Blood Selenium level in Basrah Hypertensive Patients

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Abstract

Blood selenium levels of (n = 39) hypertensive patients were determined by hydride generation flame atomic absorption spectrometry. The results compared to levels of healthy people in Basrah city (n =59). Mean value for 22 hypertensive female (63.82 ± 4.50 ng/ml) and (64.08± 5.82 ng/ml) for 17 hypertensive male were found. The mean value for healthy women found to be (82.30 ±2.87 ng/ ml) (n=28) and for healthy men (94.71± 4.86ng/ml) (n = 31). Significantly lower values were observed in the patient group (p= 0.0004) for men and (p = 0.001٤) for women. The result show no significant variation in the selenium levels due to sex in patient (p= 0.97) but there is an significant differences due to sex in healthy people (p = 0.033) Blood selenium levels of healthy people were similar to those found for other countries (Bratakos etal. 1990).

نسبة السلينوم بالدم لمرضى ضغط الدم العالي

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الخلاصة

تم تقدير تركيز عنصر السلينيوم في الدم للاشخاص المصابين بارتفاع ضغط الدم في مدينة البصرة بتقنية الامتصاص الذري اللهبي – تكوين الهايدرايد وقورنت النتائج مع اشخاص اصحاء وكان معدل قيمة التركيز للاشخاص المصابين من الاناث هو (63.82± 4.50 ng/ml) وللذكور n = 17 (64.08±5.82 ng/ml) بينما كان معدل التراكيز للاصحاء من الاناث n=28 هو (82.30±2.87 ng/ml) وللذكور n = 31 هو (94.71±4.86 ng/ml) كما اظهرت النتائج وجود فروقات معنوية للاشخاص المصابين مقارنة بالاصحاء ولم تظهر النتائج فروقات معنوية بالنسبة للجنس.

Introduction

There has been increased interest in selenium since the discovery that selenium is an essential element and plays a role in glutathione peroxidase activity(Chen and Lin ,2000) Selenium has been demostrated in type (I) iodothyronine 5'- deiodinase activity which is involved in thyroid hormone metabolism(Arthur and Bekett,1990) in less than 40 years, selenium has gone from being a feared toxin to an essential nutrient and a potential anticarcinogenic agent(Geranld and Combs,1997).

A deficient selenium status has been associated with the occurrence of several human diseases(Lockitch and Crit.1989).In addition there is growing evidence that low selenium status is related to an increased risk of developing Cancer (Ratnasinghe etal. ,2000,Mannistro etal.,2000)

The possible role of selenium in several diseases such as antherosclerosis, cardiomyopathies, cancer and rheumatoid arthristis, among others, has been reviewed by Neve(Neve ,1991).

In most studies the human selenium status has been assessed by measuring selenium in serum(Kuroda etal., 1988). plasma(Vanlente and Daher,1992) or whole blood(Thomson and Robinson 1980). Most of the papers deal with plasma selenium levels. No difference was made between serum and plasma (Krsnjavi etal ., 1992). Further the activity of the whole Blood can be used for evaluation of selenium status due to the longlif–span of red Blood cells (Vanlente and Daher ,1992)therefore, whole blood selenium values may be more instructive for interpeting selenium status as an indicator of long – term exposure (Thomson etal. ,1988)

Since no values on selenium levels in hypertension were found in Basrah city, the aim of this study is to determine the selenium concentation level in the people suffuring from this disease.The disease was dentify by medicinal investigation.

Materials and Methods

Sample collection (n = 39) hypertensive patients age (40-60)years in the period (2 – 10) years were sampled in Basrah city (22 women and 17

men). (n = 59) (28 women and 31 men) apparently healthy individuals residing in the same area acted as control group. Collection of the blood samples was carried in 10 ml polystyrene vials containg anticoagulant (K – EDTA) and stored in refegerater and frozen at – 20C^0 until analysis. Blood selenium concentration were determind by hydride generation flame atomic absorption spectrometry.

Reagents

All reagents were of analytical grade- selenium oxide standard solution (1000 ppm) was obtained from Fluka. Standard solution of selenium (selenium concentration in the assay (10, 20 40, 60 , 80 , 100 ng) were prepared daily from 1 ppm stock solution. Hydrochloric acid 37.5 % from Ajax, Nitric acid 37% from Fluka. All glassware socked overnight in (30% v/v) nitric acid, thoroughly rinsed with water and dried. (2% w/v) sodium borohydride (high purity grade from Fluka) were prepared daily. Deionized water were used in the preparation.

