مجلة الريادة للبحوث والأنشطة العلمية
Al-Riyadah Journal For Researches And Scientific Activities
العدد الحادي عشر
March 2025 مارس
المجلد الثاني

Supplemental nutrition's effect on ferritin levels and pregnancy stages in Sabratha women.

Fathyah Alarif Mohammed Almahjoubi and Sameya Al thait Ambyyah Habhab
Department of Zoology, Faculty of science, Sabratha university
Correspond author: fathytalarf3@gmail.com

Abstract

Background: One protein that stores iron is called ferritin; a spherical protein complex made of 24 subunits that can store up to **4,500 iron atoms** in a non-toxic, soluble form. Iron is necessary for red blood cell formation and oxygen transport. Your muscles, bone marrow, liver, and other body organs also require iron. Serum ferritin levels are a good way to measure how much iron is stored in the body. **study objectives** regarding **ferritin and hemoglobin levels across three stages of pregnancy.**

Experiment: Pregnant women were categorized into three age groups for this study. Each participant was required to complete a standardized questionnaire covering key health and lifestyle factors. To ensure a representative sample, participants were randomly selected from the obstetric population attending Sabratha Teaching Hospital during the study period. This approach minimized selection bias and enhanced the generalizability of the findings.

Results: A total of 92 pregnant women were distributed for the study according to their age, and their age range was from 18 to 40 years old (mean age 28). The majority of pregnancies were in the age range of 26-33 years old (46%), followed by the age range of 18-25 years old (37%), followed by the age range of 34-40 years old (17%). However, there is no significant correlation (p-value < 0.05) between ferritin and supplement nutrition. statistically significant (P-value < 0.003) between the first and second trimesters and supplement nutrition.

Discussion: Our study findings demonstrated that iron supplementation raised Hb levels throughout the course of pregnancy, a positive effect that contrasted with ferritin's negative effect. Iron supplementation had no discernible detrimental effects on pregnant women's nutrition during three stages of pregnancy. According to Lewis et al. (2012), the high request for iron during pregnancy involved mobilization from its stores, which, if further decreased, may result in complete iron store depletion. As iron stores become depleted and exhausted, hemoglobin concentration decreases, resulting in iron deficiency anemia.

Conclusion: In our study, there was no relationship between supplementary nutrition and ferritin, but there was a relationship between supplementary nutrition and hemoglobin in the second trimester of pregnancy, and it is an indication of the presence of anemia.

Keywords: pregnant women, ferritin, Hb, Supplementation, trimester.

تأثير التغذية التكميلية على الفريتين ومراحل الحمل لدى النساء الحوامل في مدينة صبراتة

فتحية العارف محمد المحجوبي وسامية الثابت امبية هبهب
قسم علم الحيوان – كلية العلوم– جامعة صبراته
الايميل الأكاديمي: fathyah.Almahjouni@sabu.edu.ly

