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RESEARCH ARTICLE

Consumption of Iodized Salt among Households of District Lucknow, India

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Abstract

Iodine deficiency is the world's single greatest cause of preventable mental retardation. Universal Salt Iodization is a safe, cost-effective and sustainable strategy to ensure sufficient intake of iodine by all individuals. In Uttar Pradesh only 42.5 % households are using cooking salt which was iodized at the recommended level. The present study was conducted to assess the pattern of consumption of iodized salt and the awareness about health benefits of iodized salt among households in Lucknow. A cross sectional study was conducted in rural and urban Lucknow in 400 households selected using PPS technique and were interviewed using predesigned oral questionnaire and household salt was tested for Iodine content by kit. It was observed that 257(64.2%) households were using salt of iodine content of >15ppm, 135(31.8%) were using salt with inadequate iodine content and 8(4%) households were consuming salt with no iodine. On multivariate analysis high social class, literacy status, exposure to mass media was significantly associated with consumption of adequately iodized salt. 62% of the people surveyed knew iodine deficiency results in goiter, iodization of salt as an important attribute to the quality of salt was found only in 11.2 % respondents. It is recommended better IEC is the need of the hour to improve consumption of appropriately iodized salt.

Introduction

Iodine Deficiency Disorders (IDD) remains a significant public health problem in over 50 countries. Iodine deficiency is the world's single greatest cause of preventable mental retardation. It has been estimated that 200 million people in India are exposed to the risk of IDD and more than 71 million suffer from goitre and other forms of IDD. Children and adults need an adequate amount of iodine in their diets to avoid getting IDD. Iodine deficiency is known to cause goitre and cretinism. Children with IDD can grow up stunted, apathetic, mentally retarded, and incapable of normal movement, speech, or hearing. IDD in pregnant women may cause miscarriage, stillbirth, and mental retardation in infants [(1).]

The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) have recommended Universal Salt Iodization (USI) as a safe, cost-effective and sustainable strategy to ensure sufficient intake of iodine by all individuals [(2).]

UNICEF conducted a Coverage Evaluation Survey in 2009 (CES 2009), in India overall, 71.1 percent of the households were using cooking salt which was iodized at the recommended level of 15 ppm or more. Only 9.3 percent of the households used salt that was not iodized at all and 19.3 percent used salt that was iodized inadequately (<15 ppm). But the same survey revealed that in Uttar Pradesh only 42.5 % households were using cooking salt which was iodized at the recommended level[(3).] Keeping in view the above facts he present study was conducted to assess the pattern of consumption of iodized salt and the awareness about health benefits of iodized salt among households in Lucknow.

MATERIAL & METHODS

A cross-sectional house to house study was conducted in district Lucknow in one rural block (Malhiabad) and one urban sector (Chowk) chosen randomly. Sample size was calculated based on the formula $4PQ/L^2$, where P is the prevalence (42.5. %), Q is 100-P (50) and L is the permissible error i e. 10% of P, sample size comes out to be ~400 [(4).] Number of household to be taken for the survey in a village / ward was decided according to population proportion to size (PPS).

Each respondent was explained the purpose of the study by the investigator prior to the administration of interview and informed consent was obtained. The confidentiality of the information was assured. Interview was started with general discussion to gain confidence and it slowly extended to specific points. Using a pre-tested interview schedule, the following aspects were enquired from the respondents - background characteristics like religion, locality, education. Socio economic status was calculated by modified Prasad's classification based on the per capita monthly income and in order to offset inflationary trends, All India Whole Price Index (AIWPI) of year 2010 was used. [(5)]

Respondents were also asked about the type cooking salt that they predominantly use; reasons for the same, awareness about the benefits of iodized salt and salt storage practices.

Respondents' media exposure was measured by asking about the frequency (almost every day; at least once a week; less than once a week; or not at all) with which they read a newspaper or magazine, watch television, or listen to the radio. In addition, all respondents were asked whether they 'usually go to a cinema hall or theatre to see a movie at least once a month'. Respondents who do not read a newspaper or magazine, watch television, or listen to the radio at least once a week, or see a movie at least once a month were considered to not be regularly exposed to any media.[(6)]

Iodine content of cooking salt in each interviewed household was done using a rapid-test kit (MBI Kits) obtained from state health department. One drop of the starch solution was squeezed onto a half tea spoon sample of cooking salt obtained from the household. If the colour changed (from light blue through dark violet), it was matched to a colour chart provided with the test kit and recorded the iodine level as <15 or >15 ppm. If the initial test was negative (no change in colour), a second confirmatory test, adding an acid-based solution in addition to the starch solution was done. If the colour of the salt does not change even after the confirmatory test, the salt is not iodized (zero Iodine level). [(6)]

Data was entered by two different persons separately on Microsoft Access and cross matched to detect any discrepancy in data entry before the data was analyzed using SPSS software version 17.01 for Windows XP.

RESULTS:

Of the 400 households, 208 (52.0%) were urban and 209(52.3%) Muslim. In 73 % of respondents head of the family was illiterate and 61.2 % respondents belonged to social class V according to modified Prasad's Classification. Exposure to any form of mass media was found in 64 % respondents. (Table 1).

