

HUMAN HEALTH AND MINOR MINERALS

Part III. Diabetes Control with Chromium Complexes: Trace Metal Analysis of the Emerald and its Complexes (Zamarrud Stone & Zamarrud Kushtajats)

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The salts of *Zamarrud* (emerald) have been used for diabetic control in the Islamic system of medicine for centuries. An analysis of trace metals was carried out to determine its effectiveness in diabetes. Atomic absorption spectroscopy studies indicated the presence of large amounts of chromium (100 ppm). The presence of chromium in such amounts clearly provides the scientific background for its usefulness in controlling diabetes.

Key words: Emerald; Chromium; Diabetes.

INTRODUCTION

The first recorded evidence of the vital role that chromium plays in animals was observed when rats on chromium-deficient diet were observed to lose their ability to maintain a healthy blood sugar level [1]. They developed diabetes-like symptoms. They also had abnormally high levels of cholesterol in their blood. It has also been experimentally concluded that chromium is essential [2] for man in the metabolization of sugar.

Chromium is now considered [3] a part of a compound called glucose tolerance factor, a substance known to be present in the brewer's yeast, liver and kidney which improves glucose tolerance in animals suffering from insulin disorder. The analysis of the hair of a diabetic patient showed that the level of chromium was less than normal in the body [4, 5]. It was suggested that the deficiency of chromium resulted in hyperglycemia, growth failure, neuropathy, cataract and atherosclerosis [6]. Chromium supplementation [7, 8] improves glucose tolerance in malnourished children and elderly diabetic patients. The administration [9] of organic chromium was found to be of benefit and appeared advisable during pregnancy.

Mertz *et al.* have suggested that chromium deficiency results in glucose intolerance and the administration of chromium resulted in normal glucose tolerance. Lue *et al* [19] reported that relative supplemented chromium response was significantly higher in low insulin than in high insulin subjects and the ratio of total insulin to total

glucose was significantly lower in low insulin than in high insulin subjects.

EXPERIMENTAL

Chromium content of the metallic salts used for diabetes control in the Islamic system of medicine.

Zamarrud (emerald). It was purchased from the market. *Zamarrud salts:* (Kushtajat of zamarrud) (Hamdard Dawakhana). It was purchased from the sales office of Hamdard. *Kushtajat of Zamarrud:* (Qarshi Dawakhana) It was procured from Qarshi Dawakhana. *Kushtajat of Zamarrud:* (Ajmal Dawakhana) It was also procured from Ajmal Dawakhana.

Preparation of solutions for atomic absorption studies. A definite amount of zamarrud were taken for experiments. The ash of the emerald stone and its calxs were prepared by burning the material at 850-900° in an electrically heated oven. Higher temperature gave more insoluble materials. The ash was first treated with 10% HCl, then with 20% HCl and finally with concentrated HCl. All the coloured materials went into the solution leaving some minute quantities of white insoluble material. The solution was made upto 250 ml. by adding distilled water for atomic absorption studies.

Measurements of absorptions were carried out in the ketone phase by using Perkin-Elmer 280-B atomic absorption spectrophotometer with lamps having different wavelength.

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RESULTS

The trace metals analysis of zamarrud stone and its kushtas (organic metallic complexes) were carried out and the following results were obtained by atomic absorption spectroscopy.

No. Name	Chromium (ppm)	Copper (ppm)	Zinc (ppm)
1. Emerald stone	102	65	78
2. Zamarrud kushta (Hamdard Dawakhana)	98	59	71
3. Zamarrud kushta (Qarshi Dawakhana)	101	62	75
4. Zamarrud (Ajmalji Dawakhana)	100	60	70

DISCUSSION

Modern scientific research has clearly proved through different experiments and studies that the deficiency of chromium in the human body is the real cause of diabetes². Different chromium complexes [10, 11] of inorganic origin were used for the control of this disease successfully. In the Islamic system of medicine the salts of zamarrud (kushtajat which can be called organometallic complexes) are in use for the control of diabetes [9]. Atomic absorption studies showed the presence of large amount of chromium. So on the scientific ground its effectiveness can be explained because these salts of chromium are usually in the organic nature. The maximum bioavailability is there because organic metallic⁹ compounds or complexes

have proved their maximum bioavailability to the human body.

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