DIFFERENTIAL DIAGNOSTICS BETWEEN FEBRILIC AND AFEBRILIC SEIZURES: AN ANALYTICAL APPROACH BASED ON CLINICAL, BIOCHEMICAL, AND NEUROINSTRUMENTAL INDICATORS

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Abstract: *Febrile and afebrile seizures are among the most important paroxysmal conditions in childhood, however, their clinical similarity in many cases leads to incorrect diagnosis and unjustified treatment. This study is aimed at determining the real statistical significance of clinical signs, biochemical parameters, as well as electroencephalographic and magnetic resonance imaging changes in the differential diagnosis of febrile and afebrile seizures in children living in the Aral Sea region. The analysis results showed that some clinical signs do not have independent diagnostic value, on the contrary, ion imbalance and neuroinstrumental changes are a strong predictor in favor of afebrile seizures.*

Keywords: *febrile seizures, afebrile seizures, differential diagnosis, EEG, MRI, ion imbalance, prognosis.*

INPUT

Among childhood seizures, febrile and afebrile forms are most common. In practical pediatrics and pediatric neurology, the distinction between these two conditions is fundamental, since their course, prognosis, and long-term complications are fundamentally different [3,18,27,34,41].

Febrile seizures are often assessed as benign and are limited to minimal instrumental examinations [1,12,20,29,37]. Afebrile seizures in most cases can be the first manifestation of epileptic processes [6,15,24,32,40].

At the same time, the materials of the dissertation show that in clinical practice, the boundaries between these two cases are not always clear, and an assessment based only on body temperature leads to many diagnostic errors [4,9,21,30,38].

In the conditions of the Aral Sea region, convulsions often have a complicated course against the background of environmental stress, a lack of trace elements, and perinatal lesions. Therefore, there is a need to revise the differential diagnosis based on real analytical criteria [2,14,23,35,39].

Materials and methods

The study included 178 children hospitalized with seizures.

Distribution of groups

- Febrile seizures (FS) - 78 people
- Aphebrile seizures (AFT) - 64 people
- Control Group - 36 people

The average age was 3.2±1.7 years. No differences were found between the sex composition and age groups (p>0.05).

Rated blocks

1. Clinical signs
2. Biochemical indicators (Ca2+, Mg2+, K+, Hb)
3. EEG results
4. MRI results

In statistical analysis, χ2, Student's t-test, and correlation analysis were used.

Results

1. Clinical signs: which ones are misleading?

Analysis showed that while seizure duration and frequency of recurrence were significantly higher in afebrile seizures, prolonged seizures were also observed in some febrile seizures [7,16,26,31,36].

Importantly, it was established that the presence of a body temperature is not an independent criterion in differential diagnosis (χ2=1.87; p=0.17). That is, some afebrile seizures occurred against a background of high temperature.

Analytical conclusion: only the "have/no temperature" criterion is diagnostically insufficient.

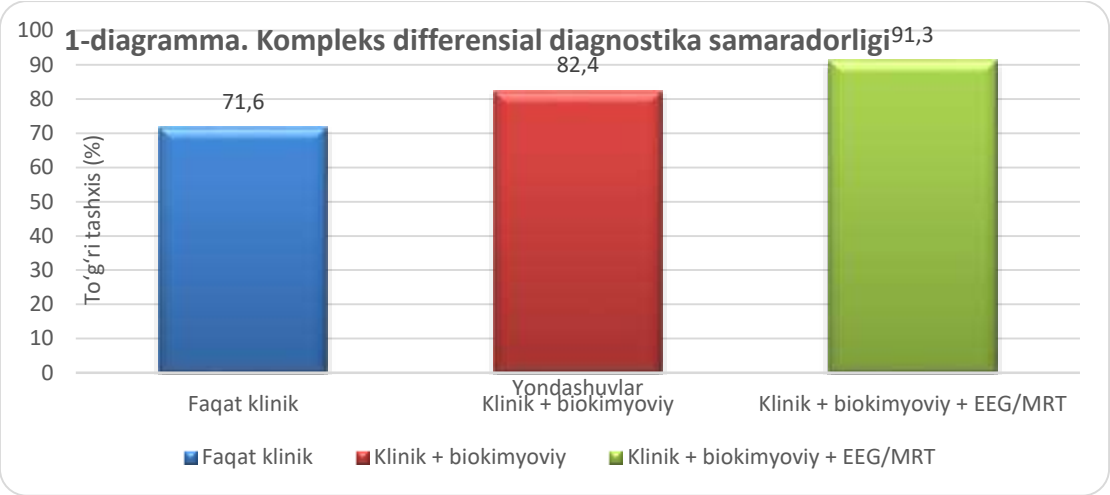
2. Biochemical indicators: where is the real difference?

