

## IODINE IN URINE OF PREGNANT WOMEN AFTER AUGMENTATION OF IODINE IN SALT IN MACEDONIA

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**Abstract:** The iodination of salt with 20–30 mgr iodine /Kg NaCl substantially raised the level of iodine in the urine of pregnant women from a total of 6.9 (median value in 1994) to 12.77 microg iodine/dl (median value). The iodine metabolism in Macedonia is dependent on salt iodination.

**Key words:** iodine in pregnancy.

Iodization of salt in Macedonia is compulsory since 1956 when a federal law was introduced in former Yugoslavia. All salt in Yugoslavia was iodized in the salt production places: the Adriatic coast of Montenegro and Croatia, the salt mines in Tuzla. This obligatory iodization with a content of 10 mgr KI/Kg NaCl reduced the occurrence of goitre. In Macedonia the incidence of goitre was high (50–60%), the iodization of salt reduced the goitre index in schoolchildren to 8–9% (Dolgeva *et al.* 1) measured in 1974, another parameter at that time was the uptake rate of over 40% in the thyroid gland measured with <sup>131</sup>I, this result was brought to the Yugoslav Congress for Nutrition held in Ohrid (Macedonia, 1974). The amount of iodine in salt did not eradicate goitre completely, and many discussions were started. The recent increase of iodine in salt in Austria and Switzerland in the eighties gave an impetus to Macedonia to raise the iodization

of salt. MANU formed a special board with the representation of all the Yugoslav republics, but the political situation and the wars in Slovenia, Bosnia and Hercegovina, Croatia and Kosovo impeded the intention of passing a new federal law. Some of the former republics of Yugoslavia raised the iodine content to 20–30 mgr I/Kg NaCl. The iodine content in Macedonia was raised in October 1999 by the Ministry of Health to 20–30 mgr iodine (as iodate) in 1 Kg of salt. This regulation is obligatory for total import of salt for human and animal consumption. The next table presents data about the current status of iodine in salt.

Investigated samples of salt in 2000 (Veterinary Institute, Skopje, Macedonia,

Origin	less than 10 mgr/Kg I(KIO <sub>3</sub> )	10–20 mgr/Kg I(KIO <sub>3</sub> )	20–30 mgr/Kg I(KIO <sub>3</sub> )	over 30 mgr I(KIO <sub>3</sub> )
Bosnia & Hercegovina	1	2	90	2
Austria	/	/	6	3
Greece	3	13	109	15
FRYugoslavia	1	2	13	1
Bulgaria	/	/	13	4

In order to examine the actual state of iodine deficiency, we estimated iodine excretion in urine of pregnant women in the ninth month of pregnancy hospitalized in the clinics for delivery. Both clinics were investigated 7 years earlier (in 1994) (2). In 1994 pregnant women had less than 10 microg iodine in urine. At that time the iodine content of salt was 10 mgr/KJ/Kg NaCl. The decree of the Ministry of Health was over 1 year before the present investigation.

### *Material and methods*

#### *Subjects*

All women (397) were primiparae or multiparae, in age from 18–38 years, healthy, coming to the department for delivery. The urine was sampled in the laboratory immediately before hospitalization.

Urine samples were collected in the morning in plastic beakers, then the urine was transferred to new plastic tubes (3–5 ml). Until the dosage was performed at the Faculty of Natural Sciences of the Ss. Ciril and Methodius University in Skopje, the probes were kept at 4°C in the cold room. The number of pregnant women was 123, and the previous group which was investigated in 1994 (7 years earlier) were from the same department. Thus we have the present group of

pregnant women on a salt diet of 20–30 mgr iodine per Kg salt, and the previous group of 274 pregnant women with iodine in the salt of 10 mgr KJ/Kg NaCl (2).

### Methods

The urinary iodine concentration was measured by the ceric iodine arsenic acid wet ash technique based on the Sandell-Kolthoff reaction modified by Waeschnik O. and Eber O. *et al.* (3)

Statistical methods employed average value (SV), standard deviation (SD), median value of iodine excretion in urine.

### Results

They were no differences in goitre and urine iodine excretion in the investigated groups. In table 1 and table 2 are shown group 1, 123 women were investigated this year (May, 2001), group II was investigated in 1994 using the same method of urine collection and measurement of iodine. During this interval of 7 years between both groups food intake and food preparation was not changed. The standard of life in this period is almost the same. The hospitalization of pregnant women for hospital delivery in the last 4–5 decades is common custom in our population because it is free of charge, the delivery is controlled by specialists and midwives. The drinking water in Macedonia is almost iodine-free, the principal food is bread with a low salt content, meat, fish from the Macedonian lakes, eggs, legumes are poor in iodine. The only iodine-rich food is white cheese (prepared from cow's milk and sheep's milk). The mode of preparation of food did not change in these 7 years.

In table 1 the iodine in urine is over 10 microg/dl. In table 2 the excretion rate of iodine in urine is quite different because all pregnancies have less than 10 microg/dl iodine in urine.

