STUDIES OF THE THYROID FUNCTION IN CHILDREN WITH DOWN'S SYNDROME

BENJAMIN J. SCHMIDT *
NELSON CARVALHO **
CLÁUDIO C. ORTEGA ***
JOSÉ LIBERMAM ***
JANE M. M. BIAZZI ***
POJUCAN M. TAPAJÓS ***
STANISLAU KRYNSKI ****

The study of the thyroid function in Down's syndrome has been the subject of various contraversal publications, thus clearly showing the existing doubts within some not too well defined aspects.

Benda's anatomo-pathological works are expressive, showing anatomic alterations of the thyroid in 47 of the 48 cases studied with Down's syndrome. Benda et ali. [2, 3, 4] and Myers [12] refer to the importance of the maternal hypothyroidism in the genesis of mongolism. Various works [1, 11, 13, 15] have shown thyroid functional alterations in mongoloids. On the other hand, some authors [7, 10, 14, 16] have not found alterations of the thyroid function in Down's syndrome. Saxena et al. [15] severely criticize the common and indiscriminated use of the thyroid hormone in mongoloid patients, once a hypothyroidism diagnosis has not been previously established. Such doubts and discrepancies in the specialized bibliography encouraged us in making a study of the thyroid function in non-institutionalized patients with Down's syndrome, by comparing the results obtained from normal siblings with almost the same corresponding ages as the patients studied.

MATERIALS AND METHODS

Twenty nine non-institutionalized children clinically and cytogenetically characterized as suffering from Down's syndrome were selected. The age of the patients ranged from 1 to 16 years old, being 18 males and 11 females. The T-3 (triiodethyronine) and T-4 (tetraiodethyronine) seric levels of all the patients were

---

Trabalho apresentado no XVIII Congresso Brasileiro de Pediatria (Salvador, BA, de 13-10-1973), realizado no Centro de Habilitação de São Paulo, em colaboração com a Escola Paulista de Medicina (EPM) e o Centro de Medicina Nuclear da Faculdade de Medicina da Universidade de São Paulo (FMUSP), sob auxílio da Comissão Nacional de Energia Nuclear (São Paulo): * Professor Adjunto do Departamento de Pediatria da EPM (Serviço Prof. A. A. Carvalho); ** Diretor Clínico do Centro de Medicina Nuclear da FMUSP; *** Médicos do Centro de Habilitação de São Paulo; **** Diretor Técnico do Centro de Habilitação de São Paulo.

dosed and the I^{131} captation by the thyroid after 2 and 24 hours was measured. The results obtained were compared to the others taken from the patient's sibblings, in a total of 39, being 22 males and 17 females, all clinically normal, aged from 2 to 18 years old.

The readings of the radiiodine were made through sparkling detectors supplied with thallium activated sodium iodide cristal, measuring 3.5 x 5 cm, in order to reduce to a minimum the iodine quantity which should be administered to the patient. The technique employed followed the norms recommended by the International Agency of Atomic Energy[3]. The tracing doses varied from 20 to 30 mCi of I^{131}. The readings were taken in the first 2 and 24 hours after the dose was administered. The fixation percentages of T-3 on resin were determined, according to the technique recommended by Brookeman and Williams[6], with material supplied by the Ames Company. The plasmatic T-4 was determined following Braverman et al's technique[5], using the Ames Company patterns.

RESULTS

The results of the I^{131} captation by the thyroid, as well as the readings of the triodothyroinine (T-3) and tetraiodothyronine (T-4) are showen in Table 1.

Thyroid captation of the I^{131} (% D)			
After 2 hours (mean ± S.D.)		After 24 hours (mean ± S.D.)	
Patients	Normal siblings	Patients	Normal siblings
7.52 ± 2.76	9.90 ± 3.66	28.00 ± 6.95	29.64 ± 7.32
T-3 (retention %)		T-4 (mcg %)	
Patients	Normal siblings	Patients	Normal siblings
50.43 ± 5.4	52.16 ± 7.66	6.17 ± 1.83	6.32 % 1.65

Table 1 — Thyroid function test in mongoloids and relatives.

The results obtained from the patients as compared to their normal siblings shown that there is a significant difference ($P < 0.01$) in the captation of I^{131} by the thyroid in the first two hours. This difference becomes insignificant ($P > 0.05$) when compared to the results of the 24 hour's captation. In relation to the T-3 and T-4 levels, there were no significant differences in the two groups studied.

DISCUSSION

In the cases studied, the T-3 and T-4 levels, as well as the captation of the I^{131} through the thyroid measured 24 hours after the I^{131} was administered were close to the results obtained from the patients siblings, all clinically normal ($P > 0.05$). Considering these tests, it can be stated

that the results obtained from the patients studied were normal. Regarding the T-3, the works of Kurland et al. [11], Pearse et al. [13], Jackin et al. [9] and Spinelli Ressi and Bergonzi [17] showed high levels in patients with Down's syndrome. It must be pointed out that these authors determined the captation of the T-3 through erythrocyte, a methodology subject to a series of errors and not up-to-date. Rimoin et al. [14], using a similar technique as the one employed at the present study, did not find significant alterations of the I^{131}, when comparing the results obtained from mongoloids to the ones from normal individuals.

