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THYROID FUNCTION OF CHILDREN ON CARBAMAZEPINE, PRIMIDONE, PHENOBARBITAL, AND VALPROIC ACID

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ABSTRACT

There is a decrease in free thyroxin (FT4) and T4 concentrations with Carbamazepine (CBZ) therapy, although TSH levels remained unchanged [1]. Multiple studies with the aim of evaluating serum thyroid hormone regulation in children undergoing long-term Carbamazepine therapy were proposed as a result of this research [2]. CBZ can trigger subclinical hypothyroidism. Both Phenytoin (PHT) patients experience a significant decrease in thyroid hormone serum levels [3,4]. There are only a few studies on the correlation between barbiturates and thyroid hormone levels. A total of 55 children with epilepsy were randomly assigned to one of four groups: phenobarbital, PRM, CBZ, or VPA, depending on whether they had generalized or partial epilepsy. Phenobarbital was given to twenty-nine cases (75.9% male and 24.1 percent female, mean age: 38 28.75 months). There was no substantial difference in serum T3, T4, T3RU, and TSH levels in Phenobarbital patients before and 3 months after prescribing (P>0.05). Their ages were slightly lower than those of the CBZ and VPA classes. Primidone was given to twenty-eight patients (64.3 percent male and 35.7 percent female, mean age 35.37 31.85 months). They were slightly younger than the CBZ and VPA classes (p0.05), but there were no substantial variations in serum T3, T4, T3Ru, and TSH levels before and after therapy (p>0.05).

Key words: Pediatric Patients, Thyroid Function, Primidone, Phenobarbital.

INTRODUCTION

There is a decrease in free thyroxin (FT4) and T4 concentrations with Carbamazepine (CBZ) therapy, although TSH levels remained unchanged [1, 2]. Multiple studies with the aim of evaluating serum thyroid hormone regulation in children undergoing long-term Carbamazepine therapy were proposed as a result of this research [3, 4]. CBZ can trigger subclinical hypothyroidism. Both Phenytoin (PHT) patients experience a significant decrease in thyroid hormone serum levels [5, 6]. There are only a few studies on the correlation between barbiturates and thyroid hormone levels [7,8]. The fact that TSH does not increase in hyperthyroid patients with Graves' disease on phenobarbital (PB) therapy suggests an overall impact of therapeutic doses of PB on thyroid hormone metabolism is comparatively gentle [9, 10].

Many studies have documented altered thyroid function (especially low FT4) in epilepsy patients treated with Valproic Acid (VPA), but the findings have been mixed: normal or elevated thyroid hormone and TSH serum levels have been reported [11].

The variations in serum levels of Free T4, T3, T3 resin uptake (T3RU), and TSH in epileptic children treated with carbamazepine, Primidone, phenobarbital, and valproate before and 3 months after prescription were examined in this research [12, 13, 14].

Aims & Objectives:

In this study we analyze the Thyroid function of epileptic children on treating with Carbamazapine, Primidone, Phenobarbital, and Valproic acid.

Methodology:

A total of 55 children with epilepsy were randomly assigned to one of four groups: phenobarbital, PRM, CBZ, or VPA, depending on whether they had generalized or partial epilepsy.

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They were 21 girls and 34 boys, ranging in age from 2 months to 15 years, with an average age of 61.06 44.97 months. Abnormal neurologic testing, malformed cerebral computed tomography (CT) and/or magnetic resonance imaging (MRI), liver or kidney failure, thyroid disease or endocrinopathies, use of contraindicated remedies, and hereditary or chromosomal anomalies were also considered exclusion requirements. Patients with spontaneous epilepsy, people on a multi-drug therapy regimen, and/or those with serious disorders that affect thyroid function were therefore removed. An endocrinologist examined the effects of the computations to assess thyroid activity.

The mean and standard deviation of data with a normal distribution were reported, while the median and range of data with a non-normal distribution were reported. We used analysis of variance for statistical analysis of variables with a normal distribution, with the Student t test for corresponding pairwise comparisons. The Mann-Whitney U measure, as well as Pearson and Spearman correlation coefficients, is used for statistical study of variables with non-normal distributions.

Thyroid function in epileptic children receiving Carbamazepine and Primidone have also been connected. SPSS programme version 14 was used to evaluate the data. The chi-Score scale was used to estimate thyroid dysfunction. P0.05 and a 95% confidence interval is deemed meaningful.

VPA was provided to 14 children, CBZ to 14 children, Phenobarbital to 14 children, and PRM to 13 children. The form of epilepsy was listed according to the International League Against Epilepsy's proposals. A pediatric neurologist used the AEDs based on the patients' age and type of epilepsy; CBZ was preferred for partial seizures with or without generalization, VPA was preferred for patients with primary generalized seizures (including absence and myoclonic seizures), and phenobarbital and PRM were preferred for children with generalized or paroxysmal seizures. CBZ and VPA doses prescribed were below therapeutic limits:20-30 mg per kilogram per day (200-600 mg per day). Phenobarbital and PRM doses recommended were within the therapeutic range: 3-5 mg/kg/day and 20 mg/kg/day, respectively. There were no other drugs recommended that were considered to interfere with thyroid function.

Results & Discussion:

Phenobarbital was given to twenty-nine cases (75.9% male and 24.1 percent female, mean age: 38 28.75 months). There was no substantial difference in serum T3, T4, T3RU, and TSH levels in Phenobarbital patients before and 3 months after prescribing (P>0.05). Their ages were slightly lower than those of the CBZ and VPA classes. Primidone was given to twenty-eight patients (64.3 percent male and 35.7 percent female, mean age 35.37 31.85 months). They were slightly younger than the CBZ and VPA classes (p0.05), but there were no substantial variations in serum T3, T4, T3Ru, and TSH levels before and after therapy (p>0.05).

Table 1: Patients mean age in different groups

Medication	Phenobarbital	Primidone	Valproate	Carbamazepine
Number	16	14	15	18
Mean Age (Months)	18 ± 11.55	15.37 ± 11.85	56.75± 31.07	57.27±35.28

Table 2: Thyroid hormone levels prior to AED therapy

Medication	Phenobarbital	Primidone	Valproate	Carbamazepine
TSH	1.71±1.42	1.78 ± 0.29	1.26 ± 1.09	1.48 ± 1.15
T3	1.47±0.30	1.79±0.21	1.64± 0.28	1. 53± 0.16
T4	6.14±1.91	7.02 ± 1.54	7.15± 1.17	6.57 ± 1.71
T3RU	15.01±1.83	15.01± 1.13	29.22±1.34	31.8±1.26

Serum T3, T4, and FT4 levels decreased dramatically after 8-24 months of carbamazepine treatment relative to the placebo group in 42 cases. They also followed up with 12 patients for 1 to 5 months and discovered that although serum T3 and TSH concentrations remained stable, serum T4 concentrations dramatically decreased in contrast to pre-treatment levels. TSH levels rose in the first 4-20 days of therapy and then rapidly decreased to normal levels.

When looking at 13 patients with an average age of 7.5 years that were given carbamazepine for 14.82 months and observed no substantial differences in serum FT3 and TSH levels, but significant low serum FT4 levels as compared to the control group. They also observed little distinction in thyroid hormone levels between patients who received valproate and those who did not. We observed no major differences in thyroid hormones in 115 cases with an average age of 62.0644.97 months who obtained AED for three months, but small changes in some variants.

Conclusion:

The use of these AEDs by children for a brief amount of time does not tend to raise the likelihood of thyroid dysfunction. We recommend that the researchers

perform this analysis again with more patients and a longer follow-up time.

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