

IODINE DEFICIENCY DISORDERS IN NEISHABOUR

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ABSTRACT

Iodine deficiency has been considered in Iran since 20 years ago and has been acknowledged recently. We studied iodine deficiency disorders in 1618 Neishabourian students. 60% of children had palpable and 2.5% had visible goiters. Height and weight of these children were lower than International and Tehranian children but higher than Isfahanian children.

Hormone studies showed increased T4, decreased T3RU, increased T3 and T3/T4 ratio which are indicators of iodine deficiency.

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INTRODUCTION

Between 4 to 8 million people live in iodine deficient regions of the world.¹ The most important iodine sources for man are water, food, especially sea foods, salt, flour, and progressively, iodine-containing contrast media. Iodine of water and food is mostly in the form of organic compounds which are rapidly absorbable from the gastrointestinal tract. Most iodine disposal is via the kidneys. The remainder is excreted from feces, sweat, and milk. Iodine content of 24 hour urine is the best measure for its availability, consumption and plasma concentration. If this is below 50 micrograms per gram of creatinine, goiter will be endemic. If below 25, cretinism will be endemic.²

Daily iodine requirements vary between 120 and 150 micrograms in adults and approximately 50 micrograms in infants.¹

The wide spectrum of iodine deficiency disorders (I.D.D.) ranges from simple goiter to mental and physical disturbances and cretinism. Although there are cheap solutions for this problem, it has not yet been resolved in the world and is given priority by the World Health Organization (WHO).

Goiter, i.e. enlargement of the thyroid gland is the most prevalent sign of IDD. In 11 of 23 countries of the eastern mediterranean region including Iran, this is an important health problem.¹ In epidemiologic studies the overall enlarged thyroid (stage 1 to 3) or just visible goiters are considered significant.

Table I. Laboratory values of Neishabour children

| Hormone | No. | Mean + / - 2 SD |
|------------------|-----|-------------------|
| T4(micro g / dl) | 188 | 10.32 ± 4.17 |
| T3(ng / dl) | 151 | 203 ± 130 |
| T3/T4 ratio | 151 | 19.8 001/002 12.3 |
| T3RU | 188 | 26.8 +/- 6.6 |
| FT4I | 188 | 2.74 +/- 1.08 |

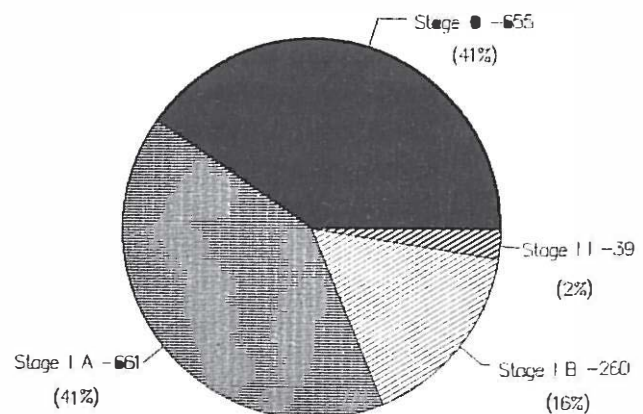


Fig. 1. Clinical staging of goiter (Neishabour, 1989).

MATERIALS AND METHODS

In cooperation with the education and cultural office of Neishabour 6 boys' schools and 3 girls' primary

