

Prospective study of T3, T4 and TSH values in elderly female patients admitted in an Internal Medicine service

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Abstract

A prospective study was carried out among 129 elderly female patients admitted to an acute care unit of a university hospital.

Blood samples were taken to assay Triiodothyronine(T3), Thyroxin (T4) and Thyroid-Stimulating Hormone by a "sensitive" method (sTSH). A total of 66% of patients had at least one abnormal test result. A total of 43% of patients appeared to have the "Euthyroid Sick Syndrome". One patient was thyrotoxic and t

two had hypothyroidism.

A total of 10 patients had abnormal TSH levels for no apparent reasons; 4 patients had low TSH values with normal T3 and T4 levels; the others six patients had high TSH values and also high T4 levels.

Key words: thyroid function, non-thyroid sickness.

Introduction

The frequency of thyroid dysfunction increases with age, mainly in the female gender.^{1,2} The clinical diagnosis of hypothyroidism is difficult in the elderly, as many thyroid insufficiency symptoms can easily be confused with ageing; hyperthyroidism presents itself often in an atypical manner, with signs and symptoms which can suggest other organs pathologies.² Thus, it has been proposed that thyroid function tests are part of the routine laboratorial evaluation in the elderly.^{3,4,5}

To value these laboratorial findings often creates problems to in-patients in acute conditions, once that, whether in a serious non-thyroid condition, whether in a medical therapy, changes can be determined that

only a small percentage of patients express a "true" hypothyroidism or hyperthyroidism.⁶

The authors aim to evaluate the frequency of changes in serum T3, T4 and TSH, in elderly female patients, as well as its clinical usefulness whilst determining it routinely.

Material and methods

A population of 129 patients of female gender, aged ≥ 60 years old ($73.8 \pm SD 8.0$), admitted in the University Internal Medicine and Gastroenterology Service of Hospital Pulido Valente. In all patients, regardless of the diagnosis on admission, it was carried out a laboratorial evaluation of the thyroid function, through the serum dosage of T3 (Standard Range: 1.3 – 2.5 nmol/L), T4 (SR: 69-141 nmol/L) and TSH (SR: 0.3-3.8 mU/L), through the tr FIA (Time Resolved Fluorescence Immunoassay). In all patients it was recorded the age and the diagnosis on admission.

It was made the respective database with the names, ages and respective laboratory values using the DBase III plus software, being used afterwards for descriptive statistical calculations, the Statpack II software.

It was determined the frequency where at least one of the study laboratorial endpoints was changed and the alterations found were characterized. In patients within normal range of TSH, T4 and T3, were determined the average and standard deviation. It was also assessed T3, T4 and TSH changes regarding the age

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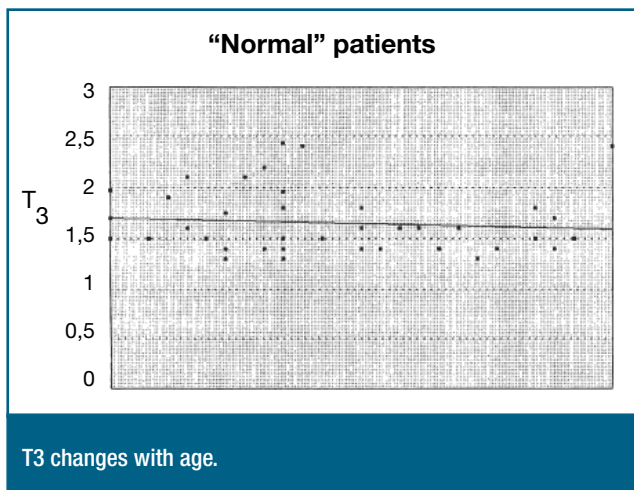


