

SELENIUM PLASMA LEVELS IN A HEALTHY POPULATION IN ALGERIA.

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Abstract

Selenium, a micronutrient, is a trace element and a cofactor required to maintain glutathione peroxidase activity. Its deficiency can induce modification in the cellular antioxidative states and the appearance of some diseases. Until now no research was carried out on this element in Algeria. The selenium plasma content of 266 algerian healthy inhabitants from Souk Ahras city had been determined using Zeeman-effect corrected atomic absorption spectrometry. The selenium concentration (mean \pm standard deviation) found in this population is (83,89 \pm 21,61 $\mu\text{g/l}$). The mean value for 130 men (85,75 \pm 22,26 $\mu\text{g/l}$) tended to be higher than women (82,08 \pm 20,82 $\mu\text{g/l}$) but not statistically significant ($P = 0,166$). Whereas, when subjects were divided into various age groups we have noted that there is a different plasma selenium values. The statistical analyses revealed that there is no significant difference ($P = 0,302$ and $P = 0,054$) between males and females since the birth to thirty year. However there is a significant difference ($P = 0,035$ and $P = 0,011$) from thirty to fifty year. On the other hand, the difference is highly significant ($P = 0,006$) from ten to twenty year and very highly significant ($P = 0,000$) beyond fifty year. The selenium rates increase from childhood until 50 years and decrease afterwards. We have also noticed that there is a significant difference between women before and after menopause ($P = 0,005$).

key words: Selenium; plasma; selenium determination; human nutrition; atomic absorption graphite furnace; Algeria.

INTRODUCTION

In recent years selenium has become an increasingly important object of study, due to its ambivalent character as a toxic element which is also essential to the human organism [Salonen 1986, Virtamo and all 1985]. Initially, the biological effects of selenium in both animals and humans were only considered as regards toxicity, which

becomes apparent when the intake of the element exceeds the organism's capacity to eliminate it. Acute intoxication causes damage to the central nervous system and chronic intoxication by inhalation has recently been shown to cause fetotoxicity and teratogenesis in humans [Bunker 1992].

On the other hand, selenium intake is fundamental in the daily diet and varies greatly [Virtamo and all 1985, Zhang 1989, Behne and all 1990, Berry and all 1991]. Epidemiological studies have shown a possible correlation between the origin and incidence of different types of cancer, cardiovascular sclerosis, hepatic cirrhosis and cretinism in populations from areas with low environmental availability of selenium [Magos L and all 1980, Willett and all 1983, Helzlsouer KJ and all 1989, Taskinen E. and all 1988, Korpela H and all 1989, Korpela H 1993, Food and Nutritional Board 1989, 1980]. Mortality has also been observed to be lower in areas with a high concentration of selenium in soils, as long as it stays below toxic levels [Rea HM and all 1980]. Because it overlaps with vitamin E [Jiang HF 1989], selenium has recently been recognised as essential to the human diet. We know that selenium acts as a cofactor in the glutathione peroxidase of cell membranes and this is important in cellular deintoxication of peroxides and free radicals [Virtamo and all 1985, Verlinden M 1983].

The aim of our study was to evaluate the plasma Selenium levels in healthy individuals living in the province at the east of Algeria (Souk Ahras) and to know if the population of this area is overdrawn or not out of this element; especially that no studies were realized in Algeria until now.

MATERIALS AND METHODS

Study design

A cross-sectional survey was conducted during the year 2008-2009 to measure selenium in serum samples of 267 individuals ranging in age from 6

days to 70 years in Souk Ahras district due to various mild health problems.

Sample collection

Determination of selenium The samples of plasma (300 µl) are added to (900µl) the mixed matrix modifier (copper acetate, silver nitrate, triton × 100 nitric acid and milli-Q water). The selenium levels were determined by graphite furnace atomic absorption spectroscopy with Zeeman background correction (Perkin Elmer 3030)[20].

Statistical analysis

The data were expressed as mean ± SD and were subjected to statistical evaluation, using student t-test. Statically significance was set on P < 0,05 .

RESULTS

Our study carried out on 266 healthy individuals resident in Souk-Ahras (Algeria) from birth trough adolescence to old age revealed that the mean and the standard deviation of selenium levels in plasma is 83,89 ± 21,61 µg/l (e.G., Fig. 1).

