Study Of The Pre & Post.Operative Serum Calcium Level In Cases Of Thyrotoxicosis

thesis

submitted in partial fulfillment

for master degree of general surgerg

By

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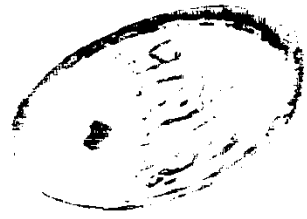
M. B. , B Ch.



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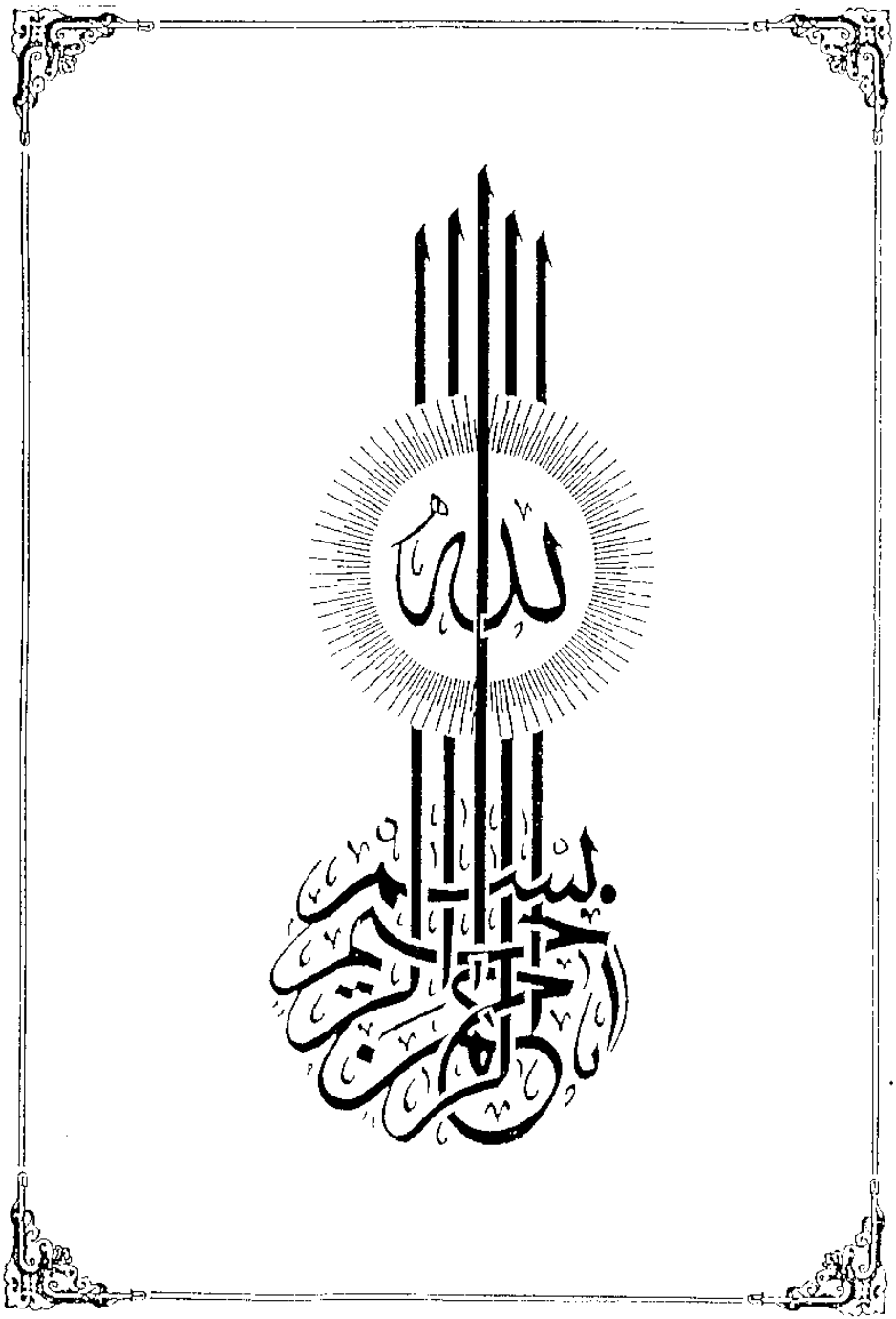
بسم الله الرحمن الرحيم

