

AN ASSESSMENT OF IODINE IN CHEESE IN MACEDONIA

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A b s t r a c t: Macedonian white cheese has 57 microg/dl iodine. In comparison to other nutritional items as milk, eggs and bread with a low contingent of iodine, the Macedonian cheese covers a good part of daily iodine necessity.

Key words: iodized cheese, iodine.

We assessed last year some products in Macedonian food containing iodine: milk, bread, eggs, iodized salt. These nutritional items are deficient in iodine compared to western technology of food preparation (1, 2). Cheese prepared as white cheese from sheep and cow's milk is a much-used nutritional product. According to the Central Macedonian Statistical Bureau at the Ministry of Health the laboratory measured iodine dosage in order to have an estimation of what the contribution of cheese is in the daily Macedonian diet. The collection of cheese was independently performed by the food inspectors in all regions of Macedonia. In June 1998 all specimens were in the laboratory. We present our results with a brief comment on iodine metabolism.

Method

Cheese samples were collected in most parts of Macedonia during June 1998. A total of 112 samples were analyzed. Prepared samples were dry ashed at 610°C in the presence of K₂SO₃ and ZnSO₄. The average recovery value was

over 95% estimated with radioactive iodine. Analyses were performed at the laboratory of organic chemistry at the Institute of Chemistry, Faculty of Natural and Mathematical Sciences, at the University „St. Cyril and Methodius“, Skopje, R. Macedonia. The validity of the results was previously confirmed using reference material from the Laboratory of Charlottesville, VA, USA (3). The methods were recommended by WHO using 0.25 ml samples of the material employing autolytic action cerium ion coupled to the reduction of ceric ion (Ce^{++}) coupled to the oxidation of arsenate (As^{+3} to As^{+5}). We routinely use this method for over ten years and several thousand of samples examined in practice.

The cheese samples were measured in 1 g parcels, homogenized with $ZnSO_4$ and K_2CO_3 before pipeting 0.25 ml. After keeping at $610^\circ C$ the residuum was dissolved in distilled water and treated with Ce and As. The examination on the photometer was done in less than 25 minutes.

Results and discussion

All specimens are presented in table 1. The values are roughly between 20 and 220 microg I/dl. Some items have a high content of iodine which is probably due to the recently higher content of iodine in salt (over 20 mgr KI/Kg NaCl). Student T-test was used for statistical evaluation. The histogram presents iodine content in all white cheese samples (figure 1). The average is 54 microg I/dl, the median value is 37 microg I/dl. In contrast to iodine content in bread, milk or eggs, iodine in cheese is high. British dairy products contain 26–33 microg/dl I, less than in Macedonian white cheese. In a previous paper we compared iodine content of bread, milk, eggs. The values in Macedonia are for this items 30–40% lower than the British (1, 2). The content of iodine seems to be in Macedonia higher because the technique of white cheese preparation is using iodized salt. In Germany, Belgium, Italy, France, where goiter is still a problem in some regions, dietary iodine intake is low. In the Netherlands iodine intake in total diets is high (400 microg/day) (5).

In our population the iodine intake is lower than normal because the iodination of salt previously stated by law at 10 mgr KI/Kg NaCl since 1956 and recently elevated to 20 mgr KI/Kg NaCl is still insufficient due to the low content of iodine in water and total diet (4). The iodination is stated as a mild iodopenic pattern. The result of iodine assessment in children (3–7 years) in Skopje was not decisive because more than half had sufficient iodine excretion in urine (7). An extensive study of schoolchildren in Macedonia revealed mild iodopenia especially in mountainous part of west Macedonia, but urine levels

of iodine presented 11.7 microg/dl (8) although palpable thyroid in this same population was 11%.

This unexpected elevated level of iodine in white cheese with a percentage of 16–18% of total iodine intake seems to be of a positive value in our population. Iodine intake of the British population is covered more by milk than by cheese, in our population it is covered more by cheese, our milk has low iodine content. Cheese is salted and this brings the iodine level to a remarkable positive level. Dairy husbandry brings 1/3 of iodine in the total diet but almost through milk consumption. The cattle food in the UK, USA, Canada, Finland contains more iodine, whereas the cheese preparation in Macedonia contains iodine through the treatment of white cheese with iodized salt, our milk is really iodopenic (1, 2).

