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*Urinary iodine excretion in inhabitants of rural region living
in the Lublin Province*

Iodine is the element necessary for the human organism to function properly. Iodine is essential especially for the synthesis of thyroid hormones that regulate the cellular metabolism of the whole organism. Low levels of iodine in serum cause the decrease of T3 and T4 synthesis as well as, in the first stage, compensatory hypertrophy of a thyroid gland, which results in a goitre (6). Prolonging deficiency of iodine in the organism may cause some delays in physical and mental development. Deficiency of iodine in the foetal stage and in the first period of infancy is the most dangerous (2, 8). As a result a child may suffer from mental and physical underdevelopment. The currently used prevention is iodised salt. Daily demand of the human organism for iodine amounts to 150-300 μg (1, 3). Despite the constant supplement of iodine, endemic goitre occurs in many regions of Poland (4, 5, 7).

The purpose of the work was to estimate the concentration of iodine in urine among the inhabitants of a typical agricultural region as a simple method of detecting deficiency of iodine in the human organism.

MATERIAL AND METHODS

132 people at the age from 9 to 74 (54 men and 78 women), the inhabitants of a village Majdan Nowy in the Lublin Province were included in the research. Most of the examined have lived in this region since birth. The examined were divided into four age groups: Group I – 38 inhabitants (15 boys and 23 girls) at the age of 9 to 18 years, Group II – 42 inhabitants (17 men and 25 women) at the age of 19 to 40 years, Group III – 52 inhabitants (22 men and 30 women) above 40 years.

Concentration of iodine was tested in the first morning portion of urine. The level of iodine was measured by the Sandell-Kolthoff method, and the level of creatinine by the Folin method. The reading was conducted by means of spectrophotometer SPECOL made by Carl-Zeiss, Jena. The results were described statistically by means of t-Student's test.

RESULTS

Table 1 presents the results of the research. It was stated that among women the amount of iodine excretion together with urine was increasing along with age. The biggest amount of iodine excretion was observed in the group above 40 years of age. The average value of the indicator of the amount of excreted iodine per 1g of creatinine was indeed higher in group III, both in relation to group I ($p < 0.05$) and group II ($p < 0.01$). Among men in various age groups the excretion of iodine together with urine was at a similar level. The observed differences were not statistically significant.

The amount of the excretion of iodine together with urine was similar among men and women up to 40 years old (group I and II). Statistically significant differences were observed in group III, in which the excretion of iodine among women was essentially higher ($p < 0.05$) than among men.

DISCUSSION

Tab. 1. Urinary iodine excretion in people living in the rural region

Group		Mean value (μg iodine/1 g creatinine)	Min-max values	SD	Significance of differences
I (9 - 18 years old)	males	45.2	22.8 - 74.9	13.5	ns
	females	54.2	20.3 - 143.4	32.0	
II (19 - 40 years old)	males	53.7	29.2 - 105.3	20.8	ns
	females	54.6	20.3 - 105.3	18.6	
III (>40 years old)	males	52.8	11.9 - 120.5	28.5	$p < 0.05$
	females	74.0	29.2 - 163.7	29.5	
Significance of differences		females: I : II - NS I : III - $p < 0.05$ II : III - $p < 0.01$	males: I : II - NS I : III - NS II : III - NS		

Deficiency of iodine may result in a goitre and thyroid hypofunction. The deficiency is quite frequent in many regions of the world, especially in the areas situated far from seas. In southern Poland, mainly in the region of the Carpathians and the Sudeten, endemic goitre occurrence was stated (4, 5, 9). Poznań and the Podlaskie Province belong to the area where deficiency of iodine is observed. The area of the Lublin Province is in mere danger of goitre occurrence (7). Deficiency of iodine is mainly related to its insufficient supply in food, especially in drinking water. Most iodine that is absorbed by the human organism is excreted together with urine. The level of iodine in urine is therefore a good marker of the amount of iodine supplied in the diet.

