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ORIGINAL ARTICLE

Association of Maternal Iron Deficiency Anemia with Lower Ferritin Level of New Born among Pregnant Women

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ABSTRACT

Objective: Aim of current study is to determine the prevalence maternal iron deficiency anemia with lower ferritin level of new born among pregnant women.

Study Design: Cross-sectional study

Place and Duration: The study was conducted at Gynae and Obs department of Mufti Mehmood Teaching Hospital, D I Khan for duration of six months from January 2021 to June 2021.

Methods: There were one hundred and thirty pregnant women were included in this study. Women were aged between 18-45 years. Data on enrolled patients' ages, BMIs, and educational attainment levels were collected after informed written consent was obtained. At birth, the umbilical cord and the mother's blood were taken for a Complete Blood Count (CBC) to measure haemoglobin and serum ferritin levels in both the mother's and her baby's bloodstream.SPSS 23.0 used to analyze complete data.

Results: The mean age of the females were 29.14±5.87 years with mean BMI 25.4±7.44 kg/m^2. Most of the females were not educated 80 (61.5%). Mean hemoglobin level of mothers were 116.9±34.66 g/L and with mean serum ferritin level 19.6±8.52 ng/mL. Frequency of iron deficiency anemia (Hb< 110 g/L) was found among 70 (53.8%) cases with low serum ferritin < 15 ng/mL). Among 70 cases, 40 (57.1%) cases had mild anemia, moderate anemia found in 18 (25.7%) patients and severe anemia found in 12 (17.1%) cases. Among anemia patients mean ferritin level was 13.9±16.6 ng/mL with mean hemoglobin 87.5±12.34 g/L. Mean gestational age of new born were 36.8±12.43 weeks. Mean weight of the infants were 2534.23±5.2 grams.

Conclusion: We concluded in this study that strongly association of iron deficiency anemia with low ferritin level. Maternal anemia is a serious health problem in which life of pregnant women and her child are endangered.

Keywords: Anemia, Pregnant Women, Serum Ferritin, Hemoglobin, New born

INTRODUCTION

A lack of iron (ID) is the most frequent micronutrient deficit in the world, especially in impoverished nations [1]. It is the leading cause of nutritional anaemia. Women who are pregnant are especially prone to ID because of the increased metabolic needs of pregnancy, which include a developing placenta, baby, and maternal tissues [2].

It is typical for pregnant women in Ethiopia and other impoverished countries to begin their pregnancies with low or depleted iron reserves, which may increase the risk of iron-deficiency anaemia (IDA). Maternal malnutrition frequently coexists with severe anaemia [3]. When the mother and foetus have conflicting needs, the normal maternal-fetal iron homeostasis may be disturbed [3–5]. Premature birth, intrauterine growth retardation, and neonatal and perinatal mortality [6] are all possible outcomes for both the mother and the foetus. For newborns under the age of six months, maternal iron is the primary source of dietary iron, and it is reasonable to wonder if maternal IDA affects the foetus during and after the womb.

During pregnancy, an expectant mother's blood volume and foetus red cell mass necessitate a daily iron intake of 1000 mg.[8]A considerable increase in the absorption of iron by the mother during pregnancy [9] is true, but 50% of pregnant women throughout the globe are anaemic owing to ID, and it is possible that this affects the iron transfer to the baby. Placenta controls how much iron passes from mother to foetus. Ferroportin, the divalent metal transporter 1, and the transferrin receptor (TfR)-1 and 12, as well as the control of placental expression of these proteins, are all part of the placental iron transfer system.[10] When a baby is 24 weeks pregnant, the body's ability to regulate itself is fully functional.[11] In the third trimester of pregnancy, the foetus acquires iron at a rate of 1.35 mg/(kg d) of foetal weight.

Fetal iron status and growth have been examined in several research [12] to see if there is a connection. The results, on the other hand, are still contradictory. It has recently been found that low and high haemoglobin levels in early pregnancy may increase the chance of having a baby with low birth weight, being born prematurely, or even dying. According to [13], there was a lower probability of an undesirable birth outcome when Hb was tested in the second and third trimesters. Serum ferritin levels in different trimesters were also found to have a lower correlation with unfavourable delivery outcomes [14].