FIG. 1

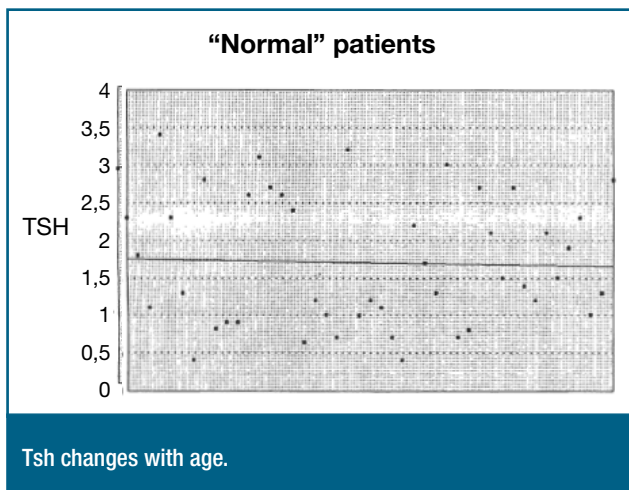


FIG. 3

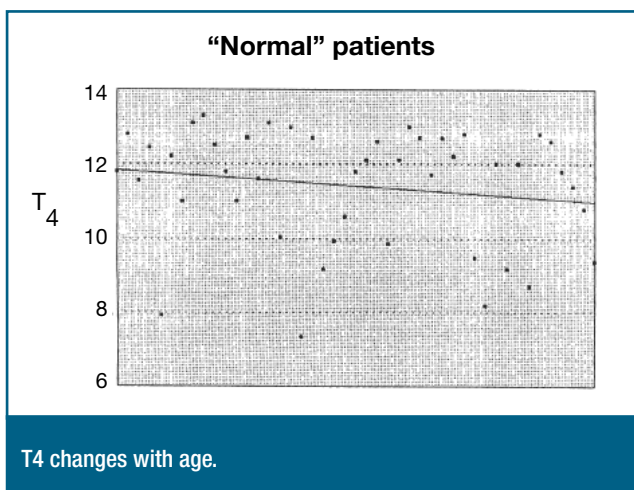


FIG. 2

of the patients group in which three endpoints were normal. TSH tr FIA values were separated in 6 groups: 0 to 0.09 mU/L – considered significantly reduced; 0.1 to 0.29 mU/L considered as slightly reduced; 0.3 to 3.8 mU/L normal; 3.9 to 5.0 mU/L – considered slightly increased; 5.1 to 10 mU/L rather increased and > 10 mU/L very increased.

Patients with TSH tr FIA significantly changed were grouped according to T4 values and the clinical procedures were reviewed.

Results

Among the 129 patients studied, only 45 (34.4%) showed a normal range in the 3 evaluated endpoints.

In this group, it was seen a slight decrease on TSH and T3, with age, slightly less marked for T4 and without a statistical meaning (Fig. 1, 2 and 3, respectively). In the remaining 86 patients (65.6%) there was a change in at least one of them. Around 5% showed TSH values lower than normal, and in 17% the TSH was high; we will come back to these two groups. In 56 (42.7%) were found changes which have been referred as “Euthyroid Sick Syndrome”, being the most frequent a lower value of an isolated T3 (36 patients – 27.5%), followed of low values both for T3 and T4 (14 patients – 10.7%) (Table 1).

In the group in which 3 endpoints were normal, the average ± SD was 1.65 ± 0.30 for T3; 111.3 ± 22.8 for T4 and 1.70 ± 0.85 for TSH.

Patients with abnormal TSH

TABLE I

Euthyroid Sick Syndrome Patients

TSH	T4	T3	No. Patients	%
N	N	↓	36	27,5
N	↓	↓	14	10,7
N	↑	N	4	3,0
N	↑	↓	2	1,5
TOTAL			56	42,7
N – Normal ↓ Low ↑ High				

TABLE II

T4 values in patients with abnormal TSH values

TSH	No. Patients	%	T4 (No. Patients)		
			A	N	B
0-0.09	5	3,8	1	4	—
0.1-0.29	2	1,5	—	2	—
3.9-5	6	4,6	—	4	2
5.1-10	9	6,9	—	6	3
>10	6	4,6	—	1	5

N – Normal; B – Reduced; C – Increased

TSH value was lower than normal in 7 patients (5.3%), being in 5 (3.8%) significantly reduced (<0.1 mU/L), suggesting a hyperthyroidism diagnosis. High values of TSH were found in 21 patients (16%) having a significant increase (>5 mU/L) in 15 (11.5%) From this last group, 7 patients (5.3%) showed normal values for T4, suggesting a subclinical hypothyroidism diagnosis and only a patient would present a TSH > 10 mU/L.

Higher TSH values than 5 and T4 subnormal values, suggesting a hypothyroidism diagnosis, occurred in 8 patients (6.1%) (Table 2).

Table 3 shows the values for TSH, T4 and T3 and the clinical diagnosis in patients with TSH < 0.1 mU/L. Patient no.17 had a laboratorial diagnosis of hyperthyroidism, not yet clinically suspected. The remaining four patients showed normal values for T4.

Table 4 shows TSH and T4 values, as well as clinical diagnosis of patients with TSH > 5 and a reduced T4. In one of them was made a clinical diagnosis of

hypothyroidism in a myxedematous stage, on admission (Patient no. 113); patient no.125 had undergone thyroidectomy, and has been in hormone replacement therapy.

Discussion and conclusions

The results obtained, confirm that T3, T4 and TSH values are often changed in elderly patients admitted in an Internal Medicine Service of an acute conditions hospital. In 65.6% of patients there were abnormal values in at least one of these endpoints.

