

## GOITRE IN SCHOOL GIRLS OF THE MEWAT AREA OF HARYANA

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### ABSTRACT

A survey was carried out on 5449 school girls aged 10-16 years in the Mewat area of Haryana for goitre. The overall prevalence of goitre was nearly 29.5%. Thus goitre was a public health problem in the region. Analysis of the water sources in the study population used for drinking and cooking purposes revealed low iodine content, high mineral contents (calcium, magnesium, fluoride and chloride), total hardness of water as well as bacterial pollution. These factors were related to the high prevalence rate.

**Key words:** Goitre in school-girls, Mineral content of water, Iodine deficiency.

Goitre has been the ancient scourge of mankind. In India, 19 out of 25 States and 2 out of 6 Union Territories are endemic for goitre(1). In the state of Haryana, the Central Goitre Survey team conducted a survey in the Ambala District in 1972 and declared goitre to be a public health problem(2).

The Mewat area of Haryana, is a low lying area between the two ranges of the Aravalli hills and includes parts of the Faridabad and Gurgaon districts. The present study was carried out in this region to determine the magnitude of the problem of goitre and to relate the composition of the sub-soil water with the goitre prevalence.

### Material and Methods

The Mewat area has a population of nearly 5 lakhs (1985-86), and includes 491 villages, 3 tehsils, and 1 sub-tehsil in Faridabad and Gurgaon districts of Haryana(3). The dominant population is of Mevs (Muslims), with agriculture as the main occupation of the majority. Wheat, millets and maize form the staple diet, and water source for drinking and cooking purposes is from the subsoil water table (wells and tube wells). The Mev population has low literacy and economic levels.

The study population comprised of school girls between 10-16 years. In the urban area which has 3 tehsils and 1 sub-tehsil, all the Government Girls High Schools were visited. In the rural area which comprised of 6 blocks, 5 villages having middle or high school per block were included in the survey. A total of 1425 urban and 4024 rural school girls were examined as per the WHO guidelines for goitre survey(4).

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The water from main water sources used for drinking and cooking purposes in the area, was collected in plastic bottles as per the recommendations of the ICMR(5). Thirty six water samples were collected and analysed at the Biochemistry Department of Medical College, Rohtak, as per the standard technique given by the ICMR(5). The reports of the chemical analysis of water in the study area were collected from the office of the Executive Engineer of the Public Health Department of the PWD on request.

### Results

Tables I & II show the prevalence of goitre among the school girls in the urban and rural school girls of the study population. Table III shows the prevalence of goitre among the school girls in the rural Mewat along with the mean iodine contents of the water used for drinking and cooking purposes. Table IV compares the prevalence of goitre with iodine content of water in the urban area. The hardness, calcium, magnesium, chlorides, fluorides, nitrates, nitrites contents of the water are given in Table V.

### Discussion

The overall prevalence of goitre in the Mewat area (as estimated by the clinical examination of 5449 school girls), was nearly 29.5%. The significantly higher rate among the pre-pubescent(10-12), and pubescent(12-14) as compared to the post-pubescent(14-16) girls of the study population may be contributed to by the growth spurt which creates demand for the thyroid hormones. If the demand is not satisfied with the limited amounts of the iodides available, compensatory enlargement of the thyroid gland occurs(6). The goitre was a public health problem both in the rural and urban Mewat areas as per the WHO criterion of the enlarged thyroid gland(4). It is very important to identify such areas, since the goitrous parents may have children born as cretins, deaf-mutes, and with mental deficiency(7). In adults the sequelae of goitre are higher incidence of abortions, stillbirths, congenital abnormalities, hypothyroidism, and the development of the secondary thyrotoxicosis(7).

