Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

Assessment of Iron Deficiency and Anemia in Pregnant Women

Charu Batra Atreja[1], Atulya Atreja[2]

[1]Assistant Professor, Department of Pathology, Maharishi Markandeshwar Institute of Medical Sciences & Research (MMIMSR), Maharishi Markandeshwar (Deemed to be University) (MMDU), Mullana, Ambala, Haryana, India
[2]Consultant Pulmonary Medicine, Aarogyam Chest & Hematology Centre, Karnal, Haryana, India

Abstract

Background: The aim is to assess iron deficiency and anemia in pregnant women. **Material and Methods:** One hundred twenty pregnant women were enrolled and parameters such as age, gestation week, laboratory values, type and reason for the prescription of medication and/or lifestyle etc. were recorded. **Results:** Significant iron deficiency was observed in 5 with <12 weeks, in 12 with 12- 24 weeks and 18 with >24 weeks of pregnancy. Moderate was seen in 10, 8 and 20 with <12 weeks, 12-24 weeks and >24 weeks of pregnancy and mild in 3, 6 and 12 with <12 weeks, 12-24 weeks and >24 weeks of pregnancy. The prevalence of anaemia found to be 15% in first trimester, 22% in second trimester and 58% in third trimester. Medications prescribed were ferrous sulfate/folic acid in 62%, ferrous sulfate in 30% and food supplements in 8%. **Conclusion:** There was high prevalence of iron deficiency and anaemia among pregnant women. There is requirement of routine monitoring and screening for iron deficiency at several time points during pregnancy for timely commencement of iron treatment.

Keywords: Anemia, Ferrous Sulfate, Iron Deficiency.

Corresponding Author: Dr. Charu Batra Atreja, Assistant Professor, Department of Pathology, Maharishi Markandeshwar Institute of Medical Sciences & Research (MMIMSR), Maharishi Markandeshwar (Deemed to be University) (MMDU), Mullana, Ambala, Haryana, India. Email: drcharubatra@gmail.com

Introduction

Anemia is one of the main causes of disability worldwide and consequently, at an international level, represents a serious public health problem. In 2010, the global anemia prevalence was estimated to be 32.9%, resulting in 68.4 million years lived with disability.[1,2] Iron deficiency anemia, ranked as the fifteenth leading cause of disability-adjusted life years (DALYs) by the WHO in 2012, is the most common etiology and WHO data estimate that iron deficiency anemia in children and adults results in 19.7 million DALYs, or 1.3% of global total DALYs.[3,4]

The extra iron requirements during pregnancy are considered to be met through cessation of menstrual losses, increased intestinal absorption and mobilisation of maternal iron stores.[5] However, a large proportion of pre-pregnant women or those of reproductive age have low iron stores, predisposing them to an increased risk of iron deficiency when becoming pregnant.[6]

Anemia and iron deficiency are common during pregnancy. A small decrease in hemoglobin (Hb) is a normal physiological consequence of the increase in blood plasma volume during pregnancy.[7] Normally, after an initial increase (due to the cessation of menstruation), Hb levels decrease by around 20 g/l and reach their lowest level during the second trimester, returning to pre-pregnancy levels as the pregnancy advances toward term.[8] The increase in iron requirements during pregnancy results from increased total blood cell volume, the

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

requirements of the fetus and placenta and, during labor, blood loss.[9] Considering this, we performed present study to assess iron deficiency and anemia in pregnant women.

Material and Methods

After considering the utility of the study and obtaining approval from ethical review committee of the institute, we selected one hundred twenty pregnant women.

Data such as age, gestation week, laboratory values, type and reason for the prescription of medication and/or lifestyle etc. was recorded. The duration of pregnancy was defined, in gestation weeks, as <12 weeks (first trimester of pregnancy), ≥12 and ≤24 weeks (second trimester) and >24 weeks (third trimester). Anemia was defined as Hb <11 g/dl (in the first and third trimesters) or <10.5 g/dl (second trimester) [19,20]. Iron deficiency was defined as serum ferritin <15 μg/l. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

Results

Table 1: Iron deficiency based on duration of pregnancy

Iron deficiency	<12 weeks	12- 24 weeks	>24 weeks
Significant	5	12	18
Moderate	10	8	20
None	3	6	12
Total	18	26	50

Significant iron deficiency was observed in 5 with <12 weeks, in 12 with 12- 24 weeks and 18 with >24 weeks of pregnancy. Moderate was seen in 10, 8 and 20 with <12 weeks, 12-24 weeks and >24 weeks of pregnancy and none in 3, 6 and 12 with <12 weeks, 12-24 weeks and >24 weeks of pregnancy [Table 1].

