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# DETERMINATION OF SOME ESSENTIAL TRACE ELEMENTS (CHROMIUM, ZINC AND SELENIUM) IN SELECTED EGYPTIAN SEEDS AND MEDICINAL PLANTS

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## ABSTRACT

There is a strong relationship between $Cr^{3+}$ , $Zn^{2+}$ and $Se^{4+}$ and insulin. These essential trace elements is well known to take part in the synthesis , secretion and activity of insulin. Some Egyptian aromatic plants are utilized as tisanes by diabetic people as medicinal plants. Their active principle is not yet known, and the importance of their $Cr^{3+}$, $Zn^{2+}$ and $Se^{4+}$ contents in the claimed therapeutic properties should not be discarded.

The purpose of this study was to determine $Cr^{3+}$, $Zn^{2+}$ and $Se^{4+}$ in some plants and herbals. $Cr^{3+}$ was determined using Graphite Atomic Absorption, Se estimation was performed using Hydrid Generation atomic, Men and Zn determination was made by Flame Atomic Absorption. Most of analyzed plants contain $Cr^{3+}$ at the normal level for this element (1.173 – 4.632 µg/g : n=16) but some plants used to prepare tisanes to alleviate diabetic conditions contained higher levels ( 8.64 -18.115 µg/g , n=4) than others (0.280 – 0.479 µg/g , n=2). Zinc was found at the normal levels (36.825 – 17.30, n=9), but some plants had higher levels (142.50 - 55.27 µg/g, n=15) than others (10.55 –9.152 µg/g , n=2). On the other hand , Se was present at a high level in most plants(1832.25-73.50, n=13 µg/kg) , but in a modest level in some plants (21.75-40.05,n=8 µg/kg) and low in others (1.75-14.75 g/kg,n=6).

***Key words:*** *chromium , medicinal plants , seeds , selenium , zinc.*

## 1. INTRODUCTION

Chromium is an essential trace element needed in very small quantities (50 – 1,000 micrograms daily , Anderson 1998) for normal health in humans.

Chromium is a vital nutrient and there is accumulating evidence linking low levels of chromium with heart disease, diabetes and possibly cancer. In 1959 , trivalent chromium was identified as the active component of the "glucose tolerance factor" ,which alleviated impaired glucose tolerance in rats fed diet inadequate in chromium. In 1960,reports indicated that $Cr^{3+}$ could help improve blood sugar control in diabetics.

$Cr^{3+}$ enhances insulin action and thus influences carbohydrate, lipid, and protein metabolism.(Althuis *et al.,* 2002; Berrio *et al.,* 1995;Abraham *et al.* 1992;Anderson *et al.,* 1991; Anderson 1993; Anderson *et al.,* 1997; and Anderson 1998).

The recommended dietary allowance (RDA) for $Cr^{3+}$ is 50 μg daily. The anti-aging dosage of $Cr^{3+}$ for older people is recommended at 200 μg daily (National Research Council,1989).

There is a strong relationship between Zinc and insulin. This essential trace element is well known to take part in the synthesis, secretion and activity of insulin (Faure *et al.,* 1992). Furthermore, zinc also mimics some actions of insulin (Shisheva *et al.,* 1992). Fredric *et al.*(1995) suggested that zinc improves glucose assimilation ,as evidenced by increase in weight , and improvement results mainly from an increase in glucose effectiveness ( Insulin-like effect) rather than an action on insulin response or insulin sensitivity.

Chen *et al.* (1998) reported that zinc supplementation alleviated the hyperglycemia of obese and obmice , which may be related to its effect on the enhancement of insulin activity.

Administration of oral and /or injectable trace elements and some antioxidants have been proposed as a therapeutic (Coppey *et al.,* 2001). Ezaki (1990) first showed the effect of sodium selenate as a potential insulinlike agent. Other studies performed by both sodium selenate 2.5- as an insulin mimetic and as an antioxidant *in vivo*, depending 4.5 mg/d) and sodium selenite 0.5 mg/d) showed that selenium also acted on its concentration and tissue (McNeill *et al.*,1991; Becker *et al.*, 1996).

