

ALTERATION OF THYROID FUNCTION AND MORPHOLOGY IN PATIENTS UNDERGOING REGULAR HEMODIALYSIS AND CONTINUOUS AMBULATORY PERITONEAL DIALYSIS

HEMODİYALİZ VE SAPD HASTALARINDA İZLENEN TİROİD FONKSİYON TESTİ VE TİROİD MORFOLOJİSİ DEĞİŞİKLİKLERİ

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ÖZET

Klinik olarak ötiroid olan, düzenli hemodiyaliz(HD) ve sürekli ayaktan periton diyaliz (SAPD) tedavisi gören hastalarda in vitro tiroid fonksiyon testlerini kullanarak, 27 SAPD ve 15 HD hastasında tiroid fonksiyon anomalileri araştırıldı. Ultrasonografi ile tiroid volümü ölçüldü ve tiroid nodülleri araştırıldı. Serumda, serbest triiodotironin (fT3), serbest tiroksin (fT4), TSH, antimikrozomal antikor (AMA) ve antitiroglobulin antikor (ATA) seviyeleri ölçüldü. Bu değerler kontrol grubu (n=100) ile kıyaslandı. Üremik hastalarda, serum fT3, TSH, AMA ve ATA değerleri normal sınırlar içerisinde bulunurken, serum fT4 değerleri normalden daha düşük saptandı. Ultrasonografik olarak belirlenen tiroid hacimleri kontrol grubundan farklılık göstermezken, nodüler guatr sıklığı daha yüksek olarak saptandı.

Anahtar sözcükler: Tiroid fonksiyonları, tiroid volümü, üremi, diyaliz

INTRODUCTION

The kidney plays an important role in producing and metabolism of the various hormones (1). In addition, chronic renal failure causes alterations in the internal milieu that affects the synthesis and secretory rate of hormones as well as causing alterations in hormone effects on target tissues. Several hormonal alterations have been described in patients with chronic renal failure

SUMMARY

In vitro thyroid function tests were performed on clinically euthyroid patients undergoing regular hemodialysis (HD) or continuous ambulatory peritoneal dialysis (CAPD). Thyroid function abnormalities were studied in 27 CAPD patients and 15 HD patients. Thyroid volume was measured by ultrasonography and thyroid nodules were detected. Serum free triiodothyronine (fT3), free thyroxine (fT4), TSH level, antimicrosomal antibodies and antithyroglobulin antibodies were also measured. These values were compared to control group (n=100 patients). Serum fT4 levels were under the normal range while serum fT3 and TSH level were nearly normal. Antimicrosomal antibody and antithyroglobulin antibody levels were also under normal range. In study group, thyroid volumes were normal, but nodular thyroid diseases were more common than normal population. Because of the high incidence of thyroid dysfunction and nodular goitre were found, screening of thyroid function and goitre detection with ultrasound should be considered in uremic patients.

Key Words: Thyroid function, thyroid volume, uraemia, dialysis

(1-22). A number of previous studies have shown that serum thyroid hormone levels are frequently abnormal in patients on continuous ambulatory peritoneal dialysis (CAPD) and regular hemodialysis (HD) (1-22); but the pathogenesis of such abnormalities are poorly understood. There is altered iodine trapping in patients with chronic renal failure (CRF) but iodine organification appears to be normal (3,22).

Serum free thyroxine (fT4) and triiodothyronine (T3) are well indicators to show the concentration of biologically active thyroid hormones. In this study, the effect of HD and CAPD on thyroid hormones and thyroid morphology were investigated in uremic patients.

PATIENTS AND METHODS

Studies were performed in 27 CAPD patients and 15 HD patients (23 male, 19 female; range 19-71 years, age:47.2±1.4 years) who had regularly dialysis treatment for at least 6 months. All patients had renal paranchimal pathology and the patients who had other systemic disorders were excluded. *HD treatment* had been performed by using hemophane-hollow-fiber dialyzer and bicarbonate dialyzed under 230-250 ml/min blood and 500 ml/min dialyzed flows with B-Brown segura dialysis machine. *CAPD treatment* had been performed by using 1.36-2.27g % dextrose including peritoneal dialyate solution (2 lt/6 hours).

In all of patients, thyroid volumes were measured by ultrasonography and thyroid nodules were detected. fT3, fT4, TSH levels, antimicrosomal antibody (AMA) and antithyroglobulin antibody (Anti Tg Ab) levels were also measured. The control group consist of 50 male, 50 female who are 20-60 years (mean age: 32.1±8.9 years).

Serum fT3, fT4, TSH levels, antimicrosomal antibody and antithyroglobulin antibody were measured by chemiluminescent enzyme immunoassay (CIA).