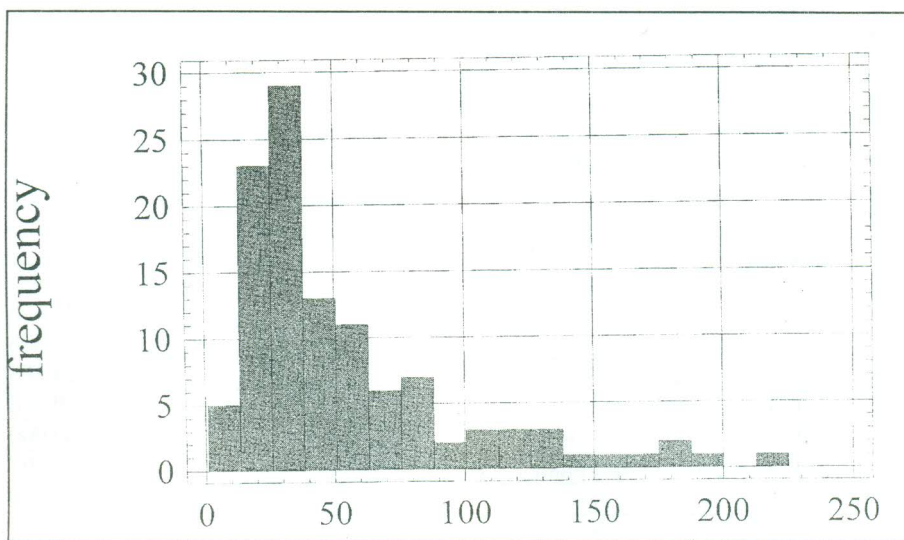


Figure 1 – Micrograms I in 100 g cheese

Summary Statistics for UG-100GR

Count = 112

Average = 54.8709

Median = 37.0974

Mode = 29.9983

Geometric mean = 42.753

Variance = 1873.98

Standard deviation = 43.2895

Standard error = 4.09047

Minimum = 10.5024

Maximum = 213.567

Range = 203.065

Lower quartile = 26.0125

Upper quartile = 71.0489

Interquartile range = 45.0364

Skewness = 1.70384

Std. skewness = 7.36143

Kurtosis = 2.55609

Std. kurtosis = 5.52178

Coeff. of variation = 78.8934%

Sum = 6145.54

Проба	Потекло	$\mu\text{g I}/100\text{g}$
40	Штип, с. Лескавица, овчо	42.097
41	Штип, с. Гугамци, кравјо	79.866
42	Штип, с. Пухче, овчо	111.835
43	Штип, с. Радање, овчо	47.097
44	Штип, с. Брест, овчо	72.097
45	Штип, с. Парчалија, овчо	39.408
46	Берово, с. Двориште, овчо	65.485
47	Струмица, с. Еднокуќево, овчо	62.097
48	Струмица, с. Сачево, кравјо	54.998
49	Струмица, с. Моноспитово, кравјо	29.998
50	Струмица, с. Самоилово, овчо	29.408
51	Струмица, с. Сушица, овчо	167.847
52	Берово, с. Русино, овчо	190.164
53	Струмица, с. Цанаклија, овчо	40.485
54	Струмица, с. Попиево, овчо	110.001
55	Струмица, с. Иловица, овчо	29.998
56	Струмица, овчо	141.069
57	Гевгелија, с. Стојаково, ЗИК „Винојуг“, овчо	24.408
58	Гевгелија, ЕФ „Кожув“, овчо	83.294
59	Гевгелија, с. Мони, „Кожув“, козјо	24.408
60	Гевгелија ЗТП „Сточарство-млек“, Богданци, овчо	136.069
61	Гевгелија ЗТП „Сточарство-млекара“, Богданци, кравјо	116.895
62	Куманово, ППТУ „Алпи-97“, Пчиња, овчо	37.097
63	Куманово, РИК „Силекс“ млекара, силирано кравјо	37.097
64	Куманово, ППТУ „Драган“, кравјо	24.998
65	Куманово ППТУ „Драган“, овчо	32.097
66	Куманово, млекара „Млеко сим“, овчи кашкавал	60.000
67	Куманово, млекара „Млеко продукт“, кашкавал	27.097
68	Куманово, „Млеко сим“, кравји кашкавал	37.097
69	Куманово, ППТУ „Миме пром“, кравјо сирење	34.998
70	Куманово, ППТУ „Миме пром“, овчо сирење	24.408
71	Куманово, ППТ „Симдраг“, овчо сирење	55.000
72	Куманово, млекара „Млеко сим“, кравјо сирење	133.930
73	Скопје, Т. Југокомерц, овчо	40.485
74	Скопје, СТД „Овче Поле“, кравјо	22.096
75	Скопје, ПП Бистра-продукт, овчо	113.932
76	Скопје, ПТП „Радика“ увоз-извоз, овчо	18.816
77	Велес, с. Лозово, овчо	178.395
78	Велес, с. Дурбулица, овчо	127.965
79	Велес, с. Виничани, кравјо	22.096
80	Велес, с. Ведовци, кравјо	18.816
81	Велес, с. Ивановица, овчо биено	44.867
82	Велес, с. Ногаевци, овчо	35.351
83	Кочани, с. Оризари, кравјо	18.816

