

Original Research Article

Assessment of the magnitude of goitre in the age group of 6-12 years in district Bandipora of Kashmir division

Malik W. Raja*, Rifat Jan

Department of Community Medicine, Government Medical College Srinagar, Srinagar, Jammu and Kashmir, India

Received: 08 April 2026

Accepted: 19 May 2026

*Correspondence:

Dr. Malik W. Raja,

E-mail: rajwsm.raja@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Iodine deficiency disorders (IDD) have remained an unresolved public health problem in India. This study was done to determine the prevalence of goitre among school-aged group of 6–12 years in district Bandipora.

Methods: This was a cross-sectional study done among children of 6–12 years in district Bandipora. Multi-stage 30 cluster sampling was used to select the study sample. For the selection of 30 clusters in each district, probability proportional to size (PPS) was employed. From each cluster, 90 children were selected.

Results: Out of 2700 children examined, Grade 1 goiter was found in 359 (13.3%) children and Grade 2 goiter was found in 50 (1.85 %) with a total goiter rate (sum of grade first and grade second) of 15.14%. On analysing the urine samples, about 22% of the children had mild to moderate iodine deficiency.

Conclusions: The study showed mild goitre prevalence in school-aged children of 6–12 years in the Bandipora district of Kashmir valley. Continuous periodic surveys to assess the magnitude of the iodine deficiency disorders (IDD) and ensuring the availability of iodized salt should be undertaken to ensure sustainable elimination of IDD in India.

Keywords: Goitre, India, Iodine deficiency disorders, TGR, Urinary iodine

INTRODUCTION

Iodine is an essential element required for synthesis of thyroid hormones T4 and T3. Iodine insufficiency is a major global public health issue, among young children and pregnant women and is a key factor in children's brain damage that may be avoided. Low dietary iodine intake is one of the primary causes of iodine insufficiency.

Iodine is mostly found in the thyroid gland and is found in extremely small concentrations in the human body. Hypothyroidism and a variety of functional and developmental problems, caused by low iodine intake. This results in inadequate production of thyroid hormones, which is referred to as having IDD.¹ The most obvious sign of IDD is goitre. Endemic goitre is a

maladaptation to iodine deprivation that comes from enhanced thyroid stimulation by thyroid stimulating hormone to increase the use of available iodine. The WHO and UNICEF Joint Committee on Health Policy advocated universal salt iodization (USI) as a method to guarantee that everyone is consuming enough iodine. According to some experts, iodizing all salt could be the most beneficial public health initiative of the last 20 years and a remarkably affordable public health objective. Depending on the median urine iodine excretion (UIE) in micrograms/litre or the total goitre rate, districts are classified as having mild, moderate or severe iodine shortage (Table 2).² Globally, there are thought to be between 10% and 20% of persons with goitres (or roughly 700 million people). Similar estimates for poor urine flow are typically in the 30–40% range and around 1.7 billion people 1.3 billion of whom are Asians are

affected. Iodized salt accessibility varies greatly between rural populations (85.6%) and urban communities (46.4%), according to a 2009 evaluation survey. In India, IDD are acknowledged as a serious public health issue. IDD is present in every state in the nation, according to surveys done in various states. According to the National Family Health Survey 5 (NFHS 5), the prevalence of goitre or thyroid disorder in the general population was 2.9%.³ Out of the 282 districts examined so far, sample surveys done in 25 states and 5 union territories of the country found that IDD is a major public health problem in 241 districts, where the prevalence is greater than 10%. According to estimates, 71 million people in India suffer from goitre and other IDD, while 200 million people live in iodine-deficient areas.⁴

IDD frequently manifests as thyroid gland enlargement and goitre prevalence surveys are used as a diagnostic technique to pinpoint IDD-prone locations. Globally, there are thought to be between 10% and 20% of persons with goitres (or roughly 700 million people). Similar estimates for poor urinary level are typically in the 30–40% range and around 1.7 billion people 1.3 billion of whom are Asians are affected.⁵ No state in India is free from iodine deficiency and is "at risk" of developing IDD, according to a national survey done by the ICMR. IDD is a concern for almost 350 million people in this country, according to iodized salt research. IDD is widespread in India, with 303 out of 365 districts having a total goitre rate (TGR) of more than 10%.⁶

Bandipora District is one of the 20 districts in Jammu and Kashmir UT in northern India. Bandipora town is the administrative headquarters of the district. Bandipora. This district was carved out from the erstwhile Baramulla district in 2007. The district is bounded by Kupwara district in the west, Baramulla district in the south and Kargil, Srinagar and Ganderbal districts in the east. This district occupies an area of 345 km². The district has a population of 392,232.