The RDA of Se for men and women is 70 and 55 µg/d, respectively (National research council,1989)..

In Egypt , some medicinal seeds are consumed as tisanes by diabetic people to alleviate their health problems. In popular medicine, these plants are well known in relation to that therapeutic property , but the involved active principles are unknown. Perhaps compounds containing trace elements as Cr ,Zn and Se could be responsible for their pharmacological effect. For this purpose , some Egyptian plants commonly employed to reduce blood sugar were analyzed for these elements using atomic absorption spectrometry.

The aim of this study was to make an available database for Cr , Zn and Se in some Egyptian seeds and medicinal plants.

## 2.MATERIALS AND METHODS

### 2.1.Sample preparation

Some plants shown in Tables 2,3 and 4, were purchased from herb stores that sell them as having antidiabetic properties, but others were obtained from North Sinai. Only the parts claimed to be active were used.

The first step in sample preparation was air drying at room temperature(25°C) , followed by grinding in a porcelain vessel , avoiding contact with stainless steel to prevent contamination. The obtained powder was further dried at 105°C for 3 hrs. After cooling , 1.00 g of the material was incinerated at 500°C for 3hrs (in triplicate) in porcelain crucible . To the resulting ash, 10 ml of superpure HCl : $HNO_3$ : $H_2O$ (1:1:8) were added , and after boiling for 2 mins, the cooled solution was quantitatively transferred to a 25 ml volumetric flask to be used without further dilution. This procedure was performed according to Curtius and Campos(1982).

## 2.2.Instrumentation and analysis conditions

### 2.2.1.graphite furnace

A Perkin Elmer Atomic Absorption Spectrophotometer . model 3300 AAS equipped with Perkin Elmer graphite furnace , model HGA, a deuterium lamp background corrector, and an auto sampling system model were utilized in all determinations. As a light source , a hollow cathode lamp was utilized, and pyro/plat form tubes were used as atomizers.

The conditions for analysis of Cr were based on the instruction presented by the instrument manual. Samples 10 µL were carried to the graphite tube by the autosampling system and submitted to furnace established conditions (Table1).

**Table(1):Recommended HGA analytical conditions for chromium.**

| | | | |
|---|---|---|---|
| **Wave length** | : 357.9 | **Pretreatment (°C)** | :1650 |
| **Slit** | :0.7 | **Atomization temp(°C)** | :2500 |
| **Tube site** | :pyro/platform | | |
| **Matrix modifier** | : 0.05 mg $Mg(NO_3)$ | | |
| **Characteristic mass** (pg/0.004 As) : 3.0 | | | |

**Comments**:Diluted used to obtain data 0.2% $ANO_3$.

## 2.3.Chromium determination

Direct determination of the chromium concentration in the prepared samples was performed by comparison with aqueous standard chromium (Merck). A stock solution (100ppm) was prepared and stored in a polyethylene container. Working aqueous standards were made fresh daily by volumetric dilution of the stock solution to the desired concentration with deionized water. A calibrated curve automatically prepared between 10 and 40 ppb of $Cr^{3+}$ was obtained (r2=0.9998). $Cr^{3+}$ measurements were closer to the mean value obtained with the standard calibration curve method.(Perkin-Elmer,1982).

**2.4.Zinc determination**

Samples for zinc concentrations were determined by the method of Flame Atomic Absorption Spectrophotometry, wavelength 213.9, slit 0.7 air-acetylene oxidizing.(Perkin-Elmer,1982).

**2.5.Selenium determination**

The Se determination by Hydride Generation Atomic Absorption Spectrophotometry (HGAAS) was performed according to (Thnat and Miller 1977) for plants. Samples to be analyzed for Se should prereduced prior to analysis by adding 1:1 diluted HCl to the sample or standard solution followed by heating at 20°C for 20 mins. After prereduction , the solution may be diluted without the risk of back oxidation from $Se^{4+}$ to $Se^{6+}$ .