In most prior research assessing the relationship between iron status and birth outcomes, haemoglobin levels were utilized as an indicator of iron status, and only a few studies used serum ferritin as an indicator of iron status. Furthermore, research that look at the effects of low maternal iron levels on health tend to come from more affluent regions of the world. Studies in low-income countries are few, and thus far there is little evidence that

maternal ferritin levels have an effect on pregnancy outcomes.[15]

As a result, we set out to see if there was any correlation between the iron status of pregnant women as measured by plasma serum ferritin levels.

MATEIAL AND METHODS

This cross-sectional study was conducted atGynae and Obs department of Mufti Mehmood Teaching Hospital, D I Khan for duration of six months from January 2021 to June 2021. The study was comprised of 130 pregnant females. Data on enrolled patients' ages, BMIs, and educational attainment levels were collected after informed written consent was obtained. Patients had previous pregnancy complication, had pregravid chronic diseases and those were on iron supplementation were not included in this study.

Patients were between the ages of 18 and 45. Pregnant mothers were asked to donate blood on their first visit to one of the participating facilities for a prenatal medical assessment. Complete Blood Count (CBC) analysis was performed using blood samples (CBC). Pregnant women with haemoglobin levels below 110 g/L were found to have anaemia. Hb 70 g/L was considered severe anaemia; Hb 70-99 g/L was considered moderate anaemia; and Hb 100-109 g/L was considered mild anaemia.

Ferritin levels in mothers' serum were measured after the samples were kept at -18°C and utilised for analysis. Ferritin reagent kits and an automated chemistry analyzer equipment (Abbott, USA) were used in accordance with the manufacturer's instructions to measure serum ferritin. Calibration was performed using six ferritin standards (corresponding to ferritin levels ranging from 0 to 1000 ng/ml). Calibrations of the ferritin standard were traceable to WHO standards. In addition, the ferritin controls (low, medium, and high) were tested in each run to ensure the test's correctness and precision.SPSS 23.0 used to analyze complete data. Categorical variables were assessed by using frequency and percentages. Mean standard deviation was used.

RESULTS

Mean age was 29.14±5.87 years with mean BMI 25.4±7.44 kg/m^2. Most of the females were not educated 80 (61.5%). Mean hemoglobin level of mothers were 116.9±34.66 g/L and with mean serum ferritin level 19.6±8.52 ng/mL.(table 1)

Table 1: Baseline characteristics of enrolled cases

Variables	Frequency	Percentage
Mean age (years)	29.14±5.87	-
Mean BMI (kg/m^2)	25.4±7.44	-
Mean Hb (g/L)	116.9±34.66	-
Mean SF (ng/mL)	19.6±8.52	-
Education status		
Yes	80	61.5
No	50	38.5

Frequency of iron deficiency anemia (Hb< 110 g/L) was found among 70 (53.8%) cases with low serum ferritin < 15 ng/mL).(fig 1)

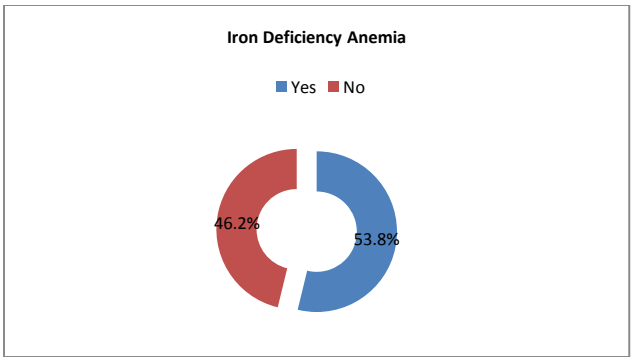

Figure 1: Association of IDA with low ferritin level

Among 70 cases, 40 (57.1%) cases had mild anemia, moderate anemia found in 18 (25.7%) patients and severe anemia found in 12 (17.1%) cases.Among anemia patients mean serum ferritin level was 13.9±16.6 ng/mL with mean hemoglobin 87.5±12.34 g/L. (table 2)