Iodine Deficiency

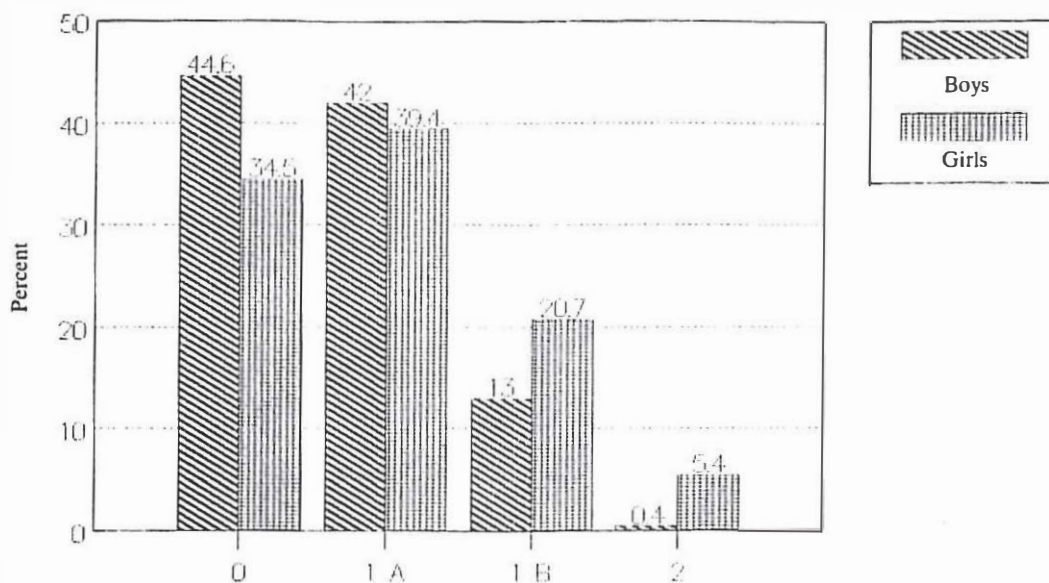


Fig. 2. comparison of goiter clinical staging between boys & girls.

schools were chosen randomly and students of the first and fifth grades were studied (age 6 to 11 years).

A total of 1618 students were examined, consisting of 970 boys and 648 girls. Height and weight were determined by a Sica scale. 188 students were randomly selected among volunteers for hormone assays consisting of T₄ (RIA), T₃ (RIA), and T₃RU done by endocrine laboratory of Ghaem Medical Center in Mashad. Hormone assays were performed by radioimmunoassay kits from Diagnostic Products Corporation.

Clinical evaluation was performed by a team consisting of one endocrinologist, one pediatrician, a nutritionist and 2 medical students. Classification of goiter was performed according to WHO classification as below:

STAGE DESCRIPTION

- 0: Thyroid is neither palpable nor visible even with extended neck.
- 1: Thyroid is palpable. If not visible, 1A, and if it is visible with extended neck, 1B.
- 2: Thyroid is palpable and visible in normal position.
- 3: Thyroid is visible from a distance.

Statistics were calculated by 2 tailed student t tests and Chi square test.

RESULTS

Goiter surveillance

Incidence of palpable goiter was 60% and in order of

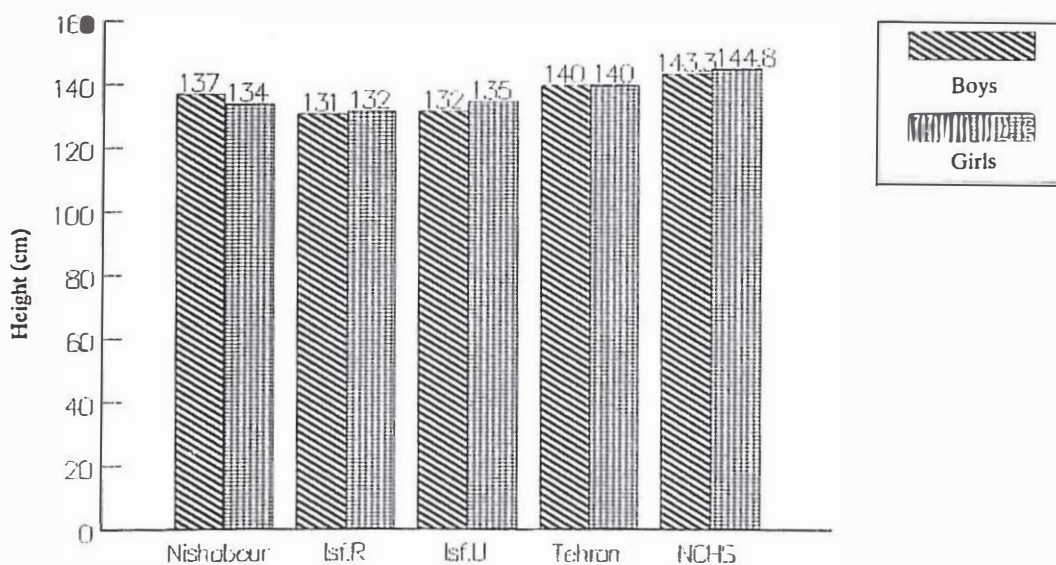


Fig. 3. Comparison of height P50 between 11 year old children.

