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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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PAEDIATRIC SYMPTOMATIC SEIZURES IN INDIA: UNRAVELLING VARIED ETIOLOGIES AND NEUROIMAGING PATTERNS - A MULTICENTRIC STUDY

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Abstract.

Introduction: Pediatric neuroimaging presents a unique set of challenges, primarily stemming from the intricacies of normal myelination processes occurring within the initial two years of life. This complexity is particularly pronounced in the context of pediatric epilepsy, where a substantial proportion of neuroimaging cases appears normal, especially in instances of idiopathic or provoked seizures. Nevertheless, abnormalities in neuroimaging tend to manifest in cases of acute or remote symptomatic seizures. Notably, the etiological landscape of seizures in children diverges significantly from that observed in adults, with neurodevelopmental, neurometabolic, and neuro-infectious factors emerging as predominant contributors.

Methodology: This multicentric study, conducted between November 2021 and November 2023, spanned diverse hospitals across various states in India. Encompassing children from birth to 12 years of age experiencing acute and remote symptomatic seizures, the study meticulously documented clinical and demographic profiles. Exclusion criteria were applied, excluding typical febrile seizures and idiopathic epilepsy syndromes to ensure a focused analysis.

Results: The study encompassed a total of 109 cases, revealing a spectrum of neuroimaging findings. Noteworthy among these were cortical malformations, including focal cortical dysplasia (12 cases), tuberous sclerosis (6 cases), polymicrogyria (3 cases), hemimegalencephaly (1 case), lissencephaly (1 case), schizencephaly (2 cases), heterotopias (3 cases), cavernous hemangioma (1 case), and AV malformation (1 case). Additionally, neoplastic lesions (6 cases), neurocysticercosis (5 cases), tuberculoma (4 cases), hippocampal sclerosis (3 cases), post-hypoxic and cerebrovascular accident gliosis (3 cases), leukodystrophies (2 cases), and non-lesional cases (58 cases) were documented.

Conclusion: Pediatric neuroimaging in symptomatic seizures may present with normal findings, influenced by interpreter bias and the non-uniform availability of 3T MRI across different medical centers. The diverse causative factors for symptomatic seizures underscore the impact of demographic features, including the endemicity of specific infections and birth injuries, on the observed variability across medical centers. These findings underscore the imperative for a comprehensive understanding and standardization in pediatric neuroimaging practices.

Key words. Paediatric Symptomatic Seizures.

Introduction.

Epilepsy, characterized by recurrent and unprovoked seizures, is a neurological disorder impacting individuals of all ages, including the pediatric demographic [1]. Seizures, arising from abnormal electrical activity in the brain, manifest in diverse forms, ranging from subtle movements to loss of consciousness [2]. In India, as in many global regions, epilepsy stands as a significant public health concern. The burden of pediatric seizures is particularly noteworthy, given the multitude of contributing etiologies that add complexity to this condition [3].

Within India, the prevalence of epilepsy displays regional variations influenced by factors such as socioeconomic conditions, cultural beliefs, and healthcare accessibility. Epidemiological studies indicate that epilepsy affects approximately 5 to 10 per 1000 children, establishing it as a relatively common neurological disorder in the pediatric age group. Beyond its prevalence, managing pediatric seizures presents challenges stemming from the diverse causes, including neurodevelopmental, neurometabolic, and neuro-infectious factors, underscoring the imperative for precise diagnostic tools [4].

Neuroimaging assumes a pivotal role in the comprehensive evaluation of pediatric seizures. Unique challenges arise in interpreting neuroimaging in the pediatric population, distinguished by the ongoing myelination process within the initial two years of life [5]. Pediatric neuroimaging not only facilitates the identification of structural abnormalities associated with seizures but also contributes to the understanding of the developing brain. The significance of neuroimaging is heightened by the fact that a notable proportion of seizures in children may exhibit idiopathic or provoked characteristics, resulting in normal neuroimaging findings [6].

