LBW infants was higher than mothers of infants with normal weight at birth. The history of maternal abortion has been confirmed as a factor determining and influencing weight at birth. The results of a study conducted on LBW infants in 2005 and 2006 in a medical school in Nepal showed that factors such as prenatal bleeding, hypertension, and intrauterine growth limitations are associated with the weight of infants at birth [15]. For bleeding during pregnancy, a study on 20,820 pregnant women showed that there is a strong relationship between bleeding during pregnancy and premature birth [15]. Unfavorable outcomes are also extended in pregnancies with chronic hypertension and the severity of fetal growth restriction is directly correlated to the severity of hypertension [16]. Many findings indicate an association between mobility and adequate rest with LBW [15]. Mothers with less care before parturition and who are active in hard physical works are prone to complications at parturition, as bodily fatigue and insufficient rest lead to premature

delivery. Moreover, mothers who are engaged in hard physical activities are more prone to shocks to the abdomen and fetus, which causes bleeding, uterine rupture, premature delivery, and LBW [15]. Several factors influence the health of the mother and fetus, such as proper nutrition by the mother. Pregnant women are prone to malnutrition, which is resulted from hormonal, bodily, and metabolic changes. These changes lead to an increase in nutritional demands. Indeed, an adequate growth of the fetus, receiving adequate food, and supplying the fetus's food needs are associated with the nutrition by the mother [12]. When a mother has no adequate food available during pregnancy, some irreversible changes will occur in the fetus [13]. Studies show that proper nutrition by mothers before and during pregnancy diminishes the rate of mortality of infants so that such an influence is much more than the influence following parturition [14].

There is a need for a comprehensive view of various biological factors to describe LBW. Most of the research on LBW, hygiene, and nutrition in Iran has not remarkably covered main biological factors, including the history of abortion, inadequate nutrition by the mother, mother's rest and mobility, mother's hypertension, and bleeding during pregnancy. Thus, LBW can be prevented by controlling risk factors that are under the influence of biological circumstances. This study attempts to compare the biological characteristics of mothers of LBW infants with mothers of infants with normal weight.

### Methods:

This research was designed based on the causal-comparative post-event survey. The statistical population of this study consisted of infants weighing less than 2.5 kg and infants weighing more than 2.5 kg (normal), born from 2018 to 2019 in Gorgan hospitals with their mothers. Having a list of infants and delivery records, the files of 325 infants (171 LBW infants and 154 infants with normal weight) were taken from six hospitals in Gorgan by random sampling. Mothers were asked to respond to the biological, mental, and social characteristics of parents questionnaire (Afrooz; 2004) to evaluate their biological characteristics (i.e., history of abortion, history of hypertension, nutritional status, bleeding during pregnancy, adequate mobility, and rest).

The research tool was a biological, mental, and social characteristic of parents' questionnaire (Afrooz, 2004). This questionnaire includes 80 questions and items, and three main parts, respectively for biological characteristics, cognitive characteristics, and psycho-social status of parents. In this study, the questions of the first part (i.e., biological characteristics) were practiced. The questions were scored as "yes" and "no", as well as "excellent", "good", and "average". The total score was obtained from the sum of the scores of all subscales. The internal consistency of this questionnaire was obtained 0.85 using Cronbach's alpha coefficient, and its face validity was obtained 0.88 by the Kuder–Richardson Formula 20 (KR-20) [28]. Afrooz et al. (2019) estimated the reliability coefficient of the list of biological, psychological, and social characteristics of parents' questionnaire as 0.78 [34].

### Results:

Findings correlated to LBW infants in Gorgan city according to biological characteristics (i.e., history of abortion, history of hypertension, nutritional status, bleeding during pregnancy, adequate mobility, and rest), mothers of LBW infants and mothers of infants with normal weight using Chi-square method and Phi coefficient are presented in Tables 1 and 2.