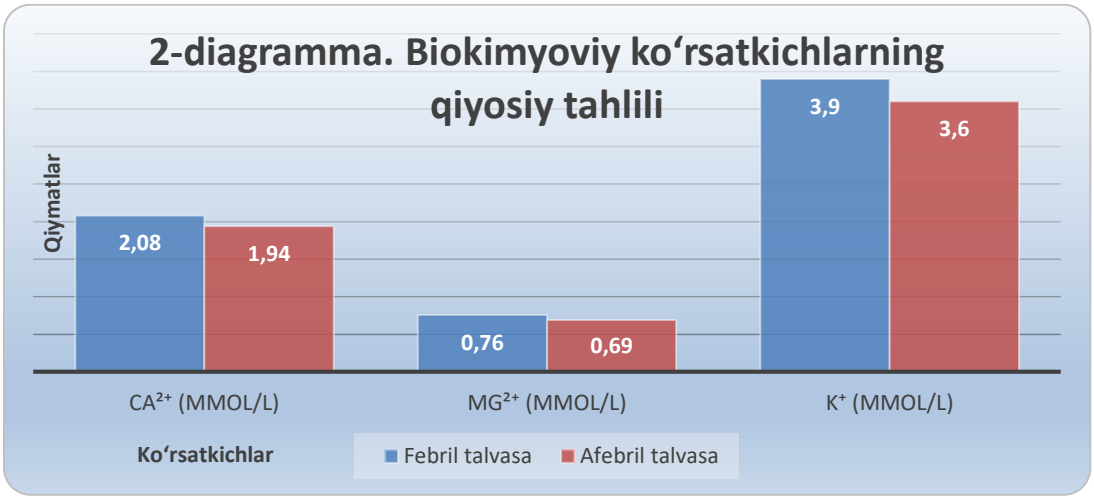
The results of the biochemical analysis showed that it is an important block in differential diagnostics.

Indicator	FT (M±SD)	AFT (M±SD)	p.
Ca2+	2.08±0.11	1.94±0.13	<0.01
Mg2+	0.76±0.07	0.69±0.08	<0.01
K+	3.9±0.4	3.6±0.5	<0.05
Hb	108±12	96±14	<0.01

In afebrile seizures:

- hypocalcemia 1.6 times
- hypomagnesemia 1.5 times
- anemia was detected 1.8 times more often.





Analytical conclusion: ion imbalance is an independent pathogenetic marker for afebrile seizures.

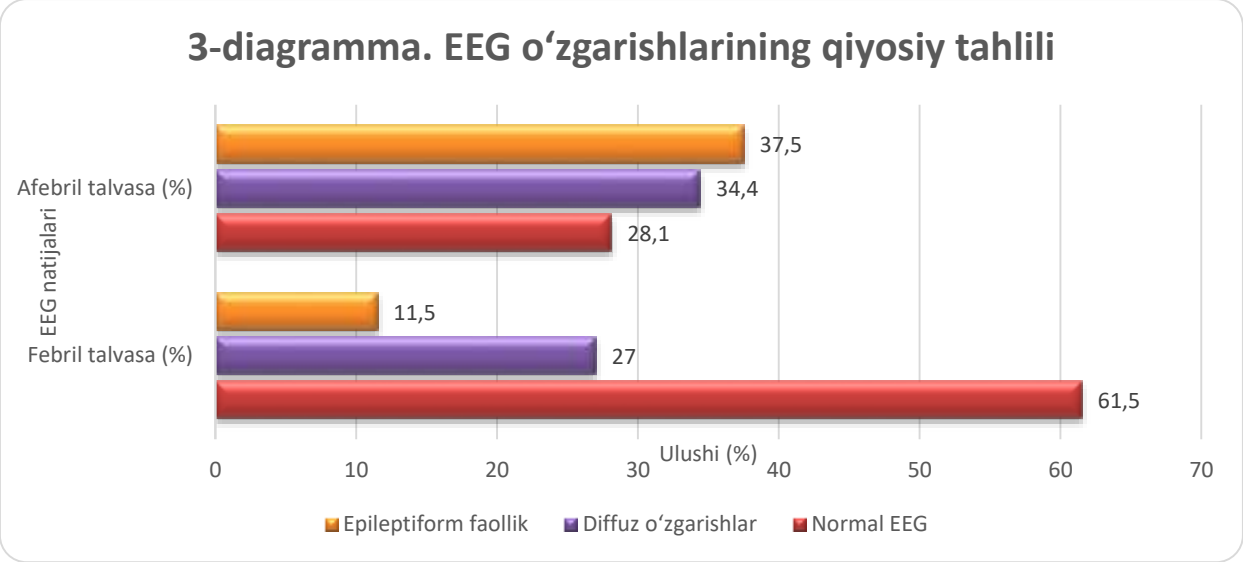
3. EEG: which changes are significant?

