RESEARCH LETTER

Iodine Deficiency Disorders in School Age Children in Kullu District, Himachal Pradesh

Iodine deficiency disorder is a major public health problem in Himachal Pradesh. A study was conducted in district Kullu to assess the prevalence of IDD in school age children. Clinical examination of the thyroid of 1986 children was conducted. On the spot urine and salt samples were collected. The Total Goiter Rate was found to be 23.4% and median urinary iodine excretion was 175µg/L. The population is possibly in transition phase from iodine deficient to iodine sufficient nutrition.

Keywords: *Goiter, Iodine deficiency.*

Iodine deficiency disorder (IDD) has been recognized as a major public health problem in India. Out of 587 districts in the country, 282 have been surveyed for IDD and 241 have been found to be goiter-endemic [1]. In 1983-84, the Government of India adopted a policy to achieve universal iodization of edible salt by 1992 [2]. District Kullu in Himachal Pradesh is a known iodine deficiency endemic area. An earlier survey conducted in 2003 found prevalence rate of TGR as 9.6% [3]. This study was conducted in 2012 with the objective to assess the current status of IDD amongst school age children (6-12 years) in the district. Informed consent was taken from each child and his/her parent. The project was approved by ethical committee of All India Institute of Medical Sciences, New Delhi.

The 30 clusters (schools) were selected by using Population Proportionate to Size (PPS) sampling methodology [4]. In each school all children were enlisted and using random number table, 66 children were selected. The clinical examination of the thyroid gland was conducted [4]. "On the spot" urine samples were collected randomly selected 18 children. A total of 532 urine samples were collected and tested. The UIE levels were analyzed using the wet digestion method [5]. From each cluster, 23 salt samples were collected (total of 681) and tested by standard Iodometric Titration (IT) method [6]. The girls in the age group of 11+ who had menstruation on the day of the survey [*n*=16], did not consented and hence were excluded from the study. With anticipated prevalence of iodine deficiency as 15%, absolute precision of ±2.0, confidence level 95% and a design effect of 1.5, a sample size of 1837 children was calculated.

A total of 1986 children were included. The TGR prevalence was found to be 23.4% (Grade I- 23.1% and Grade II- 0.3%), indicating moderate iodine deficiency. The UIE analysis (*n*=532) revealed that the proportion of children with UIE level of <20, 20-49, 50-99, 100-199 and >200 µg/l, was nil, 6.0%, 19.3%, 30.5% and 44.2%, respectively. The median UIE level was 175µg/L indicating no biochemical deficiency of iodine in the population studied. Analysis of the salt samples (*n*=681) revealed that 2.2%, 46.5% and 51.3% of salt samples had <5ppm, 5-<15 ppm and 15ppm and more, iodine content, respectively**.** Earlier studies conducted in district Kullu have also documented the median UIE levels of 205µg/L (2003) and 200 µg/L (2005), respectively in SAC [7-8].

Findings of the present study indicate that the population studied is going through a transition stage from iodine deficient to iodine sufficient. Earlier studies have also documented similar finding of persistence of higher TGR for few years after correction of iodine intake by the population [9-10]. The possibility of goitrogenic factors leading to high TGR rate cannot be ruled out. There is a need of enforcing the Prevention of Food and Adulteration Act, to ensure that salt with iodine content of 15ppm and more, is sold in the market.

Contributors: All the authors have contributed, designed and approved the study.
Funding: DBT Government of India; *Competing interests*: None stated.

***Sushil Chander, Umesh Kapil, Vandana Jain and Neha Sareen**
**District Kullu, Himachal Pradesh, and Human Nutrition Unit, All India Institute of Medical Sciences, New Delhi 110 029, India.*
umeshkapil@gmail.com

References

1. Kapil U. Progress made in elimination of IDD and possible impact of lifting ban on sale of non iodized salt. J Acad Hosp Admin. 200;12:33-41.
2. International Institute for population sciences (IIPS) and macro international. 2007. National Family Health Survey (NFHS-3), 2005-06: India: Volume I. Mumbai: IIPS.
3. Prevalence rate of goiter according to survey conducted in areas during 1981-2004. National Goiter Control Programme. Available on http://cbhidghs.nic.in/writereaddata/linkimages/10176695673813.pdf. Accessed April 2, 2013.
4. WHO. Assessment of iodine deficiency disorders and

monitoring their elimination. A guide for programme Managers. WHO/UNICEF/ICCIDD. World Health Organization; Geneva: 2007.
5. Dunn JT, Crutchfield HE, Gutekunst R, Dunn D. Methods for measuring iodine in urine. A joint publication of WHO/ UNICEF/ICCIDD;1993. p.18-23.
6. Karmarkar MG, Pandav CS, Krishnamachari KAVR. Principle and procedure for iodine estimation- a laboratory manual. New Delhi: Indian Council of Medical Research. ICMR Press; 1986. p.1-17.
7. Current Status of IDD in select districts of different regions of country. NIN Press Hyderabad: National Institute of Nutrition; 2003. p.11-28.
8. Kapil U, Sharma TD, Singh P, Dwivedi SN, Kaur S. Thirty years of a ban on the sale of noniodized salt: impact on iodine nutrition in children in Himachal Pradesh, India. Food Nutr Bull. 2005;26:255-8.
9. Zimmermann MB, Hess SY, Adou P, Toresanni T, Wegmüller R, Hurrell RF. Thyroid size and goiter prevalence after introduction of iodized salt: a 5-y prospective study in schoolchildren in Côte d'Ivoire. Am J Clin Nutr. 2003;77: 663-7.
10. Zimmermann MB, Adou P, Toresanni T, Zeder C, Hurrell R. Persistence of goiter despite oral iodine supplementation in goitrous children with iron deficiency anemia in Côte d'Ivoire. Am J Clin Nutr. 2000;71:88-93.