

## Prevalence of Goitre among primary school children in the Mewat area of Haryana

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### Abstract

Iodine is one of the essential micronutrients required for the normal mental and physical well being of human beings. Iodine Deficiency Disorder (IDD) has been considered as major public health problem in India including Mewat. The present goiter survey was done in Mewat district with the objective of estimating the prevalence of goiter in primary school children, of age six to twelve years. 1050 children from six to twelve years were clinically examined for the presence of goitre during survey. Overall goitre prevalence rate was 15.2%. Prevalence was significantly higher among females than males ( $P=0.039$ ). Age-specific prevalence rate (ASPR) was higher in 9 to 12 yrs age group as compared to 6 to 8 yr age group and it was statistically significant.

**Key words:** Goitre, IDD, Urinary iodine concentration, Primary school children

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### Introduction

Food and nutrition security at the individual and population level is a fundamental right. Nutrition security ensures optimal actualization of human resources and overall progress and development of a society and nation. Iodine is one of the essential micronutrients required for the normal mental and physical well being of human beings. The healthy human adult body contains 20-30 mg of iodine of which 70- 80% is in the thyroid gland<sup>1</sup>. The spectrum of diseases includes goitre, cretinism, hypo-thyroidism, brain damage, abortion, still birth, mental retardation, psycho-motor defects and hearing and speech impairment.<sup>2</sup> Iodine deficiency is the single most important cause of preventable brain damage and mental retardation in the world.<sup>3</sup>

Iodine deficiency disorders (IDD) are a worldwide major public health problem. Their effects are hidden and profound, affecting quality of human life.<sup>4</sup> Globally two billion people are at risk of iodine deficiency disorders due to insufficient iodine intake. Nearly 266 million school-aged children worldwide have insufficient iodine intake. Of the 130 countries which reported data for IDD in 2006 (comprising 91.1% of the total global population), IDD was a public health problem in 47 countries.<sup>5</sup>

Iodine Deficiency Disorder (IDD) has been considered as major public health problem in India including Mewat. It has been estimated that in India more than 71 million individuals suffer from IDDs, while another 200 million people are living in areas

with iodine deficiency.<sup>6</sup> India has made considerable progress in its IDD control programme. Less than 5 percent total goiter rate (TGR) was found in 9 out of 15 districts studied in 11 states by Indian Council of Medical Research (ICMR) study.<sup>7</sup> The present goiter survey was done in Mewat district with the objective of estimating the prevalence of goiter in primary school children, of age six to twelve years, to determine the median urinary iodine concentration in a sample of children.

### Materials and Methods

**Study setting:** The present study was conducted in the Mewat district of Haryana. The district comprises of Nuh, Nagina, Taoru, Punhana and Ferozpur Jhirka blocks, 431 villages and 297 Panchayats. The Mewat district has an area of 1,499 sq Km and has a population of 1,089,406 as per the 2011 census.

**Study design:** This was a cross sectional study.

**Study period:** This study was conducted during the months of February and March 2016.

**Study subjects:** A cross-sectional study of children aged six to twelve years, studying in the first to seventh classes of the primary schools of rural areas was conducted. From each class, five boys and five girls who were present in class on the day of the visit were selected randomly for examination. In total, 70 students were examined from each school in the selected villages. Thus, a total of 1050 students were examined in schools, after obtaining informed consent from teachers as well as students.

**Inclusion criteria:** Only those children who were present at the time of visit to primary school were recruited as study subjects.

**Exclusion criteria:** Those subjects who refused to give consent to participate in the study were excluded from the study.

**Training and survey technique:** The investigators themselves examined the children during the survey. The current survey included the World Health

Organization (WHO) grading system as per the revised guidelines under NIDDCP. The child was examined by the examiner in a sitting position, with the neck in a normal position. The following classification was used for goiter: (a) grade 0 – not visible, not palpable, (b) grade 1 – palpable, but not visible, and (c) grade 2 – palpable and visible, as per the WHO/ UNICEF/ ICCIDD guidelines.<sup>8</sup>

### Sampling Method

The cluster sampling method was used for selection of villages. A list of the villages of the Mewat district was obtained from the Zila Panchayat, office of the District Health Office (DHO). Subsequently, the cumulative population was figured using Microsoft Office Excel. By calculating the cluster interval, 15 villages were selected from the list. As the study was confined to only the rural areas of the Mewat district, urban populations were excluded from the cumulative population calculations. One primary school in each of the 15 selected villages was visited for school survey. When the desired sample size of five boys and five girls from each class was not achieved, the nearest primary school was approached and the desired sample size was achieved. The children were examined by the palpatory method, and the above-mentioned criteria were used for the classification of goitre. According to these criteria, goitre prevalence rate of 5.0–19.9% was considered mild; 20–29.9% was moderate, and above 30% was considered as a severe public health problem.

**Data collection:** Basic socio demographic data was collected by interview method. Each child was

examined for thyroid enlargement and was graded using WHO classification.

**Data analysis:** Collected data was appropriately coded and entered in the Microsoft Excel software. Data was analyzed using SPSS (Statistical Package for Social Studies) version 20.0 as per objectives of the study. Quantitative variables were represented using mean and standard deviation.

