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N. Seyrek
S. Paydas
Y. Sagliker

Cukurova University Medical Faculty,
Department of Nephrology,
Adana, Turkey

Effect of Erythropoietin Administration on Thyroid Functions of the Patients Undergoing Regular Hemodialysis

Dear Sir,

Impaired hypothalamic-hypophyseal-gonadal regulation in uremic patients may induce endocrine disturbances [1]. It has been suggested that administration of erythropoietin (Epo) may improve these endocrinological changes as well as correct anemia in patients with chronic renal failure [2]. In the present study, we investigated the influence of Epo administration on the thyroid function tests in patients undergoing regular hemodialysis (HD).

Fifty-nine clinically euthyroid patients, 31 males and 28 females, with an average age of 38.1 ± 14.8 years (range 15–60) on regular HD, were studied. Patients with goiter, known thyroid disease or with severe systemic illness were excluded. The underlying diseases were glomerulonephritis (n = 17), tubulointerstitial nephritis (n = 11), hypertension (n = 23), autosomal dominant polycystic kidney disease (n = 3) and unknown (n = 5). Patients were dialyzed for 4 h 2–3 times/week, receiving subcutaneous Epo 150 IU/kg/week (for 6 months) and oral ferrum preparations. Serum hematocrit (Hct), total protein, albumin, triiodothyronine (T_3), thyroxine (T_4) and thyroid-stimulating hormone (TSH) were taken immediately before HD. Hematocrit, total protein and albumin were measured by autoanalyzer, T_3 and T_4 were analyzed by using radioimmunoassay, and TSH was analyzed by ELISA. Results of the measurements of thyroid function were compared between patients receiving and patients not receiving Epo (controls). Student's t test and Pearson's correlation were used for statistical analysis.

Of the 59 patients, the mean Hct, total protein, albumin, total T_3, total T_4 and TSH were 19.7 ± 4.1%, 7.9 ± 1.1 g/dl, 4.3 ± 0.9 g/dl, 53.1 ± 25.5 ng/dl, 6.1 ± 1.6 µg/dl and 1.8 ± 1.6 mIU/ml, respectively. The results of the patients in respect to receiving Epo are summarized at table 1. Serum T_3, T_4 and TSH were similar in the two groups and there was no statistical difference between the two groups. No significant correlation was demonstrated between Hct and T_3, T_4, TSH in patients wo were receiving Epo. But a correlation was found between albumin and T_3 in this group ($r = 0.3863$, $p < 0.05$).

T_3 and T_4 were below the normal range in 69 and 5% of the study group, respectively. TSH was above the normal range in 6.7% of the study group. Of the patients who were receiving Epo, T_3 was low in 21 (70%), T_4 was low in 1 (3%) and TSH was elevated in 2 (6.6%). On the other hand, T_3 was low in 20 (69%), T_4 was low in 2 (6.8%) and TSH was elevated in 2 (6.8%) of the patients who were not receiving Epo.

Epo therapy-associated well-being of patients on HD has been due not only to the correction of the anemia, but also to an associated correction of endocrine abnormalities. Lundin et al. [3] have reported that an Epo-associated increase of hair thickness

Table 1. Characteristics of the patients

	Epo treated	p value	Controls
Age, yeears	40.8 ± 13.7	>0.05	38.4 ± 15.7
Sex, m/f	14/16	>0.05	15/14
Hct, %	21.7 ± 3.3	<0.05	18.7 ± 4.5
Total protein, g/dl	8.2 ± 0.9	<0.01	7.5 ± 1.2
Albumin, g/dl	4.4 ± 0.6	>0.05	4.1 ± 0.7
T_3, ng/dl	49.7 ± 21.4	>0.05	56.6 ± 30.0
T_4, µg/dl	5.9 ± 1.5	>0.05	7.6 ± 3.2
TSH, mIU/ml	1.8 ± 1.5	>0.05	1.8 ± 1.8

KARGER
E-Mail karger@karger.ch
Fax + 41 61 306 12 34

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Prof. Saime Paydas, Associate Professor
Cukurova University
Faculty of Medicine
Department of Internal Medicine
TR–01330 Adana (Turkey)

and change of quality of fingernails might be an influence of Epo on thyroid function. Although decreased serum levels of T_3 and T_4 have been observed in HD patients, no difference has been found in respect to receiving Epo administration or not in HD patients in our study [1]. So, Epo did not seem to improve these abnormalities despite a partial correction of the anemia.

In our study, we found that T_3 and T_4 were below the normal range in 69 and 5% of the patients on regular HD, respectively. The decrease in serum level of T_3 was more significant. Extrathyroidal reduction in conversion of T_4 to T_3 in uremia may explain this situation. The serum levels of TSH were within normal limits except in 3 patients in our study group. There was only a correlation between albumin and T_3 in patients who were receiving Epo.

In conclusion, our data confirm that hemodialyzed patients often have asymptomatic thyroid disturbances. We also suggest that Epo does not improve these abnormalities, despite it correcting anemia in patients undergoing regular HD. Finally, the influences of uremia and HD on thyroid hormones have to be studied regularly and if it is required, thyroid hormone preparations have to be given.

References

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