



RESEARCH ARTICLE

Epilepsy, Attention-Deficit/Hyperactivity Disorder and Methylphenidate: Critical Examination of Guiding Evidence

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Abstract

Objective: Attention-Deficit/Hyperactivity Disorder (ADHD) and epilepsy are commonly comorbid; yet in the psychiatric literature, there is a remarkable paucity of guiding evidence regarding the safety and efficacy of treatment using methylphenidate (MPH) in this population. The objective of this review is to critically appraise evidence regarding the treatment of ADHD in the context of seizure disorders in order to better inform management considerations and practices. **Method:** A comprehensive search of the Central, Embase, Medline, and Web of Science databases identified 349 references. After a thorough review, only nine relevant references contributing new information and providing reliable and interpretable data were identified; seven were prospective studies (two double-blind placebo controlled trials, five open-label trials) and two were retrospective reviews. Prospective studies were then reviewed in detail, critically appraised, and interpreted. **Results:** All studies reported no increase in seizure rates in a majority of participants after exposure to MPH. MPH was effective in treating ADHD symptoms. However, the following major limitations to the studies impede drawing confident conclusions: small sample sizes, lack of uniformity regarding seizure type and severity, seizure-free period pre-stimulant treatment, and low baseline seizure rates. **Conclusions:** Given the academic, social, emotional, and functional impact of untreated ADHD, a watchful approach to the use of MPH in children with stable epilepsy who are impaired by ADHD symptoms is justified.

Key Words: *epilepsy, seizure, attention-deficit/hyperactivity disorder, ADHD, stimulant, methylphenidate.*

Résumé

Objectif: Le trouble du déficit d'attention avec hyperactivité (TDAH) et l'épilepsie sont fréquemment comorbides; et pourtant, dans la littérature psychiatrique, il y a une remarquable rareté de données probantes directrices concernant l'innocuité et l'efficacité du traitement par méthylphénidate (MPH) dans cette population. L'objectif de cette revue est d'évaluer de façon critique les données probantes sur le traitement du TDAH dans le contexte des troubles convulsifs afin de mieux éclairer les considérations et pratiques de prise en charge. **Méthode:** Une recherche exhaustive des bases de données Central, Embase, Medline, et Web of Science a identifié 349 références. Après un examen minutieux, seulement neuf références pertinentes apportant une information nouvelle et offrant des données fiables et interprétables ont été relevées; sept étaient des études prospectives (deux essais à double insu contrôlés contre placebo, cinq essais ouverts) et deux étaient des revues rétrospectives. Les études prospectives ont ensuite été examinées en détail, ont fait l'objet d'une évaluation critique, et ont été interprétées. **Résultats:** Toutes les études n'indiquaient aucune hausse des taux de crises d'épilepsie chez une majorité de participants après une exposition au MPH. Le MPH était efficace pour traiter les symptômes du TDAH. Toutefois, les limitations majeures suivantes des études empêchent de tirer des conclusions en toute confiance : petites tailles d'échantillons, absence d'uniformité à propos du type et de la gravité des crises, période sans crise avant le traitement par stimulant, et faibles taux de crises au départ. **Conclusions:** Étant donné l'effet scolaire, social, émotionnel et fonctionnel du TDAH non traité, une approche vigilante de l'utilisation du MPH chez les enfants dont l'épilepsie est stable et qui sont aux prises avec les symptômes du TDAH est justifiée.

Mots clés: *épilepsie, crise, trouble du déficit d'attention avec hyperactivité, TDAH, stimulant, méthylphénidate.*

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Introduction

Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder affecting approximately 5%-7% of children worldwide (Polanczyk, Silva de Lima, Horta, Biederman, & Rohde, 2007). ADHD, characterized by developmentally excessive levels of inattention, overactivity, and impulsiveness is recognized more frequently among schoolchildren than among adolescents and is more common in boys than in girls. Epilepsy is a disease characterized by recurrent, unprovoked epileptic seizures (transient occurrences of abnormal excessive or synchronous neuronal activity in the brain) or by a single seizure in the presence of other factors that connotes a high recurrence risk (Fisher et al., 2014). It affects 0.5% of the general population (Epilepsy Canada, www.epilepsy.ca) and, in children, rates range from 0.05%-0.1% (Hauser, 1994).