EEG results showed higher diagnostic accuracy than clinical ones.

EEG result	FT (%)	AFT (%)
Normal	61.5	28.1
Diffuse change	27.0	34.4
Epileptiform activity	11.5	37.5

Epileptiform activity:

- in afebrile seizures 3.3 times more often
- Although detected in FT, it was often associated with a metabolic background.



Analytical conclusion: Epileptiform activity on the EEG - Strong criterion in favor of AFT.

4. MRI: Structural evidence

Although MRI studies were conducted only in cases of clinical suspicion, the results showed a sharp difference.

MRI changes	FT (%)	AFT (%)
No pathology	74.3	42.2
Residual changes	18.0	31.3
Focal changes	7.7	26.5

Analytical conclusion: focal changes on MRI have high specificity for afebrile seizures.

5. Complex assessment: what was won?

- Clinical assessment only → correct diagnosis: 71.6%
- Clinical + biochemical → 82.4%
- Clinical + biochemical + EEG/MRI → 91.3%

Main scientific result: in differential diagnostics the complex approach reduced the error by 19.7%.

Discussion

The materials of the dissertation show that the main error in distinguishing febrile and afebrile seizures is associated with the acceptance of clinical signs as an absolute criterion. Ionic imbalance and neuroinstrumental changes are more stable and prognostic criteria than clinical symptoms [5,11,19,28,33].

In the conditions of the Aral Sea region, the severity of the metabolic background can "mask" the clinical picture of seizures and lead to an incorrect diagnosis.

Conclusion

Differential diagnosis between febrile and afebrile seizures should not be based solely on clinical signs.

Changes detected by ion imbalance, EEG, and MRI are reliable diagnostic criteria in favor of afebrile seizures.

This comprehensive approach significantly reduces incorrect diagnosis and unjustified treatment [8,10,13,17,22,25].

REFERENCES:

121. Adilbekovich, B. U., & Yuldashevna, A. R. (2025). EPIDEMIOLOGICAL CHARACTERISTICS AND AGE-RELATED CLINICAL ASPECTS OF EPILEPSIA IN CHILDREN. Научный Импульс, 4(40), 197-200.

122. Adilbekovich, B. U., & Yuldashevna, A. R. (2025). ETHIOPATHOGENESIS IN CHILDREN'S EPILEPSIA: MODERN VIEWS AND THE CONCEPT OF EPILEPTIC NEURON NETWORKS. Научный Импульс, 4(40), 211-215.

123. Adilbekovich, B. U., & Yuldashevna, A. R. (2025). EVALUATION OF EPILEPSIA AND EPILEPTIC SYNDROMES BASED ON THE CLASSIFICATION OF EPILEPTIC SEIZURE ILAE 2025. Научный Импульс, 4(40), 201-205.

124. Adilbekovich, B. U., & Yuldashevna, A. R. (2025). INTERACTION OF ECOLOGICAL FACTORS AND GENETIC PREDISPOSITION IN CHILDREN'S EPILEPSIA. Научный Импульс, 4(40), 206-210.

