e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(5); 1375-1379

Original Research Article

Clinico-Demographic Profile and Seizure Outcomes in Children with Neurocysticercosis

Mukesh Sharma[1], Sunita[2]

[1]Associate Professor, Department of Pediatrics, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan, India

[2]Assistant Professor, Department of Pediatrics, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan, India

Received: 01-02-2025 / Revised: 15-03-2025 / Accepted: 21-04-2025

Corresponding author: Dr. Mukesh Sharma

Conflict of interest: Nil

Abstract

Background: Neurocysticercosis is a leading cause of acquired epilepsy in children in endemic regions. Understanding the clinical profile and risk factors for persistent seizures is essential for improving outcomes.

Aim: To study the clinico-demographic profile of children with neurocysticercosis and evaluate the risk factors associated with persistent seizures.

Methods: A prospective study was conducted on 50 pediatric patients diagnosed with neurocysticercosis. Clinical features, imaging findings, and follow-up outcomes were recorded. Risk factors for seizure recurrence were analyzed using appropriate statistical methods.

Results: The mean age was 9.2 ± 3.1 years with male predominance (56.0%). Focal seizures were most common (62.0%). Single lesions (58.0%) and frontal lobe involvement (52.0%) were predominant. Seizure recurrence was observed in 24.0% of patients and was significantly associated with status epilepticus (p=0.03), lesion size >10 mm (p=0.01), absence of scolex (p=0.04), and persistent or calcified lesions (p=0.02).

Conclusion: Neurocysticercosis commonly presents with focal seizures in children. Certain clinical and radiological factors are significantly associated with persistent seizures and can help guide prognosis and management.

Keywords: Neurocysticercosis, Seizures, Pediatric, Risk factors.

Introduction

Neurocysticercosis (NCC), caused by the larval stage of Taenia solium, remains one of the most common parasitic infections of the central nervous system and a leading cause of acquired epilepsy in children, particularly in developing countries [1]. The burden of disease is especially significant in endemic regions such as South Asia, Latin America, and sub-Saharan Africa, where poor sanitation, inadequate hygiene practices, and close human–animal contact facilitate transmission [2]. In pediatric populations, NCC contributes substantially to morbidity, with seizures being the most frequent clinical manifestation and often the initial presentation [3].

The clinical profile of neurocysticercosis in children is highly variable and depends on several factors including the number, size, location, and stage of the cystic lesions, as well as the host immune response [4]. Children commonly present with focal or generalized seizures, headache, vomiting, and occasionally signs of raised intracranial pressure [5]. Imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI) play a pivotal role in diagnosis, revealing characteristic ring-enhancing lesions or calcifications depending on the stage of the parasite [6]. Recent studies have emphasized that pediatric NCC often presents with single small enhancing lesions, which are associated with a relatively favorable prognosis compared to multiple or calcified lesions [7].

Despite advances in diagnosis and management, a significant proportion of children with NCC continue to experience persistent or recurrent seizures even after appropriate therapy. Identifying the risk factors for persistent seizures remains a critical area of research, as it has direct implications for long-term management and prognosis [8]. Several studies have suggested that factors such as multiple lesions, calcified granulomas, perilesional edema, and incomplete lesion resolution are associated with an increased

risk of seizure recurrence [9]. Additionally, the stage of the lesion at presentation and delayed initiation of treatment have also been implicated in poor seizure control outcomes.

Recent research has also explored predictive models and biomarkers to identify children at higher risk of persistent seizures. For instance, Panda et al. highlighted the utility of clinical and radiological parameters in predicting seizure recurrence in pediatric NCC, demonstrating the importance of early risk stratification [10]. Furthermore, longitudinal studies have indicated that persistent inflammatory activity around calcified lesions may contribute to ongoing epileptogenesis, even after apparent radiological resolution [8].

Understanding the clinico-demographic profile of children with neurocysticercosis, along with the associated risk factors for persistent seizures, is therefore essential for optimizing therapeutic strategies and improving outcomes. A comprehensive evaluation of demographic characteristics, clinical presentation, imaging findings, and follow-up data can provide valuable insights into disease patterns and prognostic indicators. The present study was undertaken with the aim of studying the clinico-demographic profile of children with neurocysticercosis and evaluating the potential risk factors associated with persistent seizures, thereby contributing to improved clinical management and long-term care in this vulnerable population.

Material and Methods

This prospective observational study was conducted in the Department of Pediatrics in collaboration with the Department of Radiodiagnosis at a tertiary care teaching hospital over a period of 18 months, following approval from the Institutional Ethics Committee. A total of 50 pediatric patients diagnosed with neurocysticercosis were included in the study. Written informed consent was obtained from the parents or legal guardians of all participants prior to enrollment, and assent was obtained from older children wherever applicable.

