

Influences of Age, Sex and Caste on Goiter Prevalence of the People in Tripura, North East India

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INTRODUCTION

The multifactorial nature and complex interactions of host factors (age, sex) with region-specific environmental conditions in the pathogenesis of endemic goiter constitute a major challenge in understanding and control of the problem in endemic areas (Gaitan, 1996). Entire north eastern region of India (including the state of Tripura) is in the classical goiter endemic belt of India. Overall goiter prevalence was reported to be 17 percent in Tripura by the Central Goiter Team in 1970 (Pandav and Kochupillai, 1982). Recognising the importance of iodine deficiency as public health problem, the entry of non-iodised salt in this region was banned in 1988-89 and thus the people have been using edible salt fortified with iodine since then. However the decline in goiter prevalence was not found in Tripura even years after salt iodization (Chandra et al, 1997a, Chandra et al, 1997b and Chandra et al, 1999). In the present study, the interaction of host factors, viz. age, sex and caste in influencing goiter prevalence among school children during post-salt iodization phase has been highlighted.

MATERIALS AND METHODS

Study Areas: The selection was based on the recommendation of Perez et al (1960) that different areas to be studied in survey should be homogenous with respect to geographical characteristics, agricultural pattern and economic status. For the purpose 17 rural areas were selected from each of the rural blocks and 5 areas from the urban localities throughout Tripura by purposive sampling method (Cochran, 1977). In each selected area school children were chosen at random.

Target Population: Goiter prevalence of the school aged children indicates the correct status of iodine deficiency in general population (Global Prevalence of Iodine Deficiency Disorders,

1993), therefore children in the age group 6-15 years of both sexes had been considered as the target group.

Clinical Goiter Survey: All the students of the studied schools who were present on the days of survey work were clinically examined to investigate the enlargement of thyroid gland or goiter by palpation method (Delange et al, 1986), i.e. when the thyroid lobes found larger than the examiner's thumb is considered as goitrous:

Grade	Description
Stage 0	No goiter
Stage 1A	Thyroid lobes larger than the ends of thumb
Stage 1B	Thyroid enlarged, visible with head tilted back
Stage 2	Thyroid enlarged, visible with neck in normal position
Stage 3	Thyroid greatly enlarged, visible from a considerable distance

The age, sex and caste of the examined children were recorded along with the goiter grades in the specific proforma prepared for the purpose.

This grading system has the advantage over the proposed revised classification of goiter (Indicators for Assessing IDD, 1993) because the observed results may be converted to revised classification of goiter because Grade 1 which is the sum of pre revised Grade 1A and 1B and Grade 2 is the sum of Grade 2 and 3.

Dietary Survey: The role of iodine deficiency as an environmental determinant in the development of endemic goiter is firmly established. However, there are observations that region-specific factors other than iodine deficiency in the etipathogenesis of endemic goiter (Gaitan, 1990). In several goiter endemic areas, environmental goitrogens have been found in foodstuff (Stanbury and Hetzel, 1980; Gaitan, 1989). As the people of the region consume foods containing dietary goitrogen (SCN precursors) as common vegetables, therefore, the people of the study areas were interviewed regarding their consumption of foods containing dietary goitrogen and the information was recorded.

RESULTS AND DISCUSSION

In all 10,801 school children were clinically examined for goiter from 22 study areas throughout Tripura. Overall goiter rate was 21.63% (Table 1). Goiter was prevalent at endemic level (more than 5%) in all the study areas but with various occurrences (from 12.71% - 33.96%). Most of the goiters are palpable (grade 1A and 1B), however, visible goiter (Grade 2 and 3) also exists. Thus as per the clinical criteria of WHO/UNICEF/ICCIDD (Indicators for Tracking Progress, 1994) iodine deficiency disorders (IDD) is still a moderate public health problem in this region even years after salt iodization programme (5.0-19.9% mildly endemic, 20-29.9% moderately endemic, >30% severely endemic).

Age specific goiter prevalence in overall studied population is shown in table 2. In iodine deficient environment goiter develops at the age of 6 years (Hetzel, 1987). In Tripura even the children who were born after the salt iodization programme goiter were found endemic among them indicating that the current status of iodine intake failed to prevent goiter among the children.