ADHD is overrepresented in the pediatric epilepsy population, and its prevalence has been reported to be as high as 20%-40% (Dunn & Kronenberger, 2005). Although other recent studies suggest that the difference might not be as large, it is still significantly greater than general population estimates (Kaufmann, Goldberg-Stern, & Shuper, 2009; Socanski, Aurlen, Herigstad, Thomsen, & Larsen, 2013). The reverse is also true, in that 2.3% of children with ADHD have epilepsy (Socanski et al., 2013) which is higher than general population rates. The inattentive presentation of ADHD appears to be the most common in the epilepsy population (Dunn & Kronenberger, 2003; Koneski, Casella, Agertt, & Ferreira, 2011), although other studies suggest that, as in the general population, the combined type is most common (Gonzalez-Heydrich et al., 2007; Socanski et al., 2013). The male to female ratio also appears to be closer to 1:1 (vs 2-3:1 in ADHD without epilepsy) (Dunn & Kronenberger, 2003), but other studies suggest that it is closer to the 3:1 rate observed in the general population (Socanski et al., 2013).

Kaufmann et al. (2009) proposed mechanisms explaining the epilepsy and ADHD comorbidity. The first hypothesis is that there are independent circumstantial factors; both ADHD and epilepsy are common in childhood and, therefore, may occur together. The second hypothesis is that there is a common underlying factor affecting neurochemistry and neurogenesis such as genetics, biochemistry (possibly adrenergic), or gene/environment interaction. The third hypothesis is that one condition has direct causative effects on the other condition; for example, the impact of clinical or subclinical epileptiform discharges on vigilance, memory, and processing speed (Austin et al., 2001); the side effects of antiepileptic drugs (AEDs) such as topiramate, associated with cognitive dulling (Martin et al., 1999), and phenobarbital, associated with disinhibition (Bourgeois, 1998); or that ADHD may somehow decrease seizure threshold (Aldenkamp, Arzimanoglou, Reijts, & Van Mil, 2006). However, there is evidence suggesting that

some of the previous theories may not hold. For example, the comorbidities of ADHD with and without epilepsy are similar so ADHD and epilepsy may not have a common underlying cause (Gonzalez-Heydrich et al., 2007); inattention may start before the first recognized seizure (Dunn & Kronenberger, 2003) which suggests epilepsy would not likely be a causative factor. Furthermore, optimizing seizure control or normalizing electroencephalograms (EEGs) with AEDs does not significantly reduce ADHD symptoms (Schneebaum-Sender, Goldberg-Stern, Fattal-Valevski, & Kramer, 2012). Consequently, it can be concluded that the mechanism explaining ADHD-epilepsy comorbidity is yet to be elucidated.

Regulatory bodies in Canada and the United States have issued warnings regarding the risk of methylphenidate (MPH) lowering the seizure threshold. The Canadian Compendium of Pharmaceuticals and Specialties (CPS) states:

“There is some clinical evidence that Ritalin may lower the convulsive threshold in patients with prior history of seizures...Clinical experience has shown that a small number of patients may experience an increase in seizure frequency when treated with Ritalin. If seizure frequency rises, the drug should be discontinued.”

