Epilepsy & Behavior 94 (2019) 1–8

Contents lists available at ScienceDirect

Epilepsy & Behavior

journal homepage: www.elsevier.com/locate/yebeh

Review

Levetiracetam versus carbamazepine in treatment of rolandic epilepsy

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ARTICLE INFO

Article history:
Received 1 February 2019
Revised 8 February 2019
Accepted 8 February 2019
Available online 15 March 2019

Keywords:
Antiepileptic
EEG
Levetiracetam
Rolandic
Treatment

ABSTRACT

Purpose: The aim of the current study was to systematically review the literature to compare the efficacy of levetiracetam (LEV) with that of carbamazepine (CBZ) to control seizures and reduce the burden of interictal epileptiform discharges in children with rolandic epilepsy (RE) and also to compare their tolerability.
Methods: We searched the electronic database PubMed on January 9, 2019 for original articles that included the following English-language search terms in the title: "Rolandic epilepsy" OR "benign childhood epilepsy with centrotemporal spikes" since 2000. We concentrated our review on three main areas: 1. Neuropsychological impairments in children with RE; 2. Influence of epileptic activity on cognitive performance in RE; 3. Effects of antiepileptic drug (AED) therapies in RE.
Results: The primary search yielded 308 papers. We reviewed the results and removed duplicate articles and all nonoriginal, non-English papers. Finally, after carefully reviewing the full texts, we included 44 original articles to achieve the aims of this review.
Conclusion: Physicians taking care of children with RE should be aware of the risks for cognitive dysfunctions in these patients and screen their patients for any subtle dysfunction that may affect their academic performance and achievement. If and when the physician decides to prescribe an AED for their patients with RE, LEV is probably a better option compared with CBZ to prescribe for these children.

1. Introduction

Rolandic epilepsy (RE), also known as benign epilepsy with centrotemporal spikes (BECTS), is the most common focal epilepsy syndrome in childhood; it approximately constitutes 8%–25% of all childhood epilepsies [1]. Rolandic epilepsy mostly affects preschool and school-age children; at a time, children are supposed to learn and thrive. Despite being usually considered as a benign condition, several studies have shown that this syndrome is associated with cognitive problems in affected children [2].

Some studies demonstrated that interictal epileptiform activity in RE may be associated with cognitive dysfunction and the reduction or resolution of interictal epileptiform activity in children with RE may lead to improvement in attention and cognitive function in these children [3,4]. Such reductions were sometimes achieved by antiepileptic drugs (AEDs). A reduction of electroencephalographic epileptiform activity by more than 50% was achieved in some patients with levetiracetam (LEV), sulthiame (STM), lamotrigine (LTG), clobazam (CLB), and valproic acid (VPA), in one study [4].

Carbamazepine (CBZ) is often considered as the first-line AED in the management of this syndrome by many physicians [1]. However, it has been associated with worsening of language and speech problems in some children with RE [5]. On the other hand, LEV is an AED that has been shown to be effective in various types of epileptic seizures, both focal and generalized [6]. The efficacy of LEV as monotherapy for childhood epilepsies has been demonstrated before [6–8].

The aim of the current study was to systematically review the literature to compare the efficacy of LEV with that of CBZ to control seizures and reduce the burden of interictal epileptiform discharges in children with RE and also to compare their tolerability. We hypothesized that LEV is efficacious in controlling seizures in these patients, but is superior to CBZ with respect to reducing the burden of interictal epileptiform discharges and, therefore, may improve the cognitive functions of these children.

2. Methods and materials

We searched the electronic database PubMed on January 9, 2019 for original articles that included the following English-language search terms in the title: "Rolandic epilepsy" OR "benign childhood epilepsy

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https://doi.org/10.1016/j.yebeh.2019.02.009
1525-5050/

with centrotemporal spikes" since 2000. We concentrated our review on three main areas:

1. Neuropsychological impairments in children with RE: review of neuropsychological studies in RE
2. Influence of epileptic activity on cognitive performance in RE: review of electroencephalographic studies in RE
3. Effects of AED therapies in RE: review of drug studies in RE.

