

Results of Epidemiological Study Conducted for the First Time in the Sokh District of Fergana Region

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Abstract Despite the measures taken, in the Republic of Uzbekistan there is still a high prevalence of iodine deficiency diseases (IDD). While in 1998 the optimal concentration of iodine in the urine (100–300 µg/l) was observed in 5.6% of the population, in 2016 this figure increased to 77%. The share of iodized salt (15.0–55 µg/g potassium iodate) was 7.6% in 1998 and increased to 81% in 2016 among the population. The prevalence of endemic goiter among the population of Uzbekistan decreased from 70% in 1998 to 31% in 2016. Thus, there is a noticeable improvement in IDD indicators compared to previous years. However, the targets have not yet been reached. Employees of the RSSPMCE MH named after Academician Y.Kh. Turakulova, as a result of several epidemiological studies in Fergana region in 1998, 2004, and 2010 to assess the severity of iodine deficiency using a random sampling method, found that iodine deficiency remains severe. In 1998, the prevalence of endemic goiter (EG) among children was 69.8%. After 5 years in 2004 according to the results of epidemiological studies, it was found that the prevalence of EG among children was 59.8%. In 2010 monitoring of iodine deficiency diseases showed that the prevalence of ED in Fergana region was 39.9%, which indicates a dynamic decrease compared to 1998 and 2004, although the severity of iodine deficiency (ID) remains severe. But among the abovementioned epidemiological studies, there were no studies in the Sokh region. The purpose of this study was to study the prevalence of iodine deficiency diseases among the population of the Fergana region, Sokh district of the Republic of Uzbekistan for the first time. It has been established that the prevalence of iodine deficiency conditions is critical in the Sokh region.

Keywords Iodine deficiency diseases, Epidemiology, Fergana region, Sokh district

1. Introduction

Sokh district is an independent administrative-territorial unit of the Fergana region of the Republic of Uzbekistan, completely surrounded by the territory of Kyrgyzstan. The district is an exclave for Uzbekistan, an enclave for Kyrgyzstan. The territory is surrounded on all sides by mountainous terrain and has a territorial relation to the Fergana region. It was not previously investigated for the presence of iodine deficiency in this region, although the Fergana region is considered one of the most famous iodine deficiency regions in the world. Currently, the district consists of 19 settlements. The population is 74.1 thousand people, including the urban population of 38.8 thousand people (65.9%) and rural of 20.1 thousand people (34.1%). National composition is as follows: 99.2% Tajiks, 0.7% Kyrgyz, 0.1% Uzbeks and other nationalities [1].

The staff of the RSSPMCE of the Ministry of Health of the Republic of Uzbekistan conducted epidemiological studies in 1998, 2004, and 2010 in the Fergana region to assess the

severity of iodine deficiency using random sampling method, which showed that there is a severe iodine deficiency. In 1998, the prevalence of EG among children was 69.8%. 5 years later, in 2004, according to the results of epidemiological studies, it was found that the prevalence of EG among children was 59.8%. In 2010 Monitoring of IDD showed that the prevalence of EG in the Fergana region was 39.9%, which indicates a dynamic decrease compared to 1998 and 2004, although the severity of IDD remains severe. [2] But among the abovementioned epidemiological studies, no studies were conducted in the Sokh district.

The objective of the study was to study the prevalence of iodine deficiency diseases among the people of the Fergana region the Sokh district in the Republic of Uzbekistan.

2. Materials and Methods of the Study

WHO evaluates the severity of iodine deficiency conditions by a number of parameters such as clinical indicator (the prevalence of goiter in the population) and a biochemical indicator (the level of iodine excretion in urine).

The severity of iodine deficiency is determined by the prevalence of thyroid enlargement among the population. ED may be present if the frequency of EG in the population of children of primary and secondary school age exceeds 5%.

In order to study the prevalence of IDD in dynamics among the organized population of the Sokh district epidemiological study was conducted, which included schools and kindergartens (a random sample) and the total number of studied persons was 245 children of school and preschool age. To quantify the iodine content, 207 urine samples were collected (schoolchildren aged 11-15 years and among kindergarten children aged 4-6 years).