In the domain of pediatric seizures, neuroimaging emerges as a critical diagnostic tool for uncovering a spectrum of abnormalities. This is particularly evident in cases of acute or remote symptomatic seizures, where neuroimaging often reveals abnormalities guiding clinicians in understanding the underlying causes. The spectrum of neuroimaging findings in pediatric seizures spans cortical malformations such as focal cortical dysplasia, tuberous sclerosis, and polymicrogyria, alongside neoplastic lesions, infectious etiologies like neurocysticercosis and tuberculoma, and various other structural abnormalities [7].

The present study, conducted across diverse hospitals in India, aims to contribute to the evolving knowledge base surrounding pediatric symptomatic seizures and their neuroimaging patterns. Through the unraveling of varied etiologies and neuroimaging findings, this research endeavors to illuminate the intricate landscape of pediatric seizures in the Indian population, emphasizing the crucial role of neuroimaging in understanding and managing these cases. Employing a multicentric approach encompassing different states and demographic profiles, the

study seeks to provide insights that can inform clinical practices, enhance diagnostic accuracy, and ultimately improve outcomes for children grappling with seizures in India.

Methodology.

Study Design: This multicentric investigation employed a prospective observational design to scrutinize the diverse etiologies and neuroimaging patterns linked to pediatric symptomatic seizures in India. The study aimed to attain a comprehensive understanding of the demographic, clinical, and neuroimaging profiles of children aged from birth to 12 years who underwent acute and remote symptomatic seizures. A varied sample of participants was recruited from multiple hospitals across different states in India, adhering to inclusion criteria targeting children within the specified age range experiencing acute or remote symptomatic seizures. Exclusion criteria were applied to exclude cases of typical febrile seizures and idiopathic epilepsy syndromes, ensuring a focused analysis of symptomatic seizures with identifiable underlying causes.

Data collection occurred between November 2021 and November 2023, entailing meticulous documentation of clinical and demographic profiles. A structured and standardized data collection form was employed to maintain consistency across various participating centers, encompassing crucial variables such as age, gender, medical history, seizure attributes, and relevant clinical details.

The study included both children with generalised convulsions and those with specific focal seizures, regardless of their neurological impairments. Individuals with periodic quivering movements impacting one or more extremities, facial grimace followed by changed sensorium, gazing look with altered sensorium, and chewing and sucking motions associated with sensorium deficit were also included. The criteria also included patients with minor posturing or scarcely noticeable tremors that were linked with tone and reflex activity disruptions. Furthermore, erratic movements, continuous sobbing, and irritation were examined, particularly when associated with a known certain underlying cause of seizures Inclusion in the study was contingent upon a thorough examination conducted by a pediatric consultant or pediatric neurologist, ensuring a comprehensive assessment based on both clinical history and expert evaluation. Neuroimaging data were collected through the review of magnetic resonance imaging (MRI) scans, conducted using 3 Tesla MRI scanners where available, to enhance image quality and resolution, aiming to facilitate the identification of structural abnormalities associated with symptomatic seizures.

Demographic and clinical characteristics were summarised using descriptive statistics such as frequencies, percentages, means, and standard deviations. Neuroimaging findings were categorized, and the prevalence of specific abnormalities was determined. Subgroup analyses based on age groups, gender, and geographic locations were conducted to explore potential associations and patterns. Statistical methods, such as chi-square tests, were applied to identify significant relationships between variables. Additionally, logistic regression analysis was employed to assess the influence of various demographic and clinical factors on the likelihood of specific neuroimaging abnormalities.

The study followed ethical requirements and was approved by the Institutional Review Board (IRB) or Ethics Committee at each participating hospital. The participating children's parents or legal guardians provided informed consent, emphasising the voluntary nature of their involvement and the confidentiality of the acquired data.

Results.

Table 1 delineates the clinical characteristics and diagnostic assessments in a cohort of pediatric epilepsy patients. The majority of patients are male (62.3%), with a diverse age distribution, including 29.3% aged 0–3 years, 25.6% aged 4–6 years, 23.8% aged 7–9 years, and 21.1% aged 10–12 years, with a mean age of 7.8 years (±4.6). Socioeconomic status varies across lower, upper lower, lower middle, upper middle, and upper categories. CSF analysis reveals abnormalities in 35.8% of cases, while brain imaging detects abnormalities in 21.8%. Electroencephalography (EEG) findings indicate abnormalities in 30.3% of cases. This comprehensive overview provides insights into the demographic and diagnostic profile of pediatric epilepsy patients, aiding clinicians in understanding the diverse aspects of this patient population.