We reviewed the current evidence and tried to determine whether neuropsychological impairments happen in children with RE, if they are related to interictal epileptiform activity in these patients, and finally, what the effects of AED therapies are in these patients. The search and inclusion process is shown in Fig. 1. We also reviewed several previous systematic reviews, meta-analyses, and their references.

3. Results

The primary search yielded 308 papers. We reviewed the results and removed duplicate articles and all nonoriginal, non-English papers. Finally, after carefully reviewing the full texts, we included 44 original articles to achieve the aims of this review (Fig. 1).

With regard to the first question (i.e., neuropsychological impairments in children with RE), 23 original papers were identified and included [9–31] (Table 1). With respect to the second question (i.e., influence of epileptic activity on cognitive performance in RE), eight original papers were identified and included [3,32–38] (Table 2). With regard to the third question (i.e., effects of antiepileptic drug therapies in RE), 13 original papers were identified and included [5,39–50] (Table 3).

4. Discussion

In this review, we tried to answer to three questions in order to provide evidence with respect to prescription of LEV versus CBZ in treatment of rolandic epilepsy. Here, we did not try to discuss "to treat or not to treat rolandic epilepsy", which is a very controversial issue [1].

4.1. Is RE associated with neuropsychological impairments?

The brief answer is "yes"! There is not any large population-based study to provide a definite answer to this question. Patients referred to tertiary centers do not represent the whole population of patients with RE. However, many studies consistently reproduced similar results that neuropsychological and cognitive impairments happen in children with RE. The spectrum of these abnormalities includes language impairments, memory problems, attention deficits, learning problems, and other cognitive dysfunctions. These cognitive dysfunctions may lead to educational and academic underachievement in children with RE, if they remain undiagnosed and untreated [9–31]. A meta-analysis of literacy and language in children with RE concluded that the presence of reading and phonological processing deficits in children with RE highlights the importance of early literacy and language assessment in these patients [51]. A systematic review of attention impairments in children with RE concluded that attention systems are impaired in children with active centrotemporal spikes, implying a more widespread functional cortical dysfunction in RE than previously thought. These impairments resolve upon electroencephalographic remission of centrotemporal spikes [52]. A systematic review and meta-analysis of cognitive functions in RE showed that children with RE demonstrated significantly lower scores on neuropsychological tests across all cognitive factors compared with those in healthy controls [53]. The authors concluded that children with RE show a profile of pervasive cognitive difficulties, and therefore, they challenged the current conceptions of RE as a benign disease [53]. It has been shown that when children with RE are retested after several years, neuropsychological deficits have often disappeared in most of them [21,54]. However, any cognitive dysfunction during the golden years of their life (i.e., school years) may reduce their abilities to achieve their best later in life! This should be tested in double blind randomized clinical trials in the future.

4.2. Does interictal epileptic activity affect cognitive performance in RE?

The brief answer is "yes"! Many studies have shown that there is a significant negative correlation between amount of interictal epileptiform activity and cognitive performance in children with RE [3,32–38,54]. It seems that interictal rolandic spikes directly disrupt the functional brain networks responsible for language, behavior, and cognition [38]. A recent review concluded that interictal epileptiform discharges impair performance acutely and probably chronically. Therefore, there are good theoretical reasons for suppressing interictal epileptiform discharges; however, no strong direct evidence exists and no consensus has been reached by experts on how much effort this deserves [55]. An alternative hypothesis is that the interictal epileptiform discharges

