

PalArch's Journal of Archaeology  
of Egypt / Egyptology

EFFECT OF MATERNAL HEMOGLOBIN LEVEL IN BIRTH WEIGHT OF  
NEONATES IN PAKISTAN

*Dr. Riffat Aisha<sup>1</sup>, Dr. Atif Akbar<sup>2</sup>, Dr. Niaz Muhammad Aajiz<sup>3</sup>, Dr. Riaz Muhammad<sup>4</sup>,  
Sohail Roman<sup>5</sup>, Mehreen Saba<sup>6</sup>*

<sup>1,2,6</sup>Bahauddin Zakariya University, Multan, Pakistan

<sup>4,5</sup>Sarhad University of Science & Information Technology Peshawar, Pakistan

Department of education Islamia College Peshawar

Email: [riffat.aisha@yahoo.com](mailto:riffat.aisha@yahoo.com), [atifakbar@bzu.edu.pk](mailto:atifakbar@bzu.edu.pk), [niaz@icp.educative.pk](mailto:niaz@icp.educative.pk)  
[riazm.chemistry@gmail.com](mailto:riazm.chemistry@gmail.com), [sohail.ss@suit.edu.pk](mailto:sohail.ss@suit.edu.pk), [mehreensaba@bzu.edu.pk](mailto:mehreensaba@bzu.edu.pk)

**Dr. Riffat Aisha, Dr. Atif Akbar, Dr. Niaz Muhammad Aajiz, Dr. Riaz Muhammad, Sohail Roman, And Mehreen Saba, Effect of Maternal Hemoglobin Level in Birth Weight of Neonates in Pakistan -- Palarch's Journal of Archaeology of Egypt/Egyptology 19(2), 569-574. ISSN 1567-214x.**

**Keywords: Effect, Maternal Hemoglobin Level, Birth Weight, Neonates, And Pakistan. Abstracts**

**ABSTRACT**

**Background:** Pregnant females are vulnerable to have anemia noticeable by hemoglobin level < 11 gr/dl. Anemia in the pregnant condition is related to increased rates of maternal and perinatal mortality, premature delivery, low birth weight, and other contrary results. This study aimed to explore the correlation between hemoglobin level and birth weight in pregnant women in rural and urban areas in Pakistan.

**Methods and Materials:** A cross-sectional was conducted from January 2016 to March 2017, recruiting all pregnant women registered in hospitals in rural and urban areas of Pakistan. Hemoglobin level was obtained from the medical records and analyzed to correlate with birth weight.

**Results:** In our study 3455 pregnant women were included. The mean maternal hemoglobin level was 10.897 0.916 gr/dl and birth weight was 2.9773 0.5323 kg. The proportion of maternal anemia and low birth weight was 55.10% and 16.43% respectively. Pearson correlation test showed  $r = 0.418$  and  $p\text{-value} = 0.000$  which was significant.

**Conclusions:** There was a positive correlation between maternal hemoglobin level and birth weight of neonates.

## INTRODUCTION

Pregnancy increases considerably the iron needs in a mother and her fetus. During pregnancy, the fetal demand for iron increases maternal iron requirements by about 1 g. (Sekhavat et al., 2013) The burden of anemia in pregnant women in developed countries like Australia, the United States, the United Kingdom, and Germany ranges from 9% to 51%. These measures contrast with those of developing countries like Ghana, Sudan Nepal, Bangladesh, Pakistan, and India, where the burden of anemia ranges from 44% to 81%. (Kumari et al., 2019)

Prevalence of anemia among pregnant women (%) in Pakistan was reported at 44 % in 2019, according to the World Bank collection of development indicators, compiled from officially recognized sources. Recent statistics show a prevalence of around 45% of Iron deficiency anemia in Pakistan, which is quite high realizing the failure of public health measures to control it. According to EMRO WHO statistics, it has been found that more than one-fifth of women in Pakistan suffer from anemia. In Pakistan, the prevalence of anemia among ever-married women aged 15 to 44 is reported to be 26% in urban areas and 47% in rural areas. The prevalence of anemia among pregnant women living in urban areas is similar, ranging from 29% to 50%.