Table 1. *Clinical Characteristics and Diagnostic Assessments in Paediatric Epilepsy Patients.*

Characteristics	n (%)
Gender	
Male	68 (62.3)
Female	41(37.6)
Age (in years)	
0–3	32 (29.3)
4–6	28 (25.6)
7–9	26 (23.8)
10–12	23 (21.1)
Mean (±SD)	7.8(4.6)
Socioeconomic status	
Lower	29(26.6)
Upper lower	23(21.1)
Lower middle	15(13.7)
Upper middle	26(23.8)
Upper	16(14.6)
CSF analysis (n=39)	
Normal	25 (64.1)
Abnormal	14 (35.8)
Brain image (n=87)	
Normal	68 (78.1)
Abnormal	19 (21.8)
Electroencephalography (EEG) (n=66)	
Normal	46(69.6)
Abnormal	20(30.3)

Table 2 presents the biochemical profile of a study population, offering key insights into various parameters. Hemoglobin levels are reported at 10.4 ± 1.32 gm/dl, and total leukocyte count is 12.2 ± 5.6 × 103/mm3. Platelet count is 2.8 ± 1.3 lac/mm3, while random blood sugar levels average at 104.1 ± 28.5 mg/dl. Electrolyte levels include sodium (135.3 ± 9.1 mmol/L) and potassium (4.4 ± 3.6 mmol/L). Calcium levels are reported

at 8.8 ± 0.5 mg/dl. Cerebrospinal fluid (CSF) analysis reveals CSF protein levels at 43.8 ± 18.6 mg/dl, CSF lymphocytes at 96.7 ± 10.2%, CSF sugar at 68.2 ± 14.2 mg/dl, and CSF polymorphs at 2.9 ± 10.8%. This comprehensive overview aids in understanding the biochemical parameters within the study population, facilitating clinical assessments and interpretations.

Table 2. *Biochemical parameters of children with epilepsy.*

Biochemical tests	Number	Mean ± SD
Haemoglobin (gm/dl)	98	10.4 ± 1.32
Total leucocytes count (×103/mm3)	98	12.2 ± 5.6
Platelets count (lac/mm3)	98	2.8 ± 1.3
Random blood sugar (mg/dl)	94	104.1 ± 28.5
Sodium (Na+) (mmol/L)	82	135.3 ± 9.1
Potassium (K+) (mmol/L)	82	4.4 ± 3.6
Calcium (mg/dl)	82	8.8 ± 0.5
CSF protein (mg/dl)	39	43.8 ± 18.6
CSF lymphocytes (%)	39	96.7 ± 10.2
CSF sugar (mg/dl)	39	68.2 ± 14.2
CSF polymorphs (%)	39	2.9 ± 10.8

Table 3. *Distribution of cases based on Neuroimaging Spectrum.*

Neuroimaging Findings	Number of Cases	Percentage of Total Cases
Cortical Malformations		
Focal Cortical Dysplasia	12	11.01%
Tuberous Sclerosis	6	5.50%
Polymicrogyria	3	2.75%
Hemimegalencephaly	1	0.92%
Lissencephaly	1	0.92%
Schizencephaly	2	1.83%
Heterotopias	3	2.75%
Cavernous Hemangioma	1	0.92%
AV Malformation	1	0.92%
Other Structural Abnormalities		
Neoplastic Lesions	6	5.50%
Neurocysticercosis	5	4.59%
Tuberculoma	4	3.67%
Hippocampal Sclerosis	3	2.75%
Post-hypoxic and Cerebrovascular Accident Gliosis	3	2.75%
Leukodystrophies	2	1.83%
Non-lesional Cases	58	53.21%
Total Cases	109	100%