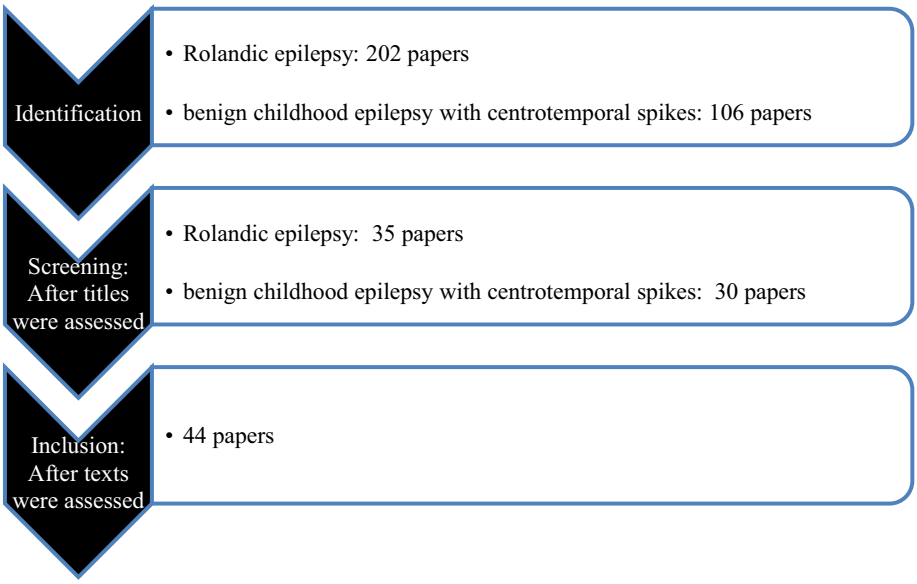

Fig. 1. The search and inclusion process.

Table 1
Neuropsychological impairments in children with RE.

Study	Design	Sample size	Methods	Findings	Conclusion
Lindgren et al., 2004	Longitudinal	26	An initial investigation of cognitive functions in 32 children with RE, using an extensive test battery, was followed 2.5 to 3 years later by a second assessment of 26 of these children, using the same technique	At the second assessment, the ability for immediate memory, memory and learning of visuospatial as well as auditory–verbal material, and delayed recall was the same in the group with RE as in the control group	Children with RE did not present any major cognitive difficulties when a mean of five years had passed since onset of the syndrome
Monjauze et al., 2005	Cross sectional	16	Language assessment	56% of children showed moderate or severe language impairment	RE may be associated with impairment in language function
Northcott et al., 2005	Cross sectional	42	Comprehensive neuropsychological and language assessments were performed	A specific pattern of difficulties in memory and phonologic awareness was found	Some children with RE have specific difficulties in memory and phonologic processing skills
Papavasiliou et al., 2005	Case–control	68	Written language skills were compared between children with RE ($n = 32$) and controls ($n = 36$)	Patients performed significantly worse than controls in spelling, reading, showed dyslexic-type errors, and frequently had below-average school performance	Children with severe RE performed significantly worse than controls in written language skills and reading comprehension
Vinayan et al., 2005	Cross sectional	50	Educational performance was evaluated by an interview with the parents	Educational problems were identified in 27 children (54%); 19 of them had neuropsychological or language impairment ($p = 0.003$)	A significant number of children with RE have neuropsychological impairment and educational problems
Northcott et al., 2006	Cross sectional	28	Patients underwent comprehensive longitudinal neuropsychological and language assessments	Improvement in cognitive functioning, particularly in the areas of verbal memory, receptive language ability, and phonemic manipulation, was observed. Visual memory and aspects of phonologic awareness showed no changes	Some cognitive difficulties may resolve; however, continued monitoring, particularly in areas of visual memory and phonologic awareness, is necessary
Pinton et al., 2006	Retrospective	18	Neuropsychological and learning assessments	Visuospatial skills, attention, and visuospatial memory were significantly weak. Reading, numeracy, and/or spelling ability were significantly delayed	RE can be accompanied by specific cognitive problems and low academic achievement
Piccinelli et al., 2008	Case–control	41	School abilities were evaluated and compared in 20 children with RE, and a group of 21 healthy controls	Specific difficulties with reading, writing, and calculation were found in 9 out of 20 children with RE and 2 out of 21 healthy controls ($chi^2 = 0.01$). Learning disabilities in patients with RE were correlated with a marked increase in epileptiform discharges during sleep ($chi^2 = 0.02$) (relevant in Table 2)	Patients with RE have academic difficulties
Ay et al., 2009	Case–control	51	35 children with RE and 16 healthy controls underwent standardized neuropsychological testing	Patients exhibited significantly impaired visuomotor and reading ability and attention to verbal stimuli compared with control subjects	RE may cause learning disabilities
Danielsson & Petermann 2009	Case–control, retrospective	50	25 children with RE/RS and 25 healthy controls were compared	For children with RE/RS, cognitive testing revealed increased verbal and nonverbal deficits and visual-constructive performance deficit as compared with children in the control group	There is an association between RE and language and memory deficits
Goldberg-Stern et al., 2010	Case–control	51	36 children with RE were tested for cognitive functions prior to commencing treatment with antiepileptic drugs, and the findings were compared with those in 15 healthy children	Scores for verbal functioning on neuropsychological tests were significantly lower in the study group	Children with RE have impaired ability to process verbal information