Table 2: Prevalence of anaemia in pregnancy

Trimester	Prevalence
First	15%
Second	22%
Third	58%

The prevalence of anaemia found to be 15% in first trimester, 22% in second trimester and 58% in third trimester [Table 2].

Table 3: Medications prescribed to pregnant women with iron deficiency

Treatment	Percentage
Ferrous sulfate/folic acid	62%
Ferrous sulfate	30%
Food supplements	8%

Medications prescribed were ferrous sulfate/folic acid in 62%, ferrous sulfate in 30% and food supplements in 8% [Table 3].

Discussion

Either anaemic or non-anaemic iron deficiency prior to and during pregnancy can have adverse consequences for both the mother and offspring, especially with respect to neonatal iron-deficient condition.[10,11] It was previously thought that neonate was protected from iron

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

deficiency as the developing fetus could acquire sufficient iron from the mother even when she was iron deficient.[12] However, it is now documented that neonatal iron stores can be compromised when the mother is iron deficient or anaemic.[13,14] We performed present study to assess iron deficiency and anemia in pregnant women.

Our results showed that significant iron deficiency was observed in 5 with <12 weeks, in 12 with 12- 24 weeks and 18 with >24 weeks of pregnancy. Moderate was seen in 10, 8 and 20 with <12 weeks, 12-24 weeks and >24 weeks of pregnancy and none in 3, 6 and 12 with <12 weeks, 12-24 weeks and >24 weeks of pregnancy. Loy et al,[15] examined the proportion and risk factors of iron deficiency among pregnant women. 985 Asian women were assessed for iron status at 26–28 weeks' gestation, with plasma ferritin and soluble transferrin receptor (sTfR) measurements. Iron status was determined according to plasma ferritin concentrations at ≥30 μg/L (iron sufficiency), 15 to < 30 μg/L (modest iron depletion) and < 15 μg/L (severe iron depletion). The median (25-75th percentile) plasma ferritin concentration was 24.2 μg/L. Overall, 660 (67.0%) and 67 (6.8%) women had modest and severe iron depletion, respectively. Higher plasma sTfR was observed in women with severe iron depletion than among those with iron sufficiency (median 17.6 versus 15.5 nmol/L; p< 0.001). Age < 25 years, Malay and Indian ethnicities, university qualification, multiparity and lack of iron-containing supplementation were associated with increased odds of modest and severe iron depletion.

Our results showed that the prevalence of anaemia found to be 15% in first trimester, 22% in second trimester and 58% in third trimester. Harvey et al,[16] explored the prevalence and management of iron deficiency and anemia among pregnant women. In this study, randomly selected investigators assessed pregnant women presenting for a consultation. Participants completed a questionnaire at study inclusion. A total of 1506 patients were enrolled by 95 investigators. Overall, investigators estimated a moderate or significant risk of iron deficiency in almost 60% of women. The overall prevalence of anemia (15.8%) increased with longer pregnancy duration. Medication (mainly iron-based) was prescribed to 57.3% of patients.

We found that medications prescribed were ferrous sulfate/folic acid in 62%, ferrous sulfate in 30% and food supplements in 8%. Bencaiova G et al,[17] showed that mild iron deficiency anemia and depleted iron stores detected early in pregnancy are not risk factors for adverse maternal or perinatal outcomes in women receiving iron supplements.