TABLE I—Prevalence of Goitre in Urban Area

Age (yr)	No.	Goitre in per cent*				Total
		Ia	Ib	II	III & IV	
10-11	265	24.5	8.7	—	—	33.2
11-12	281	25.6	10.7	—	—	36.0
12-13	329	17.9	14.0	2.7	—	34.6
13-14	236	17.4	14.0	2.5	—	33.9
14-15	174	14.9	10.3	2.3	—	27.5
15-16	140	18.6	7.9	1.4	—	27.9
Total	1425	20.3	11.2	1.5	—	33.0

\*Goitre as per the WHO classification.

TABLE II—Prevalence of Goitre in Rural Area

Age (yr)	No.	Goitre in per cent*				Total
		Ia	Ib	II	III & IV	
10-11	864	18.3	4.5	—	—	22.8
11-12	609	20.2	8.3	0.3	—	28.7
12-13	743	18.2	10.5	1.2	—	29.9
13-14	703	19.3	9.5	0.4	—	29.3
14-15	549	16.0	8.0	0.4	—	24.4
15-16	556	17.5	3.8	0.2	—	21.4
4024		18.3	7.5	0.4	—	26.2

\*Goitre as per the WHO classification.

TABLE III—Prevalence of Goitre in Rural School-girls and the Iodine Contents of Main Water Sources

Block	Goitre in per cent		Iodine contents of water	
	Ib & above	Total	No. of samples	(µg/l)
1. Hathin	11.3	32.4	5	12.1
2. Nuh	7.9	27.4	5	12.3
3. Tarou	8.3	22.5	5	14.3
4. Pnehna	6.2	23.1	5	14.3
5. Nagina	8.0	28.4	5	15.1
6. Ferozepur Jika	6.5	27.5	5	13.2

TABLE IV—Prevalence of Goitre Among School Girls of Urban Area and Iodine Contents of Water Sources

Area	Goitre in per cent		Iodine content of water	
	Ib & above	Total	No. of samples	(µg/l)
1. Hathin	6.9	26.0	2	14.0
2. Nuh	13.1	35.7	2	14.5
3. Ferozepur Jika	8.0	26.6	1	12.2
4. Sohna	19.8	41.8	1	9.0

TABLE V—Chemical Characteristics of the Water Samples in the Mewat Area

Minerals	Mean (mg/L)	SD
1. Total dissolved solids	5408.5	1786.8
2. Total hardness as calcium carbonate	1577.6	816.7
3. Calcium	226.5	24.3
4. Magnesium	168.4	35.7
5. Chlorides	1790.5	146.9
6. Fluorides	0.62	0.08
7. Nitrites	traces	—
8. Nitrates	0.005	—
9. pH	7.4	0.28

The iodine contents of the water in the goitre endemic areas in India have been found to vary from 0.29 to 18.7 micrograms per litre (8). In the Mewat area these varied from 9 to 14 micrograms per litre in rural areas and 12 to 14 micrograms per litre in the urban water samples. Detailed chemical analysis of water in the Mewat region showed high content of calcium, magnesium, chlorides, and total hardness of water. The presence of nitrites and nitrates in water indicates possible bacterial contamination of the water. Day and Powell (9) correlated the prevalence of goitre in 17 Himalayan villages with the concentration of fluoride, calcium, magnesium, and total hardness of water. An association between hardness of water and goitre has also been reported by Murrey *et al.* (10). An excess of chlorides also causes goitre to appear probably because of the resultant loss of iodides in the urine (11). Calcium is thought to decrease the metabolic effects of thyroxine and thus appears to exercise an indirect action on iodine deficiency by increasing the iodide requirements (12). McCarrison *et al.* (13), have shown the importance of water pollution on the prevalence of endemic goitre in the

Himalayan areas. The bacterial contamination of water is thought to act as goitrogen (14).

This study thus highlights that excess of minerals coupled with water pollution could be the crucial factor creating the relative lack of iodides in the Mewat area. There is need to ensure safe drinking water in the region along with a strong health education campaign to educate the masses in the area on the use of the iodised salt for cooking.

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