

## Brief Reports

### Current Status of Iodine Nutriture and Iodine Content of Salt in Andhra Pradesh

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*A cross sectional survey was conducted in the year 2001, to establish the current status of iodine nutriture and level of salt iodisation in the state of Andhra Pradesh, India.*

*All the 23 districts were included. The data was collected in each district through school approach. A total of 3706 salt samples and 1952 casual urine samples were collected. Nearly 45% of the population was found to be consuming iodised salt. All the districts had adequate iodine nutriture except Rangareddy and Cuddapah. The districts which were earlier found endemic to iodine deficiency namely Srikakulam, Vizianagaram, Visakhapatnam, Godavari, Khammam, Adilabad and Warrangal were found with adequate iodine nutriture as reflected by median UIE level of more than 100 µg/L. The study revealed success of salt iodisation program in the state.*

**Key words:** *Iodine deficiency, mental retardation, iodized salt, urinary iodine excretion level*

Iodine deficiency is the most common preventable cause of mental retardation in the world today(1). Surveys conducted in 282 districts of India have identified 242 districts as endemic to iodine deficiency(2). The Government of India had initiated a National Iodine Deficiency Disorders Control Program (NIDDCP) for prevention of iodine deficiency disorders (IDD). Under the NIDDCP program, there is a policy of universal salt iodization under which the entire population of the country is to receive iodized salt with a minimum of 15 ppm of iodine. However, the Government of Andhra Pradesh had implemented a partial ban on sale of non-iodized salt for edible purposes in iodine endemic districts only(3).

The consumption of iodised salt has been reported to be low by the population in Andhra Pradesh(4). The recent National Family Health Survey (NFHS) II conducted in 1998-1999 also revealed that in Andhra Pradesh as high as 72.5% of the salt samples had iodine content less than the stipulated level of 15 ppm(4). The present study was conducted to establish the current status of iodine nutriture and level of salt iodisation in different districts of Andhra Pradesh in the year 2001 so that the corrective measures can be initiated to prevent IDD.

#### Subjects and Methods

The study was undertaken in all the 23 districts of Andhra Pradesh during the year

2001. The guidelines recommended by WHO / UNICEF / ICCIDD for a rapid assessment of salt iodisation in a district was adopted(1). In each district all the senior secondary schools were enlisted and one school was selected by random sampling for the detailed study. One hundred and fifty children in the age group of 11 to 18 years studying in the school were included in the study and briefed about the objectives of the study during the morning assembly. Children belonging to different villages attending the school on the day of the survey were identified and were provided with auto seal polythene pouches with an identification slip. They were requested to bring four tea spoons of salt (about 20 g) from their family kitchen. A minimum of 100 salt samples were collected from each district by utilizing the uniform sampling methodology. The iodine content of salt samples was analyzed using the standard iodometric titration method(5). An internal quality control sample having a known concentration range of iodine content was run with every batch of test samples. If the results of the internal quality control sample was within the range then the test was deemed in control and if the results were outside the range, then the whole batch was repeated.

More than 35 children from the same school were randomly selected and were requested to provide "on the spot" casual urine samples. Plastic bottles with screw caps were used to collect the urine samples. The samples were stored in the refrigerator until analysis. The urinary iodine excretion (UIE) levels were analyzed using the wet digestion method(6). An internal quality control sample having a concentration range of iodine content was run with every batch of test samples, as specified above. In addition to the proportion of children consuming iodised salt and their urinary iodine excretion levels, 95% confidence interval was also worked out.

## Results

A total of 3706 salt samples were collected from 23 districts of Andhra Pradesh. The district wise distribution of iodine content of salt is depicted in *Table I*. It was observed that 55% of the families were consuming iodised salt with more than 5 ppm. In other words, the 95% confidence interval of these families was 52.9% to 57.2%. It was found that in the coastal districts of Nellore, Rangareddy, Vishakhapatnam, Anantapur, East Godavari, Kurnool, Prakasam and Mehaboobnagar districts less than 10% of the families were consuming salt with iodine content of 15ppm.