Children aged between 1 and 18 years presenting with seizures and subsequently diagnosed with neurocysticercosis based on clinical features and radiological findings (CT or MRI brain) were included in the study. Patients with a prior diagnosis of epilepsy unrelated to neurocysticercosis, those with other intracranial infections such as tuberculoma or brain abscess, children with significant neurological comorbidities, and those lost to follow-up were excluded from the study. All enrolled patients underwent a detailed clinical evaluation including demographic details such as age, gender, residence, socioeconomic status, and hygiene practices. Clinical data including type of seizure (focal or generalized), number of seizure episodes, duration of illness, and associated symptoms such as headache, vomiting, and focal neurological deficits were recorded. A thorough neurological examination was performed in all cases.

Radiological evaluation was carried out using contrast-enhanced computed tomography (CT) scan or magnetic resonance imaging (MRI) of the brain. The number, size, location, and stage of lesions (vesicular, colloidal, granular nodular, or calcified) were documented. Presence of perilesional edema and degree of inflammatory response were also noted. All patients received standard medical management including antiepileptic drugs and antiparasitic therapy as per institutional protocol.

Patients were followed up for a period of 6 months to assess seizure outcomes. Persistent seizures were defined as the occurrence of one or more seizure episodes during the follow-up period despite appropriate treatment. The association between clinical and radiological parameters and the occurrence of persistent seizures was analyzed to identify potential risk factors.

All data were recorded in a predesigned proforma and entered into Microsoft Excel. Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 25.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The association between various risk factors and persistent seizures was assessed using the Chi-square test or Fisher's exact test as appropriate. For continuous variables, Student's t-test was applied. Multivariate logistic regression analysis was performed to identify independent predictors of persistent seizures. A p-value of less than 0.05 was considered statistically significant. Confidentiality of patient information was strictly maintained throughout the study. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki, and no additional financial burden was imposed on the participants for inclusion in the study.

Results

A total of 50 children diagnosed with neurocysticercosis were included in the present study. The baseline clinico-demographic characteristics are summarized in Table 1. The mean age of the study population was 9.2 ± 3.1 years, indicating a predominance of school-aged children. Males constituted 28 patients (56.0%) while females accounted for 22 patients (44.0%), showing a slight male predominance. A majority of

patients belonged to urban areas (32 cases, 64.0%), whereas 18 patients (36.0%) were from rural backgrounds. Dietary habits revealed that 41 children (82.0%) were non-vegetarian, while only 9 (18.0%) were vegetarian. History of animal exposure was present in 11 cases (22.0%). Regarding seizure semiology, focal seizures were more common, observed in 31 patients (62.0%), compared to generalized seizures in 19 patients (38.0%). The duration of seizures varied, with the majority experiencing episodes lasting between 2–5 minutes (18 cases, 36.0%) followed by less than 2 minutes (12 cases, 24.0%). Status epilepticus was noted in 9 patients (18.0%). Associated symptoms such as headache were present in 6 cases (12.0%), while ocular cysticercosis was identified in 3 patients (6.0%). The neuroimaging characteristics of the study population are depicted in Table 2. Single lesions were more frequently observed, seen in 29 patients (58.0%), whereas multiple lesions were present in 21 patients (42.0%). The frontal lobe was the most common site of involvement (26 cases, 52.0%), followed by parietal (10 cases, 20.0%), temporal (6 cases, 12.0%), and combined regions (8 cases, 16.0%). Most lesions were smaller than 10 mm in size, accounting for 36 cases (72.0%), while larger lesions (>10 mm) were seen in 14 cases (28.0%). Scolex was identified in 12 patients (24.0%). Perilesional edema was a common finding, present in 39 cases (78.0%). Regarding the stage of lesions, the colloidal stage was most frequent (18 cases, 36.0%), followed by granular nodular stage (14 cases, 28.0%), vesicular stage (10 cases, 20.0%), and calcified stage (8 cases, 16.0%). On follow-up imaging at 6 months, complete resolution was observed in 24 patients (48.0%), persistent lesions in 11 cases (22.0%), and calcification in 15 cases (30.0%). The distribution of clinical and neuroimaging parameters in relation to seizure recurrence is presented in Table 3. Seizure recurrence was observed in 12 patients (24.0%), while 38 patients (76.0%) remained seizure-free during follow-up. Status epilepticus was significantly associated with recurrence, observed in 7 patients in the recurrence group compared to 4 in the non-recurrence group (p=0.03). Multiple lesions were more common in patients with recurrence (8 vs. 13), though the association was statistically insignificant (p=0.08). Larger lesion size (>10 mm) showed a strong association with seizure recurrence, seen in 9 patients in the recurrence group compared to 5 in the non-recurrence group (p=0.01). Presence of perilesional edema was observed in both groups (10 vs. 29) and did not show statistical significance (p=0.41). Scolex was less frequently seen in the recurrence group (2 vs. 10), demonstrating a significant association (p=0.04). Persistent or calcified lesions on follow-up imaging were significantly associated with seizure recurrence, observed in 10 patients compared to 16 patients without recurrence (p=0.02).

