

A cross sectional study on Prevalence of Goitre among school-going children in selected schools of West Jaintia Hills

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Abstract

In India, IDD constitute a major public health problem. Not one state or union territory within the country is free from the matter of IDD, out of 587 districts within the country, 282 are surveyed for IDD and 241 are found to be Goitre endemic. Hence, this study aims to assess the prevalence of Goitre among school-going children in selected schools of West Jaintia Hills. The objectives of the study are to assess the prevalence of Goitre among school-going children in selected schools of West Jaintia Hills and to find out the association between Goitre and iodine level of salt used for cooking at home. A cross sectional study was conducted among school going children in West Jaintia Hills District, using convenient sampling technique in the month of December 2019 and February-March 2020. Data was collected using semi structured and structured questionnaire consisting of five sections; section I: socio-demographic characteristics of the respondents, section II: semi structured questionnaire on handling and storage of salt and consumption of Goitrogenic foods in the

household, section III: grading of Goitre according to the criteria recommended by the Joint WHO/ UNICEF /ICCIDD Technical Consultant Group, section IV: salt testing (To check the iodine level in the salt used for cooking at home).

Total 304 children were included in the analysis. The prevalence of Goitre was found to be 6% (only Grade 1). 71 salt sample was estimated for level of iodine, 41% of the sample had inadequate iodine content (<15 ppm). The study found out that, there was significant association between Goitre and iodine level of the salt used for cooking in the household. In the present study, the prevalence of Goitre is very less and the people are well aware about iodized salt but they lack knowledge about the importance of iodine in relation to Goitre. Ensuring proper storage and handling of salt at the household level are highly recommended.

Keywords: Goitre, Prevalence, School going children.

Introduction

The term “Goitre” refers to the abnormal enlargement of the thyroid gland below the adam’s

apple. The thyroid is a small butterfly-shaped gland within the neck, just ahead of the windpipe (trachea). It produces thyroid hormones, which helps to manage the body's metabolism (the process that turns food into energy). A swelling of thyroid can further cause a swelling of the neck or larynx (voice box). Iodine is a crucial micro-nutrient required for human nutrition. Iodine Deficiency Disorders (IDDs) are one among the main world-wide public health problems of today which causes wide spectrum of disabilities. It includes lowering of IQ levels in school going children, Goitre, deaf mutism, impairment of reproductive functions, weakness, paralysis of muscles mental defects and lesser degree of physical dysfunction. Many studies conducted all over India had shown high prevalence of Goitre. In an effort to eliminate iodine deficiency and to go along with the international goal of Universal Salt Iodization (USI), compulsory iodization of all table salts was introduced in India in 1983. Iodine Deficiency is mainly caused by low iodine content in the diet, arising from low iodine levels in the soil, water, or crops ⁽¹⁾. Additionally, the consumption of goitrogenic food items, like millet and cassava ⁽²⁾, and the side by side existing of micronutrient deficiencies e.g. Iron, selenium and vitamin A deficiency ⁽³⁾, low maternal education, poor household, low socio-economic status, the unavailability of latrine, advanced age and sex of the child are some of the factors associated with Iodine Deficiency. Fortification of salt with iodine is the widely accepted preventive strategy to fight against Iodine Deficiency Disorder. Several studies carried out in India have shown a high percentage of Goitre incidences. In 1983, mandatory

iodization of all salt was introduced in India in an effort to eliminate iodine deficiency. The Government of India has relaunched National Iodine Deficiency Disorders Control Programme (NIDDCP) in the year 1992 with a goal to reduce the prevalence of Iodine Deficiency Disorder to non-endemic level. In 2009, a survey was carried out in Jamnagar district, Karnataka with the aims to determine the prevalence of Goitre in primary school children aged 6-12 years; to determine median urinary iodine concentration (UIC); and to assess the level of iodine in salt samples at households of the surveyed population. A total of 360 numbers of children participated in the study, and they were tested for the median urinary concentration. Total of 750 salt samples at household were tested on the spot. Survey results show total Goitre rate among primary school children aged 6-12 years was 4.83%, with no significant difference between age and sex. In conclusion, although there has been significant progress in the reduction of Goitre and related IDDs globally, they remain significant burden in India due to poor salt storage practices and a weak universal salt iodization program. Understanding the extent of Goitre and its associated factors is important for designing strategies that can reduce the burden of Goitre among children. This study, therefore, aims to assess the prevalence of Goitre among school going children in selected schools of West Jaintia Hills.

Objectives

1. To assess the prevalence of Goitre among school-going children in selected schools of West Jaintia Hills.
2. To find out the association between Goitre and iodine level of salt used for cooking at home.