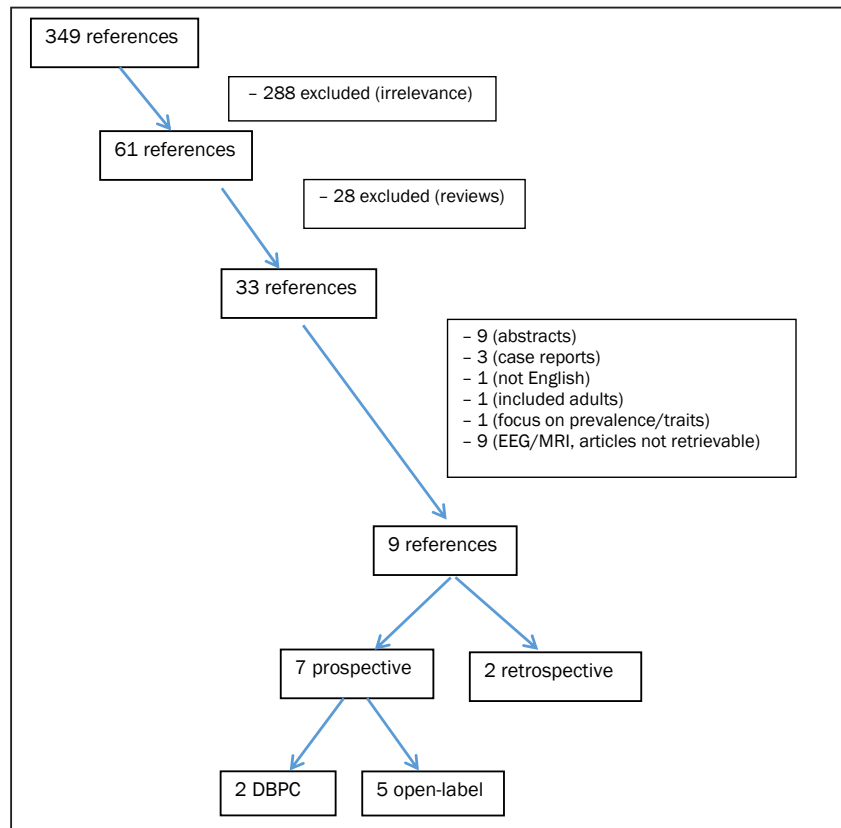
The Food and Drug Administration in the United States (FDA) lists seizures, mainly in patients with a history of seizures, as a serious side effect of MPH and also warns against using MPH in people with seizures (U.S. Food and Drug Administration, www.fda.gov, “Ritalin Medication Guide”). These concerns are echoed by the American Physician’s Desk Reference (Physician’s Desk Reference, www.pdr.net) and the British National Institute for Health and Clinical Excellence (NICE) guidelines (Harpin, 2008).

The implications of these many cautions is that practitioners may hesitate to use MPH to treat ADHD in children with epilepsy (Tan & Appleton, 2005), which can then impact on aspects of functioning and quality of life with decreased academic performance and self-esteem (Schubert, 2005).

Although ADHD is frequently seen in child psychiatry settings, virtually all papers investigating the treatment of ADHD comorbid with epilepsy have appeared in Neurology or Pediatrics journals. This review paper attempts to close this gap by widening the target audience to include Psychiatry. The purpose of this review is to critically appraise the evidence regarding ADHD, seizure disorder, and MPH use in children in order to better inform treatment considerations and practices.

Methods

A thorough and comprehensive search of the following databases was conducted: Central, Embase, Medline, and Web of Science. Keywords included “Attention Deficit Disorder with Hyperactivity” (exploded), “Epilepsy” (exploded),

Figure 1. Selection process for relevant and interpretable studies

“Methylphenidate” (and all brand names), and “Child” (exploded). The keywords were kept quite broad so as to be as inclusive as possible. The search was limited to the English language. An initial scan of recent review articles using the more general keyword “stimulant” indicated that the bulk of the data is related to methylphenidate rather than to amphetamines, therefore it was decided to limit the search to methylphenidate in an effort to maximize the possibility of meaningful data interpretation.

The process of identification of studies contributing new information and providing reliable and interpretable data is described in the following paragraph and summarized in Figure 1. The broad literature search identified 349 references; 288 were excluded because the primary objectives were not ADHD, seizure disorder, or MPH; or they were not focused on a child and adolescent population. Examination of the remaining 61 references resulted in the further exclusion of 52 references as they did not represent original information, were conference abstracts or case reports, involved adults and did not delineate individual results, were indirectly related (focused on EEG and MRI studies), or the abstract/full text could not be retrieved. Thus, nine relevant references producing new data were identified: seven were prospective studies (two double-blind placebo controlled trials (DBPC), five open-label trials) and two

were retrospective reviews (Fosi, Lax-Pericall, Scott, Neville, & Aylett, 2013; Gonzalez-Heydrich et al., 2014). For the purposes of this paper, we will focus exclusively on the prospective studies as they provide the most reliable and interpretable data. The studies are summarized in Table 1.

