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Influence of iodine ions in drinking water on their excretion with urine

Iodine is a necessary element for a human organism to function properly. Iodine is essential especially for the synthesis of thyroid hormones. Both the excess and deficiency of iodine in an organism may cause serious disorders in body functions. Daily demand of a human organism for iodine ranges from 40 to 300 μg (6, 10, 13, 16). Iodine is provided mainly by means of nourishment (14, 15). The content of iodine in drinking water has an essential influence on iodine supplies (9). Deficiency of iodine in an organism can be estimated by an analysis of iodine intake as well as measurement of iodine concentration in drinking water and iodine excretion with urine (8, 12).

The purpose of the work was to estimate the relationship between the amount of iodine excretion with urine and iodine concentration in drinking water among the inhabitants of the Lublin province.

MATERIAL AND METHODS

71 healthy people were included in the research. There were 19 children at the age from 7 to 18, 52 adults at the age from 19 to 80. They all live in the region of Zamość. Concentration of iodine was tested in the first morning portion of urine and it was converted into single concentration of creatinine. Water for the research was taken from the wells from individual farms. Concentration of iodine in urine and drinking water was measured by the Sandell-Kolthoff method (1, 4). The level of creatinine in urine was marked by the Folin's method (5). The relationship between iodine excretion and its concentration in drinking water was examined by means of indicating a factor of Pearson's linear correlation.

RESULTS

Average concentration of iodine in urine of the examined people was 132.0 μg/1g of creatinine. The concentration of iodine in drinking water was 27.5 μg/l (Tab. 1). The

Table 1. Iodine concentration in drinking water and urinary iodine excretion in people living in the Lublin province

	Mean value	Min.-max.	SD
Iodine concentration in drinking water (g/l)	27.5	20.0 – 30.0	3.2
Urinary iodine concentration (g/1g creatinine)	132.0	70.0 – 240.0	31.6

obtained values of iodine concentration both in urine and the examined drinking water did not differ from the values accepted as the norm on the basis of specialist literature. It was stated that there was a statistically essential correlation between the amount of iodine excretion in urine and iodine concentration in drinking water (Fig. 1).

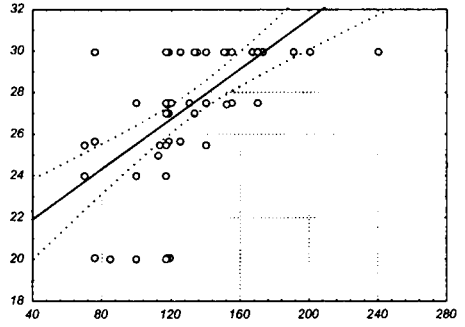

Fig. 1. Correlation between I ions in drinking water and their excretion with urine

DISCUSSION

Poland belongs to European countries in which iodine deficiency is moderate (3, 11). Iodine preventive treatment has been conducted since 1935. However, the research carried out by many authors showed ineffectiveness of iodine preventive treatment that has been done so far (15). It also showed that it is necessary to change the way of iodised salt distribution as well as to increase the concentration of KJ in edible salt up to 30 mg/kg.

The whole salt, which is intended to be eaten, has been iodised since 1997. The lower concentration of iodine in drinking water has also a great influence on iodine deficiency in an organism (9). Most iodine that is absorbed by a human organism is excreted together with urine. According to many authors the estimation of iodine excretion with urine is a good indicator of the amount of iodine supplied in a diet (2, 7).

The obtained results of the research do not show iodine deficiency among the inhabitants of the Lublin province. In the carried out research, iodine excretion with urine among all age groups was within the values accepted as the norm. It also did not differ from the suggested norms of I ions concentration in drinking water that comes from wells in individual farms. In their own research, a statistically essential positive correlation between iodine content in drinking water and the amount of iodine excretion with urine was also observed. This observation is in accordance with the research carried out by other authors.

The possibility to repeat the carried out research as well as the simplicity of methods make it possible to use this research as screening research. This kind of research is useful both for estimation of iodine deficiency in an organism and early preventive treatment.

CONCLUSIONS

1. There is no iodine deficiency stated among the inhabitants of villages in the region of Zamość.
2. Concentration of iodine in drinking water that comes from wells from individual farms varies within broad limits. However, it does not differ from recommended norms.
3. There is a positive correlation between iodine concentration in drinking water and the amount of iodine excretion with urine.

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SUMMARY

The purpose of the work was to appraise the correlation between magnitude of iodine excretion with urine and concentration of iodine ions in drinking water in the population living in the Lublin province. The tests were also performed among the citizens of the Zamość voivodship. Mean concentration of iodine in urine of the tested citizens was 132.0 μg/g creatinine. Mean value of I ions in drinking water was 27.5 μg/l. The obtained

results of concentration of iodine both in urine and drinking water did not differ as shown in references. Statistically significant correlation between the measure of I excretion in urine and I ions concentration in drinking water was confirmed. There is no ascertained deficiency of iodine in Zamość region inhabitants. The concentration of iodine in drinking water from adjacent wells was fluctuating in wide limits, but did not differ from recommended norms. There is a positive correlation between concentration of iodine in drinking water and its level in excreted urine.

Wielkość wydalania jodu z moczem a jego stężenie w wodzie pitnej

Celem pracy była ocena zależności pomiędzy wielkością wydalania jodu w moczu a stężeniem jodu w wodzie pitnej u mieszkańców województwa lubelskiego. Badaniami objęto 71 osób. Wśród badanych było 19 dzieci w wieku od 7 do 18 lat i 52 osoby dorosłe w wieku od 19 do 80 lat, zamieszkałe w okolicach Zamościa. Stężenia jodu oznaczano w porannej porcji moczu i przeliczano na jednostkowe stężenie kreatyniny. Wodę do badań pobierano ze studni gospodarstw indywidualnych. Stężenie jodu w moczu i w wodzie pitnej oznaczano metodą Sandell-Kolthoffa. Poziom kreatyniny w moczu oznaczano metodą Folina. Zależność pomiędzy wydalaniem jodu w moczu a jego stężeniem w wodzie pitnej badano wyznaczając współczynnik korelacji liniowej Pearsona. Średnie stężenie jodu w moczu badanych osób wynosiło 132,0 μg/g kreatyniny. Stężenie jodu w wodzie pitnej wynosiło średnio 27,5 μg/l. Uzyskane wartości stężeń jodu zarówno w moczu, jak i w badanej wodzie pitnej nie odbiegały od wartości uznanych na podstawie piśmiennictwa za normę. Stwierdzono istotną statystycznie korelację między wielkością wydalania jodu w moczu a jego stężeniem w wodzie pitnej.