Original Article

A Report on Goiter Survey among School Age Children (6-12 years) in Northern India

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Abstract

Background: Deficiency of iodine causes goiter which is a visible sequelae. One of the major impacts of iodine deficiency is that it can lead to impaired neurodevelopment particularly in early life. Goiter surveys are conducted to identify areas of IDD and can be used as a baseline assessment of a region's iodine status and as a sensitive long-term indicator for the success of an iodine programme. **Methodology:** This cross-sectional study was conducted among 6-12 years children by the Department of Community Medicine, Government Medical College, Srinagar, in collaboration with Department of Drug and Food Control Organization under NIDDCP, in district Anantnag, Kashmir division (J&K) during the month of March and April, 2017. The sample size of 2700 was calculated using the method of Population Proportionate to Size (PPS) sampling in the age group of 6-12 years children. Demographic variables and goiter grade was recorded by trained health professionals, assessment of goiter was done clinically by inspection and palpation of the thyroid gland. **Results:** In this study, we studied a total of 2700 school children in the age group of 6-12 years from district Anantnag with mean age of 9.69 ± 2.02 years. 50.7% were boys. The age distribution prevalence of goiter was observed to be 13.8% with highest prevalence seen among schools children of age 8-10 years (45.8%). The prevalence of grade 1 goiter was more than ten folds higher than grade 2 goiter. It has been observed that Achabal and Mattan zone have higher prevalence of grade 1 & grade 2 Goiter 22.40% and 22.22% respectively. Achabal and Mattan zone have goiter prevalence of moderate severity and outnumber other zones. **Conclusion:** The present study shows that Kashmir division is still an endemic area, where goiter remains a significant public health problem. Effect of geographical locations, dietary factors, storing salt techniques, cooking techniques and interaction of iodine with other nutrients are some areas where further research can be done in future.

Keywords: Goiter survey; Northern India; School children; Goiter in Children; IDD in children

Introduction

The hormones produced by the thyroid gland require iodine as an essential component and these hormones are essential for sustaining human life, therefore iodine is crucial for human development and survival. Deficiency of iodine causes goiter which is a visible sequelae, clinically detected by physical inspection and palpation of the thyroid gland. One of the major impacts of iodine deficiency is that it can lead to impaired neurodevelopment particularly in early life. [1] Persistent iodine deficiency can eventually affect growth and mental development in all age groups in the same geographic areas irrespective of their socio-economical status. [2] The prevalence of goitre increases with the severity of iodine deficiency and becomes endemic in populations where the intake of iodine is less than 10 µg per day. [3]

World over, around 740 million people are affected by goiter and 2.2 billion people (over 38% of the global population in 130 countries) live in iodine deficient regions, thus under risk of Iodine deficiency disorder [IDD] According to the World Health Organisation (WHO), Iodine deficiency is the single most common cause of preventable mental handicap worldwide. [4] Many countries including India, Pakistan and China have recognised their entire population at risk of IDD. [5] In India, more than 200 million people reside in geographically goiter endemic areas and 71 million suffer from iodine deficiency disorders. [6]

The surveys conducted by Central and State health Directors, ICMR, and Medical institutes have clearly demonstrated that not even a single state or union territory in the India is free from spectrum of IDDs. Out of 390 districts surveyed in all the 29 States and 7 UTs, 333 has been found endemic i.e., where the prevalence of Iodine Deficiency Disorders (IDDs) is more than 5%. [7] Fortification of salt with iodine is the widely accepted preventive strategy to fight against IDD. Several studies carried out in India have shown a high percentage of goiter incidences. [8,9] It has been made mandatory to iodinize all table salts in India to eliminate iodine deficiency. Government of India has relaunched National Iodine Deficiency Disorders Control Programme (NIDDCP) in the year 1992 with a goal to reduce the prevalence of IDD to non-endemic level. It has been noticed that after implementation of NIDDCP, India has made

How to Cite this Article: Saleem SM et al. A Report on Goiter Survey among School Age Children (6-12 years) in Northern India. Ann Med Health Sci Res. 2017; 7: 102-105

considerable progress toward IDD elimination. [10] In this regard in 2005, central government has issued notification banning the sale of noniodized salt for direct human consumption in the entire country, which was effective from May, 2006 under the Food Adulteration Act. [10]

The common manifestation of IDD is the enlargement of the thyroid gland and survey method is used as a diagnostic tool to detect IDD in the community. Goiter surveys are conducted to identify areas of IDD and can be used as a baseline assessment of a region's iodine status and as a sensitive long-term indicator for the success of an iodine programme. [4] The school age children are usually taken into account as the Iodine deficiency causes an immediate effect on the child's school performance [2,3] and they represent a useful population for the assessment of IDD, both because of their accessibility through schools and physiological vulnerability. [11] Literature search reveals that many studies have been conducted in different parts of India and Kashmir division to estimate the burden of IDD, no such study has been conducted in district anantnag of Kashmir division which lies in the southern sector of Jhelum Valley about 60 kms from the summer capital of Jammu & Kashmir. Owing to proximity of Peer Panchal Range, this stretches in its south and south-east regions. A well-known fact about goiter is its high prevalence in hilly regions possibly owing to the soil and water deficient in iodine compared to low lying areas. In view of this, we conducted this goiter survey among school going children of district anantnag, Kashmir division to see prevalence of IDD.