Проба	Потекло	µg I/100g
84	Кочани, СТЕ „Рибар“, овчо	185.694
85	Кочани, ЗИК „Кочанско Поле“, кравјо	73.670
86	Кочани, СТУ „Шара 2“, кравјо	19.406
87	Кочани, СТД „Дортицин“, кравјо	24.195
88	Кочани, мес. „Астор Интекс“, овчо	22.096
89	Кочани, прод. „Центро Маркет“, овчо	19.406
90	Кочани, с. Велешта, овчо	22.096
91	Кочани, с. Драслајца, овчо	50.001
92	Кочани, с. Велешта, овчо	19.406
93	Кочани, Делото ЖДА, овчо	73.670
94	Кочани, с. Шум, овчо	19.997
95	Кочани, СТД „Шара 2“, овчо	18.816
96	Кочани, СТД „Солун 3“, мешано	55.703
97	Кочани, Мини-маркет, овчо	27.582
98	Кочани, ПТУ „Албам“, овчо	27.582
99	Тетово, с. Камењаре, овчо	213.567
100	Тетово, „Садри Комерц“, кравјо	27.878
101	Тетово, с. Коњаре, Н. Зибери, овчо	51.577
102	Тетово, с. Радиовце, кравјо	12.716
103	Тетово, с. Коњаре, Н. Зибери, биено	40.901
104	Тетово, с. Палагица, овчо	27.878
105	Тетово, с. Боготиње, овчо	38.695
106	с. Древоец	33.864
107	с. Беровци	27.027
108	с. Клепач	10.502
109	Бела Црква	10.502
110	Ерековци	27.058
111	Кавадарци, Тиквеш-ком, кравјо	10.502
112	Кавадарци, Тиквеш-ком, овчо	10.502

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Резиме

ИЗУЧУВАЊЕ НА ЈОДОТ ВО СИРЕЊЕТО ВО МАКЕДОНИЈА

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Количината на јод во нашето бело сирење, подготвено пред сè од овчо и кравјо млеко, содржи висока количина на јод во однос на останатите прехранбени продукти во Македонија (млеко, леб, јајца). Споредено со количината на јод во млечните производи во Англија, кај нас вредноста е повисока (средна вредност од испитани 112 примероци – 57 $\mu\text{g}/\text{dl}$), макар што останатите прехранбени продукти во Европа имаат 30–40% повеќе јод од македонските. Високата содржина на јод во македонското сирење се должи на техниката на неговото подготвување со додавање на јодирана сол, што во Англија не е случај. Со јодираното сирење се обезбедува околу 16–18% од дневната количина на јод потребна да ја прими организмот, а ако се земат минималните количини на јод од 100 $\mu\text{g}/\text{ден}$, со сирењето се обезбедува дури 50% од јодниот минимум.

Клучни зборови: јод во сирењето, јод.

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