OPEN ACCESS Freely available online

Journal of Hematology & Thromboembolic Diseases

Mini Review

Exploring Hematologic Markers: Serum Ferritin Concentration and Iron Therapy Needs in Pregnant Women

Cheryl Misak*

Department of Clinical laboratories, University of the Bahamas, Nassau, Bahamas

ABSTRACT

The study aims to investigate the association between serum ferritin concentration in the third trimester of pregnancy and various hematologic parameters, with a specific focus on discerning the most reliable indicator for identifying women in need of iron therapy. Blood samples were collected from pregnant women with a hemoglobin level above 10 g/dL, excluding those with thalassemia trait at the time of booking. The samples, obtained at 28-30 weeks' gestation, underwent a correlation analysis, utilizing Spearman ρ values, to assess the relationship between serum ferritin concentration and hemoglobin, mean corpuscular volume, mean cell hemoglobin, mean cell hemoglobin concentration, and hematocrit. The analysis, employing Receiver Operating Characteristic (ROC) curves, determined the optimal relationship among these parameters. The results demonstrated a significant correlation between serum ferritin concentration and hemoglobin (ρ =0 0.211), mean corpuscular volume (ρ =0.332), mean cell hemoglobin (ρ =0.304), and hematocrit (ρ =0.199). Notably, the ROC curve analysis revealed that hemoglobin exhibited the largest area under the curve. The study concludes that serum ferritin concentration in the early third trimester is most strongly correlated with hemoglobin levels. Using a cutoff of 11 g/dL or below (identified in 25% of all patients), the research successfully identified 64% of women requiring iron therapy. These results provide details about an important hematologic characteristic that can aid healthcare practitioners in making informed decisions regarding iron supplementation during pregnancy.

Keywords: Serum ferritin concentration; Iron therapy; Pregnancy; Hematologic markers; Hemoglobin

INTRODUCTION

Pregnancy represents a transformative period in a woman's life, characterized by dynamic physiological changes to support the growing demands of the developing fetus. Central to maternal and fetal well-being is the intricate balance of hematologic markers, particularly serum ferritin concentration, a key indicator of iron status. Iron plays a crucial role in various physiological processes, including the synthesis of essential proteins like hemoglobin, vital for oxygen transport. As such, understanding the nuanced relationship between serum ferritin concentration and hematologic parameters becomes paramount, especially in the context of identifying reliable markers for discerning the iron therapy needs of pregnant women.

This study embarks on the journey of exploring hematologic markers, with a specific focus on serum ferritin concentration, to unravel their association with key parameters such as hemoglobin and red cell indices. The overarching goal is to pinpoint the most robust hematologic characteristic that can effectively guide healthcare practitioners in identifying pregnant women who may require iron therapy. By delving into this intricate interplay of variables, we aim to contribute not only to the refinement of clinical practices but also to the broader understanding of how hematologic markers influence maternal health during the pivotal period of pregnancy [1].

In the subsequent sections, we will delve into the methodology employed in this potential investigation, the demographic

Correspondence to: Cheryl Misak, Department of Clinical laboratories, University of the Bahamas, Nassau, Bahamas, E-mail: cherylmisak09875@yahoo.com

Received: 29-Sep-2023, Manuscript No. JHTD-23-28061; **Editor assigned:** 03-Oct-2023, Pre QC No. JHTD-23-28061 (PQ); **Reviewed:** 17-Oct-2023, QC No. JHTD-23-28061; **Revised:** 24-Oct-2023, Manuscript No. JHTD-23-28061 (R); **Published:** 31-Oct-2023, DOI: 10.35248/2329-8790.23.11.570.

Citation: Misak C (2023) Exploring Hematologic Markers: Serum Ferritin Concentration and Iron Therapy Needs in Pregnant Women. J Hematol Thrombo Dis.11:570.

characteristics of the study population, and the comprehensive literature review that grounds our exploration within the broader context of maternal care. This research aims to improve our capacity to offer personalized and evidence-based care to expectant mothers by navigating the complicated field of hematologic markers. This is especially important in diverse healthcare settings like our regional hospital, where the majority of patients are from lower socioeconomic class and predominantly Chinese demographics. Join us on this journey as we unravel the complexities of hematologic markers and their implications for iron therapy needs in pregnant women [2,3].