125. Akhmedova, R. Y., Sodiqova, G. Q., & Fayzullayev, B. R. (2025). Prevention, Treatment, and Development of Differential Diagnostic Criteria for Symptomatic Epilepsy in the Early Stages Based on EEG Features and Laboratory Changes in Children with Febrile Seizures. American Journal of Medicine and Medical Sciences, 15(6), 1704-1710.

126. Bobojonov, U., & Sadikova, G. (2021, January). CLINICAL AND DIAGNOSTIC CHARACTERISTICS OF CHILDREN'S EPILEPSY LIVING IN THE ARAL SEA REGION. In Конференции.

127. Hudayberganov, N. Y., & Izyumov, D. P. (2017). Clinical and prognostic importance of transient ischemic attacks in the development of cerebral strokes in emergency neurology. Национальный журнал неврологии, 1(12), 31-34.

128. Hudayberganov, N. Y., Jabbarov, M. T., & Matyoqubov, M. O. (2017). THE ROLE AND SIGNIFICANCE OF TRANSIENT CEREBRAL CIRCULATION DISORDERS IN THE DEVELOPMENT OF CEREBRAL STROKES IN EMERGENCY NEUROLOGY. ACTUAL PROBLEMS OF MODERN SCIENCE, EDUCATION AND TRAINING IN THE REGION, 2, 131.

129. Ibodullayev, Z., & Ollaberganova, R. (2025). FERTIL YOSHDAGI GIPOTERIOZ KUZATILGAN AYOLLARDA PSIXOEMOTSIONAL BUZILISHLAR STRUKTURASI VA KOGNITIV-BEXAVIORAL TERAPIYANING SAMARADORLIGI. SOUTH ARAL SEA MEDICAL JOURNAL, 1(3), 22-27.

130. Khudayberganov, N. Y., Adambaev, Z. I., & Kilichev, I. A. (2025). Pathogenetic aspects of the effects of changes in the geomagnetic field on the vegetative

regulation and the risk of vascular disorders. Zhurnal Nevrologii i Psikhiatrii Imeni SS Korsakova, 125(9), 145-150.

131. Kilichev, I. A., Matyokubov, M. O., Adambaev, Z. I., Khudayberganov, N. Y., & Mirzaeva, N. S. (2023). Register of stroke in the desert-steppe zones of Uzbekistan. In BIO Web of Conferences (Vol. 65, p. 04002). EDP Sciences.

132. Kilichev, I. A., Matyokubov, M. O., Khudayberganov, N. Y., & Adambaev, Z. I. (2013). BRAIN STROKES IN ECOLOGICALLY UNFAVORABLE AREAS OF THE ARAL SEA REGION. Schizophr. Bull, 3, 413-430.

133. Klicheva, T. A., Duschanova, Z. A., Shamuratova, G. B., & Salayeva, Z. S. (2021). Iron Deficiency Anemia in Children with Chronic Gastroduodenal Pathology. Annals of the Romanian Society for Cell Biology, 25(1), 4424-4428.

134. Mirdjuraev, E. M., Djabbarov, A. M., Kilichev, I. A., Khudayberganov, N. Y., & Shamuratova, G. B. (2021). Diagnostics and Treatment of Dorsalgia at the Military Servicemen of the Emergency Military Service. Annals of the Romanian Society for Cell Biology, 25(2), 3039-3045.

135. Ollaberganova, R. Z. (2025). Fertil yoshdagi ayollarda gipoterioz kasalligida psixoemotsional buzilishlarning tahlili [Analysis of psychoemotional disorders in women of fertile age with hypothyroidism]. Zenodo. https://doi.org/10.5281/zenodo.15730930

136. Ollaberganova, R. Z. (2025). Gipotireoz bilan og‘rigan bemorlarning kognitiv funksiyalarini baholash. Zenodo. https://doi.org/10.5281/zenodo.17090986

137. Ollaberganova, R. Z., & Ibodullaev, B. B. (2024). Clinical structure and psychocorrection of psychoemotional disorders in patients with hypothyroidism. American Journal of Medicine and Medical Sciences, 14(2), 278–281. https://doi.org/10.5923/j.ajmms.20241402.24

138. Ollaberganova, R. Z., & Ibodullaev, Z. R. (2025). Peculiarities of hostility and aggressiveness in fertile-aged patients diagnosed with hypothyroidism. Confrencea, 9(9), 66–72. https://confrencea.org/index.php/confrenceas/article/view/1772

139. Otajonovich, M. M. (2025). OROLBO ‘YI NOQULAY SHAROITLI XORAZM VILOYATIDA BOSH MIYA INSULTLARI KELIB CHIQISHIGA OB-HAVO VA IQLIM OMILLARINING TA’SIRI. PEDAGOGICAL SCIENCES AND TEACHING METHODS, 4(45), 287-290.