Results

Effects of MPH on seizure control

The first critical issue examined was the effect of MPH on seizure control. The data is summarized in Table 2. The two double-blind placebo controlled trials are described first, followed by the five open-label prospective studies to allow the reader an opportunity to appreciate the data landscape potentially informing practice.

Feldman et al. (1989) studied ten patients (eight male, two female) with ADHD (DSM III criteria), subtypes not specified; and epilepsy, no seizures for the previous three months, mixed seizure types. IQ was not one of the exclusion criteria, and 60% of participants were in special education programs. This was a double-blind placebo controlled cross-over study of Immediate Release (IR) MPH; dosing of MPH IR was 0.3 mg/kg/dose AM and noon. Each child acted as their own control. Most were being treated with AED monotherapy, primarily with carbamazepine (5/10);

Table 1. Summary of prospective trials retrieved regarding Epilepsy, ADHD, and MPH in children

First Author/Year	Design	N and population	Severity of epilepsy	Treatment dosage	Effects on sz frequency	Effects on ADHD
Feldman 1989	Prospective, DBPC (cross-over), Followed for 8 weeks	N = 10 Epilepsy (mixed), ADHD (DSM-III)	No sz in previous 3 months	MPH 0.3 mg/kg/dose, QAM and QNOON	No sz during the 1-month study, no sz reported in the 5 who continued taking MPH 3-12 months after study ended.	Improvement in 7/10 (p<0.05) (Conner's teacher's rating scale, Finger tapping task). NOTE: No changes in Conner's parent rating scale
Gonzalez-Heydrich 2010	Prospective, DBPC (cross-over, pilot), Followed for 1-3 weeks	N = 33 Epilepsy, ADHD (~ 50% inattentive, ~ 50% combined)	No sz in previous 1 month	OROS MPH (3 patients - 18mg, 9 patients - 36mg, 21 patients - 54mg). Max dose for 1 week. Target dose < 1mg/kg/d for 11 patients, 1-1.5 for 13 patients, and 1.5-2 for 9 patients.	5 sz on OROS (1/5 on 18 mg, 2/5 on 36 mg, 2/5 - in 1 individual - on 54 mg), 3 sz on PBO.	Improvement in 60-70% at 54 mg compared to PBO (ADHD Rating Scale IV Home version). Related to increasing dose.
Santos 2013	Prospective, open-label, Followed for 4 weeks	N = 22 Epilepsy (mixed), ADHD	"Active" epilepsy: ≥1 sz in previous 3 months	MPH 0.36 mg/kg/d (max 0.8mg/kg/d)	1/22 had increase in sz frequency Of the 10 patients who had achieved sz control, 3 had recurrence but frequency was similar or reduced as compared to prior.	Improvement in 16/22 (73%) (subthreshold on SNAP-IV)
Koneski 2011	Prospective, open-label, Followed for 6 months	N = 24 Epilepsy, ADHD (10 (41.7%) ADHD-I, 9 (37.5%) ADHD-C, 5 (20.8%) ADHD-HI). MPH naïve.	"Uncontrolled seizures": ≥2 sz in previous 6 months, treated with AED	MPH 0.5 mg/kg/d (max 22 mg/d)	No increase in sz frequency in 22/24 (91.6%) - 5 had no sz, 7 had fewer sz, 10 had same frequency. The 2/24 (8.3%) who had increase in sz frequency both had high frequency at baseline.	Improvement in 70.8% (SNAP-IV, p<0.001)
Yoo 2009	Prospective, Open-label, Followed for 8 weeks	N = 25 Epilepsy (50% partial 50% generalized), ADHD (60% ADHD-C, 40% ADHD-I). 36% had MR.	No sz in previous 3 months	OROS MPH 1.0±0.4 mg/kg/d	23/25 did not experience sz. 2/25 had sz within 2 weeks of dose increase	Improvement on average, p<0.001 (ADHD Rating Scale) - individual results not provided NOTE: Primary measure was Quality of Life.