Table 3 outlines neuroimaging findings in 109 cases of epilepsy, categorizing them into cortical malformations and other structural abnormalities. Among cortical malformations, focal cortical dysplasia is notable, accounting for 11.01% of cases, followed by tuberous sclerosis (5.50%), polymicrogyria (2.75%), and other rare malformations. Within other structural abnormalities, neoplastic lesions (5.50%), neurocysticercosis (4.59%), and tuberculoma (3.67%) (Figure 1) are identified, emphasizing the diverse etiologies. Noteworthy is the high percentage (53.21%) of non-lesional cases, indicating challenges in identifying structural causes. The prevalence of non-lesional cases underscores the complexity of epilepsy etiology, necessitating thorough neuroimaging assessments for comprehensive diagnoses. This analysis enhances our understanding of the spectrum of neuroimaging findings in epilepsy, from common malformations to less frequent structural abnormalities, guiding clinicians in tailoring diagnostic approaches based on the diversity of observed cases.

Table 4 The statistical analysis reveals a significant gender association (P=13.05, p=0.004), indicating varying proportions of males and females across age brackets. In terms of CSF analysis, while there is no significant difference in the distribution of normal and abnormal results across age groups (P=3.26, p=0.35), the majority falls within the normal range (Figure 2). Brain imaging results show a higher prevalence of normal findings, but the association is not statistically significant (P=1.79, p=0.615). MRI images are depicted (Figures 3a-c,) PET CT scan image of 8-year-old child with left insulo opercular hypometabolism (Figure 4). The EEG results display a balanced distribution between normal and abnormal findings across age groups, with no significant association (P=0.7, p=0.86). These findings provide valuable insights into the distribution of key factors in different age groups and genders, offering a foundation for further exploration and clinical considerations.

Discussion.

This presented multicentric study delves into the intricate realm of pediatric symptomatic seizures, illuminating the diverse etiologies and neuroimaging patterns observed across various hospitals in India. This discourse aims to dissect pivotal findings, explore their implications, and underscore the broader relevance of the study's insights in the context of pediatric neuroimaging and epilepsy management.

Status epilepticus in children constitutes a life-threatening situation demanding immediate medical attention. Accordingly, there is a call for epidemiological studies to gauge its prevalence and identify causative factors, thereby aiding in effective management. Noteworthy is the observation that the morbidity rate associated with status epilepticus in infants and children surpasses that in adults, whereas the mortality rate is higher in adults compared to the pediatric group [8].

The research elucidates a myriad of contributing variables, encompassing neurodevelopmental, neurometabolic, and neuro-infectious aspects, highlighting the intricate nature of pediatric seizures in India. It accentuates the commonality of epilepsy in children, aligning with international concerns. Reports indicate that the prevalence of epilepsy in affluent nations ranges from 6 to 8/1000, while in poor nations, it is four to six times greater [9].

The findings shed light on a spectrum of neuroimaging results, emphasizing the prevalence of cortical malformations such as focal cortical dysplasia, tuberous sclerosis, and polymicrogyria. The categorization of other structural abnormalities, including neoplastic lesions, neurocysticercosis, and tuberculoma, offers nuanced insights into the diverse etiologies contributing to pediatric symptomatic seizures. Significantly, the high percentage of non-lesional cases (53.21%) underscores the complexity of epilepsy etiology, urging clinicians to navigate challenges in identifying structural causes. Cultural, socioeconomic, and healthcare access factors further contribute to the variability in seizure prevalence across different regions in India.

Table 4. *Analysis of patients with seizure based on age groups.*

Variables	0-3 (Age in Years) n=32	4-6 (Age in Years) n=28	7-9 (Age in Years) n=26	10-12 (Age in Years) n=23	P value
Gender					13.05,0.004
Male (n=68)	24 (19.96)	19 (17.47)	18 (16.22)	7 (14.35)	
Female (n=41)	8 (12.04)	9 (10.53)	8 (9.78)	16 (8.65)	
CSF analysis	n=11	n=11	n=10	n=07	
Normal(n=25)	6 (7.05)	8 (7.05)	8 (6.41)	3 (4.49)	3.26,0.35
Abnormal(n=14)	5 (3.95)	3 (3.95)	2 (3.59)	4 (2.51)	
Brain Image	n=28	n=26	n=24	n=9	
Normal(n=68)	24 (21.89)	20 (20.32)	18 (18.76)	6 (7.03)	1.79,0.615
Abnormal(n=19)	4 (6.11)	6 (5.68)	6 (5.24)	3 (1.97)	
EEG	n=25	n=22	n=12	n=7	
Normal(n=46)	18 (17.42)	16 (15.33)	8 (8.36)	4 (4.88)	0.7,0.86
Abnormal(n=20)	7 (7.58)	6 (6.67)	4 (3.64)	3 (2.12)	

