RELATION OF ZINC TO SOME OBSTETRIC COMPLICATIONS

Thesis

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الله

بسم الله الرحمن الرحيم

سبحانك لا علم لنا إلا ما علمتنا
إنك أنت العليم الحكيم

صدق الله العظيم

بسم الله الرحمن الرحيم

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The role of trace elements in health and disease is still poorly understood. During pregnancy, a phase of rapidly increasing nutritional requirements, one would expect changes in the trace element levels to occur. Thus far, a decrease in maternal zinc, iron and calcium levels during pregnancy have been documented (Jameson, 1976). On the other hand, the maternal copper level increases towards the end of pregnancy (Prema et al., 1980). To what extent these changes are physiological and to what extent pathological, is largely unknown. Reports suggesting that deficiencies of certain trace elements may be involved in complications of pregnancy have been published.

Jameson (1976) reported decreased serum zinc levels in a group of patients with abnormal labour, atonic bleeding and premature birth.

Cherry et al., (1981) found that women experiencing hypertension and/or toxaemia during pregnancy had significantly lower plasma zinc levels.

During the intrapartum period, lower plasma zinc levels were associated with a prolonged latent phase, a protracted active phase, labour > 24 hours and cervical and vaginal lacerations (Lazebnik, 1988).

AIM OF THE WORK:

The purpose of the present study is to test the hypothesis that certain complications during the course of pregnancy and delivery will be related to abnormal plasma zinc level, as one of the indices of zinc status.

REVIEW OF LITERATURE

TRACE ELEMENTS

Trace elements are those elements whose total concentration in a 70 kilograms human is less than 4 grams (Henkin, 1976).

Our bodies depend on at least nine trace elements such as: iron, zinc, copper, manganese, iodine, chromium, selenium, molybdenum and cobalt for optimal metabolic functions (Aggett, 1985).

Studies of trace elements have been particularly aided by the recent development of novel techniques such as flameless atomic absorption spectrophotometry, gas-liquid chromatography, X-ray fluorescence and mass spectroscopy, which have allowed reliable measurement of several trace elements in different tissues.

Deficiency of an essential trace element results in a characteristic deficiency syndrome in a manner analogous to a specific vitamin or hormone deficiency. The deficiency syndrome is associated with a specific structural, functional, biochemical and physiological abnormalities. These abnormalities in turn, are prevented or reversed after administration of the deficient element. Similarly, toxicity may result from excess of these essential elements. They perform functions indispensible to maintenance of life, growth and reproduction.

William and Thomas (1985), reported that improvement in analytical methods have expanded our understanding to the role of trace elements in human nutrition and disease. A summary of the data concerning body content, plasma concentration, functional role and deficiency appears in the following table (Table 1).

Calcium, magnesium, iron and zinc are quantitatively the largest, present in gram quantities. Copper, chromium, manganese, iodine and fluoride, however are found only in milligram quantities.

Table [illegible] : Trace elements ([illegible] and [illegible], 1985)

Element	body content	Concentration in whole blood	plasma or serum	average intake	Absorption
Calcium	1000 gm	[illegible] mg/100 ml	[illegible]-10.5 mg/100 ml	[illegible]-1.5 gm/day	0.1-0.5 gm
Magnesium	25 gm	[illegible] mEq/L	1.5-2.5 mEq/L	400 mg/day	100 mg
Iron	5 gm	[illegible] mg/100 ml	[illegible]-180 µg/100 ml	12-15 mg/day	0.6-1.5 mg
Zinc	2 gm	[illegible] µg/100 ml	120 µg/100 ml	10-15 mg/day	1 mg
Copper	100-150 mg	[illegible] µg/100 ml	109 µg/100 ml	[illegible] mg/day	0.6-1.6 mg
Iodine	10-20 mg	-	4-8 µg/100 ml	[illegible]-1000 µg/day	50-1000 mg
Manganese	12-20 mg	[illegible] µg/100 ml	1.4 µg/100 ml	[illegible]-8 mg/day	
Molybdenum	10-20 mg	[illegible] µg/100 ml	1.4 µg/100 ml	100 µg/day	90 µg
Chromium	6 mg	[illegible] µg/100 ml	1-[illegible] µg/100 ml	500 µg/day	[illegible] µg
Cobalt	1 mg	[illegible] µg/100 ml	2-[illegible] µg/100 ml	300 µg/day	30-[illegible] µg

[illegible] As iron in hemoglobin ([illegible] = 12.7 gm/100 ml).
[illegible] Serum [illegible] higher than [illegible] [illegible] platelets [illegible]

ZINC

The content of zinc is approximately 1.4 to 2.3 gm in a 70 kilogram man with a 20% of this amount in the skin. Circulating concentrations can be readily measured and average 121 ug/100 ml in serum and somewhat more than ten times this concentration in red blood cells (Prasad et al., 1970).

Evans et al., (1973) showed that, although intake of zinc is between 10 and 15 mg per day, absorption is usually low, representing less than 10%, and is decreased by certain binding agents, particularly phytates which are present in various cereals.

Zinc is a factor in a number of enzymes, including alkaline phosphatase (found in liver and bone), carbonic anhydrase, carboxy peptidase (from the pancreas), and lactate, malate and alcohol dehydrogenase. Zinc is also of importance in the B-cells of the pancreas and may be involved in the crystallization of insulin in the granules within the cells (Hambidge, 1978).

Zinc has an important role in the synthesis of DNA and protein, as shown by the reduced incorporation of radioactivity from thymidine into nuclear DNA in zinc deficiency. This impairment can be overcome by injecting zinc in a short time before giving thymidine. The effects of zinc on the activity of ribonuclease offer one explanation for these effects on nucleic acid synthesis. Zinc is an inhibitor of this enzyme, and in deficiency states the activity of ribonuclease might be enhanced (Brandes et al., 1980).

Experimental zinc deficiency has been produced in several laboratory animals and has been documented with reasonable certainty in human beings. Zinc deficiency in human is characterized by dwarfism and hypogonadism (Prasad et al., 1970).

William and Thomas (1985), showed that many patients have come from certain villages in Egypt and Iran in which the ingestion of diets high in cereals might impair the absorption of zinc. The subjects in question are usually males and show a marked delay in onset of sexual development, pubic hairs are sparse or absent and the tests are small. Facial hair is sparse and hepatosplenomegaly is frequent. Administration of zinc accelerated growth of these boys and lead to an enhanced rate of sexual development. On this basis, it appears that zinc deficiency can be a causative factor in human disease. The mechanism by which zinc appears to impair growth is unclear. It is known to be