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Table 1 (*continued*)

Study	Design	Sample size	Methods	Findings	Conclusion
Oliveira et al., 2010	Case–control	38	19 children with RE and 19 healthy controls were compared	Children with RE had a significantly poorer performance when compared to the control group in tests involving writing, arithmetic, and reading	Assessment of children with RE is necessary to investigate specific deficits that require appropriate professional assistance
Overvliet et al., 2011	Cross sectional	48	Patients were screened for language impairment and reading skills	23% of children with RE had speech therapy in the past and 35% repeated a year on primary school	Language is impaired in children with RE
Miziara et al., 2012	Case–control	40	40 patients and variable numbers of controls (based on the tests) were evaluated by applying a school performance test	Children with RE showed lower scores in academic performance	Children with RE have difficulties in their academic performance
Vinţan et al., 2012	Case–control	36	Neuropsychological assessment of 18 children with RE compared with a matched control group was done	Substantial differences were identified for the visual memory subtests	RE is associated with subtle neuropsychological deficits
Neri et al., 2012	Case–control	53	25 children with RE and 28 healthy controls were studied. A comprehensive neuropsychological battery was used	RE children had worse performance than the control group in some categories of the Wisconsin Card Sorting Test, the Trail Making Test part B, and the Verbal Fluency Test	Regarding cognition, the term benign should be used cautiously in RE
Overvliet et al., 2013	Case–control	50	25 children with RE and 25 healthy controls were tested on their language function using the CELF-4 (Clinical evaluation of Language Fundamentals, Dutch edition)	The core language score was significant lower in patients with RE compared with healthy controls	Language is impaired in children with RE
Verrotti et al., 2013	Cross sectional	17	9 patients with RE and 8 siblings underwent clinical and neuropsychological evaluations	A significant impairment was found in language domain, attentional functioning, and verbal memory in both patients and siblings	This study supports the hypothesis of a specific neurocognitive phenotype in RE
Ayaz et al., 2013	Case–control	62	Behavioral problems were assessed by the Child Behavior Checklist (CBCL) and psychiatric diagnoses were established by using the Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime Version	The RE group presented more psychiatric disorders. Verbal and total IQ scores in the RE group were lower. The RE group had a higher externalizing score and higher total scores in CBCL.	RE had negative effects on attention and IQ performance and increased behavioral problems and psychiatric disorders
Kim et al., 2014	Retrospective	74	Record review for ADHD	65% of patients had ADHD	Children with RE have a high prevalence of ADHD
Oliveira et al., 2014	Case–control	62	31 patients with RE and 31 paired children underwent a language and neuropsychological assessment performed with several standardized protocols	Dyslexia occurred in 19.4% and other difficulties in 74.2% of patients with RE. This was significant when compared with the control group ($p < 0.001$)	Dyslexia occurs in patients with RE
Filippini et al., 2016	Case–control	30	15 school-aged children with RE and 15 healthy children were assessed with a comprehensive neuropsychological battery	Significant differences between patients and controls emerged in 3 domains: language, executive functions, and academic skills	Children with new-onset RE may demonstrate a range of neuropsychological dysfunctions
Currie et al., 2018	Cross sectional	64	25 children with RE and a comparison group ($n = 39$) completed assessments of reading comprehension, listening comprehension, word/nonword reading, speech articulation, and nonverbal IQ	Reading comprehension and word reading were worse in children with RE	Children with RE may be at risk of poor reading comprehension

RE: rolandic epilepsy; RS: rolandic spike; ADHD: attention-deficit hyperactivity disorder; IQ: Intelligence quotient.

