Status of Iodine Deficiency Disorders Control Program in district Jashpur of Chhattisgarh

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Abstract:

Introduction: Globally Iodine Deficiency Disorders (IDDs) are a major public health problem. The single most important preventable cause of mental retardation is Iodine deficiency (ID). Iodine deficiency disorders (IDDs) refer to all the consequences of Iodine deficiency in a population. However, all these disorders can be easily prevented before they occur by consuming iodated salt daily. Present study was done in district Jashpur Chhattisgarh to assess the impact of Iodine Deficiency Disorder Control Program with the following objectives:

1. To estimate the prevalence of goiter among children of age group 6-12 years
2. To evaluate the iodine uptake status reflected by Urinary Iodine Excretion (UIE) levels in sub sample of study population.
3. To assess coverage of iodized salt at community level by using Rapid Salt Testing Kit. To assess storage practice and Knowledge regarding benefits of Iodized salt.

Study Design: A Cross-sectional study was conducted in selected schools of Jashpur district. Children in the age group of 6-12 years were selected for study using latest NIDDCP guidelines of Government of India. Clinical examination of 90 children (45 boys and 45 girls) in each school/cluster for goiter was done. Sub sample of study population were selected by systematic random sampling for urine sample and Median Urinary Iodine excretion (MUIE) was estimated. Salt samples were collected from 4 randomly selected households and 1 sample from retail shop from each identified clusters using rapid salt testing kit and storage practices were also observed at the same time.

Results: Prevalence of Goiter was found to be 16.29%. The prevalence of Goiter was higher among boys than in girls. The prevalence was highest in female children with age group of 8-9 years. Median urinary Iodine excretion (MUIE) was found to be 53mcg/l. 53.52% salt samples brought by school children were found inadequately iodized (Iodine content<15ppm). 45% salt samples among visited households had unsatisfactory (<15PPM) iodine content. 88.51% of children had insufficient iodine intake.

Conclusion: Jashpur district is highly endemic for Iodine Deficiency Disorders (IDD). This needs immediate public health measures. Universal salt iodization with periodic monitoring of IDD should be undertaken with top priority.

Key Words

Iodine Deficiency Disorder (IDD), NIDDCP, Goiter, Urinary Iodine excretion (UIC).

Introduction

Globally Iodine Deficiency Disorders (IDDs) are a major public health problem. [1]The single most important preventable cause of mental retardation is Iodine deficiency (ID)[2]. In India out of 582 districts in the country, district level surveys conducted in 324 districts have revealed that IDD is a major public health problem in 263districts, i.e. prevalence rate of Goiter is 10% and more in the population. [5]Iodine deficiency disorders (IDDs) refer to all the consequences of Iodine deficiency in a population. More than 1.5 billion people all over the world are at risk of IDD. Iodine deficiency has multiple adverse health effects, all due to inadequate thyroid hormone production, that are termed the iodine deficiency disorders (IDD). Iodine Deficiency Disorders are permanent and incurable with few exceptions. It may lead to Goiter, still births, abortions; congenital anomalies increased infant mortality, mental deficiency, deaf-mutism, squint & dwarfism. However, all these disorders can be easily prevented before they occur by consuming iodated salt daily. Iodine is required for the synthesis of the thyroid hormones, Thyroxine (T4) and Tri-iodothyronine (T3). When iodine intake falls below the recommended levels, the thyroid may no longer be able to synthesize sufficient amounts of thyroid hormones. The resulting low level of thyroid hormones in the blood (hypothyroidism) is the principal factor responsible for damage to the developing brain of fetus[3]. Salt iodization has been introduced in many countries to control iodine deficiency. The Govt. of India took a policy decision to iodate the entire edible salt in the country by 1992[4]. In 1962, Government of India launched National Goiter Control Program and in 1992, it was renamed as National Iodine Deficiency Disorders Control Program[2]. According to WHO/UNICEF/ICCIDD, a total goitre rate of 5% or more in primary school children (6-12 yr) is used to signal the presence of a public health problem[6]. Present study was done in district Jashpur Chhattisgarh to assess the impact of Iodine Deficiency Disorder Control Programme with following objectives:

1. To know the prevalence of goiter in children 6-12 years by clinical examination.
2. To assess the iodine uptake status by Urinary Iodine Excretion (UIE) levels in study population.
3. To know the status of coverage of iodized salt at community level by on-the-spot testing through Rapid Salt Testing Kit and storage practices in the study area.

