SERUM IRON AND FERRITIN CONCENTRATION IN TOXAEMIA OF PREGNANCY

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of
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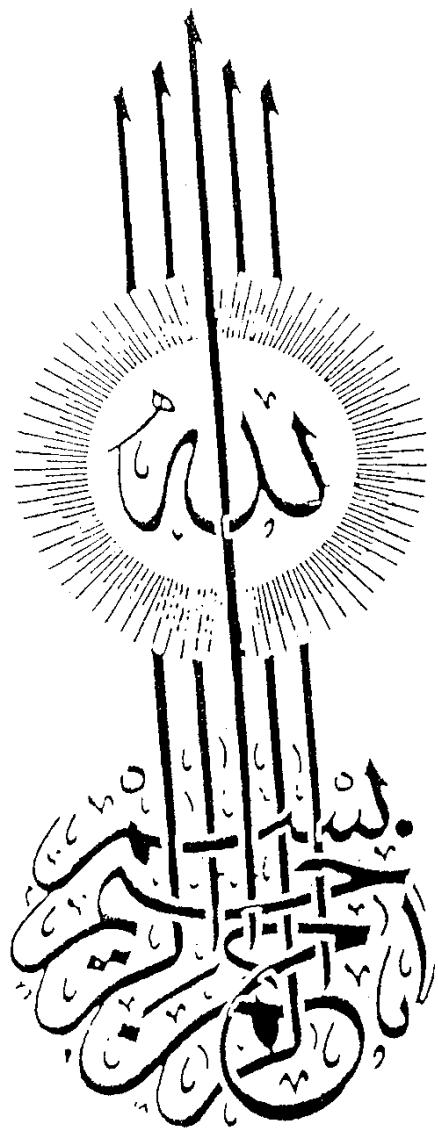

