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Prevalence of Goitre and Its Relationship With Iodine Deficiency in School Children in Kocaeli, Turkey

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Abstract: Prevalence of Goitre and Its Relationship with Iodine Deficiency in School Children in Kocaeli, Turkey

5564 primary school children living in Kocaeli, Turkey, were clinically assessed for thyroid gland enlargement. Goitre was graded according to the WHO 1994 classification. 792 children showed various grades of goitre, giving a prevalence of overall goitre of 14.23%. The median urinary iodine values were found to be

greater than 10mg/dl in each group of 20 students, who were selected randomly from those in whom Grade I and Grade II goitre had been detected and from those in whom goitre had not been detected. These results, when evaluated according to the WHO/ICCIDD criteria, suggest that it is unlikely that Kocaeli city center is an iodine-deficient area, and that there is no correlation between the prevalence of goitre and iodine deficiency.

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Introduction

Goitre in childhood is a heterogeneous endocrine disorder associated with several factors, such as iodine deficiency and autoimmunity. The most practical method for determining iodine deficiency for a region is to assess the goitre prevalence (1). In addition, other parameters used include *high neonatal TSH ratio*, assessment of *mean urinary iodine* and *mean thyroglobuline levels* (2).

The identification of a target group is as crucial as the method used in determining iodine deficiency. Generally, school-age children are considered an appropriate target group because they fulfil the desired criteria of *susceptibility to iodine deficiency*, *accessibility as a study group* and *representativeness of society as a whole* (3).

Iodine deficiency continues to be a major public health problem in Turkey. The Ministry of Health initiated the *Iodine Deficiency Disorders Control Programme* in all provinces in 1993. With the aim of making a contribution to this programme, we set out to evaluate the problem of iodine deficiency in school-age children by determining the prevalence of goitre and iodine levels in urine.

Materials and Methods

This study was carried out in fifth-year primary schools on 5564 students. The students were examined by general practitioners who were trained in goitre grading and physical examination of the thyroid. Data were then recorded on research forms. Goitres were graded according to the classification developed by the World Health Organisation (WHO) in 1994, as outlined in Table I. (3). All the children in whom goitre was detected were re-evaluated in the Paediatric Endocrinology Unit of the Kocaeli Faculty of Medicine.

In the second part of the study, 20 subjects were selected randomly from each group of students: those in whom Grade I and Grade II goitre were detected and those who were considered to have no goitre. Iodine levels in urine collected from these children were then assessed using the catalytic action method. WHO/UNICEF/ICCIDD criteria were used in assessing the mean urine iodine levels (3).

The T-test was used for statistical comparisons between the groups.

Results

A total of 5564 students were examined during the study and goitre was detected in 792 (14.23%) of these children. Table II shows the distribution of students according to gender and grade of goitre. The mean age of the students was 11.2±0.2 years. Although the prevalence of Grade I and Grade II goitre among female students was found to be higher than in male students, the statistical difference was not significant.

Table III shows the mean iodine levels in urine collected from each group of 20 students in whom Grade I and Grade II goitre were detected and those in whom goitre was not detected. There was no statistical difference between the mean urinary iodine levels of these three groups of students. The mean urine iodine values were found to be greater than 10mg/dl in 70% of students with Grade I goitre, in 74% of those with Grade II goitre and in 71% of those with no goitre.

Discussion

In general, it has been reported that goitre prevalence in schoolchildren is 5-14%; however, this may vary

according to several factors, such as regional differences and the methods used to evaluate goitre (4). The sensitivity of clinical examination in establishing the presence of goitre increases with better training of the related health personnel and it is regarded as a practical screening method in population-based studies (5, 6). Table IV outlines the criteria from a joint report of the WHO and International Council for the Control of Iodine Deficiency Disorders (ICCIDD) on evaluation of iodine deficiency for a region in terms of public health and management strategies (3).

The overall goitre prevalence in our study was 14.83%, which implies mild iodine deficiency. However, the prevalence of Grade II goitre was found to be 2.66%. Given that the goitre rate is high in iodine-deficient areas, and given that the sensitivity of clinical examination increases with higher grades of goitre, the overall goitre prevalence we found should be considered with caution.

The WHO and ICCIDD suggest that the assessment of urinary iodine levels should be performed in at least 40 subjects (3). In our study, an assessment of iodine levels was carried out on the spot urine of 60 children, and the

Grade 0	No palpable or visible goitre
Grade I	A mass in the neck that is consistent with an enlarged thyroid that is <i>palpable but not visible</i> when the neck is in the normal position. It moves upwards in the neck as the subject swallows. Nodular alteration(s) can occur even when the thyroid is not enlarged.
Grade II	A swelling in the neck that is <i>visible when the neck is in a normal position</i> and is consistent with an enlarged thyroid when the neck is palpated.

Table 1. WHO Goitre Classification-1994.

	Females	Males	Total
Number of students	2661	2903	5564
Number of goitres	432(14.2)	360(10.2)	792(14.2)
Number of Grade I goitres	344(12.9)	300(10.2)	644(11.5)
Number of Grade II goitres	88(3.30)	60(2.06)	148(2.66)

Table 2. Distribution of students according to grades of goitre and gender.

Grade of goitre	spot urine iodine (µg/dl) (mean)	spot urine iodine (µg/dl) (median)
Grade I	16.27±10.35	13.27
Grade II	18.71±11.92	16.45
No Goitre	15.91±10.03	15.57

Table 3. Iodine excretion in spot urine according to grade of goitre.

Indicator	Target Population	Severity of Public Health Problem (prevalence)		
		Mild	Moderate	Severe
Goitre Grade>0	SAC*	5-19.9%	20-29.9%	≥30%
Thyroid volume>97 th Centile by ultrasound	SAC	5-19.9%	20-29.9%	≥30%
Median urinary Iodine level(µg/dl)	SAC	5-9.9	2-4.9	<2
TSH>5mU/l whole blood	newborns	3-19.9%	20-39.9%	≥40%
Median Tg(ng/ml)	C/A**	10-19.9	20-39.9	≥40

*SAC= School-age children.

**C/A= children and adults.

median iodine value was found to be above 10mg/dl in children with Grade I and Grade II goitre and in those with no goitre. There was no statistical difference between the groups in terms of median iodine values.

Evaluation of these results according to the WHO/ICCIDD criteria suggests that it is unlikely that Kocaeli city centre is an iodine-deficient area, and that there is no correlation between the prevalence of goitre and iodine deficiency in this area.

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Table 4. Summary of Iodine Deficiency Disorders (IDD) Prevalence Indicators and criteria for definition as a Public Health Problem.