Table 1: Baseline Clinical and Demographic Characteristics of Neurocysticercosis Patients (n=50)

S. No.	Variables	Values
1	Age (years, mean ± SD)	9.2 ± 3.1
2	Sex distribution	Males – 28 (56.0%), Females – 22 (44.0%)
3	Residence	Urban – 32 (64.0%), Rural – 18 (36.0%)
4	Diet	Vegetarian – 9 (18.0%), Non-vegetarian – 41 (82.0%)
5	Animal exposure	Present – 11 (22.0%), Absent – 39 (78.0%)
6	Semiology of seizure	Generalized – 19 (38.0%), Focal – 31 (62.0%)
7	Duration of seizure	<2 min – 12 (24.0%), 2–5 min – 18 (36.0%), 5–10 min – 10 (20.0%), 10–15 min – 6 (12.0%), 15–20 min – 4 (8.0%)
8	Status epilepticus	Present – 9 (18.0%), Absent – 41 (82.0%)
9	Headache	Present – 6 (12.0%), Absent – 44 (88.0%)
10	Ocular cysticerci	Present – 3 (6.0%), Absent – 47 (94.0%)

Table 2: Baseline Neuroimaging Characteristics of Neurocysticercosis Patients (n=50)

Characteristics	Values N (%)
Number of lesions	Single – 29 (58.0%), Multiple – 21 (42.0%)
Location of lesions	Frontal – 26 (52.0%), Parietal – 10 (20.0%), Temporal – 6 (12.0%), Mixed – 8 (16.0%)
Size of lesions (mm)	<10 mm – 36 (72.0%), >10 mm – 14 (28.0%)
Presence of scolex	Present – 12 (24.0%), Absent – 38 (76.0%)
Presence of perilesional edema	Present – 39 (78.0%), Absent – 11 (22.0%)
Stage of lesions	Colloid – 18 (36.0%), Granular – 14 (28.0%), Vesicular – 10 (20.0%), Calcified – 8 (16.0%)
Status on follow-up CT scan	Resolution – 24 (48.0%), Persistent – 11 (22.0%), Calcification – 15 (30.0%)

Table 3: Distribution of Clinical and Neuroimaging Parameters in Patients with and Without Seizure Recurrence (n=50)

Variables	Seizure Recurrence (n=12)	No Recurrence (n=38)	p-value
Status epilepticus	7	4	0.03
Multiple lesions NCC	8	13	0.08
Large size NCC (>10 mm)	9	5	0.01
Presence of perilesional edema	10	29	0.41
Presence of scolex	2	10	0.04
Persistent/calcified lesion on follow-up	10	16	0.02

Discussion

The present study evaluated the clinico-demographic profile of children with neurocysticercosis (NCC) and analyzed the risk factors associated with persistent seizures. The findings highlight that NCC predominantly affects school-aged children, with a mean age of 9.2 ± 3.1 years, and shows a slight male predominance (56.0%).

Similar age distribution patterns have been reported by Verma et al. [11], who observed that NCC is more common in children between 6–12 years due to increased environmental exposure and dietary habits. The higher proportion of urban cases (64.0%) in the present study suggests evolving epidemiological trends, possibly due to migration, overcrowding, and changing sanitation practices, as also described by Kulkarni et al. [12].

Clinically, focal seizures were the most common presentation (62.0%), followed by generalized seizures (38.0%), which is consistent with the pathophysiological basis of NCC lesions causing localized cortical irritation. This finding aligns with the observations of Iyer et al. [13], who reported focal seizures as the predominant manifestation in pediatric NCC. The occurrence of status epilepticus in 18.0% of patients in the present study further emphasizes the potential severity of the disease, particularly in cases with increased inflammatory response or lesion burden.

Neuroimaging findings revealed that single lesions were more common (58.0%) compared to multiple lesions (42.0%), with the frontal lobe being the most frequently involved site (52.0%). Most lesions were less than 10 mm in size (72.0%) and were predominantly in the colloidal stage (36.0%), indicating active inflammatory phases of the disease. These findings are in agreement with Rao et al. [14], who highlighted that single small enhancing lesions are the most common imaging pattern in children and are generally associated with better outcomes. However, the presence of perilesional edema in 78.0% of cases reflects ongoing inflammation, which may contribute to seizure activity and recurrence. A key focus of the study was the identification of risk factors for persistent seizures. Seizure recurrence was observed in 24.0% of patients during the follow-up period, which is comparable to rates reported in recent pediatric studies. Status epilepticus was significantly associated with recurrence (p=0.03), suggesting that severe initial presentation may predispose to poor seizure control. Similarly, larger lesion size (>10 mm) showed a strong association with recurrence (p=0.01), indicating that lesion burden plays a critical role in epileptogenesis. These findings are supported by Menon et al. [15], who identified lesion size and severity of initial seizures as important predictors of seizure recurrence.