A subnormal value of an isolated T3, was the most often alteration (27.5%) and is due mainly to the inhibition of a peripheral conversion of T4 into T3, determined by an associated non-thyroid disease.⁷

For such reason, is pointless to determine T3 in a severe non-thyroid condition towards a hypothyroidism diagnosis; however, it can be used as a prognostic factor, once its value lowers as more critical is the clinical condition.^{7,8}

The serum concentration of T4 can also be abnormal in patients with a non-thyroid condition, namely due to the change in concentrations of carrier proteins. In 10.7% of the patients we studied there were under normal values for T4. For this reason, the T4 dosage of free T4 (FT4), should replace the T4 dosage.⁸ The changes mentioned before were included in the Euthyroid Sick Syndrome group. Although it had not been confirmed by the rT3 dosage, we highlight the normal sTCH presence in all patients of this group. Also, a TSH suppressive therapy in the patients sub-group with low T3 and T4 was not made.

The biggest progress verified in the “thyroid function tests” was the introduction of highly sensitive immunometric methods to determine serum TSH that made sTSH (TSH through a sensitive method),

TABLE III

Patients Characteristics with confirmed or likely hyperthyroidism

No. Order	TSH (0.3-3.8)	T4 (69-141)	T3 (1.3-2.5)	Age	Clinical condition
17	0.02	232	5.2	77	Heart failure; Auricular fibrillation
14	0.01	N93	N1.6	81	Aortic and mitral fibrocalcification disease; Unstable angor
3	0.03	N108	0.8	70	CVA, Deceased
16	0.05	N131	N2.6	88	Acute myocardial infarction; Deceased
13	0.02	N69	N1.6	86	Parkinson. Dehydration

TABLE IV

Patients' characteristics with confirmed or likely hypothyroidism

No. Order	TSH	T4	Age	Clinical condition
112	6.6	55	75	Heart failure. Anemia
126	10.0	50	61	Severe liver failure. Deceased
115	9.06	60.7	76	Kidney failure. Obesity
114	10.1	21	57	Metastised breast tumor. Deceased
116	11.8	46	86	Heart failure. Kidney failure. Respiratory failure. Diabetes
125	14.0	62	63	Thyroidectomy. Hormone replacement therapy
113	105.0	18	71	Myxedema
111	11.0	65.4	80	CVA. Heart failure. Hypertension. Diabetes

the best isolated endpoint to detect a probable thyroid hyperfunction.^{9,10} Its value is still higher when there is a severe non-thyroid disease or the administration of drugs which often change T3, T4 and even FT4.⁹

We found sTSH values significantly low in 3.8% and significantly high in 11.5%. Very similar values (3.9% and 11.1%, respectively) were also described in a recent work by DeGroot.⁶

sTSH values can be suppressed administering dopamine, corticoids and tricyclic antidepressive pharmacologic dosages, masking a true hypothyroidism.¹¹ Such values can also be transiently high in many euthyroid patients in a recovery stage of a severe condition.^{7,8}

In patients with a low TSH, suggesting a hyperthyroidism diagnosis, only one (0.8%) had significantly high values of T3 and T4, enabling to raise a hyperthyroidism diagnosis without a clinical suspicion (patient no. 17, Table 3).

The remaining patients can not be clarified by the data we have available.

It is frequent to find low TSH values (due to the administration of drugs and possibly other factors in severe conditions) which are not confirmed in subsequent determinations,¹¹ what can happen with some of our patients.

Low sTSH values with normal FT4 and T3 can correspond, in the absence of drugs which interfere with the TSH secretion, a light thyrotoxicosis. In such cases it is indicated the T3 suppression test or the TRH test.

With a basis on the determination of sTSH and

T4, 5.32% of our patients had sub-clinical hypothyroidism (high sTSH, with a normal T4) and 6.12% probable hypothyroidism compared with respectively 6% and 5.8% in the patients from the work previously mentioned by DeGroot.⁶

A frank hypothyroidism occurred in two patients

(1.5%); one of them was admitted in a myxedematous stage, the other having undergone thyroidectomy and with insufficient hormone replacement therapy (patients no. 113 and 125 of Table 4).

The results obtained in the studied population, although confirming the frequent change on thyroid function tests, show that only a small percentage express a "true" hypo- or hyperthyroidism, respectively 1.5% and 0.8%, not allowing stating the usefulness of determining these laboratorial endpoints, routinely, of all elderly patients. However, this enables us to suggest that the determination of FT4, replacing the dosages of T3 and T4 and in some cases, the FT3 (sTSH reduced but with a normal FT4 – thyrotoxicosis of T3) can make easier the interpretations of the laboratorial changes.^{2,3,9}

Seldom there will be a need to evaluate the TSH response to TRH.

We think that the evaluation of the thyroid function in the elderly patient must be carried out every time there is a high degree of suspicion and we propose an initial screening with a simultaneous determination of sTSH and FT4. ■

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