### Results

**Table 1: Socio demographic profile of study sample (n=1050)**

| Characteristic                 |                           | No. | %    |
|--------------------------------|---------------------------|-----|------|
| Gender                         | Boys                      | 525 | 50.0 |
|                                | Girls                     | 525 | 50.0 |
| Age groups (yrs)               | 6- 8                      | 450 | 42.9 |
|                                | 9- 10                     | 300 | 28.6 |
|                                | 11-12                     | 300 | 28.6 |
| Religion                       | Hindu                     | 158 | 15.0 |
|                                | Muslim                    | 892 | 84.9 |
| Educational status of Mother's | Upto intermediate         | 913 | 86.9 |
|                                | Graduate or Post graduate | 137 | 13.0 |

1050 children from six to twelve years were clinically examined for the presence of goitre during survey. Of these, 50% were males and 50% were females. The mean age of the children was  $8.88 \pm 1.83$  years. Majority (84.9%) of the study participants were Muslim by religion (Table 1).

**Table 2: Age-specific goitre prevalence in the Mewat district**

| Age          | Grade-0 |      | Grade-1 |      | Grade-2 |     | TGR |       |
|--------------|---------|------|---------|------|---------|-----|-----|-------|
| 6            | 143     | 95.3 | 07      | 4.7  | 0       | 0   | 07  | 0.67  |
| 7            | 139     | 92.7 | 10      | 6.7  | 1       | 0.6 | 11  | 1.05  |
| 8            | 143     | 95.3 | 05      | 3.3  | 2       | 1.3 | 07  | 0.67  |
| 9            | 131     | 87.3 | 18      | 12.0 | 1       | 0.6 | 19  | 1.81  |
| 10           | 120     | 80.0 | 28      | 18.7 | 2       | 1.3 | 30  | 2.86  |
| 11           | 116     | 77.3 | 31      | 20.7 | 3       | 2   | 34  | 3.24  |
| 12           | 98      | 65.3 | 47      | 31.3 | 5       | 3.3 | 52  | 4.95  |
| <b>Total</b> | 890     | 84.8 | 242     | 13.9 | 18      | 1.3 | 160 | 15.24 |

Prevalence of goitre increased with age. The highest prevalence (%) was observed in the age group of 11-12 years. Overall goitre prevalence rate was 15.2%. Age-specific prevalence rate (ASPR) was higher in 9 to 12 yr age group as compared to 6 to 8 yr age group (Table 2).

**Table 3: Association of Socio-demographic factors & Goitre**

| Characteristic   |       | Goitre Present (Grade-1 & 2) |       | Goitre Absent |       | Total No. | P value       |
|------------------|-------|------------------------------|-------|---------------|-------|-----------|---------------|
| Gender           | Boys  | 68                           | 12.9  | 457           | 87    | 525       | <b>0.039*</b> |
|                  | Girls | 92                           | 17.5  | 433           | 82.4  | 525       |               |
| Age groups (yrs) | 6- 8  | 22                           | 4.89  | 428           | 95.1  | 450       | <b>0.00*</b>  |
|                  | 9- 10 | 47                           | 15.67 | 253           | 84.3  | 300       |               |
|                  | 11-12 | 91                           | 30.3  | 209           | 69.67 | 300       |               |

|                                       |                           |     |       |     |       |     |               |
|---------------------------------------|---------------------------|-----|-------|-----|-------|-----|---------------|
| <b>Religion</b>                       | Hindu                     | 25  | 15.82 | 133 | 84.17 | 158 | 0.824         |
|                                       | Muslim                    | 135 | 15.13 | 757 | 84.86 | 892 |               |
| <b>Educational status of Mother's</b> | Upto intermediate         | 139 | 15.22 | 774 | 84.78 | 913 | 0.974         |
|                                       | Graduate or Post graduate | 21  | 15.33 | 116 | 84.67 | 137 |               |
| <b>Family History</b>                 | Present                   | 29  | 34.52 | 55  | 65.48 | 84  | <b>0.000*</b> |
|                                       | Absent                    | 131 | 13.56 | 835 | 86.44 | 966 |               |

\* Statistically significant

Prevalence was significantly higher among females than males ( $P=0.039$ ). Age-specific prevalence rate (ASPR) was higher in 9 to 12 yr age group as compared to 6 to 8 yr age group and it was statistically significant. There was significant association between positive family history and presence of goiter in the study subjects (Table 3).

### Discussion

To evaluate the severity of IDD in a region, the most widely accepted marker is the prevalence of endemic goiter in school children. On the basis of IDD prevalence, the WHO / UNICEF / ICCIDD<sup>9</sup> recommended the criteria for understanding the severity of IDD as a public health problem in a region.

In the studied district, the total goitre prevalence rate was 15.2% (grade 1 – 13.9%; grade 2–1.3%) indicating that IDD was a mild public health problem. A similar study conducted in district Ambala, Haryana reported 12.6% total goitre prevalence,<sup>10</sup> which was almost similar to the present study. The present study reports mild prevalence rates, probably due to the availability of iodized salt everywhere now, from cities to the smallest villages; yet the consumption remains low. There was association between the age of children and the prevalence of goiter, similar results were seen in earlier studies.<sup>11,12</sup> An international study from Indonesia reported 35% goiter prevalence among school children.<sup>13</sup> Another international study, conducted nationwide in Yemen, mentioned 16.8% goiter prevalence in school children, indicating that IDD was a public health problem internationally also.<sup>14</sup> In addition, this study reports that prevalence among girls was more than among boys, which was also reported by various studies.<sup>12,15</sup>

### Conclusion

The present study showed mild goiter prevalence in primary school children in the Mewat district of Haryana. This problem calls for further investigation, to identify factors that would strengthen the national program.

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