

# **Assessment of Iodine Nutriture Status Among School Children of Dhaka University Campus : Biochemical Iodine Deficiency**

**Abdullah Al Mamun<sup>1</sup>, Md. Mohiduzzaman<sup>2</sup>, Cadi Parvin Banu<sup>3</sup>, Harur K. M. Yusuf,<sup>4</sup> and Salamatullah Quazi<sup>5</sup>.**

1, 2, 3, 5 Institute of Nutrition and Food Science, Univesity of Dhaka, Dhaka Bangladesh 4 Department of Biochemistry, Univesity of Dhaka, Dhaka Bangladesh

## **Introduction**

Iodine deficiency is a risk factor for the growth and development of millions of people living in iodine deficient environments throughout the world. The effects on growth and development, together called the Iodine Deficiency Disorders (IDD), comprise goitre, still births and miscarriages, neonatal and juvenile thyroid deficiency, dwarfism, mental defects, deaf mutism, and spastic weakness and paralysis, as well as lesser degrees of loss of physical and mental function. All these effects are due to inadequate thyroid hormone production, because iodine is an essential constituent of the thyroid hormone<sup>1</sup>.

Since most iodine that is absorbed is excreted in the urine, urinary iodine level is a good marker of a previous day's dietary iodine intake. However, since an individual's level of urinary iodine varies daily and even during a given day, data can be used only for

making a population-based estimate. Experience has shown that the iodine concentration in early morning urine specimens (child or adult) provides an adequate assessment of a population's iodine status: 24-hour samples are not necessary. It has been found preferable to express the results per litre of urine rather than per gram of creatinine which is cumbersome, expensive, unreliable and unnecessary<sup>2</sup>. In general, urinary iodine concentration below 10 µg/dl is considered to be a strong suspicion of biochemical iodine deficiency<sup>3</sup>.

Iodine deficiency is one of the major public health problems in Bangladesh. The results of the National Iodine Deficiency Disorder Survey in Bangladesh—1993 conducted by a team of University of Dhaka revealed that 68.9% of Bangladeshi population have biochemical iodine deficiency (urinary iodine <10 µg/dl) and the median urinary iodine level

in the study population was 3.4 µg/dl in the hilly zone, 5.1 µg/dl in the flood prone zone and 7.4 µg/dl in the plain zone<sup>4</sup>. Another survey on institutional level completed very recently and this was the study on the Iodine Nutriture Status among Resident and Non-resident students of Dhaka University. The results indicated that 67.2% students of Dhaka University were biochemically iodine deficient (males 76.7%, females 58.1%) having urinary iodine level less than 10 µg/dl<sup>5</sup>. The present study was undertaken to assess the prevalence of goitre and percent subjects suffering from iodine deficiency. Here we reported the percent subjects suffering from iodine deficiency.

#### **Materials and Methods**

The study was conducted among the school children of Dhaka University campus. The students are mostly reside in the University campus and surroundings. The schools are namely Nilkhet High School, Udayan Biddaloy and University Laboratory School. Male and female students were selected randomly from different classes.

**Collection of Urine :** A total of 598 urine samples were collected of which 217 from Nilkhet High School, 203 from Udayan Biddaloy and 178 from University Laboratory School.

The urine samples were collected in a wide mouthed screw capped plastic bottles. They were carried in cartoons and brought to the laboratory where they were stored at 0°C. They were kept at room temperature one day before the urine samples analyzed for iodine.

**Biochemical Estimation of Iodine :** Urinary iodine was assessed by the wet digestion method adopted by Gutekunst *et. al*<sup>6</sup>. At a time 30 samples, along with 5 standards of different concentrations and one blank were digested. Deionized water was used as a blank. The results were expressed as µg of iodine per dl of urine.

#### **Results**

Median urinary iodine (MUI) and population with biochemical iodine deficiency (PWBD) of three schools are shown in Table-1. Out of three schools in Dhaka University campus median urinary iodine was found lowest (7.9 µg/dl) and percent population with biochemical deficiency was highest (57.6%) in the students of Nilkhet High School. The median urinary iodine level in the male school children of Dhaka University campus was 10.7 µg/dl and that in the female school children was 9.9 µg/dl. So, the overall median value of urinary iodine in school children of Dhaka

University campus was 10.1, slightly higher than the cut-off value of 10.0 µg/dl.

Table 2. shows the median urinary iodine and population with biochemical deficiency according to age and sex. Respondents of 10, 11, and 13 years of age had MUI below 10.0 µg/dl and 50% respondents of

10 years of age had biochemical deficiency of iodine.

In the present study, we also found 14.3% students of Nilkhet High School, 2.0% students of Udayan Biddaloy and 4.0% students of University Laboratory School had MUI less than 2.0 µg/dl (data not shown in table).

