

Study on prevalence of iodine deficiency disorder and salt consumption pattern in Patan District, Gujarat

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ABSTRACT

Iodine Deficiency Disorders are one of the most severe form of micronutrient deficiency which superimposes its harmful effects on the productivity and vitality of our society. The social impact of iodine deficiency arises not so much from goiter as from the effect on the central nervous system. Objective: 1) To study prevalence of Iodine Deficiency Disorder in Patan district 2) To estimate iodine deficiency by urinary excretion method and 3) To assess the salt consumption pattern in the region. Study Design: Cross Sectional Study. Methods and Material: As per protocol children of School age was the study population for the IDD survey. Study carried out in rural population only, city and urban area excluded from study. School children aged 6 to 13 years were selected as target group. Goiter prevalence, iodized salt and urinary iodine excretion in the target group were used as outcome variable. Goiter was assessed by palpation method and urine samples were collected from them. From every cluster, 20 salt samples were collected from School Children's home. Salt samples were tested for Iodine content on the spot. Results: An overall goiter prevalence of 7.5% was observed in the region. Female had a prevalence of 7.8% and males 7.1%. The median urinary iodine excretion in the Patan district was 83.75 µg / L. 45.5% of house hold consume salt having I₂ content of greater than 15 ppm. Conclusion: Iodine deficiency remains a public health problem in the region and there is need of further strengthening the system of monitoring the quality of iodized salt being used by the population of the state.

Key words: Goiter, urinary Iodine, prevalence, iodized salt.

INTRODUCTION

Iodine is essential for thyroid function, necessary for the normal growth, development and functioning of the brain and body¹. Iodine deficiency is one of the most common preventable causes of mental retardation and brain damage in the world today. About 1.5 billion people worldwide live at risk of IDD of which more than 655 million people are already affected with IDD. In India, about 200 million people live at risk of IDD, whereas more than 71 million people are suffering from goiter and other IDDs². Organized efforts to deal with the problem of IDD were intensified in 1992 under National Iodine deficiency disorder Control Programme. But the progress of the programme needs to be monitored using the quantifiable indicators as recommended by International Council for the control of Iodine deficiency disorders, WHO and UNICEF³. Goitre

prevalence was assessed clinically by standard palpation method and grading of goitre was done according to the criteria recommended by the joint WHO/UNICEF/ICCIDD as follows^{3, 4}:

Grade 0

No palpable or visible goitre

Grade 1

A mass in the neck that is consistent with an enlarged thyroid that is palpable but not visible when neck is in the normal position. It moves upward in the neck as the subject swallows.

Grade 2

A swelling in neck that is visible when the neck is in a normal position and is consistent with an enlarged thyroid when neck is palpated. The sum of grade II and I provides Total Goitre Rate.

In last 50 years, many countries in North America, Asia, Europe and Oceania have successfully eliminated Iodine deficiency disorders or made substantial progress in their control, largely as a result of salt iodization with potassium iodide or potassium iodate and through dietary diversification⁵. In India, keeping in view the magnitude of the problem and technical, administrative, financial and

operational feasibility on the recommendations of the Central Council of Health Government of India in 1984, took a policy decision for USI. I.e. all edible salt in the country would be fortified with iodine⁶. Other detrimental effects of iodine deficiency includes increased incidence of stillbirth, abortion and congenital abnormalities including endemic cretinism⁷.

Indicators recommended by ICCIDD, WHO and UNICEF

Indicators	Goal (%)
Salt iodization	
Proportion of households consuming effectively iodized salt	> 90
Urinary iodine	
Proportion below 100 mcg/l	<50
Proportion below 50 mcg/l	<20
Thyroid size	
Among school children of 6-12 years age	<5
Proportion with enlarged thyroid, by palpation or ultrasound	

Goitre Resurvey is conducted every five year for monitoring of programme. Due to reformation of the districts in the year 2001, Patan district was created from the part of Mahesana and Banaskantha districts. So this Goitre survey was carried out in Patan district by Community Medicine Department of B.J. Medical College.

MATERIAL AND METHODS

Survey was done amongst the school children registered at various primary schools run by Zilla Panchayat in March 2005. A PHC wise list of schools for the entire district was obtained from the Chief District Health Officer. This list contained number of schools per PHC, number of students per school and their cumulative totals. As per GOI guidelines, 5 % of total children in the age group of 6 – 13 years were the sample size. The cluster sampling method was followed. 15 clusters were selected. Each cluster would represent one PHC. Survey was started from school in the PHC headquarters village and covered other schools in a concentric manner till the adequate sample size was achieved. During the survey, investigators ensured approximately equal representation of gender. Goitre prevalence was assessed clinically

by standard palpation method and was graded as grade 0, I and II. 20 salt samples were collected from the students (preferably from different schools) and were tested on the spot with UNICEF kit.

Ten Samples of Urine in each cluster were collected from students of different Standard for Iodine estimation. These samples were collected in plastic bottles (50 ml capacity with screw cap with Thymol crystal as preservative) with a label. These samples were sent to Regional IDD Laboratory at Government Medical College, Surat for measurement of Iodine excretion in urine by Laboratory testing. Data were collected in pre-designed and pre-tested proforma. Data analysis was done in EPI INFO and various apparent statistical tests were applied.