Literature data diverge with regard to the captation of the I^{131} through the thyroid: Pearse et al. [13] with 24 hour readings showed a hypocaptant thyroid in their mongoloids; Cottino et al. [7], by taking readings in 1, 24 and 48 hours, found no significant difference after comparing the results to the normal ones. In the present work the results obtained in the thyroid captation of the I^{131} when obtained 2 hours after the intake of isotope radium, were significative ($P < 0.01$) when compared to the results obtained from the clinically normal siblings. These results suggest that the mongoloids might have a deficit of the hypothalamus-hypophyso-thyroid axis, although the levels of the thyroid captation during the 24 hours reached indexes similar to the normal; during the first 2 hours the levels were significantly lower than those found in the controls. The hypothalamus-hypophysary stimulus or the response of the thyroid gland would be slow but compensated when analyzed after 24 hours. Such hypothesis unfolds perpectives for new studies within Down's syndrome.

SUMMARY

The thyroid function (T-3 triiodothyronine; T-4 tetraiodothyronine and the captation of the I^{131} through the thyroid, in 2 and 24 hours after the intake of isotope radium), was studied in patients with Down's syndrome and the results being compared to those obtained from the respective siblings, all clinically normal. The comparative results showed no significant differences, except in the 2 hours captation of the I^{131} through the thyroid ($P < 0.01$). The findings suggest that the hypothalamus-hypophysary or the response of the thyroid gland would be slow, but compensated when analyzed after 24 hours.

RESUMO

Estudos da função tireóidea em crianças com síndrome de Down

Os autores estudaram a função tireóidea (T-3, triiodotironina; T-4, tetraiodotironina e captação do I^{131} pela tireóide com 2 e 24 horas após a ingestão do radioisótopo) em pacientes com síndrome de Down, e compararam os resultados com os obtidos nos seus respectivos irmãos, todos clinicamente

normais. Os resultados comparativos não apresentaram diferenças significativas, exceto na captação de 2 horas do I^{131} pela tireóide ($P < 0,01$). Os achados sugerem que o estímulo hipotálamo hipofisário ou a resposta da glândula tireóide seria lento(a) mas compensado(a) quando analisados após 24 horas.

REFERENCES

1. BENDA, C. E. & BIXBY, E. M. — Function of the thyroid and pituitary in mongolism. Am. J. Dis. Child. 58:1240, 1939.
2. BENDA, C. E.; DAYTON, N. A. & PROUTY, R. A. — On the etiology and prevention of mongolism. Am. J. Psychiat. 99:822, 1943.
3. BENDA, C. E. — Mongolism and Cretinism. 2nd ed. Grune and Stratton, New York, 1949.
4. BENDA, C. E. — What is mongolism? Internat. Rec. Med. 165:75, 1952.
5. BRAVERMAN, L. E.; VAGENAKIS, A. G.; FOSTER, A. E. & INGBAR, S. H. — Evaluation of a simplified technique for the specific measurement of serum thyroxine concentration. J. Clin. Endocrinol. 32:497, 1971.
6. BROOKEMAN, V. A. & WILLIAMS, C. M. — Evaluation of the resin strip technique for determing serum T-3 binding capacity and thyroxine. J. Nucl. Med. 12:55-59, 1971.
7. COTTINO, F.; FERRARIS, G. M. & CODA, G. — Thyroidal function in mongolism. J. Clin. End. Metab. 16:830, 1956.
8. International Agency Atomic Energy (Wien) — Nov.: 20-30, 1960.
9. JACKIM, F.; WORTIS, J. & ADESMAN, J. — Triiodothyronine uptake by erythrocytes in mongolism. Proc. Soc. Exp. Biol. Med. 107:401, 1961.
10. KEARNS, J. F. & HUTSON, W. F. — The use of radio activeoidine studies in congenital thyroid aplasia. Quart. Bull. Northwestern Med. School 25:270, 1951.
11. KURLAND, G. S.; FISHMAN, J.; HAMOLSKY, M. W. & FREEDBERG, A. S. — Radioisotope study of thyroid function in 21 mongoloid subjects, including observations in 7 parents. J. Clin. Endocrinol. 17:552, 1957.
12. MYERS, C. R. — An application of the control group method to the problem of the etiology of mongolism. Proc. Am. A. Ment. Deficiency 62:142, 1938.
13. PEARSE, J. J.; REISS, M. & SUWALSKI, R. T. — Thyroid functions in patients with mongolism. J. Clin. Endochinol. 23:311, 1963.
14. RIMOIN, D. L. — Thyroxine-binding proteins in mongolism. J. Clin. End. Metab. 25:708, 1965.
15. SAXENA, K. M. & PRYLES, C. V. — Thyroid function in mongolism. J. Pediatrics 67:363, 1965.
16. SIMON, A.; LUDWIG, C.; GOFMAN, J. W. & CROOK, G. H. — Metabolic studies in mongolism. Am. J. Psychiat. 111:139, 1954.
17. SPINELLI-RESSI, F. & BERGONZI, F. — Red cell triiodothyronine uptake as a measure of thyroid function in mongolism. Acta Paediat (Stokolm) 52:575, 1963.

Departamento de Pediatria — Escola Paulista de Melicina — Rua Botucatu 720 — 04203 São Paulo, SP — Brasil.