The element $Se^{4+}$ was also measured by using the same Atomic Absorption and with the Hydride technique involving the reaction of acidified aqueous samples with a reducing agent of sodium borohydride. The reaction was transported to a quartz cell by means of an argon carrier gas in which it was converted to gaseous metal atoms. The amount of light absorbed was then measured by using the lamps as a source of light. The conditions used for measuring Se element were as follows:

Reagents:

| | |
|---|---|
| Carrier solution : | 10% (v/v) HCl |
| Reducing agent : | 0.2% $NaBH_4$ in 0.05% NaOH |
| Sample solution : | $Se^{4+}$ in 10%(v/v) HCl. |

## 3.RESULTS AND DISCUSSION

In spite of the fact that insulin has become one of the most important therapeutic agents known to medicine, research workers again have been making efforts to find insulin substitutes from synthesis or plant sources for the treatment of diabetes. Many of them have remained as an alternative to conventional therapy in areas where insulin is not readily available (Sanchez *et al.*, 1994). Cr , Zn and Se in some plants with antidiabetic properties were measured according to the standard calibration curve methods.

Tables(2 , 3 and4) present the results for Cr and Zn contents in μg/g dry wt and Se in μg/kg, some of which are used in the herbal treatments of diabetes. The plants claimed to have hypoglycemic activity have a higher concentration (1.1-3.8 μg/g dry wt) (Valdemar,1998). *Lupinus termis* has a high value of Cr (12.83 μg/g dry wt). Glombitza *et al.*, 1994 studied the use of many plants for the treatment of diabetes mellitus *e.g. Bryonia cretica* ,Salex species , *Lupinus termis* , Fenugreek and Allium species.

Chromium and zinc contents in sage were 2.615 and 20.357 μg/g (dry wt),respectively while it was 13μg/kg in the case of selenium.

Sage may be of value to people with diabetes. Laboratory studies indicated that sage may boost insulin's action, since sage was found to boost insulin activity two-to five folds or more in patients with Type II (non-insulin dependent) ( Tyagi and Delanty,2003).

In the Egyptian folk medicine , many plants were used in the treatment of diabetes mellitus *e.g., Bryonia cretica* , *Salix* species , *Lupinus termise* , Fenugreek and Allium species. The highest value of Cr was found in *Nigella sativa* (18.918 μg/g dry wt), the concentrations of zinc and selenium in the same plant were 84.57μg/g and 10.5 μg/kg , respectively. Salem *et al.*(2004) reported that the ratio of total cholesterol/HDL-cholestrol highly significantly decreased in hypercholestrolemic rats by giving *Nigella sativa* diets, which proved the beneficial effect of these diets as hypercholestrolemic agents.In addition, Salem *et al.*,(2004) indicated that hypercholestrolemic diet induced significant increase in liver enzymes activities(ALT , AST , GCT, LDH and alkaline phosphates AlP). *Nigella sativa* at different levels significantly ($p<0.01$) decreased ALT , AST GCT, LDH and the levels of alkaline phosphatase activity. Shils and Shike(1994) found that $Cr^{3+}$ is either involved with binding of insulin to its receptors or with chromium facilitates insulin binding and subsequent uptake of glucose into the cell. Supplemented $Cr^{3+}$ has been shown to decrease fasting glucose level, improve glucose tolerance, and decrease total cholesterol and triglycerides while increasing HDL-cholesterol in normal,elderly and type2 diabetic subject( Mooradian *et al.*,1994 and Baker 1996).