**Table 1. A comparison of the frequency of biological characteristics between the two groups with weight of less than 2.5 kg and more than 2.5 kg.**

Variable	Levels	2.5 kg>		2.5 kg<	
		No.	Frequency (%)	No.	Frequency (%)
The history of abortion	Yes	135	78.94	89	57.79
	No	36	21.05	65	42.20
The history of hypertension	Yes	42	24.56	35	22.72
	No	129	75.43	119	77.27
Bleeding during pregnancy	Yes	48	28.07	18	11.68
	No	123	71.92	136	88.31
Adequate mobility and rest	Yes	101	59.06	131	85.06
	No	70	40.93	23	14.93
Nutritional status	Excellent	23	13.45	43	27.92
	Good	59	34.50	85	55.19
	Average	52	30.40	19	12.33
	Poor	37	21.63	7	4.54

**Table 2. The results of biological characteristics of mothers with infants weighting less than 2.5 kg and more than 2.5 kg**

Variable	Chi-square ( $\chi^2$ )	Phi coefficient
The history of abortion	16.93	0.23
The history of hypertension	0.15	0.02
Bleeding during pregnancy	13.43	0.20
Adequate mobility and rest	26.81	0.18
Nutritional status	40.05	0.35

For the history of abortion, the chi-square test results showed that 73.68% of mothers with LBW infants had a history of abortion, while no history of abortion was observed for 57.79% of mothers with normal-weighted infants. The results showed a meaningful difference between the two groups of mothers in terms of the history of abortion ( $P < 0.001$ ,  $X^2 = 16.93$ ,  $\Phi = 0.23$ ).

A total of 24.56% of mothers with LBW infants and 22.72% of mothers with normal-weighted infants had a history of hypertension during pregnancy. The results showed no meaningful difference between the two groups of mothers in terms of the history of hypertension ( $P > 0.001$ ,  $X^2 = 0.15$ ,  $\Phi = 0.02$ ).

A total of 28.07% of mothers with LBW infants and 11.68% of mothers with normal-weighted infants had a history of bleeding during pregnancy. The results showed a significant difference between the two groups of mothers in terms of bleeding during pregnancy ( $P < 0.001$ ,  $X^2 = 13.43$ ,  $\Phi = 0.2$ ).

A total of 59.06% of mothers with LBW infants and 85.06% of mothers with normal-weighted infants had proper mobility and rest during pregnancy. The results showed that there is a significant

difference between the two groups of mothers and their mobility and rest during pregnancy with birth weight ( $P < 0.001$ ,  $X^2 = 26.81$ ,  $\Phi = 0.18$ ).

A total of 13.45 % and 34.5% of mothers with LBW infants had respectively excellent and good nutritional status during pregnancy, with the corresponding values of 27.92% and 55.19% were obtained for mothers of infants with normal weight. The results showed a meaningful difference in birth weight between the two groups of mothers in terms of nutrition during pregnancy ( $P < 0.001$ ,  $X^2 = 40.05$ ,  $\Phi = 0.35$ ).

### Conclusion:

Birth weight is a well-known, simple, and typical indicator of health and a predictor of health status in adulthood. Having a well-balanced weight at birth is one of the preferences of the health care systems in most industrialized and developed countries. This index is utilized to assess the growth and health status of infants in each country [18]. LBW is one of the leading causes of mortality in infants and toddlers and plays a critical role in childhood complications along with congenital anomalies [19]. This work was conducted to compare some of the biological characteristics influencing the infant's birth weight in Gorgan.

Results obtained for the history of abortion during pregnancy between the two groups of mothers of LBW infants (78.94%) and mothers of infants with normal weight (57.79%) showed a meaningful difference between the birth weight and the history of maternal abortion during pregnancy. These results are compatible with the data published by Ebyghbalian on abortion with a frequency of 62 participants (21.7%) for mothers of LBW infants and a frequency of 163 participants (13.4%) for mothers of infants with normal weight, as well as the results published by Rajabpour [17], Chhabra et al. [20] and Nahar [21]. Therefore, the history of abortion has been confirmed as a determining and influential factor on the weight of the infant at birth.