Table 2
Influence of epileptic activity on cognitive performance in RE: EEG studies.

Study	Design	Sample size	Methods	Findings	Conclusion
Baglietto et al., 2001	Prospective	18	9 children with RE with marked activation of interictal epileptic discharges (IEDs) during sleep, and 9 unaffected control children were enrolled in a prospective study	At the time of detection of IED activation during sleep, patients showed a mean Full-Scale IQ score significantly below that of control participants. At the time of IED remission, neuropsychological reevaluation showed a notable increase in IQ score and a significant improvement in cognitive function	IEDs in RE are associated with cognitive problems
Riva et al., 2007	Case–control	24 children with an active centrotemporal focus, compared them with a group of 16 controls matched for age and schooling	Interictal EEG and neuropsychological assessment	Interictal EEG discharges demonstrated that a high rate of occurrence while awake, multifocal location, and temporal prominence seem to impair some of neuropsychological functions	RE-type epileptic activity plays a role in generating cognitive problems
Nicolai et al., 2007	Retrospective	28 children with RE	24-hour EEG recordings	The presence of intermittent slow wave focus during wakefulness, a high number of spikes in the first hour of sleep, and multiple asynchronous bilateral spike–wave foci in the first hour of sleep correlates significantly with educational or behavioral impairment	Some EEG Characteristics of patients with RE correlate with educational impairments
Fonseca et al., 2007	Cross sectional	33 children with RE	Simultaneous EEG and computerized neuropsychological testing in a visual discrimination between words and pseudowords task	Of 13 children with RS between stimulus presentation and response, only 2 (15.4%) made a significantly greater proportion of errors during RS than during RS-free periods	Transitory cognitive impairment occurred in a limited number of children with RE and did not impair their school performance
Ebus et al., 2011	Retrospective	26 children with RE and/or rolandic spikes	24-hour EEG and neuropsychological assessment	There is a significant negative correlation between amount of nocturnal epileptiform activity and reading sentences	Reading performance is impaired in children with RE and is correlated with the amount of nocturnal epileptiform activity
Xiao et al., 2016	Cross sectional	22 medication-naive patients with RE	EEG-fMRI with a 3-T MRI scanner	The analysis of dynamic changes revealed positive correlations between bilateral rolandic areas and left inferior frontal gyrus, left inferior parietal lobe and supramarginal gyrus, and right inferior frontal gyrus and left caudate	Interictal rolandic spikes directly disrupt the functional brain networks responsible for language, behavior, and cognition
Nissenkorn et al., 2017	Retrospective	34 children with RE	Sleep EEG and neurocognitive evaluation	Children with epileptiform activity of more than 50%, had lower score in fine motor tasks, but not in other neurocognitive performances	No significant negative cognitive effect of abundant epileptiform activity was observed
Danhofer et al., 2018	Prospective	32 children with RE	All-night EEG monitoring and complex neuropsychological testing	The occurrence of epileptiform discharges on nocturnal EEG was positively related to higher attention deficit and higher impulsivity	There is a significant negative impact of epileptiform discharge activation in patients with RE on their neuropsychological profiles

RE: rolandic epilepsy; RS: rolandic spike; IED: interictal epileptic discharges; EEG: electroencephalography; MRI: magnetic resonance imaging; fMRI: functional MRI.

are a manifestation of an underlying cerebral process that gives rise to the electrical and functional (e.g., cognitive) abnormalities in these children [56].

4.3. Is LEV efficacious in controlling seizures in patients with RE and superior to CBZ with respect to reducing the burden of interictal epileptiform discharges?