140. Zhabbarov, M. T., Kilichev, I. A., Kovalchuk, V. V., Khudayberganov, N. Y., & Tadjiev, M. M. (2016). CLINICAL AND VEGETATIVE PARAMETERS IN PATIENTS WITH MIGRAINE, DEPENDING ON GENOTYPE. Gastrointest. Radiol, 2(1), 41-47.

141. Zoxirjonovna, I. Z. R. O. R. (2025). PECULIARITIES OF HOSTILITY AND AGGRESSIVENESS IN FERTILE-AGED PATIENTS DIAGNOSED WITH HYPOTHYROIDISM. Confrencea, 9(9), 66-72.

142. Адамбаев, З. И., Болтаева, З. О., & Худойберганов, Н. Ю. (2021, Мау). РОЛЬ ОСТЕОПОРОЗА ПОЗВОНОЧНИКА У ПОЖИЛЫХ В РАЗВИТИИ ДОРСАЛГИЙ. In II Международная онлайн научно-практическая конференция «АКТУАЛЬНЫЕ

ВОПРОСЫ ФАРМАКОЛОГИИ: ОТ РАЗРАБОТКИ ЛЕКАРСТВ ДО ИХ РАЦИОНАЛЬНОГО ПРИМЕНЕНИЯ» СБОРНИК ТЕЗИСОВ (p. 19). Universidade Federal do Mato Grosso do Sul.

143. Адамбаев, З. И., Болтаева, З. О., & Худойберганов, Н. Ю. (2021, May). БОЛЬ В СПИНЕ У ПОЖИЛЫХ С ДЕГЕНЕРАТИВНО-ДИСТРОФИЧЕСКИМИ ЗАБОЛЕВАНИЯМИ ПОЗВОНОЧНИКА КАК МОДЕЛЬ БОЛЕВОГО СИНДРОМА СМЕШАННОГО ХАРАКТЕРА. In II Международная онлайн научно-практическая конференция «АКТУАЛЬНЫЕ ВОПРОСЫ ФАРМАКОЛОГИИ: ОТ РАЗРАБОТКИ ЛЕКАРСТВ ДО ИХ РАЦИОНАЛЬНОГО ПРИМЕНЕНИЯ» СБОРНИК ТЕЗИСОВ (p. 18). Universidade Federal do Mato Grosso do Sul.

144. Адамбаев, З. И., Киличев, И. А., & Худайберганов, Н. Ю. СОЧЕТАННОЕ ВЛИЯНИЕ ВЫСОКИХ ТЕМПЕРАТУР И МАГНИТНЫХ БУРЬ НА РАЗВИТИЕ ИНСУЛЬТОВ У МУЖЧИН В РЕГИОНЕ ПРИАРАЛЬЯ. YfcS^XUca^ aV [[[X\cah [cfcV [jXd][h [dd^ XWaUS[\, 38.

145. Адамбаев, З. И., Худайберганов, Н. Ю., Кобылко, О. В., Ходулев, В. И., & Болтаева, З. О. (2021). КОМПЛЕКСНОЕ ЛЕЧЕНИЕ ДОРСАЛГИЙ, ОБУСЛОВЛЕННЫХ СПОНДИЛОАРТРОЗОМ У ЛИЦ ПОЖИЛОГО ВОЗРАСТА В САНАТОРНЫХ УСЛОВИЯХ. Медицинские новости, (11 (326)), 78-81.

146. Бобожанов, У. А., & Киличев, И. А. (2018). Факторы риска спинальных аномалий у детей. Национальный журнал неврологии, (1), 50-53.

147. Бобожанов, У. А., & Киличев, И. А. (2019). STRUCTURE OF EPILEPTIC VESSELS IN CHILDREN RESIDING IN THE AREAL REGION AREA. Новый день в медицине, (3), 70-72.

