The Turkish Journal of Pediatrics 28:177 - 180, 1986

HEIGHT AND BONE AGE OF TURKISH CHILDREN WITH GOITER WHERE THIS CONDITION IS ENDEMIC*

*Yusuf Gedik MD***, Tahsin Teziç MD****,
*Sinan Kazancıoğlu MD*****, Cemil Kaya MD******

Key words: bone maturation, endemic goiter, height

Endemic goiter is the most common endocrine disorder seen in Turkey. Especially in the northeast Black sea region, the incidence of goiter is very high[1,2]. It is a problem of every age group beginning from the newborn period[3]. The status of thyroid functions in endemic goiter regions has been published in previous reports[1,4-8].

In this study we have tried to find out the effects of endemic goiter on statural growth and bone maturation of children.

Material and Methods

In this study seventy-eight goitrous children between three and fifteen years old, living in the Trabzon area were examined. None of the goitrous children had previously been treated with thyroid hormones. The heights of the children were measured by a standard measuring scale, on a flat surface and after removal of the shoes. The statural growth of the children was assessed by using Tanner's Developmental Measures[9].

All of the children were evaluated for the presence of symptoms and signs of hypo- and hyperthyroidism. The thyroid glands were examined and graded according to the techniques recommended by the Pan American Health Organization[10].

The skeletal maturity of the children was determined radiologically. The serum thyroid hormones (T_3 and T_4) were determined by the competitive radioimmuno-

* From the Department of Pediatrics, the Karadeniz University Medical Faculty, Trabzon.
** Assistant Professor of Pediatrics, Karadeniz University Medical Faculty.
*** Associate Professor of Pediatrics, Karadeniz University Medical Faculty.
**** Associate Professor of Radiology, Karadeniz University Medical Faculty.
***** Resident in Pediatrics, Karadeniz University Medical Faculty.

assay method using coated T_4 and T_3 tubes (Clinical assays, Travenol-Genentech diagnostics) and a minigama counter.

Statistical significance of the differences was evaluated by Student's *t* test.

Results

The mean serum T_3 and T_4 values of goitrous children are shown in Table I. In 41% of the goitrous children, serum T_4 levels were lower than normal for their age. The T_3 values of all goitrous children were in the upper normal level for their age. No growth retardation nor hypothyroidic sign or symptom were detected.

The height age/bone age ratio of the goitrous children is shown in Table I. No significant difference was found in the height age/bone age ratio between children with normal T_4 and children with low T_4 ($P>0.05$).

TABLE I

The Serum T_4 and T_3 Values and Bone Age / Height Age Ratios of Goitrous Children

	Goitrous children with low T_4 value	Goitrous children with normal T_4 value
Number of cases	32 (41%)	46 (59%)
Mean serum T_4 value ± SD (microgram / dl)	3.56 ± 1.32	8.06 ± 1.48
Mean serum T_3 value ± SD (nanogram / ml)	1.94 ± 0.84	1.81 ± 0.83
Height age / bone age ± SD	1.11 ± 0.2	1.15 ± 0.26

Discussion

In our study we found no symptom or sign compatible with hypothyroidism among the goitrous children living in the eastern Black sea region. The statural growth of the children was not retarded.

In order to find out whether bone age determination (bone maturation) could be used as a valuable index in the assessment of subclinical hypothyroidism, we compared the height age/bone age ratio of goitrous children with low serum T_4 and normal serum T_4 concentrations.

The absence of growth and bone maturation delay in the goitrous children showed that the effect of iodine deficiency in this area has little effect on these parameters in this region.

Although determination of serum TSH is essential in the diagnosis of hypothyroidism, we divided the goitrous children into two groups, the low and the normal T_4 groups. The normal ranges for serum T_4 and T_3 were taken from Fisher's study[11,12]. In a previous study we reported that 16% of stage II goitrous children and 38% of stage III goitrous children were biochemically hypothyroidic (subclinical hypothyroidism)[1]. We believe that these parameters can be used in the evaluation of the goitrous children in the absence of serum TSH.