The brief answer is "yes"! Levetiracetam monotherapy is effective and well-tolerated in children with RE [45,47,50]. In addition, LEV affects interictal epileptiform discharges in RE [41], and LEV seems to be superior to CBZ in its ability to suppress the interictal epileptiform discharges in children with RE [40]. In one study of 22 drug-naive patients with epilepsy (not RE cases), the authors investigated the cognitive effects of LEV monotherapy with quantitative electroencephalogram (EEG) analysis and neuropsychological tests; they concluded that LEV was associated with acceleration of background EEG frequencies and improvement in cognitive function [57]. In one study of 26 children with no prior history of seizures consistent with RE, who had rolandic spikes found coincidentally on EEG, in a subset of children ($n = 7$) who reported comorbid language or learning difficulties, the authors prescribed an empiric trial of LEV [58]. They concluded that incidental rolandic spikes may represent a discrete neurological condition, with about one-quarter of the patients later developing epilepsy; some of these children may experience improvement in their intellectual functioning with LEV [58]. On the other hand, CBZ may worsen speech problems in children with RE [5], and transition of children with RE from their previous AED regiment to LEV may cause improvement in their cognitive function [39]. An open-label, noninterventional, controlled surveillance study that evaluated the cognitive outcome of patients, who were administered LEV (#370) or CBZ (#128) monotherapy, showed a mild but definitely superior cognitive outcome with LEV as compared with CBZ monotherapy [59]. As a result of the above findings, some experts believe that we should consider adding RE to the list of exceptions to the adage "Treat the child, not the EEG" [56]. However, we should keep in mind that LEV is not free of adverse effects. Incidence of adverse events with LEV is similar to other AEDs [60]. The most commonly reported adverse events with LEV in children are somnolence and irritability or behavioral problems [61]. Whether treatment of interictal epileptiform discharges in children with RE is indicated to

Table 3
Effects of antiepileptic drug therapies in RE: drug studies.

Study	Design	Sample size	Methods	Findings	Conclusion
Rating et al., 2000	A 6-month randomized, double-blind, placebo-controlled study	66	31 received STM and 35 received placebo	1. 25 of the 31 STM-treated patients (81%) and 10 of the 35 placebo-treated patients (29%) completed the trial without any treatment failure events ($p = 0.00002$) 2. 10 STM-treated patients had a normal asleep EEG after 6 months	STM is remarkably effective in preventing seizures in patients with RE
Kramer et al., 2002	Comparative trial	56	38 patients who received CBZ and 18 patients who received STM were studied	1. Cessation of seizures was observed in 73.6% of the CBZ group and in 66.7% of the STM group (p = not significant) 2. Normalization of interictal epileptiform activity on EEG was seen more often following treatment with STM (71%) than with CBZ (42%) (p = not significant)	No significant differences between these two medications were found
Tzitiridou et al., 2005	Monotherapy trial	70	OXC monotherapy 25 mg/kg/day	1. Sustained cessation of seizures was observed in 53% of patients 2. Normalization of interictal epileptiform activity was observed in 58% of patients	OXC is effective in preventing seizures and normalizing EEGs and seems to preserve cognitive functions and behavioral abilities as long-term monotherapy
Park et al., 2005	Prospective	11	Patients were assessed for standardized full articulation. Speech problems were assessed before and after treatment with CBZ	Speech problems were present in patients with RE and worsened after CBZ treatment	Patients with RE treated with CBZ should be monitored for language and speech problems
Kossoff et al., 2007	Pilot study	6	Children were transitioned from their current AED to 40 mg/kg/day LEV over a 2-week period and retested at 6 months for language function	5 had improvement in auditory verbal memory	LEV may have a beneficial effect on language in children with RE
Coppola et al., 2007	An open-label, parallel group trial	39	21 children received LEV and 18 received monotherapy with OXC, randomly	1. After 18.5 months, 19 out of 21 patients (90.5%) on LEV, and 13 out of 18 (72.22%) on OXC did not have further seizures 2. Adverse side effects on LEV were reported in 3 children (14%), and on OXC in 2 (11%)	LEV and OXC may be potentially effective and well-tolerated drugs for children with RE
Verrotti et al., 2007	Clinical trial	21	LEV was administered as a first drug (in 9 patients) or converted after previous treatment with other AEDs (in 12)	At the end of follow-up (12 months), all patients were seizure-free or showed a reduction of seizures >50%, without any important adverse effect	LEV monotherapy is effective and well-tolerated in children with RE
Borggraefe et al., 2013	A double-blinded, randomized, controlled trial	43	Patients randomly were allocated to either LEV or STM treatment group	1. Treatment failure events occurred in 4 patients (19%) in the LEV treatment group and in 2 patients (9%) in the STM treatment group ($p = 0.4$) 2. Adverse events occurred more frequently in the LEV group compared with STM group	The rates of seizure-free patients were high in both groups
Xiao et al., 2014	Comparative trial	56	33 children received LEV and 23 received VPA as initial monotherapy	1. The seizure-freedom rates were not significantly different between the two groups 2. greater number of the children taking VPA achieved EEG normalization compared to those taking LEV (95% vs. 72% at 18 months)	Low-dosage VPA and LEV monotherapies are equally effective in controlling seizures, but VPA exhibited better efficacy than LEV in improving the electrophysiological abnormalities
Liu et al., 2016	Monotherapy trial	85	In A group, TPM was orally administrated once a night, with a final dose of 2 mg/kg/day. In B group, TPM was orally administrated twice a day, with a final dose of 4 mg/kg/day.	There was no significant difference in overall efficacy rate, or changes in EEG activity between the two groups. The rate of adverse reactions for A group was 9.1%, which was significantly lower than the 29.3% for B group	Nightly oral administration of TPM is a feasible strategy for the treatment of RE
Han & Kim, 2018	Retrospective	120	The patients were randomly treated with LTG, OXC, or TPM monotherapy, and underwent EEG and standardized language tests	1. The seizure recurrence rates in the LTG, TPM, and OXC groups were 19.4%, 21.7%, and 11.4% 2. Patients in The LTG and OXC groups showed significant improvements in their language tests 3. EEG improvements were not related to language function	The improvements in language and problem-solving performance in children with RE were greater for LTG and OXC than for TPM