During pregnancy, blood volume is increased due to higher plasma volume and erythrocyte numbers. The plasma increase is higher than hemoglobin, leading to a lower hemoglobin concentration. Low hemoglobin concentration in pregnant women below 11gr/dl is designated as anemia of pregnant women. One of the effects of anemia in pregnant women is a delivered baby with low birth weight. This may be to disturbance to nutrition, oxygenation, and uteroplacental circulation. (Safithri et al., 2019)

Low Birth Weight (LBW) is a vital displayer of general health and reproductive health condition of the population which may be cleared as “the weight at birth less than 2500 grams” (WHO, 2014). According to UNICEF (2014), Pakistan has the second-highest recorded rate of LBW (32%), surpassed only by Mauritania which has a rate of 34%. The youngster is upcoming of the population and a child’s health is based on the mother who raises him/ her. Birth mass is a sign of a mother’s physical condition and is a sign of the health situation of a population. The poorer the birth weight, the higher the chance of death (Sheoran, 2011). This study aimed to explore the correlation between maternal hemoglobin and birth weight in Pakistan.

## METHODS AND MATERIALS

The study design was a cross-sectional study conducted from January 2016 to March 2017 in a rural and urban areas in Pakistan. For data collection, questionnaires/Performa were used. For this, direct personal interviews were carried out with mothers of neonates, and the responses were noted on Performa. A total data of 3455 pregnant women were collected aged 17-40 years old. Data on maternal hemoglobin and birth weight were obtained from the medical record of pregnant women who gave birth at the three hospitals, i.e. Civil Hospital, Sahiwal, Fatima Memorial Hospital, Multan, and Nishtar Hospital Multan after getting ethical approval from the Committee.

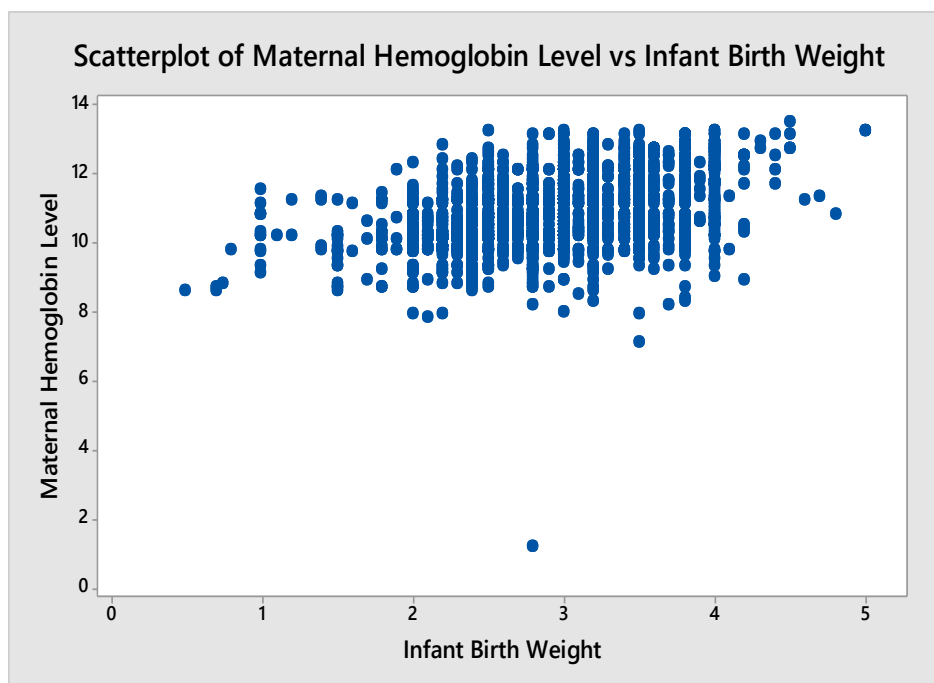
Data were collected and analyzed univariate to find the proportion of each variable, and bivariate to find the correlation between two variables using the Pearson correlation test, with a significant value of  $p < 0.05$  using statistical software (SPSS).