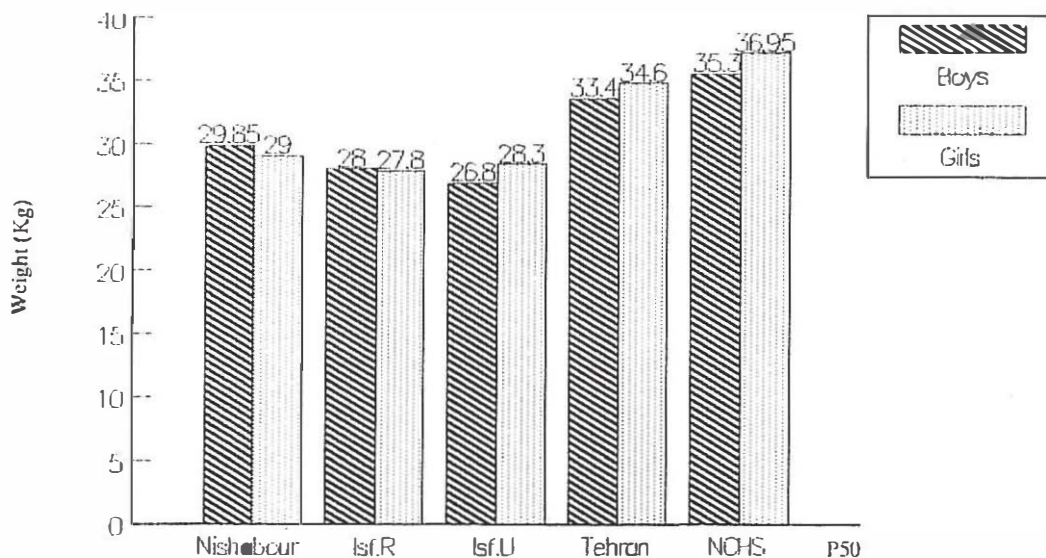


Fig. 4. Comparison of weight P50 between 11 year old children.

frequency stages 1A among boys and more progressed stages were common in girls (Fig 2). Goiter was more common in fifth grade than first grade students (64 versus 53%).

Height and weight

According to our study these 2 features of physical growth are lower in Neishaburian children than NCHS and Tehran but are higher than Isfahan (Fig 3 and 4).

Laboratory assays

In our study T4 and T3 values are increased significantly ($p < 0.005$). The rise in T3 is much more than T4 and T3/T4 ratio has also increased significantly ($p < 0.005$). This is conforming to iodine deficiency in which

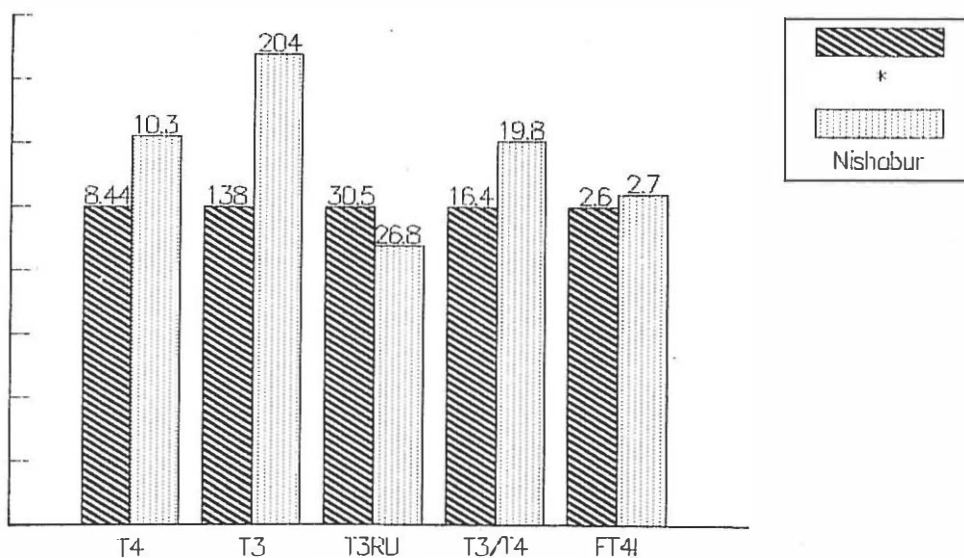
more monoiodothyrosines and hence T3 are formed than diiodothyrosines and hence T4.

Table I indicates mean \pm 2 standard deviation for thyroid hormones among 5th grade students.

