Ain Shams University
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SERUM COPPER LEVEL IN OVARIAN TUMOURS

Thesis
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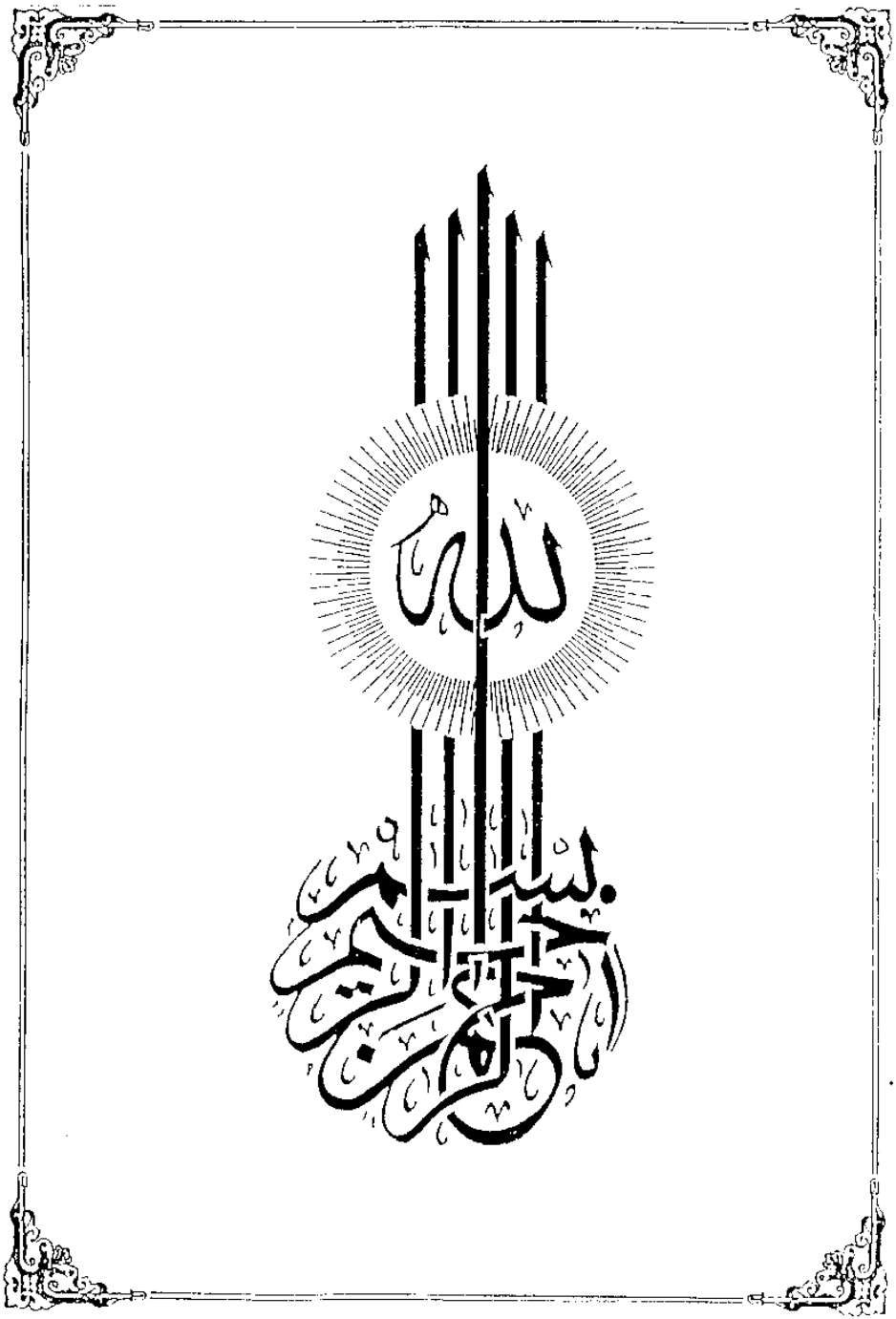
بسم اللَّهِ الرَّحمٰن الرَّحِيمِ

قَالُوا سُبحَٰنَكَ لَا عِلمَ لَنَآ إِلَّا مَا عَلَّمتَنَآ إِنَّكَ أَنتَ ٱلعَلِيمُ ٱلحَكِيمُ

صدق الله العظيم
سورة البقرة ٣٢



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Recent studies indicated that trace levels of Copper dramatically enhance the biological damage caused by Oxygen loss of various enzymatic activities, single or double strand breaks in DNA and changes in different properties of proteins could be caused by elevated levels of intracellular copper. It is therefore conceivable that accumulation of copper traces in a given organ may cause intracellular damage ultimately expressing itself in carcinoma. (Margalioth et al., 1989)

The level of copper and zinc in serum of patients with various diseases, including malignant tumours have been intensively investigated in recent years.

