Prevalence of Goiter among Primary School Children of Kulgam District, Jammu & Kashmir, India

S Muhammad Salim Khan,a Raihana Mahjabeen,b Muneer Ahmad Masoodi,b Junaid Kauser,* Shahnaz Nabi*a

a. Department of Community Medicine, Government Medical College, Srinagar; b. GB Pant Hospital, Srinagar*

Corresponding Author: S Muhammad Salim Khan, Assistant Professor, Department of Community Medicine, Government Medical College, Srinagar. Email: smsalimkhan@gmail.com

Abstract

Iodine Deficiency Disorder (IDD) is a major public health problem in India, especially in the sub-Himalayan belt. The Kashmir valley is a known iodine deficiency endemic area. This study was conducted to estimate the prevalence of goiter among primary school children in Kulgam district of Jammu & Kashmir state of India.

This study was carried out using a 30-cluster survey method among primary schools of Kulgam district using population proportionate to size (PPS) sampling techniques. A total of 2700 school children, including 1350 boys and 1350 girls from the first to seventh grades in the age group of 6 to 12 years, were examined.

The overall prevalence of goiter expressed as Total Goiter Rate (TGR) was 18.9%; 21.2% among boys and 16.7% among girls. Higher goiter rates were found in the older age groups: 23.1% among 11 years and 21.9% among 12 years old children.

Keywords: Thyroid disorders, Goiter, Goiter prevalence, Iodine deficiency, IDD, Total Goiter Rate, TGR, Kashmir

Background and Rationale

Iodine is an essential micronutrient required for human growth and development. Even though needed only in minute quantities, iodine is an important constituent of thyroid hormones that regulate metabolism, growth and development. Iodine deficiency is a leading cause of mental impairment and can lead to abortion, stillbirth, increased neonatal, infant and child mortality, and developmental abnormalities. Iodine Deficiency Disorders (IDD) are a complex set clinical and subclinical conditions occurring mainly due to deficient dietary intake of iodine. Iodine deficiency is associated with reduced thyroid hormone synthesis, leading to increased thyroid-stimulating hormone levels, which stimulates thyroid over growth and goiter.

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, and are under risk of IDD. According to the World Health Organisation (WHO), Iodine deficiency is the single most common cause of preventable mental handicap worldwide. Many countries including China and India have come to regard their entire population as at risk of IDD.

In India, more than 200 million people reside in goiter endemic areas and 71 million suffer from iodine deficiency disorders. IDD exists in all States and Union Territories. Of the 282 districts surveyed for IDD in the country, 241 have been found to be goiter endemic. Several studies conducted all over India have shown high prevalence of goiter. Assessment of goiter prevalence is the most pragmatic approach for determining iodine deficiency in a region. Studies in sub-Himalayan regions has found moderate to high prevalence of goiter. Jammu and Kashmir is a sub-Himalayan state in India, which has three administrative regions, namely Kashmir Valley, Jammu and Ladakh. Keeping in view the topographic and physical characteristics of Kulgam district of Kashmir Valley, a study was conducted to estimate the prevalence of goiter among school children in the age group of 6-12 years.

Objectives

1. To assess the magnitude of goiter among school children in the age group of 6-12 years in Kulgam district of Jammu & Kashmir.
2. To study the age and gender distribution of goiter among the children.

Methods

This cross-sectional study was conducted in Kulgam district during the months of April and May, 2010 by Department of Community Medicine, Government Medical College, Srinagar. Based on 30% expected prevalence of goiter, 95% confidence limits and 5% absolute precision, the sample size was calculated to be 2700. Two-stage cluster sampling was used to select the study subjects. In the first stage, clusters were identified using the Population Proportionate to Size (PPS) method. The list of villages in the district, along with

Published on 20th February, 2014
the population figures from the latest census was obtained. A sample of 30 villages was selected from the district, which formed the clusters. A sample of 90 school children (45 boys & 45 Girls) in the age group 6 -12 years were randomly selected from each cluster. Thus, a total of 2700 students were examined in the schools, after obtaining informed consent from teachers, parents and students.

Data collection was done by the faculty, demonstrators, PG students and interns of the Department of Community Medicine who had obtained training for case identification and goiter grading at a state level training workshop conducted by the State Nutrition Cell. The survey included the World Health Organization (WHO) grading system as per the 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: “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(s) can occur even when the thyroid is not enlarged”.

Grade 2, Goiter visible and palpable: “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”.

The sum of grades 1 & 2 is taken as Total Goiter Rate (TGR).

Data was collected using a specially designed questionnaire, including information about name, zone, school, exact age of the child and sex. Clinical examination of the thyroid gland of each child was done through inspection and palpation. Data entry and analysis was done using Epi-Info by specially trained doctors from the Department.