**Table(2): Chromium concentration in the studied samples.**

| Common name | Arabic(local)name | Latin name | Cr ( µg/g) ± SD(n=3) |
|---|---|---|---|
| Lavender cotton(flower) | El-Qaissom | *Achillea fragrant* | 18.061±0.158 |
| vender cotton(whole seed) | El-Qaissom | *Achillea fragrant* | 2.94±0.032 |
| Thymifolius | Qussaib El-raal | *Fumana thymifolia* | 1.473±0.023 |
| Rose of Jericho | Kaff Mariam | *Anastatica hierochuntica* | 1.865± 0.055 |
| ınd wormwood (flower) | Al-Ader | *Artemisia monosperma* | 1.606±0.007 |
| ınd wormwood .(whole seed) | Al-Ader | *Artemisia monosperma* | 2.33 ±0.011 |
| Juniper | Al-Arar | *Juniperus phoenicea* | 2.26±0.026 |
| Rocket(seeds) | Gargeer | *Eruca vesicaria sativa* | 3.123±0.38 |
| Harmeli | Harmal | *Pegnum harmola* | 0.280±0.141 |
| Wild thyme | Zaatar Barri | *Thymus syriacum* | 1.768±0.078 |
| Black cumin | Habbet Al-Barakah | *Nigella sativa* | 18.918±0.098 |
| Nettle | Aras | *Urtica dioica* | 4.632±0.228 |
| Lupine | Termis | *Lupinus digitatus* | 12.83±0.365 |
| ajoram or sweet majoram | Bardakosh | *Majoran hortenis* | 8.699±0.309 |
| ankincense or Olibanum | Leban dakar | *Boswelia Carterii* | 0.479±0.028 |
| Fenugreek | Helba | *Trigonella foenum* | 2.497±0.188 |
| Wormwood | Damseesah | *Artemisia anomala* | 2.134±0.119 |
| Aloes | Sabbar | *Aloe spp.* | 13.949±0.118 |
| Myrrh | Morr | *Commiphora myrrha* | 2.615±0.110 |
| Morning-glory | Hantit | *Ipomoea spp.* | 1.165±0.095 |
| Saga or garden sage | Marmariah | *Salvia officinalis* | 1.353±0.013 |
| Turmeric | Korkom | *Curcuma domestica* | 1.1655±0.095 |
| Chick pea(cooking) | Hommos Tabkh | *Cicer arietinum , spp asiaticum* | 2.94±0.032 |
| Chick pea(sweets) | Hommos Halawiat | *Cicer arietimum , spp* arientale | 18.155±0.095 |
| Barley | Shaeir | *Hordeum vulgare* | 4.555±0.058 |

**Table(3): Selenium concentration in the studied samples.**

| Common name | Arabic(local)name | Latin name | Se ( μg/kg) ± SD(n=3) |
|---|---|---|---|
| Lavender cotton(flower) | El-Qaissom | *Achillea fragrant* | 40.50±.0114 |
| Lavender cotton(whole seed) | El-Qaissom | *Achillea fragrant* | 39.75±0.122 |
| Thymifolius | Qussaib El-raal | *Fumana thymifolia* | 106.00±0.58 |
| Rose of Jericho | Kaff Mariam | *Anastatica hierochuntica* | 215.00±0.114 |
| Sand wormwood (flower) | Al-Ader | *Artemisia monosperma* | 31.5±0.029 |
| Sand wormwood .(whole seed) | Al-Ader | *Artemisia monosperma* | 84.50±0.154 |
| Juniper | Al-Arar | *Juniperus phoenicea* | 24.25±.0.26 |
| Rocket(seeds) | Gargeer | *Eruca vesicaria sativa* | 1832.25±0.151 |
| Harmeli | Harmal | *Pegnum harmola* | 115.625±0.024 |
| Wild thyme | Zaatar Barri | *Thymus syriacum* | 77.75±0.068 |
| Black cumin | Habbet Al-Barakah | *Nigella sativa* | 10.5±0.045 |
| Nettle | Aras | *Urtica dioica* | 73.50±0.138 |
| Lupine | Termis | *Lupinus digitatus* | 200.25±0.119 |
| Majoram or sweet majoram | Bardakosh | *Majoran hortenis* | 28.75±0.045 |
| Frankincense or Olibanum | Leban dakar | *Boswelia Carterii* | 14.47±0.026 |
| Fenugreek | Helba | *Trigonella foenum* | 24.25±0.34 |
| Wormwood | Damseesah | *Artemisia anomala* | 231.255±0.013 |
| Aloes | Sabbar | *Aloe spp.* | 1.75±0.19 |
| Myrrh | Morr | *Commiphora myrrha* | 9.50±0.016 |
| Morning-glory | Hantit | *Ipomoea spp.* | 219.25±0.0106 |
| Saga or garden sage | Marmariah | *Salvia officinalis* | 13.00±0.026 |
| Turmeric | Korkom | *Curcuma domestica* | 34.75±0.064 |
| Chick pea(cooking) | Hommos Tabkh | *Cicer arietinum , spp asiaticum* | 465.25±0.101 |
| Chick pea(sweets) | Hommos Halawiat | *Cicer arietinum , spp arientale* | 14.25±0.013 |
| Barley | Shaeir | *Hordeum vulgare* | 211.75±0.632 |