In our research it was stated that iodine excretion together with urine among the inhabitants of an agricultural region of the Lublin Province is lower than the values accepted as the norm on the basis of specialistic literature (1). This fact may prove iodine deficiency in this region. The carried out research is in accordance with other authors' observations concerning iodine deficiency in the area of southern and eastern Poland (6, 9). The lowest excretion of iodine together with urine was observed among the examined at the age from 9 to 18 years. It may be related to the low supply of iodine in the diet and the increased, at this age, demand for this element and thyroid hormones synthesis. The highest excretion of iodine together with urine was observed among women above 40 years old. However, it still remained at the level lower than reference values.

The results of the research prove the necessity of conducting, on a large scale, screening research concerning iodine deficiency. The research should be conducted in order to isolate groups of risk and to introduce an intensive supplement of this element.

CONCLUSIONS

1. The inhabitants of an agricultural region of the Lublin Province show low excretion of iodine together with urine.

2. The supplement of iodine is necessary, especially at the stage of intensive physical development.

3. Monitoring of iodine concentration in urine is a sensitive marker of iodine deficiency in the human organism.

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SUMMARY

Iodine is the element necessary for the human organism to function properly. Iodine is essential especially for the synthesis of thyroid hormones that regulate the cellular metabolism of the whole organism. The purpose of the work was to estimate the concentration of iodine in urine among the inhabitants of a typical agricultural region as a simple method of detecting deficiency of iodine in the human organism. The biggest iodine excretion was observed in a group above 40 years of age. The amount of the excretion of iodine together with urine was similar among men and women up to 40 years old. Monitoring of iodine concentration in urine is a sensitive marker of iodine deficiency in the human organism.

Wydalenie jodu w moczu u mieszkańców regionu rolniczego
województwa lubelskiego

Jod jest pierwiastkiem koniecznym do prawidłowego funkcjonowania organizmu człowieka. Jako mikroelement wchodzący w skład hormonów tarczycy, które regulują metabolizm komórkowy całego organizmu, dostarczany musi być w odpowiedniej ilości. Dobowe zapotrzebowanie organizmu człowieka na jod wynosi 150-300 μg , jednak mimo suplementacji w wielu regionach Polski występuje endemicznie wole. Celem pracy jest ocena stężenia jodu w moczu u mieszkańców rejonu rolniczego jako prostej metody wykrywania niedoboru jodu w organizmie.

Badania przeprowadzono u 132 mieszkańców wsi Majdan Nowy w województwie lubelskim w wieku od 9 do 74 lat (54 mężczyzn i 78 kobiet). Wioska położona jest w oddali od głównych dróg komunikacyjnych w rejonie Roztocza. Większość badanych zamieszkuje ten region w tych samych warunkach od urodzenia. Stężenie jodu w próbce wykonywano u badanych z rannej porcji moczu. Poziom jodu oznaczano metodą Sandell-Kolthoffa, a odczyty przeprowadzano przy użyciu spektrofotometru SPECOL firmy Carl-Zeiss, Jena.

Uzyskane wyniki poddano analizie statystycznej za pomocą testu t-Studenta. Stwierdzono, że wielkość wydalania jodu z moczem u kobiet wzrastała wraz z wiekiem i była najwyższa w grupie badanych powyżej 40 roku życia. Średnia wartość wskaźnika ilości wydalanego jodu/1g kreatyniny była istotnie wyższa w grupie III, zarówno w stosunku do grupy I ($p < 0,05$), jak i do grupy II ($p < 0,01$). Wydalenie jodu z moczem u mężczyzn w różnych grupach wiekowych kształtowało się na podobnym poziomie, a obserwowane różnice nie były statystycznie istotne. Wielkość wydalania jodu z moczem u mężczyzn i kobiet do 40 roku życia była podobna. Statystycznie istotne różnice zaobserwowano w grupie III, w której wydalanie jodu u kobiet było istotnie wyższe ($p < 0,05$) niż u mężczyzn. U mieszkańców regionu rolniczego województwa lubelskiego stwierdza się niskie wydalanie jodu z moczem. Monitorowanie stężenia jodu w moczu jest czułym markerem niedoboru tego pierwiastka w organizmie człowieka. Konieczna jest suplementacja jodu, szczególnie w okresie intensywnego rozwoju fizycznego.