Results

The age and gender distribution of the sample is given in Table 1. Out of 2700 children examined, 500 (18.5%) had Grade -1 Goiter while only 11 (0.4%) had Grade-2 Goiter, with a Total Goiter Rate (TGR) of 18.9% as shown in Table 2. Prevalence of Goiter was found to be higher among older children. Grade-1 Goiter in age groups of 11 and 12 years was 22.8% and 21.3% respectively and TGR was 23.1% and 21.9% in the same age groups. This finding was statistically significant with Chi-square statistic of 29.853 and P value < 0.001.

Prevalence of Goiter was found to be significantly higher among boys than girls. TGR among boys was 21.2% and girls 16.7% (Table 3). (Chi-square statistic - 8.9817. P value = 0.003).

Discussion

Goiter has been found to be a major public health problem in Kashmir. In this study the Total Goiter Rate was found to be 18.9%, with grade-1 goiter at 18.5% and grade 2 at 0.4%. An earlier study by Zargar AH et al in 1995 among school children aged 5-15 years in Kashmir valley had 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.15 Zargar AH et al in another study conducted in Baramulla district of Kashmir valley in 1997 found the Total Goiter Rate (TGR) to be 52.08%, with a higher prevalence among males (52.08%) than females (49.23%).16 Over these years the prevalence of goiter has declined in the valley as found also by Rafiq et al (2013) in Srinagar district where the Total Goiter Rate (TGR) was 15.27%; 16.35% among girls and 13.38% among boys.17 This decline can be attributed

Table 1. Age and Sex Distribution

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>224</td>
<td>164</td>
<td>388</td>
</tr>
<tr>
<td>7</td>
<td>95</td>
<td>109</td>
<td>204</td>
</tr>
<tr>
<td>8</td>
<td>106</td>
<td>80</td>
<td>186</td>
</tr>
<tr>
<td>9</td>
<td>110</td>
<td>162</td>
<td>272</td>
</tr>
<tr>
<td>10</td>
<td>153</td>
<td>132</td>
<td>285</td>
</tr>
<tr>
<td>11</td>
<td>139</td>
<td>177</td>
<td>316</td>
</tr>
<tr>
<td>12</td>
<td>523</td>
<td>526</td>
<td>1049</td>
</tr>
<tr>
<td>Total</td>
<td>1350</td>
<td>1350</td>
<td>2700</td>
</tr>
<tr>
<td>%</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2. Age and Grade of Goiter

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Grade-0 (%)</th>
<th>Grade-1 (%)</th>
<th>Grade-2 (%)</th>
<th>TGR (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>352 (90.7)</td>
<td>34 (8.8)</td>
<td>2 (0.5)</td>
<td>36 (0.93)</td>
<td>388 (100)</td>
</tr>
<tr>
<td>7</td>
<td>165 (80.9)</td>
<td>39 (19.1)</td>
<td>0 (0.0)</td>
<td>39 (19.1)</td>
<td>204 (100)</td>
</tr>
<tr>
<td>8</td>
<td>149 (80.1)</td>
<td>37 (19.9)</td>
<td>0 (0.0)</td>
<td>37 (19.9)</td>
<td>186 (100)</td>
</tr>
<tr>
<td>9</td>
<td>228 (83.8)</td>
<td>44 (16.2)</td>
<td>0 (0.0)</td>
<td>44 (16.2)</td>
<td>272 (100)</td>
</tr>
<tr>
<td>10</td>
<td>233 (81.7)</td>
<td>50 (17.6)</td>
<td>2 (0.7)</td>
<td>52 (18.3)</td>
<td>285 (100)</td>
</tr>
<tr>
<td>11</td>
<td>243 (76.9)</td>
<td>72 (22.8)</td>
<td>1 (0.3)</td>
<td>73 (23.1)</td>
<td>316 (100)</td>
</tr>
<tr>
<td>12</td>
<td>819 (78.1)</td>
<td>224 (21.3)</td>
<td>6 (0.6)</td>
<td>230 (21.9)</td>
<td>1049 (100)</td>
</tr>
<tr>
<td>Total</td>
<td>2189 (81.1)</td>
<td>500 (18.5)</td>
<td>11 (0.4)</td>
<td>511 (18.9)</td>
<td>2700 (100)</td>
</tr>
</tbody>
</table>

