

## Iodine Deficiency Status Amongst School Children in Pauri, Uttarakhand

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**Objective:** To assess the iodine deficiency status amongst school age children in district Pauri, Uttarakhand. **Methods:** 2067 children (age of 6-12 years) were included. Clinical examination of thyroid gland of each child was conducted. On-the-spot urine and salt samples were collected from children. **Results:** Total Goitre Rate was found to be 16.8% and median Urinary Iodine Concentration level was 115 µg/L. Only 40.4% of salt samples had e 15 ppm of iodine. **Conclusion:** There is a mild degree of iodine deficiency in school age children in district Pauri. There is a need of strengthening the National Iodine Deficiency Disorder Control Program.

**Keywords:** Goiter, India, Iodine deficiency, Survey.

In India, 200 million people are exposed to the risk of Iodine Deficiency and more than 71 million suffer from goitre and other iodine deficiency disorders (IDD) [1-3]. Iodine deficiency is a major public health problem in Uttarakhand, India. In 1962, the National Goitre Control Programme was launched in eight hilly districts (Uttarkashi, Chamoli, Pithoragarh, Tehri Garhwal, Pauri Garhwal, Dehradun, Nainital, and Almora) – and in Bijnor district – in Uttarakhand [4]. In State of Uttarakhand – according to NFHS-3 survey – 46% households were using iodized salt with iodine content of 15 ppm or more [5].

The present study was conducted in year 2012 to assess the status of iodine deficiency amongst school-age children in district Pauri, Uttarakhand.

### METHODS

This was a cross-sectional school-based study including children in age group of 6-12 years. School enrolment of primary classes was more than 90% and hence school based approach was adopted to cover the children. All primary schools in rural and urban area in the district were enlisted. The 30 clusters were identified using Probability Proportional to Size (PPS) methodology [6]. In each school, all children in the age group of 6-12 years were enlisted and 69 children were identified using random number table. The children were briefed about the objectives of the study and informed consent was taken. Clinical examination of the thyroid was conducted for all the enrolled children by trained research team members. The grading of goitre was done as per the criteria recommended by WHO/UNICEF/ICCIDD. When in doubt, the immediate lower grade was recorded.

The intra- and inter-observer variation was controlled by repeated training and random examinations of goitre grades by first author. The sum of grades 1 and 2 provided the Total Goitre Rate (TGR) of the study population [6]. From each cluster, casual urine samples were collected from 19 children selected randomly. Plastic bottles with screw caps were provided to children for the urine samples. The samples were stored in the refrigerator until analysis. Salt samples were also collected from 19 children selected randomly from each cluster. The urinary iodine concentration (UIC) levels were analyzed using the wet digestion method [7]. The iodine content of salt samples was analyzed by standard Iodometric Titration (IT) method [8].

A pooled urine sample was prepared for internal quality control (IQC) assessment. The IQC sample was analyzed 30 times and mean and standard deviation (SD) of this pooled sample was calculated. The IQC samples of known concentration of iodine content were run with every batch of study urine samples. If the results of the IQC samples were within the range (mean  $\pm$  2SD) then the urine sample results of the study subjects were deemed valid. However, if the results were outside the range of IQC sample, then the whole batch of the study subjects was repeated [9].

The study was approved by ethical committee of All India Institute of Medical Sciences, New Delhi.

With anticipated prevalence of 15%, absolute precision of  $\pm$  2.0, confidence level 95% and a design effect of 1.5, we required minimum of 1837 children for assessment of iodine deficiency amongst school age children.

**RESULTS**

A total of 2067 children (49.1% boys) were included. The TGR was found to be 16.8%.

A total of 580 random samples of urine were collected. The median UIC level was 115 µg/L. The percentage of children who had UIC levels 20-49, 50-99, 100-199 and ≥200 µg/L were: 25.3, 17.2, 34.0 and 23.5 percent, respectively. No child had UIC level <20 µg/L.

A total of 562 salt samples were collected. Only 40.4% of the children were consuming salt with iodine of ≥15 ppm.

**DISCUSSION**

It has been recommended that if more than 5% school age children (6-12 yrs) are suffering from goiter, the area should be classified as endemic to iodine deficiency [6]. A TGR of 16.8% signifies that mild iodine deficiency existed in the population included in the study. The median UIC level of 115 µg/L indicates that there was no biochemical deficiency of iodine in the subjects studied.

We could not compare our results with earlier studies as there is lack of scientific data on status of iodine deficiency in district Pauri. Findings suggest that population of Pauri district is in a transition phase from iodine deficient to iodine sufficient. Elimination of IDD from district Pauri can be achieved by continued and sustained supply of iodized salt with adequate quantity of iodine to the entire population.

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