**Table(4): Zinc concentration in the studied plants.**

| Common name | Arabic(local)name | Latin name | Zn( µg/g) ± SD(n=3) |
|---|---|---|---|
| Lavender cotton(flower) | El-Qaissom | *Achillea fragrant* | 77.007±0.032 |
| Lavender cotton(whole seed) | El-Qaissom | *Achillea fragrant* | 33.57±0.008 |
| Thymifolus | Qussaib El-raal | *Fumana thymifolia* | 55.257±0.0585 |
| Rose of Jericho | Kaff Mariam | *Anastatica hierochuntica* | 21.525±0.0112 |
| Sand wormwood (flower) | Al-Ader | *Artemisia monosperma* | 124.50±0.0031 |
| Sand wormwood .(whole seed) | Al-Ader | *Artemisia monosperma* | 33.225±0.0026 |
| Juniper | Al-Arar | *Juniperus phoenicea* | 20.650±0.058 |
| Rocket(seeds) | Gargeer | *Eruca vesicaria sativa* | 88.00±0.0028 |
| Harmeli | Harmal | *Pegnum harmola* | 40.525±0.057 |
| Wild thyme | Zaatar Barri | *Thymus syriacum* | 35.15±0.0116 |
| Black cumin | Habbet Al-Barakah | *Nigella sativa* | 84.75±0.0016 |
| Nettle | Aras | *Urtica dioica* | 66.25±0.292 |
| Lupine | Termis | *Lupinus digitatus* | 57.800±0.0425 |
| Majoram or sweet majoram | Bardakosh | *Majoran hortenis* | 105.357±0.0077 |
| Frankincense or Olibanum | Leban dakar | *Boswelia Carterii* | 10.55±0.0064 |
| Fenugreek | Helba | *Trigonella foemum* | 65.35±0.0403 |
| Wormwood | Damseesah | *Artemisia anomala* | 74.20±0.0661 |
| Aloes | Sabbar | *Aloe spp.* | 26.125±0.004 |
| Myrrh | Morr | *Commiphora myrrha* | 9.125±0.041 |
| Morning-glory | Hantit | *Ipomoea spp.* | 17.30±0.034 |
| Saga or garden sage | Marmariah | *Salvia officinalis* | 20.357±0.0083 |
| Turmeric | Korkom | *Curcuma domestica* | 17.30±0.344 |
| Chick pea(cooking) | Hommos Tabkh | *Cicer arietinum , spp asiaticum* | 60.625±0.045 |
| Chick pea(sweets) | Hommos Halawiat | *Cicer arietinum , spp arientale* | 56.20±0.0809 |
| Barley | Shaeir | *Hordeum vulgare* | 36.825±0.0101 |

Experts recommended a higher dosage (400 - 1000 µg/day) for men and for people desiring to reduce high cholesterol and triglycerides, improve glucose tolerance , boost immune system functioning , thwart heart disease and cancer(Vincent,2000). It is virtually impossible to get adequate daily Cr3+ from the average normal diet (Vincent, 2000).

