Original Articles

ASSESSMENT OF IODINE DEFICIENCY DISORDERS USING THE 30 CLUSTER APPROACH IN THE NATIONAL CAPITAL TERRITORY OF DELHI

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Objective: *Iodine Deficiency Disorders (1DD) are a major public health problem in India. The National Capital Territory (NCT) of Delhi is a known iodine deficiency endemic area. The Delhi Government banned the sale of non-iodised salt since 1989. The present study was conducted to assess the status of IDD after 7 years of salt iodisation programme in the state.* ***Design:*** *Cross sectional.* ***Methodology:*** *The recent indicators recommended by the World Health Organization-United Nations Children's Fund-International Council for the Control of Iodine Deficiency Disorders (WHO-UNICEF-ICCIDD) were utilized for the assessment of IDD. A total of 30 clusters were selected using population proportionate to size cluster sampling procedure. In each identified cluster, one primary school was selected using random sampling. A total of 6911 school children in the age group of 8-10 years were included for the study.* ***Results:*** *The total goiter prevalence rate was 8.6% while 2.1, 8.4, 17.6 and 71.9% of the children had urinary iodine excretion levels of <2, 2 - 4.9, 5 - 9.9 and 10 and above mcg/dl, respectively. The median urinary iodine excretion was 17 mcg /dl. Of the 1854 salt samples analyzed, salt with a nil iodine content was consumed only by 1.4% of the beneficiaries. Forty one per cent of families consumed salt with an iodine content of less than 15 ppm.* ***Conclusion:*** *IDD continues to be a public health problem in the NCT of Delhi. There is a need of strengthening the existing monitoring system for the quality of iodised salt.*

Key words: *Iodine deficiency disorders, Goiter, Urinary iodine excretion, Iodised salt.*

IODINE Deficiency Disorders (IDD) are a major public health problem in India. The results of sample surveys conducted by different agencies in 239 districts of 25 states and 4 union territories of the country have identified 197 districts as endemic for IDD. The National Capital Territory (NCT) of Delhi is also a known iodine deficiency endemic area(l-3).

A study conducted in 1980 in the NCT of Delhi reported a goiter prevalence of 55% in school children in two areas of the state(4). Subsequently, since March 1989 the Government of the NCT of Delhi banned the sale of non-iodised salt for human consumption(5).

In 1995, the Government of the NCT of Delhi initiated an action plan for the prevention and control of IDD in the state.

Subjects and Methods

The study was conducted in the

National Capital Territory of Delhi. The recent indicators recommended by World Health Organization-United Nations Children's Fund-International Council for the Control of Iodine Deficiency Disorders (WHO-UNICEF-ICCIDD) were utilized for the assessment of IDD(6).

Children in the age group of 8-10 years were considered for the present study. Subjects in this age group have been recommended for the assessment of IDD because of their combined high vulnerability, representativeness of community and easy accessibility(6). In Delhi, the school enrollment of primary classes was more than 80% and hence the school approach was adopted.

All the villages and urban units in the NCT of Delhi with their respective populations were enlisted. In the NCT of Delhi there were 209 villages (in 5 community development blocks), 120 urban charges (in 3 statutory towns), and 29 census towns. Thus, from a total of 358 population units, 30 clusters were selected using population proportionate to size cluster sampling procedure(6,7).

Calculation of Sample Size

The sample size of children to be surveyed was calculated with a presumption that the prevalence of goiter at the time of the survey was 15%. Confidence level of 95%, relative precision of 10% and design effect of three was also considered for calculation of sample size. Utilizing these parameters a sample size of 6531 was obtained.

Selection of Subjects

In each identified population unit (cluster), all the primary schools were enlisted and one school was randomly selected for the detailed survey. In each school, about 230 children were surveyed. If a school had less number of children in that case an adjoining school was also included in the study. In each class, the children were briefed about the study objectives. Subsequently, the children between 8-10 years of age were identified with the help of school records for inclusion in the study. An attempt was made to study an equal number of children (between 70-80) in the ages of 8, 9 and 10 years.

Assessment of Goiter

All the children were clinically examined for goiter by the palpation method by the same research team member in all the clusters. Goiter size was graded according to the criteria recommended by the WHO(6). The sum of grades 1 and 2 provided the total goiter rate (TGR) in the study population.

Urinary Iodine Excretion

It has been recommended that from a minimum of 10% of the children being surveyed, urine samples should be collected to get a valid estimate of iodine status in a community (6). Urine samples were collected from 20% of the total children studied. In each cluster, a total of about 55 casual urine samples were randomly collected from the subjects examined. Plastic bottles with screw caps were used to collect the urine samples. The samples were stored in the refrigerator until analysis. The iodine content of the urine was analyzed using the standard laboratory method (8).

Iodine content of Salt Consumed

In each school, about 60 children were asked to bring about 20g of salt which was routinely being consumed in their respective homes in autoseal polythene pouches. The iodine content of the salt was estimated by the standard iodometric titration method(9).

Statistical Analysis

Chi square test was used to determine differences among groups.

