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Abnormality of thyroid function tests in geriatric population undergoing chronic dialysis

Yaşlı Kronik Diyaliz Hastalarında Tiroid Fonksiyon Test Anormallikleri

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ÖZET

Amaç: Geriatrik diyaliz hastalarında tiroid hormonlarının nasıl etkilendiğine dair yeterli veri yoktur. Ayrıca bu hastalarda yaş ve hastalık süresinin tiroid fonksiyon testi anormallikleri açısından ek bir risk faktörü olup olmadığı bilinmemektedir. Bu yüzden bu çalışmada yaşlı kronik diyaliz hastalarının ve yaşlı sağlıklıların tiroid fonksiyon testlerini karşılaştırmayı amaçladık**.**

Gereç ve Yöntemler: Kırk altı kronik diyaliz hastası (24 periton diyalizi (PD) ve 22 hemodiyaliz (HD)) ve 44 sağlıklı kontrol çalışmaya dahil edildi. Yapılan fizik muayene sonrasında hasta ve kontrol grubundan alınan açlık kan örneklerinden tiroid fonksiyon testleri çalışıldı. Diyaliz grubunda tüm hastalara tiroid stimüle edici hormon (TSH), serbest triiyodotironin (sT3) ve serbest tiroksin (sT4) çalışıldı, ancak kontrol grubunda 44 hastanın 14'ünde serbest hormon ölçümleri yapılamadı.

Bulgular: Serum TSH ve sT4 düzeyleri iki grupta benzerdi, ancak sT3 düzeyleri diyaliz grubunda daha düşük bulundu (2.48 ± 0.57 ve 3.06 ± 0.90 p= 0.003). Kontrol grubunda düşük sT3 sendromu görülmezken, diyaliz hastalarının 7(% 15,2)' sinde düşük sT3 sendromu saptandı (p=0,01). Tiroid fonksiyon test bozukluğu oranı diyaliz hastalarında daha fazla bulundu, sırayla 22 (% 47,8)'ye karşın 12 (%40) (p=0,05).

Sonuçlar: Yaşlı diyaliz hastaları, sağlıklı kontrollere göre daha çok tiroid fonksiyon test anormalliklerine sahipti. Ayrıca bu hastalar, tıpkı genç ve orta yaşlı kronik diyaliz hastaları gibi, kontrol grubuna göre daha düşük sT3 düzeylerine sahipti. Bununla birlikte, bu sonuçların klinik süreçte ne anlama geldiği ve kliniğe nasıl bir yansımasının olduğu, özellikle yaşlı hastalarda henüz açık değildir. Bu konuda büyük, ileriye dönük, randomize ve kontrollü çalışmalara ihtiyaç vardır.

Anahtar kelimeler: diyaliz; yaşlı; serbest T3

ABSTRACT

Objective: There is not enough data about how thyroid hormones were affected in geriatric dialysis patients and whether age and duration of disease could be considered as additional risk factors for the thyroid function test abnormalities. For this reason we aimed to compare thyroid function tests of elderly chronic dialysis patients and elderly healthy controls.

Methods: Forty six chronic dialysis patients (24 peritoneal dialysis (PD) and 22 hemodialysis(HD)) and 44 healthy controls were taken into the study. After the physical examination, we collected patients' and controls' fasting blood samples and thereafter thyroid function tests were performed. In dialysis group thyroid stimulating hormone (TSH), free triiodothyronine (fT3) and free thyroxine (ft4) analysis of all patients were performed, but in control group free hormone levels were not studied at 14 of 44.

Results: Serum TSH and fT4 levels were similar in two groups, however fT3 levels were found to be less in dialysis group (2.48 ± 0.57 and 3.06 ± 0.90 p= 0.003). Low fT3 syndrome was not detected in controls, but 7 (15,2%) patients have had low fT3 syndrome in dialysis patients (p=0,01). The rate of thyroid function test abnormalities were higher at dialysis patients as compared with controls, 22 (47,8%) and 12 (40 %), respectively (p=0,05).

Conclusions: Elderly dialysis patients had higher thyroid function test abnormalities than controls. They had lower fT3 levels than controls such as young and middle age chronic dialysis patients. However, what does it mean for clinical process and how its clinical expression is not clearly known, especially in an elderly patients. Large, prospective, randomized and controlled trials are necessary for this topic.

