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Research Article

A study to assess the iodine deficiency disorder and salt consumption pattern in Lucknow

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ABSTRACT

Background: Iodine is an essential element for thyroid function, necessary for the normal growth, development and functioning of the brain and body. In India, about 200 million people are already affected with IDD. In India, about 200 million people live at risk of IDD, whereas more than 71 million people are suffering from goiter and other IDDs. Aims and objectives: 1) To estimate the prevalence of goiter in Lucknow district. 2) To study the level of urinary iodine excretion of the study population. 3) To study the salt consumption pattern in Lucknow district.
Methods: A descriptive cross sectional study was carried out amongst School children in the age group of 6 to 12 years in urban and rural areas of Lucknow district over a period of one year. A sample size of 400 was estimated. A pre structured & pre tested questionnaire was used to interview. Data was Tabulated on Microsoft excel and, analysis was carried out using Chi square test & other necessary statistical test as appropriate, using software SPSS 17.0 version.
Results: A total No. of 400 children were studied. In urban areas 54% were males and 46% were females. Mean age of children were found to be 9.22 years with standard deviation of 2.28. By history, majority (79.8%) of the families were using iodized salt and only 20.3% were using non-iodized salt. Over all prevalence of goiter was 12.7%. Prevalence of goiter was more in rural areas (18%) than in urban areas (7.5%). Prevalence of goiter was more among females (19.9%) than in males (6.8%).
Conclusions: To conclude, findings of the present study demonstrates that prevalence of goitre was high (12.7%) among children in Lucknow district and therefore it constitutes a public health problem in this region. Strict implementation of salt iodization and marketing in hard to reach areas is recommended as a measure to control the situation.

Keywords: Iodine deficiency disorder, Iodized, Noniodized, School children, Salt

INTRODUCTION

Iodine is an essential element for thyroid function, necessary for the normal growth, development and functioning of the brain and body.[1] While iodine deficiency is known as to cause endemic goiter, it most deleterious effect maybe on the developing brain of the fetus, ranging from mild brain dysfunction to irreversible intellectual impairment. It is the single most common cause of preventable mental retardation and brain damage in the world today. Iodine Deficiency Disorder (IDD) is known to have a significant public health (PH) problem all over the world. About 1.5 billion people worldwide live at risk of IDD of which more than 655 million people are already affected with IDD. In India, about 200 million people are already affected with IDD. In India, about 200 million people live at risk of IDD, whereas more than 71 million people are suffering from goiter and other IDDs.[2]

Iodine deficiency disorder is among the easiest and least expensive of all nutritional disorders to prevent. Salt

iodization is currently the mass widely used strategy to control and eliminate IDD.[3]

Not a single state or union territory in the country is free from problem of IDD. Out of 87 districts in the country 282 have been surveyed for IDD and 241 are found to be goiter endemic.[4]

The age group recommended by WHO for IDD survey (Goiter survey) was 6-12 years. This age group was recommended to be used in survey because children in this group have high vulnerability, easy access and are useful for surveillance of other health advice also, affected children develop an enlarged thyroid due to deficiency of iodine can be easily examined in school settings.

As goiter is more prevalent in the sub Himalayan belt where Uttar Pradesh is a part of it nevertheless no such study has been conducted in this region, thus the present work is undertaken by the department of community medicine Era's Lucknow medical college and hospital.

Aim and objectives

- To estimate the prevalence of goiter in Lucknow district.
- To study the level of urinary iodine excretion of the study population.
- To study the salt consumption pattern in Lucknow district.

METHODS

Study unit

School children in the age of 6 to 12 years in Lucknow district

Study design

A descriptive cross sectional study

Study area

Urban and Rural areas of Lucknow

Study period

July 2012- June 2013, for a period one year

Sample size

A sample size of 400 was estimated expecting a goiter prevalence of 50.3% and accepted error of 5%.

Inclusion criteria

Children 6 to 12 years of age from selected schools

Exclusion criteria

Children <6 years and >12 years of age and children who had refuse to give consent.

Sampling technique

A multi stage sampling procedure is adopted to select the sample size. At first stage by simple random sampling we have selected 5 schools from a list of schools in Lucknow district. At second stage we have divided our sample size equally in each school and then by simple random sampling 80 children (6 to 12 years) were selected from each school. This study was conducted after the ethical clearance from the ethical committee of Era's Lucknow medical college, Lucknow.

Statistical analysis

Data was tabulated on Microsoft excel and, analysis was carried out using chi square test & other necessary statistical test as appropriate, using software SPSS 17.0 version.

Tools of data collection

A pre structured and pre tested questionnaire was used to interview. Contents of the questionnaire were explained to the students and principal and they were assured that a total confidentiality will be maintained. The selected children were examined for thyroid enlargement, as recommended by ICMR bulletin 1986.[5] The thyroid enlargement i.e., goiter was graded as,

G0 - No enlargement

G1 - A palpable enlargement

G2 - A visible and palpable enlargement

On the spot casual salt samples was collected from 40% of the selected children in the school. Salt iodine testing was done by spot kit method (HIMEDIA). As a result, salt was classified as iodized and non-iodized. Iodized salt was again classified on the basis of iodine content i.e. <15 ppm and >15 ppm.

RESULTS

A total No. of 400 children were studied. Among them 200 in urban areas and 200 in rural areas. In urban areas 54% were males and 46% were females. Almost same number of percentages i.e. 55.5% males and 44.5% females were in rural areas. Out of total, Fathers of 62.3% of Children were unskilled worker and 37.8% were skilled worker. Fathers of 59.0% were literate and res of them were illiterate (Table 1). Mean age of children were found to be 9.22 years with standard deviation of 2.28.

Table 1: Biosocial characteristics of children/study population.

