

Iodine Status and Prevalence of Goitre in School Going Children in Rural Area

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ABSTRACT

Introduction: Iodine deficiency disorder (IDD) is one of the preventable major public health problems in India. It has been always thought that goitre was only found in the Himalayan goitre belt. Recent surveys outside the conventional goitre belt have identified foci of iodine deficiency in other parts of India.

Aim: 1) To assess the prevalence of goitre among school-going children in the age group of 6-15 years. 2) To find out the relationship of goitre prevalence with the salt intake and urinary iodine excretion. 3) To unfold the iodine nutritional status of the study population.

Material and Methods: The study was conducted from January 2005 to July 2006 in school children of 6-15 years of age, attending the 55 schools of Bellur hobli in the southern part of India. The clinical examination of all the 1600 children of the selected schools was done to detect and grade goitre. Urine

and salt samples were collected from sub-samples (n = 400) to estimate the urinary iodine excretion level and iodine content in the salt respectively.

Results: The goitre prevalence in the study population was found to be 0.125%. Urinary iodine excretion (UIE) level of ≥ 100 mcg / l was found in 361 children (90.25%) and < 100 mcg / l in 39 children (9.75%). Estimation of iodine content of the salt samples revealed that 363 (90.75%) consumed adequately iodised salt (> 15 ppm) and 37 (9.25%) consumed inadequately iodised salt (< 15 ppm).

Conclusion: Bellur Hobli is not an endemic area for goitre and there is no biochemical iodine deficiency in this population due to effective implementation of Universal iodization programme (UIP). It is reasonable to conclude that by achieving the universal iodisation of salt, IDD can be successfully eliminated from the community.

Keywords: Goitre, Iodine deficiency, Iodised salt, Urinary iodine excretion

INTRODUCTION

Iodine deficiency disorder (IDD) is one of the major public health problems in India. It is a common preventable cause of mental deficiency in the world today. Over 200 million people in the world are estimated to suffer from iodine deficiency [1].

In India it is estimated that 150 million people are at risk of IDD of which 54 million have goitre and 2.2 million are cretins and 6.6 million have other milder neurological deficits [2].

Whereas goitre has ceased to be a major problem in many developed countries (although not eradicated), it continues to be a serious health problem in many third world countries [3]. The Asian countries present a particularly urgent challenge for the control of IDD.

It has always been thought in India that goitre was only found to a significant extent in the Himalayan goitre belt. In recent years renewed surveys outside the conventional goitre belt have identified endemic foci of iodine deficiency in other parts of India. In short no state in India can be said to be entirely free from goitre [3].

In India, out of 457 districts, 275 districts have been surveyed for IDD and 235 districts have been found to be endemic [4].

Keeping this in mind, this study is conducted to evaluate iodine status and the prevalence of goitre in rural school children (age group: 6-15 years) in Bellur a place in southern India with a view to adopt measures to lower the prevalence of IDD if it is found to be significant in this area.

MATERIALS AND METHODS

The study was conducted on school children in 6-15 years of age, attending the statistically selected 55 schools which included primary, middle and high schools of Bellur hobli, which has a

surface area of 70.52 sqkms, located in Nagamangala Taluk, Mandya District, Karnataka, India. This is a place in the southern part of India, situated about 250 kilometres from the coastal area-Mangalore, India.

The school children formed representative study population for iodine status estimation as they represent community [5]. The goitre rate in children in the age group of 6-15 provides a convenient indicator of the status of iodine deficiency in the community [6].

Institutional Ethical Committee clearance was taken for the conduct of the study. The study spanned over a period of 1.5 years from January 2005 to July 2006.

A list of all schools that is primary, middle and High school in Bellur hobli was obtained from Block Education Officer, Nagamangala taluk, Mandya District along with the number of students in each of them. Bellur hobli has 55 schools (primary, middle and high schools) that had a total of 5435 students. The identified schools both government and private were contacted and the teachers and students were briefed about the objectives of the study and informed oral consent of the participants was taken.

Since there were no earlier studies of prevalence of goitre in Bellur Hobli, the sample size of children to be surveyed was calculated referring to similar previous studies by assuming the estimated prevalence as 20%, [7] with a confidence level of 95% and an allowable error of 10% on the estimated prevalence, a sample size of 1600 was obtained.

Sampling for the study was done as per WHO guidelines for school based surveys [8]. The total number of school children in the study area was 5435. Making use of probability proportion to size (PPS) cluster sampling, a representative sample of 1600 students was drawn as per WHO guidelines [8].

The clinical examination of all the children of the selected schools was done by a standard palpation method to note the presence/absence of goitre, and the grading of goitre was done according to the criteria recommended by the joint WHO/UNICEF / ICCIDD [8,9]. The sum of the grades 1 and 2 provided the total goitre prevalence in the study population.

Urine and salt samples were collected from sub-samples (n = 400) of the same study group to estimate the urinary iodine excretion level and iodine content in the salt respectively.

Collection of urine samples and estimation of urinary iodine estimation

Urine samples were collected irrespective of age, sex and presence or absence of goitre. On-the-spot mid-stream urine samples were collected with meticulous attention to avoid contamination with iodine. Samples were collected in a screw-topped bottles and were tightly screwed. Iodine levels in the urine were measured by using wet digestion method (Method A), in which urine is digested with ammonium persulphate and the results were read spectrophotometrically. The iodine level of ≥ 100 mcg/l was taken as criteria to indicate no deficiency [10].