Chromium has a very low toxicity level without side effects at normal doses (Sutherland *et al.*,2000). According to experts (Vincent, 2000), a person could even take three hundred times the ecommended dose of 2000 micrograms without "getting in trouble". However, excessively high doses of chromium do bio-accumulate in liver and kidneys over time but high doses are unnecessary. The anti-aging dose of 200 µg daily is considered to be perfectly safe and effective according to experts(Anderson,1998). The two stable valence states of Cr found in biological systems, hexavalent $Cr^{6+}$ is much more toxic than trivalent $Cr^{3+}$ (Sutherland *et al.*,2000).

From Tables (2,3 and 4), it could be noted that $Cr^{3+}$ in chick pea (cooking type) (18.155 µg/g) is higher than chick pea (sweet type)(1.353 µg/g) .That was on contrast to the concentrations of Se in the two plants since it was higher 33 folds in the case of chick pea (cooking type) when compared to chick pea (sweets type). Zinc in both types of chick pea was almost of the same concentrations.

Abdel-Rahim *et al.* (2004) suggested that supplementation with raw chick pea seed meal (var G35), raw or soaked, decreased either glucose or cholesterol in plasma. Also , the authors concluded that chick pea could be used at about 100g/day to regulate the blood glucose of diabetic patients.

The values of Cr ,Zn and Se for turmeric were 1.165 ,17.30 µg/g. and 34.075µg/kg . Lucy Dey *et al.*(2002) found that Cr content of turmeric species had a beneficial effects to decrease fasting glucose levels, improved glucose tolerance and lowered insulin levels. Shallan *et al.*(2004) concluded that biscuits made using the powder of turmeric exhibited significant hypoglycemia as serum glucose or hypocholestrolemic activity agent. Some plants are used in the herbal treatment of diabetes. The values of Cr in herb *Juniperus phoenicea* is 2.26 µg/g. Asad *et al.* (2002) suggested that the best result in blood glucose, AST , ALT and lipids pattern were shown in

5% level of *Juniperus phoenicea* dry plant supplementation when compared with diabetic control. The value of Cr in *Fumana thymifolia* is (1.47 µg/g). Regarding the Recommended Dietary Allowances (RDA), zinc and selenium contents in *Fumana thymifolia* were found to be of sufficient levels. The results obtained by Asad *et al.*,(2001) showed that the optimum level of *Fumana thymifolia* plant that can be used was 6% supplementation significantly decrease the weight gain ,blood glucose , lipid pattern and transaminase activities compared to correspond control. *Artimisia monosperma* Cr values was (1.606 µg/g). Asad *et al.*,(2003) showed that the optimum level of the dried plant can be used at 7.5%. This level decreased the weight gain , blood glucose , urea serum , uric acid , total lipids , total cholesterol , triglycerides . ALT and AST. Also barley contains high values of Cr , Zn and Selenium. In Iraq,for example, bread from barley flour is traditionally used in the management of diabetes mellitus , and the flour was postulated to explain its beneficial effect (Mahdi and Naismith,1991).

The Cr and Zinc contents of *Anastacia hierochuntica* plant were of adequate levels but it was higher in the case of selenium. The highest level of *Anastacia hierochuntica* (dry plant) that can be used was 8% concerning consumer acceptability. Also improved increase the weight gain while the blood glucose , GOT,GPT and lipids pattern were decreased when compared with positive control.(Asad *et al.*, 1999).

Some plants not claimed to have medicinal properties , which have lower values of the metal, may also be active if Cr is also involved with adequate ligands to be well absorbed and used by the organism.