الخلاصة

الخلفية: أحد البروتينات التي تخزن الحديد يسمى الفيريتين. فالحديد ضروري لتكوين خلايا الدم الحمراء ونقل الأكسجين. وكذلك مطلوب أيضًا من قبل العضلات ونخاع العظام والكبد وأعضاء الجسم الأخرى. وتعد مستويات الفيريتين في الدم طريقة جيدة لقياس كمية الحديد المخزنة في الجسم. **وهدفت الدراسة** الي: توفير معلومات حول الفيريتين والهيموجلوبين في المراحل الثلاث من الحمل. **التجربة:** تم تصنيف النساء الحوامل إلى ثلاث فئات عمرية وتم فحص كل فئة عمرية عن طريق استبيان تجيب عليه النساء الحوامل. وللتأكد من ذلك قمنا بالاتصال بعينة عشوائية من الحوامل في مستشفى صبراتة التعليمي. **النتائج:** تم إجراء الدراسة على 92 حاملاً موزعين حسب أعمارهم وفئاتهم العمرية من 18 إلى 40 سنة (متوسط العمر 28). كانت غالبية الحوامل تتراوح أعمارهم بين 26 – 33 عامًا (46%)، تليها الفئة العمرية 18–25 عامًا (37%)، تليها الفئة العمرية 34–40 عامًا (17%). ومع ذلك، لا يوجد ارتباط معنوي عند ($p<0.05$) بين الفيريتين والتغذية التكميلية. وتوجد دلالة إحصائية عند ($P<0.003$) بين الثلث الأول والثاني والتغذية التكميلية. **المناقشة:** أظهرت نتائج دراستنا أن مكملات الحديد ترفع مستويات الهيموجلوبين طوال فترة الحمل، وهو تأثير إيجابي يتناقض مع التأثير السلبي للفيريتين. لم يكن لمكملات الحديد أي آثار ضارة ملحوظة على تغذية المرأة الحامل خلال المراحل الثلاثة من الحمل. وتتطلب الحاجة العالية للحديد أثناء الحمل تعبئة مخزونه مما يؤدي الي المزيد من النقص في استنزاف مخزون الحديد بالكامل، وفقًا للويس وآخرين 2012. ومع استنفاد مخازن الحديد، ينخفض تركيز الهيموجلوبين مما يؤدي إلى فقر الدم بسبب نقص الحديد. **الاستنتاج:** في دراستنا لا توجد علاقة بين التغذية التكميلية والفيريتين، ولكن هناك علاقة بين التغذية التكميلية والهيموجلوبين في المرحلة الثانية من الحمل، وهو مؤشر على وجود فقر الدم.

الكلمات المفتاحية: النساء الحوامل، الفيريتين، الهيموجلوبين، التغذية التكميلية، مراحل الحمل.

Introduction

Ferritin is one protein that accumulates iron. The production of red blood cells and the movement of oxygen throughout the body depend on iron. Your muscles, bone marrow, liver, and other body organs also need iron (1). Iron-deficiency anemia is caused by a low ferritin level. Your low red blood cell count is indicated by this. A poor diet or blood loss might cause an iron deficit (2). Both before and throughout pregnancy, a mother's general health and nutritional status have a significant influence on the health and results of her unborn child. An infant in good health is more likely to grow into a child and then an adult (3, 4).

The mother's health and food intake affect the baby's birth weight, postnatal growth rate, and chances of survival. In addition to improving the mother's health, a nutritious diet before, during, and after pregnancy reduces the likelihood that her children may grow up to have birth defects, chronic illnesses, and other pregnancy-related issues. A mother who is healthy and eating properly has a higher chance of having a good pregnancy and giving birth to a healthy child. Nutrition is essential for the best potential pregnancy outcome. Undernutrition in the mother may lead to low birth weight and insufficient intrauterine growth. Additionally, the primary causes of maternal death, including infection and hemorrhage, are influenced by food either directly or indirectly (5).

It's important to keep up a healthy diet during pregnancy. A pregnant lady has to consume enough food and energy for the benefit of her growing fetus as well as her own bodily functions. A woman's nutrition during pregnancy can have a significant impact on the fate of her pregnancy. When a pregnant woman consumes certain nutrients, they go from her bloodstream to the placenta. The nutrients pass via the placenta and into the fetus's circulation (6). A prenatal diet high in proteins, carbs, vitamins, minerals, and fat is necessary to feed the body and nourish the developing fetus. If the mother's diet is not enough to meet the fetus's demands, she will pay for part of the nutrients herself. If she does not produce enough blood or a healthy placenta, her baby may grow more slowly (7).

Pregnant women must drink enough water to avoid dehydration, which can cause early labor or miscarriage. Pregnant women should drink at least two quarts (64 oz) of fluid every day. Water should make up at least half of the fluids consumed. The remainder can be obtained via milk, juice, and other beverages (8). A vegetarian diet during pregnancy may have two benefits: it may reduce the risk of pre-eclampsia and ensure enough folate levels during conception. The mother's nutrition before and throughout pregnancy can affect the course of the pregnancy, the growth of the fetus, and the health of the offspring as they grow into young adults. Maternal morbidity is also reduced since preeclampsia and premature birth are less frequent pregnancy complications. In order to reduce their risk of birth defects, women must maintain a healthy nutritional status, according to the American Dietetic Association.

