

Prevalence of Goiter in the Children of 6-12 years in Porbandar district, Gujarat, India

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Abstracts: Research Question: What is the situation of Iodine Deficiency Disorders (IDD) and salt consumption in Porbandar district? Objectives: To assess the magnitude of IDD in Porbandar district and also assess the salt consumption patterns in the region. Design: Cross Sectional Study. Setting: Primary schools in rural areas. Study Tools: Clinical examination of study population for goiter, laboratory assessment of urine samples of study population. Participants: Study was conducted among 2700 school children in the age group of 6-12 years from 30 clusters. Urine samples were collected from 10% of selected children and salt samples from 20% of the selected children. Results: An overall goiter prevalence of 8.8% was observed in the region. Girls had a prevalence of 9.6% and boys had 8.0%. The median urinary iodine excretion in the region was 65 µg/l. 61.9% of children had biochemical iodine deficiency with 25.2%, 14.8% and 21.9% having severe, moderate and mild iodine deficiency respectively. In Porbandar district, only 72.4% households consume salt with iodine content of more than 15 ppm. Conclusion: Iodine Deficiency is a public health problem in the Porbandar district.

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Key Words: Prevalence, Goiter, Iodine Deficiency, Urinary Iodine, Iodized salts**Author for correspondence:** Dr Ilesh Kotecha, Department of Preventive & Social Medicine, Government Medical College, Bhavnagar 364 001 E mail: drileshkotecha@yahoo.co.in

Introduction: Iodine, an essential nutrient needed in a minute quantity is vital component of thyroid hormones. Thyroid hormones are needed for optimal mental and physical development and regulation of body metabolism.¹ 90% of human brain development occurs between 3rd month of pregnancy & 3rd year of life (critical period). Deficiency of iodine during this critical period of development results in permanent brain damage.^{1,2,3} According to WHO, Iodine deficiency is single most common cause of preventable mental handicap worldwide.⁴ The term Iodine Deficiency Disorders refers to all the ill-effects of iodine deficiency in a population that can be prevented by ensuring that the population has an adequate intake of iodine.

IDD has been recognized as a major public health problem worldwide. Almost 1.6 billion people all over the world are at risk of IDD. In India, United Nations Administrative Committee on Coordination/ Standing Committee on Nutrition (ACC/SCN) 2004 estimated that a third of India's population (a sixth of the total global population) is at risk of IDD.⁴ Surveys carried out by Central and State Health Directorates, Indian Council of Medical Research and various Medical Colleges have shown that no State or Union Territory is free from the problem of Iodine Deficiency Disorders

(IDD). Out of 586 districts in the country, 281 districts have been surveyed for IDD and 41 districts have been found to be endemic. The prevalence of goiter in 6-12 years children from ICMR/National Nutrition Monitoring Bureau (NNMB) surveys was 4.8%.^{5,6}

National goitre control program was launched in 1962 with central assistance. In year 1991, name of the program was changed to National Iodine Deficiency Disorders Control Programme. Under which total ban for selling non iodised salts was imposed and universal iodisation of edible salts was made compulsory.¹⁰ The present survey was done after 16 years of implementation of universal salt iodisation. From 2000 the central government lifted the ban on sale of non iodized salt for human consumption

Material and Methods: Two stage cluster sampling was done. The study was conducted in Porbandar District in the month of December 2008. The list of villages, primary schools and children studying in 1st to 7th standard in age group of 6 to 12 years were obtained from the Jilla Panchayat of Porbandar. In first stage, 30 clusters were selected by systematic cluster sampling. In second stage 90 children from each village were selected from the

primary schools randomly from their muster rolls. 12 children (6 boys & 6 girls) from each standard of 1-4 (of age-group 6 to 9) and 14 (7 boys & 7 girls) children from each standard of 5-7 (age-group of 10 to 12) were examined for goitre. If the sufficient children of required age & sex were not available from the single school, another nearby school from the same or nearby village was visited to select & examine remaining children. If the enrolment rate of the school of any village is less than 100%, proportionate children were examined from the community by visiting households. To classify the Goitre, WHO classification for goitre was used.⁷ Urine sample of every 10th student selected was collected in a wide mouthed bottle with thymol crystal and transported to laboratory at Department of Biochemistry, Medical College, Surat. Salt samples of every 5th students' household were checked for the iodine content on the spot with the iodine testing kit. Appropriate statistical tests were applied to compare different variables. Chi-square test was used to compare goiter prevalence among age and sex groups.

Result: A total of 2700 primary school children were examined in the district; out of them 238 (8.8%) had goiter. 8.0% and 0.8% school children were having grade I and grade II goitre respectively. [Table-1]. The prevalence of goiter varied from 8.1% to 11.5%, the lowest in Ranavav Taluka and highest in Kutiyana taluka. The prevalence of goiter was higher in females than in males (9.2% vs. 7.2%) though the difference was statistically not significant [Table-2]. **Urine analysis:** A total of 270 urine samples were analyzed for urinary iodine excretion (UIE). The median UIE was 65 µg/l. The median UI was lowest in Kutiyana taluka, whereas the highest was recorded in Porbandar taluka (70 µg/l) [Table-3]. When UIE values were categorized as recommended by WHO, 61.9% of subjects in Porbandar District had biochemical iodine deficiency, out of which 25.2%, 14.8% and 21.9% had severe, moderate and mild iodine deficiency respectively. According to the epidemiological criteria for assessing severity of IDD based on median Urinary Iodine level, all of these talukas were falling in the category of mild IDD problem