Variables	Urban (200)		Rural (200)		Total (400)	
	No.	%	No.	%	No.	%
Sex						
Male	108	54.0	111	55.5	219	54.8
Female	92	46.0	89	44.5	181	45.3
Father's occupational status						
Unskilled worker	117	58.5	132	66.0	249	62.3
Skilled worker	83	41.5	68	34.0	151	37.8
Father's educational Status						
Illiterate	61	30.5	103	51.5	164	41.0
Literate	139	69.5	97	48.5	236	59.0

By history, majority (79.8%) of the families were using Iodized salt and only 20.3% were using non-iodized salt. Families using iodized salt were more in urban areas (94.5%) than in rural areas (65%) and it was found to be significant (P value = 0.0001) (Table 2).

Table 2: Distribution of type of salt used in the family by history.

Type of salt used	Urban (200)		Rural (200)		Total (400)	
	No.	%	No.	%	No.	%
Iodised	189	94.5	130	65.0	319	79.8
Non-iodised	11	5.5	70	35.0	81	20.3
Chi-square = 53.88, P value <0.0001						

Salt iodine testing was done in about 40% of samples by spot kit method. After testing 75.3% of samples were found to be iodized. In iodized salt, quantity of iodine was <15 ppm in 35.2% of samples and >15 ppm in 64.8% of samples (Table 3).

Table 3: Results of salt iodine testing by kit method (40% of samples).

Type of salt	Urban (200)		Rural (200)		Total (400)	
	No.	%	No.	%	No.	%
Non-iodised	11	5.5	70	35.0	81	20.3
Iodised						
<15 ppm	34	25.0	10	33.3	44	35.2
>15 ppm	71	52.2	10	33.3	81	64.8
Chi-square = 1.47, P value = 0.226						

Over all prevalence of goiter was 12.7%. Prevalence of goiter was more in rural areas (18%) than in urban areas (7.5%). This deference was found to be statistically significant (P value = 0.004) (Table 4).

Prevalence of goiter was more among females (19.9%) than in males (6.8%). This difference was statistically significant (P value <0.0001) (Table 5).

Table 4: Area-wise prevalence of goiter.

Results	Urban (200)		Rural (200)		Total (400)	
	No.	%	No.	%	No.	%
G0 - No enlargement	185	92.5	164	82.0	349	87.3
G1 - A palpable enlargement	15	7.5	33	16.5	48	12.0
G2 - A visible and palpable enlargement	0	0	3	1.5	3	0.7
Chi-square = 11.014, P value = 0.004						

Table 5: Sex-wise prevalence of goiter.

Results	Male (219)		Female (181)		Total (400)	
	No.	%	No.	%	No.	%
G0 - No enlargement	204	93.2	145	80.1	349	87.3
G1 - A palpable enlargement	13	5.9	35	19.3	48	12.0
G2 - A visible and palpable enlargement	2	0.9	1	0.6	3	0.7
Chi-square = 16.934, P value <0.0001						

DISCUSSION

In present study, by history, majority (79.8%) of the families of the children were using iodized salt and only 20.3% were using non-iodized salt after testing 75.3% of samples were found to be iodized. In iodized salt, quantity of iodine was <15 ppm in 35.2% of samples and >15 ppm in 64.8 % of samples. In the study by Akhil Bandhu Biswas[6] in Malda 85.1% of the beneficiaries consumed iodized salt with adequate iodine (≥15 ppm) which is still below the recommended goal of >90%.[4] In a study by C. Chaudhary[7] in Ambala majority (88%) of the salt samples were adequately iodized, i.e. having >15 ppm, while 3.2% were non-iodized. In a study by Umesh Kapil,[8] 53.4% of the beneficiaries consumed salt with an iodine content of less than 15 ppm, which was below the stipulated level (of 15 ppm).

According to WHO/UNICEF/ICCIDD,[9] a total goitre rate of 5% or more in primary school children (6-12 year) is used to signal the presence of a public health problem. In present study over all prevalence of goiter was 12.7%.In a study by Shridhar V. Raval,[10] in Gandhinagar, total prevalence of goiter was 7.75%. Though the findings by Imtiyaz A. Bhat et al.[11] are comparable with the finding, as they have detected the prevalence of goiter to be of 11.9% in Jammu region. In the study by Akhil Bandhu Biswas[8] in Malda, a total goiter prevalence rate of 11.3% was found. Overall prevalence of goiter in the study by C.

Chaudhary[7] in Ambala, was 12.6%. In a study by Umesh Kapil[8] in Merrut a total goitre prevalence rate of 11.6% was found. In the study by Madhu B. Singh[12] in Jodhpur, children, total goiter rate was 11.4% which was significantly higher in females than males.

In present study prevalence of goiter was more among females (19.9%) than in males (6.8%). In the study by Madhu B. Singh[12] similar findings were observed. The prevalence was found to be more in males (7.82%) as compared to females (7.68%) by Shridhar V. Raval,[10] in Gandhinagar while in Jammu, The prevalence of goiter was higher in females than in males (16.12% vs. 10.10%) reported by Imtiyaz A. Bhat et al.[11]

CONCLUSIONS

To conclude, findings of the present study demonstrates that prevalence of goiter was high (12.7%) among children in Lucknow district and therefore it constitutes a public health problem in this region. Strict implementation of salt iodization and marketing in hard to reach areas is recommended as a measure to control the situation.

To overcome the problem of IDD, the government of India started intervention programs in the last decade, including National Iodine Deficiency Disorder Control Program and Universal Salt Iodization (USI). USI involves the iodization of all human and live-stock salt, including salt used in food industry. Adequate iodization of all salt will deliver iodine in the required quantities to the population on a continuous and self-sustaining basis.

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