continued

Table 1. continued

First Author/Year	Design	N and population	Severity of epilepsy	Treatment dosage	Effects on seizure frequency	Effects on ADHD
Gucuyener 2003	Prospective, Open-label, Followed for 12 months	N = 119 Epilepsy (mixed, N=57) or EEG abnormality only (N = 62), ADHD	“Active” epilepsy: mean sz freq in previous 1 yr was 8.2 ± 3.9 (but Table 1 states 12.9 ± 7.1)	MPH 0.3-1 mg/kg/d, titrated up to twice daily dosing	In epilepsy group, mean sz frequency remained the same (increased in 5/57).	Improvement in 92/119 (77%), p=0.01 (teacher/parent Conner’s rating scales) NOTE: similar results in sz group and EEG-abn group
Gross-Tsur 1997	Prospective, (DBPC design on testing days only), Followed for 8 weeks on MPH	N = 30 Epilepsy (mixed), ADHD (DSM III)	No specific criteria. In 8 weeks prior, no sz in 25/30, 1 sz in 1/30, 2 sz in 4/30	MPH 0.3 mg/kg QAM	No change in sz frequency (sz-free remained sz-free, 3/5 with sz had increase, 1/5 had no change, 1/5 became sz-free)	Improvement in 70% (parental reports, enhanced Continuous Performance Test)

sz = seizure; abn = abnormal

other treatments included valproic acid (2/10), phenytoin (1/10), and phenobarbital (2/10). The authors highlighted that ADHD symptoms did not worsen with the barbiturate. The children were followed for four weeks on MPH IR / Placebo (PBO), followed by a two week “wash-out” period, followed by another four-week trial of PBO / MPH IR. There were no seizures during the study period, and no seizures were reported in the five children who continued taking MPH 3-12 months after the study ended. They also observed that EEGs did not deteriorate: two had minor changes, not associated with seizure and, in one case, the EEG actually improved.

Gonzalez-Heydrich et al. (2010) conducted a DBPC cross-over pilot study of Osmotic Controlled-Release Oral Delivery System MPH (OROS MPH). They studied 33 patients with ADHD, moderate to severe, 50% inattentive and 50% combined; and epilepsy, no seizures in the previous one month, mixed seizure types. IQ was one of the exclusion criteria. They utilized a dosing escalation strategy: participants were first randomized to placebo or OROS MPH for a certain number of weeks, then off medications for one week, and then crossed-over to the other condition. If they tolerated the lowest dose, then some participants were moved up the dosing scale to a maximum of 54 mg or 2 mg/kg. Three participants stayed on OROS MPH 18 mg, nine participants on 36 mg, and 21 participants on 54 mg. Therefore, the target dose varied depending on the patient (< 1 mg/kg/d for 11 patients, 1-1.5 mg/kg/d for 13 patients, and 1.5-2 mg/kg/d for nine patients). Participants were followed for up to three weeks (18 mg patients were followed for one week, 36 mg for two weeks, and 54 mg for three weeks). The maximum dose for each group was limited to a one-week duration to minimize time spent on placebo. In this study, differences in the rate of seizures between the OROS

MPH group and the PBO group were not significant (five seizures occurred while on OROS MPH: 1/5 on 18 mg, 2/5 on 36 mg, 2/5 on 54 mg – one patient; versus three seizures during the PBO phase). There was no significant worsening of epilepsy and no status epilepticus. However, the authors did note significantly more seizures on the 1.2-2 mg/kg/d dose than in the <1.2 mg/kg/d dose. They concluded that increasing the dose of OROS MPH may warrant caution, but not a concrete warning, due to the small sample size and low number of seizure events during the study.