Apparatus

In recent years, there has been a growing interest in the techinque of hydride generation for the determination of selenium and a few other elements in various materials Hydride generation FAAS technique use for selenium are more sensitive by three order of magnitude than nebulization FAAS. An additional advantage is that selenium is separated from the matrix before atomization, thus avoiding the interferences that occur when the conventional techniques are used. In our study Ashimadzo model AA-630 – 12 atomic a bsorption spectrometer with air acetylene burner was used with selenium hollow cathod lamp (pye Unicam Ltd). The generated H2Se was transported into aheated quartz tube adjusted to atomic absorption spectrometer by nitrogen (3L. min^{-1}) carrier gas for atomization and the determination of selenium was performed using a wave length of 196.1 nm.

Analytical Procedure

The digestion procedure was carried out by adding concentration nitric acid (1 ml per 0.5 ml of blood sample). The solution was heated at 70 oc for 2hrs. and then at 100 co for 3hrs. with stirring until the fumes of

nitrric acid was disappeared. After cooling to room temperature the sample was transfer to 5ml volumetric flask and diluted by 1.5M hydrochloric acid. The solution was transfer to test tube and heated for 30min at 70co to reduce all selenium to the quadrivalent state. 0.5 ml of the solution was injected to 10ml reaction cell and 0.5 ml of 2% sodium borohydride solution was added to reduce the tetravalent selenium to H_2Se. As calibration the direct and standard addition methods were used (0, 100, 200, 300, ng/ml) of standard selenium was added to 0.5ml sample. The detection limit (selenium concentration corresponding to two – times the standard deviation of twenty blanks) was 1.36 ng/ml the precision of the mehtod was estimated from analysis of 10 consecutiue measurements. The results expressed as arelative standard deviation (RSD%) = 7.3. The linearity of response was varified by using standards ranging from (1-1000 ng/ml) and the sensitivity = 0.045 ng/ml. The percent recovery was found to be 82.7 – 106.0 by adding (25, 50, 75 ng) of selenium standard to the treated sample.

Statistics

Statistical analysis of differences between group means was performed using ANOVA test. The level of significance was set at

$P < 0.05$ in all cases.

Results and Discussion

Fig (1) show the standard curve, the selenium concentration levels in whole blood from apparently healthy people are presented in table (1) and fig(2). The mean value for men (94.71 ± 4.86) ng/ml, (n=31) was higher than the mean value found for women (82.30 ± 2.87)ng/ml (n=28) this trend was statisicaly significant (p=0.033) which was similar to that found by others(Akesson et al.,1991)Whether there is a sex difference in blood selenium levels remains controvesial, although most authors have found no significant variations in the selenium levels due to sex, as is extensively discussed (Robbererchт and Deelstra ,1994).

Comparison of healthy group and subjects dealing with hypertension conditions revealed that there are statistically significant.

Differences are significantly lower between hypertension and healthy males (p=0.0004) and between hypertension and healthy females (p = 0.0018).

The result also show no statistically significant in the comparison between the hypertensive male and hypertensive female (p =0.97) as shown in (table 1).

As a whole the healthy population (males and females) reveals statistically significant higher blood selenium compared to all hypertensive patients.

The values for selenium concentration in healthy people are in of values found by other authors.

The range scarce literature data on blood selenium levels are summarized in table (2)