Table 1: Goiter prevalences in 22 localities of Tripura

S. No.	Study Areas	Population Studied	Goiter Prevalences	
			No	%
1.	Taranagar	331	84	25.38%
2.	R. K. Nagar	577	121	20.97%
3.	Agartala	906	221	24.39%
4.	Madhupur	576	104	18.06%
5.	Kalitila	526	85	16.16%
6.	Kunjaban	330	73	22.12%
7.	Purba Ramchandraghat	306	53	17.32%
8.	Uttar Durganagar	291	68	23.37%
9.	N.C. Nagar	268	91	33.96%
10.	Mohanbhog	637	136	21.35%
11.	Bhuratali	737	181	24.56%
12.	Kathalchari	373	49	13.14%
13.	Jolaibari	724	172	23.76%
14.	Arya Colony	344	48	13.95%
15.	Kalabaria	514	112	21.79%
16.	Dakshin Chandrapur	648	200	30.86%
17.	Rajkang & Rangrang	610	158	25.90%
18.	Manik Bhandar	445	86	19.33%
19.	Manughat	575	100	17.48%
20.	Sonaimuri	492	86	17.48%
21.	Ragna	299	38	12.71%
22.	Vidyannagar	292	60	20.55%
Total		10801	2336	21.63%

Table 2: Overall age specific goiter prevalences in the overall population in Tripura

Ages (Yrs)	Total number studied	Grades of Goiter			
		1A	1B	2	Total
6	1116	110 (09.86%)	40 (03.58%)	4 (00.36%)	154 (13.80%)
7	1099	131 (11.92%)	45 (04.09%)	6 (00.55%)	182 (16.56%)
8	1147	179 (15.61%)	68 (05.93%)	17 (01.48%)	264 (23.02%)
9	1084	153 (14.11%)	83 (07.66%)	24 (02.21%)	260 (23.99%)
10	993	137 (13.80%)	64 (06.45%)	23 (02.32%)	224 (22.56%)
11	1192	206 (17.28%)	81 (06.80%)	25 (02.10%)	312 (26.17%)
12	1306	198 (15.16%)	85 (06.51%)	17 (01.30%)	300 (22.97%)
13	1097	177 (16.13%)	75 (06.84%)	12 (01.09%)	264 (24.07%)
14	981	143 (14.58%)	56 (05.71%)	13 (01.33%)	212 (21.61%)
15	786	115 (14.63%)	40 (05.09%)	9 (01.15%)	164 (20.87%)
Total	10801	1549 (14.34%)	637 (05.90%)	150 (01.39%)	2336 (21.63%)

Table entries are numbers of subjects with percent of total in parentheses

The distribution of goiter prevalence in male and female population is presented in table 3. Agewise overall goiter rates in male and female were in the ranges of 15% - 27% and 12 - 25% respectively. The percentage of goiter in terms of grades 1A, 1B, 2 in the total population were 15.02%, 5.07% and 0.88% respectively in the male against 13.62%, 6.77% and 1.92% respectively in the female (Figure 1). With the advancement of age the goiter rate was found to increase in both sexes and in boys it was maximum in the age group 11 years and then gradually declined to reach the basal level while in girls the prevalence was maximum at the same age group 11 years but it remained almost steady upto 15 years (Figure 2). The overall results showed that girls were more affected by goiter severity than the boys. The observed result is almost consistent with the earlier observation of Hetzel (1987) who showed that goiter rate increases with age so that it reaches a maximum with adolescence and girls have a higher prevalence than boys.

Overall goiter prevalence in respect of caste is shown in table 4. It showed that goiter was most prevalent (23.32%) in general caste,

Table 3: Overall age-specific goiter prevalences in male and female populations of the school children of Tripura