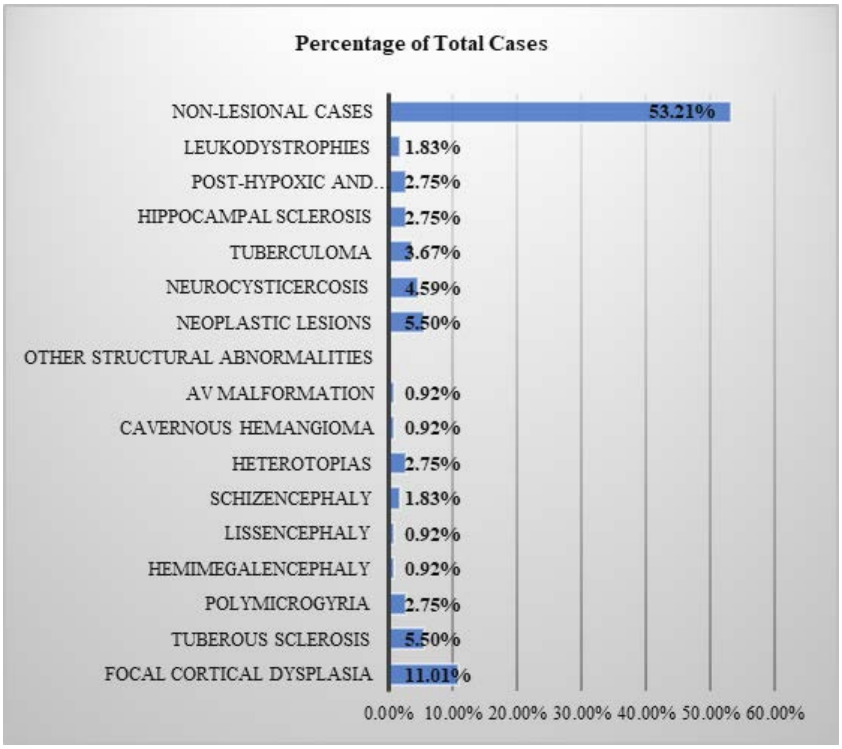

Figure 1. *showing percentage of different diseases with seizures.*

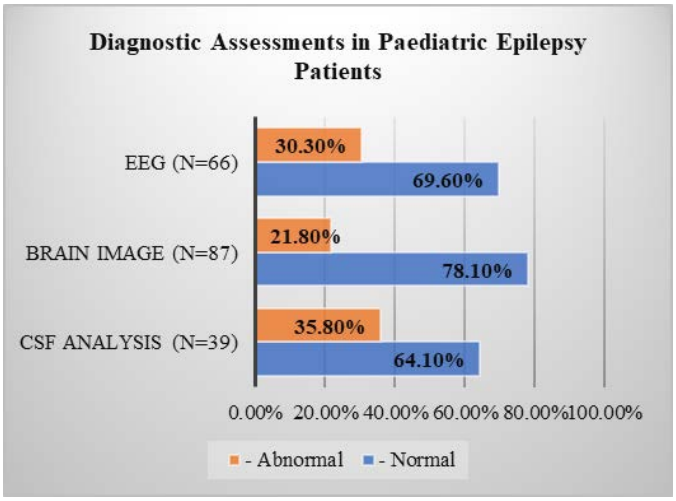

Figure 2. *showing diagnostic assessment in patients.*

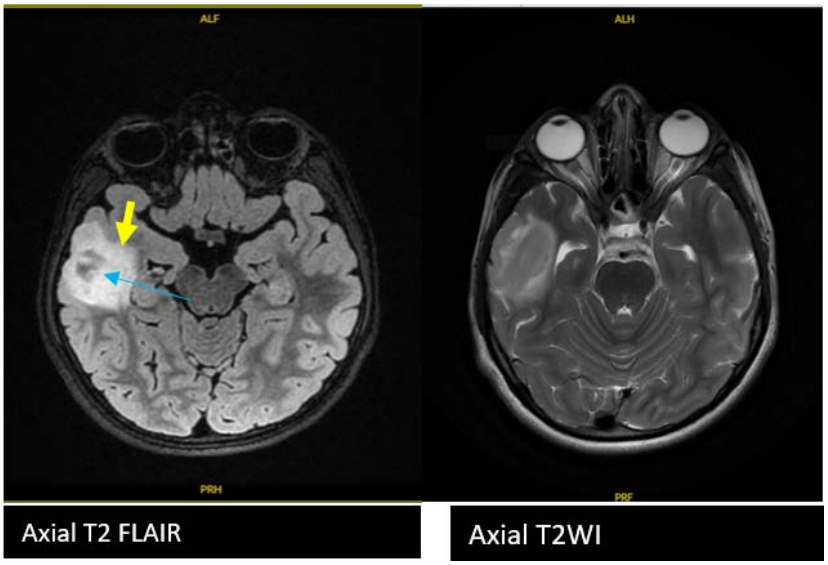

Figure 3A. *showing MRI of the Tumor.*

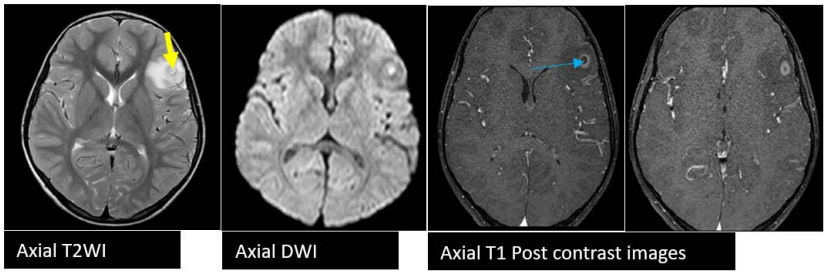

Figure 3B. *There is a high T2 signal cortical lesion in the right temporal lobe. There is central suppression on