Key words: dialysis, elderly, free T3

Introduction

Chronic renal disease (CRD) and dialysis affect endocrinologic and metabolic status in many ways. Especially thyroid gland is effected and abnormal thyroid function tests are mostly seen. It may be explained by multiple mechanisms including lowered circulating thyroid hormone concentration, altered peripheral hormone metabolism, disturbed binding to carrier proteins, possibly reducted tissue thyroid hormone content and increased iodine depot in thyroid gland [1, 2]. In many studies involving young or middle age population, these results were shown in dialysis patients and these abnormalities were associated with morbidity and mortality. There is not enough data about how thyroid hormones were affected in geriatric dialysis patients and whether age and duration of disease could be considered as additional risk factors for the thyroid function test abnormalities. In healty geriatric population, thyroid hormon disorders, especially hypothyroidism, are increased and it seems to effect patients' morbidity and mortality. For this reason we aimed to compare thyroid function tests of elderly chronic dialysis patients and elderly healthy controls.

Material ve Method:

The protocol was conformed to ethical guidelines of our institution, and informed consent was obtained from each participant. Forty six (23 male, 23 female) elderly chronic dialysis patients (24 peritoneal dialysis (PD) and 22 hemodialysis(HD)), and 44 elderly healthy controls (18 male, 26 female) were taken into the study. Current therapy for thyroid disease, thyroid surgery, radioiodine therapy within 12 months were considered as the exclusion criteria. No patient was taking lithium, amiodarone, or other drugs that may interfere with thyroid function. After the physical examination, we collected patients' and controls' fasting blood samples and thereafter thyroid function tests were performed. In dialysis group all TSH, fT3 and ft4 analysis of all patients were performed, but in control group free hormone levels were not studied at 14 of 44. Further investigations including thyroid autoantibodies and anterior pituitary hormone measurements were performed where indicated. Serum TSH, free T_4, and free T_3 were measured by chemiluminescent immunoassay. Thyroid abnormalities were defined as follows: Overt hypothyroidism: TSH > 4,5 mIU/mL and fT4 < 0,7 ng/dL; subclinical hypothyroidism: TSH >4,5 mIU/mL and fT4 normal; hyperthyroidism: TSH < 0,5 mIU/mL and fT4 > 2 ng/dL; subclinical hyperthroidism: TSH < 0,5 mIU/mL and fT4 normal.

The statistical analysis was performed by using Student's t-test and correlation analysis was performed by Pearson test. The SPSS 15 (SPSS Inc, Chicago, USA) was used. Data were expressed as mean ± standard deviation. A p value of < 0.05 was considered significant.

Results

The mean age of dialysis patients and the control group were similar (respectively 66.76 ± 5.66 and 68.52 ± 7.60). The mean dialysis time of the patients was 25.4 ± 19.1 months. Serum TSH and fT4 levels were similar in two groups, however fT3 levels were found to be less in dialysis group (2.48 ± 0.57 and 3.06 ± 0.90 p= 0.003). Low fT3 syndrome was not detected in controls, but 7 (15,2%) patients have had low fT3 syndrome in dialysis patients (p=0,01) (Table 1). The rate of thyroid function test abnormalities were higher at dialysis patients as compared with controls, 22 (47,8%) and 12 (40 %), respectively (p=0,05). There was no correlation between age and

thyroid hormones in both groups. Also no correlation was determined between dialysis duration and thyroid hormones in dialysis group. In addition to this, all of the patients were clinically euthyroid.

Discussion

In this study we found : 1. Half of the elderly dialysis patients had got abnormal thyroid function tests. 2. Dialysis patients had got significantly lower fT3 levels and 3. Rate of low fT3 syndrome was significantly higher. However, serum TSH levels were not different in two groups of elderly.

It's known that thyroid hormone abnormalities might be seen in CRD for quite some time. Nevertheless, lower level of free thyroid hormones and its clinical importance had been investigated recently. There are only few studies those revealed association between low thyroid hormone levels and mortality in CRD and dialysis patients [3, 4]. Inflammation and cardiac dysfunction were accused for this association [4-6]. Zoccali et al. investigated the relationship between inflammation parameters and thyroid hormones in CRD. There were consistent and independent inverse associations between C reactive protein and IL-6, an indicator of endothelial activation/dysfunction, and fT3 in these patients [7]. Additionally, in CRD patients who had been applied renal transplantation had low serum T3 levels and it was associated with graft dysfunction [8]. However, to our knowledge only one study suggested that there was no association between low thyroid hormones and mortality in these patients [9].

