Thyroid Function in "Symptomless", Aged Hemodialysis Patients

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Introduction

Disturbances of thyroid function are multifactorial in etiology, affect 10-12% of chronic hemodialysis (HD) patients and their incidence increases with age[1,2,3]. Among the various, main or aggravating, factors implicated in the etiology of those disturbances the autoimmune disorders(especially in diabetic patients), the constantly increasing age of HD population, the reduced activity of hepatic deiodinase as well as the increased concentration of inorganic iodine and the biocompatibility of HD membranes, are iincluded[1,4-6].

Expression of thyroid disturbances can range from clinically overt hyper- or hypo-thyroidism to simple (subclinical) disturbances of thyroid hormone or antithyroid antibody(Anti-Tg, Anti-TPO) levels. There is increasing evidence that subclinical disorders carry an increased risk for exacerbation of existing coronary artery disease and cardiac arrythmias (subclinical hyperthyroidism) or dyslipidemias, coronary artery disease and atherosclerosis (subclinical hypothyroidism)[7-9], while several authors reported beneficial effects after treatment of these subclinical thyroid disturbances[10,11].

Bearing in mind that in normal (or symptomless) population, thyroid function abnormalities are often increasing with age, in this study we made an attempt to investigate thyroid function in a selective group of aged hemodialysis patients.

Patients and Methods

Thyroid function of 109 HD patients, 61M-48F, with an age of 67,5±8,8 years(range 51-85 years) and on HD for 57,7±52 months(range 9-250 months) was assessed. Their primary nephropathy was: diabetes mellitus in 29/109 (26,6%), chronic glomerulonephritis in 15/109 (13,76%), adult polycystic kidney disease in 14/109 (12,84%), various nephropathies in 13/109 (11,92%) while primary renal disease was unknown in 31/109 (28,44%). No patient had history of thyroid disease, received any medication that could interfere with thyroid function or suffered from acute illness at the time of the study. In those patients, blood was drawn before the first dialysis of the week and FT_3, FT_4, TSH, Anti-thyroglobulin antibodies (Anti-Tg), Anti-thyroperoxidase antibodies (Anti-TPO) blood levels were measured using RIA methods. Normal laboratory values for the aforementioned parameters are as follows: FT_3: 1,6-4,3pg/ml, FT_4: 0,6-1,9ng/dl, TSH: 0,3-4μIU/ml, Anti-Tg≤100IU/ml, Anti-TPO≤10IU/ml.

Subclinical hypothyroidism was defined as symtomless elevation of TSH>4 μIU/ml and normal tyhroid hormone levels and subclinical hyperthyroidism as symptomless decrease of TSH<0,3μIU/ml and normal tyhroid hormone levels[12].

Results

There was no statistically significant difference between men and women for all the tested parameters of thyroid function (Table 1) as well as on the incidence of diabetes mellitus in these two groups(data not shown). Table 2 indicates the absolute numbers and percentages of patients with abnormal values for the three groups(sum of patients, males, females). Also, in the same table, the results of statistical comparison of men and women are depicted. The epidemiological and laboratory characteristics of patients with abnormal TSH levels are showed in Table 3. From the statistical correlations of the measured parameters statistically significant were: a) for the sum of patients those of FT_3-FT_4 ($r=0,36$ $p<0,001$) and TSH-FT_4 ($r=-0,264$ $p<0,01$) b) for the group of male patients, the correlation of FT_3-FT_4 ($r=0,560$ $p<0,001$) and c)for females the negative correlations of TSH-FT_3($r=-0,6$ $p<0,001$) and Anti-Tg-FT_3 ($r=0,3$ $p<0,05$).

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Table 1. Results of epidemiological and laboratory parameters and the statistical comparison between men and women.

Patients/Sex	Sum (n=109)	Men(n=61)	Women(n=48)
Age(years)	67,5±8,8(51-85)	68±9(51-85)	67±7(51-81)*
HD(months)	57,7±51,6(9-250)	57,3±50,6(2-250)	57,8±53(5-227)*
FT_3(pg/ml)	2,2±0,4(0,3-3,1)	2,27±0,34(1,2-2,9)	2,12±0,45(0,3-3,1)*
FT_4(ng/dl)	0,79±0,26(0,2-1,6)	0,78±0,26(0,2-1,6)	0,8±0,26(0,2-1,5)*
TSH(μU/ml)	2,33±2,13(0,1-80)	1,97±1,4(0,1-8)	4,36±11,36(0,3-80)*
Anti-Tg (IU/ml)	53,8±131(1-703)	37,4±109(5-703)	74±153(1-525)*
Anti-TPO(IU/ml)	8,1±24,8(1-174)	4,5±7,6(1-43)	12,5±35,7(1-174)*

* p : NS

Table 3. Epidemiological and laboratory characteristics of patients with abnormal TSH levels*.

