

## CLINICAL SIGNIFICANCE OF ELECTROENCEPHALOGRAPHIC AND MAGNETIC RESONANCE TOMOGRAPHY CHANGES IN CHILDREN WITH FEBRILE SEIZURES

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**Abstract:** *Febrile seizures are one of the most common seizures in children and are considered to have a benign course in most cases. However, in some children, after febrile seizures, functional and structural changes in the central nervous system can develop. This study is aimed at assessing the clinical significance of changes detected by electroencephalography (EEG) and magnetic resonance imaging (MRI) in children with febrile seizures in the Aral Sea region. The study results showed that EEG and MRI changes are more common in complex febrile seizures and are associated with the risk of developing epileptic syndromes in the future.*

**Keywords:** *febrile seizures, EEG, MRI, pediatric neurology, epileptic risk, Aral Sea region.*

### INPUT

Febrile seizures have long been considered a functional and transient condition [2,14,23,31,39]. For this reason, many clinical protocols do not recommend in-depth instrumental examinations after febrile seizures [5,11,20,28,36]. However, scientific research conducted in recent years shows that in some children, against the background of febrile seizures, bioelectrical disorders of brain activity and structural changes occur [1,9,17,34,41].

Electroencephalography is an important method for assessing the bioelectrical activity of the brain, allowing for the determination of seizure readiness and epileptiform activity [6,15,26,33,38]. Magnetic resonance imaging is a leading diagnostic method for assessing the structural state of brain tissue and identifying organic changes [4,12,21,29,40].

The Aral Sea region is environmentally unfavorable, and children living in this region are more prone to perinatal lesions, micronutrient deficiencies, and metabolic disorders [7,18,25,32,35]. These factors can lead to a more severe course of febrile seizures and an increased risk of central nervous system damage [3,10,19,27]. Therefore, a comprehensive analysis of EEG and MRI changes is of scientific and practical importance [8,13,16,22,24,30,37].

### Materials and methods

The study was conducted in children's medical institutions located in the Aral Sea region. The study included 136 children with febrile seizures.

### Study groups

Children were divided into two groups according to clinical characteristics:

- Simple febrile seizures (OFT) - 82 children

- Complex febrile seizures (MFT) - 54 children

The age of the children ranged from 6 months to 6 years, and the average age was  $2.9 \pm 1.5$  years.

#### Test methods

All children underwent the following instrumental examinations:

- standard EEG (awake and asleep)
- brain MRI

EEG results were assessed by the presence of normal, diffuse changes, and epileptiform activity. Structural changes, periventricular zones, the temporal region, and the state of the hippocampus were analyzed on MRI.

Statistical analysis was carried out on the basis of percentage comparison and the  $\chi^2$  test. Reliability level  $p < 0.05$ .

#### Results

##### EEG analysis

As a result of EEG studies, in 68.3% of children in the group with simple febrile seizures, bioelectrical activity was normal. In the group of children with complex febrile seizures, normal EEG was recorded in only 29.6% of cases.

Table 1. Distribution of EEG results by groups (%)

| EEG indicator         | OFT  | MFT  |
|-----------------------|------|------|
| Normal EEG            | 68.3 | 29.6 |
| Diffuse changes       | 23.2 | 37.0 |
| Epileptiform activity | 8.5  | 33.4 |

