Determination of Some Trace Elements in Serum and Uterine Fibromyomas

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by

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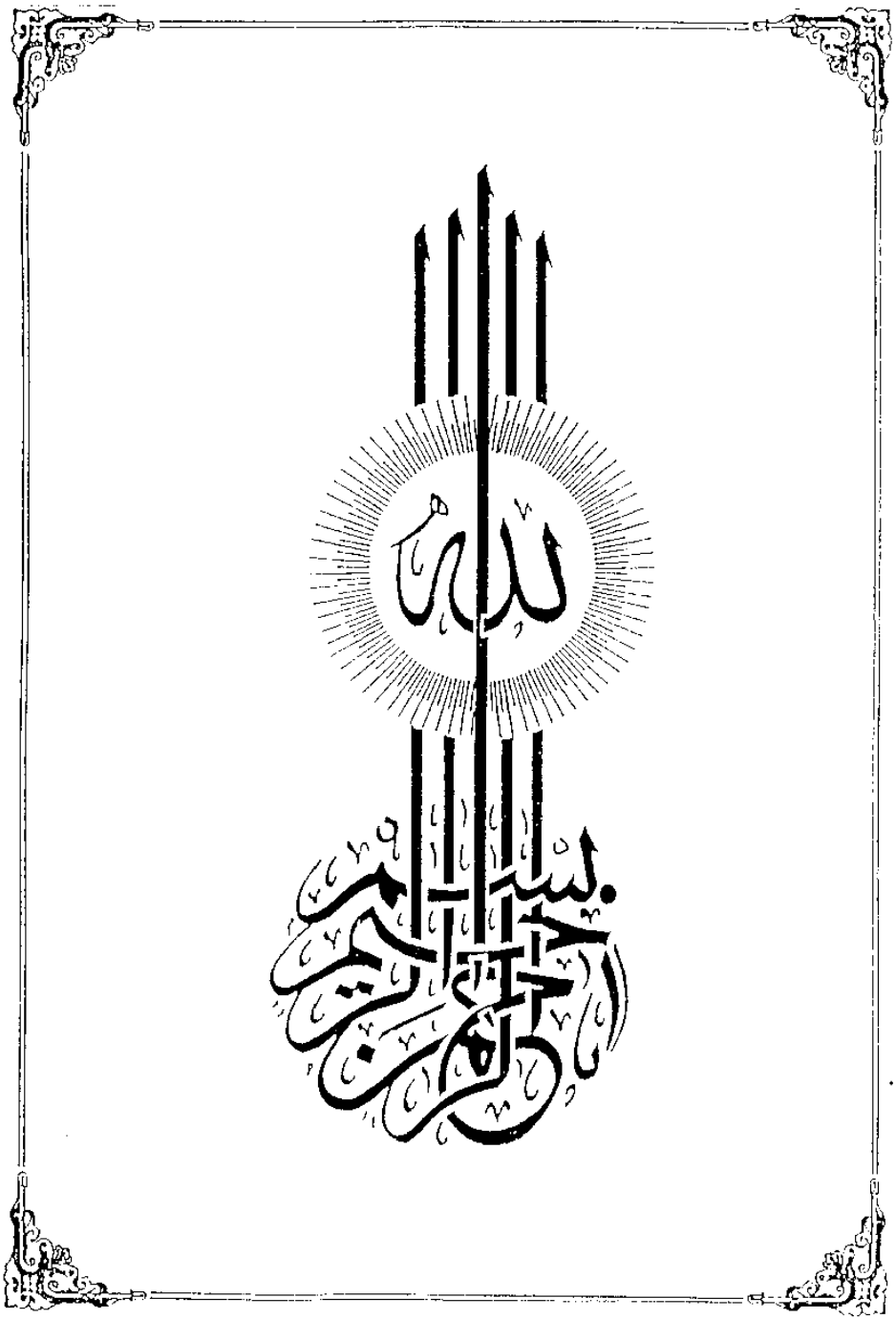
بسم الله الرحمن الرحيم

وفوق كل ذى علم عليم

صدق الله العظيم

سورة يوسف الاية ٧٦



ABSTRACT

Fibroids (Leiomyomas) are the commonest tumors of the uterus . There are no published data regarding the correspondence of minor and trace elements levels in leiomyomas to the serum. Thirty fibroid patients and 20 control cases are involved in this study. Trace elements are analysed by energy dispersive x-ray fluorescence, the elements measured were zinc, copper, iron, calcium, arsenic, bromine, phosphorus, potassium, sulpher, and chlorine. In general, a significantly decreased levels ($p < 0.01$) of zinc and iron and increased levels of copper were found in fibroid tumor, whereas a significant increased level ($p< 0.01$) of calcium, copper and bromine were found in patient's serum, with a less significant increase ($p < 0.05$) for arsenic than in control cases. When a correlation was made between leiomyomas elemental levels and their levels in serum from the same individual, no correlations were found. However, regarding trace elements interaction, a positive correlation ($r-0.502$) was found between iron and zinc in patient's serum, such result was not published before. It appears that the determination of trace elements in fibroid patients may be of value in general evaluation;despite that the serum elemental levels, do not seem to reflect fibroid tissue levels, it may be useful in discriminating between fibroid patients and normal cases.