Table 1

Iodine in urine of pregnant women (9-th month): microg %  
(2001)

Count (n)	12	29	19	61	TOTAL 123
Average	12.01	11.22	10.638	13.9	12.57
Standard deviation	3.9	3.43	3.48	4.46	4.93
Median	12.2	11.26	8.2	13.152	12.17

Table 2

Iodine in urine of pregnant women (1994) ninth month: microg %

University Clinic, obstetric department	Average SV + Standard deviation	
n = 30	7.33 + 3.01	(March, 1994)
n + 24	7.33 + 2.98	(May, 1994)
n = 18	8.62 + 2.76	(May, 1994)
n = 12	7.7 + 3.76	(July, 1994)
n = 22	7.31 + 2.93	(June, 1994)
n = 13	10.27 + 6.55	(June, 1994)
Cair Obstetric Clinic		
n + 24	2.1 + 1.1	(April, 1994)
n = 30	4.3 + 4.3 + 2.2	(May, 1994)
n = 32	4.19 + 3.3	(June, 1994)
n + 22	2.56 + 1.2	(June, 1994)
n = 26	3.3 + 2.5	(May, 1994)
n = 4 (Albanian extraction)	7.48	(July, 1994)
n + 16 (Macedonian orthodox)	5.56	(June, 1994)

### Discussion

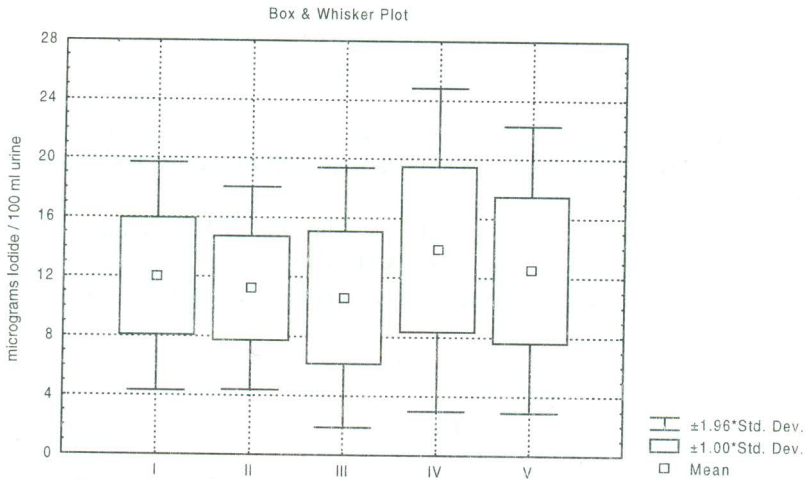
This study is an attempt to compare the influence of the increase of iodine in salt from 10 mgr KI/Kg NaCl to 20–30 mgr iodine in 1 Kg salt on iodine metabolism in pregnant women by using the standard method of determination of urinary concentration of iodine. In some European countries the median urinary content of iodine is today over 10 microg/dl: in The Netherlands in schoolchildren the median value is 14–16 microg/dl, in the Slovak Republic the median value is 13–14 microg/dl, in Germany 10.3–12.6 microg/dl, in Austria 9.8–12 microg/dl, whereas in Poland the excretion rate is low, median value 2–3.2 microg/dl (4).

It seems that the compulsory iodination of salt for consumption in human, animal and food ingredients has a stable value in iodine metabolism. In Macedonia iodine is brought only through consumption of iodized salt.

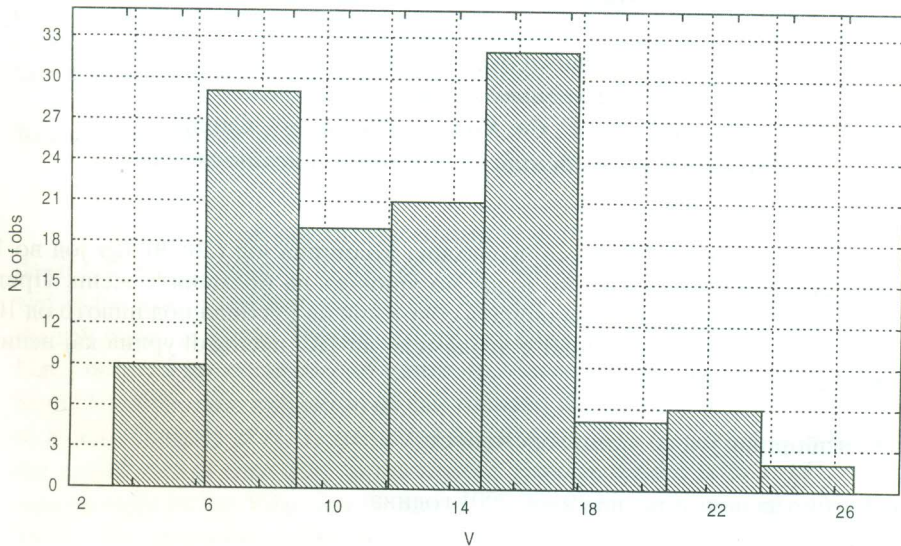
Table 1 presents iodine values over the minimal rate but still lower than iodine values in urine in USA, Great Britain, the Netherlands. (4)

A total of 909 donors in Skopje were examined on iodine level in urine, the samples dated 1996, 1997 and 1998 in a period when the iodination of salt

was 10 mgr KJ/Kg NaCl. These samples gave a rate under 10 microg/dl (median 6.9, average 9.65 microg/dl urine). (5).



Iodine excretion in pregnant women in the year 2001. I-IV are pregnant women investigated after urine sampling. V is the result of all pregnant women (123) consuming iodized salt 20-30 mgr iodine / 1 Kg NaCl. Average excretion is 12.57 microg/dl.



Iodine excretion of pregnant women in 2001, average excretion rate in 123 pregnant women is 12.57 microg/dl.

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## Резиме

### ЈОД ВО УРИНАТА НА БРЕМЕНИ ЖЕНИ ПО ЗГОЛЕМУВАЊЕТО НА ЈОДОТ ВО СОЛТА ВО МАКЕДОНИЈА

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Јодирањето на солта со зголемена количина јод (20–30 mg јод во 1 кг сол) суштествено го покачи јодот во урината на бремените жени. Пред оваа зголемена јодизација уринарната содржина на јод била под нивото од 10 microg јод/dl, сега оваа вредност е зголемена на 12.7 microg/dl урина кај испитаните 123 бремени жени.

**Клучни зборови:** јод во урина, бременост.

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