EFFECTS OF IRON DEFICIENCY ANAEMIA ON GROWTH OF INFANTS FROM ONE AND HALF UP TO FOUR YEARS

THESIS

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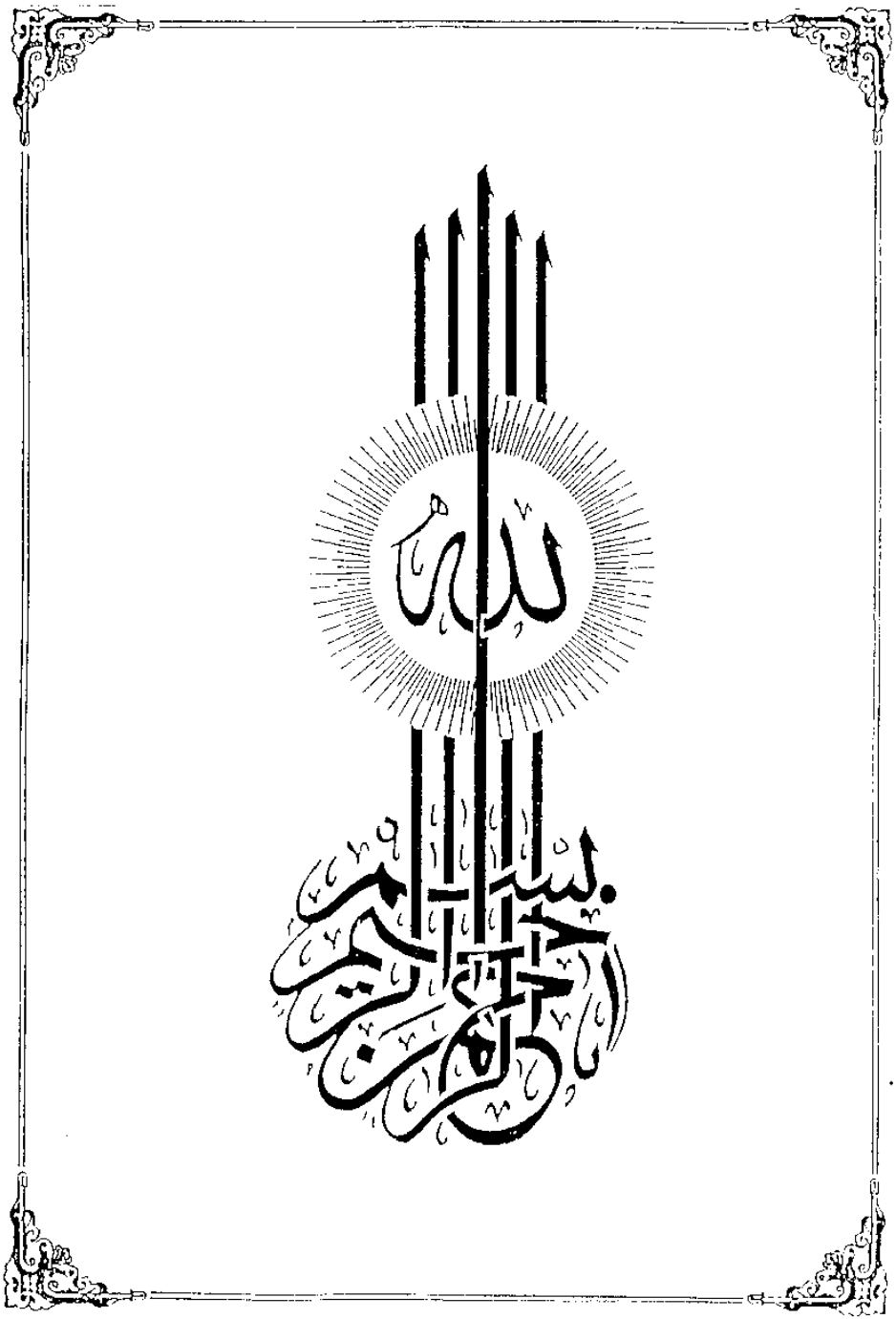

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Chapter (I)

INTRODUCTION AND STATEMENT OF THE STUDY PROBLEM

CHAPTER I

INTRODUCTION

Iron deficiency in infancy and children is mainly a common problem in healthy and in children with systemic diseases (Reeves *et al.*, 1983).

It constitutes a major problem of public health affecting 10 % to 20 % of the world population, although developing countries are specially susceptible, developed countries are also at risk (Heroberg *et al.*, 1985).

Iron deficiency anaemia is the most common nutritional deficiency in children and is wide spread in paediatric age groups through the world.

It occurs in about 30 % of preschool children with a peak incidence after 12th month till 5 years (Devis *et al.*, 1960 & Wintrobe, 1976).

This is due to the trace amount of iron in diet, the limited ability of human body to absorb dietary iron, the need of iron for growth as will as the high incidence of parasitism and gastrointestinal blood loss. All these factors make infants and children especially vulnerable to develop negative iron balance and iron deficiency anaemia (Phillip *et al.*, 1978).

Chapter (II)

REVIEW OF LITERATURE AND DEFINITION OF TERMINOLOGY

CHAPTER II

REVIEW OF LITERATURE AND DEFINITION OF TERMINOLOGY

Definition of Iron Deficiency Anaemia (IDA)

Iron deficiency anaemia in infancy is mainly due to inadequate iron stores at birth and inadequate amount of iron in diet of infants (Dulman, 1980).