Table 1: Age & Sex wise Prevalence of Goitre in the Children of 6-12 Years of Age of Porbandar District

Age (Years)	Sex	Gr 0 (%)	Gr I (%)	Gr II (%)	Gr I+II (%)
6 – 8 (N=1080)	M	493 (91.3)	44 (8.1)	3 (0.6)	47 (8.7)
	F	487 (90.2)	48 (8.9)	5 (0.9)	53 (9.8)
9 – 10 (N=780)	M	358 (91.8)	29 (7.4)	3 (0.8)	32 (8.2)
	F	361 (92.6)	27 (6.9)	2 (0.5)	29 (7.4)
11 – 12 (N=840)	M	391 (93.1)	26 (6.2)	3 (0.7)	29 (6.9)
	F	372 (88.6)	41 (9.8)	7 (1.6)	48 (11.4)
Total (N=2700)	M	1242 (92.0)	99 (7.3)	9 (0.7)	108 (8.0)
	F	1220 (90.4)	116 (8.6)	14 (1.0)	130 (9.6)
Total	N=2700	2462 (91.2)	215 (8.0)	23 (0.8)	238 (8.8)
X ² = 0.357, df = 4, P value = 0.55 Difference statistically not significant					

Table 2: Sex wise Prevalence of Goiter in the Children of 6-12 Years of Age of Porbandar District

Sex	No Goitre (%)	Goitre Gr I (%)	Goitre Gr II (%)	Goitre Gr I+II (%)
Boys (n=1350)	1242 (92.0)	99 (7.3)	9 (0.7)	108 (8.0)
Girls (n=1350)	1220 (90.4)	116 (8.6)	14 (1.0)	130 (9.6)
Total (n=2700)	2462 (91.2)	215 (8.0)	23 (0.8)	238 (8.8)
X ² = 2.23, df = 1, P value = 0.135 Difference statistically not significant				

(Median Urinary Iodine within 50-99 µg/L).⁸ [Table 4]

Salt analysis: A total of 540 household salt samples, collected from the children were analyzed for iodine content by using spot iodine test kits. Nearly 72.4% of household's salt samples were found iodized with more than 15 ppm of iodine,

Table 3: Iodine Estimation in the Urine Samples of the Children (10% Children) of 6-12 years of age Of Porbandar District

Taluka	No. of Urine Samples	Median $\mu\text{g/L}$	No. of Urine samples with iodine level (%)			
			<20 $\mu\text{g/L}$	20-49 $\mu\text{g/L}$	50-99 $\mu\text{g/L}$	≥ 100 $\mu\text{g/L}$
Porbandar	153	70	37 (24.2)	23 (15.0)	27 (17.6)	66 (43.2)
Ranavav	63	65	12 (19.0)	10 (15.9)	16 (25.4)	25 (39.7)
Kutiya	54	50	19 (35.2)	7 (13.0)	16 (29.6)	12 (22.2)
District	270	65	68 (25.2)	40 (14.8)	59 (21.9)	103 (38.1)

Table 4: Assessing severity of IDD based on Median Urinary Iodine levels

Urinary Iodine Level (mcg/l)	Severity of IDD	Percentage (N=270)
<20	Severe	25.2
20-49	Moderate	14.8
50-99	Mild	21.9
>100	Normal	38.1

Whereas 8.5% households salt samples were found non iodized in Porbandar district.

The prevalence of Goiter was more in those who were consuming non iodised salt compare to those consuming iodised salt, though the observed difference was statistically not significant. [Table-5].

Discussion: To evaluate the severity of IDD in a region, WHO recommended the criteria of prevalence of endemic goitre in school children.⁸ In the present study, the total goitre prevalence was 8.8% indicating that IDD is a mild public health problem in the region.

Various resurveys (between 1998 & 2001) conducted by different medical colleges of the Gujarat state have shown that most of the districts have the prevalence rate of Goitre in school going children of more than 5%.⁹

In this study, availability at household level of iodized salts was only 72.4% (>15 ppm). Data from District Level Household Survey (DLHS-RCH 2002-04) survey confirmed that as compared to National

Table 5: Association of Iodine Level of Salt Consumed & Goitre Prevalence in the Children of 6-12 Years of Porbandar District

Goitre Grade	Prevalence of Goitre among the Children with Salt iodine content of (%)			
	NIL (n=46)	>0 to 15 ppm (n=103)	≥ 15 ppm (n=391)	TOTAL (n=540)
No Goitre (Gr 0)	40 (87.0)	96 (93.2)	366 (93.6)	502 (93.0)
Total Goitre (Gr 1+ Gr 2)	6 (13.0)	7 (6.8)	25 (6.4)	38 (7.0)

$X^2 = 0.58$, $dF = 1$, $P \text{ value} = 0.448$, $RR = 1.36$ (95% C.I. – 0.72 to 2.60) Difference statistically not significant

Family Health Survey 2 (1998-99) there was some decline in the household availability of iodized salt after lifting of the national ban.^{10,11} Data from NNMB micronutrient survey (2003) also confirmed decreased use of iodized salt in various states.⁵

Conclusion: The present study shows mild prevalence of goiter in Porbandar with difference of goiter between those consuming iodized salt & those not consuming iodized salt which indicates universal iodization and consumption may reduce prevalence of iodine deficiency in the area.

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