Material and Methods

Study Design: Cross sectional observational study Study Area: Jashpur district of Chhattisgarh

Study Sample: As per the Government of India recommended methodology Sampling technique: 30 cluster sampling. Sample Size: 2700 children {90 children (45 boys & 45 girls) from 30 clusters}

Study tool: Clinical Examination of 6-12 years children for enlargement of thyroid (i.e. Goiter), Rapid Salt Testing kit for assessment of iodine content in edible salt, Estimation of Urine Iodine Excretion (UIE) by wet digestion method (i.e. The Sandell Kolthoff reaction) done at Dept of Biochemistry Pt. JNM Medical College Raipur. Entire Jashpur district was covered during June 2015. The survey team consisted of trained Medical Personnel (i.e. PG scholar / Junior Resident/Demonstrator/ Interns) of Department of Community Medicine, Pt. JNM Medical College, and Raipur (C.G).

Observations

Table 1: Block wise prevalence of Goitre in Jashpur District

Block	Children examined	Goitre Cases	Prevalence Rate (%)
Bagicha	540	49	9.05
Duldula	180	28	15.56
Farsabahar	450	142	32.22
Jashpur	180	67	37.22
Kansabel	270	22	8.15
Kunkuri	270	39	14.45
Pathalgaon	540	65	12.04
Manora	270	25	9.26
Total	**2700**	**437**	**16.18**

Table 2: Age and Sex wise Prevalence of Goiter among surveyed children in Jashpur District

Age group	Sex	Total examination	Grade of Goiter			Total cases Goiter (1 & 2)	Percentage
			Grade 0	Grade 1	Grade 2		
6-7 Years	M	351	298	37	16	54	15.09
	F	365	303	45	17	62	16.98
	Total	716	601	82	33	116	16.06
8-9 Years	M	349	294	40	15	55	15.75
	F	335	278	35	22	58	17.01
	Total	684	572	75	37	113	16.37
10-11Years	M	373	315	42	16	58	7.9
	F	359	298	46	15	61	16.99
	Total	732	613	88	31	119	16.25
12 Years	M	310	266	33	11	44	14.19
	F	292	245	33	14	48	16.09
	Total	602	511	66	25	92	15.11

Table 3: Distribution according to indicators of iodine deficiency disorder as per IDDCP targets

Indicators	IDDCP targets	Observation in Jashpur district
Goiter Prevalence	< 5%	16.29%
Urinary iodine excretion	Proportion <100mcg/l (<50%)	89%
	Proportion <50 mcg/l (<20%)	46.66%
Median Urinary Iodine Excretion (MUI)	> 100mcg/l	53mcg/l
Salt iodization coverage of school children	>15PPM >90% household	52.48%
Status of Iodine Deficiency as per UIE level		
UIE level	**Proportion of observed children**	**Interpretation**
< 20 mcg/L	0.00%	Severe Iodine Deficiency
<50 mcg/L	46.66%	Moderate Iodine Deficiency
<100 mcg/L	41.85%	Mild Iodine Deficiency

Table 4: Distribution of edible salt and Iodine content of Salt sample in Household Survey/Retail shop and Knowledge about benefits of Iodized Salt

S. No	Source of Edible Salt in household survey	Iodine Content		Total
		> 15 PPM	**< 15 PPM**	
1	Public Distribution System (PDS)	49 (50%)	49 (50%)	98 (81.67%)
	Local Retail Shop	20 (90.9%)	2 (9.09%)	22 (18.33%)
	Total	69 (57.5%)	51(42.5%)	120 (100%)
Storage practices in household survey				
2	Closed Container	43(63.23%)	25(36.76%)	68 (54.16%)
	Open Container	8 (15.3%)	44(65.38%)	52 (45.83%)
	Total	51 (42.5%)	69(57.50%)	120 (100%)
3	**Salt coverage in Retail Shop**	3.33%	96.67%	100%
Knowledge about benefits of Iodized Salt				
4	Yes	12(17.33%)	2 (3.92%)	14 (11.66%)
	No	57(82.67%)	49(90.08%)	106(88.33%)
	Total	69(57.55%)	51(42.45%)	120 (100%)

Results

Goiter prevalence

Out of 2700 school children clinically examined prevalence of Goiter in surveyed district was found to be 16.18% (Table no.1). Block wise prevalence was highest in Jashpur block (37.22%) and lowest in Kansabel block (8.15%) (Figure no.1). Age wise prevalence was Highest (16.37%) in 8-9 years age group of children whereas low (15.11%) in 12 years of children (Table no. 2). Median urinary Iodine excretion (MUIE) was found to be 53mcg/l (Table no. 3). As evaluation of urinary iodine estimation showed that majority (88.51%) of children had insufficient iodine intake. 41.85% of children had mild Iodine deficiency followed by 46.66% moderate Iodine deficiency (Table no.3). On analysis of salt samples brought by School children reveals that 46.48% (251 out of 540) salt samples were found adequately iodized whereas 53.52% (289 out of 540) salt samples were found inadequately iodized(Iodine content <15 ppm) (Table no.4). Out of all visited household (i.e. 120household) 45% of (54 out of 120) had unsatisfactory (< 15 PPM) iodine content (Table no.5). Majority 81.67% (98 out of 120) of them procure edible salt from Public Distribution System (PDS) (Table no.4).Almost all the 96.67% (29 out of 30) retail shops surveyed had iodine content >15 ppm (Table no. 4). Faulty storage practice was observed in 45.83% (52 out of 120) of visited households (Table no.5). Only 11.66% (14 out of 120) had knowledge about benefits of iodized salt among visited households (Table no.4).