قالوا سبحانك لا علم لنا إلا ما علمتنا إنك
انت العليم الحكيم ،

«صدق الله العظيم»



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INTRODUCTION

INTRODUCTION

That disturbances of calcium metabolism may appear in patients with thyrotoxicosis is well known.

Hypercalcemia is a frequent occurance in thyrotoxic patient, due to the action of thyroid hormone upon bones, it may significally modify certain clinical features of the disease (Gorden et al., 1974) .

The exchangeable calcium pool is markedly increased, serum alkaline phosphatase level may be elevated, fecal and urinary calcium excretion is greatly augmented and a negative calcium balance is usual (Cook, et al., 1959).

A number of hypothesis had been advanced to explain the mechanisms responsible for the changes found in calcium metabolism and bone in hyperthyroidism.

Aub et al., (1929) , suggested that thyroid hormone acts directly on bones to promote bones resorption an effect which later was thought to be independent of the parathyroid hormone. Robertson (1942) , concluded that thyroid hormone had a direct effect on the kidneys and causes a negative calcium balance by increasing the

renal excretion of calcium.

Hypercalcemia reflecting bone metabolism may give symptoms such as : polydipsia and polyuria, nausea and vomiting, weakness as well as anaemia-if the serum calcium is sufficiently elevated (De-Groot, 1975) .

Overt bone disease in thyrotoxicosis has been described as osteoporosis is now rare complication because the disorder is recognized and treated early and effectively.

After thyrodectomy for thyrotoxicosis the state of hypercalcemia is reversed very abrubtly. The hungry bone absorb calcium, so the serum calcium level falls.

After a few weeks, as the bone become satisfied the blood calcium and serum alkaline phosphatase resume their normal level (Michie et al., 1971).

AIM OF WORK

In the present work, the changes which occurs in calcium metabolism in cases of thyrotoxicosis will be studied in two folds :

- The incidence of hypercalcemia with thyrotoxicosis in the pre-operative state.
- The incidence of hypocalcemia after thyroidectomy for thyrotoxicosis.

REVIEW OF LITERATURE

CHAPTER I

PHYSIOLOGY AND CALCIUM METABOLISM

The adult human body contains about 1100 gm. of calcium (1.5% of the body weight), most of it is in the skeleton.

The plasma calcium is normally about 10 mg% varing between 8.5 and 10.4 mg% (5 meq/litre) , (2.5 mmols/litre) it is partly bound to plasma protein and partly diffusable (table I).

It is the free, ionized calcium in the body fluid that is necessary for blood coagulation, normal cardiac and skeletal muscle contraction, and nerve function .

A decrease in the extracellular calcium at myoneural junction inhibit transmission. But this effect is overbalanced by the excitatory effect of low calcium level on nerve and muscle cells. The result is hypocalcemic tetany which is due to increased activity of the motor nerve fibres.

This condition is characterized by extensive spasm of skeletal muscle, involving specially the muscle of the extremities and the larynx.

Diffusable		1.34
- ionized (Ca^{++})	1.18	
- complex to HCO_3	0.16	
- citrate, etc.		
Non diffusable (Protein-bound)		1.16
- Bound to albumin.	0.92	
- Bound to globulin.	0.24	
Total Plasma Calcium.		2.50

(Table I) : Distribution (mmol/litre) of calcium in normal human plasma.

In addition, calcium is an important constituent of the intracellular cement substance.

Calcium deficiency also has effects on clotting and other systems ; in vivo however , the level of plasma calcium at which fatal tetany occur is still above the level at which clotting defects would occur.