Methods

This cross-sectional study was conducted among 6-12 years children, in district Anantnag, Kashmir division (J&K) during the month of March and April, 2017. The sample size of 2700 was calculated using the method of Population Proportionate to Size (PPS) sampling in the age group of 6-12 years children as per recommended guidelines of WHO/UNICEF/ICCIDD. [10-12] Anantnag district was divided into five educational zones and the list of all the schools were collected from official website of the district. [13] Prior permission to conduct the survey was obtained from the Director of education department and informed consent from zonal education officer and school heads before the start of the study. A total of 30 schools were selected from the whole district, six from each zone. A sample of 90 school children (45 boys and 45 Girls) in the age group 6 -12 years were randomly selected from each school. Thus, a total of 2700 students were examined to achieve the required sample size. Demographic variables and goiter grade was recorded by trained health professionals from the department of Community Medicine who had obtained prior training for case identification and goiter grading.

Assessment of goiter was done clinically by inspection and palpation of the thyroid gland and graded as per World Health Organization (WHO) grading system and revised guidelines under National Iodine Deficiency Disorders Control Programme (NIDDCP). [14]

Grade 0, No Goiter (No palpable or visible goiter)

Grade 1 (Goiter palpable but not visible) and

Grade 2 (Goiter visible and palpable in normal position of neck)

Data was entered in Microsoft excel spreadsheet 2007 and analyzed in SPSS v 20.0. The outcomes variables are expressed in percentages based on age, sex and goiter grade.

Results

In this study, we studied a total of 2700 school children in the age group of 6-12 years from district Anantnag with mean age of 9 ± 1.86 years. 50.7% were boys. The age distribution prevalence of goiter among school children (6-12 years) in district Anantnag is shown in Table 1, which was observed to be 13.8% [95% CI=13.14-14.46] with highest prevalence seen among schools children of age 8-10 years (45.8%). The prevalence of grade 1 goiter was more than ten folds higher than grade 2 goiter. Table 2 shows sex distribution of Grade 1 and grade 2 goiter cases in district Anantnag with slightly higher prevalence of grade 1 goiter in girls and grade 2 goiters in boys. The distribution of goiter prevalence among boys and girls in different educational zones of district Anantnag is shown in Table 3. It has been observed that Achabal and Mattan zone have higher prevalence of grade 1 & grade 2 Goiter 22.40% and 22.22% respectively. The severity score of Goiter as a major public health problem is shown in Table 4. [15] Achabal and Mattan zone have goiter prevalence of moderate severity and outnumber other zones.

Discussion

In India, previous studies had shown that no states or union territories were free from IDD Iodine deficiency disorders (IDD) although being preventable disorders. [16,17] For assessment of the severity of the iodine deficiency of any geographical area, WHO/UNICEF/ICCIDD had established the criteria on the basis of total goiter prevalence (palpable and visible goiter). [14] Any geographical area is classified as endemic for iodine deficiency when a total goiter prevalence rate in that area is more than 5% among school children aged 6-12 years. [7,15] With an objective to find the prevalence of IDD in district Anantnag, we conducted goiter survey in 2700 school children aged 6-12 years and found that the total goiter prevalence was 13.8% [95% CI=13.14-14.46] The presence of goiter among boys and girls were almost equal with fewer gender differences. This finding proved that individual sex has no role in IDD and it's the consumption of iodine as salt with foods that make the difference. [18] In our study, the prevalence rates of grade 1 goiter and grade 2 goiter were found to be 12.8% and 1.0% respectively. An earlier study by Khan SMS et al. in 2014 reported 18.9% prevalence of goiter in children aged 6-12 years in Kashmir division where 18.5% of children had grade 1 goiter and 0.4% had grade 2nd goiter. [19] This finding shows that over a period of time, the overall prevalence of total goiter and grade 1 goiter has fallen considerably which may be attributed to consumption of iodized salt while the prevalence of grade 2 goiters has slightly increased. This may be due to the endemic nature of the disease itself and asymptomatic cases which often get unnoticed. Another study from Kashmir by Rafiq et al. found the total Goiter Rate (TGR) as 15.27%; 16.35% among girls and 13.38% among boys. [20] Zargar AH et al. in 1997 conducted a study among school children aged 5-15 years in Kashmir valley and found a TGR of 45.2%; 43.9% among boys & 46.23 among girls. 37.74% of children had grade 1 goiter and 7.44% had grade 2nd goiter. [21] Many studies including ours show that the prevalence of goiter has declined in the valley over time but still it is a major public

Table 1: Age distribution of children with goiter in Anantnag District.