Criteria developed by WHO experts were selected as criteria for assessing the severity of IDD (Table 1).

Table 1. IDD severity assessment criteria

Parameters	Population	mild	moderate	severe
Goiter	School children	5-19.9%	20-29.9%	30%
Thyroid size	School children	5-19.9%	20-29.9%	30%
Iodine in urine (mkg/L)	School children	50-90	20-49	20

The total number of examined children was 245 children. The degree of enlargement of the thyroid gland was determined according to the WHO classification by means of palpation: 0 when the thyroid gland is not enlarged, 1 degree and 2 degree of enlargement of the thyroid gland.

The results obtained for the determination of ioduria in the region are grouped according to the concentration of iodine in urine as follows: <20 mcg/l corresponds to severe iodine deficiency, 20-49.9 mcg/l corresponds to moderate severity, 50-99.9 mcg/l corresponds to mild severity, and 100-300 mcg/l corresponds to the norm.

The method of Nawschinek O. et al., improved by Mishchenko B.P. et al., was used to determine the concentration of iodine in urine (10). To measure the iodine in salt a technique based on the disproportionation reaction

between iodide and iodate in an acidic medium, resulting in the formation of free iodine and its titration with a solution of sodium thiosulfate was used.

The data obtained was statistically processed using the MS Excel software package.

3. Results and Discussion

Epidemiological studies of the prevalence of endemic goiter in the Sokh district among the examined individuals showed that diffuse goiter of the 1st stage was diagnosed in 73.9% (181 children), diffuse goiter of the 2nd stage was diagnosed in 8.2% (20 children) of the examined. The total prevalence of endemic goiter is 82% (201 children) (Table 2). It is also worth noting that among preschool children it turned out to be much lower (14.4%) than in adolescents, exceeding it by 6 times, amounting to 85.6%.

Table 2. Diffuse goiter prevalence among school children and kindergarten children in the Sokh district

Districts	Examined children	Diffuse goiter		
		I stage	II stage	Total
Sokh district	245	181 (73.9%)	20 (8.2%)	201 (82%)
School children	172	152 (88.3%)	20 (11.6%)	172 (85.6%)
Kindergarten children	73	29 (39.7%)	0(0%)	29 (14.4%)

The results ioduria definition among the studied group of the organized population of the Sokh district (111 schoolchildren, 96 pupils) showed that out of 207 urine samples (100%) collected from school in 183 samples (88.4%) the concentration of iodine was in the range from 20 to 99 micrograms /l, in 18 samples (8.7%) the concentration of iodine in urine was in the range of 100-200 mcg/l and only in 6 samples (2.9%) the concentration of iodine was in the range of more than 200 mcg/l of the normal value (Table 3).

Table 3. Ioduria analysis results in the sokh district

Iodine concentration in urine (median, mkg/L)	Expression of iodine deficiency	Number of people		Percentage		Number of people	Percentage
		*SC	**KC	SC	KC		
Below 20	Severe iodine deficiency	16	4	14.4	4.2	20	9.7
20 – 49	Moderate iodine deficiency	53	47	47.7	49	100	48.3
50 – 99	Mild iodine deficiency	33	30	29.7	31.3	63	30.4
100 – 200	Adequate consumption of iodine	5	1	4.5	1	18	8.7
201 – 299	More than adequate	3	1	2.7	1	4	1.9
>300	Excessive	1	1	0.9	1	2	1