It was observed that 257(64.2%) households were using salt of iodine content of >15ppm, 135(31.8%) were using salt with inadequate iodine content and 8(4%) households were consuming salt with no iodine.(Figure I)

As depicted in Table II, among people surveyed, 58.5% were aware of iodized salt. There is fair knowledge among the respondents about the effects of iodine deficiency on the human body. 62% of the people surveyed knew iodine deficiency results in goiter. 15.3% of the people knew that iodine deficiency causes "less mental development" and 11.0 % knew it causes "less physical development".

Iodization of salt is not generally seen as an important quality when people are assessing quality of salt. In fact, iodization of salt as an important attribute to the quality of salt was found only in 11.2 % respondents. Of all the important attributes that people ascribe to salt, "Whiteness" (43.0%) seemed to be the most important followed by, "Looks good" (34.8 %) and "Tastes good" (11.0%).

The study findings demonstrate that the type of salt consumed has important ramifications for iodized salt coverage. 68.5 % of packaged refined salt was adequately iodized. Among the households surveyed, 93.7% are using packaged refined salt. This study further reveals that people stored their salt well, 64.8% of the people stored their salt in containers with lids, 14.4 % stored salt in the same pouch in which they bought it and 20.8% stored it in a container without a lid

Consumption of appropriately iodized salt (>15 ppm) had no relationship with locality and religion of households. Literacy status of head of household, higher socioeconomic status, exposure to mass media and consumption of refined salt were associated significantly with adequately iodized salt ($p<0.005$). Surprisingly respondents who had knowledge of effect of iodine deficiency were not consuming adequately iodized salt. (Table III).

Table I: Socio- Demographic Characteristics of Studied Population

Characteristics	N (%)
Religion	
Hindu	191(47.7)
Muslim	209(52.3)
Education of Head of the Family	
Illiterate	296(73.0)
Literate	104(27.0)
Locality	
Rural	192(48.0)
Urban	208 (52.0)
Social Class(Modified Prasad)	
II	20(5.0)
III	47(11.8)
IV	88 (22.0)
V	245(61.2)
Exposure to Media	
Yes	256(64.0)
No	144 (36.0)

Figure 1

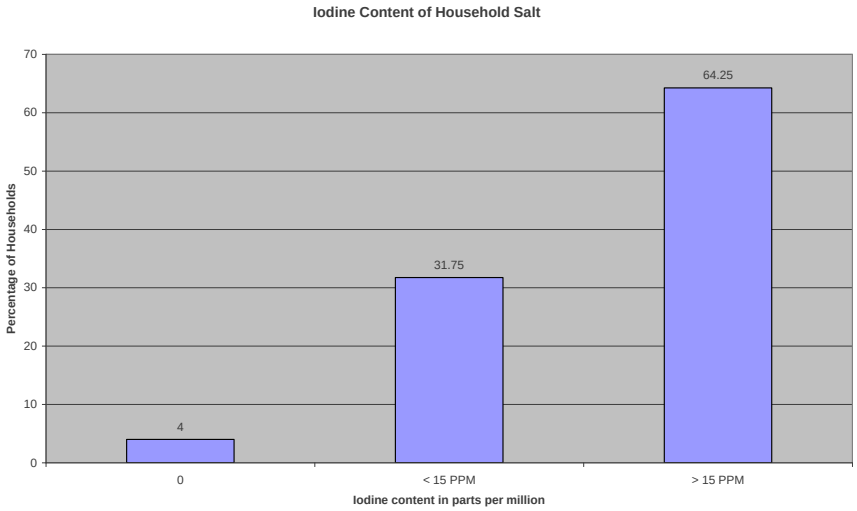

Table II: Salt Related Practices of studied population

Characteristics	N (%)
Awareness of Iodized Salt	
Yes	234(58.5)
No	166(41.5)
Knowledge About Health effects of Iodine	
No	44(11.0)
Goitre	246(61.50
Less Mental development	61(15.3)
Less Physical development	44(11.0)
Others	5(1.3)
Respondents perception of good Quality of Salt	
Tastes Good	44(11.0)
Whiteness	172(43.0)
Looks Good	139(34.8)

Iodized	45(11.3)
Type of Salt Consumed	
Crystalline	25 (6.3)
Refined	357 (93.7)
Salt Storage practices	
Container with lid	259(64.8)
Pouch of the salt	58(14.4)
Container without Lid	83(20.8)