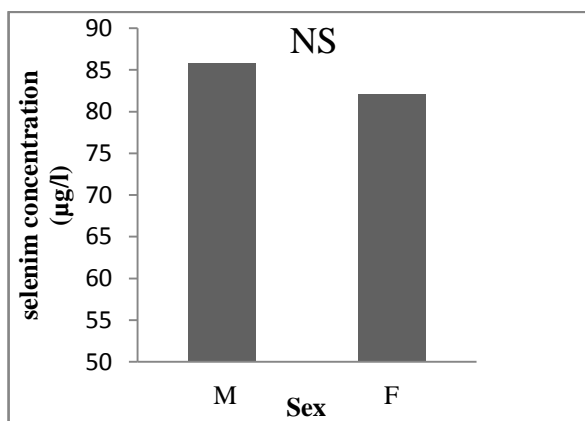


Figure .1: Plasma selenium levels and sex.

Our results show that the plasma selenium levels in women are lower than in men. The mean (e.g., Fig. 1).

Selenium and age groups

The statistical analyses showed that there is no significant difference (P = 0,302 and P = 0,054) between the males and the females concerning the first and the third age groups ([0 – 10[and [20 - 30[).

However, there is a significant difference (P = 0,035 and P = 0,011) for the fourth and the fifth age groups ([30 - 40[and [40 - 50[).

On the other hand, the difference is highly significant (P = 0,006) for the second group ([10 – 20[) and very highly significant (P = 0,000 and P = 0,000) within the sixth and seventh age groups ([50

Venous blood sample (10 ml) was drawn from each participant into tubes with no anticoagulant and centrifuged. The serum was separated and stored at -18°C.

- 60[and [60 - 70[) (e.g., Fig. 2). We also note that the comparison of age-groups revealed differences in plasma selenium values.

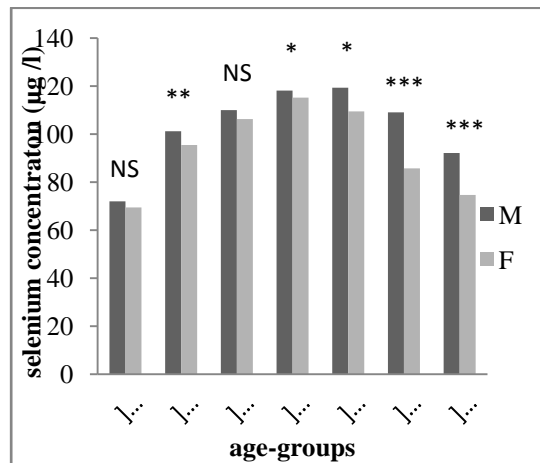


Figure .2: Plasma selenium levels and age groups.

NS= Not significant;

M= Male; F= females

Women in postmenopausal and premenopausal

We noticed that there is a statistically significant difference (P = 0,005) between women in postmenopausal and premenopausal (e.g., Fig. 3).

We also noticed that the selenium rate for women before menopause is lower than that for women after menopause

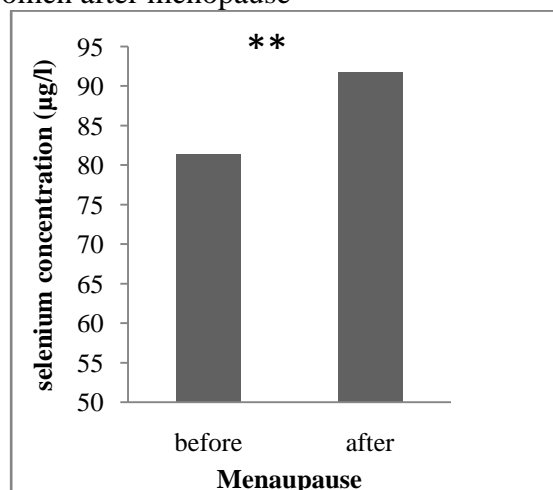


Figure .3: Plasma selenium concentration for women before and after menopause.

CONCLUSION

Our selenium values for healthy population of Souk-Ahras are higher than those reported in some literature [B. Tiran 1992] for Austrian population, [F. Dubois. 1990] for French but lower than Norway [HM. Meltzer; 1992] and Russia [J. Nève. 1991]. No person had plasma selenium values lower than 59,22µg / l, the level considered to reflect inadequate selenium status [RA. Riemersma. 1990]. However all women and men had a plasma selenium concentration below 98,7µg / l which considered to be required for optimal glutathione peroxidase activity [MP. Rayman. 1997, Nève J. 2000] this confirmed that the population of Souk-Ahras selenium intakes are lower than those necessary for optimal health [CD. Thomson. 2004.].

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