

Relationship of Low Level of Ferritin in Newborn and Iron Deficiency Anemia in Mothers: A Single Center Study

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Low Level of Ferritin in Newborn and Iron Deficiency Anemia in Mothers

ABSTRACT

Objective: To assess the relationship between low levels of ferritin in newborns and iron deficiency anemia in mothers.

Study Design: current descriptive cross-sectional study

Place and Duration of Study: This study was conducted at the HBS General Hospital Islamabad July 2022 to December 2022.

Materials and Methods: Blood was taken and sent to laboratory for testing of serum ferritin. The data was collected through predesigned proforma. The collected data was analyzed by the latest version of SPSS.

Results: The total number of participants was 160 in the present studies. The mean age was 25 ± 1.98 years. 58 (36.25 %) had mild iron deficiency anemia, while 55 % of them had moderate, and 8.75% of them has severe iron deficiency anemia. Moreover, the proportion of serum ferritin in the newborn had a low level of 102 (63.75%) while 58 (25 %) had a normal level of serum ferritin. 42 (41.17 %) had mild, 52 (50.98 %) moderate and 8 (7.85 %) of them had severe low serum ferritin levels.

Conclusion: The present study concluded that most of the mothers with iron deficiency had low serum ferritin levels. Therefore, iron deficiency anemia and low level of serum ferritin in the infants of iron-deficient mothers is a serious health problem, and both mothers and infants can develop multiple health problems. Finally, the study concluded that iron-deficient mothers had a direct effect on the serum ferritin level of their infants.

Key Words: Serum ferritin level, Pregnancy, Iron deficiency anemia, Hemoglobin level.

Citation of article: Saad M, Javed H, Kiani SN, Khan NB, Shahid F, Sheikh S. Relationship of Low Level of Ferritin in Newborn and Iron Deficiency Anemia in Mothers: A Single Center Study. Med Forum 2023;34(8):208-211.doi:10.60110/medforum.340848.

INTRODUCTION

Iron insufficiency along with iron-deficiency anemia (IDA) afflicts approximately 200 million individuals around the world.¹ Anemia consistently piques the attention of numerous individuals from all over the globe.

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Received: March, 2023

Accepted: May, 2023

Printed: August, 2023

It has become a fairly common hematological illness throughout developing nations as well as emerging countries, particularly within individuals who are vulnerable such as kids, and teenagers, along with females of reproductive maturity and those who are sexually active.² Most research investigations used ferritin from the blood as a marker of the iron store, however, this type of serum ferritin contains major known problems in that it's considered a reactive substance in the acute phase (APR); that elevates after the spread of infection, particularly when the symptoms do not yet appear during the sub-clinical phase of infections.³ A premature delivery (before 28 weeks of gestation), growth retardation within the womb, and newborn and postpartum mortality are conceivable consequences that can affect the mother and the baby who is unborn.⁴ Women throughout countries that are developing typically commence being pregnant having reduced and inadequate levels of iron, placing themselves in imminent danger of developing (IDA).⁵ Anemia tends to be serious because typically associated with malnutrition among mothers^{4,5}. Newborns who are premature have lower overall body iron concentrations. The shortage grows as the gestational period decreases. iron deficiency in newborns who are preterm is further aggravated by accelerated postnatal development,

recurrent phlebotomies, as well as postponed feeding through the mouth.⁶ In such circumstances, the differing requirements of both the mother along with fetus could interfere with the optimal maternal-fetal balance of iron.^{4,7} Given that parental iron represents the most important source of iron in infants until they reach the age of six months and a half, it would seem logical to look into whether iron deficiency anemia (IDA) throughout gestation impacts the developing baby and its offspring.⁸ Apparently, a few research report ferritin levels based on particular gestational stages. Ferritin concentrations were observed as reaching 45 g/l during periods of 14 and 16 weeks of pregnancy, as well as 200 g/l until week 39 of gestation.⁹ Fetuses who underwent a percutaneous collection of umbilical blood despite pathological mother fetus circumstances reported a rise in mean plasma ferritin between 17.7g/l in 18-20 weeks of conception up to 56.8g/l during 32-35 weeks of pregnancy. Anemia due to iron deficiency and anemia should always be taken into account because it has an obvious influence on the individual's level of life and hence needs sufficient management. It can also be the result of substantial or serious disorders; thus, it is critical to research its cause. In this study, hemoglobin, as well as ferritin, were utilized to determine anemia with a deficiency of iron. Further research, including additional critical indications that include transferrin, serum transferrin receptor in order, and total iron, is recommended for a better comprehension of the cause of Iron anemia and improved therapy.¹⁰ Therefore, the present study focused to study the effect of maternal iron deficiency on the serum ferritin level of newborns, because the low serum ferritin might not be evident during the initial two to three months. In conclusion, the current study will help mothers to prevent IDA, and in turn, the health of newborns will be maintained so that the health of both mothers and infants will be maintained.

MATERIALS AND METHODS

The current descriptive cross-sectional study was conducted at the HBS General Hospital Islamabad from July 2022 to December 2022, after the approval institutional review board, the total duration of the study was 6 months. The total sample size was selected by using the online Rao soft calculator. The sample size of the study was 160 through a convenient non-random sampling technique with a confidence interval of 95 %, in addition, the margin of error was 7 %. Antennal mothers (pregnant mothers) having age from 20 to 30 years of age, moreover, the level of Hb of all these women was less than 10.5 mg/dl, all these women had primary and multigravida were included after their willingness to participate in the study. Women who have a history of antepartum and postpartum hemorrhage, women with chronic diseases like diabetes

mellitus, kidney diseases, heart failure, recent transfusion of blood, women having multiple pregnancies, and anemia due to other causes rather than iron were excluded from the study. Proper written informed consent was obtained from each participant. A sample of blood was drawn from the vein of the mother was obtained at the time of labor or if needed then taken before the C-section as well, and from the infants, the blood was drawn from the umbilicus just after clamping for the purposes of full blood count in order to evaluate the Hb and serum ferritin level of both infants and mother. A well-designed proforma regarding the general details of the participant was filled. The data was collected both from participants and through lab reports of blood. The collected data was analyzed by the latest version of SPSS.