FLAIR imaging (blue arrow) with a pronounced rim of FLAIR bright signal. This is consistent with a DNET.*

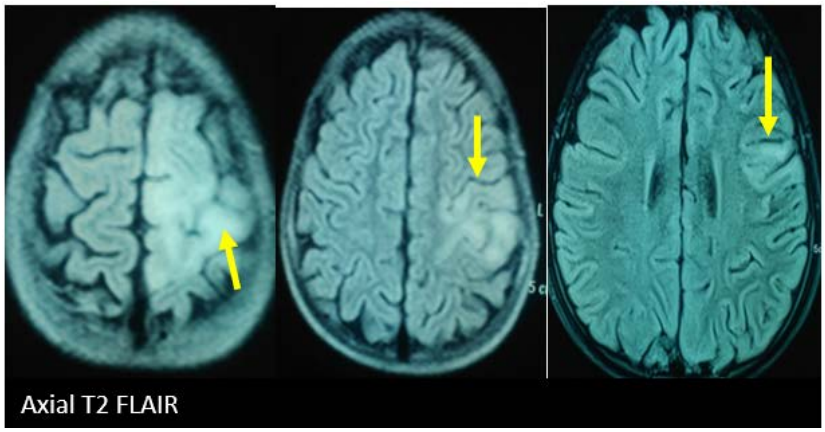

Figure 3C. *Proven case of neurocysticercosis. There is a well-defined T2 hyperintense, ring-enhancing lesion showing diffusion restriction, measuring around 9 x 9 mm with an internal eccentric-enhancing focus (blue arrow)seen on the left frontal lobe. There is significant perilesional edema.*