Table 3 (*continued*)

Study	Design	Sample size	Methods	Findings	Conclusion
Kanemura et al., 2018	Comparative trial	197	89 patients treated with CBZ, 73 patients with VPA, and 35 patients with LEV. EEG response to AED treatment was classified as complete disappearance and response (≥50% reduction in RS frequency)	Responders comprised 11.2% of the patients treated with CBZ, 56.2% of the patients with VPA, and 71.4% the patients with LEV	LEV seems to be superior to CBZ and VPA in its ability to suppress RDs in children with RE
Zhang et al., 2018	Case–control	40	The modulation effects of LEV on the fMRI activation/deactivation patterns associated with centrotemporal spikes (CTS) in RE was studied. 40 patients with RE, including LEV-medicated patients (n = 20) and drug-naive patients (n = 20), were studied	LEV inhibits CTS-associated activation intensity and alters the temporal pattern of this activation in the epileptogenic regions, and it also affects the brain deactivation related to higher cognition networks	LEV affects RS in RE

RE: rolandic epilepsy; RS: rolandic spike; EEG: electroencephalography; CTS: centrotemporal spikes; AED: antiepileptic drug; LEV: levetiracetam; STM: sulthiame; LTG: lamotrigine; VPA: valproic acid; CBZ: carbamazepine; TPM: topiramate; OXC: oxcarbazepine.

improve their cognitive problems should be tested in double blind randomized clinical trials in the future. In addition, the optimal LEV dosage to suppress interictal epileptiform discharges in children with RE is to be determined.

In conclusion, physicians taking care of children with RE should be aware of the risks for cognitive dysfunctions in these patients and screen their patients for any subtle dysfunction that may affect their academic performance and achievement. If and when the physician decides to prescribe an AED for their patients with RE, LEV is probably a better option compared with CBZ to prescribe in these children.

Conflict of interest

Ali A. Asadi-Pooya, M.D.: Honoraria from Cobel Darou; Royalty: Oxford University Press (Book publication); Research support from NIMAD. Mahta Forouzesh, M.D.,

Hamid Eidi, M.D., D.B.A., Seyed Emad Mirzaghafour, D.V.M. are employees of Cobel Darou.

Acknowledgments

This study was supported by Cobel Darou.

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