Materials & Method

A cross sectional study was conducted among school going children in West Jaintia Hills District, in the month of December 2019 and February-March 2020. 304 children were selected using convenient sampling technique. Data was collected using semi structured and structured questionnaire consisting of five sections; section I: socio-demographic characteristics of the respondents, section II: semi structured questionnaire on handling and storage of salt and consumption of Goitrogenic foods in the household, section III: grading of Goitre according to the criteria

recommended by the Joint WHO/UNICEF/ICCIDD Technical Consultant Group, section IV: salt testing (To check the iodine level in the salt used for cooking athome).

Results

Section I: This section describes the socio demographic characteristics of 304 school going children studying in class I till class VII who participated in the study. The characteristics were age, gender, religion, education status and occupation of parents.

Table 1: Frequency and percentage distribution of respondents according to socio-demographic variables n = 304

Socio- Demographic Variables	Frequency (F)	Percentage (%)
Age		
6-8 Years	96	31.6%
9-11 Years	119	39.1%
12-15 Years	89	29.3%
Gender		
Male	131	43%
Female	173	57%
Religion		
Christian	132	43.4%
Non- Christian	172	56.6%
Educational Status		
Class I	52	17.1%
Class II	50	16.4%
Class III	51	16.8%
Class IV	57	18.8%
Class V	26	8.6%
Class VI	43	14.1%
Class VII	25	8.2%
Occupation of Mother Teacher		
Housewife	12	4%
Laborer	72	23.6%

Farmer	208	68.4%
Occupation of Father		
Teacher	6	2%
Business	8	2.7%
Farmer	61	20%
Laborer	229	75.3%

Table 1 shows that out of 304 participants, 119 (39.1%) were in the age group of 9-11 years, 173 (57%) majority of participants were female and belonged to non-Christian community (56.6%). Students ranges from class I-VII with a majority 57 (18.8%) in class IV.

Most of the mothers of participants are farmers 208 (68.4%) and fathers are laborers 229 (75.3%).

Section II: This section describes the findings related to handling, storage of salt used for cooking at home and consumptions of Goitrogenic foods. The data has been described and interpreted in the following table.

Table 2: Frequency and percentage distribution showing handling and storage of salt used for cooking at home. n = 304

Items	Frequency (F)	Percentage (%)
knowledge about iodized salt		
Yes	304	100%
No	-	-
Salt used for cooking at home		
Iodized salt	304	100%
Non- iodized salt	-	-
Use non-iodized salt at home for other purposes beside cooking		
Yes	-	-
No	304	100%
Type of salt available in local shop		
Iodized salt	304	100%
Non- iodized salt	-	-
Quantity of salt bought at a time		
1kg	96	31.5%
2kg	111	36.5%
3kg	97	32%
Storage of salt		
Container without cover	30	9.9%
Container with cover	274	90.1%
Storage of container with salt		
Shelf	304	100%

Other (near the fire, on the table) - -

Table 2: shows that 304 (100%) participants had heard about iodized salt and used it for cooking at home. Non iodized salt is not used anymore and only iodized salt is available in local shop. 111 (36.5%) of participants

bought 2kg of salt at a time and 274 (90.1%) stored their salt in a container with cover, 304 (100%) said they keep the container containing the iodized salt in a shelf or Almirah.

Table 3: Frequency and percentage distribution showing consumption of Goitrogenic food at household level. n 304

Items	Frequency (f)	Percentage (%)
Consumed seasonal vegetables (Goitrogenic foods)		
Raw bamboo shoot	43	14.1%
Cauliflower	46	15.1%
Mustard leaves	81	26.7%
Cabbage	134	44.1%
Frequency of consumption of these vegetable		
Once a week		
Twice a week	138	45.4%
Thrice a week	132	43.4%
	34	11.1%
Sources of these vegetables		
Other (market and garden)	178	58.6%
Market	98	32.2%
Garden	28	9.2%

Table 3: shows maximum number of participant's i.e. 134 (44.1%) consume goitrogenic food mostly like cabbage and 138 (45.4%) said that they consume this goitrogenic food only once in a week, 178 (58.6%) of the participants get some of these vegetables from the market and some from their garden. Consumption of mustard leaves are mainly from their garden. Cabbage, cauliflower is mainly from the market while raw bamboo shoot mostly they got it from the forest nearby. Section III: This section describes the findings related to prevalence of Goitre. Clinical examination of thyroid gland using the standard method which is one of many approaches recommended by the joint WHO/UNICEF/ICCIDD technical consultant group to

identify IDD was used in the study. The data is described in the form of table given below.