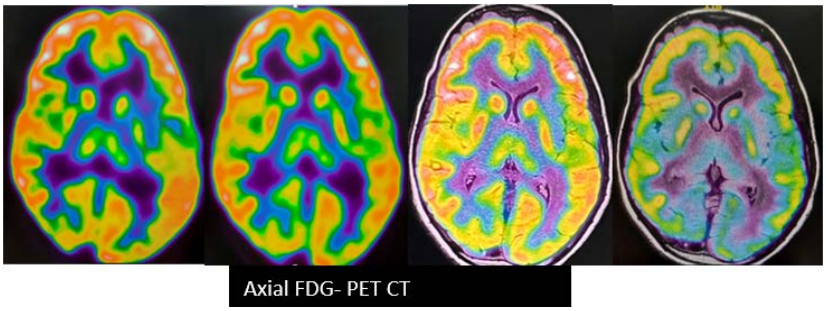

Figure 4. *There is T2 hyperintensity with cortical thickening seen along the left frontal region in this patient with drug resistant epilepsy, consistent with focal cortical dysplasia 8year old with DRE showing left insulo-opercular hypometabolism.*

The discussion of our study sheds light on the notable prevalence of non-lesional cases, with a particular focus on febrile seizures as a frequent reason for status epilepticus. Our findings align with those from King Abdulaziz Medical City, Saudi Arabia, where febrile causes constituted 15% of total pediatric status epilepticus cases. This emphasizes the significance of febrile seizures as a contributing factor in diverse geographical contexts [10]. Examining studies from Japan and Europe provides a broader perspective on the multifaceted origins of status epilepticus. In Japan, a significant proportion of cases (49.3%) were attributed to febrile seizures among children below 15 years old. Conversely, European research highlights the role of cerebrovascular pathology (34–60%) in causing status epilepticus, emphasizing the need for age-specific considerations in symptomatology detection [11,12].

Our study delves into the intricate relationship between cortical malformations and status epilepticus, revealing that approximately 27.5% of cases are associated with these malformations. Notably, neoplastic lesions contribute a smaller percentage (5.5%). Focusing on Malformations of Cortical Development (MCDs), it is established that at least 75% of MCD patients will experience epilepsy. Among cortical malformations, our results pinpoint Focal Cortical Dysplasia as a major cause of status epilepticus and febrile seizures [13].

Building on this, a study by Frater et al. examining surgical pathologic findings in extratemporal-based intractable epilepsy identifies MCDs as the cause in 40% of cases [14]. The prevalence of MCDs in intractable or medication-resistant childhood epilepsy ranges from 25% to 40%. Furthermore, advancements in the understanding of MCDs involve their classification based on embryologic, genetic, and imaging criteria [13].

Contrary to past assumptions, the majority of MCDs are now considered to have a genetic basis, with over 30 genes identified as causes of these disorders. Despite the unclear physio pathological mechanisms underlying epilepsy in MCD patients, emerging clinical and experimental data suggest diverse developmental processes, either cell autonomous or linked to abnormal neuronal network development. This highlights the complicated interplay of genetic and environmental variables in the development of MCD-associated epilepsy [15].

The unique challenges associated with interpreting neuroimaging in the pediatric population are primarily due to the ongoing myelination process within the initial two years of life. This normal developmental process complicates the identification of abnormalities, particularly in cases of idiopathic or provoked seizures. The study acknowledges the limitations posed by interpreter bias and non-uniform availability of 3T MRI scanners across centers, underscoring the need for standardized practices in pediatric neuroimaging.

The results reveal a diverse spectrum of neuroimaging findings in pediatric seizures, emphasizing the significance of imaging in understanding underlying causes. The prevalence of cortical malformations, neoplastic lesions, and infectious etiologies underscores the need for a comprehensive diagnostic approach. Notably, a substantial percentage of non-lesional cases highlights the diagnostic challenges, prompting a deeper exploration into the complex landscape of epilepsy etiology.

