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Short Communication
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Primary Prevention of Iodine Deficiency Disorders

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Short Communication

Prevention of iodine deficiency disorders has been defined by the WHO as one of the main factors influencing the public health [1]. Actually about 1/3 global population is exposed on dangerous iodine deficiency [2,3].

Iodine reacts very easy with Natrum (NaJ) and Kalium (KJ) and is transported to the cells, where returns electrons and creates negative electric potential -54V.

$2J=J+2e=-0.54V$

In this way, iodine is very strong antioxidant and develops particular action against infectious diseases and neoplasmatic processes.

Transport of iodine into the cells is possible due to enzyme "natrium iodide symporter"-(NIS) existing in gastric mucosa, salivary glands, in thyroid and in the breast of breast-feeding women. In the thyroid iodine is taking part in the synthesis three and four iodine tyrosine, regulating all metabolic pathways [4].

Consequences of Iodine Deficiency

In 1983, Hetzel for the first time defined consequences of iodine deficiency as "iodine deficiency disorders" [5]. Iodine deficiency on the population level leads to endemic goiter and its deficiency in pregnancy may cause underdevelopment of brain and cretinism.

A degree of iodine deficiency must be compared with normal walues determined by WHO [6] (Table 1).

Especially pregnant and breast-feeding women need more iodine due to increase syntheses of thyroid hormones in pregnancy. Actual models of iodine prophylaxis not protect pregnancy in recommended amounts of iodine and it is necessary to deliver 100-150 ug/day of iodine under physician control.

Especially iodine deficiency in the first trimester of pregnancy is dangerous due to possible damage of the brain of fetus [7]. That why it is recommended to supply addition dose of iodine, before pregnancy-when pregnancy is planned and control of thyroid gland by USG. Another very important marker is TSH level before, during pregnancy, and in the blood of fetus as well [8].

We are facing the global problem: according to WHO iodine deficiency occurs in the majority of the world territory. In Europe 97 million persons is exposed to iodine deficiency [9]. The main effect of iodine deficiency is goiter and its frequency reflects extent of the iodine deficiency in the studded area. Poland is an iodine deficiency area with north-southern gradient, where northern part by the marine is free from iodine deficiency and southern part. The mountain area, where-before of iodine prophylaxis-underdevelopment of brain and cretinism were observed [10]. The most endangered persons on iodine deficiency are pregnant women: investigations undertaken in Krakow`s region registered in these women 80% of goiter [11]. Another population group very sensitive on iodine deficiency are schoolchildren. In nationwide investigation in southern part of Poland, frequency of goiter in schoolchildren was 80% [12].

In 1977, Delange F, Camus M, Winkler M, et al. worked up screening procedure based on the serum thyrotropin (TSH) determination for congenital hypothyroidism [13]. This procedure was developed for monitoring iodine deficiency in newborns [14].

Determination of TSH in neutral screening was complained with monitoring of iodine deficiency and effectiveness of iodine prophylaxis in Poland [15,16].

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Table 1: Normal Values of Iodine in the Diet.

Age Group	Age	Iodine (ug/24 hours)
Nursery school pupils	0-59 months	90
School pupils	0-59 months	120
School pupils adults	6- 12 years	150
Pregnant and breast feeding women	> 12years	250

Iodine Prophylaxis and Its Effectiveness

In the lights of the last 2 decades publications, the world is facing up to global problem of iodine deficiency [9]. According to analyses performed by WHO in 2007 among 40 European countries based on the study of iodine concentration in urine, only in 19 countries this concentration was consistent with WHO recommendation [3]. In 1990, World Health Assembly formulated recommendation for all states to introduce iodine prophylaxis based on iodization of kitchen salt and to solve the problem until 2000 [17]. Following that, World Health Organization, United Nations Children Founds, and International Council for Control of Iodine Deficiency Disorders recommended iodine concentration in salt and. monitoring system, for control of effectiveness in the model of iodine prophylaxis [2,18]. The model of iodine prophylaxis in Poland is presented in Table 2.

In 1991, the Polish Council for Control of Iodine Deficiency Disorders was created as multicenter group of experts in the field. In the lights of results of investigation, pointing at endemic goiter in pregnant women and schoolchildren the Council applied in 1991 to the Minister of Health to initiate mandatory iodization of household salt (20-40mg J/kg). Formulas for neonates 0,10-0,15 mgKI/100ml. The model proves very effective on the population level. Prevalence of goiter in schoolchildren dropped down from 25% to 2,5% [19,20], prevalence of goiter in pregnant women decreased from over 80% to 10,53% [21,22], and frequency of neonatal TSH lowered from 12,88 to 4,01 nmol/l [23].

Additional carrier of iodine in Poland is cow milk due to iodization of licks for cows and caused increase of iodine in milk to 130ug/l [24,25].

In 2002 conference of the experts of ICCIDD in Goteborg assessed very well Polish model of iodine prophylaxis, its results, and included Poland into the group of countries with sufficient supplementation of iodine on the population level [26].

Polish program of iodine prophylaxis is continued up to present time; however, every preventive program must be monitored. Monitoring of the program is performed within the Program of Elimination of Iodine Deficiency financed by the Ministry of Health [27].

We have to remember, that other Iodine Prophylaxis Program was developed in Poland after Chernobyl accident in 1986. The program effectively diminished consequences of the 131-J exposition on the population level [28].

Conclusions

- The model of iodine prophylaxis in Poland is based on obligatory iodization of household salt, iodization of formulas for infants, additional supplementation of iodine in pregnant and breast-feeding women and education.
- The model of iodine prophylaxis is very effective: endemic goiter in schoolchildren retreated, and in pregnant and breast-feeding women decreased from 80% to 19%.
- The model of iodine prophylaxis is continued and monitored in cooperation with International Council for Control of Iodine Deficiency Disorders, Polish Council for Control of Iodine Deficiency Disorders and the Ministry of Health.
- Iodine prophylaxis in Poland may play some protective role in the case of nuclear accident.

Table 2: The Model of Iodine Prophylaxis in Poland.

• Obligatory iodization of household salt 20-40 mg I/kg.
• Iodization of cow milk for neonates- 0.10-0,15 mgKI/100/ml.
• Addition dose of iodine for pregnant and breast feeding women 100-150ug./ twenty four hours
• Increase consumption of foodstaf rich in iodine: see fish, cow milk, yolk, fruits, vegetable.

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