Table 2: Severity of IDA with low ferritin level

Variables	Frequency (n=70)	Percentage
IDA		
Mild	40	57.1
Moderate	18	25.7
Severe	12	17.1
Mean SF (ng/mL)	13.9±16.6	
Mean Hb (g/L)	87.5±12.34	

Mean gestational age of new born were 36.8±12.43 weeks. Mean weight of the infants were 2534.23±5.2 grams with height 46.24±5.55 cm.(table 3)

Table 2: Pregnancy outcomes among enrolled cases

Variables	Mean	Standard Deviation
Mean gestational age (weeks)	36.8	12.43
Mean Weight (g)	2534.23	5.2
Mean height (cm)	46.24	5.55

DISCUSSION

Iron deficiency anaemia has been related to higher rates of maternal and foetal mortality and morbidity throughout pregnancy. Breathing difficulties, fainting, exhaustion, palpitations, and sleep problems are common among moms who are affected. [16] In addition, they are more likely to suffer perinatal infection, pre-eclampsia, and bleeding during pregnancy. Cognitive and behavioural problems were also documented following childbirth. [17] Intrauterine growth retardation, preterm, and low birth weight are all associated with high death rates, especially in underdeveloped countries. [18] First-trimester iron insufficiency has a greater influence on fetal development than anemia later in pregnancy.

In our study 130 pregnant women of aged 18-45 years were included.Mean age was 29.14±5.87 years with mean BMI 25.4±7.44 kg/m^2. Most of the females were not educated 80 (61.5%). Mean hemoglobin level of mothers were 116.9±34.66 g/L and with mean serum ferritin level 19.6±8.52 ng/mL. Above mention results of current study showed resemblance to previous studies.[19,20]Frequency of iron deficiency anemia (Hb< 110 g/L) was found among

70 (53.8%) cases with low serum ferritin < 15 ng/mL). The frequency of anemia among pregnant women in this research was comparable to the percentages reported for pregnant women in other Arab countries [21]. Among pregnant women in rural Jordan, Al-Mehaisen et al. [22] found that anemia prevalence varied from 18.9% in the first trimester to 32.7 percent in the second trimester to 42.5 percent in the third. Among pregnant Kuwaiti women, anemia was found to be present in 24.1% of the women Incidence of anemia varied according to the stage of pregnancy, with the lowest prevalence in first trimester (14.8 percent) and the greatest in second trimester (49.2 percent) (36 percent). First-trimester anemia rates for pregnant women in Saudi Arabia ranged from 29.6 percent [24] to 27.7 percent [25] in two locations of Saudi Arabia.

Among 70 cases, 40 (57.1%) cases had mild anemia, moderate anemia found in 18 (25.7%) patients and severe anemia found in 12 (17.1%) cases.Among anemia patients mean serum ferritin level was 13.9±16.6 ng/mL with mean hemoglobin 87.5±12.34 g/L.Iron deficiency anemia may continue for up to a year in newborns with low iron reserves. [26] Because of the potential long-term implications, it's critical to discover such a condition early and get it addressed. For the proper functioning of the nervous system, it is vital to consume iron. The brain's energy metabolism is altered by iron deficiency anemia, and this leads to problems with neurotransmitter activity and myelination. [27] As a result, children with iron deficiency anemia have cognitive, social-emotional, and adaptive development challenges.[28]Mean gestational age of new born were 36.8±12.43 weeks. Mean weight of the infants were 2534.23±5.2 grams with height 46.24±5.55 cm.Contrary to earlier studies [29], our findings between BMI and pregnancy outcome were not supported by the small percentage of overweight/obese women in the research population.

There was a correlation between maternal iron deficiency anemia and decreased ferritin levels in newborns. Pregnant mothers and their unborn children are at risk when they suffer from maternal anemia. For this reason, it is essential to begin teaching girls at an early age and spreading effective knowledge about healthy eating, frequent prenatal examinations, and the use of iron-folic acid tabs to ensure a healthy pregnancy.

CONCLUSION

We concluded in this study that strongly association of iron deficiency anemia with low ferritin level. Maternal anemia is a serious health problem in which life of pregnant women and her child are endangered.

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