LITERATURE REVIEW

Our institution, a regional hospital, plays a crucial role in both healthcare and medical education, particularly in the field of obstetrics. Annually, we handle approximately 5000 deliveries, serving as a significant hub for medical students undergoing obstetric training. The demographic makeup of our patient population is predominantly Chinese, constituting 88% of the total. Notably, the majority of our patients belong to the lower socioeconomic class, emphasizing our commitment to providing healthcare services to diverse communities. The Filipino community represents the second most prevalent ethnic group utilizing our hospital services. To address the nutritional needs of pregnant women and promote maternal health, a standardized approach is employed. Specifically, starting from the 20th week of gestation, all pregnant patients receive a prescribed multivitamin preparation called Obimin. This pharmaceutical product is sourced from United Laboratories/ Westmont Pharmaceuticals in Manila, Philippines. The composition of Obimin includes essential components such as 29 mg of elemental iron, calcium, copper, iodine, and a combination of multiple vitamins. The formulation is designed to support the overall well-being of pregnant women, addressing key nutritional requirements during this critical period [4].

The inclusion of elemental iron in the Obimin formulation is particularly noteworthy. Iron is a vital mineral during pregnancy, as it plays a pivotal role in preventing iron-deficiency anemia, a condition that can have adverse effects on both maternal and fetal health. Given the importance of adequate iron levels in pregnancy, the provision of 29 mg of elemental iron in each dose of Obimin underscores our commitment to comprehensive maternal care. Calcium, another essential component of Obimin, contributes to the development of fetal bones and teeth, supporting the growing needs of the developing fetus. Copper, iodine, and a mix of multiple vitamins further complement the formulation, addressing various aspects of maternal and fetal nutrition. This comprehensive approach aligns with our hospital's commitment to ensuring that pregnant women receive well-rounded and evidence-based care [5].

Our emphasis on prescribing Obimin to all pregnant patients reflects our dedication to preventive and holistic healthcare. By incorporating this multivitamin preparation into our standard practice, we aim to optimize maternal nutrition and contribute to positive pregnancy outcomes. This commitment is especially relevant in our context, where a significant portion of our patient population represents the lower socioeconomic class, making access to quality healthcare and nutritional support paramount. A total of 437 mothers were initially enrolled in the study. However, data pertaining to serum ferritin concentrations were unavailable for three participants. Additionally, four subjects did not have complete blood results during the initial assessment, prompting a repetition of the tests at the subsequent visit. Consequently, these seven individuals were excluded from the study, resulting in a final study group comprising 430 mothers. The demographic characteristics of the included participants were analyzed to provide a comprehensive understanding of the study cohort. The mean maternal age was calculated to be 29.3 years, with a standard deviation of 5.0 years. This statistical representation offers a central tendency and dispersion measure, respectively, providing insights into the age distribution within the study group [6].

In further delineating the demographic profile, the study considered parity status. Among the 430 mothers included in the final analysis, 222 (51.6%) were nulliparas, indicating that more than half of the participants were experiencing their first pregnancy. In addition, 158 (36.7%) mothers were classified as para 1, denoting those with one previous childbirth, while 50 (11.6%) fell into the para 2 category, signifying mothers with two prior deliveries. This breakdown of parity status is essential for contextualizing the study findings, as different obstetric histories may influence maternal health parameters. The inclusion of nulliparas, para 1s, and para 2s allows for a nuanced analysis of how serum ferritin concentrations may vary across different obstetric groups. Understanding these distinctions can contribute valuable insights into the potential impact of prior pregnancies on the hematological profiles of mothers. The study initially recruited 437 mothers, with data discrepancies leading to the exclusion of seven participants. The final analysis focused on a cohort of 430 mothers, revealing a mean maternal age of 29.3 years. The distribution of nulliparas, para 1s, and para 2s within the study population provides a detailed snapshot of the participants' obstetric histories, facilitating a more nuanced interpretation of the study's hematological findings. These demographic insights enhance the robustness and applicability of the study's conclusions to diverse maternal populations [7].