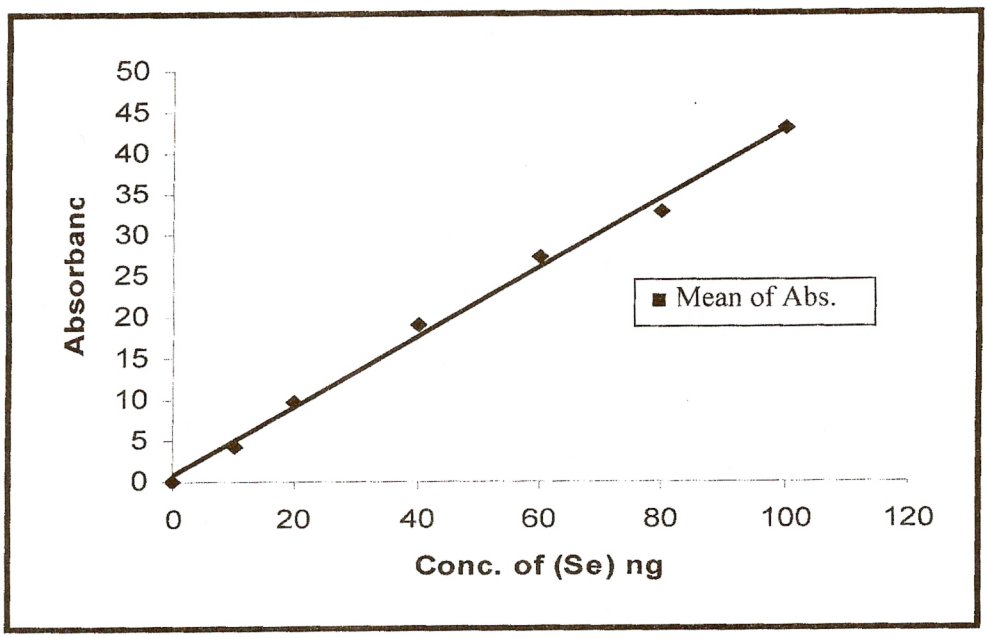
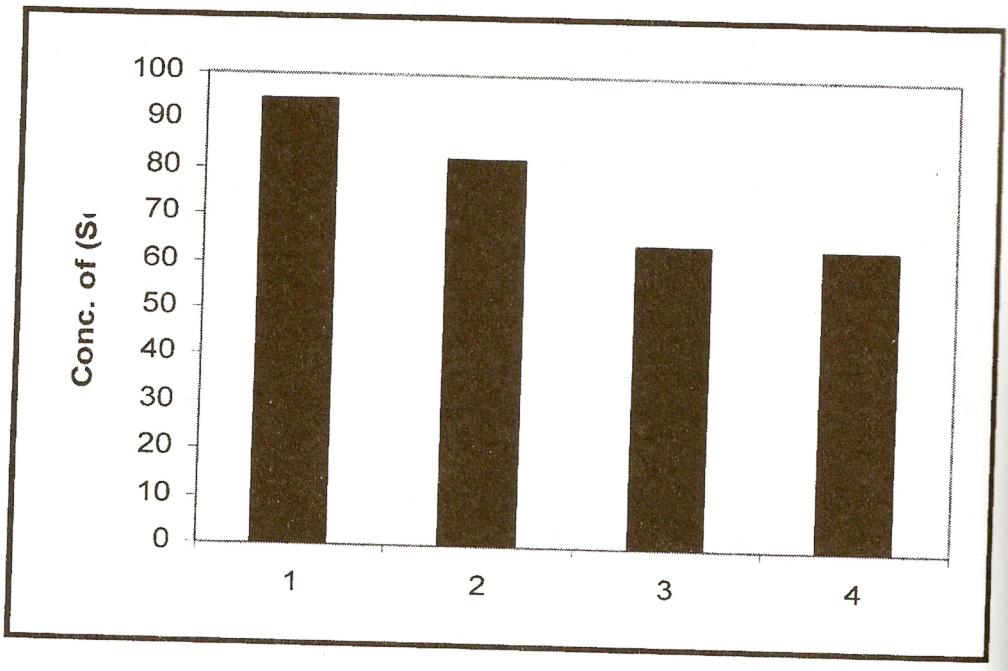


Fig.(1) Standard curve for Selenium.



1= healthy males 2= healthy females 3= patient males 4= patient females

Fig.(2) The Selenium concentration level (ng/ml) in whole blood for healthy and patients (Both sex)

Table (1) Blood selenium levels (ng/ml) in Sample Studied.

Group	N	$\bar{X} \pm SD$	Range
Patients			
Males	17	64.08 ± 5.82	46.6 – 93.0
Females	22	63.82 ± 4.50	46.6 – 93.0
Total	39		
Healthy (controls)			
Males	31	94.71± 4.86	53.0 – 140.0
Females	28	82.30 ± 2.87	70.0 – 112.
Total	59		

SD = Standard deviation

$\bar{X}$ = mean value (ng/ml)

Table (2) Literature data on blood selenium levels (ng/ml)

N	Sex	Selenium concentration X ±SD	Characteristics	References
18	-	99.0 ± 26.9	Whole blood	Bratakos etal.,1990
48	M + F	178 ± 14	Whole blood	Bratakos etal.,1990
93	F	81 ± 12	Serum	Overad etal., 1991
15	M	102 ± 4.7	Serum	Cirelli etal., 1991
35	M	90 ± 9.9	Serum	Delibasi etal., 1992
16	-	94	Plasma	Iain etal.,1996
16	-	84	Plasma	Iain etal.,1996
5	-	73	Serum	Iain etal.,1996
5	-	76	Serum	Iain etal.,1996
101	M	70.7 ± 16.2	Serum	Van Cauwenbergh etal.,1994
	F	64.9 ± 14.7	Serum	Van Cauwenbergh etal.,1994

Conclusion

The blood selenium values of patient suffuring from hypertension lower than the blood selenium levels in healthy people. As far as could be traced, for the first time blood selenium levels for hypertensive patients have been established and proven to be lower than those obtained for a healthy control group.

The reason for this observed results remain to be elucidted. No effect of sex was observed, as also the most dominant trend in literature (Cirelli etal. ,1991)

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