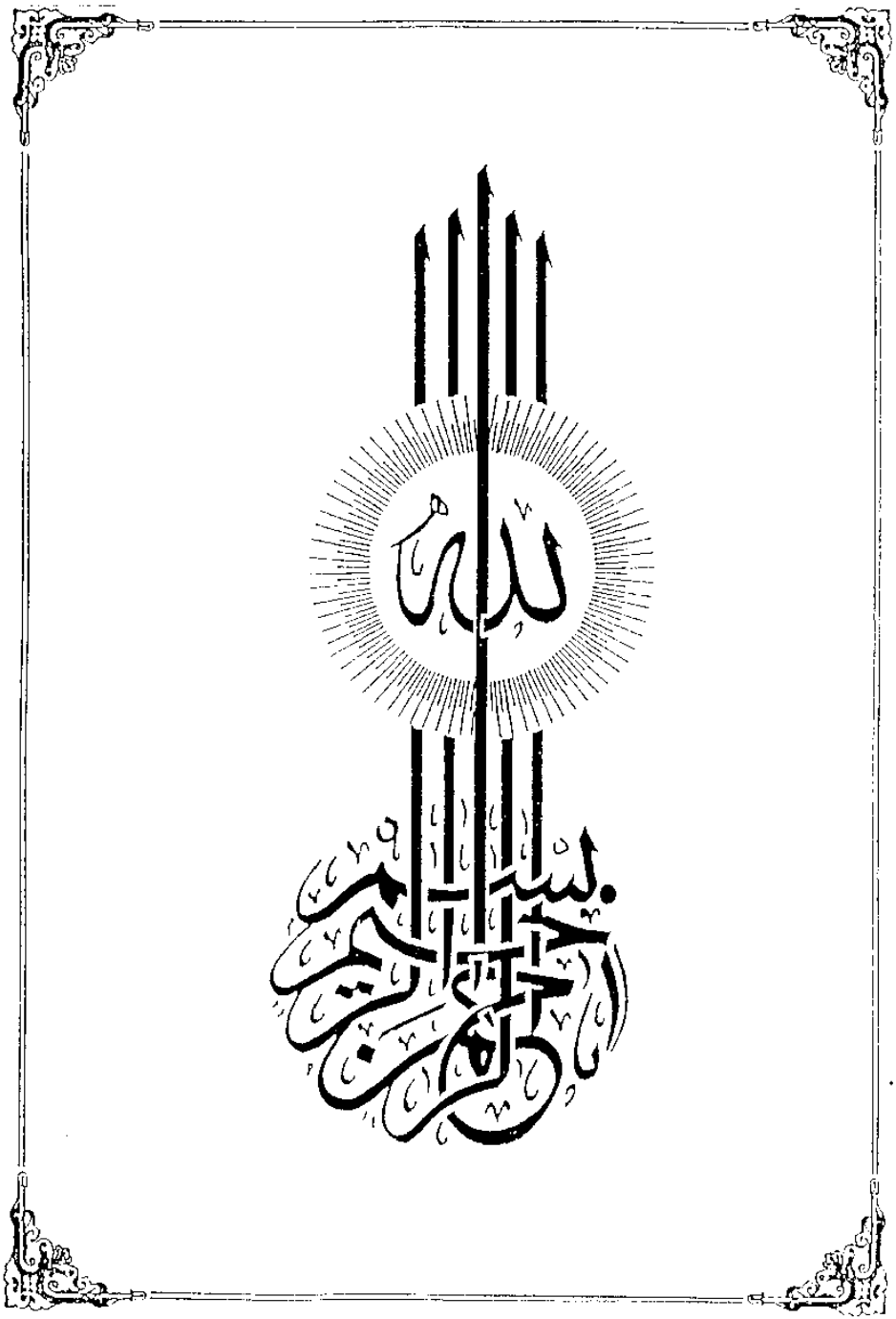

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INTRODUCTION

Toxaemia of pregnancy is a multisystem disease with variable manifestations. Although it classically presents with renovascular and neurological signs, the literature is replete with references to hepatic, hematologic and metabolic changes with this disorder.

Serum ferritin, a protein that complexes iron, is the major storage form of iron found in the liver, spleen and bone marrow (Crichton R,R., 1971).

Ferritin is an accurate reflection of the bodys'iron stores. Latent subclinical iron deficiency can be detected by serum ferritin determinations before hemoglobin and serum iron concentrations decrease (Kaneshiga, E. 1981).

Normal women during the third trimester of pregnancy have a decrease in serum iron and serum ferritin, as their stores of iron are depleted because of the fetoplacental demand and the required expansion of the red cell mass.

Bieleck et al (1974) and Kaneshige (1981) reported a lowered serum iron in Toxaemic patients.

Kaneshige 1981 noted that the mean serum ferritin diminishes with advances of pregnancy .

Entman et al (1982) noted a striking elevation of serum iron in severe cases of toxaemia of pregnancy with return to normal iron values with improved clinical status.

Entman et al (1982) reported a marked increase in the mean concentration of ferritin during the third trimester and at labour for toxaemic patients.

Aim of the work

The aim of this work is to study iron dynamics during normal pregnancy and toxaemia of pregnancy by estimation of serum iron. Total iron binding capacity and ferritin in maternal and cord blood, searching for diagnostic useful criteria for conservative clinical management.

REVIEW OF LITERATURE

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IRON METABOLISM

Iron is by far the most important trace element in the body, it has two properties of particular importance in biology, the ability to exit in more than one relatively, stable oxidation state (Fe++ or Fe+++) and the ability to form complexes (Wordwood 1977).

1.1 Iron content of the body.

The body of a healthy adult contains 4 - 5 gm of iron in the following forms:

1. Blood haemoglobin contains about 2.5 gm.
2. Storage iron ($^{2}/_{3}$ as ferritin, $^{1}/_{3}$ as haemosidrin) amounts 1 - 1.5 gm.
3. Myo-globin (Myo—haemoglobin) in red cell muscle contains 0 - 2 gm of iron.
4. Intracellular enzymes containing iron protoporphyrins including cytochrome oxidase, catalase, peroxidase, and cytochrome, account for less than 0 - 0.1 gm iron.