It is a common problem in healthy children and in children with diseases also (Reeves *et al.*, 1983).

Later born infants show higher incidence of iron deficiency anaemia than first born infant (Guest and Brown, 1977).

Factors which contribute for iron deficiency in infancy and childhood:-

(1) Iron storage at birth.

(2) Growth rate.

(3) Dietary intake and absorption of iron.

(4) Blood loss.

1. Iron Storage at Birth

Iron storage at birth in full term infants is about 60-70 mg/kg weight which cross the placenta during the last months of pregnancy (Wilson, 1971).

There are few factors which alter this amount of iron these are:-

(1) Blood loss from foetal circulation.

(2) *Cord clamping practices*: early clamping yield 31 ml/kg blood in contrast to 45 ml/kg in late clamping (Dullman, 1974).

(3) *Maternal iron deficiency or frequent pregnancy*, this might be important factor.

However, the placenta can remove iron from low maternal concentration to high foetal concentration (Woodruff, 1977).

3. Growth Rate

Growth rate is used to express growth in relation to birth weight. The full term infant doubles his weight at 5-6 months and triples his weight at one year.

The haemoglobin level at birth is 16-18 gm/100 ml and at 5-6 ms about 11 gm/100 ml, which mean that the infant need no iron supply until he doubles his weight at 5-6 ms.

After this age rapid growth occurs and exogenous iron is needed. Iron deficiency is unlikely to occur until the infant is 2.5 times his birth weight (Woodruff, 1977).

The growing child needs to absorb 0.5-0.9 mg of iron each day during the first year of life (Burman, 1982); this

cannot be supplied by either human or cow's mild. Since both sources have low concentrations of iron and 5-9 pints would be required to provide sufficient iron for the child's daily need.

A 4 kg baby is provided with sufficient iron stores to last for 6 months, it is thus important that the baby should be started on iron rich foods by this time. On the other hand, a 2.5 kg baby has only sufficient iron to grow to 4 or 5 kg, which occurs before solid food is given and hence liquid iron supplements must be provided.

Inadequate iron intake may continue once solid food has been started. It is for this reason that specially prepared infant foods, such as those based on cereals, have an artificially raised iron content. It is thought that about 10 mg of iron per day is required in the diet during the first 2 years of life (Burman, 1982).

3. Dietary Intake and Absorption of Iron

Iron intake and absorption depend upon the amount in the diet and efficient absorption.

Ferrous salts are more absorbable while phosphate oxalate and phytate decrease absorption (Jacob, 1978).

Gastric acidity and rapid growth rate increase iron

absorption. It decrease also in chronic diarrhoea, malabsorption syndromes and gastrointestinal anomalies (Dullman, 1978).

Both human and cow's milk are poor sources of iron but breast milk iron is completely absorbed than other milk.

Full term breast fed infants unusually develop iron deficiency anaemia until six months of age. Prolonged milk feeding or delayed weaning is usually one of the commonest causes of iron deficiency anaemia during infancy.

During childhood a mixed diet usually supply an efficient amount of iron (Saarinen, 1978).

Iron deficiency in infancy is usually due to inadequate iron stores at birth and inadequate amount of iron intake in diet (Burman, 1971).

Saarinen and Siimes (1980), reported that timing and choice of solid foods for infants may have a much greater influence on iron nutrition than was previously realized.

Oski and Landow (1980), reported that the introduction of some solid food in a breast feed baby could compromise the excellent iron absorption of the breast milk.

Iron deficiency remains a nutritional problem for infants in an urban setting and is largely a result of the

early introduction of whole cow's milk into the diet (Sadowitz and Oskifa, 1983).

Consumption of fresh cow's milk, unfortified cow's milk formulas and cereal products predispose to iron deficiency.

Breast feeding, iron and ascorbic acid, fortified cow's milk formulas and cereals, and the use of ascorbic acid, rich foods and meat decrease the likelihood of iron deficiency (Dallman, 1986).

The lack of routine iron supplementation as a preventive procedure and the routine use of cow's milk for infants feeding are the probable causes of this prevalence of iron deficiency anaemia (Laron *et al.*, 1985).

So the introduction of foods such as meat and ascorbic acid enhance absorption of iron from the entire meal, while milk, cow's milk and other diary products and cereals have the reverse effect (Cook and Mansen, 1976).

Upper respiratory and other mild antecedent infections commonly predispose to iron deficiency probably because of a decrease in iron absorption (J. Ped., 1984).

1. Iron Loss

Iron loss are less important in development of iron deficiency anaemia in children.

In areas where hookworm infestation is prevalent, blood loss is a common cause of iron deficiency anaemia (Dullaan, 1974).

PATHOGENESIS OF IRON DEFICIENCY ANAEMIA

In the early stages of negative iron state, iron is mobilized from stores to meet haemoglobin. Synthesis and metabolic activity until the stores are exhausted.

This is called pre-latent iron deficiency stage which is characterized by absence of iron storage without any decrease in serum iron concentration or haemoglobin level (Jacob, 1977).

With further iron depletion a fall in serum iron occur but no interference with erythropoiesis and latent iron deficiency results.

The last stage is iron deficiency anaemia with iron deficient erythropoiesis, which may be due to metabolic or enzymatic changes (Jacobs, 1977).

Red cell compensatory mechanism leads to decrease oxygen affinity resulting normal delivery of oxygen to the tissues at rest but on exertion this may be less effective leading to impairment of physical work (Viteri and Javan, 1974).