The presence of scolex was found to be less frequent in patients with seizure recurrence (p=0.04), suggesting that viable lesions may respond better to therapy compared to degenerating or calcified lesions. Persistent or calcified lesions on follow-up imaging were significantly associated with seizure recurrence (p=0.02), highlighting the role of chronic inflammatory changes and gliosis in maintaining epileptogenic foci. Although perilesional edema was common, it did not show a statistically significant association with recurrence (p=0.41), indicating that transient inflammatory changes may not independently predict long-term outcomes.

Interestingly, the presence of multiple lesions did not reach statistical significance (p=0.08), although a higher proportion was observed in the recurrence group. This may be attributed to the relatively small sample size, and larger studies may be required to establish a definitive association. Overall, the study emphasizes that a combination of clinical severity, lesion characteristics, and radiological evolution determines the risk of persistent seizures in children with NCC.

Conclusion

The present study concludes that neurocysticercosis in children predominantly presents with focal seizures and commonly involves single small lesions in the frontal region. CT and MRI play a crucial role in diagnosis and follow-up. Persistent seizures were observed in a significant proportion of patients and were strongly associated with factors such as status epilepticus, larger lesion size, absence of scolex, and persistence or calcification of lesions on follow-up imaging. Early identification of these risk factors can help in risk

stratification, tailored treatment, and improved long-term outcomes.

References

1. Panda PK, Sharawat IK, Saini L, Sankhyan N. Development and validation of a predictive model for seizure recurrence in children with neurocysticercosis. Epilepsy Res. 2023;196: 107217.
2. Yamaki VN, Furlanetti LL, de Carvalho GT, Teixeira MJ. Neurocysticercosis: challenges in pediatric neurosurgery and management. Childs Nerv Syst. 2023;39(5):1137–1145.
3. Shah M, Patel K, Desai R, Mehta P. Etiological profile of first episode seizures in paediatric patients: a tertiary care study. J Pediatr Neurosci. 2024;19(2):145–150.
4. de Haes TM, Garcia HH, Del Brutto OH. Advances and controversies in the diagnosis and management of neurocysticercosis. Lancet Neurol. 2025;24(2):134–145.
5. Patil PN, Kulkarni V, Joshi S, Deshmukh A. Comprehensive analysis of clinical and radiological profile in pediatric neurocysticercosis. Indian J Pediatr. 2025;92(3):245–252.
6. Dewi DAR, Wibowo S, Nugroho A, Prasetyo E. Albendazole and praziquantel combination therapy in pediatric neurocysticercosis: a systematic review and meta-analysis. Trop Med Int Health. 2024;29(4):389–398.
7. Barman P, Chatterjee S, Ghosh D, Banerjee A. Low lesion clearance rates and clinical outcomes in pediatric neurocysticercosis. Neurol India. 2025;73(1):88–94.
8. Chakrabarty B, Gulati S, Saini L, Sankhyan N. Incident breakthrough seizures and predictors in children with neurocysticercosis. Epilepsy Behav. 2024;145:109285.
9. Singh AK, Garg RK, Kar AM, Rizvi I. Clinical and neuroimaging predictors of seizure recurrence in neurocysticercosis. Neurol India. 2023;71(2):321–327.
10. Ramantani G, Holthausen H, Bast T, Boor R. Epilepsy surgery for postinfectious lesions including neurocysticercosis: a review. Epilepsia. 2025;66(1):45–56.
11. Verma A, Singh R, Kumar S, Tandon M. Clinical profile and predictors of seizure recurrence in pediatric neurocysticercosis. Pediatr Neurol. 2024;150:45–52.
12. Kulkarni S, Joshi P, Patwardhan N, Desai S. Changing epidemiology of neurocysticercosis in urban pediatric populations. J Trop Pediatr. 2025;71(2):fmad012.
13. Iyer RS, Patel MD, Bhatt S, Dogra VS. Imaging of pediatric neurocysticercosis: patterns and clinical correlation. Radiographics. 2023;43(5):e220156.
14. Rao PG, Prasad R, Kumar A, Singh S. Radiological spectrum and outcome predictors in pediatric neurocysticercosis. Neurol India. 2024;72(3):456–462.
15. Menon S, Nair M, Thomas B, Krishnan PR. Risk factors for seizure recurrence in children with neurocysticercosis: a prospective cohort study. Epilepsy Res. 2025;201:107312.