In fully developed cases of hypothyroidism, besides the typical physical findings, retarded bone age is an important laboratory finding[13,14]. The absence of bone age retardation in endemic goitrous children shows that this parameter cannot be used in the diagnosis of subclinical hypothyroidism. In some endemic places goitrous subjects show the characteristic findings of cretinism[15]. Their metabolism is markedly reduced, body temperature may be subnormal and also the appearance of carpal development is greatly delayed[11].

Although our study does not involve the evaluation of the newborn and infantile periods, the normal growth and normal bone maturation of the children suggest that the iodine deficiency in this area plays little part in delaying the statural growth and bone maturation of goitrous children.

Summary

The statural growth, bone age and serum T_4 and T_3 values of seventy-eight endemic goitrous children are evaluated. No retardation in height and bone age was found in the goitrous children and also there was no significant difference in the height age/bone age ratio between goitrous children with a low T_4 and those with a normal T_4 level.

REFERENCES

1. Teziç T, Gedik Y, Baki A, et al. The incidence of goiter among students living in a group of mountain villages in the Black Sea region and their thyrotropin and thyroid hormone values. *Turk J Pediatr* 27:193, 1985.
2. Eser S. Kuzey Anadolu'da guatr durumu. *İstanbul Üniversitesi Tıp Fakültesi Mecmuası* 23:713, 1960.
3. Teziç T, Gedik Y, Arslanoğlu M, Demirci Y. A goitrous neonate of a hypothyroidal family living in Northern Turkey where this condition is endemic. *Turk J Pediatr* 25:259, 1983.
4. Rothenbuchner G, Koutras DA, Raptis S, et al. The effect of thyrotropin-releasing hormone on serum TSH, T-4, and T-3 levels in endemic and sporadic nontoxic goitre. *Horm Metab Res* 6:501, 1974.

5. Patel YC, Pharoah PO, Hornabrook RW, et al. Serum triiodothyronine, thyroxine and thyroid-stimulating hormone in endemic goiter: a comparison of goitrous and nongoitrous subjects in New Guinea. *J Clin Endocrinol Metab* 37:783, 1973.
6. Stevenson C, Silva E, Pineda G. Thyroxine (T_4) and triiodothyronine (T_3): Effects of iodine on the serum concentrations and disposal rates in subjects from an endemic goiter area. *J Clin Endocrinol Metab* 38:390, 1974.
7. Vanderpas J, Bourdoux P, Lagasse M, et al. Endemic infantile hypothyroidism in a severe endemic goitre area of central Africa. *Clin Endocrinol* 20:327, 1984.
8. Chopra IJ, Hersman JM, Hornabrook RW. Serum thyroid hormone and thyrotropin levels in subjects from endemic goiter regions of New Guinea. *J Clin Endocrinol Metab* 40:326, 1975.
9. Smith DW. *Growth and Its Disorders: Basic and Standards, Approach and Classifications, Growth Deficiency Disorders, Growth Excess Disorders, Obesity.* Philadelphia: WB Saunders Co, 1977, p 101.
10. Ibbertson HK. Endemic goitre and cretinism. *Clin Endocrinol Metab* 8:97, 1979.
11. Franchi SH. Hypothyroidism. *Pediatr Clin North Am* 26:46, 1979.
12. Fisher DA, Sack J, Oddie TH, et al. Serum T_4, TBG, T_3 uptake, T_3, reverse T_3, and TSH concentrations in children 1 to 15 years of age. *J Clin Endocrinol Metab* 45:191, 1977.
13. Hall R, Scanlon MF. Hypothyroidism: clinical features and complications. *Clin Endocrinol Metab* 8:37, 1979.
14. Franchi S. Hypothyroidism, congenital and acquired. In Kaplan SA (ed). *Clinical Pediatric and Adolescent Endocrinology.* Philadelphia: WB Saunders Co, 1982, p 94.
15. Goslings BM, Djokomoeljanto R, Docter R, et al. Hypothyroidism in an area of endemic goiter and cretinism in Central Java, Indonesia. *J Clin Endocrinol Metab* 44:481, 1977.