Santos et al. (2013) conducted an open label, non-controlled trial of 22 patients with ADHD and a variety of epilepsy types and “active” illnesses, defined as at least one seizure in the preceding three months while on adequate AED. A baseline period of three months during which AED treatment was optimized and seizure control was achieved in 10/22 patients was followed by three months of MPH up to 0.8 mg/kg/d (average 0.36 mg/kg/d). Only one patient experienced an increase in seizures compared to baseline; among the ten patients who had achieved seizure control, three had recurrences, but the frequency was similar or reduced as compared to baseline. Seizure severity did not worsen; in fact, seizure severity was significantly reduced, which the authors surmise may be related to heightened vigilance or continued effects of the AED optimization made in the baseline period. Koneski et al. (2011) conducted a prospective study, registering 24 children with ADHD and “uncontrolled” seizures, which they defined as at least two seizures in the last six months. All were treated with AED and were MPH naïve. Average dosing of MPH was 0.5 mg/kg/d (22 mg/d), and patients were followed for six months. They reported no increase in seizure frequency in 22/24 (91.6%); five had no seizures during the study, seven had fewer than baseline, and ten had the same frequency.

Table 2. Effects of MPH on seizure control in children with epilepsy and ADHD: prospective studies			
Study (first author, year)	N	Participants not having increase in seizure rate #	Participants not having increase in seizure rate %
Feldman, 1989	10	10	100
Gonzalez-Heydrich, 2010	33	33	100
Santos, 2013	22	18	82
Koneski, 2011	24	22	92
Yoo, 2009	25	23	92
Gucuyener, 2003	57	52	91
Gross-Tsur, 1997	30	27	90
Average	201	185	92

Table 3. Effects of MPH on ADHD symptoms in children with epilepsy and ADHD: prospective studies that provided raw data			
Study (first author, year)	N	Participants improving from MPH use #	Participants improving from MPH use %
Feldman, 1989	10	7	70
Gross-Tsur, 1997	30	21	70
Santos, 2013	22	16	73
Koneski, 2011	24	17	71
Average	86	61	71

There was an increase in seizure frequency in 2/24 (8.3%), both of whom had high frequency of seizures at baseline. Yoo et al. (2009) conducted an eight-week open-label trial of OROS-MPH on 25 patients with a variety of epilepsy types who had been seizure-free for three months. Sixty percent had ADHD combined, 40% ADHD inattentive, and 36% had an intellectual disability. They found that only 2/25 had a seizure within two weeks of dose increase, but not severe enough to discontinue OROS-MPH. Gucuyener et al. (2003) conducted an open-label study enlisting 57 participants with active epilepsy (variety of seizure types) and 62 participants with EEG abnormalities; all had ADHD and were at an increased risk for developing seizures. They treated with MPH 0.3-1 mg/kg/d, titrating up to twice daily dosing. Participants were followed for one year. In the epilepsy group, the mean seizure frequency remained the same, but increased in 5/57 cases; EEG readings were on average improved. Gross-Tsur, Manor, vanderMeere, Joseph, & Shalev (1997) conducted a prospective study of 30 children with a variety of epilepsy types and ADHD. Twenty-six out of 30 were receiving monotherapy AED, and the remainder were on more than one AED. The design was eight weeks of AED only, followed by eight weeks of AED + MPH (0.3 mg/kg, AM). They utilized a double-blind placebo controlled design on testing days (including AED drug

levels, EEG, and Continuous-Performance Task). They reported no change in seizure frequency: seizure free remained seizure free; 3/5 with seizures had an increase, 1/5 had no change, and 1/5 became seizure free.

Effects of MPH on ADHD symptoms in children with epilepsy

A summary of the findings are presented in Table 3. The two DBPC trials discussed earlier suggest that about 70% of participants improved with respect to ADHD symptoms, consistent with general population rates (Feldman et al., 1989; Gonzalez-Heydrich et al., 2010). Specifically, Feldman et al. (1989) reported that seven out of ten participants improved significantly, and Gonzalez-Heydrich et al. (2010) reported that 60%-70% of participants improved on OROS MPH 54 mg. Of the open-label trials, only three provided the raw data regarding how many participants improved; overall, consistent with general population rates, MPH response rates were 71%. Gonzalez-Heydrich et al. (2010) commented on possible factors impacting on treatment response, such as type of seizure disorder and ADHD sub-classification. They noted that children with generalized seizure onsets (N=7) had less robust responses than those with focal onsets (N=26); they also reported a non-significant trend for children with the ADHD inattentive

presentation having a less robust response than those with the combined presentation.