About the history of hypertension during pregnancy, the results showed no significant difference between the two groups of mothers of LBW infants (24.56%) and mothers of infants with normal weight (22.72%) ( $P > 0.001$ ). These findings are consistent with the findings of Zahed Pasha [22], Reme et al. [23], and Zarbakhsh [15], which did not show a significant relationship between maternal hypertension and infant weight at birth. These results, however, were not consistent with the findings of the works of Fallah [24], Wikstrom [25], and Bakker [26]. Mothers' low information about the role and importance of hypertension during pregnancy, which can threaten the health of mother and fetus, has caused them to overlook this variable and not to take the necessary measures to control it.

About bleeding during pregnancy, there was a meaningful difference between the two groups of mothers of LBW infants (28.07%) and mothers of infants with normal weight (11.68%) ( $P < 0.001$ ). These results were consistent with the results of Young et al. [27], Eshraghian [35], Talebian [6], and Rajabpour [17]. Bleeding during pregnancy can threaten the health of the fetus and leads to abortion and premature delivery.

Regarding the mobility and proper rest of mothers during pregnancy, the results showed a significant difference between the two groups of mothers of LBW infants (59.06%) and mothers of infants with normal weight (85.06%) ( $P < 0.001$ ). These results are consistent with the results of the works of Takito and Benicio [29], Talebian [8], Zeydabadi [4], and Zarbakhsh [15]. Physical fatigue,

inadequate rest, hard physical activity, or inactivity during pregnancy can threaten the health of the fetus and lead to premature delivery.

And ultimately, the results of an analysis of the nutritional variable during pregnancy showed a meaningful difference between the two groups of mothers of LBW infants (13.45% [excellent] and 34.5% [good]) and mothers of infants with normal weight (27.92 [excellent] and 55.19 [good]) ( $P < 0.001$ ). These results were consistent with the findings of Delaram [30], Khoushabi and Saraswati [31], Fadakarsoogheh [32], and Asadi [14].

Research findings confirm the necessity of proper nutrition for the mother during pregnancy, as not consuming the appropriate foods can weaken the fetus and threaten its growth. The critical role of proper and adequate nutrition during pregnancy is quite apparent to both the mother and the fetus, as people's health mainly depends on their food intake and nutritional structure during pregnancy. An unhealthy and inadequate diet of the mother threatens the development of the fetal brain. This is why mental retardation due to maternal malnutrition is prevalent in developing countries [33].

The results of this study revealed that some biological characteristics of mothers such as the history of abortion, history of hypertension, bleeding during pregnancy, adequate mobility and rest, and nutritional status are effective on infant weight at birth. Birth weight is a central factor determining the possibility of survival and development combined with the health of the child. Therefore, the incidence of LBW is one of the most important health indicators.

### **Research application**

Given that LBW causes all kinds of personal, family, and social problems, pregnancy care should be considered thoughtfully. This requires comprehensive planning and follow-up in the field of education and advancing the level of awareness of mothers and families by implementing health education programs. In the case of pregnancy, it can positively affect the optimal growth of infants during pregnancy, and such awareness can lead to preserving health and following health considerations among pregnant women, followed by the birth of normal-weight infants.

### **Research Limitations**

All research has come with some restrictions, and this is likewise true about this work. For this, a detailed and comprehensive study of various dimensions of biological characteristics is required. Our study simply addressed some of these biological characteristics. Therefore, researchers are recommended to investigate other biological factors related to low weight, such as a history of maternal diseases (e.g., cardiovascular disease, cancer, diabetes, asthma, thyroid, polygamy), a history of alcohol consumption, and more to implement a more complete prevention plan.

### **Ethical considerations**

In general, adherence to ethical principles is necessary, given the importance of educational research and its influence on participants and educational researchers. Therefore, in this study, ethical considerations in educational research were discussed. Before the study, all participants signed the consent form and they were informed about the subject and methodology of the study. They were assured that medical ethics were observed and their private and personal information remained confidential. When necessary, the results were interpreted for them, any observations were made,

and the necessary instructions were given to the participants to follow up. This study had no money strain on participants and was conducted following the moral and cultural standards of the subject.

#### **Conflict of interest**

The authors declare that there is no conflict of interest.

#### **Acknowledgments**

The authors thank all administrators and staff of the hospitals and those who have contributed to this research.