**Table 1:** The Baseline Characteristics of Pregnant Women

Characteristics	n = 3455	%
<b>Parity</b>		
0	18	0.52
1	865	25.04
2	966	27.96
3	728	21.07
4	449	13.00
5	250	07.24
6	104	3.01
7	48	1.39
8	19	0.55
9	04	0.12
10	03	0.09
11	01	0.03
<b>Female Education Level</b>		
1. (Illiterate)	13	0.38
2. (Primary)	37	1.07
3. (Middle)	203	5.90
4. (Metric)	731	21.24
5. (Intermediate)	1010	29.34
6. (Graduation)	817	23.74
7. (Higher Education)	630	18.23
<b>Occupation</b>		
Working	1571	45.47
Housewife	1884	54.53

**Table 2:** Hemoglobin Maternal Level and Infant Birth Weight

Characteristics	n = 3455	%
<b>Hemoglobin Level</b>		
< 11 gr/dl	1904	55.10
11-13 gr/dl	1520	43.99
>13 gr/dl	31	0.897
<b>Infant Birth Weight</b>		
< 2500 gram	568	16.43
≥ 2500 gram	2887	83.56



**Figure.1:** The Linear Relationship between Maternal Hemoglobin Level and Infant Birth Weight

## RESULTS

Table 1 shows that out of 3455 pregnant women, 966 (27.96%) had ever given birth twice (2 parities). The majority were intermediate 1010 (29.34%) in our data set and 1884 (54.53%) were housewives. The proportion of maternal anemia and low birth weight was 55.10% and 16.43% respectively (Table 2). The mean maternal hemoglobin level was 10.897 0.916 gr/dl and birth weight was 2.9773 0.5323 kg.

The linear test was used after the normality test. It showed a p-value = 0.000 ( $p < 0.05$ ), this result indicates that there was a linear relationship between maternal hemoglobin level and infant birth weight as shown in Figure 1. Furthermore, the Pearson correlation test was used to see how close the relationship between two variables was.

Pearson correlation test showed that the value of the Pearson correlation coefficient ( $r$ ) was 0.418, indicating a strong correlation, and the p-value  $< 0.05$  showed significant relationship between maternal hemoglobin level and infant birth weight.

## DISCUSSION

The study has shown that 55.10% of pregnant women are anemic and this is higher than the national percentage i.e. 44%. The characteristics of the respondents are different compared to the national characteristics in general. Furthermore, these pregnant women have had normal and cesarean-section deliveries. In this study, the results show a significant correlation between low hemoglobin levels of pregnant women and low infant birth weight ( $p = 0.000$ ), likewise, a previous study in Pakistan, also has shown a significant correlation

between maternal hemoglobin levels in the third trimester and infant birth weight (Bakhtia et al, 2007). Many confounding factors cannot be controlled, such as maternal age, parity, nutritional status, chronic disease during pregnancy, genetic factors, characteristics of antenatal care, maternal smoking habits, and socioeconomic condition (Safithri et al, 2019). Another study conducted in Iran has shown a similar result that there is a significant relationship between low hemoglobin levels and low birth weight of neonates (Sekhavat et al, 2011). In our study, most of these factors have been controlled by exclusion criteria, however, several factors are not examined because of the incomplete data in the medical records. Furthermore, several factors that affect birth weight were not studied, such as maternal nutrition before and during pregnancy, intake of iron tablets, antenatal visits during pregnancy, and socioeconomic condition, whereas it may become a confounding factor in this study (Khanal et al, 2014; Kumar et al, 2010; Nobile et al, 2007; Matin et al, 2008). Maternal nutritional intake before and during pregnancy can affect fetal development. Poor nutrition in the mother before and during pregnancy can lead to a lack of nutrients that are transmitted through the placenta to the baby (Muthayya, 2009). Inadequate intake of iron tablets during pregnancy and the lack of antenatal care visits may increase the risk of low birth weight of the baby (Khanal et al, 2014). The intake of iron tablets during pregnancy helps increase overall maternal nutrition so it may increase the birth weight of the baby. In antenatal visits, the risk of low birth weight can be reduced because antenatal visits can improve the mother's diet during pregnancy, and monitor and assist the mother in weight gain during pregnancy (Khanal et al, 2014). Socioeconomic conditions have an important role for pregnant women because it affects maternal nutrition before and during pregnancy (Matin et al, 2008).