Collection of Salt samples and estimation of iodine content of the salt

Children from the same sub-samples were asked to bring 20 gm of salt sample from home in a polyethylene pouch which was provided to them. Iodine content was estimated by using spot testing kits. Salt samples that reveal iodine content of ≥ 15 ppm is considered adequately iodised. The test kit produced by MBI chemicals, Chennai (India), a starch-based colourimetric test, was used for estimation of iodine in the salt sample. The test was performed according to the manufacturer's instructions to measure iodine in salt at 0, 7, 15, and >30 ppm [11].

RESULTS

Among 1600 children studied, 1019 (63.68%) were between 6-11 years of age and 581 (36.31%) were between 12-15 years of age. Only two cases of goitre were detected in the present study group. Grade 1 goitre (A goitre that is palpable but not visible) was noted among both subjects. Hence the total goitre rate was 0.125% indicating that goitre is not a public health problem in this area. Male to female ratio in this study was 1.32:1 and the both observed cases of goitre were female children.

The median UIE of urine samples from all the 30 clusters showed that the median UIE level to be ≥ 100 mcg/l in 361 cases (90.25%). Only 9.75% (39) of the samples had median UIE < 100 mcg/l. The median UIE levels of all the urine samples (n=400) estimated was 179 mcg/l, indicating that there was no biochemical deficiency of iodine in the study population.

Analysis of 400 salt samples obtained from the study population showed that more than 90% of the salt samples had iodine content more than the stipulated level of (15 ppm) iodine indicating the adequacy of iodine content of the salt and only 9.25% samples had less than 15 ppm of iodine in the salt sample. Consumption of iodised salt was found to be satisfactory in the study area [Table/ Fig-1].

Sl. No.	Area studied	Age group in years	Goitre prevalence	Median UIE level	Iodine status of salt	Remarks
01	Bellur Hobli, Mandya District, Karnataka	6-15	0.125%	179 mcg/l	> 15 ppm in all clusters	Not an endemic area and USI programme is established

[Table/Fig-1]: The prevalence of goitre, UIE level and salt iodine status

DISCUSSION

In our present study conducted among the 1600 school going children of Bellur hobli, Nagamangala Taluk of Mandya District, Karnataka, aged between 6-15 years, we found that goitre prevalence was 0.125%. Other studies across India showed a prevalence that ranged from 1% to 52%. Median urinary iodine excretion in our study was 179 mcg/l while similar studies recorded median UIE ranging from 110-200 mcg/L. The mean iodine content of the salt samples collected was found to be >15 ppm and other studies noted values mean iodine content to be <15 ppm and found usage of iodised salt that ranged from 15%-100% of households of study population.

A study done by Abdul Hamid Zargar in the year 1993 among the 1876 school-going children of Baramulla District, Kashmir, in the age group of 5-15 years showed that goitre prevalence was 52.08% and the mean \pm SEM urinary iodine was 41.85 ± 2.52 μ g/g of creatinine, indicating a biochemical iodine deficiency. Thus their study indicated that the Baramulla District was an endemic area for goitre [4].

In a study done by R.K. Gakkhar, et al., from Jabalpur, Madhya Pradesh, the goiter prevalence was 2.4% and urinary iodine level was 110mcg/l among 1205 school-going children aged between 6-15 years in that area [5].

In a study at Hamipur District, Himachal Pradesh with 6897 school children, the goitre prevalence was 8.8% and median urinary iodine excretion was found to be 140 mcg/l. They also found out in their study that only 13.3% children were using salt having iodine content and <15 ppm. Study population appeared to be in a transition phase from iodine-deficient to iodine-sufficient state [12].

A similar study was conducted by Umesh Kapil, et al., in Bharathpur District, Rajasthan, among 3072 school-going children. They found out that the goitre prevalence was 7.2% and median UIE was 200 mcg/l. In the salt samples tested for iodine content, 56% had iodine in it. Though UIE levels showed no biochemical deficiency of iodine, the goitre prevalence indicated a mild iodine deficiency in that area [13].

A study at the Erankulum District of Kerala with 1254 children aged between 6-12 years in 1999 had shown the goitre prevalence of 1% with a median UIE of 200 mg/l with 89% of the population using adequately iodised salt. So we inferred that iodine deficiency was not a public health problem in Eranakulum [14].

The findings of our study suggest that our study area, Bellur hobli, is not an endemic area for goitre and there is no biochemical iodine deficiency. Study findings are also suggestive of sufficient usage of iodised salt in the study area.

The present study has shown that utilisation of adequately iodised salt in the study area has resulted in lower goitre prevalence.

Limitation of the study was that the study did not take into account socioeconomic and demographic profile and clinical manifestations of the study population.

CONCLUSION

Bellur hobli is not an endemic area for goitre and there is no biochemical iodine deficiency in this population due to effective implementation of UIP.

IDD can be prevented by identifying the high-risk population and taking appropriate preventive and corrective measures. It is reasonable to conclude that by achieving the universal iodisation of salt, IDD can be successfully eliminated from the community.

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