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Educational problems with underlying neuropsychological impairment are common in children with Benign Epilepsy of Childhood with Centrotemporal Spikes (BECTS)

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Benign childhood epilepsy;
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Summary

Introduction: Benign Epilepsy of Childhood with Centrotemporal Spikes (BECTS) is one of the most common childhood epilepsies with a good prognosis regarding the seizure and neuropsychological outcomes. However, recent reports indicate the presence of neuropsychological problems in a significant percentage of children with BECTS. Our study was aimed to examine the educational performance and neuropsychological functions along with clinical and electrographic characteristics in a cohort of children with BECTS.
Methods: We identified a cohort of children with BECTS by screening medical and EEG recordings of patients attending our institute. Data were collected with a standard protocol. Their educational performance was evaluated by an interview with the parents. Neuropsychological and language tests were administered to children who had educational problems. Statistical analysis was done using the χ^2-test.
Results: Fifty children (29 boys and 21 girls; mean age of onset of epilepsy 7.84 ± 2.87 years) who met the criteria for BECTS were included in this study. Atypical seizure characteristics for BECTS were observed in 26 (52%) children. EEG showed typical centrotemporal spike and wave discharges in all children, 42% of them had a tangential dipole in the frontocentral region. An additional extra-rolandic focus in the EEG was found in seven children (14%). Educational problems were identified in 27 children (54%); 19 of them had neuropsychological or language impairment ($p = 0.003$). We found a statistically significant correlation between the occurrence of educational problems and the absence of a tangential dipole in the

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EEG ($p < 0.001$). Abnormal language function had a significant correlation with atypical seizure semiology ($p = 0.021$).
Conclusion: This study shows that a significant number of children with BECTS have neuropsychological impairment and educational problems.

Introduction

Epilepsy in children shows considerable polymorphism. Conditions like Lennox–Gastaut Syndrome are associated with multiple seizures, progressive mental decline and significant disability. On the other hand, syndromes like Benign Epilepsy of Childhood with Centrotemporal Spikes (BECTS) or childhood absence seizures tend to have a favorable prognosis. BECTS is one of the most common form of childhood epilepsies but the reported prevalence varies from 10 to 24%.[1,2] It is characterized by the occurrence of partial seizures after 2 years of age associated with normal neurological and intellectual functions. Typically, the brief partial, mainly motor seizures are stereotyped in semiology, with a nocturnal preponderance. Family history is often positive.[3] The principal electroencephalographic (EEG) criteria include normal background activity, high amplitude biphasic spikes followed by prominent slow waves in the mid-temporal (T3, T4) and central (C3, C4) areas, activation of epileptiform activity during sleep but not during hyperventilation and occasional generalized spike-wave discharges.[4] Seizures tend to remit spontaneously by adolescence. BECTS is generally considered to be a benign disorder, but several atypical forms have recently been described.[5] Paradoxical aggravation of seizures, while on antiepileptic drug (AED) therapy, has also been reported.[6] Neuropsychological functions and psychosocial adjustment of these children have been studied for over three decades. One of the earlier studies[7] observed mild behavioral or scholastic problems in these children, but attributed them to parental anxiety and social restrictions while another case–control study failed to demonstrate any difference in intelligence, behavior or school adjustment.[8] Several recent studies have identified neuropsychological impairment and developmental learning disabilities in these children, but the clinical relevance of these observations is uncertain. Staden et al.[9] demonstrated that children with BECTS could have selective language dysfunction (reading, spelling, and auditory verbal learning) even when their IQ is normal which would suggest a perisylvian dysfunction. Several subtle motor coordination and neuropsychological impairments have been identified in a small case–control study.[10] Our objective in this study was to characterize the educational outcome and neuropsychological profile in a cohort of children with well-defined clinical and electrographic features of BECTS.

Methods

Children with clinical and electroencephalographic features suggestive of BECTS were identified from medical and EEG records of our institute and were called for a review at the hospital. Those children who satisfied the criteria for BECTS (see Table 1) were included in the study and were evaluated according to a standard protocol. The ictal semiology was described in detail and was classified into typical and atypical features as described by Loiseau.[11] Detailed history on treatment, seizure outcome, peri-natal events, development and family were obtained. Neurological examination was carried out with special emphasis on soft neurological signs as described by Touwen.[12] EEG details included background activity and spike characteristics. We followed Gregory and Wong's description of frontal positivity and centrotemporal negativity as the tangential dipole.[13] The presence of any associated extra-rolandic foci was noted separately.

Table 1 Clinical and electrographic criteria for inclusion as BECTS.

Clinical criteria[3]	Electrographic criteria[4]
1. No neurological or intellectual deficits	1. Normal background activity
2. Onset of seizures after the age of 2 years	2. High amplitude biphasic spikes followed by prominent slow waves in mid temporal (T3, T4) and central (C3, C4) areas
3. Brief partial, mainly motor seizures that are stereotyped in semiology	3. Activation of epileptiform activity during sleep but not during hyperventilation
4. Frequent nocturnal occurrence	4. Occasional generalized spike-wave discharges
5. Family history of epilepsy, especially for benign types	