*- school children **- kindergarten children

Thus, the data obtained for the Sokh district indicate that 88.4% of children have iodine deficiency of mild and moderate severity, and only 18 children have adequate iodine intake, which was more than 8.7%. The data obtained indicate that there is a pronounced degree of iodine deficiency in the surveyed area of the republic. The median concentration of iodine in the urine of schoolchildren in the Sokh district is only 25 micrograms /l for the majority, in fact approaching a critically low threshold, as a result of which the prevalence of goiter among schoolchildren is extremely high with 82%. Analysis of the structure of the prevalence of iodine deficiency showed that almost the entire surveyed population (more than 80% of schoolchildren and preschool children) had iodine deficiency. The prevalence of goiter is a clinical quantitative indirect indicator of the severity of iodine deficiency. The assessment of the prevalence of goiter reflects the previous (but not currently existing) provision of iodine to the population, since in conditions of iodine deficiency, it takes at least 2-3 years for the development of goiter. Taking into account low sensitivity and specificity of thyroid palpation to determine the stage of goiter, an ultrasound examination (ultrasound) of the thyroid gland is recommended as part of epidemiological studies, which is the basis for further more thorough epidemiological studies. [3]

Of course, there are many factors that have led to such critical conditions of iodine deficiency in the Sokh district. First of all, it should be taken into account that iodine deficiency is especially pronounced in rural areas, which is undoubtedly due to both socio-economic reasons and certain food traditions. The second and most common factor of iodine deficiency is mountainous areas and foothills, which include our surveyed area, and due to the intensity of the processes of growth, metabolism and development the need for iodine in children is especially great. It should also be noted in this connection it is extremely important and necessary to study the state of iodine security of children of early and preschool age in dynamics, since with iodine deficiency in children of this age category, due to the physiological characteristics of growth, there is a real risk of deviation in physical and intellectual development, decreased immunity, and development somatic endocrine morbidity.

Solving these problems and realizing the medical and social significance of IDD the republic adopted a law in 2007 defining a system of state measures for the prevention of IDD on the territory of the Republic of Uzbekistan. It was based on the universal iodization of eatable salt for retail trade and the food industry. Currently, the availability of iodized salt to the population remains low with 25-30%, and the quality does not always meet the requirements of the standard. As an urgent measure, with the help of the government, in a number of districts of the republic prevention of IDD was carried out in the children's population with the help of the pharmaceutical drug iodine - antistrumin.

In iodine-deficient regions there is a delay in the formation

of basic cognitive functions in critical age periods. According to Professor L.A. Shcheplyagina (Scientific Center for Children's Health of the Russian Academy of Medical Sciences) [10], 85% of children have deviations in some indicators of the intellectual-mnestic sphere, of which 30% have severe deviations in most of the studied functions, while 55% of children have partial cognitive deficits of varying severity.

According to epidemiological studies (1998, 2004, 2010, 2016), the problem of iodine deficiency persists in our country. More than 60% of the country's population live in regions with naturally caused iodine deficiency. Despite the implementation of preventive programs (measures) in the regions, the existing "voluntary" model of prevention has proved ineffective. Salt iodization programs require the creation of an effective monitoring and evaluation system. It has been revealed that there are no territories in Uzbekistan whose population would not be at risk of developing iodine deficiency diseases. In Uzbekistan with the background of mass educational and preventive measures to eliminate iodine deficiency, there is a tendency to decrease the prevalence of endemic goiter, but the extent of iodine deficiency diseases remains severe. Taking into account the fact that the last study was conducted in 2011 among school-age children and in 2016 among non-pregnant women and data on the content of iodine in salt and urine indicate that, despite the large-scale measures carried out, more than 30% of the population of the Republic of Uzbekistan still remain in a state of iodine deficiency. There was a need to conduct an epidemiological study of the iodine deficiency state in dynamics in all regions of the Republic.

4. Conclusions

As a result of epidemiological studies conducted for the first time in the Sokh district, the defined prevalence of endemic goiter was 82%. According to the data obtained on the iodine content in urine indicate that more than 88% of the children are at the critical threshold of iodine deficiency. The reason for the severity of iodine deficiency conditions is associated with the presence of non-iodized food salt on the Uzbek market, as well as the low quality of the produced food salt. It is necessary to strengthen the work on the elimination of iodine deficiency conditions, to improve the conditions of salt production, to establish internal and external laboratory control over the quality of the produced iodized food salt, to prevent the entry of non-quality food salt into the national market.

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