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Urine iodine excretion in schoolchildren living in urban area

Iodine is a microelement necessary for thyroid gland hormones production: triiodothyronine and tetraiodothyronine, which condition accurate growth, development and functioning of human body. The hormones play a key-role in energetic processes, protein, fats and carbohydrates metabolism, they are necessary for the development of central and peripheral nervous system, and also in stimulation of bone growth.

Iodine is absorbed via gastrointestinal tract. Humans take it with food and drink. Approximately 80% of the total amount of iodine taken in is passed with urine, small quantities are lost with faeces and exhaled air. The amount of the element excreted in urine is correlated with its intake. The recommended daily amount of iodine is 120-150 μg , whereas its concentration in urine should be over 100 $\mu\text{g/l}$. Insufficient iodine supply leads to many diseases: goitre, juvenile hypothyroidism, physical and mental retardation and, in severe cases, cretinism.

The aim of the study was to evaluate the level of iodine excreted with urine in schoolchildren as a marker of iodine metabolism.

MATERIAL AND METHODS

Single urine samples of morning collection from 216 schoolchildren were examined. There were 29 girls and 35 boys 7-8 years of age, and 74 girls and 78 boys 11-12 years of age. In order to determine iodine ions concentration in the urine samples we used Sanedell's-Kalthoff's method modified by Drożdż.

RESULTS

The urinary iodine excretion in girls is depicted in Table 1 and Table 2, and in boys in Table 3 and Table 4. The summary of the results obtained in the study is included in Table 5.

Table 1. Urinary iodine excretion in girls 7-8 years old

Urine iodine concentration	N	%
below 20 $\mu\text{g/l}$	1	3
20-50 $\mu\text{g/l}$	1	3
50-100 $\mu\text{g/l}$	14	49
over 100 $\mu\text{g/l}$	13	45
Total	29	100

Table 2. Urinary iodine excretion in girls 11–12 years old

Urine iodine concentration	N	%
below 20µg/l	2	3
20-50µg/l	72	97
50-100µg/l	-	-
over 100µg/l	-	-
Total	74	100

Table 3. Urinary iodine excretion in boys 7–8 years old

Urine iodine concentration	N	%
below 20µg/l	-	-
20-50µg/l	-	-
50-100µg/l	20	57
over 100µg/l	15	43
Total	35	100

Table 4. Urinary iodine excretion in boys 11–12 years old

Urine iodine concentration	N	%
below 20µg/l	1	1
20-50µg/l	1	1
50-100µg/l	26	33
over 100µg/l	50	65
Total	78	100

Table 5. The summary of urinary iodine excretion in all the examined children

Urine iodine concentration	N	%
below 20µg/l	4	2
20-50µg/l	4	2
50-100µg/l	81	38
over 100µg/l	127	58
Total	216	100

DISCUSSION

The results indicate that only 58% of all the examined children take in enough iodine per day, judging by their urinary iodine excretion. It is a disappointing result according to the national prophylaxis campaign launched in 1997 to add iodine to the kitchen salt available on the Polish market. The anti-iodine-depletion-prophylaxis was realised by adding 30mg of KJ per 1 kg of kitchen salt. Similar actions were undertaken in other European countries. The effectiveness of this model of prophylaxis was evaluated in an investigation performed in Poznań region in 1998. It shows that since 1992 the percentage of juvenile goitre in children was decreased from 26% to 21% (1). In Switzerland the iodine prophylaxis was launched in 1922. At present goitre occurs only in 10% of their population (9). Apart from using iodine-enriched salts it is also important to eat a variety of foods that are good sources of this element: sea fish, cereals, fruit and vegetables, milk and dairy products and egg yolk (8). In 1993 a group

of Dutch investigators designed a stimulation study of the impact of iodine-enriched food consumption like bread, biscuits, ham, cheese, margarine, milk and dairy products containing 10, 50 or 100 mg KJ/kg on human iodine metabolism. Their expectations were to decrease iodine depletion symptoms occurrence by 65% and increase the total iodine intake by 45% (6). Moreover, it is crucial for goitre endemia prophylaxis to provide the society health education. It should emphasize the role of iodine consumption for human body functioning and warn against iodine depletion symptoms (6). Unfortunately, according to the data obtained by the Institute of Food and Feeding in 1993 the majority of Polish consumers had no knowledge about iodine and its' depletion consequences (9). It indicates that there is a necessity of health education campaign focused on iodine and its' importance for well-being.

CONCLUSIONS

1. According to urine iodine excretion 42% of examined children had poor dietary intake.
2. Anti-iodine-depletion campaign launched in 1997 has already yielded goitre occurrence reduction by 5% in comparison to 1992.
3. There is a strong need for iodine-focused educational programme.

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SUMMARY

Iodine is a microelement necessary for thyroid gland hormones production. It is essential for the growth and development of human body. The aim of the study was to determine urine iodine excretion in schoolchildren living in urban area. We found out that approximately 42% of the examined children excreted small amounts of iodine with urine, which proves low dietary intake of the element. Therefore, it is necessary to promote the right dietary patterns and iodine supplementation in developing children.

Wydalenie jodu z moczem u dzieci w wieku szkolnym mieszkających w mieście

Jod jest mikroelementem niezbędnym do syntezy hormonów tarczycy. Uczestniczą one w wielu przemianach biochemicznych i zapewniają prawidłowy wzrost i rozwój organizmu ludzkiego. Przeprowadzone przez nas badania wykazały, że problem niedoboru jodu wśród dzieci w wieku szkolnym dotyczy znacznego odsetka populacji. Wskazuje to na konieczność prowadzenia intensywnych działań profilaktycznych, zmierzających do wyeliminowania tego zjawiska.