This study was carried out with the goals of determining the prevalence of goitre among school-aged children between the ages of 6 and 12 in district Bandipora and to determine the association between age and gender with the prevalence of goitre considering the topographic and physical characteristics of the Bandipora district of Kashmir valley. Additionally, we were interested in finding out how much iodine was present in salt samples and on average in urine samples.

METHODS

Study design

This was a cross-sectional study.

Study place

The study area was Bandipora district of Kashmir valley.

Study duration

Study was conducted between March 2022 to April 2022

Sampling method

Gender stratified cluster sampling technique.

Sample size estimation

30 clusters were selected and each cluster included 90 children.

Selection of children

30 schools were selected from the entire district employing PPS after line-listing all the schools in the district, which formed the cluster. The study included children aged 6-12 years. Permission was obtained from the Directorate of School Education Kashmir and Chief Education Officer, Bandipora.

A list of schools in the selected clusters was obtained from the office of CEO Bandipora. 45 boys and 45 girls (90 students) between age groups of 6 to 12 years were randomly selected from each cluster. Thus, 6–7 boys and girls of each group were selected from each selected cluster. The sample was selected in a way to ensure equal representation from all the age groups.

If the first school could not provide the required number of children a second school in the same district was included till the required number was met. A total of 2700 children were screened for goitre in the district (Table 1).

Procedure

The diagnosis of goitre was based entirely on inspection and palpation of the neck. It was done as per the prescribed procedure. Every 5th child was also asked to get a sample of the salt used in cooking from the home in sealed envelopes and urine sample was collected in a sealed container from every 10th child. The samples were labelled as per the number of clusters to which they belonged.

Interpretation of results

The goitre was classified as per the WHO grading into three stages Grade 0, Grade 1 and Grade 2 (Tables 2 and 3). Grade 0 was taken as absence of goitre whereas Grades 1 and 2 meant presence of goitre. The sum of Grade 1 and Grade 2 is taken as the TGR.

RESULTS

Data analysis revealed goitre to be present in 15.15% of children (Table 4). Out of the 2700 children examined, Grade 1 goitre was found in 359 (13.3%) of children and Grade 2 goitre was found in 50 (1.85%) as shown in

Table 5 with a TGR of 15.14%. About 75% of the salt samples had 6.54 ppm of iodine at the consumer level. On analyzing the urine samples, 22% of the children had mild to moderate iodine deficiency. Adequate salt intake

was present in 16%, followed by 14% and 48% who had an above requirement and excess amount of salt in urine samples. These results are highlighted in Table 6.

Table 1: Demographic characteristics of study population.

Age group (in years)	Gender		Total
	Males (%)	Females (%)	
6	160 (41)	230 (59)	390
7	230 (59)	160 (41)	390
8	158 (43.1)	222 (56.9)	390
9	160 (45)	200 (55)	360
10	173 (60)	217 (40)	390
11	220 (57)	170 (43)	390
12	155 (38)	225 (62)	390
Total			2700

Table 2: WHO grading of goitre.

Indicator	Mild	Moderate	Severe
Total goitre rate	5–19.9%	20–29.9%	≥30%
Median UIE (micrograms/l)	50–99	20–49	<20

Table 3: WHO grades description.

Grade description	
Grade 0	No palpable or visible goitre/ no goitre
Grade 1	A mass in the neck that is consistent with an enlarged thyroid, that is palpable but not visible when the neck is in normal position. It moves upward in the neck as the subject swallows. Nodular alteration can occur even when the thyroid is not enlarged/goitre palpable but not visible
Grade 2	A swelling in the neck that is visible when the neck is in a normal position and is consistent with an enlarged thyroid when the neck is palpated / goitre visible and palpable.

Table 4: Prevalence of goitre in the study population.

Goitre status	N	%
Present	409	15.15
Absent	2291	84.85
Total	2700	100

Table 5: Relationship of goitre grade with gender.

Gender	Grade of the goitre			TGR	Total
	0	1	2		
Males	1105 (83.6%)	194 (14.7%)	23 (1.7%)	217 (16.4%)	1322 (100%)
Females	1186 (86%)	165 (11.97%)	27 (1.95%)	192 (13.92%)	1378 (100%)
Total	2291 (84.85%)	359 (13.29%)	50 (1.85%)	409 (15.14%)	2700 (100%)

Table 6: Iodine levels (ppm) in salt samples and UI levels (ppm) according to who in salt and urine samples of district Bandipora.

