

Research Article

To Study of Hepcidin Levels and Certain Hematological Parameters in Pregnant Women

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Abstract

The present study was designed to find the relation between certain hematological parameters and pregnancy. The study used one hundred volunteers (seventy five pregnant women and twenty five non-pregnant women). Then, pregnant women divided into three subgroups according to the trimester (first trimester, second trimester and third trimester). Hematological tests showed significant increased ($P<0.05$) in TIBC (Total Iron Binding Capacity) and significant decreased ($P<0.05$) in Hepcidin, ferritin, Iron, Hb (hemoglobin) and MCV (mean corpuscular volume) compared with non-pregnant women group. Third trimester show a high affected according to the results compare with other trimesters. It was concluded from this study that the pregnancy led to several hematological parameters change.

Keywords: Hepcidin, Ferretin, Iron, hematological, Binding capacity.

الخلاصة

صممت الدراسة الحالية لاجاد العلاقة بين بعض المتغيرات الدموية والحمل. استخدمت الدراسة مئة متطوعة (خمسة وسبعون امرأة حامل وخمسة وعشرون امرأة غير حامل). بعدها. قسمت النساء الحوامل الى ثلاث مجاميع ثنائية اعتمادا على فترة الحمل (الثالث الاول، الثالث الثاني والثالث الثالث). الفحص الدموي اظهر زيادة معنوية في مستويات قابلية ارتباط الحديد الكلية وكذلك انخفاض معنوي في مستويات الهيبيسيدين والفيريتين والحديد والهيموكلوبين ومتوسط حجم كريات الدم الحمر مقارنة مع مجموعة النساء غير حوامل. يستنتج من هذه الدراسة بان الحمل يؤدي الى تغيرات في بعض المعايير الدموية.

Introduction

Hepcidin was discovered in blood of human and urine samples as a small bactericidal peptide (defensin and cathelicidin) and named liver-expressed antimicrobial peptide (LEAP-1) [1] [2] [3]. Hepcidin is a peptide, hormone that functions as both the homeostatic regulator of systemic iron metabolism, and a mediator of host defense. Sensing of circulating iron and iron stores is thought to occur in the liver, which is the primary site of hepcidin, production and secretion [4] [5] [6]. Hepcidin production can be assessed by measuring liver hepcidin mRNA levels (in animal models) or by measuring hepcidin peptide in the serum or plasma (in humans and mice) [7]. Iron homeostasis regulated by two mechanisms: intracellular mechanism, dependent, on the amount of iron, for the cell, and a systemic

mechanism, in which hepcidin plays a crucial role [8] [9] [10] [11] [12].

Most amount of the iron absorbed from the diet or recycled from hemoglobin is intended for developing erythrocytes, whose, production is increased in response to erythropoietic stimuli, such as blood loss or hypoxia [13] [14] [15]. Hepcidin binds to ferroportin, regulating iron export, into plasma. If hepcidin concentrations are low, ferroportin molecules are hiding on the plasma membrane and export iron. When hepcidin concentrations increase, hepcidin binds to ferroportin molecules inducing their internalization and degradation, and iron release are decreased, progressively [16]. Maternal hepcidin were significantly correlated with indicators of maternal iron status [17] [18]. During the first trimester of pregnancy, serum and urinary hepcidin were positively

correlated with ferritin and negatively correlated with serum transferrin receptor index, a sensitive indicator of iron deficiency [19]. So, the aim of this study is find the relation between certain hematological parameters and pregnancy.

Materials and Methodology

One hundred volunteers (female) were taken in this study. Seventy five pregnant women and 25 non-pregnant women (married) randomly who referred to Al-Dawoody private lab in Kirkuk between October 2015 to June 2016, range of age between (20-30 years).

In this study, one hundred volunteers (Seventy five pregnant women and twenty five non-pregnant women) were used and divided to two mainly groups (according to pregnancy state) and then pregnancy female divided into three subgroups according to the trimester as shown in Table 1.

Table 1: The groups of study.

| Groups | Number |
|--------------------|--------|
| First trimester | 25 |
| Second trimester | 25 |
| Third trimester | 25 |
| Non-pregnant women | 25 |

Five milliliters (ml) of venous blood samples were obtained from the volunteers (at each trimester). 3ml of blood samples were dispensed into test tubes for clotting and 2ml transferring into EDTA tubes. Sera were obtained after samples were centrifuged at 5000 R for ten minutes and stored until assayed for laboratory investigations [20].

Estimation of parameters

Serum hepcidin was measured by using (enzyme-linked immunosorbent assay (ELISA)), ferritin, Iron, Total Iron Binding Capacity (TIBC), Hemoglobin (Hb), MCV and erythrocytes sedimentation rate (ESR) measured according to Nemeth and Ganz (2006) [6].