Regardless of our findings regarding the association between low hemoglobin level during pregnancy and low birth weight, some previous studies have shown otherwise resulting that low hemoglobin level during pregnancy is not associated with low birth weight (Safithri et al, 2019; Madaan et al, 2013).

Limitations of this study were that not all influencing factors can be controlled, such as maternal nutrition before and during pregnancy, intake of iron tablets, antenatal visits during pregnancy, and socioeconomic conditions. Further study needs to include all of these factors, by doing primary data collection with a prospective cohort study method and assessing hemoglobin levels from the first until the third trimester of pregnancy. As for secondary data, to control the factors that may affect the results, a good medical record is encouraged, such as data on third-trimester hemoglobin level, maternal history of the ANC, and keeping medical records in a good place, to be used for any later study, and to provide complete information. To conclude, our study shows that there is a correlation between hemoglobin levels of pregnant women with birth weight. Other factors for low maternal hemoglobin need to be further explored.

#### **REFERENCES LIST**

- Matin A, Azimul S, Matiur A, Shamianaz S, Shabnam J, Islam T. (2008). Maternal socioeconomic and nutritional determinants of low birth weight in urban area of Bangladesh. *J Dhaka Med Coll*, 17(2):83–87.

- Nobile CG, Raffaele G, Altomare C, Pavia M. (2007). Influence of maternal and social factors predictors of low birth weight in Italy. *BMC Public Health*, 7(1):192–200.
- Kumar SG, Kumar HH, Jayaram S, Kotian M. (2010). Determinants of low birth weight: a case control study in a district hospital in Karnataka. *Indian J Pediatr*, 77(1):87–89.
- Khanal V, Zhao Y, Sauer K. (2014). Role of antenatal care and iron supplementation during pregnancy in preventing low birth weight in Nepal: comparison of national surveys 2006 and 2011. *Arch Public Health*, 72(1):4–13.
- Madaan G, Bhardwaj AK, Narang S, Sharma P. (2013). Effects of third trimester maternal hemoglobin upon newborn anthropometry. *J Nepal Paediatr Soc*, 33(3):186–189.
- Muthayya S. (2009). Maternal nutrition and low birth weight. *Indian J Med Res*, 130(5):600–608.
- Sekhavat, L., Davar, R., & Hosseinidezoki, S. (2011). Relationship between maternal hemoglobin concentration and neonatal birth weight. *Hematology*, 16(6), 373-376.
- Kumari, S., Garg, N., Kumar, A., Guru, P. K. I., Ansari, S., Anwar, S., & Sohail, M. (2019). Maternal and severe anemia in delivering women is associated with risk of preterm and low birth weight: A cross sectional study from Jharkhand, India. *One Health*, 8, 100098.
- Safithri, S. F., Kania, N., & Diana, A. (2019). Correlation between Maternal Hemoglobin Level and Birth Weight. *Althea Medical Journal*, 6(2), 91-94.
- World Health Organization. (2014). *Global Nutrition Targets 2025: Low birth weight policy brief* (No. WHO/NMH/NHD/14.5). World Health Organization.
- Sheoran, A. P., Babu, M., Mandal, K., & Rai, K. (2011). Effectiveness of Planned Health Education Programme regarding risk factors and care of low birth weight babies in terms of knowledge and practice among Mothers. *Nursing and Midwifery Research Journal*, 7(4).
- Bakhtiar, U. J., Khan, Y., & Nasar, R. (2007). Relationship between maternal hemoglobin and perinatal outcome. *Age*, 25, 24.
- World Health Organization, & World Health Organization. *Management of Substance Abuse Unit*. (2014). *Global status report on alcohol and health, 2014*. World Health Organization.