

## ENDEMIC GOITER IN BOYER-AHMAD

M. KIMIAGAR, M.B. YASSAI, M.T. NAFARABADI, B. SAMIMI,  
AND F. AZIZI

*From the Institute of Nutrition and Endocrine Research Center, School of Medicine, Shaheed Beheshti University of  
Medical Sciences, Tehran, Islamic Republic of Iran.*

### ABSTRACT

In order to investigate goiter prevalence in Boyer-Ahmad, an Iranian tribal province, 87 families were randomly selected in Yasuj township and Doruhan county. Clinical examination of the subjects disclosed 95% of females and 87% of males over 6 years of age to be goitrous. Grade 2 goiter had the highest prevalence among females. In males grade 1b was the most prevalent. Hormonal studies on a subsample did not show major abnormalities but free T<sub>3</sub> index was increased significantly in subjects with grade 3 goiter compared to the goitrous and grade 2 groups ( $p < 0.01$ ). Mean urinary iodine excretion was  $33.9 \pm 30.1 \mu\text{g/g creatinine}$  in Yasuj and  $23.95 \pm 16.61$  in Doruhan, indicating moderate to severe iodine deficiency. This study documents goiter hyperendemicity in a Southern province not previously acknowledged by national or international authorities.

*MJIRI, Vol.3, No1&2, 27-29, 1989*

### INTRODUCTION

Although goiter is endemic in many parts of Iran<sup>1,2</sup> its prevalence, distribution and severity are not fully known. The purpose of this study was to investigate the prevalence and severity of goiter in Boyer-Ahmad, a tribal mountainous province over 1000 km to the south of Tehran, the capital, which was suspected to be one of the iodine deficient areas in the country. This study was necessary in order to decide whether the situation is severe enough to justify some form of prophylactic measure.

### MATERIALS AND METHODS

Eighty-seven families comprising 630 subjects were selected in Yasuj and Doruhan. The selection was made, based on the most recent list of families who had registered for basic commodity rationing coupons. Generally 100 per cent of families register, therefore there is no question of any parts of the community not being represented. Families were assigned consecutive numbers and the sample was selected using a table of random numbers. As a preliminary survey in high

school students had high goiter prevalence, the sample size (over one percent of the population), was judged to be sufficient to give an accurate picture of the problem in the area. Children under six years of age were not included, as examination and specimen collection presented difficulties.

Goiter was graded based on the WHO recommendations.<sup>3</sup> Urinary iodine was measured by Ash method.<sup>4</sup> Serum T<sub>4</sub> and TSH were measured on 65 subjects using commercial kits. Free T<sub>4</sub> and T<sub>3</sub> indices were then calculated.<sup>5</sup> In our laboratories the normal ranges for free T<sub>4</sub> and T<sub>3</sub> indices are between 4.5 to 13

Table I. Goiter prevalence in Yasuj.  
Age and Sex distribution (%)

Age group (Yr)	Goiter grade	Goiter grade				
		0	1a	1b	2	3
6-12	M	-	20	80	-	-
	F	-	-	20	22	58
13-18	M	14	28	14	28	14
	F	5	4	17	58	17
≥ 19	M	14	21	50	11	4
	F	5	4	17	50	23

Table II. Goiter prevalence in Doruhan.  
Age and sex distribution (%)

Age group (Yr)	Goiter grade		0	1a	1b	2	3
	M	F					
13-18	M		—	12	36	52	—
	F		—	—	14	71	14
≥ 19	M		—	33	47	14	6
	F		—	—	37	58	4

and 80 to 200 respectively.

## RESULTS

Tables I and II show goiter prevalence in Yasuj township and Doruhan county. The results show that 86 percent of males and 97% of females were goitrous. In Doruhan all subjects examined had goiter. In females, grade 2 goiter had the highest prevalence followed by grades 3, 1b and 1a. In males grade 1b was the most prevalent and grades 1a, 2 and 3 were less prevalent respectively. In Table III hormonal measurements are compared in subjects with different degrees of thyroid enlargement. The student's test demonstrated that the TSH and free T4 index in goitrous subjects were not significantly different from the non-goitrous ones. The free T3 index in grade 3 goiter, although within normal limits ( $148 \pm 27$ ), was significantly higher than the non-goitrous subjects ( $112 \pm 15$ ;  $P < 0.01$ ). This difference was also significant between grades 2 and 3 ( $148 \pm 27$  vs  $125 \pm 19$ ;  $P < 0.01$ ). Urinary iodine excretion is shown in Table IV. Both groups had low urinary iodine values, and Yasuj inhabitants had significantly higher iodine output than Doruhan subjects ( $33.9 \pm 36.1$  vs  $24 \pm 16.6$ ;  $P < 0.05$ ).

## DISCUSSION

The present study demonstrates that high goiter prevalence exists in Boyer-Ahmad province. We<sup>2</sup> and others<sup>1</sup> have reported endemic and hyperendemic areas of goiter in various parts of Iran. The prevalence of goiter reported in this paper is higher than those reported in Tehran and suburbs.<sup>2</sup>

Except for a mild increase in FT 3I in the group with grade 3 goiter, thyroid function tests and serum concentration of TSH are all within normal limits in subjects studied. In fact, in our previous studies,<sup>2,6</sup> serum concentrations of T4, T3 and TSH have been normal in almost all areas of endemic goiter with high goiter prevalence; the exception has been the village of Kiga, northwest of Tehran, where severe derangement of thyroid function and increased TSH concentration

Table III. Serum concentration of TSH and free thyroid indices in subjects with different grades of goiter

Goiter grade Hormonal index	0	1a	1b	2	3
FT 3I	$112 \pm 15^*$ (13)	$126 \pm 24$ (9)	$117 \pm 39$ (28)	$125 \pm 19$ (38)	$148 \pm 27^{**}$ (7)
TSH ( $\mu$ /ml)	$2.7 \pm 1.2$ (13)	$2.9 \pm 1.4$ (9)	$2.6 \pm 1.1$ (27)	$2.61 \pm 1.0$ (38)	$2.6 \pm 0.8$ (7)
FT 4I	$8.7 \pm 1.0$ (13)	$8.6 \pm 2.0$ (9)	$8.3 \pm 1.5$ (28)	$8.1 \pm 1.2$ (38)	$8.7 \pm 1.5$ (7)

\* Mean  $\pm$  SD, numbers in parentheses indicate number of subjects

\*\* Significantly different from non-goitrous subjects as well as grade 2 group ( $P < 0.01$ )

along with growth retardation exists.<sup>6</sup>

The urinary iodine excretion is very low in the area of Boyer-Ahmad. Based on the classification proposed by Hetzel,<sup>7</sup> iodine deficiency could be considered from moderate to severe in this province as the median urinary iodine level was between 25-50  $\mu$ g/g creatinine in one area and below 25 in the other.

Our findings regarding high prevalence of goiter in Boyer-Ahmad deserve attention in that they document presence of goiter in a southern province of Iran. All international goiter maps refer only to the northern part of the country as a goitrous region.<sup>7,8</sup> Since several other provinces are situated in the slopes of Zagross mountain range, judging from reports relayed to us by other colleagues in these areas as well as scattered personal observations, we are firmly convinced that goiter is a problem of sufficient magnitude in the nation to call for action.

## REFERENCES

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Table IV. Urinary iodine level in Yasuj and Doruhan  
( $\mu$ g/gm creatinine)

	Sample Size	Mean	SD
Yasuj	89	33.9	36.1
Doruhan	46	24.0*	16.6

\* Significantly different from Yasuj ( $P < 0.05$ )

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