Statistical analysis

Data were analyzed using a statistical Minitab program, using Analysis of Variance

(ANOVA) test, in order to evaluate the significance of variability between pregnant and non-pregnant groups.

Results and Discussion

Hepcidin and Ferritin

Hepcidin in all pregnant groups (FM: 353.5 ± 17.75 , SM: 329.5 ± 17.75 , TM: 308.25 ± 22.3) show significant lower ($P < 0.05$) compare with non-pregnant groups (382.5 ± 17.54). Also, Ferritin show significant decreased ($P < 0.05$) in pregnant women (FM: 96.32 ± 4.03 , SM: 85.2 ± 4.21 , TM: 71.6 ± 5.86) compare with non-pregnant women groups (121.9 ± 5.57) as show in (Table 2).

Iron, TIBC, Hb and MCV

Levels show significant lower ($P < 0.05$) between pregnant (FM: 66.5 ± 3.1 , SM: 60.25 ± 0.96 , TM: 56.25 ± 4.03) and non-pregnant women (75.75 ± 5.12). TIBC levels in pregnant groups (FM: 305.75 ± 2.29 , SM: 321.5 ± 9.04 , TM: 339.5 ± 15.33) show significant increased compare with non-pregnant groups (295.9 ± 8.17). Hb and MCV levels show significant decreased compare with non-pregnant women as show in (Table 2). Hepcidin, a 25 amino acid peptide, is considered as a major regulator of iron homeostasis and it has antimicrobial properties [21].

The results of Hepcidin in this study show significant decreased in pregnant women compare with Non-pregnant women. Hepcidin concentration decreases gradually from the first to the second and third trimesters to undetectable levels. During pregnancy levels of hepcidin correlate with iron parameters, but not with inflammatory markers [18]. Van Santen *et al.* (2013) found that the Hepcidin levels is lower than in non-pregnant healthy women and hepcidin levels decrease as pregnancy progresses [22]. Also, Finkenstedt *et al.* (2012) found that the Hepcidin levels decreased during the pregnancy duration, and the hepcidin levels decrease as pregnancy progresses compare with Non-pregnant women [23], that is in agreement with the results of present study.

Table 2: values of different types of hematological parameters in pregnant and non-pregnant women.

| Groups | Pregnant women | | | Non-preg. women |
|------------------------|-------------------|-----------------|-----------------|-----------------|
| | First trim. | Second trim. | Third trim. | |
| Params. | 353.5 | | | |
| Hepcidin (µg/l) | ± 17.75 b | 329.5 ± 17.75 c | 308.25 ± 22.3 d | 382.5 ± 17.54 a |
| Ferritin (µg/l) | 96.32 ± 4.03 b | 85.2 ± 4.21 c | 71.6 ± 5.86 d | 121.9 ± 5.57 a |
| Iron (µg/dl) | 66.5 ± 3.1 b | 60.25 ± 0.96 bc | 56.25 ± 4.03 c | 75.75 ± 5.12 a |
| TIBC (µg/dl) | 305.7 ± 5 bc | 321.5 ± 9.04 b | 339.5 ± 15.33 a | 295.9 ± 8.17 c |
| Hb (g/dl) | 11.45 ± 0.55 b | 10.83 ± 0.26 bc | 10.1 ± 0.31 c | 12.83 ± 0.57 a |
| MCV (fl) | 81 ± 3.16 b | 76.98 ± 2.17 c | 71.9 ± 3.13 d | 88.83 ± 2.47 a |

Iron stores in the body exist primarily, in the form of ferritin. Body ferritins, levels, in contrast to haemoglobin, are, not affected by residential increase above sea level or smoking behaviour. Serum ferritin is of limited usefulness in examining iron deficiency during pregnancy [24]. Levels of S. ferritin, Iron, Hb and MCV significant decreased in pregnant women, while TIBC levels, show significant increased compare with Non-pregnant women. *Raza et al. (2011)* referred that the S. ferritin, Iron and Hb and increase in TIBC levels compare with non-pregnant women. They suggest that the high percentage of the pregnant women is iron deficient due to factors such as high parity, poor dietary habits and socioeconomic status [25]. *Bhale et al. (2013)* referred that the Hb and S. ferritin levels were lowest in second trimester as compare to first trimester in all groups and then there was stability, or slight improvement in ferritin levels found during third trimester [26], which is in agreement with the results of present study.

Conclusions

From the present study, It was concluded that the pregnancy led to several hematological parameters change including significant decreased ($P < 0.05$) in Hepcidin, ferritin, Iron, Hb (hemoglobin) and MCV (mean corpuscular volume) compared with non-pregnant women group.

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