RESULTS

The results of the current study are presented in the following easily understandable tables. Table # 01 illustrates the sociodemographic characteristics of the participants. The total number of participants was 160 in the present studies. 40 (21 %) of them were from 20-25 years of age and 120 (75 %) of them were 26-30 years of age with a mean age of 25 ± 1.98 years. However, 61.25 % of the individuals were from poor families and 36.25 % belonged to middle-class families. Table # 02 highlights the classification of women on the basis of their hemoglobin level, 58 (36.25 %) had mild iron deficiency anemia, while 55 % of them had moderate, and 8.75% of them has severe iron deficiency anemia. Moreover, the proportion of serum ferritin in the newborn had a low level of 102 (63.75%) while 58 (25 %) had a normal level of serum ferritin. Table # 04 represents the classification of serum ferritin levels in newborns, 42 (41.17 %) had mild 52 (50.98 %) moderate and 8 (7.85 %) of them had severe low level of serum ferritin.

Table No. 1: Sociodemographic characteristics

Age (years)	Number	Percentage
20 -25	40	21 %
26-30	120	75 %
The economic status of the participants		
Poor	98	61.25 %
Middle	58	36.25 %
Upper	4	2.5 %

Table No. 2: Classification of women in terms of their Hb level

Iron deficiency Anemia	Number	Percentage
Mild	58	36.25 %
Moderate	88	55 %
Severe	14	8.75 %

Table No. 3: Proportion of low serum ferritin level in newborn

Level of serum ferritin	Number	Percentage
Low level	102	63.75 %
Normal level	58	25 %

Table No. 4: Classification of newborns in terms of low levels of serum ferritin

Low level of serum ferritin	Number	Percentage
Mild	42	41.17 %
Moderate	52	50.98 %
Severe	8	7.85 %

DISCUSSION

Iron deficiency anemia is one of the most prevalent conditions nowadays but especially it is more common in females during their reproductive age. Though the symptoms of IDA in not evident, however, it has multiple effects on the growth and development of infants as well as on the mothers during the gestation period. Therefore, iron deficiency anemia in mothers needs proper investigation and management in order to maintain the health of mothers as well as their infants which will result in proper growth and development of the infants, and complications like growth retardation will be minimized. In the current study, the mean age of the participants was 25 ± 1.98 years, and 58 (36.25 %) had mild iron deficiency anemia, while 55 of them had moderate, and 8.75% of them has severe iron deficiency anemia, while a study conducted by Obai G et al concluded similar findings that the overall prevalence was 22.1 %. 23 % had mild, 9 % had moderate and 0.8 % of them had severe iron deficiency anemia.¹¹ While another study conducted by Feleke BE et al reported that there were 75.5 % of the individuals were aged 20 -25 years.¹² Moreover, other research studies conducted by Sapre SA et al (mild anemia 28%, moderate anemia 54%, and severe anemia 18%).¹³ and Maka SS et al also reported similar findings.¹⁴ In the present, the results highlight the classification of women on the basis of their hemoglobin level, 58 (36.25 %) had mild iron deficiency anemia, while 55 of them had moderate, and 8.75% of them has severe iron deficiency anemia, while a study conducted by Shaikh NB et al that 31.52 % mild anemia, 61.41 % had moderate anemia, and 7.07 % had severe anemia respectively.¹⁵ However, another study conducted by Qazi RA et al finds that the percentage of mild, moderate, and severe anemia was 52.5 %, 27.5 %, and 19.9 % respectively which was comparable to our study.¹⁶ While similar results were concluded by Vanamala VG et al that 43.3 % of the participants had mild anemia, 58 % of them had moderate and 7.8 % had severe anemia.¹⁸ In the current study, the proportion of serum ferritin in the newborn had a low

level of 102 (63.75%) while 58 (25 %) had a normal level of serum ferritin, classification of serum ferritin levels in newborns, 42 (41.17 %) had mild 52 (50.98%), in addition, 8 (7.85 %) of them severe serum ferritin levels.¹⁷ A similar study presented by Shaikh NB et al also reported that 45.56 % had mild serum ferritin level deficiency, 47.78 % had moderate, and 6.66 % of them had severely low levels of serum ferritin.¹⁵ According to the study of Kefiyalew et al that the proportion of total severe anemia in the participants was 7.8 %.¹⁸ Furthermore, Shams S et al reported that the infants (45.5 %) had serum ferritin levels from 12-30 ng/ml.¹⁹ Women within Pakistan when pregnant are thought to be more susceptible to developing anemia as a consequence of inadequate nutrition as well as impoverishment along with additional circumstances such as menstruating. Malarial diseases, intestinal parasites disease, along with medication to combat malaria blood clotting. Pregnant women were a greater probability to suffer from anemia. individuals weren't taking iron-enriched foods during the course of their pregnancy in regard to others who are taking enough vitamins.²⁰

CONCLUSION

The present study concluded that most of the mothers with iron deficiency had low serum ferritin levels. Therefore, iron deficiency anemia and low level of serum ferritin serum in the infants of iron-deficient mothers is a serious health problem, and both mothers and infants can develop multiple health problems. Finally, the study concluded that iron-deficient mothers had a direct effect on the serum ferritin level of their infants.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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