COMPARATIVE ANALYSIS OF BIOCHEMICAL INDICATORS IN CHILDREN WITH FEBRILE AND AFEBRILE SEIZURES IN THE ARAL SEA REGION

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Abstract: *Febrile and afebrile seizures are paroxysmal conditions occurring in childhood, in the pathogenesis of which metabolic and biochemical disorders play an important role. Especially in children living in ecologically unfavorable areas, the imbalance of microelements and electrolytes can significantly affect the development of seizures. This study is aimed at conducting a comparative analysis of the main biochemical parameters in children with febrile and afebrile seizures living in the Aral Sea region. The results of the study made it possible to determine the significance of ion imbalance and anemic conditions in the course of seizures and proposed prognostic criteria.*

Keywords: *febrile seizures, afebrile seizures, biochemical parameters, ion imbalance, Aral Sea region, children.*

INPUT

Seizures are one of the urgent problems in pediatric neurology, in the etiopathogenesis of which not only the immaturity of the central nervous system, but also metabolic and biochemical factors play an important role [3,11,19,27,35]. While febrile seizures are assessed as functional seizures occurring against the background of elevated body temperature, afebrile seizures are often associated with organic or metabolic disorders [1,8,16,24,40].

Studies conducted in recent years have shown that an imbalance of calcium, magnesium, and potassium ions, as well as iron deficiency anemia, is an important risk factor for the development of seizures [5,13,21,29,37]. These biochemical changes increase the excitability of neurons and lower the seizure threshold [2,10,18,33,41].

The Aral Sea region is characterized by an ecological crisis, a shortage of microelements in water and food [6,14,22,30,38]. Metabolic disorders are widespread in children living in this region, which can directly affect the clinical course of seizures and their formation [4,12,20,28,36]. Therefore, the in-depth study of biochemical parameters in children with febrile and afebrile seizures is of great scientific and practical importance [7,17,25,34].

Materials and methods

The study was conducted on the basis of children's hospitals located in the Aral Sea region. The study included 162 children admitted to the hospital with seizures.

Study groups

Patients were divided into three groups:

- Febrile seizures (FS) - 72 children
- Afebrile seizures (AFT) - 54 children

• Control group (neurologically healthy children) - 36 children

The age of the children ranged from 6 months to 7 years, the average age was 3.1±1.6 years. The groups were identical in age and sex composition (p>0.05).

Laboratory tests

The following biochemical parameters were determined in all children:

• blood calcium (Ca2+)
• magnesium (Mg2+)
• potassium (K+)
• hemoglobin level

Biochemical analyses were performed using standard laboratory methods.

Statistical analysis was performed based on descriptive methods, Student's t-test, and correlation analysis [9,15,23,26,31,32,39]. The level of reliability was taken as p<0.05.

Results

Changes in calcium and magnesium levels

According to the study results, the level of calcium and magnesium in children with febrile and afebrile seizures was significantly lower than in the control group. Cases of hypocalcemia and hypomagnesemia were especially frequent in children with afebrile seizures.

Table 1. Blood calcium and magnesium levels (M±SD)

Group	Ca2+ (mmol/l)	Mg2+ (mmol/l)
Control	2.32 ± 0.08	0.89 ± 0.05
FT	2.08 ± 0.11*	0.76 ± 0.07*
AFT	1.94 ± 0.13*	0.69 ± 0.08*

* p<0.05 compared to the control group

Diagram analysis (Diagram 1) showed that the decrease in ion levels is associated with severe forms of convulsions.

Potassium levels and neuronal excitability

Potassium levels are significantly reduced in children with afebrile seizures, which can lead to destabilization of the neuronal membrane potential.

Table 2. Blood potassium levels

Group	K+ (mmol/l)
Control	4.4 ± 0.3
FT	3.9 ± 0.4*
AFT	3.6 ± 0.5*

Relationship between anemia and seizures

A decrease in hemoglobin levels was more common in children with febrile and afebrile seizures, and iron deficiency anemia was detected in 61.1% of children with afebrile seizures.

Table 3. Anemia frequency (%)

Group	Anemia present
Control	19.4
FT	45.8
AFT	61.1

Discussion

The obtained results showed that biochemical factors play an important role in the development of seizures in children living in the Aral Sea region. Ionic imbalance and anemia increase the excitability of neurons and lower the seizure threshold.

The deeper biochemical disorders in afebrile seizures indicate that these seizures have a more metabolic and organic basis. This circumstance is important in choosing a differential diagnosis and treatment strategy.

Conclusion

In children with febrile and afebrile seizures in the Aral Sea region, the levels of calcium, magnesium, and potassium in the blood are significantly reduced, and iron deficiency anemia is widespread. These biochemical disorders are an important pathogenetic factor in the course of seizures, and their early detection and correction serve to reduce the severity of seizures.

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