

Changing Prevalence of Iodine Deficiency Disorders in Bhavnagar District

Dr. Sanat Rathod, Dr. Dhiren Amin, Dr. Devang Raval, Dr. Vikas Doshi, Dr. MP Singh

Department of Preventive & Social Medicine, Medical College, Bhavnagar-364 001.

Abstracts: Research Question: What is the situation of iodine deficiency disorder (IDD) and salt consumption in Bhavnagar district? Hypothesis: The prevalence of IDD has increased markedly as a result of medical as well as socio-economic factors. Objective: To assess the magnitude of IDD in Bhavnagar 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 goitre, laboratory assessment of casual urine sample for urinary iodine estimation of I2 content of salt samples collected from sub-samples of study population. Participants: Study was conducted among 2,940 School children in the age group of 6-12 years were selected for study using WHO 30-cluster methodology, urine samples were collected from 15% of selected children and salt samples from 43% of sub-sample. Ethical Concern: No ethical issues were involved. Results: An overall goitre prevalence of 34.19% was observed in the region. Females had a prevalence of 32.9% and males 35.4%. The median urinary iodine excretion in the region was 11.0 µg/l (range: 29.0-190.0 µg/l). Ninety-seven percent of subjects had biochemical iodine deficiency with 73.87% having severe deficiency, 21.38% having moderate and 4.04% mild iodine deficiency. In Bhavnagar region, only 34.27% households consume powdered salt having an Iodine content of greater than 15 ppm. Conclusion: Present study showed severe goiter prevalence in primary school children in Bhavnagar district [Rathod S et al NJIRM 2011; 2(4) : 18-21]

Key Words: Goitre; Iodine deficiency; Salts; Cross-sectional studies; Urinary Iodine; Prevalence; India

Author for correspondence: Dr. Sanat Rathod, Department of Preventive & Social Medicine, Medical College, Bhavnagar-364 001. E-mail: dr_sanat007@yahoo.com

Introduction: Iodine deficiency once considered a minor problem, causing goitre, an unsightly, but seemingly benign cosmetic blemish, is now known to be the most common preventable cause of mental handicap in the world. Previously it was thought that Iodine deficiency is present only in the foothill areas and some pockets in the tribal areas of the country, but now it is known that the problem of Iodine deficiency disorders is prevalent all over the country¹. About 200 million people are at the risk of IDD in our country. The survey conducted by the Central & State Health Directorates, ICMR and medical Institutes have clearly demonstrated that not even a single State/UT is free from the problem of Iodine Deficiency Disorders. It is estimated that 71 million population are suffering from goitre and other iodine deficiency disorders. Samples surveys have been conducted in 28 States and 7 Union - Territories of the country which revealed that out of 324 districts surveyed so far IDD is a major public health problem in 263 districts where prevalence is more than 10 per cent¹. Government

of India made it compulsory to sell only iodized salt to prevent this problem. However recently Government of India and then Government of Gujarat have withdrawn the ban on sale of non-iodization of salt. We have tried to reemphasize the importance of Universal Salt Iodization (USI) in this paper.

Material and Methods: The 30 cluster cross sectional study was conducted in the entire 11 Talukas of Bhavnagar district from 14th-27th march 2009. The list of villages, primary schools and population were obtained from the Jilla Panchayat of Bhavnagar. As per the guidelines provided, total 30 villages were selected from the Bhavnagar district by using cluster sampling technique. Census 2001 population was used for sampling. Areas mentioned as urban areas like cities, towns, taluka headquarters were excluded from the village list to focus only the rural population of Bhavnagar district. The survey was done among these villages in children studying in primary schools from 1st to 7th standard. The age group selected for the survey

was from 6 to 12 years. Total 70 children were examined for iodine deficiency from each primary school of selected villages. Out of these 70 children, 35 boys and 35 girls were examined. Five boys and five girls each were selected from 1st standard to 7th standard. Urine sample was also collected from one boy and one girl from each standard (total 14) to know their status of iodine excretion in urine. As per guidelines provided, about 30% school dropout rate & absenteeism was considered, 28 students were examined in the community for iodine deficiency on same day in same village. Out of these 28 students, 14 boys and 14 girls were examined. Two boys and two girls each from 6th to 12th year age were searched in the village and examined for the Iodine deficiency. Salt sample was taken from each of these children and tested by using salt testing kit supplied to all district level for the this purpose to know the level of iodization at the household level. Cases of goitre were identified and classified by using the latest classification given by W.H.O².

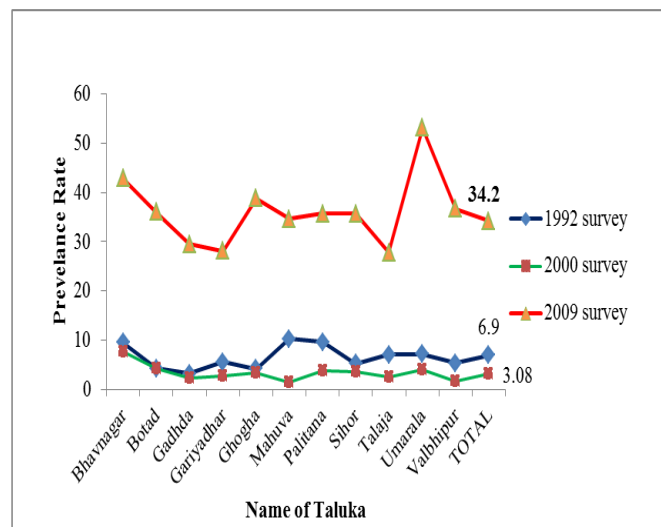
Result: Total 2940 children in the age group of 6 to 12 years, including 2100 primary school children among schools & 840 children out of schools were examined for iodine deficiency disorder in the community. 26.16% children were in grade 1 of goitre and 8.03% children were in grade 2. Remaining 65.81% children were normal. It indicates the total prevalence of 34.19%. The total prevalence is high in Boys (35.4%) for both grade 1 (26.7%) & grade 2 (8.7%) compare to Girls (32.9%) for both grade 1 (25.6%) & grade 2 (7.3%) which is much more than other study^{3,4,5}.