Figure 1: Bar diagram showing prevalence of Goitre in school going children of selected schools according to the criteria recommended by WHO/UNICEF/ICCIDD technical consultant group. n = 304.

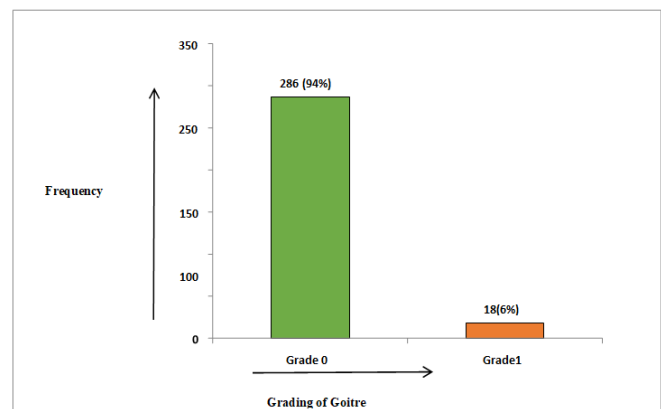


Figure 1: Depicts the prevalence of Goitre which is graded according to the criteria recommended by WHO/UNICEF/ICCIDD technical consultant group. 286 of the participants shows there is no palpable or

visible Goitre, 18 (6%) participants show grade 1 Goitre which means there is palpable enlarged thyroid but not visible when the neck is in normal position and there is no participants with grade 2 Goitre in this study.

Table 4: Frequency and percentage distribution showing prevalence of Goitre according to age and gender of participants. n = 18.

Criteria	Frequency (F)	Percentage (%)
Age	8	44.4%
6-8 years	8	44.4%
9-11 years	2	11.2%
12-15 years		
Gender		
Female	11	61.1%
Male	7	38.9%

Table 4: shows that in the present study the prevalence of Goitre is more among school going children in the age group of 6 – 11 years (88.8%) and more in female students i.e. 11 (61.1%) compare to male. This may be due to the fact that iodine requirement for female children were higher than males especially at the beginning of pubertal age. This is related to the differences in sex hormones and pubertal growth pattern among boys and girls in higher age groups.

Figure 2: Bar diagram showing frequency and percentage distribution on prevalence of Goitre according to educational status of participants. n = 18

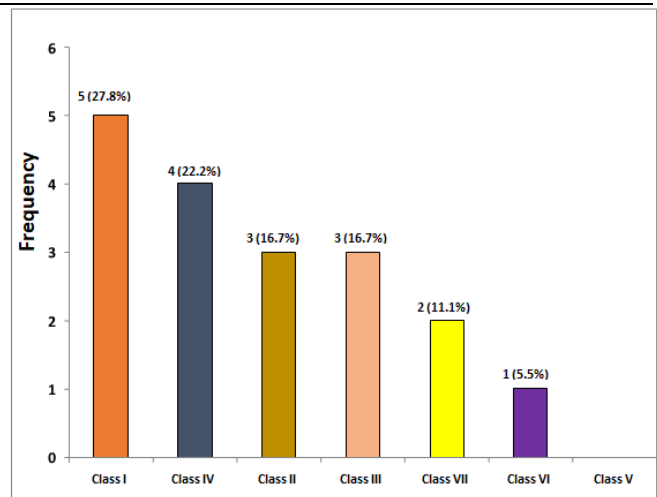


Figure 2: shows that in the present study the prevalence of Goitre is more among class I students i.e. 5 (27.8%) compare to the other classes.

Table 5: Frequency and percentage distribution showing prevalence of Goitre according to occupation of parents of participants. n = 18.

Occupation	Frequency (f)	Percentage (%)
Occupation of mother		
Laborer	5	27.8%
Farmer	13	72.2%
Occupation of father		
Farmer	7	38.8%
Laborer	11	61.1%

Table 5 shows that in the present study the prevalence of Goitre is more among students whose mothers are farmers i.e. 13 (72.2%) and whose fathers are laborer i.e. 11 (61.1%). This may be due to the fact that illiterate parents have little knowledge about the role of iodine present in the salt so proper handling and storage of salt was not done properly.

Section IV: This section describes the findings related to salt testing (to check the iodine level in the salt used for cooking at home). Salt at household level was measured by I-check a salt iodine test kit. The data collector adds one or two drops of the solution on a small sample (1-2 teaspoon). The intensity of the light blue to dark violet color which develops indicates the salt iodine level.

