TRACE ELEMENTS IN FIRST TRIMESTER THREATENED ABORTION

Thesis

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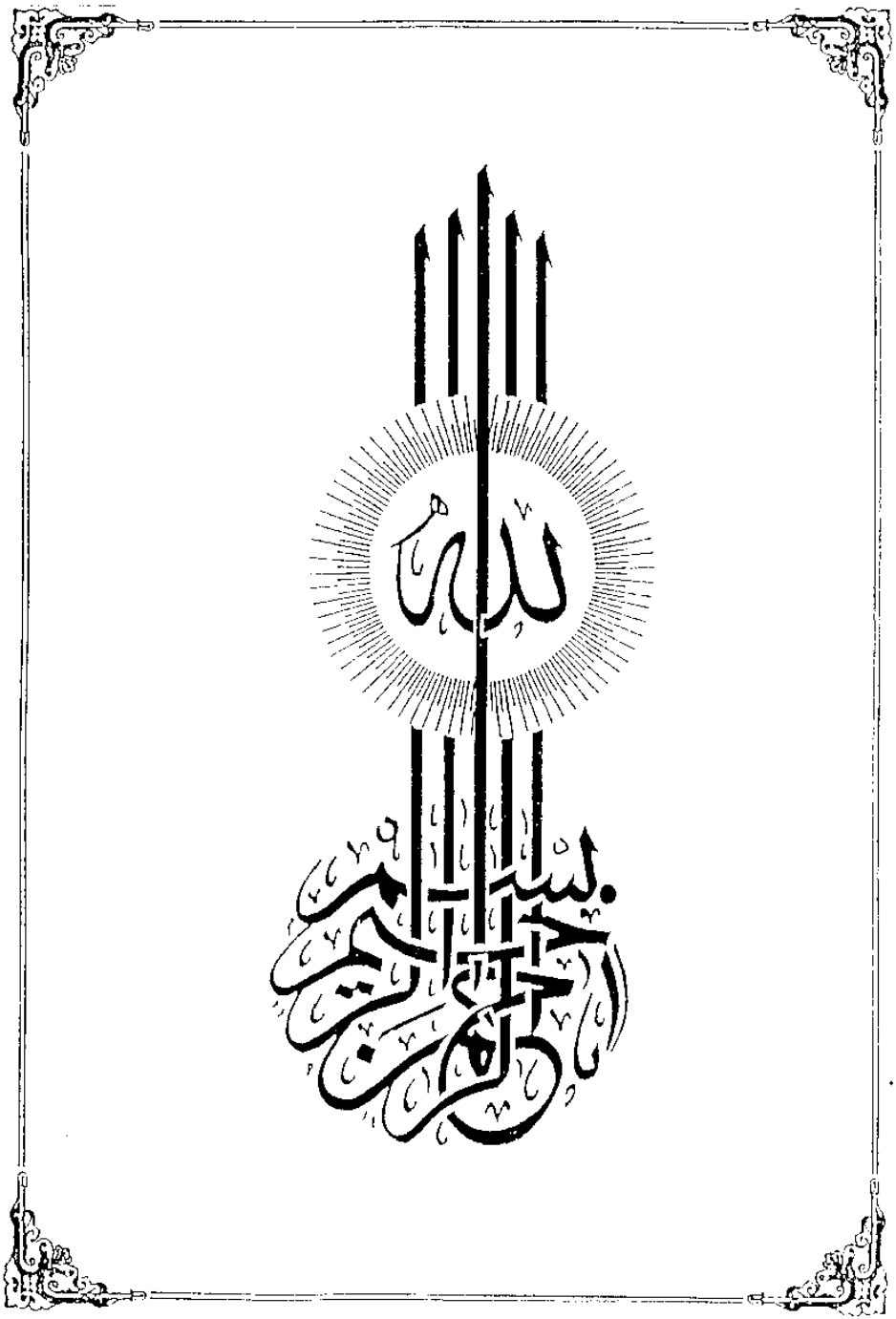

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INTRODUCTION

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More than forty trace elements have been found in the human body, however, few of them are known to have vital roles in regulating body's metabolism and maintenance of life. At least nine trace elements (iron, zinc, copper, manganese, cobalt, chromium, selenium, molybdinum and iodine) are required for optimal human health. The term trace element is a relic of the time when the concentrations of these individual elements in tissues and the body fluids could not be determined accurately. This is no longer the case, but the term remains in the popular usage simply because nothing better has been found (Aggett, 1984).

Inorganic elements that are present in the tissues in trace amounts (pg to μg per g of wet tissue) are termed trace elements (Walter and Israel, 1987).