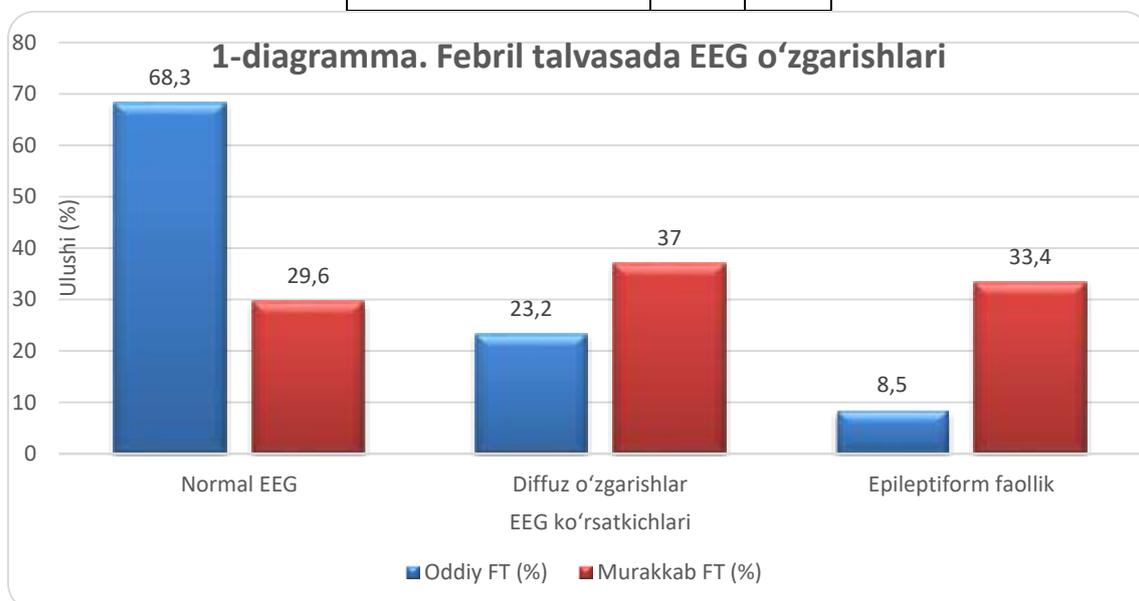


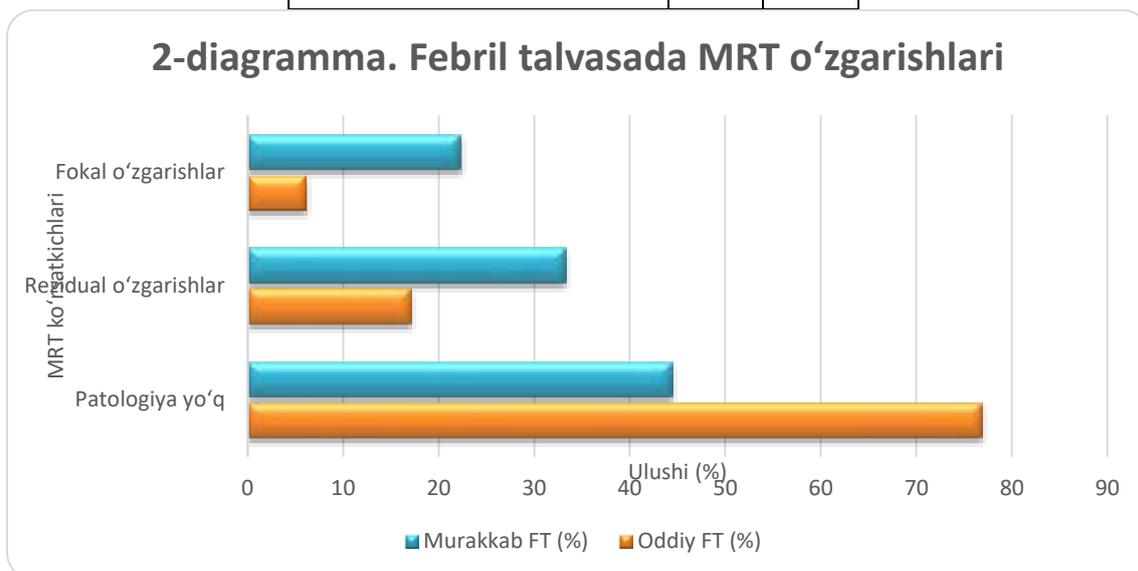
Diagram analysis (Diagram 1) showed a sharp increase in epileptiform activity in complex febrile seizures.

#### MRI results

As a result of MRI studies, no pathological changes were detected in the majority of children in the group with simple febrile seizures. Structural changes were significantly more common in children with complex febrile seizures.

Table 2. Changes detected on MRI (%)

| MRI changes                | OFT  | MFT  |
|----------------------------|------|------|
| No pathology               | 76.8 | 44.4 |
| Perinatal residual changes | 17.1 | 33.3 |
| Focal changes              | 6.1  | 22.3 |



#### Clinical relationship of EEG and MRI changes

Structural changes were also noted on MRI in 71.4% of children with epileptiform activity on the EEG. This circumstance indicates the presence of a close relationship between functional and structural brain lesions.

The combination of EEG and MRI changes in children with complex febrile seizures was 3.2 times higher than in the normal group.

#### Discussion

The obtained results showed that EEG and MRI studies in children with febrile seizures have important diagnostic and prognostic significance. Especially in complex febrile seizures, the high frequency of epileptiform activity and structural changes means a high risk of developing epilepsy later.

Due to the strong influence of perinatal and environmental factors on children living in the Aral Sea region, it is advisable to conduct in-depth instrumental examinations after febrile seizures.

#### Conclusion

In children with febrile seizures, especially in complex forms, functional and structural changes detected by EEG and MRI are widespread. The detection of epileptiform activity on EEG and structural lesions on MRI indicates an increased risk of developing epilepsy in the future.

Therefore, children with complex febrile seizures are recommended to undergo in-depth instrumental examination and long-term neurological observation.

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