Thyroid volumes and morphologies were determined by employing echocamera Siemens Sonoline SL-1, and volumes were calculated according to the following formula described by Brown et al. (24):

Thyroid volume (ml) = (n/6 x length x width x depth).

Data are expressed as mean ± 1S.D. (alpha error: 95%). Statistical analysis was performed using Student's t test. The level of significance was chosen at p<0.05.

RESULTS

Patients characteristic have been shown in **Table-I**.

In control group, the mean fT3 , fT4 and TSH values were 3.8±2.1 (normal range:2.97-5.19 ng/dl), 1.4±0.3 (normal range:0.7-1.7 ng/dl), and 3.1±1.9 (normal range:0.3-6.0 uIU/ml), respectively. In study group, the mean serum fT3, fT4, TSH values were 3.78±1.87, 0.83±0.31, 3.83±2.17, respectively. In 14 patients of 42, fT3 values were decreased comparing to

normal range. 3 patients of 42 had increased fT3 levels. However, mean fT3 was not different from control subjects (**Table-II**).

In our study group, 14 patients of 42 had decreased fT4 values and 11 patients of 42 had also minimum values of the normal range. Serum fT4 values in dialysed patients were significantly decreased comparing to control group (p=0.01). There was no difference between HD and CAPD patients.

Serum TSH levels in patients with dialysis were slightly higher than normal subject (p=0.04). There were 6 patients (14.3%) who had increased TSH levels. There was no difference between HD and CAPD patients.

In the whole group of patients, antimicrosomal antibody and antithyroglobulin antibody levels were obtained in normal range (normal range of AMA: 0-35 IU/ml and anti Tg Ab: 0-40 IU/ml). In control group, the mean thyroid volume was 12.2±26.21 ml. There were no statistical differences between control group and dialysed patients (14.91±5.30 ml) and none of the thyroid function variables were correlated with thyroid gland volume (p>0.05). Nodular thyroid disease insidance detected by ultrasonography was 21.4% (n=9) in dialysed patients.

Table I: Patients characteristic.

	Dialysed patients	Normal subjects
Age (yrs)	47.2±11.4	32.1±8.9
Male/ Female	23/ 19	50/50
Dialysis Duration (mo)	39.7±21.8	-
HD/CAPD	15/27	-

Table II: Serum fT3, fT4, TSH, AMA and Anti Tg Ab values in the study groups.

	HD	CAPD	Control	P
fT3	3.7±1.1	3.7*1.1	3.8±2.1	NS
fT4	0.86±0.3	0.78±0.24	1.4±0.3	0.01
TSH	3.8±1.8	3.91±2.39	3.1 ± 1.9	0.04
AMA	18.8±3.9	19.5±4.8	18.4±2.8	NS
Anti Tg Ab	17.8±1.2	18.2±1.8	18.3±2.4	NS

DISCUSSION

The kidneys occupy an important position in the metabolism, degradation, and excretion of several thyroid hormones and related substances (1). The most commonly reported abnormality is low serum fT3 level (7,14,17,23). In our study group, mean serum fT3 value in patient with dialysis did not differ from control group. Decreased fT3 values were obtained 33.3% in our study.

Generally, T4 levels were normal or slightly decreased in dialysed patients (1-7,14,17,23). In our study group, 14 patients of 42 had decreased fT4 values and 11 patients of 42 had also minimum values of the normal range. These findings suggested that decreased fT4 values were observed 59.5% in dialysed patients.

Usually, serum TSH levels in patients with dialysis were not different from normal subject. However, there were 6 patients (14.3%) who had increased TSH levels. The mean TSH value in patients with dialysis were also slightly higher from control group in our study. This result was different from Hegedus et al. (19). However, the previous studies were determined that patients with CRF elevated TSH levels (7,17,19,22,23). A number of previous studies have shown that serum thyroid hormone levels are frequently abnormal in patients on CAPD and HD (1-22). Hence, our results were also supported by the findings of these studies.

In the whole group of patients, antimicrosomal antibody and antithyroglobulin antibody levels were obtained in the normal range. Hegedus et al. (19) and the other authors have shown that none of the patients with CRF had thyroid autoantibodies (14,24,25). Benati et al (20) found that 3 patients had thyroid antibodies. The recent studies have shown that nodular goitre was detected in 54.8% of the uremic patients (16,19). Our study group had 21.4% nodular thyroid disease detected by ultrasonography. This was remarkably low when compared with data in other studies (7,19,21).

Uremia is accompanied with endocrine disorders, due to impaired degradation of hormones because of failed kidney functions and to the interference of the uremic environment with extrarenal degradation or synthesis and secretion of certain hormone. Because of the high incidence of thyroid dysfunction and nodular goitre in uremic patients, screening of thyroid function and goitre detection with ultrasound should be considered.

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