The discussion emphasizes the practical implications of the study's findings for clinical practitioners. The insights gained from the multicentric approach, covering different states and demographic profiles, emphasize the need for tailored diagnostic approaches considering the diverse causative factors. The role of neuroimaging as a critical diagnostic tool is underscored, with implications for enhancing diagnostic accuracy and informing targeted interventions. The study sets the stage for future research endeavors by identifying gaps and areas warranting further exploration. The discussion encourages continued efforts to standardize pediatric neuroimaging practices, addressing challenges associated with interpreter bias and equipment disparities. Additionally, the study prompts a call for research focusing on specific demographic features, such as the impact of endemic infections and birth injuries on seizure variability.

Limitations and Considerations.

Recognizing the study's limitations is imperative in comprehending the findings. The deliberate exclusion of febrile seizures and idiopathic epilepsy syndromes, although intensifying the focus on symptomatic seizures, may constrain the generalizability of the results. Additionally, the temporal scope of the study warrants consideration, and the inclusion of longitudinal studies could offer a more comprehensive understanding of the evolution of pediatric symptomatic seizures.

In summary, this presented multicentric study provides valuable insights into the intricate landscape of pediatric symptomatic seizures in India. The study's revelations underscore the necessity for nuanced approaches to diagnosis and management, placing particular emphasis on the pivotal role of neuroimaging. As the field of pediatric neurology advances, this study serves as a foundational stepping stone for subsequent research, the formulation of clinical guidelines, and initiatives aimed at standardizing practices to enhance outcomes for children affected by seizures in the diverse healthcare landscape of India.

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Ethical approval: The study was approved by the Institutional Ethics Committee.

REFERENCES

1. Epilepsy. https://www.who.int/news-room/fact-sheets/detail/epilepsy
2. Sirven JI. Epilepsy: A Spectrum Disorder. Cold Spring Harb Perspect Med. 2015;5:a022848.
3. Amudhan S, Gururaj G, Satishchandra P. Epilepsy in India I: Epidemiology and public health. Ann Indian Acad Neurol. 2015;18:263-77.
4. Halma E, de Louw AJA, Klinkenberg S, et al. Behavioral side-effects of levetiracetam in children with epilepsy: A systematic review. Seizure. 2014;23:685-91.
5. Shaikh Z, Torres A, Takeoka M. Neuroimaging in Pediatric Epilepsy. Brain Sci. 2019;9:190.
6. Singh R, Kumari R. Clinical spectrum and neuroimaging findings in children with seizures: A five-year retrospective study. Iran J Child Neurol. 2022;16:157-66.

7. Şah O, Türkdoğan D, Küçük S, et al. Neurodevelopmental Findings and Epilepsy in Malformations of Cortical Development. Turk Arch Pediatr. 2021;56:356-65.
8. DeLorenzo RJ, Pellock JM, Towne AR, et al. Epidemiology of status epilepticus. J Clin Neurophysiol Off Publ Am Electroencephalogr Soc. 1995;12:316-25.
9. Canpolat M, Kumandas S, Poyrazoglu HG, et al. Prevalence and risk factors of epilepsy among school children in Kayseri City Center, an urban area in Central Anatolia, Turkey. Seizure. 2014;23:708-16.
10. Hommady RH, Alrifai MT, Mubayrik OK, et al. Retrospective review of pediatric status epilepticus in 116 Saudi patients: predictors of outcome. Ann Saudi Med. 2017;37:455-460.
11. Nishiyama I, Ohtsuka Y, Tsuda T, et al. An epidemiological study of children with status epilepticus in Okayama, Japan: incidence, etiologies, and outcomes. Epilepsy Res. 2011;96:89-95.
12. Coeytaux A, Jallon P, Galobardes B, et al. Incidence of status epilepticus in French-speaking Switzerland: (EPISTAR). Neurology. 2000;55:693-7.
13. Leventer RJ, Phelan EM, Coleman LT, et al. Clinical and imaging features of cortical malformations in childhood. Neurology. 1999;53:715-715.
14. Frater JL, Prayson RA, Morris III HH, et al. Surgical pathologic findings of extratemporal-based intractable epilepsy: a study of 133 consecutive resections. Arch Pathol Lab Med. 2000;124:545-9.
15. Barkovich AJ, Kuzniecky RI, Jackson GD, et al. A developmental and genetic classification for malformations of cortical development. Neurology. 2005;65:1873-87.