The following are the interpretation given on the salt testing kit: Dark violet- iodine level more than 15 ppm

Light blue- iodine level less than 15 ppm

No color- no iodine in the salt which means 0 ppm

Table 6: Frequency and percentage distribution showing iodine level of salt according to storage of salt at household level. n = 29

Criteria	Frequency (F)	Percentage (%)
Storage of salt		
Container with cover	23	79.3%
Container without cover	6	20.7%

Table 6 shows that 23 (79.3%) of salt sample taken from household level had iodine level less than 15 ppm despite properly stored in container with cover. This shows that the participants are very well aware about iodine salt but they do not understand the importance of it. So despite storing it in a proper container handling were improper so it leads so humidly of salt and loss of iodine content from the salt.

Section V: This section describes the association between Goitre and iodine level of salt used for

Testing of salt was done to every 5th student and to those students that are grade 1 Goitre. Total numbers of salt sample are 71.

Figure 3: Bar diagram showing iodine level of salt used for cooking at home. n = 71

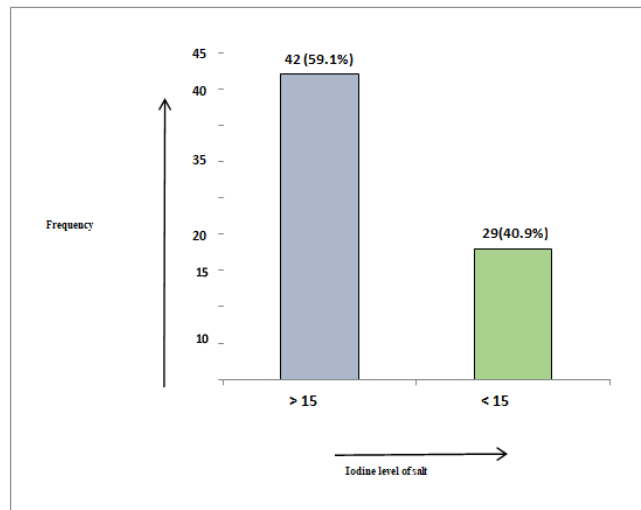


Figure 3: shows that out of 71 salt sample taken from household level, 42 (59.1%) have iodine level > 15ppm and 29 (40.9%) have iodine level < 15ppm.

cooking at home. To determine the association, Chi-Square values were computed at degrees of freedom (df) 1, with level of significance taken at 0.05 and presented in the tables below:

Table 7: Chi-Square values showing association between Goitre and iodine level of salt used for cooking at home. n = 71.

Iodine level of salt used for cooking at home	Goitre grading		df	Calculated X ² value	Tabulate d value	p Value
	0	1				
> 15 ppm	36	6	1	6.654	3.84	0.01
< 15 ppm	17	12				

*Significant at 0.05 level of significance

Table 7: Depicts the findings of association between Goitre and iodine level of salt used for cooking at home. The data presented in the above table shows that there is association between Goitre and iodine level of salt used for cooking at home.

Discussion

This study aims to assess the prevalence of Goitre among school-going children in selected schools of West Jaintia Hills. The objectives are to assess the prevalence of Goitre to and to find out the association between Goitre and iodine level of salt used for cooking at home. According to the present study, the result shows that the prevalence of Goitre was found to be 6% (Grade1). Highest prevalence seen in age group 6-11 years (88.8%), which is supported by a study conducted by Saleem SM, et al. Northern India, 2017, among school age children (6- 12 years), prevalence of grade 1 Goitre was more than ten folds higher than grade 2 Goitre. In the present study, females had higher prevalence (61.1%) compared to male. This finding is supported by the study conducted by Biradar P, et al. Ramanagara District, Karnataka, India, 2016, on prevalence of iodine deficiency disorders among 6 to 12 years school children. A total of 71 salt sample was estimated for level of iodine, 40.9% of the sample had inadequate iodine content (<15 ppm) despite proper storage in container with cover, which means that there

is improper handling of salt at household level. The study found out that, there was significant association between Goitre and iodine level of the salt used for cooking in the household. This study is supported by the findings of the study conducted by M R, Kumar A, et.al. among 6-12 years school children in Gulbarga city, 2014, reported that 6 out of 17 districts surveyed in Karnataka were endemic to iodine deficiency with Goitre prevalence rates in the range of 10.67–41.11% and more than 90% of the families were consuming salt with iodine content less than 15 ppm.

Conclusion

From the study it was found that the respondents are aware about iodized salt but they lack knowledge about the importance of iodine in relation to Goitre. The present study also depicts that there was an association between Goitre and iodine level of salt used for cooking at home. Future research should investigate household-level factors that contribute to high Goitre prevalence even when there is high coverage of adequately iodized salt. Specifically, additional research on appropriate storage of salt and the risks of consuming goitrogenic foods require better investigation.

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