Table 3: Sex and Grade of Goiter

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. (%)</th>
<th>Grade-0</th>
<th>Grade-1</th>
<th>Grade-2</th>
<th>TGR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1064</td>
<td>280</td>
<td>6</td>
<td>286</td>
<td>1350</td>
<td></td>
</tr>
<tr>
<td>% within SEX</td>
<td>78.8</td>
<td>20.7</td>
<td>0.5</td>
<td>21.2</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>% within TGR</td>
<td>48.6</td>
<td>56.0</td>
<td>54.5</td>
<td>55.9</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1125</td>
<td>220</td>
<td>5</td>
<td>225</td>
<td>1350</td>
<td></td>
</tr>
<tr>
<td>% within SEX</td>
<td>83.3</td>
<td>16.3</td>
<td>0.4</td>
<td>16.7</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>% within TGR</td>
<td>51.4</td>
<td>44.0</td>
<td>45.5</td>
<td>44.1</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2189</td>
<td>500</td>
<td>11</td>
<td>511</td>
<td>2700</td>
<td></td>
</tr>
<tr>
<td>% within SEX</td>
<td>81.1</td>
<td>18.5</td>
<td>0.4</td>
<td>18.9</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
to the sustained efforts by government and non-government agencies towards reducing IDD prevalence by creating awareness on the use of iodized salt and by banning the sale of non-iodized salt.

The TGR in Kulgam district is very similar to the study by Jyotsna et al in Narmada district in Gujarat where they found it to be 18.1%. However their Grade-2 Goiter rate is much higher at 5.7% than our observation of 0.4%. Similarly a study by Rajiv et al in 2012 in the Jammu region of J&K state has shown a TGR of 19.84%. Tapas Kumar Sen et al (2006) identified TGR of 20% in districts of West Bengal.

However the TGR in Kulgam district is higher than that in many other places beyond the sub-Himalayan belt. Ramesh et al (2013) found overall prevalence of goiter (grade 1 & 2) as 9.8% in Kottayam district of Kerala. Other figures include 12.6% in Ambala, Haryana by C Chaudhary wt al (2013). 8.8% in school children of Porbandar district, Gujarat by Ilesh Kotecha et al (2011), and 7.74% in Chamarajnagar district, Karnataka by Syed Yunus Zama et al (2013).

The prevalence was seen significantly more among children belonging to older age groups; with TGR of 23.1% and 21.9% in age groups 11 and 12 years respectively. Study by Rajiv Kumar Gupta et al also had similar findings. Also, TGR was significantly more among boys as (21.2%) in comparison to girls (16.7%). The only other study that showed a male preponderance was by Zargar AH in Baramulla district of Kashmir valley in 1997 where higher prevalence was found among males (52.08%) than females (49.23%). In most other studies girls were found to have higher prevalence than boys. Gurdeep Singh et al (2013) found the prevalence of goiter to be high among girls (12.91%) as compared to boys (11.30%). T. Sahu et al (2005) also detected higher prevalence among girls (33.14%) than boys (27.38%). However Grade-2 goiter was similar among both boys (0.5%) and girls (0.4%). In a study by M. Rafiq et al (2006) in Budgam district of J&K, grade-2 goiter among boys was 0.48 % and among girls 0.96%.

Conclusions

The sustained efforts in implementing the guidelines of National Iodine Deficiency Disorders Control Programme (NIDDCP) has been able to reduce the prevalence of goiter in Jammu and Kashmir. In spite of the reduction in prevalence over the years, goiter continues to be a major public health problem in the state. There is a need to further strengthen the implementation strategies of NIDDCP in all districts of the state to bring the prevalence below non-endemic levels.

End Note

Author Information

1. S. Muhammad Salim Khan, Assistant Professor, Department of Community Medicine, Government Medical College, Srinagar
2. Raihana Mahjabeen, Medical Officer, Nutrition Rehabilitation Centre, GB Pant Hospital, Srinagar
3. Muneer Ahmad Masoodi, Medical Superintendent, GB Pant Hospital, Srinagar
4. Junaid Ahmad Masoodi, Medical Superintendent, SKIMS Medical College, Srinagar
5. Shahnaz Nabi, Lecturer, Department of Community Medicine, Government Medical College, Srinagar

List of Abbreviations Used

IDD: Iodine Deficiency Disorder
NIDDCP: National Iodine Deficiency Disorders Control Programme
TGR: Total Goiter Rate

Conflicts of Interest: None Declared

Acknowledgements

The authors acknowledge the support and assistance of the Education Department, Kulgam, all Principals / Head of Institutions/ schools involved and children who participated in the survey. The team also acknowledges the research associates namely Uzma, Saba, Tooba, Tufail, Ubaid, Faheem, Amir, Shahid, Sofi Abid, Owais, Muzaffar, Durham and Ishtiaq Ahmad.

Financial Support

Department of Drug and Food Control Organization under NIDDCP

References


23. Ilesh Kotecha*, Dr. Kailesh Bhalani, Dr. M. P. Singh.: Prevalence of Goiter in the Children of 6-12 years in Porbandar district, Gujarat, India. NJIRM 2011; Vol. 3(1) 115-18