Hormones can interestingly affect trace elements levels. Administration of estrogen has been known for many years to produce an increase in plasma concentration of copper. The mechanism by which this change occurs is mainly through the induction of copper carrying protein ceruloplasmin (Henkin et al., 1971).

Up to our knowledge, there are no previous studies about maternal serum zinc and manganese levels in threatened abortion.

This study is trying to find out a relationship between threatened abortion and maternal serum levels of copper, zinc and manganese.

AIM OF THE WORK

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The objective of this study is to determine the changes in maternal serum concentrations of copper, zinc, and manganese in the first trimester threatened abortions and comparing their levels with those of normal pregnant women in the same period of gestation.

REVIEW OF LITERATURE

PHYSIOLOGY AND PATHOPHYSIOLOGY OF COPPER

Copper Distribution In Tissues :-

Liver and brain tissues are the main depots for copper in the body. The liver total content per organ is 133 mg with a range of 60 - 139 mg and brain total content is 8.3 mg with a range of 2 - 19 mg. In actual concentration per unit weight of tissue ash, liver and brain still the highest organs "liver 680 ±50 parts per million ash" and brain 370 ±12 parts per million ash" (Tipton and Cook, 1963).

Heart and kidney also, have the highest concentrations of copper in decreasing order after liver and brain. Bones and muscles contain half of the total body content because of their large masses (Tipton and Cook, 1963).

There is regional variation in levels of trace elements in the term human placenta, copper is present in highest levels (17.2 ±2.0 µg/g dry weight) in foetal membranes (Manci and Blackburn, 1987).

Absorption Of Copper :-

Absorption of copper takes place mainly in the stomach and upper gut by two different mechanisms. The

first one, is an energy dependent process. The large portion of copper is absorbed by the second mechanism by binding to two portions in the intestinal mucosa (Evans, 1973).

High intake of calcium carbonate and ferrous sulfide depresses the absorption of copper. The actual mechanism for copper transport from the gut to the blood is unknown (Evans, 1973).

Excretion Of Copper :-

Most of the copper is excreted via the biliary tract (Bush et al., 1955).

The copper is excreted mainly via bile and intestinal juice, a small portion is excreted in urine. The excretion of copper by the kidney probably represents the copper which has been dissociated from copper-albumin complex during its passage through the kidney (Adelstein and Vallee, 1961).

Ceruloplasmin (serum copper enzyme tightly bound about 93% of the copper in the serum) is not found in the urine under normal conditions (Evans, 1973).

It was suggested that renal nerves are involved in regulation of trace elements reabsorption and that copper and zinc from the tubular lumen may affect the lumenal cell membrane and control the transport of substances from tubular fluid into blood (Gyrchev et al., 1987).

Metabolic Functions Of Copper :-

Copper is an important constituent of many metalloenzymes as : cerebrocuprein, haemocuprein, erythrocuprein, metochondrocuprein and hepatocuprein. Copper depleted animals lose the ability to utilize stored iron because of the failure of the ferrous to ferric conversion (Osaki, 1971).

Copper Deficiency :-

The first syndrome was manifested as moderate to severe anaemia in infants whose diets were based on cow's milk (Sturgeon et al., 1956).

Serum copper and iron concentrations were low and therapy with a combination of iron and copper was required for complete cure (Sturgeon et al., 1956).

The second syndrome is less commonly associated with anaemia; in which there are : neutropenia, chronic or

recurrent diarrhoea with a low serum copper concentration (Cordan, 1966).

The third syndrome is a sex-linked recessive disorder with retardation of growth, hypothermia, degenerative changes in aortic elastin, metaphyseal lesions, progressive mental deterioration and low serum copper content (Menkes et al., 1972).

The chorionic villus copper value of 6.3 ng/mg was considered pathognomonic for Menkes disease (Tonnesen et al., 1989).

Copper Excess :-

Cases with copper excess show hepatolenticular degeneration characterized by familial tendency, incoordination, ataxia, progressive mental deterioration, and post-necrotic hepatic cirrhosis (Walshe, 1967).

Those patients with hepatolenticular degeneration excrete copper at only half of the rate of healthy controls (Former, 1974).

Serum Copper Level In Non-pregnant State :-

Schenker et al., (1969) determined the serum copper level in 28 non-pregnant women in the fertile age, they found that the mean serum copper level was 129 ±12.7 µg/100 ml for the normal non-pregnant women in the fertile age.

Prema et al., (1980) made a cross-sectional study of serum copper level, in those non-pregnant women, it was 111 µg/100 ml.