Table I: Age & Sex wise Prevalence of Goitre in the Bhavnagar District

Age (Years)	Sex	Grade 0	Grade 1	Grade 2	Prevalence of Goitre (Grade 1+2)
6-8 yrs (n=1260)	M (n=630)	430	154	46	200 (31.7%)
	F (n=630)	458	146	26	172 (27.30)
9-10 yrs (n=839)	M (n=421)	274	111	36	147 (35.0%)
	F (n=418)	274	116	28	144 (34.5%)
11-12 yrs (n=841)	M (n=418)	245	127	46	173 (41.4%)
	F (n=423)	254	115	54	169 (40.0%)
TOTAL (n=2940)	M (n=1469)	949	392	128	520 (35.4%)
	F (n=1471)	986	377	108	485 (32.9%)
	Total	1935	769	236	1005 (34.2%)

To know the prevalence of goitre among school children, a total of 2940 children were examined; out of them 1005 (34.2 %) were found to be having goitre. Out of them 769 (26.19%) were of grade I and only 236(8.03%) were of grade II.

Figure I : Showing Rate of Prevalence of Goitre amongst Primary School Children of Various Talukas of Bhavnagar District 1988 Vs 2000 Vs 2009



When current prevalence was compared with the baseline data of 1988 and 2000 and 2009 survey, it was found that prevalence rate of goitre has increased in all the Talukas³.

Table II: Comparison Goitre Grade and level of iodine content in Salt testing:

Goitre Grade	Salt Testing			TOTAL (n=1260)
	Nil (n=574)	>0 to <15 ppm (n=230)	≥ 15ppm (n=452)	
No Goitre (Grade 0)	358 (46.7%)	123 (16.1%)	285 (37.2%)	766 (60.99%)
Goitre (Grade 1)	165 (45.3%)	70 (19.2%)	129 (35.4%)	364 (28.98%)
Goitre (Grade 2)	51 (40.5%)	37 (29.4%)	38 (30.2%)	126 (10.03%)
Goitre Total (Grade 1+2)	216 (85.8%)	107 (48.6%)	167 (65.6%)	490 (39.01%)

For difference in the Prevalence of goitre (Total i.e. Gr 1 & Gr 2) between those who are consuming salt with sufficient iodine (≥ 15 ppm) and those who are consuming salt with insufficient iodine (< 15 ppm or Nil). $\chi^2 = 13.1796$, $dF = 4$, P value = 0.0104

The difference observed in the prevalence of Goitre between those who were consuming iodated salt and who were not, was statistically significant in the Bhavnagar district.

Urine analysis : A total 421 casual urine samples were analyzed by Biochemistry Department for urinary iodine excretion (UIE). The median UIE was 11.0 µg/l which was much less than study done in Delhi⁶ and Jammu⁴. Assessment of severity of IDD in Bhavnagar District based on Median Urinary Iodine level as recommended by WHO² given below:

Table III Assessing severity of IDD based on Median Urinary Iodine levels

Urinary Iodine Level (mcg/l)	Severity of IDD	Percentage (N=421)
<20	Severe	311 (73.87%)
20-49	Moderate	90 (21.38%)
50-99	Mild	17 (4.04%)
>100	Normal	3 (0.71%)

Discussion: To evaluate the severity of IDD in a region, the most widely accepted marker is the prevalence of endemic goitre in school children. WHO on the basis of IDD prevalence recommended the criteria to understand the severity of IDD as a public health problem in a region. According to these criteria, a prevalence rate of 5.0-19.9% is considered as mild; 20-29.9% as moderate and a prevalence rate of above 30% considered as a severe public health problem². In the present study, the total goitre prevalence was 34.19% indicating that IDD is a severe public health problem in the region.

The government of India launched a centrally assisted national goitre control programme in 1962. The programme was renamed as National iodine deficiency disorder control programme (NIDDCP) in 1992. Government also took a policy decision to universal iodization of edible salt in the same year. The goal of NIDDCP was to reduce the prevalence of IDD below 10% by 2010.⁷ The present survey conducted after 17 years of implementation of universal iodization of edible salts did not show much impact on the prevalence of goitre in rural areas of Bhavnagar district as only

34.27% households consume powdered salt having an Iodine content of greater than 15 ppm which was also less as compared to other states^{4,5,6} and prevalence of Goiter in the region is in rising trend.³ The difference in the prevalence of goitre in the baseline survey of 1992, 2000 and re-survey of 2009 is highly significant. These results are in line of re-surveys of other districts.^{4,5,8} Since January, 2001 in Gujarat, the ban of the availability of non-iodized salts in the market increased. In November 2005, the Central government issued notification banning the sale of non-iodized salt for direct human consumption in the entire country.⁹ Looking at our results, it is desirable that government should continue Universal Salt Iodization and ensure that only Iodized salts consumed by all.

Conclusion: The present study discovered that Bhavnagar now passed into high prevalence state of IDD with significant difference of goiter between those consuming iodized salt & those not consuming iodized salt, which indicates universal iodization and consumption will definitely reduce prevalence of iodine deficiency in the area.

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