#### **References**

- 1) Carson-Dewitt R. Highrisk pregnancy. Mosby Year Book: New York; 1999:346-383.
- 2) West J., Lawlor DA., Fairley L., Wright J.. Differences in socioeconomic position, lifestyle and health-related pregnancy characteristics between Pakistani and White British women in the born in Bradford prospective cohort study: the influence of the woman's, her partner's and their parents' place of birth. *BMJ Open*.2014; 4(6):1-12.
- 3) Mansour E., Eissa AN, Nofal LM., Kharboush I., Reda A.. Morbidity and mortality of low-birth-weight infants in Egypt. *East Mediterranean Health J*. 2005; 11(4): 723-731.
- 4) Zeidabadinejad F., Davaaee M., Afrooz GA.. The Relationship between Cognitive Characteristics and Parental Satisfaction with Birth Weight. *Jcmh*.2019;6(3):66-77. [Persian]
- 5) Murphy CC., Schei B., Myhr TL., et al. Abuse a risk factor for low birth weight? A systematic review and meta-analysis. *CMAJ*. 2001;16 (11): 1567-1572.
- 6) Talebian, M. H. & Afrouz, GA.. The Relationship between Biological, Psychological-Cognitive and Social - Cultural Characteristics of Parents with Infant's Birth Weight in Isfahan Province. *Health System Research*. 2011; 6(2):194-204. [Persian]
- 7) Wikström AK., Gunnarsdottir J., Nelander M., Simic M., Stephansson O., Cnattingius S.. Prehypertension in pregnancy and risks of small for gestational age infant and stillbirth. *Hypertension*.2016; 67(3):640-646.
- 8) Talebian M. H., Afrooz GA., Hooman H., & Aaghei A.. The effects of biological and psychological traits of mothers on low birth weight in Isfahan province. *Health System Research*. 2013;9(10):1138-1148. [Persian]
- 9) Zayeri F., Amini M., Kholdi N., Moghimbeigi A.. Determination of factors affecting growth failure of children under two years with multilevel logistic regression model. *Daneshvar*.2014; 21(112): 41-48. [Persian]
- 10) Viengsakhone L., Yoshida Y., Harun-Or-Rashid M., Sakamoto J.. Factors affecting low birth weight at four central hospitals in Vientiane, Lao PDR. *Nagoya J Med Sci*.2010; 72( 1-2): 51-58.

- 11) Mohammadi M, Vaisi Raiegan A, Mirzaei M, Zahednezhad H, Jalali R, Abbasi P. Prevalence of underweight in Iranian children: a systematic review and meta-analysis, *Tehran University Medical Journal*.2018; 76(4):241-249. [Persian]
- 12) Safari M, Saadatmand N, Azarman M. Food Intake Pattern and Related Factors in Women Referred to Medical and Health Centers of Yasouj Dena. *Quarterly Journal of Yasuj Faculty of Nursing and midwifery*. 2007; 2(2): 27-37. [Persian]
- 13) Szwajcer EM, Hiddink GJ, Koelen MA, van Woerkum CM. Nutrition awareness and pregnancy: Implications for the life course perspective. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2012; 135(1):58-64.
- 14) Asadi M, MozaffariKhosravi H, Arabi-Basharik F. (2016). The Relationship between the Gestational Weight Gain and Birth Weight in Yazd City in 2013. *TB*. 2016; 14(6):518-528. [Persian]
- 15) Zarbakhsh Bhari M, Hoseinian S, Afrooz GA, Hooman H. Prevalence of Low Birth Weight and Comparison of Many Biological Characteristics of Low Birth Weight – Newborns, Mothers with those of normal weight- newborns’ counterparts. *Jour guilan uni med sci*. 2012; 21( 81): 37-44. [Persian]
- 16) Mozurkewich, E. L., Luke, B., Avni, M., & Wolf, F. M. Working conditions and adverse pregnancy outcome: a meta-analysis. *Obstetrics & Gynecology*. 2000; 95(4): 623-635.
- 17) Rajabpour Farkhani S., Lavasani M., Afrooz GA.. The effectiveness of psychological interventions on infants’ birth weight. *Journal of Clinical Psychology Andishe Va Raftar (Applied Psychology)*. 2017; 11(42): 57-66. [Persian]
- 18) Mahmoudi Z., Karimlou M., Sajjadi H., Dejman M., Vameghi M.. Low birth weight and its association factors in Iran: according world health organization model. *Jrehab*.2012; 13( 3):75-87. [Persian]
- 19) Eghbalian, F.. Risk factor of low birth weight. *Iran J Pediatr* .2007; 17(1):27-33. [Persian]
- 20) Chhabra P, Sharma AK, Grover VL, et al. Prevalence of low birth weight and its determinants in an urban resettlement area of Delhi. *Asia Pac J Public Health*.2004 ; 16( 2):95-98.
- 21) Nahar N, Afroza S, Hossain M. Incidence of low birth weight in three selected communities of Bangladesh. *Bangladesh Med Res Counc Bull*.1998; 24(2):49-54.
- 22) Zahed Pasha Y., Esmaeili MR., Haji Ahmadi M., Asgardoon GH., Ghadimi R., Baleghi M and et al. Effect of risk factors on low-birth-weight neonates. *Babol Univ Med Sci*.2004; 22(6):18-24. [Persian]