Age in years	Total no. of children examined	Goiter Prevalence Grade 1 N (%)	Grade 2 N (%)	Total Goitre (%)
6	230	33 (14.3)	3(1.3)	15.6
7	292	35(12.0)	4(1.4)	13.3
8	314	50(15.9)	1(0.3)	16.2
9	339	48(14.2)	4(1.2)	15.3
10	348	47(13.5)	3(0.9)	14.3
11	421	52(12.4)	5(1.2)	13.5
12	756	81(10.7)	7(0.9)	11.6
Total	**2700**	**346(12.8)**	**27(1.0)**	**13.8**

Table 2: Sex distribution of Grade 1 and grade 2 goiter cases in district Anantnag.

Sex		Goiter Grade 0	1	2	Total
Male	**Count**	1182	172	15	1369
	% within Sex	86.30%	12.60%	1.10%	100.00%
Female	Count	1145	174	12	1331
	% within Sex	86.00%	13.10%	0.90%	100.00%
	Count	2327	346	27	2700
	Total % within Sex	**86.20%**	**12.80%**	**1.00%**	**100.00%**

Table 3: Distribution of goiter grade in educational zones of district Anantnag.

Study Zones	Males (n=1369) Grades				Females (n=1331) Grades				Total (N=2700) Grades			
	0	1	2	Total	0	1	2	Total	0	1	2	Total
Achabal	213	52	9	22.20%	206	52	8	22.50%	419	104	17	540
Bijbehara	250	24	1	9.00%	239	26	0	9.80%	489	50	1	540
District Headquarter	250	22	0	8.00%	234	31	3	12.60%	484	53	3	540
Mattan	201	64	5	25.50%	219	50	1	18.80%	420	114	6	540
Qazigund	268	10	0	3.50%	247	15	0	5.70%	515	25	0	540
Total	**1182**	**172**	**15**	**13.60%**	**1145**	**174**	**12**	**13.90%**	**2327**	**346**	**27**	**13.80%**

Table 4: Distribution of severity of Goitre as a public health Problem in educational zones of district Anantnag.[15]

Study Zone	Total no. of children examined	No.(%) of children with Goiter Grade 1 (%)	Grade 2 (%)	Total (1+2)	*Severity
District Headquarter	540	9.8	0.5	10.3	Mild
Bijbehara	540	9.2	0.1	9.4	Mild
Qazigund	540	4.6	0	4.6	No
Achabal	540	19.2	3.1	22.4	Moderate
Mattan	540	21.1	1.1	22.2	Moderate
Total	**2700**	**12.8**	**1**	**13.8**	**Mild**

*<5% No; 5-19.9% Mild; 20-29% Moderate; >30% Severe

health problem. The decrease in the prevalence of goiter can be attributed to continuous efforts of the government and non-government organizations by banning the sale of non-iodized salt, increase in the literacy rate in the population, awareness among people through electronic and print media and the role of medical professionals at an individual level.

Moreover, we found a unique pattern in the prevalence of goiter with age. The prevalence of goiter was found to be rising from 6 years, maximum among 8-10 years and then declining till age 12 years. A maximum number of cases were seen in the age group of 8 years (16.2%). Similar findings were reported by a study conducted in Gujarat by Chandwani HR et al. in 2012 and Wolka E in the year 2014 [22] who found that with advancing age, the prevalence of goiter decrease with a maximum number of cases in the median age group. [23] The increased demand of thyroid hormone with advancing age may be attributed to this relation of age and prevalence. Another finding of our study reports the inter zonal goiter prevalence with Achabal and Mattan zones having moderate severity goiter prevalence. It has been overwhelming that we didn't found any zone with high severity goiter prevalence.

World health organization urged to implement Universal salt iodization (USI) and iodine supplementation strategies for preventing and controlling iodine deficiency disorders. National goiter control program was launched in 1962 by Government of India and renamed National iodine deficiency disorder control programme [NIDDCP] in 1992 with the aim to reduce the prevalence of IDD to below 10% by 2010. [24] After 25 years of implementation of NIDDCP, the present study shows that the national programme has had much impact in lowering down the prevalence of goiter in district Anantnag, Kashmir division.

Recommendations

Interventions should be designed with an aim at increasing

the awareness of the health benefits of iodine in the diet, and the increasing use of iodized salt at the domestic level. The interventions should be sensitive enough to the local culture and should consequently enhance the intervention process. Health education regarding the use of iodized salt to different cadres of the community members at the house hold level, visits to the schools, visit to the health centers should be done on regular basis. Education sessions should be given at the village health centers, religious gatherings, during immunization sessions and by motivating the people with the help of ASHA. Though the study was well organised with adequate sample size, it had some limitations. The casual factors responsible for IDD in children were not studied in detail due to time constrains and poor knowledge of students about IDD which could have introduced bias in the study.

Conclusion

The present study shows total goiter prevalence of 13.8% in district Anantnag, Kashmir division indicating that it is still an endemic area, where goiter remains a significant public health problem. Though the prevalence of goiter has been reduced over years, it is still endemic. Effect of geographical locations, dietary factors, storing salt techniques, cooking techniques and interaction of iodine with other nutrients are some areas where further research can be done in future.

Acknowledgement

The authors would like to acknowledge the services and assistance of the Directorate of Education, Chief education officers, Principals/Head of Institutions, Teachers and students who took part in the survey.

Conflict of Interest

All authors disclose that there was no conflict of interest.

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