Results

A total of 6911 school children in the age group of 8-10 years were included for the study. The male: female ratio was 1.03:1. Nearly an equal number of children in 8, 9 and 10 years of age were studied *(Table I).*

The total goiter prevalence rate was 8.6%. No significant difference was found in goiter prevalence amongst the male and female children *(Table II).*

It was found that 2.1, 8.4, 17.6 and 71.9% of the children had urinary excretion levels of <2, 2 - 4.9, 5 - 9.9, 10 and above mcg/dl, respectively indicating severe, moderate, mild and no deficiency status, respectively *(Table III).* The median urinary iodine excretion was 17 mcg/dl.

It was observed that 82% and 18% of the beneficiaries consumed powdered and crystalline salt, respectively. Salt with a nil iodine content was consumed only by 1.4% of the beneficiaries. Forty one per cent of families consumed salt with an iodine content of less than 15 ppm *(Table IV).*

TABLE I-*Age and Sex Distribution (n=6911).*

Age (yrs)	Sex	
	Males	Females
8	1163	1047
9	1054	1123
10	1297	1227
Total	3514 (50.8%)	3397 (49.2%)

TABLE II-*Prevalence of Goiter in Female and Male Children*

Age (yrs)	Goiter size 0		I		II	
	F	M	F	M	F	M
8	974 (31.6)	1095 (33.8)	73 (26.4)	66 (25.4)	0	2
9	1038* (33.5)	975 (30.1)	85 (27.8)	79 (31.4)	0	0
10	1075 (34.8)	1162 (36.0)	151 (45.8)	133 (43.2)	1	2
	n=3250	n=3425	n=389	n=359	n=9	n=5

Figures in parentheses indicate percentages of n. There was no significant difference, amongst goiter prevalence in both sexes.

Discussion

Projecting the school goiter surveys results directly to the general population to which the schools belong was first recommended by a WHO study group in 1952(10) and thereafter has been internationally accepted(6). It has been

TABLE III-*Urinary Iodine Excretion Levels (n=1652)*

Severity of IDD	Urinary iodine excretion levels (mcg/dl)	No.	%
Severe	< 2.0	35	2.1
Moderate	2.0-4.9	138	8.4
Mild	5.0-9.9	291	17.6
No deficiency	> 10.0	1188	71.9

TABLE IV-*Iodine Content of Salt Samples*

Iodine content (ppm)	No.	%
Nil	26	1.4
< 5	466	25.1
5-9	189	10.2
10 -14	104	5.6
15 – 29	176	9.5
>30	893	48.2

recommended that if more than 5% of school age children (8-12 yrs) are suffering from goiter the area should be classified as endemic to iodine deficiency(6). In the present study, a total goiter prevalence rate of 8.6% was found. In an earlier study conducted in 1980(4) a goiter prevalence of 55.2% was reported in school children. The decrease in the prevalence of TGR could hence be attributed to the implementation of salt iodisation programme in the the NCT of Delhi since 1989. An earlier epidemiological study carried over 16 years on the use of iodised salt for control of endemic goiter in the Kangra valley of the Himalayan region also showed a progressive decline and control of goiter prevalence(ll).

The median urinary iodine excretion of the children studied was 17 mcg/dl indicating that there was no iodine deficiency in the present study with the cut off point of 10 mcg/dl as a criterion for assessing iodine deficiency in a population(6). In the present study, 41% of the beneficiaries consumed salt with an iodine content of less than 15 ppm. An earlier pilot study conducted in the NCT of Delhi by the first author in one school each from urban, rural and urban slums revealed that 17% of urban, 45% rural and 65% of urban slum families were consuming salt with an iodine content of less than 15 ppm. The median urinary iodine excretion levels of children belonging to urban, rural and urban slum areas were 25.0, 14.0 and 14.0 mcg/dl, respectively(12). The earlier findings supported the results of the present investigation.

Only 1.4% of the salt samples had a nil iodine indicating that nearly all the salt available to the beneficiaries was iodised. However, the findings also suggested that although the salt was being iodised either an inadequate amount of iodine was added to it at the production level or there were losses of iodine during the different points of distribution.

In conclusion, IDD continues to be a public health problem in the NCT of Delhi as per TGR of 8.6% in school children between 8-10 years of age. The findings also highlight the need for strengthening the existing system of monitoring of quality of iodised salt.

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NOTES AND NEWS

PALS COURSE

A state of the Art Workshop on Pediatric Advanced Life Support (PALS) under the auspicies of IAP is being organized by the Department of Pediatrics, Rajah Muthiah Medical College and Hospital, Annamalainagar 608 002, Tamil Nadu, between 25-26 January 1997. Registration is restricted to 40 members on a first come first served basis. The registration fees is Rs. 800/- (including the course materials). Only Demand Draft drawn in favor of Dr. S. Ramesh, PALS Course Convenor payable at Chidambaram (or) Annamalainagar will be accepted. Last date for registration is 25th December 1996. The course Director will be Dr. Janakiraman (USA). For further details please contact: Dr. S. Ramesh, Department of Pediatrics, Rajah Muthiah Medical College and Hospital, Annamalainagar-608 002. Tele.: 20281 - STD. 04142.