Tuva is a remote, biodiverse Russian republic in southern Siberia, populated by traditionally nomadic, yurt-dwelling tribes, and borders Mongolia in the south. Its capital is the city of Kyzyl. Tuva has population of 307,930 (2010 census) with ethnic Tuvans making up 82% of population. Other groups include Russians (16.3%) and a host of smaller national groups.

Not much is known about history of iodine deficiency in Tuva, which was incorporated as an Autonomous Republic of the Russian Federation in 1944. The first modern iodine survey in Tuva (Chaa-Khol district) was conducted in 1997 by endocrinologists from Institute of Medical Problems of the North (Krasnoyarsk, Russia) and included 466 adults and 246 children. Goiter was widespread (39% in adults and 83% in children) while median urinary iodine concentration (UIC) was only 16 μg/L. In 1998, neonatal thyroid screening in Chaa-Khol district showed that 45% of newborns had TSH level above 5mU/L and 12.8% were above 25 mU/L, the threshold for congenital hypothyroidism at that time [1].

During his visit to Tuva, the renowned pediatric neurologist Dr. R. DeLong (Duke University, USA) described numerous cases of cretinism characterized by severe hypothyroidism, mental retardation and neurological symptoms [2]. He recommended an agricultural approach to iodine supplementation through iodization of salt for livestock (sheep, goats and cattle) [3]. However, for various reasons, several attempts to build and maintain a salt iodization agricultural facility in Tuva (with support of Kiwanis from the United States) were not successful [4]. Instead, the Tuva government developed a program for the elimination of iodine deficiency based on the universal use of iodized salt and iodine supplements for risk groups.

The prevalence of cretinism due to iodine deficiency in Tuva in 1997 was 3.5% [5]. Various forms of endemic cretinism were reported: myxedematous, neurological and mixed. Mixed cretinism was the most common form (77.6%) and was characterized by symptoms of severe hypothyroidism, mental and growth retardation. Most patients with neurological cretinism had deafness (in 75%), with serious mental retardation combined with squint and characteristic spastic lesions of the limbs.
In the following years, the situation slowly improved. According to an assessment conducted in 2000 in two remote districts of Tuva (Todzhinsky and Kaa-Khem) the median UIC in children had climbed to 56 μg/l and 38 μg/l, respectively, while in the capital city of Kyzyl, the median UIC in schoolchildren who regularly received iodine supplements (“Antistru-min”, containing 1000 mcg of potassium iodide) was 181 μg/l. At the same time, the frequency of neonatal TSH> 20 mU/l had decreased to 1.76% [6]. A subsequent survey conducted in Tuva in 2008 showed that 47% of households were using iodized salt and pregnant women were receiving potassium iodide tablets in antenatal clinics. However, goiter incidence in children and adolescents in Tuva was 4 times higher than the average for the Russian Federation.

In 2016, the Government of Tuva issued a resolution “On the approval of an interdepartmental plan to promote a healthy lifestyle among the population of the Republic of Tuva for 2016-2018”, according to which it was recommended that food processing industry enterprises use iodized salt in the production of dairy and bakery products. The improving results of the neonatal thyroid screening program confirmed the effectiveness of these preventive measures; in 2019 only 2.1% newborns had TSH levels above 5 mU/L.

The most recent survey of 227 children aged 8 to 10 years was conducted by local endocrinologists with the assistance from National Medical Research Center for Endocrinology (Moscow) in October 2020. Three schools were selected: one in the capital city Kyzyl and two in remote districts (Ulug Khem and Kaa Khem). Median UIC was 153 μg/L demonstrated optimum iodine nutrition. The highest median UIC was in Kyzyl (197 μg/L) with lower levels in Ulug Khem (182 mcg/L and Kaa Khem (121 mcg/L) districts. The proportion of households using iodized salt was comparable in all three survey sites (95.2% in Kyzyl, 94.7% in Ulug Khem and 94.3% in Kaa Khem). The difference in UIC between the 3 groups may be explained by higher consumption of industrially processed foods in Kyzyl and Ulug Khem compared to Kaa Chem district.

This remarkable success story – a high level (over 90%) of household coverage with iodized salt and optimum iodine nutrition of population in Tuva – was reached through the adoption and vigorous enforcement of local USI decree, including control over supply of iodized salt to this remote region of Russia (Tuva does not have its own salt production). The Russian Ministry of Health has been advocating for national salt iodization legislation, but the process is painfully slow due to the negative position of some government ministries. However, the Tuva experience shows that remarkable progress from severe iodine deficiency to optimal iodine intake can be reached and sustained in this region.

References
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