	Minimum	25 th percentile	50 th percentile	75 th percentile
	0	5.28	5.99	6.54
UI level (ppm)	Up to 99.9 mild-moderate deficiency	100–199.9 adequate intake	200–299.9 above requirement	300 and above excessive
Count	57	43	36	128
% age	22	16	14	48

DISCUSSION

The most common method of preventing iodine shortage is to iodize all salt. However UI is the ideal indication for evaluating iodine nutrition in the community and recent changes in iodine intake.⁷ The most effective and practical way to monitor IDD for UI and TGR is through school-based sampling because this group is frequently accessible and may be used as a model for the broader population. In this study, the prevalence of goitre between age group 6-12 years was 15.5% which is almost similar to a study conducted in Himachal Pradesh where the prevalence was 16%.⁸ Grade 1 goitre was seen in 13.2% of children with Figures higher in boys (14.7%) than in girls (11.9%). Grade 2 goitre was present in 1.85% of surveyed children with figures slightly higher in girls (1.95%) than boys (1.9%). These findings are like a study conducted by Quanser et al.⁹

Gender-specific indicates that males have a higher TGR (16.4%) compared to females (13.9%). This finding is in contrast with existing study conducted in North Kashmir by Shifana et al.¹⁰ Similar findings were found in a study by Rajiv Kumar Gupta et al, where TGR was higher in boys (17.8%) in comparison to girls (14.6%).¹¹ Urinary iodine excretion is a sensitive marker of iodine intake and it reflects on the recent changes in iodine status.¹² It shows a varied distribution across the population. The UI levels ranged from up to 99.9 ppm (indicating mild to moderate deficiency) to levels exceeding 300 ppm, which suggests excessive iodine intake. According to WHO standards, UI levels between 100–199.9 ppm are considered indicative of adequate iodine intake, which was observed in a significant portion of the children (16%). However, a concerning 22% of the children exhibited UI levels below 100 ppm, reflecting an ongoing risk of iodine deficiency. the levels were excessive in 485, which is noteworthy.

Limitations

The lab's determination of the iodine levels in salt and urine samples could have been biased by misclassification. Also, because this study only included school-age children (ages 6 to 12), its findings cannot be applied to youngsters who do not attend classes.

CONCLUSION

The study revealed mild goitre among school children aged 6-12 years in district Bandipora of Kashmir. This indicates that despite the availability of iodised salt, goitre is still endemic in some areas. Dietary factors and improper storage and cooking techniques could be some of the contributing factors.

Continuous periodic surveys to assess the magnitude of IDD and ensuring the availability of iodised salts through regulated market checks should be undertaken. Further,

state salt production units could be made available to ensure that customers have accessibility to fresh salt and the environmental loss of iodine is kept at minimum.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Delange F. The disorders induced by iodine deficiency. *Thyroid*. 1994;4(1):107-28.
2. World Health Organization. Goitre as a determinant of the prevalence and severity of iodine deficiency disorders in populations. World Health Organization. 2014.
3. Singh A, Chakrabarty M. Insights from the National Family Health Survey, 2019-2021. *The Built Environment and Public Health in India: Opportunities, Challenges and Future Pathways*.
4. Kaur G, Anand T, Bhatnagar N, Kumar A, Jha D, Grover S. Past, present and future of iodine deficiency disorders in India: Need to look outside the blinkers. *J Family Med Prim Care*. 2017;6(2):182-90.
5. De Benoist B, Andersson M, Egli I, Takkouche B, Allen H. Iodine status worldwide. WHO Global Database on Iodine Deficiency. Geneva: World Health Organization. 2004;83:518-25.
6. Vir SC. Current status of iodine deficiency disorders (IDD) and strategy for its control in India. *Indian J Pediatr*. 2002;69:589-96.
7. World Health Organisation. Assessment of the Iodine Deficiency Disorders and Monitoring Their Elimination. Geneva: World Health Organisation. 2007: 1-107.
8. Dhiman AK, Sandhu SK, Yadav VK, Arora I. Assessment of goitre among primary school children in district Chamba, Himachal Pradesh, India. *Int J Comm Med Public Health*. 2020;7:767-9.
9. Quansar R, Chowdri IN, Salim Khan SM, Khan MA, Lone AA, Tahir M, et al. Goiter prevalence and iodine deficiency disorder among school-age children (6-12 years) in district Ganderbal of Kashmir valley. *J Educ Health Promot*. 2023;12:192.
10. Ayoub S, Bashir K, Haq I, Khan SMS, Qurieshi MA, Sumji IA, et al. Assessment of goiter and iodine deficiency among school children in North Kashmir: A cross-sectional study. *J Family Med Prim Care*. 2025;14(2):713-9.
11. Gupta R, Verma A, Jamwal D, Mengi V. Goiter Prevalence in School Children in Three Districts of Jammu Region. *JMS*. 2012;15(1):28-1.
12. Sharma R, Bharti S, Kumar KVSH. Diet and thyroid-myths and facts. *J Med Nutr Nutraceut*. 2014;3:60-5.

Cite this article as: Raja MW, Jan R. Assessment of the magnitude of goitre in the age group of 6-12 years in district Bandipora of Kashmir division. *Int J Community Med Public Health* 2026;13:3083-6.