*Table II* depicts the district-wise distribution of UIE levels. It was found that districts Rangareddy and Cuddapah had median UIE less than 100  $\mu\text{g/L}$  along with more than 20% of the urine samples with less than 50  $\mu\text{g/L}$  of iodine. These findings indicated deficient iodine nutriture in the population studied. This finding was further substantiated by the fact that in both these districts more than 60% of the families were consuming iodised salt with less than 5 ppm.

## Constraints of the Study

The most commonly recommended methodology for assessment of iodine content of salt is the 30 cluster sampling approach. However, the present study was a rapid survey in which senior secondary school children in the age group of 11-18 years were included in the study (students from 15-30 villages attend the school). The research methodology was designed keeping in mind the budget and time constraints. The main objective of the present rapid survey was to assess the level of salt iodisation and we also took the opportunity of assessing the iodine nutriture of the population also. Hence, the urinary iodine excretion levels were estimated in children in the age group of 11-18 years. On account of

**TABLE 1**—*Iodine Content of Salt Samples Collected at Beneficiaries Level in Andhra Pradesh (n = 3706)*

Name of the District	N	Iodine Content (ppm)		
		<5	5-15	15 & more
Nellore	119	95(79.8)	21(17.6)	3(2.5)
Rangareddy	204	134(65.7)	62(30.4)	8(3.9)
Vishakhapatnam	205	156(76.1)	39(19.0)	10(4.9)
Anantpur	155	78(50.3)	69(44.5)	8(5.2)
East Godavari	152	63(41.4)	79(52.0)	10(6.6)
Kurnool	106	9(8.5)	88(83.0)	9(8.5)
Prakasam	150	125(83.3)	11(7.3)	14(9.3)
Mehboobnagar	100	13(13.0)	77(77.0)	10(10.0)
Cuddapah	155	94(60.6)	43(27.7)	18(11.6)
Nalgonda	150	93(62.0)	38(25.3)	19(12.7)
Srikakulam	205	25(12.2)	153(74.6)	27(13.2)
Warangal	158	69(43.7)	67(42.4)	22(13.9)
West Godavari	148	77(52.0)	50(33.8)	21(14.2)
Chitoor	183	61(33.3)	84(45.9)	38(20.8)
Vijaynagar	211	93(44.1)	72(34.1)	46(21.8)
Nizamabad	200	110(55.0)	46(23.0)	44(22.0)
Krishna	150	107(71.3)	6(4.0)	37(24.7)
Khammam	150	79(52.7)	33(22.0)	38(25.3)
Guntur	150	60(40.0)	43(28.7)	47(31.3)
Adilabad	155	34(21.9)	70(45.2)	51(32.9)
Medak	150	61(40.7)	37(24.7)	52(34.6)
Hyderabad	200	4(2.0)	114(57.0)	82(41.0)
Karimnagar	150	23(15.3)	56(37.3)	71(47.4)
Total	3706	1663(44.9) [42.5 - 47.2]*	1358(36.6) [34.1 - 39.1]*	685(18.5) [15.6 - 21.4]*

Figures in parentheses denote percentages; \* 95% Confidence interval.

used design of the study, the weighted confidence interval of the estimates could be approximate. However, in view of comparatively large sample size involved in the study, unweighted confidence interval would provide similar results. This may be evident through a narrow confidence interval observed in the study.

## Discussion

The results of the present study showed that 55% of the population was consuming iodised salt with less than 5 ppm, although the percentage of population consuming salt with 15 ppm and more iodine was only 18.5%. The NFHS II survey documented that 27.4% of