Discussion

Goiter prevalence

In the present study, Prevalence of Goiter was found to be 16.18%. Our study finding was in accordance with a similar study done by Sambit Das et al which reported Prevalence of Goiter to be 15.1% [7] and a study in Ambala, Haryana 2010- 2011, showed 12.6% prevalence of Goiter[8]. Low prevalence was found in a study by Praveen Kumar N, Karnataka [9]. In a similar study in West Bengal, Akhil Bandhu Biswas, 2011 reports goiter prevalence rate of 8.67% with 8.08% prevalence of grade I and 0.58% prevalence of grade II [10]. In a study in Gandhinagar, goiter prevalence was found to be 7.75% [11]. In another study in Jammu prevalence of goiter was found to be 11.9%.[11,12]. However, Praveen Kumar N et al and Akhil

Bandhu Biswas et al. West Bengal depicts total Goiter rate highest (11.59%) among girls of 12 years and higher among girls (10.54%) than boys (7.05%) respectively in similar community based study.[9,10]. Similar community based study in Ambala reports high prevalence of goiter in females than male with high prevalence in the age group of 11-12 years.[8]

Urinary Iodine Estimations

In present study 88.51% children had insufficient iodine intake. Mild iodine deficiency was found among 41.85% surveyed children whereas 46.66% had moderate iodine deficiency. A similar study in Karnataka by Praveen Kumar N et al. 74.7% of urine samples showed Iodine deficiency, out of which 0.3% had mild Iodine deficiency, 4.07% had moderate and 67% had severe Iodine deficiency. [9]Another study by Akhil Bandhu Biswas, West Bengal, 2011 shows 0.28% children had urinary iodine level in severe range and 0.56% children had mild urinary iodine level. [10]Median urinary Iodine excretion (MUIE) of 53 mcg/l was found in present study. In a similar study in Gandhinagar the Median urinary Iodine excretion was found to be 165mcg/l.[11] Another study in Delhi, 2013 reported MedianurinaryIodineexcretion200mcg/l.[14]

Iodine content in Salt Samples

In present study out of 540 (18/cluster) salt samples brought by school children 53.52% (289 out of 540) salt samples were found inadequately iodized (i.e. Iodine content<15 ppm), Contrary to this finding, Karnataka study showed 60.8% salt samples had iodine content <15 ppm.[9] But in similar study by Akhil Bandhu Biswas, West Bengal, 2011, only 5.6% of salt sample was found inadequately iodized.[10]In present study 96.67% (29 out of salt sample from retail shops had iodine content >15 ppm in comparison to other studies conducted by Sambit Das et al 98.1%, by Shridhar V. Rawal et al 90.5% of saltsamples in Gandhinagar and by B.K.Potra et al 70.9% from shops reported >15 ppm iodine in similar study. [7,11,15]Household survey of salt samples 120 (4/cluster) in present study reveals, 45% (54 out of 120) had iodine content < 15 PPM and 55% had iodine content >15 ppm. Another similar study in Ambala 2010-2011, reports adequately iodized salt sample (88%) from household surveyed whereas only 3.2% were non- iodized. [8]In a prevalence study in Gandhinagar 90.5% of salt samples were found to be adequately iodized. [11]We observed faulty storage practices in 45.83% (52 out of 120) of households which could be due to lack of knowledge about benefits of iodized salt which is only 11.66% (14 out of 120).

Conclusion and Recommendations

High Goiter prevalence and unacceptable level of MUIE and gap in universal salt iodization seems to be reason of endemicity for IDD in surveyed district. Our observations showed poor implementation of Iodine Deficiency Disorder Control Program (IDDCP) in Jashpur district. After launch of Chhattisgarh Amrit Namak brand to BPL family through PDS government failed to access the quality of iodized salt in the district. Survey findings are eye opening findings and needs urgent attention to overcome this public health problem. There is need to address this problem on top priority. Since this is a baseline survey for surveyed district with high endemicity of IDD, these findings may be similar or higher in other unsurveyed district. So we recommend baseline survey for all the district of Chhattisgarh. Since Jashpur district is highly endemic for IDD therefore for monitoring purpose periodic assessment of IDD, through monitoring of iodine intake supported by other preventive perspective as well as curative care should be started immediately in the district.

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