**Table 1. Median urinary iodine and population with biochemical iodine deficiency of three schools.**

Name of School	Male			Female			Total		
	No. Examined	MUI (µg/dl)	% PWBD	No. Examined	MUI (µg/dl)	% PWBD	No. Examined	MUI (µg/dl)	% PWBD
Nilkhet High School	139	8.2	56.8	78	7.8	59.0	217	7.9	57.6
Udayan Biddaloy	115	16.1	33.0	88	12.6	28.4	203	13.5	31.0
University Laboratory School	121	12.4	27.3	57	9.7	42.1	178	10.6	32.0
Total	375	10.7	40.0	223	9.9	42.6	598	10.1	41.0

Abbreviations used: MUI, Median urinary iodine; PWBD, Population with biochemical deficiency.

**Table 2. Median urinary iodine and population with biochemical iodine deficiency according to age of the study puplation.**

Age (Years)	Male			Female			Total		
	No. Examined	MUI (µg/dl)	% PWBD	No. Examined	MUI (µg/dl)	% PWBD	No. Examined	MUI (µg/dl)	% PWBD
10	7	8.5	57.1	13	7.5	46.2	20	8.0	50.0
11	45	10.1	46.7	37	7.7	56.8	82	9.0	51.2
12	71	11.7	38.0	47	11.5	36.2	118	11.6	37.3
13	130	10.5	37.0	50	9.8	40.0	180	9.9	37.8
14	80	11.1	40.0	59	9.6	42.4	139	10.6	41.0
15	33	11.1	42.4	15	10.3	33.3	48	10.4	39.6
16	9	10.4	44.5	2	9.3	50.0	11	10.0	45.5
Total	375	10.7	40.0	223	9.9	42.6	598	10.1	41.0

Abbreviations used: MUI, Median urinary iodine; PWBD, Population with biochemical deficiency.

## **Discussion**

A total of 598 urine samples were analyzed to assess iodine nutriture status of the respondents from three schools of Dhaka University campus namely Nilkhet High School, Udayan Biddaloy and University Laboratory School. The method used to determine urinary iodine level<sup>6</sup> is the latest suggestion made by ICCIDD used in CDC laboratory at Atlanta, and also in the last IDD survey in Bangladesh—1993. The method is simple and provides reliable results.

The overall results of median urinary iodine and percent population with biochemical iodine deficiency in three schools of Dhaka University campus indicated that 41% of school children have biochemical iodine deficiency. The guardians of school children of Dhaka University area are mostly educated and in such condition 41% school children are deficient in iodine. This may be due to fact that most of them do not know that Bangladeshi foods are decreasing in iodine content day by day. To meet daily iodine requirement (150 µg/day) normal foods are not enough and so they must take iodized salt regularly.

Teachers in school level should take part in educating the students about iodine deficiency, its adverse effect on life and how this problem

can be easily prevented. Because the improve physical and mental health of the students will largely determine the quality of the next generation. After few years they will go to college or University and then they will guide the nation. A poor school performance and poor mental ability due to iodine deficiency will lead the nation improper way. Immediate measures should be undertaken to prevent mental handicap and the consequent loss of human resources in the coming generations.

## **Summary**

In the study of iodine nutriture status among school children of Dhaka University campus, not only the prevalence of goitre was assessed, but urinary iodine level was also examined to ascertain biochemical iodine deficiency in the students. The students are from different classes of three schools of Dhaka University campus which are Nilkhet High School, Udayan Biddaloy and University Laboratory School. In this paper, the detailed school-wise, and age-wise results on median urinary iodine (MUI) concentration and percent population with biochemical iodine deficiency are described. Data indicated that the overall median urinary iodine level was 10.1 µg/dl where 41.0% students were

biochemically iodine deficient having urinary iodine level less than 10.0 µg/dl.

## References

1. Hetzel, B. S. 1991 : The story of iodine deficiency. An international challenge in Nutrition. Oxford, England: Oxford University Press.
2. WHO/UNICEF/ICCIDD, Indicators for assessing Iodine Deficiency Disorders and their control through salt iodization. Micronutrient Series. WHO/NUT/ 94.6. P-22.
3. Stanbury, J. B. and A. Pinchera. 1994. Measurement of iodine deficiency disorders. In: S. O. S. for a Billion: The conquest of Iodine Deficiency disorders (Hetzel, B. S. and C. S. Pandav, Eds.) pp. 73-88. Oxford University Press, Delhi.
4. Yusuf, H. K. M., Salamatullah, Q., Islam, N. M., Hoque, T., Baquer, M., and Pandav, C. S. : Report of the National Iodine Deficiency Disorders Survey in Bangladesh—1993. University of Dhaka, Dhaka, December—1993.
5. Sabrina, S., Study on the Iodine Nutriture Status among Resident and Non-resident Students of Dhaka University. June 1994. M. Sc. Thesis, INFS, D. U. p- IV-V.
6. Gutekunst, R. 1993. Details of methods. In: Methods for measuring iodine in urine (Dunn, J. T., H. E. Crutchfield, R. Gutekunst and A. D. Dunn, Eds.) pp. 17-27. ICCIDD. The Netherlands.