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DEDICATION

This thesis is dedicated to my sons ZIAD and AHMED and to my husband. Their continuous love and support made this work possible.

INDEX

List of Tables

List of Figures

Introduction

Introduction

We are in the third era as far as the recognition of essential nutrients is concerned.

The first extended into the early 19th century when it was considered that only the "proximate principles" carbohydrate, fat, and protein and some macroelements like sodium, potassium , and calcium were necessary for life .

This was succeeded by the vitamin era, which lasted until 1948 when what appear to be the last vitamin, vitamin B_{12}, was discovered. The present and third era is that of the trace elements (McLaren, 1985). Many scientist belive that life originates from the seas. Still after so many eons the compositon of sea water and of man still have some resemblance. The bulk of the living matter is composed of carbon, hydrogen, oxygen, nitrogen and sulphur . In human tissue and body fluids a total of 70 elements was determined. Macrominerals are calcium, phasphorus, potassium, sodium and chlorine, being present in man in amounts of grams per kilogram tissue. Trace elements are those elements with amounts less than 100 mg/kg (0.01 %) of the human body (Beereboom, 1985). In the 19th century, the essentiality of iron was known. The knowledge about the value of zinc in medical practice - known in the 18th century at least in the Netherland - was temporarily forgotten (Hoogenraad, 1983). In the early 20th century, before 1957, the essentiality of

7 trace elements was recognized: Fe, CU, Zn, Mn, Co, Mo, and I. In the fifties the essentiality of Se and Cr was indicated, followed in the seventies by that of Sn, V, F, Si, Ni, and lately the possibility of As (Scwartz, 1977).

Biological functions discriminate between elements. In this way biomembranes are pumping certain elements out of the cell and others into it. Analogously, the concentration of certain trace elements is increased in certain organelles e.g. mitochandria, nuclei. Consequently certain trace elements might become accumulated or stored in certain organs, cells, or cell organelles (beereboom, 1985).

Investigation of trace elements in human tissue and body fluids has become a field of great emphasis in recent years. Attempts have been made to relate changes in the concentration of specific trace elements to various diseases. It has become well established that many trace elements play an essential role in a number of biological processes through their action as activators or inhibitors of enzymatic reactions by competing with other elements and proteins for binding sites, by influencing the permeabilty of cell membranes, or through other mechanism. It is therefore reasonable to assume that these trace minerals would exert action, directly or indirectly on the neoplastic process (Sunderman, 1978).

Relatively little has been written concerning the clinical utility of trace elements determinations on fibroid lesion. Uterine leiomyoma (fibroids) are the most common tumor in women as well as the most benign uterine tumors. Some estimates suggest that 25% of women over 35 years of age have uterine leiomyomas (Smith, 1952). Although not all leiomyomas are symptomatic, leiomyomas can cause pelvic pain or fullness, abnormal uterine bleeding, bladder irritation, infertility, and fetal wastage.

Jendryczko and Tomala (1983), reported that estrogen of endogenous as well as exogenous origin influence the zinc levels in organism and they observed increased levels of estrogens and decreased amount of zinc in myomas compared to normal uterine tissue. A recent study concerning determination of trace elements in fibroid tissue postulated that the following elements Ca, Fe, Cu, Ni, Se, and Zn, showing significant difference compared with normal myometrium (El Hao et al., 1987).

New analytical techniques such as neutron activation and EDXRF, make possible the simultaneous determination of ultratrace quantities of elements in human tissues and body fluids. By using such technique, it is possible to determine whether the simultaneous monitoring of the deficient or abundant trace elements has diagnostic or prognostic significance .

The present study was initiated to measure simultaneously a number of trace elements in human tissues, both normal myometrium and fibroid tissue and also to compare any significant correlation which may exist between fibroid tissue and serum obtained from the same individual at the time of surgery.

Beside, our study is interested to determine the feasibilty of using energy - dispersive X-ray floresence (EDXRF) system as an easier diagnostic procedure.

Our interest lies in the possibility that there may be a role in determining some trace elements in fibroid tissue and serum helping in diagnosis, prognosis, or to clarify a pathognominic effect.