**TABLE II:** Urinary Iodine Excretion levels in the Study Subjects in Andhra Pradesh (n = 1952)

Name of the District	N	Median (µg/L)	UIE Levels (µg/L)				D/N
			<20.0	20.0-50.0	50.0-100.0	≥100.0	
Nellore	93	>200.0	0(0.0)	0(0.0)	0(0.0)	93(100.0)	N
Rangareddy	107	65.0	1(0.9)	23(21.5)	48(44.9)	35(32.7)	D
Vishakhapatnam	35	>200.0	0(0.0)	0(0.0)	1(2.9)	34(97.1)	N
Anantpur	98	100.0	1(1.0)	7(7.1)	38(38.8)	52(53.1)	N
East Godavari	102	>200.0	0(0.0)	0(0.0)	0(0.0)	102(100.0)	N
Kurnool	103	130.0	0(0.0)	4(3.9)	18(17.5)	81(78.6)	N
Prakasam	102	150.0	1(1.0)	3(2.9)	14(13.7)	84(82.4)	N
Mehboobnagar	100	150.0	2(2.0)	5(5.0)	19(19.0)	74(74.0)	N
Cuddapah	97	90.0	9(9.3)	15(15.5)	28(28.9)	45(46.4)	D
Srikakulam	33	>200.0	0(0.0)	0(0.0)	2(6.1)	31(93.9)	N
Warangal	100	>200.0	1(1.0)	0(0.0)	7(7.0)	92(92.0)	N
West Godavari	70	>200.0	0(0.0)	0(0.0)	1(1.4)	69(98.6)	N
Chittoor	100	100.0	0(0.0)	4(4.0)	45(45.0)	51(51.0)	N
Vijaynagar	21	>200.0	0(0.0)	0(0.0)	1(4.8)	20(95.2)	N
Nizamabad	200	150.0	18(9.0)	11(5.5)	25(12.5)	146(73.0)	N
Krishna	96	>200.0	0(0.0)	0(0.0)	1(1.0)	95(99.0)	N
Khammam	100	200.0	0(0.0)	0(0.0)	3(3.0)	97(97.0)	N
Guntur	120	>200.0	0(0.0)	0(0.0)	2(1.7)	118(98.3)	N
Adilabad	101	125.0	0(0.0)	8(7.9)	25(24.8)	68(67.3)	N
Hyderabad	174	150.0	8(4.6)	22(12.6)	31(17.8)	113(64.9)	N
Total	1952		41(2.1) [2.3-6.5]*	102(5.2) [0.9-9.5]*	309(15.8) [11.7-19.9]*	1500(76.8) [74.7-78.9]*	

Figures in parenthesis denote percentages; D = Deficient iodine nutriture; N = Normal iodine nutriture; \* 95% Confidence interval.

population consumed salt with 15 ppm of iodine. The variation between the findings of the two studies could be possibly due to difference in the sampling methodology and the method of estimation of iodine content of salt. In NFHS II survey the spot testing kit was used while in the present study the iodometric titration method was utilized for the same.

It was found that in the coastal districts of

Nellore, Vishakhapatnam and Prakasam 80%, 76% and 83% of the population was consuming salt with less than 5 ppm of iodine, respectively. It is a well-known fact in areas where salt is produced locally, a high percentage of population consumes non iodized salt due to traditional reasons.

In the present study, majority of the districts (17/23) more than 60% of the population was consuming iodized salt. This

### Key Messages

- Higher percentage of population was consuming salt with less than 5 ppm of iodine in the coastal districts of Andhra Pradesh.
- All the districts had adequate iodine nutriture (UIE levels more than 100 µg/L) except Rangareddy and Cuddapah.

was also reflected as adequate iodine nutriture (UIE level more than 100 µg/L) in all the districts except Rangareddy and Cuddapah. The study revealed the success of the salt iodisation program in districts which were earlier found endemic to iodine deficiency like Srikakulam, Vijaynagar, Visakhapatnam, Godavari, Khammam, Adilabad and Warrangal. These districts were found to have adequate iodine nutriture in the present survey as reflected by median UIE level of more than 100 µg/L. The study findings indicate a need of further strengthening the efforts for salt iodisation in Andhra Pradesh by creating an awareness amongst the salt producers, traders and beneficiaries about the health consequences of iodine deficiency.

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*Contributors:* UK coordinated the study, helped in implementation and drafted the paper, he will act as

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