Patients with TSH>4μIU/ml							
Patient	M/F	Age	DM^+	FT_3	FT_4	Anti-Tg	Anti-TPO
1	M	62	Yes*	normal	normal	normal	normal
2	M	66	No	↓	↓	normal	normal
3	M	72	No	normal	normal	normal	normal
4	F	58	No	normal	normal	normal	normal
5	F	56	No	↓	↓	↑	normal
6	F	80	No	normal	normal	↑	normal
7	F	68	No	↓	normal	normal	normal
8	F	75	No	normal	normal	normal	↑
9	F	68	No	normal	↓	normal	normal
10	F	60	No	normal	normal	normal	normal
11	F	60	Yes*	normal	normal	normal	normal
12	F	71	No	normal	↓	normal	normal
Patients with TSH<0,3μIU/ml							
1	M	55	No	normal	normal	normal	normal
2	M	58	No	normal	normal	normal	normal

* DM : Diabetes mellitus (* Type I).

Table 2. Absolute numbers and percentages of patients with abnormal values for the three groups. Also, the results of statistical comparison of men and women are depicted.

Parameter	Sum of patients (n=109)	Men (n=61)	Women (n=48)
FT_3<1,6pg/ml	5(4,56%)	2(3,28%)	3(6,25%)
FT_3>4,3pg/ml	-	-	-
FT_4<0,6ng/dL	15(13,8%)	9(14,75%)	6(12,5%)
FT_4>1,9ng/dL	-	-	-
TSH<0,3μIU/ml	2(1,83%)	2(3,28%)	-
TSH>4μIU/ml	12(11%)	3(4,92%)	9(18,75%)*
Anti - Tg>100IU/ml	8(7,34%)	2(3,28%)	6(12,5%)
Anti-TPO>10IU/ml	10(9,17%)	5(8,2%)	5(10,4%)

*p<0,05

Discussion

In this study, a significant percentage(12,84%) of the symptomless aged(>50 years old) chronic hemodialysis patients presented disturbances of thyroid function. These disturbances were more commonly encountered in females(18,75%) than in males(8,2%) and were, generally, mild, subclinical and, more commonly, expressed as decreased thyroid activity.

Though mean values of FT_3 and FT_4(Table 1) were within the normal range one must notice that values were near the lower limit of normal, as it has also been reported in similar studies[3,13] and has been considered beneficial for sustaining nitrogen balance[14,15].

FT_4 was inversely related to TSH(r=-0,264 p<0,01) supporting the evidence that: 1) FT_4 is the most accurate laboratory index of the thyroid function[16] and 2) the negative feed-back of the axis thyroid hormones-TSH functions in a satisfactory manner. FT_4 was positively correlated to FT_3(r=0,36 p<0,001) indicating that FT_3 is a satisfactory, though weaker than FT_4, index of thyroid function.

Of all our patients 13,8% presented lower than normal serum levels of FT_4, similar to the results of Kaptein EM et al[17](12,9%) and higher to the percentage of 8% announced

by Spector DA et al[2]. Significantly higher percentage (45%) was found in the study of Hardy MJ[3].

Two patients(1,83%), both of them male, presented lower than normal TSH but normal FT_4 and FT_3 levels(subclinical hyperthyroidism), situation uncommon to the literature[1].

Similar percentage of our patients (1,83%, 1 male-1 female) were found with abnormally high TSH levels and simultaneously low levels of both FT_4 and FT_3(overt hypothyroidism) which are similar to the study of Kaptein EM[17]. All the other patients with abnormally high TSH levels [10(9,17%), 1male-9females] are classified as subclinical hypothyroidism, percentage similar or slightly higher of other studies[1,2,3]. The higher percentage of women with abnormally high TSH values (18,75% vs 4,92%, $x^2=5,24$ $p<0,05$) was the only statistically significant difference between males and females and it is in accordance with the finding of Steinmetz et al[18] in a similar study.

Abnormally high levels of Anti-TG and Anti-TPO antibodies were found in 7,34% and 9,17%, respectively, in our selected patient population finding which is much higher of other similar studies[2,19] in which, however, there is no mention on the percentage of diabetic patients. In the study of Kaptein EM et al[17], concerning chronic hemodialysis patients in which 33,3% of diabetics were included, the proportion of the antithyroid antibodies positive patients was 6,7%.

In conclusion, thyroid function disturbances, mostly mild, were not unsual in the selected (>50 years old) HD population of our study. This finding brings us to the conclusion that screening of this HD population for thyroid function abnormalities is warranted, since symptoms and signs are rarely suggestive.

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