The mother's health should be maintained during pregnancy by eating a proper diet in order to guarantee the delivery of a healthy kid. Perhaps the most important environmental factor influencing a pregnancy's success is having access to adequate nourishment. The health of both the mother and the conceptus is at risk due to inadequate supply. (9). Folic acid lowers the risk of recurrent neural tube defects in women when taken prior to conception and during the first six weeks of pregnancy. Calcium is necessary throughout pregnancy, and getting enough of it lowers blood pressure and may decrease the risk of premature birth. A daily intake of 30 mg of iron, which is best absorbed when paired with a meal high in vitamin C, can prevent iron deficiency.

Zinc supplements significantly reduce the risk of low-birth weight babies. The amount of iron stored in the body can be accurately determined by measuring serum ferritin levels (10). In clinical and public health, iron excess and insufficiency are common problems. Iron deficiency can lead to anemia, fatigue, sluggishness, stunted growth, poor performance during physical exertion, and other symptoms of a significant underlying condition. Diabetes and other hormonal, cardiac, and hepatic conditions can result from iron excess illnesses. They may also be brought on by primary, or classic, hemochromatosis or secondary hemochromatosis. In both cases, appropriate identification is required to assist the direction of public health and therapeutic treatments. An early diagnosis is required to initiate therapy immediately and avoid further iron accumulation in the body (11). The World Health Organization (WHO) reports that 42% of children under five and 40% of pregnant women worldwide suffer from anemia. The three primary causes of anemia are believed to be hemoglobinopathies, iron deficiency, and malaria. The specific ferritin limits used to diagnose iron excess and deficiency in individuals with and without underlying medical conditions have been updated by WHO using its strict process for developing evidence-based guidelines (12). The evaluation of the population's iron status aids in determining the frequency and distribution of iron overload and deficiency, guides the selection of appropriate interventions, and supports the monitoring and evaluation of the effectiveness and safety of implemented public health programs.

Exercise research shows that pregnant women, unfortunately, do not get as much exercise as non-pregnant women, and most of them do not get any throughout pregnancy. Age, parity, education, career, financial status, and physical activity prior to pregnancy are just a few of the factors that have been linked in several studies to pregnant women's health behaviors. Our questionnaires inquired about each of them (13).

Objectives of the study:

Provide information about ferritin and hemoglobin in three stages of pregnancy.

Experiment:

This experiment was designed to find out how well pregnancy. Pregnancies were classified into three age groups, and each age group was examined by a questionnaire that had to be answered by their pregnant women. To ensure that we contact a random sample, pregnancy in the Sabratha hospital teaching A sample of 92 pregnant women were given the questionnaire and explained the questions to them. The answers or results of these questionnaires were classified and put in tables.

Procedures:

The project was carried out by a pregnant women's questionnaire about ferritin and Hb pregnancy and its impact on the pregnancy.

Questionnaire:

This scientific questionnaire has been quoted from the scientific studies; its predecessor consists of 11 questions. A class of pregnant women has been answered to help us in the completion of our study of science.

Results:

Data collection:

Data collected between 1-9-2023 and 1-12-2023 of Sabratha hospital teaching

Percentage of pregnant in age group:

Of the 92 pregnant. The distribution of patients in the study according to their age and **their age range was from 18 to 40 years old (mean age 28). The** majority of patients were in the age range 26-33 years old (46%), followed by the age range 18-25 years old (37%), followed by the age range 34-40 years old (17%) (Figure 1).