Milman et al,[18] found that mean serum ferritin concentrations were estimated at 26-38 μg/L. Approximately 40-55% of this population had small or depleted iron stores (i.e., SF concentration ≤30 μg/L), and 45-60% of this population had apparently replete iron stores. The prevalence of iron deficiency (ID) and iron deficiency anemia (IDA) was 10-32% and 2-5%, respectively, depending on the cutoffs used. Approximately 20-35% of European women of reproductive age had sufficient iron stores (SF concentration >70 μg/L) to complete a pregnancy without supplementary iron. During pregnancy, European women in controlled supplementation trials who were not receiving iron supplements displayed increasing prevalences of ID and IDA during pregnancy, which peaked in the middle to late third trimester. Available evidence has suggested that, in gestational weeks 32-39, the median or geometric mean SF concentrations were 6-21 μg/L, and prevalences of ID and IDA were 28-85% and 21-35%, respectively. Women who were taking iron supplements had higher iron status and lower prevalences of ID and IDA, which were dependent on the dose of iron and compliance.

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

Conclusion

There was high prevalence of iron deficiency and anaemia among pregnant women. There is requirement of routine monitoring and screening for iron deficiency at several time points during pregnancy for timely commencement of iron treatment.

References

1. Scholl TO. Maternal iron status: relation to fetal growth, length of gestation and the neonate's iron endowment. Nutr Rev. 2011;69:23–9.
2. Radlowski EC, Johnson RW. Perinatal iron deficiency and neurocognitive development. Front Hum Neurosci. 2013;7:585.
3. Lubach GR, Coe CL. Preconception maternal iron status is a risk factor for iron deficiency in infant rhesus monkeys (Macaca mulatta). J Nutr. 2006;136:2345–9.
4. Jaime-Perez JC, Herrera-Garza JL, Gomez-Almaguer D. Sub-optimal fetal iron acquisition under a maternal environment. Arch Med Res. 2005;36:598–602.
5. Daru J, Allotey J, Pena-Rosas JP, Khan KS. Serum ferritin thresholds for the diagnosis of iron deficiency in pregnancy: a systematic review. Transfus Med. 2017;27:167–74.
6. Van den Broek NR, Letsky EA, White SA, Shenkin A. Iron status in pregnant women: which measurements are valid? Brit J Haematol. 1998;103:817–24.
7. Soh SE, Tint MT, Gluckman PD, Godfrey KM, Rifkin-Graboi A, Chan YH, et al. Cohort profile: growing up in Singapore towards healthy outcomes (GUSTO) birth cohort study. Int J Epidemiol. 2014;43:1401–9.
8. World Health Organization. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;363:157–63.
9. Choi JW, Im MW, Pai SH. Serum transferrin receptor concentrations during normal pregnancy. Clin Chem. 2000;46:725–7.
10. Scott SC, Goldberg MS, Mayo NE. Statistical assessment of ordinal outcomes in comparative studies. J Clin Epidemiol. 1997;50:45–55.
11. Sun GW, Shook bTL, Kay GL. Inappropriate use of bivariable analysis to screen risk factors for use in multivariable analysis. J Clin Epidemiol. 1996;49:907–16.
12. Masukume G, Khashan AS, Kenny LC, Baker PN, Nelson G, SCOPE Consortium. Risk factors and birth outcomes of anaemia in early pregnancy in a nulliparous cohort. PLoS One. 2015;10:0122729.
13. Reddy OC, Alemayehu E. Ordinal logistic regression analysis to assess the factors that affect health status of students in Ambo University: a case of natural and computational sciences college. Ambo University. 2015;2:153–63.
14. Singh K, Fong YF, Arulkumaran S. Anaemia in pregnancy- A cross-sectional study in Singapore. Eur J Clin Nutr. 1998;52:65–70.
15. Loy SL, Lim LM, Chan SY, Tan PT, Chee YL, Quah PL, et al. Iron status and risk factors of iron deficiency among pregnant women in Singapore: a cross-sectional study. BMC public health. 2019;19(1):1-0.
16. Harvey T, Zkik A, Auges M, Clavel T. Assessment of iron deficiency and anemia in pregnant women: an observational French study. Women's Health. 2016;12(1):95-102.
17. Bencaiova G, Breymann C. Mild anemia and pregnancy outcome in a Swiss collective. J Pregnancy. 2014;2014:307535. doi: 10.1155/2014/307535.
18. Milman N, Taylor CL, Merkel J, Brannon PM. Iron status in pregnant women and women of reproductive age in Europe. Am J Clin Nutr. 2017;106:1655S–62S