Failla and Gardll (1985) and Lau and Failla (1984)findings support the notion that in the diabetic state , the alterations in trace metal metabolism and concentration resulted mainly from the lack of insulin. Endocrine imbalance , mainly hypoinsulinemia causing an elevation of metallotheioneion, is thought to be a major contributor to the alterations of trace metal metabolism and concentration in chemical induced diabetic rats.

**Additionally, Tables (3) and (4) reveal the concentration of Zn and Se.**

Brun *et al.* (1995) suggested that 20 mg zinc gluconat as zinc load, at physiological doses, improve glucose-induced glucose disposal, and thus improves intravenous glucose tolerance. This effect colud be related to the insulinl-ike effects of this metal, which have been reported at higher superphysiological doses in animals.

Chen *et al.* (1998) concluded that Zn supplementation alleviated the hyperglycemia of ob/ob mice, which may be related to its effect on the enhancement of insulin activity. Craft and Failla (1983) reported that the metabolism of trace elements *e.g.*, Zn and Cr in diabetic rats suggested that similar abnormalities also exist for Zn. Additionally, it was shown that the increased urinary Zn excretion in the insulin-dependant rats could be reversed by the administration of insulin (Failla &Gardll, 1985 and Lau & Failla (1984).

Selenium contents of individual foods vary widely and are dependant on the introduction of that metal in the growing, transport, processing, and fortification of the food. Berkenboom *et al.* (1997) have shown that oral administration of sodium selenite is able to prevent cyclosporine-A-induced vascular toxicity. Ayaz *et al.* (2002) suggested that sodium selenite treatment may alleviate late diabetic complications when it is used under controlled conditions.

In conclusion, these results suggested that the Egyptian plants used as active agents to alleviate diabetes may have such activity owing to their high levels of Cr, Zn and Se. which should be in complex form with organic compounds to have the best therapeutic effect.

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# تقدير بعض العناصر الضئيلة الأساسية (الكروميوم و الزنك و السلينيوم) فى بعض البذور و النباتات الطبية المصرية

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## ملخص

توجد علاقة قوية بين الكروميـــوم و الزنـــك و الســلينيوم و هرمـــون الانسولين ، حيث وجد ان هذه العناصر لها دور فى عمليـــات تخليـــق و إفـــراز وكذلك نشاط هرمون الأنسولين. يستخدم الكثير من مرضى السكر بعـــض هـــذه النباتات والبذور كنباتات طبية. و على الرغم من ان الدور الحيوى لهذه النباتـــات ليس معروفا بعد على وجه الدقة إلا ان محتوى هذه النباتات من الكروم و الزنك و السلينيوم هو من الموضوعات الجديرة بالدراسة.

تهدف هذه الدراسة لتقدير محتوى بعض النباتات و الأعشاب المصريـــة من هذه العناصر الثلاثة حيث تم تقدير هذه العناصر باستخدام جهاز الامتصاص الذرى.

أوضحت النتائج ان معظم النباتات و الأعشاب المختـــبرة احتـــوت علـــى مستويات مناسبة من عنصر الكروميوم (١,١٧٣-٤,٦٣٢ ميكروجرام/جم) بينمـــا احتوت باقى النباتات المستخدمة فى علاج مرضى السكر على نسب أعلى من هذا العنصر(٨,٦٤- ١٨,١١٥ ميكروجرام/جم) مقارنـــة بغيرهـــا (٠,٢٨٠-٠.٤٧٩ ميكروجرام/جم).

و بالنسبة للزنك فقد وجد فى مستويات كافية فى معظم النباتات و لكنه وجد ايضا ان بعض النباتات تحتوى علـــى نســـب أعلـــى منـــه (٥٥,٢٧-١٤٢,٥٠ ميكروجرام/جم) مقارنة بالبعض الآخر (٩,١٥٢- ١٠,٥٥ ميكروجرام/جم. (أما عنصر السلينيوم فقد وجد بنسب عاليـــة فـــى معظـــم النباتـــات تـــتراوح بيـــن ١.٧٥و١٤,٧٥ ميكروجرام/كجم.

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