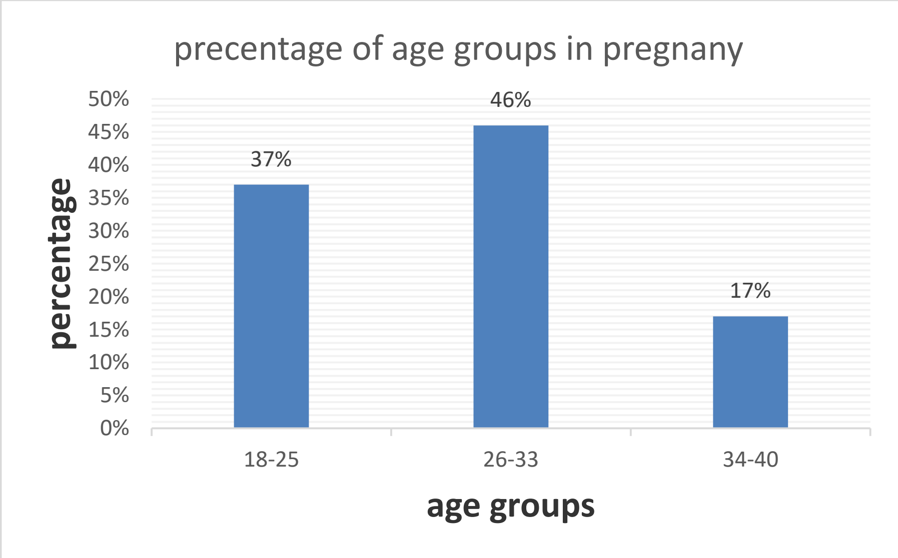

Figure 1: Show the percentage of pregnant women in the age group.

Effect of supplement nutrition on ferritin

Data from this experiment was prepared and input in SPSS. The mean age for pregnant women was calculated. The significance of the difference between supplement nutrition and ferritin was tested using a t-test at a confidence interval for differences; a P-value < 0.05 was considered to be statistically non-significant. All statistical analysis was carried out using SPSS (Table 1).

A one-way analysis of variance was carried out to evaluate the difference in the effect of age on supplement nutrition and ferritin. The significantly different results were identified using a t-test, and there was no relation between them.

Table 1: Show the effect of supplement nutrition on ferritin.

Age group		N	Mean	Std. Deviation
18-25	Supplement Nutrition	34	1.12	0.327
	Ferritin	34	1.47	0.507
26-33	Supplement Nutrition	42	1.24	0.431
	ferritin	42	1.33	0.477
34-40	Supplement Nutrition	16	1.13	0.342
	ferritin	16	1.38	0.500

Effect of supplement nutrition on pregnant stages

First trimester

The data from this experiment was input in SPSS. The mean age group for pregnant women was calculated. The difference between supplement nutrition and the 1st trimester in the age group (18-25) was tested using a t-test with a confidence interval for differences. P-value < 0.003 indicated statistical significance. All statistical analyses were performed using SPSS. (Table 2).

ANOVA analysis of variance was used to determine the difference in the effect of accompaniment nutrition on the 1st trimester.

In the age group (18-25), the significantly different were identified using a t-test and have the relation between them.

Table 2: Show the effect of supplement nutrition on the 1st trimester.

Age group		N	Mean	Std. Deviation
18-25	Supplement Nutrition	34	1.12	0.327
	HB1	34	10.47	0.861
26-33	Supplement Nutrition	42	1.24	0.431
	HB1	42	10.86	1.221
34-40	Supplement Nutrition	16	1.13	0.342
	HB1	16	11.50	0.894

Second trimester

Data from this experiment was prepared and input in SPSS. The mean age group for pregnant women was calculated. The significance of the difference between supplement nutrition and the second trimester in the age group (26-33) was tested using a t-test at a credibility interval for differences (P-value < 0.033) that was investigated as being statistically significant. All statistical analysis was carried out using SPSS (Table 3).

A one-way analysis of contrast was carried out to evaluate the difference in the upshot of supplement nutrition in the second trimester in the age group (26-33). Significant differences were identified using a t-test and the relationship between them.

Table 3: Show the effect of supplement nutrition in second trimester

Age group		N	Mean	Std. Deviation
18-25	Supplement Nutrition	34	1.12	0.327
	HB2	34	10.12	0,769
26-33	Supplement Nutrition	42	1.24	0.431
	HB2	42	9.71	1.175
34-40	Supplement Nutrition	16	1.13	0.324
	HB2	16	10.38	0.719

Third trimester.

Data from this experiment was prepared and input in SPSS. The mean age group for pregnant women was calculated. All statistical analyses were carried out using SPSS (Table 4). The age group (26-33) in the third trimester was tested using a t-test at a trust interval for differences (P-value < 0.05), which was deemed statistically significant. A one-way analysis of variance was carried out to evaluate the difference in the effect of supplement nutrition on the third trimester in the age group (26-33). The significantly different results were identified using a t-test and have the relation between them.