- 23) Reime B., Ratner PA., Tomaselli-Reime SN., et al. The role of mediating factors in the association between social deprivation and LBW in Germany. *Soc Sci Med* .2006; 62(7):1731-1744.
- 24) Fallah Mh., Afrouz GA., Heidari Ga.. Examining the Factors Effective on Birth Weight among Babies of Yazd Province in 2007, *Tolooe Behdasht*.2009; 7(3):57-65. [Persian]
- 25) Wikström AK., Gunnarsdottir J., Nelander M., Simic M., Stephansson O., Cnattingius .S. Prehypertension in pregnancy and risks of small for gestational age infant and stillbirth. *Hypertension*, Jan .2016; 67(3):640-646.
- 26) Bakker R., Steegers EA., Hofman A., Jaddoe VW.. Blood pressure in different gestational trimesters, fetal growth, and the risk of adverse birth outcomes: the generation R study. *American journal of epidemiology*.2011; 174(7): 797-806.
- 27) Yang J., et al. Vaginal Bleeding During Pregnancy and Preterm Birth. *American Journal of Epidemiology*.2004; 160(2):118-125.
- 28) Afrooz GA.. Analytical study of the relationship between birth weight and the frequency of biological, cognitive and behavioral injuries. *Journal of Psychology and Educational Sciences*. 2008; 37(2): 123-31. [Persian]
- 29) Takito MY., Benício MH.. Physical activity during pregnancy and fetal outcomes: a case-control study. *Revista de saude publica*.2010; 44(1):90-101.
- 30) Delaram M., Akbari N.. Weight Gain in Pregnancy and its Correlation with Birth Weight of Infants. *Knowledge Health*.2012; 3(2):39-44. [Persian]
- 31) Khoushabi F., Saraswathi G.. Association between Maternal Nutrition Status and Birth Weight of Neonates in Selected Hospitals in Mysore City, India. *Pakistan Journal of Nutrition*.2010; 9(12):1124-1130. [Persian]
- 32) Fadakar Soogheh K., Ghavi A., Niknami M., Kazemnejad E.. Relationship between Mother's Nutritional Status and Weight Gain during Pregnancy with Low Birth Weight, *Journal of Guilan University of Medical Sciences*.2012;21(83):27-35. [Persian]
- 33) Golchobi Firozja R., Afrooz GA., kamkari K.. Study of biological characteristics and general health of relatives and non-native parents with more than one exceptional child. *Exceptional Education*.2019;2(157): 39-48. [Persian]
- 34) Afrooz GA., khajavi J., maleki S., farid F.. Analytical Study on Relationships of Biological, Cognitive and Psychosocial Characteristics and Marital Satisfaction with Low Birth Weight in Newborn Babies. *Journal of Clinical Psychology*. 2019; 11( 2): 79-89. [Persian]
- 35) Eshraghian F.. The Effects of Risk Factor of Pregnancy Period on Infant,S Weight. *The Journal of Qazvin Univ of Med Sei*.2008; 11(4): 60- 65. [Persian]