Carrero et al. investigated 210 CRD patients with mean age of 55 for thyroid functions and their clinical outcomes [10]. Subclinical hypothyroidism (SH) was detected in 17 patients (8 %) and subclinical hyperthyroidism was detected in 6 patients (2,9 %) , while overt hypo-hyperthyroidism were not. In this study, low T3 levels (even in euthyroid patients) were found as an independent risk indicator of all causes of mortality, especially cardiovascular ones. Ozen et al. noted very high rate of low T3 syndrome (71,7%) in 669 HD patients whose mean age was 54 years and duration of dialysis was 38 months. Free T3 levels were inversely correlated with mortality due to its association with inflammation and nutritional status [11].

In CRD patients, type and frequency of thyroid function abnormalities are different in the literature. Kaptein et al. reported a higher ratio of hypothyroidism (9,5 %) contrarily to similar ratio of hyperthyroidism in CRD patients when compared with normal population [12]. The frequency of SH was reported as 10,7% and subclinical hyperthyroidism was reported as 9,6% at CRD patients who were not undergoing dialysis [13]. However, frequency of these abnormalities in elderly CRD patients are not known. Linn et al. reported that hypothyroidism had been observed more frequently in uremic patients (HD and PD patients) than in the control group (5.4% vs 0.7%, $p < 0.05$). However, the prevalence of hyperthyroidism in end stage renal disease patients was 1.4%, which was not significantly different from the control group (0.7%) [14]. In another study, 122 PD patients, mean age of 50, 19 (15,6 %) SH and 5(4,1%) subclinical hyperthyroidism cases were reported [15]. They found a correlation between PD duration and SH and also high erytropoetin need was observed in these patients. Again, Kang et al revealed high rate (27,5 %) of SH in 51 PD patients [16].

A study performed on healthy geriatrics revealed that frequency of overt hypothyroidism was 1,6% and SH frequency was 15%.[17] In the same study overt hyperthyroidism ratio was found only 0,1%

and 1,5 % patients was found to be subclinical hyperthyroid. In our study SH ratio was lower than either healthy geriatrics or adult dialysis patients. Subclinical hyperthyroidism ratio was consistent with the literature about the geriatrics and adult dialysis patients. These results are giving us only a hint about geriatric dialysis patients' ratios. Because the number of the patients in our study is quite few.

The above mentioned studies were performed on the adulthood and middle age people. Except a few studies including small numbers of geriatric patients, there is no study about the thyroid test abnormalities of the geriatric dialysis patients. For this reason, our results from this study are important.

There are some limitations in our study. First, our study population and references group were small. But we think it's an obligative state because dialysis patients' surveys are not long and elderly dialysis patients are relatively small part of all dialysis population because of this reason. Second limitation is that, dialysis patients are not a homogeneus group in our study. We included both PD and HD patients. Third, our study is in a cross sectional design and we could not evaluate clinical outcomes of low fT3 levels in dialysis group.

In conclusion, elderly dialysis patients had higher thyroid function test abnormalities than controls. They had lower fT3 levels than controls in similar way young and middle age chronic dialysis patients. However, what does it mean for clinical process and how its clinical expression is not clearly known, especially in an elderly patients. Large, prospective, randomized and controlled trials are necessary for this topic.

Table. Patients' and controls' thyroid function test abnormalities

	Dialysis (n=46)	Control (n=30)	P
Age	66.76 ± 5.66	68.52 ± 7.60	> 0.05
Male/Female (n)	23/23	18/26	> 0.05
TSH(μIU/mL)	1.97 ± 1.75	1.56 ± 1.14	> 0.05
fT3(pg/mL)	2.48 ± 0.57	3.06 ± 0.90	**0.003**
fT4 (ng/dL)	1.16 ± 1.28	0.90 ± 0.47	> 0.05
TFT Abnormality	22 (47,8%)	12 (40**%)**	**0.05**
Hypothyroidism	1 (2,2%)	0	> 0.05
Hyperthyroidism	0	1(3,3%)	> 0.05
Subclinical. hypothyroidism	2(4,3%)	1(3,3%)	> 0.05
Subclinical hyperthyroidism	5 (10,9%)	1(3,3%)	> 0.05
Low fT3	7 (15,2%)	0	**0.01**
Low fT4	8 (17,3%)	9(30%)	> 0.05

TSH: thyroid stimulating hormone, fT3: free triiodothyronine, ft4: free thyroxine, TFT: thyroid function test

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