Table 4: Show the effect of supplement nutrition in the third trimester.

Age group		N	Mean	Std. Deviation
18-25	Supplement Nutrition	34	1.12	0.327
	HB3	34	9.47	0.992
26-33	Supplement Nutrition	42	1.24	0.431
	HB3	42	9.33	1.223
34-40	Supplement Nutrition	16	1.13	0.342
	HB3	16	9.63	1.147

Discussion:

Hemoglobin level is a biochemical indicator that can be used to determine the nutritional status of pregnant women. The World Health Organization (WHO) recommends that the ideal hemoglobin level for pregnant women.

is >11 g/dl and is not less than 10.5 g/dl in the third trimester of the pregnancy (14, 15). According to the current study, proper nutrition and iron-abundant foods during pregnancy led to higher hemoglobin levels and increased squandering of iron-abundant foods. At the end of the three stages of gestation, pregnant women's hemoglobin concentrations had significantly improved. A randomized study at the University of Ghana found that consuming iron-rich foods positively correlates with improved hemoglobin levels (16).

A quasi-experimental study conducted by Al-tell MA et al. (2010) indicated a significant positive relationship between dietary practices and the improvement of hemoglobin levels in pregnant women. (17). A similar study indicated that the provision of nutrition education and an iron-rich food-based diet plan was significantly associated with improved hemoglobin levels, improved dietary intake, and nutritional knowledge on anemia and iron-rich foods (18). The intervention group had a significantly higher maternal nutritional knowledge score of anemia and iron-abundant food intake than the control group (66% vs. 24.1%). Randomized studies at the University of Ghana found that the intervention group had a significant increase in knowledge at the end of the intervention period (16).

A study conducted in Ethiopia discovered that pregnant women's knowledge of nutrition during pregnancy improved significantly after receiving nutrition education and specific dietary practices (19). Based on the results of a study conducted at 5.485°N and 7.035°E. Serum ferritin levels (ng/ml) decreased significantly ($p<0.05$) as gestational age increased. Pregnant women in their first trimester showed the highest level of serum ferritin (67.00 ± 88.38). The level decreased during the second trimester (52.48 ± 52.47) and again in the third trimester (51.26 ± 48.71). (20). This finding is consistent with the work of Kubik et al. (21) and Okwara et al. (22) about serum ferritin levels in pregnant women. As pregnancy progresses, serum ferritin levels may decrease due to increased mineral transfer between mother and fetus.

(2012), the high demand for iron during pregnancy necessitates mobilization from its stores, which, if further decreased, may result in complete iron store depletion. As iron stores are depleted and exhausted, hemoglobin concentration drops, resulting in iron deficiency anemia (23).

The results of our study showed iron supplementation led to an increase in Hb levels in stages of pregnancy, a positive effect opposite to the effect of ferritin. It was not significant on nutrition in pregnant women through three stages of negative effect.

Conclusion:

To avoid iron deficiency, doctors recommend taking 30 mg of ferrous per day beginning in week 12 of gestation, along with a well-balanced diet rich in iron mopping-up enhancers (ascorbic acid and meat).

To increase absorption, take iron supplements between meals in liquids other than milk, coffee, and tea.

In our study, there was no relationship between supplementary nutrition and ferritin, but there was a relationship between supplementary nutrition and hemoglobin in the second trimester of pregnancy, and it is an indication of the presence of anemia.

References:

1-Goldenberg, R, Hauth, JC & Andrews, WW (2000) Intrauterine infection and preterm delivery. N Engl J Med 342, 1500–1507.

2-McDonald, H., Brocklehurst, P. and Parsons, J. (2005) Antibiotics for treating bacterial vaginosis in pregnancy. The Cochrane Database of Systematic Review, issue 2.

3- Peña-Rosas JP et al. (2015). Daily oral iron supplementation during pregnancy. Cochrane Database Syst Rev. (7):CD004736

4-Scholl, T. (2005) Iron status during pregnancy: setting the stage for mother and infant. Am J Clin Nutr 81, S1218–S1222.

5- **Fisher & Nemeth (2017)**"Iron homeostasis during pregnancy." *Am J Clin Nutr*. 106(Suppl 6):1567S-1574S.