Population		Age (Years)										
		6	7	8	9	10	11	12	13	14	15	Overall
Male	Total studied	582	555	611	566	523	632	629	564	487	396	5545
	1A	61 (10.48)	68 (12.25)	90 (14.73)	83 (14.66)	80 (15.30)	125 (19.78)	93 (14.79)	100 (17.73)	76 (15.61)	57 (14.39)	833 (15.02)
	Goiter 1B	25 (4.30)	19 (3.42)	36 (5.89)	40 (7.07)	31 (5.93)	39 (6.17)	37 (5.88)	30 (5.32)	15 (3.08)	9 (2.27)	281 (5.07)
	2	2 (0.34)	1 (0.18)	6 (0.98)	11 (1.94)	12 (2.29)	8 (1.27)	4 (0.64)	2 (0.35)	3 (0.62)	0 (0.00)	49 (0.88)
	Total	88 (15.12)	88 (15.86)	132 (21.60)	134 (23.67)	123 (23.52)	172 (27.22)	134 (21.30)	132 (23.40)	94 (19.30)	66 (16.67)	1163 (20.97)
Female	Total studied	534	544	536	518	470	560	677	533	494	390	5256
	1A	49 (9.18)	63 (11.58)	89 (16.60)	70 (13.51)	57 (12.13)	81 (14.46)	105 (15.51)	77 (14.45)	67 (13.56)	58 (14.87)	716 (13.62)
	Goiter 1B	15 (2.81)	26 (4.78)	32 (5.97)	43 (8.30)	33 (7.02)	42 (7.50)	48 (7.09)	45 (8.44)	41 (8.30)	31 (7.95)	356 (6.77)
	2	2 (0.37)	5 (0.92)	11 (2.05)	13 (2.51)	11 (2.34)	17 (3.04)	13 (1.92)	10 (1.88)	10 (2.02)	9 (2.31)	101 (1.92)
	Total	66 (12.36)	94 (17.28)	132 (24.63)	126 (24.32)	101 (21.49)	140 (25.00)	166 (24.52)	132 (24.77)	118 (23.89)	98 (25.13)	1173 (22.32)

Tables entries are numbers of subjects with percentage (%) of total in parentheses

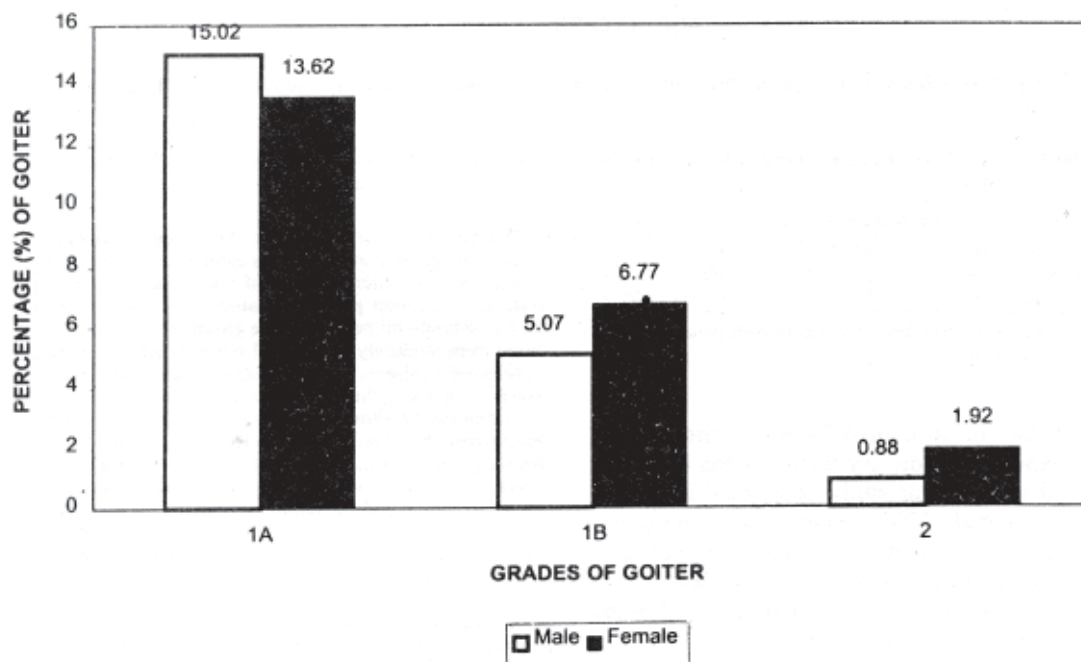


Fig. 1. Distribution of Goiter grades in male and female school-aged populations of Tripura

moderately prevalent (21.99%) in scheduled caste and it was found minimum 12.99% in the scheduled tribes. The people of all the castes consume foods namely beans, turnip, sweet potato

cabbage, cauliflower, radish, mustard, bamboo shoot, etc., containing naturally occurring goitrogens available in the region. But these variations in goiter prevalences among different castes