In Figure 5, mean values are compared with healthy children of the same age. In Figure 6 girl values are compared with boys. We found that girls have decreased T3 ($p < 0.005$), T4 ($p < 0.005$) and T3/T4 ratio ($p < 0.005$) compared with boys.

DISCUSSION

Goiter in the opinion of an epidemiologist is divided into sporadic and endemic types, in a clinician's view to



* Fisher, et al, JCEM 45(1977) 191-198.

Fig. 5. Thyroid hormonal assays (Neishabour, 1989).

Iodine Deficiency

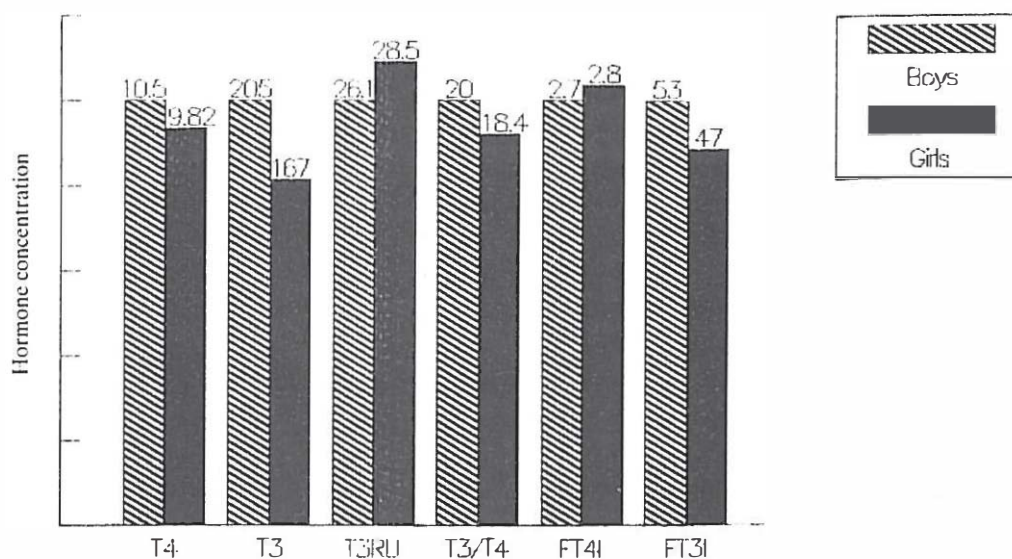


Fig. 6. Comparison of thyroid hormonal values between boys & girls.

toxic and non toxic, surgeons to diffuse and nodular, and pathologists to benign and malignant. Simple goiter, the subject of our study, arises because of reduction in synthesis of thyroid hormones. Goiter is the most prevalent disorder of iodine deficiency.

20 years ago studies of Emami, et al showed that iodine deficiency existed in Iran, especially in the Alborz and Zagross mountainous regions.⁵ Unfortunately, the problem was forgotten soon. In 1983 a group from Iran Institute of Nutrition and Research Department of Taleghani Hospital of Shahid Beheshti University of Medical Sciences began a new survey in Shahriar region, southeast of Tehran. They showed that 80% of the residents had goiter and 7% of them had visible goiters.⁷ In 1984, a study on students of east Tehran revealed that 71.5 % of boys and 88% of girls had goiter.⁸ Another study in Yasuj and Sisakht showed that 95% of women and 87% of men were afflicted.⁹

The result of our study and the great number of Neishaburian patients with large goiters, disturbances of mental and physical growth and cost of treatment necessitates prompt increase in iodine availability for the residents of iodine deficient areas. There are various possible approaches that follows:

[1] Iodination of salt: The goal is to provide 120 to 150 micrograms of iodine through 10 grams daily salt consumption. This is considered the best way and is the most accepted approach.

[2] Intramuscular injection of iodinated oil, one injection of which provides enough iodine for three to five years.

[3] Oral iodinated oil: It is to be repeated everyone to two years.

[4] Iodination of water, which besides iodine supplementation serves for water disinfection.

[5] Iodination of flour and thereby bread. This seems to be the most practical way to be considered in Iran.

[6] Sodium iodate pills. This is no longer considered as a method of iodine supplementation.

Fortunately a national committee for control of IDD has been launched and has begun its nationwide activities, making preliminary steps toward iodination of salt in spite of existing problems. This method along with iodination of flour may be the most appropriate.

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