6-Pena-Rosas, J. and Viteri, FE. (2009) Effects and safety of preventive oral iron or iron and folic acid supplementation for women during pregnancy. The Cochrane Database of Systematic Review, issue 4,

7-Haider, B., Olofin, I. and Wang, M. (2013) Anaemia, prenatal iron use, and risk of adverse pregnancy outcomes: systematic review and meta-analysis. BMJ 346, 3443.

8- Scholl TO (2010). "Maternal iron status: relation to fetal growth and length of gestation." Nutr Rev. 68(Suppl 1):S23-S29.

9-Saha, C., Jain, V. and Gupta, I. (2000) Serum ferritin level as a marker of preterm labor. Int J Gynaecol Obstet 71, 107–111.

10-Scholl, T. (1998) High third-trimester ferritin concentration: associations with very preterm delivery, infection, and maternal nutritional status. Obstet Gynecol 92, 161–166.

11- Amina Z. Khambalia, Clare E. Collins, Christine L. Roberts, Jonathan M. Morris, Katie L. Powell, Vitomir Tasevski and Natasha Nassar (2015) igh maternal serum ferritin in early pregnancy and risk of spontaneous preterm birth. British Journal of Nutrition. Volume 114 Issue 3. pp. 455 – 461. DOI: https://doi.org/10.1017/S0007114515001932.
12-Weintraub, A., Sheiner, E. and Mazor, M. (2005) Maternal serum ferritin concentration in patients with preterm labor and intact membranes. J Matern Fetal Neonatal Med 18, 163–166.
13-Xiao, R., Sorensen, TK. and Frederick, IO. (2002) Maternal second-trimester serum ferritin concentrations and subsequent risk of preterm delivery. Paediatr Perinat Epidemiol 16, 297–304.
14- WHO (2011). Haemoglobin Concentrations for the Diagnosis of Anaemia and Assessment of Severity. Department of Nutrition for Health and Development (NHD), World Health Organization; Geneva, Switzerland.
15- Yusrawati Hasibuan, (2020). The hemoglobin levels in third trimester pregnant women and body weight of newborn. Vol 4, No 11.
16- Otoo G. and Adam Y. (2016). Effect of Nutrition Education with an Emphasis on Consumption of Iron-Rich Foods on Hemoglobin levels of Pregnant Women in Ghana. FASEB J.;30(1).
17- Al-tell MA., El-guindi FK., Soliman NM. and El-Nana H. (2010). Effect of Nutritional Interventions on Anemic Pregnant Women's Health Using Health Promotion Model. Med J Cairo Univ;78(2):109–18.
18- Dev Ram Sunuwar, Raj Kumar Sangroula, Nani Shova Shakya, Renu Yadav, Narendra Kumar Chaudhary and Pranil Man Singh Pradhan (2019). Effect of nutrition education on hemoglobin level in pregnant women: A quasi-experimental study. LoS One. 14(3).
19- Robertson N. and Ladlow B. (2017). Effect of individual dietetic intervention on gestational weight gain and associated complications in obese pregnant women. Aust N Z J Obstet Gynaecol.
20- I L. Okoroiwu, Jane Ugochi, Chinedu-Madu, Jane Ugochi Chinedu-Madu (2021). Evaluation of Iron Status, Haemoglobin and Protein Levels of Pregnant Women in Owerri Metropolis. Journal of Pharmaceutical Research International.
21- Kubik P., Leibschang J., Koualska B., Laskowska Klita T., Stainislawska A., Chelchowska M. and Machiejewski T. (2010) Evaluation of iron balance healthy pregnant women and their newborns. Ginekol pol;81(5):358-63.
22. Okwara JE., Nnabuo LC., Nwosu DC., Ahaneku JE., Anolue F., Okwara NA., Amah UK., Meludu SC., Dioka CE., Okwara EC., Egwurugwu IN., Ubajaka CF. and Chukwulebe AE. (2013). Iron status of some pregnant women in Orlu town--eastern Nigeria. Niger J Med.;22(1): 15-8.
23- Lewis, S.M., Bain B., Bates. Dade and Lewis (2012). practical haematology, Tenth edition. Churchill Livingstone: UK: 1:176-179.