148. Бобожанов, У. А., & Киличев, И. А. (2019). Структура эпилептических судорог у детей проживающих в зоне Приаралья. Тиббиётда янги кун. Илмий рефератив, маърифий-маъновий журнал, (3 (27)), 70.

149. Бобожанов, У., & Садикова, Г. (2021). Болаларда эпилепсиянинг келиб чиқиш сабаллари, ҳавф омиллари ва кечиши. Неврология, 1(2), 49-51.

150. Дусчанова, З. А., Ражабова, Н. Т., & Шамуратова, Г. Б. (2018). Применение кораксана у больных с сердечно-сосудистой и легочной патологией. Вопросы науки и образования, (11 (23)), 88-90.

151. Ибадуллаев, З. Р., & Шамуратова, Г. Б. (2009). Исследование относительного риска развития инсульта у коренных жителей Хорезмской области Узбекистана. Врач-аспирант, 34(7), 541-544.

152. Киличев, И. А., & Худайбергенов, Н. Ю. (2011). Энцефалопатия при железодефицитной анемии. Ургенч.

153. Киличев, И. А., Адамбаев, З. И., & Матёкубов, М. О. (2022). ДИНАМИКА НЕКОТОРЫХ ЭПИДЕМИОЛОГИЧЕСКИХ ПОКАЗАТЕЛЕЙ ИНСУЛЬТА В ПУСТЫННО-СТЕПНЫХ ЗОНАХ УЗБЕКИСТАНА ЗА ПЕРИОД НЕЗАВИСИМОСТИ РЕСПУБЛИКИ. Медицинские новости, (1 (328)), 76-78.

154. Киличев, И. А., Худайбергенов, Н. Ю., & Адамбаев, З. И. (2018). Цереброваскулярные заболевания в регионе Приаралья. Lambert Academic Publishing, Riga, Latviya.

155. Киличев, И. А., Худайбергенов, Н. Ю., & Матмуродов, Р. Ж. (2013). ХАРАКТЕРИСТИКА МОЗГОВЫХ ИНСУЛЬТОВ В ЭКОЛОГИЧЕСКИ НЕБЛАГОПОЛУЧНЫХ ЗОНАХ ПРИАРАЛЬЯ. ИССЛЕДОВАНИЯ СНА У ДЕТЕЙ РАННЕГО ВОЗРАСТА, 13.

156. Киличев, И. А., Худойбергенов, Н. Ю., & Адамбаев, З. И. (2015). Мозговые инсульты в экологически неблагоприятных зонах приаралья. NATIONAL JOURNAL OF NEUROLOGY, (8), 33-38.

157. Матёкубов, М. О., & Омаров, А. К. М. ТУРЛИ ГЕОГРАФИК ҲУДУДЛАРДА БОШ МИЯ ИНСУЛЬТЛАРИ ЭПИДЕМИОЛОГИЯСИ, ЎЛИМ ВА ЛЕТАЛЛИК КЎРСАТКИЧЛАРИНИНГ ТАҲЛИЛИ. YfcS^ XUca^ aV [[[X\cah [cfcV [jXd][h [dd^ XWaUS [\, 97.

158. Садикова, Г. К., Таджиев, М. М., & Бобожанов, У. А. (2017). Анализ факторов риска спинальных аномалий у детей. Молодой ученый, (12), 151-153.

159. Худайберганов, Н. Ю., & Мадримов, И. Х. (2025). ДЕЙСТВИЕ ГЕОМАГНИТНЫХ БУРЬ НА СОСТОЯНИЕ АВТОНОМНОЙ НЕРВНОЙ СИСТЕМЫ У БОЛЬНЫХ С ВЕГЕТАТИВНЫМИ РАССТРОЙСТВАМИ. Современные подходы и новые исследования в современной науке, 4(8), 18-21.

160. Худайберганов, Н. Ю., Жаббаров, М. Т., & Матёкубов, М. О. (2017). Неврологическая семиотика у больных железодефицитной анемией тяжелой степени. Национальный журнал неврологии, 1(S11), 54-56.

161. Худайбергенов, Н. Ю. (2006). Неврологические проявления при длительно-текущей железодефицитной анемии тяжелой степени. Методические рекомендации.