RESULTS

Table 1 shows that the prevalence of goiter was higher in 10-13 years old school children than in younger children though difference was statistically insignificant ($\chi^2 = 3.47$, $df=1$, $p= 0.062$). Females have more prevalence of goitre than males, however difference was not significant ($\chi^2 = 1.68$, $df=1$, $p= 0.194$).

Table 1: Prevalence of goiter according to age and sex group

Age group (years)	No. of students	Grade 0 Goiter	Grade I Goiter	Grade II Goiter	Prevalence of Goiter
6-9	5773	5366	287	120	7.05
10-13	3366	3093	197	76	8.11
Gender					
Male	4815	4473	233	109	7.10
Female	4324	3986	251	87	7.81

Table 2: Taluka wise distribution of salt iodine level

Taluka	Iodine status in salt samples			Total
	0 ppm	< 15 ppm	≥ 15 ppm	
Santalpur	14 (35.0)	4 (10.0)	22 (55.0)	40 (100)
Radhanpur	9 (45.0)	2 (10.0)	9 (45.0)	20 (100)
Sami	33 (41.25)	25 (31.25)	22 (27.5)	80 (100)
Harij	16 (80.0)	3 (15.0)	1 (05.0)	20 (100)
Patan	32 (40.0)	37 (46.25)	11 (13.75)	80 (100)
Sidhpur	2 (10.0)	7 (35.0)	11 (55.0)	20 (100)
Chanasma	11 (27.5)	23 (57.5)	6 (15.0)	40 (100)
Total	117 (29.25)	101 (25.25)	182 (45.5)	400 (100)

Salt samples from school children's home can give idea about consumption pattern of iodized salt in community. A total of 400 salt samples collected from children were analyzed. Salt samples from School Children's home can give idea about consumption pattern of iodized salt in community. There were no iodine in 29.25% salt samples, 25.25% salt samples, iodization was found < 15 ppm and while 45.5% samples were iodized adequately (≥ 15 ppm). In Harij taluka, only 5% salt samples are adequately iodized. Harij (80%), Radhanpur (45%) Sami (41.3%) and Patan (40%) taluka shows no iodization of salt which is consumed (Table 2).

A total of 150 urine samples were collected and analyzed. Laboratory findings of Urinary excretion of iodine showed that 64 (42.7%) samples had 100 μg / L or more iodine level. Rest of samples of urine (57.3%) showed insufficient excretion of iodine which reflect deficit intake of iodine. Median of urinary iodine of Patan district was 83.75 μg / L, which was very low as compared to minimum standard of 100 μg / L. Gender wise median urinary

iodine concentration is 92.5 μg / L in males and 80 μg / L in females.

Taluka wise median urinary iodine concentration shows that only two talukas having a median urinary iodine concentration more than 100 μg / L (Patan 101.25 and Sidhpur 188.5) which suggest that these two talukas have adequate iodine intake. Other talukas had mild iodine deficiency.

DISCUSSION

The term Iodine deficiency Disorders (IDD) as proposed in 1983 refers to all effects of Iodine deficiency on growth and development in human and animal population, which can be prevented by correcting iodine deficiency⁸.

The present study based on clinical examination of 9139 students in Patan district indicated a goiter prevalence of 7.5%. While studying the relationship of goiter prevalence with age, we observed that goiter prevalence was insignificantly higher in older children: 8.11% in 10-

Table 3: Urinary iodine in various taluka of patan district

Taluka	Status of Urinary Iodine in urine sample	
	< 100 µg / L	≥ 100 µg / L
Santalpur	15 (17.4)	05 (07.8)
Radhanpur	08 (09.3)	02 (03.1)
Sami	22 (25.6)	18 (28.1)
Harij	08 (09.3)	02 (03.1)
Patan	20 (23.2)	20 (31.2)
Sidhpur	01 (01.2)	09 (14.1)
Chanasma	12 (14.0)	08 (12.5)
Total	86 (100.0)	64 (100.0)

13 year old children against 7.05% in 6-9 year old children. Imtiyaz et al⁹ reported a similar pattern: 12.8 % in 9-12 year old children as against 10.6% in 6-8 year old children. This may be expected, due to pubertal age and during this phase of life spurt in growth of body organ may cause enlargement of Thyroid gland. In our study, we observed a slight higher prevalence in girls (7.81%) than in boys (7.1%). Females had slightly more prevalence of

Grade I goitre as compared to males, while grade II goitre was recorded slightly more in case of male. Sahu et al¹⁰ showed a prevalence of 23.1% in girls and 17.3% in boys in Orissa. Another study¹¹ revealed a prevalence of 7.3% in boys and 17.0% in girls in Puranpur district

Taluka wise sami and Chanasma had higher prevalence rate followed by Radhanpur and other. In district, out of 400 samples, only 182 (45.5%) salt samples were adequately iodized, shows need for strengthening of distribution network for iodized salt at a affordable rate that community can accept.

CONCLUSION

Present report suggests that still IDD is a health problem in Patan District and Program activities need to be strengthened. Health education can help in increasing public awareness about the nutritional value of iodized salts in the prevention of this disorder in order to ensure that IDD remains under control. Also, availability of iodized salt in open market as well as Public Distribution shop round the year should be ensured followed by close monitoring of Programme by District Health authority.

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