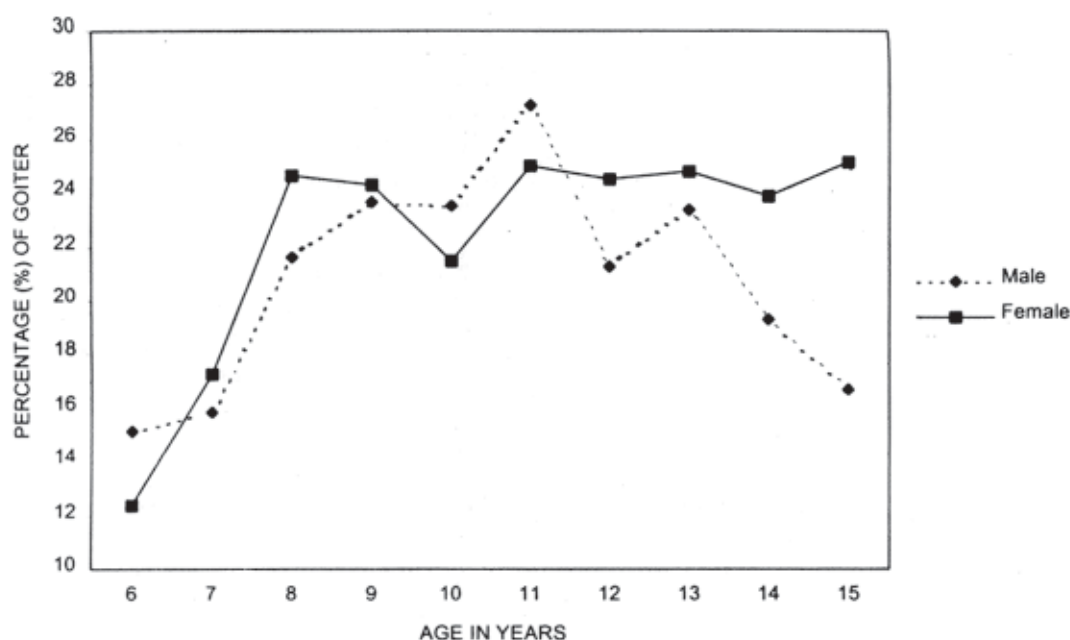


Fig. 2. Distribution of Goiter at different ages in male and female school-aged populations of Tripura

Table 4: Overall prevalences among different castes of Tripura

	Population studied	Goiter prevalence
A. General caste	6823	1591 (23.32%)
B. Scheduled caste	2538	558 (21.99%)
C. Scheduled tribes	1440	187 (12.99%)

Table entries are number of subjects with percent (%) of total in parentheses

might be due to their different environmental adaptability and dietary habit, as has been observed in a similar study conducted in Africa (Biaassoni et al., 1998), where it was found that minute difference in iodine deficiency between two populations induces to tally different pattern of goiter and thyroid function probably for the differences in diet.

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KEY WORDS Goiter. Caste. Food Habit. Environmental Adaptability.

ABSTRACT Goiter prevalence of selected population in respect of age, sex and caste was evaluated in the conventional iodine deficient Tripura of north east India during post-salt iodization phase. The study was carried out on 10,801 school-children in the age group 6-15 years of both sexes from randomly selected 22 representative localities. In selected localities, children were clinically examined for goiter categorising them in respect of ages, sexes and castes. Obtained results showed goiter was prevalent at endemic level (more than 5%) in all study localities. With advancement age the rate was found to increase up to the age of 11 years in both sexes. However in boys a gradual decline in goiter rate was found and returned to basal level by 15 years while in girls the rate of increase remained steady up to 15 years. Female population was affected more than the male in prevalence and severity. They were exposed under uniform system of iodine supply and dietary goitrogens, however endemic goiter was mostly prevalent in general castes, moderately among scheduled castes and minimum among scheduled tribes. These variations might be due to non-uniform environmental adaptability associated with different dietary practices.

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