DISCUSSION

Ferritin, a pivotal component in iron metabolism, serves as a principal storage protein for this essential mineral. Its primary repositories include the spleen, liver, and bone marrow, reflecting its critical role in preserving iron reserves within the body. Notably, ferritin's presence extends beyond these key organs; it is also identified in mucosal cells of the small intestine, the placenta, kidneys, testes, skeletal muscles, and circulating plasma. The diverse distribution of ferritin underscores its multifaceted involvement in various physiological processes. The mucosal cells of the small intestine, for instance, demonstrate the presence of ferritin, emphasizing its role in iron absorption, a crucial step in maintaining overall iron homeostasis. Similarly, the inclusion of ferritin in the placenta highlights its significance in facilitating iron transfer to support fetal development and erythropoiesis.

Moreover, the presence of ferritin in the kidneys, testes, and

skeletal muscles underscores its involvement in cellular iron storage and utilization. In the kidneys, ferritin likely contributes to the regulation of iron levels, ensuring a delicate balance within the body. Skeletal muscles essential for locomotion and metabolic functions. Benefit from ferritin's role in iron provision for myoglobin synthesis, vital for oxygen transport within muscle tissues. The recognition of ferritin in circulating plasma emphasizes its systemic impact on iron distribution. Ferritin's ability to release iron when needed and sequester it when in excess underscores its dynamic function in responding to the body's iron demands. This regulatory mechanism is particularly crucial for meeting the iron requirements for the synthesis of hemoglobin, a pivotal component in oxygen transport, and myoglobin, which supports oxygen storage in muscles. In essence, ferritin's most critical function lies in its capacity to supply iron for the synthesis of iron-containing proteins, particularly hemoglobin and myoglobin. These proteins are indispensable for oxygen transport and storage, underlining ferritin's indispensable role in ensuring the vitality of essential physiological processes. The intricate distribution of ferritin across diverse tissues and organs further emphasizes its systemic impact on iron homeostasis and highlights its significance in supporting various cellular and metabolic functions [8].

CONCLUSION

The study explores the correlation between serum ferritin concentration during the third trimester and various hematologic parameters to identify the most reliable indicator for determining the need for iron therapy in pregnant women. The study found a significant correlation between serum ferritin concentration and key hematologic parameters, including hemoglobin, mean corpuscular volume, mean cell hemoglobin, and hematocrit. The study not only addressed its specific objective of identifying a reliable hematologic characteristic for iron therapy in pregnant women but also contributed to the broader understanding of ferritin's role in maternal health. The findings have implications for refining maternal care practices and nutritional interventions, aligning with our hospital's commitment to delivering comprehensive and evidence-based healthcare to diverse communities.

REFERENCES

1. Abioye AI, Aboud S, Premji Z, Etheredge AJ, Gunaratna NS, Sudfeld CR, et al. Iron supplementation affects hematologic biomarker concentrations and pregnancy outcomes among iron-deficient Tanzanian women J Nutr.2016;146(6):1162-1171.
2. Daru J, Allotey J, Peña Rosas JP, Khan KS. Daru J, Allotey J, et al. Serum ferritin thresholds for the diagnosis of iron deficiency in pregnancy: A systematic review. Transfus Med. 2017 ;27(3):167-174.
3. Garcia-Casal MN, Pasricha SR, Martinez RX, Lopez-Perez L, Peña-Rosas JP. Serum or plasma ferritin concentration as an index of iron deficiency and overload. Cochrane Database Syst Rev. 2021; 5(5):CD011817.
4. Shao J, Lou J, Rao R, Georgieff MK, Kaciroti N, Felt BT, et al. Maternal serum ferritin concentration is positively associated with newborn iron stores in women with low ferritin status in late pregnancy. J Nutr. 2012;142(11):2004-2009.
5. Cayir S, Kilicaslan C. Hematologic parameters as predictive markers in pediatric Bell's palsy. Eur Arch Otorhinolaryngol. 2021;278:1265-1269.
6. Zhou X, Xu L, Huang Z, Zhang L, Zhang H, Zhu W, et al. The hematologic markers as prognostic factors in patients with resectable gastric cancer. Cancer Biomarkers. 2016;17(3):359-367.
7. Chattopadhyaya S, Ghosal S. DNA methylation: A saga of genome maintenance in hematological perspective. Hum Cell. 2022;35(2): 448-461.
8. Bartoli CR, Ghotra AS, Pachika AR, Birks EJ, McCants KC. Hematologic markers better predict left ventricular assist device thrombosis than echocardiographic or pump parameters. Thorac Cardiovasc Surg. 2014:414-418.