(Samson Wright 1982)

1.2 Iron balance.

The intracellular iron containing enzymes and Myohaemoglobin are stable substances, the iron of which can not be called upon for other purposes. Blood Hb, on other hand is continually undergoing destruction , the iron content of Hb is 0.33 %, thus 100 ml. of blood containing 15 g. of Hb., contains 50 mg. of iron As the

red cells live about 120 days, 0.8 % of the total blood haemoglobin, i.e. the contained in 50 ml. of blood, is destroyed daily releasing about 25 mg. of iron.

1.2.1 Iron stores:

A well-nourished, adult mal probabily has 4 - 5 gm of iron in the body, the major portion of this iron is hemoglobin (about 3 gm), some in myoglobin and iron containing enzymes, and the bulk of the remainder is present as storage iron which can be mobilized as necessary for haemoglobin production (Baker, 1979).

1.2.2 Iron losses:

Since iron is recycled in the body, the major factor affecting iron requirement is the amount of the lost from the body, a number of WHO related studies has investigated physiological and pathological iron losses in a variety of population groups.

a. Basal physiological losses:

In males and non menstruating females, the main routes of iron loss are via the gasterointestinal tract, the skin and the urine, studies using Fe^{59} labelled iron and measuring the decay in whole blood redioactivity over prologed periods, have show mean total daily losses of 0.6 mg (Finch, 1959) and 0.9 mg (Green, 1968).

b. Menstrual losses:

In women of child bearing age iron losses due to menstruation must be added to the basal losses from the

gasterintestinal tract, skin and urine, these has been measured in women in Burma (Aung, 1971).

c. Losses in sweat:

Iron deficiency is common in tropical countries and one hypothesis to explain this high prevalence was excessive losses of iron in sweat. Several studies, using chemical methods to measure iron in sweat, appeared to support this hypothesis (Apte 1963).

d. Losses due to parasites:

It has long been appreciated that hookworm infestation was frequently associated with anemia and that there was some relationship between the severity of the infestation and degree of anemia (Layrisse and Roche, 1964).

1.3 Iron requirements and sources.

The need for iron in the human diet varies greatly at different ages and under different circumstances.

It is determined by the requirements for tissue growth and hemoglobin synthesis and the replacement needs due to iron loss in urine, faces and sweat and in females the additional loss in menstruation, gestation and lactation.

To maintain mutritional balance, the daily intake of iron must replenish the amount lost from the body, puls supply any additional amounts needed for growth and development.

The requirements of iron as commended by a WHO expert committee for individuals of different age and sex as shown in table (1)(WHO, 1972).

Table (1)

Daily requirement of iron i.e. the amount that must be absorped to maintain homeostasis (WHO, 1970, and 1972).

No		mg
1	Infants 5 to 12 months	0.7
2	Children 1 to 12 years	1.0
3	Boys 13 to 16 years	1.8
4	Girls 13 to 16 years	2.4
5	Menstruating women	2.8
6	Men	0.9
7	Pregnancy, first half	0.8
8	Pregnancy, second half	3.0
9	Lactation	2.4

It is clear that during growth, pregnancy and lactation when demand for hemoglobin formation is increased, additional iron is needed to diet. The best dietary sources of iron are organ meats liver, heart, kidney and spleen.

Other good sources are egg. yolk, whole wheat, fish, spinach and molasses.

1.4 Food iron absorption.

The process by which the body meets its current needs of iron can be described as a stepwise transportation of iron from the environment to the blood stream.

Three major phases take place:-

1. Selection and preparation of food items.
2. Intraluminal transportation and processing of non heam and heam iron.
3. Mucosaluptake and transportation of iron to the blood stream.

1.4.1 Selection and preparation of food items:

Different absorption patterns result according to the type of food in the diet. Absorption of vegetable food iron is about double when it is given together with meat, liver or fish.

This absorption increases progressively according to the amount of ascorbic acid adminstered. Iron absorption from two vegetable foods is very similar when they are ad minstered together.

Moreover a similar absorption pattern is found when one vegetable is mixed with an iron salt as either a ferric or ferrous compound (Mlayrrise, 1975).

1.4.2 Intraluminal transportation:

This stage covers what happens to the food iron from ingestion until it is presented to and accepted by the absorptive sites of the mucosal cells (Rasmussen, E, 1983).