Table III: Determinants of Levels of Iodized Salt Consumption

	Iodine Content of Cooking Salt					
	< 15 ppm(143)		**> 15 ppm (257)**		**Total(400)**	
Variables	**No.**	**%**	**No.**	**%**	**No.**	**%**
Religion						
Hindu	68	47.5	123	47.8	191	47.7
Muslim	75	52.4	134	52.2	209	52.3
				Chi square=1.235	Df=1	p=0.425
Locality						
Rural	63	44.1	129	50.2	192	48.0
Urban	80	55.9	128	49.8	208	52.0
				Chi square=1.387	Df=1	p=0.239
Literacy of head of Head of the Family						
Illiterate	130	90.9	166	64.6	296	74.0
Literate	13	9.1	91	35.4	104	26.0
				Chi square=33.075	Df=1	**p<0.001**
Socio Economic Status of household						
II	0	.0	20	7.8	20	5.0
III	3	2.1	44	17.1	47	11.8
IV	37	25.9	51	19.8	88	22.0
V	103	72.0	142	55.3	245	61.3
				Chi square=34.515	Df=3	**p<0.001**
Exposure to Mass media						
Yes	63	44.1	193	75.1	256	64.0
No	80	55.9	64	24.9	144	36.0
				Chi square=38.424	Df=**1**	**p<0.001**
Salt Consumed						
Crystalline	25	17.5	0	.0	25	6.3
Refined	118	82.5	257	100.0	357	93.8
				Chi square=47.925	Df=1	**p<0.001**

Knowledge about Effect of Iodine deficiency						
Yes	126	88.1	230	89.5	356	89.0
No	17	11.9	27	10.5	44	11.0
				Chi square=0.179	Df=1	p=0.672

Table: IV Results from the logistic regression analysis on Iodized Salt Consumption

Variable	Category	P value	95 % Confidence Interval	
			Lower	Upper
Social Class	II and III	<0.001	0.17	0.305
	IV and V			
Respondents Education	Literate	<0.001	0.207	0.573
	illiterate			
Locality	Urban	<0.78	0.2589	15.457
	Rural			
Exposure to Media	Yes	<0.001	0.326	0.898
	No			
Type of salt	Crystalline	<0.03	0.130	0.1233
	Refined			

Note: Dependent variable: Iodized Salt (>15ppm)

On multivariate analysis high social class, literacy status, exposure to mass media was significantly associated with consumption of adequately iodized salt. (TableIV)

DISCUSSION

IDD are among the easiest and least expensive of all nutrient disorders to prevent. The addition of a small, constant amount of iodine to the salt that people consume daily is all that is needed.

One of the goal for monitoring progress towards sustainable elimination of IDD as a public health problem determined by a Joint WHO/ UNICEF/ICCIDD Working Group on assessment and monitoring of IDD is percentage of households consuming effectively iodized salt should be >90%,[7] the study reveals that only 64.25 % of households are consuming adequately iodized salt in Lucknow, which is far below the target of >90 % salt iodization. According to NFHS-3 in UP 49 %.of households were consuming salt with iodine content > 15PPM ,[6] baseline facts – concurrent assessment of health and family health programme (2007) found 56 % households in Lucknow consuming salt with iodine content >15ppm. [8]

Household socioeconomic status is an important determinant in consumption of adequately iodized salt. In the market the cost of branded packaged iodized salt is almost five times higher than the easily available coarse crystalline salt. Thus poorer household are much likely to purchase coarser salt. Coarser salt is uncrushed, has a larger crystal size than refined salt and higher levels of impurities and higher affinity to moisture causing leaching of KIO3 especially if it is not packaged and stored properly. This is what was found in our study that none of the samples of coarse salt had adequate iodine levels. [9]

The head of the household is the most important person who takes decisions in the household and education improves knowledge and awareness of need of iodized salt. In our study as also seen in NFHS-2 report availability of adequately iodized salt was significantly higher in literate households. [10]

An important finding in the study is that respondents who were exposed to mass media were consuming adequately iodized salt. A similar study in Turkey showed that the use of local mass media is effective in raising the prevalence of iodized salt use. Local mass media could therefore be used as part of a national strategy to prevent iodine deficiency disorders. [11]

A limitation of this paper is the potential for recall bias and method of determining iodine content with Kit. The titration method is the best method. Recent evaluations of kits showed that the colour reaction cannot be used as a quantitative indication of the

iodine content. These kits should therefore be regarded as qualitative rather than quantitative and are most appropriate to indicate the presence or absence of iodine, but not of the concentration. An advantage of rapid test kits is that they can be used in the field to give an immediate result. They are therefore useful to health inspectors and others who are involved in carrying out spot checks on food quality or household surveys. They may also play a valuable educational role, in that they provide a visible indication that salt actually is iodized. [(12)]

CONCLUSION

The study has provided a picture of iodized salt consumption and awareness in district Lucknow. It gives us with information on underlying factors that may be inhibiting the community switch to iodized salt. This switch over requires advocacy, which is not an event rather a process and thus a continuous efforts at community and national level are required. It is often contended that lack of cash prevents impoverished families from buying iodized salt, when coarse salt is readily available. However, even in impoverished households men often smoke tobacco and chew gutka. Messages with calculations of the cost of a pack of Bidi or a pack of gutka against the annual cost of using iodized salt to prevent brain damage in children may facilitate a change of priority even among relatively poor families. Messages should also be targeted also on proper storage of salt as improper practices can lead to loss of iodine content in salt. Further the quality of knowledge about IDD is to be improved. Knowledge about IDD has most often been limited to visible goitre. There needs to be clear and direct messages about IDD's brain damage threat and its relevance to school performance and subsequent economic productivity for the family.

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