It has been documented that the serum copper increased and/or serum zinc decreased as a non-specific reaction pattern during the active phase of these diseases. Serum copper and zinc levels and their clinical usefulness in malignant states have been investigated mainly in patients with haematological malignancies and gynecological tumours. (Brande and Joseph, 1983)

Ceruloplasmin is a glycoprotein (alpha 2,globulin) containing 3 mg of copper/g. It plays an important role in copper transport, regulation of biogenic amines for brain

chemistry and liver protection against accumulation of excess copper (Prasad, 1978).

Kulbama et al. (1984) observed a positive correlation between serum free estriol and serum copper levels in maternal sera. The rise of serum copper during pregnancy is due to the increase of serum ceruloplasmin level caused by increased estrogen production from maternal and foetal origin. Margalioth (1985), suggest that serum copper level has been found to be elevated in the presence of certain neoplastic processes. These findings are part of an increasing interest in recent years in evaluation of the micro-enviroment especially with respect to trace elements which could provide sensitive and reliable monitoring of the presence of progression of neoplasms in humans. Among gynecologic malignancies serum copper was thorougly investigated only in carcinoma of cervix. Serum copper level greater than 199 ug/dl were highly suggestive of invasive carcinoma as opposed to dysplasia. There is little information about serum copper level in patients with ovarian carcinoma.

AIM OF THE WORK

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The aim of this work is to assess the accuracy and significance of serum copper as an easy, available and cheap method for diagnosis of ovarian tumours.

REVIEW OF LITERATURE

Copper

The term trace elements is applied to elements which occure in body tissues and fluids in minute amounts. Essential physiological functions have been established for some of these elements i.e. copper, cobalt, zinc, iodine, magnesium and molyoidenum.

Others may be accidental contaminants, although there is suggestive evidence of biological importance of flourine, barium, stronium and arsenic. In view of the fact that their essential activities are exerted by mere traces of these elements, it would appear that their functions are catalytic in nature i.e. that they act as direct activators of certain enzymes or indirectly as essential components of vitamines and hormones. (Cantrow and Trumper, 1956)

Copper metabolism:

Requirements and Sources

The daily requirements of copper is 2.5mg/day for adult but infants and children require about 0.05mg/kg body weight. Deficiency is rare in infants before the age of 5-6 month due to high stored copper. Prematures are suspectable to copper deficiency (Far and Arnell 1978).

Sturgeon et al. 1956 described anaemia in infants whose diet was copper deficient. Serum iron and copper were both low and therapy with a combination of iron and copper was required for complete cure.

Chase, Clark, Cartwright and Maxwell 1952 stated that: there is less absorption of iron from the gastrointestinal tract of rats deficient in copper than in rats supplied with copper. The amount of radio iron absorbed was favored by amounts of dietery copper up to levels of 0.25 to 0.50 mg per rat per day. Above this amount there was no greater iron absorption, in fact there appeared to be some what reduced absorption.

The influence of copper on iron absorption is not due to the simultaneous administration of copper with the iron but appears to be correlated with the level of copper in the tissues.

Sources of copper

The richest sources of dietery copper are nuts, shell-fish, liver, mushrooms, kidney, chocolats and dried legumes. Cow's milk is a poor source of copper (0.015 - 0.18 mg/L; human milk ranges from 1.05 mg/mL at the beginning of lactation to 0.15 mg/L at the end (Harper et al 1977).

Absorption of copper

In man copper is mainly absorbed from the duedenum. More than 50% of man's dietery copper is not absorbed.

Cartwright et al. 1944 reported that 1% of the dietery copper intake was absorbed.

Mills 1956 reported that copper organic compounds are probably more soluble than inorganic salts.

Lassiter and Bell 1972 found that the more soluble copper salts are more than less soluble.

Prasad 1983 reported that up to 32% of orally administered copper is absorbed.

There is little known about the factors involved in the intestinal absorption of copper but it is impaired in gastro-intestinal disorders as diarrhea, malabsorption

syndrome, cow's milk, allergy, lymphosarcoma, scleroderma and Kwashiorkor.

Excretion

Much of the absorped copper is reexcreted in the bile which also may contain copper which has not passed through liver cells at all. This is suggested from the observation of the almost instantaneous appearance of copper in fistula of bile after I.V. injection of copper.

High Proportion of ingested copper is found in faeces mostly of unabsorbed copper.

Cartwright 1960 estimated that amount of copper lost in urine in nephrotic syndrome by 600 ug/24 hour urine instead of 100 ug/24 hour urine in normal persons.

He also found a positive relation between the degree of cupuria and the degree of protienurea.

Negligable amount are lost in sweat (Prasad 1978).

Distribution of copper

Spectar 1956 estimated copper levels in different body fluids as follows:

- Whole blood contains 98 ug/100 ml
- Spinal fluid contains 12 ug/100 ml
- Saliva contains 26 ug/100 ml