The calcium in bone is of two types : A readily exchangeable reservior , and a large pool of stable calcium

that is only slowly exchangeable bone calcium (Fig. 2).
(Williams 1974).

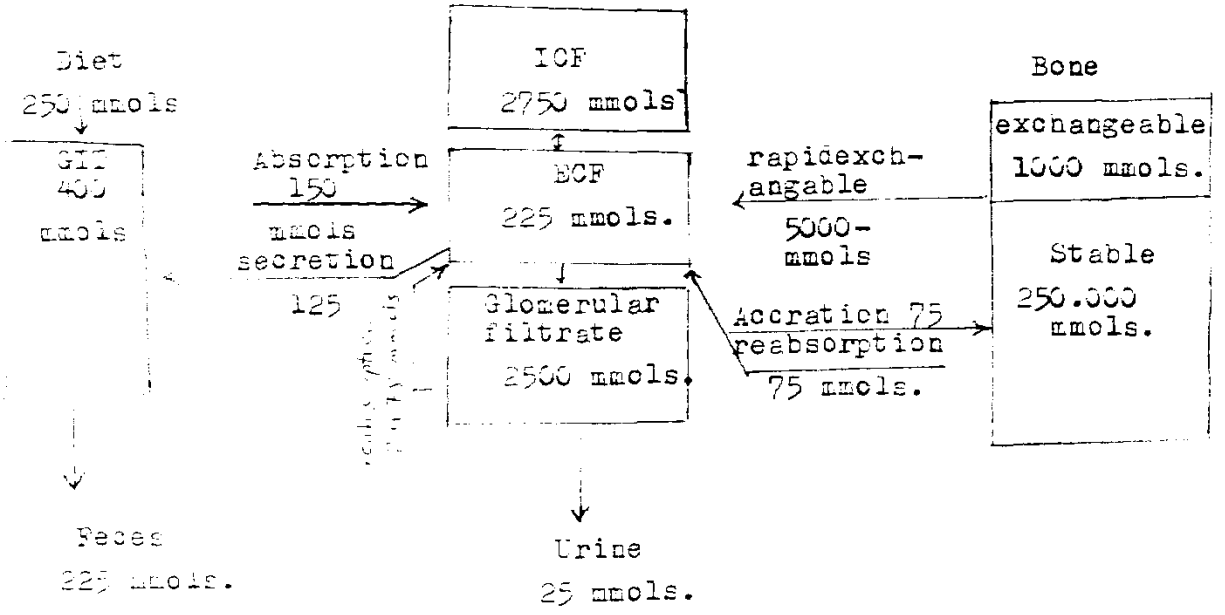

Fig.2) Calcium metabolism in adult human being ingesting 1000mg. (250 mmols) of calcium perday. (Modified from Rasmussen : Parathyroid hormone, calcitonin and calciferol in:
Textbook of endocrinology , 5th, ed. Williams, R.H.
[illegible] .

ICF = Intracellular fluid.
ECF = Extracellular fluid.
GIT = Gastro intestinal tract.

SOURCES AND REQUIRMENT OF CALCIUM :-

Of the common foods milk and cheese are the richest sources of calcium . Most other foods contribute smaller amounts e.g., egg yolk, beans, lentils, nuts, figs, cabbage, cauliflewer .

Men and Women after 18 years of age requires about 800 mg. of calcium daily, but this amount increases to about 1.2 gm. daily during pregnancy and lactation.

CALCIUM ABSORPTION :

Calcium absorption from the gastrointestinal tract undergoes adaptation, i.e., it is high when calcium intake is low and decreased when calcium intake is high.

Calcium absorption is also decreased by substances which form insoluble salts with calcium (e.g., phosphates and oxalates) or by alkalies, which favour formation of insoluble calcium soaps.

A high-protein diet increases absorption in adults, active transport of calcium out of the intestinal lumen occurs primarly in the upper small intestine, this process