Tolerability of MPH in children with ADHD and epilepsy

All but one study (Koneski et al., 2011) reported adverse side effects, albeit via varying measures (parent report versus scales). They were consistent with known side effects of MPH, such as loss of appetite (Feldman et al., 1989; GrossTsur et al., 1997; Gucuyener et al., 2003; Santos et al., 2013; Yoo et al., 2009), headache (GrossTsur et al., 1997; Gucuyener et al., 2003; Santos et al., 2013), and insomnia (Gonzalez-Heydrich et al., 2010; GrossTsur et al., 1997; Gucuyener et al., 2003; Yoo et al., 2009). Feldman et al. (1989) ascertained side effects of appetite suppression and minor emotional lability via parent report. Gonzalez-Heydrich et al. (2010) used the Barkley Side Effects Checklist – Modified (BSECM) and found the most common side effects were emotional lability (more severe on OROS-MPH than on PBO), insomnia, overfocus, and tics. All side effects were transient.

Discussion

From a first glance, it may be reasonable to conclude from the above presented evidence that MPH is relatively safe and effective for use in children with comorbid ADHD and epilepsy (when results from all the studies are averaged, 92% of participants do not experience an increase in seizure frequency, and 71% experience improvement in ADHD symptoms). However, major limitations to these studies impede drawing confident conclusions. Only two studies follow a double-blind placebo controlled design. Small sample size was often the case; thus under-power was the rule. The number of seizures during a study was often too small; in one instance, participants were excluded as soon as they had one seizure (Gonzalez-Heydrich et al., 2010). Low baseline seizure rate also impedes arriving at informed assumptions of causality. Follow-up times varied vastly, ranging from one to 12 months.

There is also a lack of uniformity across studies with regards to: (a) seizure type: focal, general, EEG abnormalities only; and, (b) severity of the seizure disorder: active versus inactive, seizure-free versus not-seizure-free, and difficult-to-treat versus refractory epilepsy. In addition, there is an absence of clarity regarding critical inclusion/exclusion criteria such as intellectual disability; whether or not the child is MPH naïve; dosing based on weight, fixed dose, or response-based; concurrent treatment with AEDs; and whether or not behavioral interventions are concurrently used or have previously failed. Dearth of uniformity of outcome measures of core ADHD symptoms constituted another important impediment. All of these factors pose a challenge in summing the evidence, as the population at hand may be quite varied.

To address some of these limitations, more research is required in the domain. Specifically, maintaining the DBPC design will be imperative, but with larger sample sizes. If larger sample sizes cannot be obtained then, at minimum, allowing for a longer follow-up duration will provide for more events, which can increase the power of the findings. Moreover, having more uniformity of severity rating of the seizures, the types of seizures, other inclusion and exclusion criteria, standardizing medication administration and dosing, and increased uniformity in primary outcome measures will help to substantiate this evidence base.

Conclusions

Evidence indicates that MPH is effective in treating ADHD symptoms in children with epilepsy; however, the evidence is less clear regarding safety concerns. Arriving at confident conclusions is premature given the noted limitations in study design, power, and participant characteristics. Rather, we would propose that a careful risk/benefit analysis is key when considering treatment of ADHD with MPH in children with epilepsy. Factors that should be taken into consideration include baseline seizure frequency, severity and type of seizures, as well as the longitudinal course of ADHD symptoms. As part of informed consent, the limits of available evidence guiding practice ought to be discussed with parents and competent children. It is important to keep in mind that psychoeducation and behavioural strategies are important tools in the management of ADHD and should be implemented if possible (Gonzalez-Heydrich et al., 2006). Prior to methylphenidate initiation, seizure frequency should be recorded (Koneski et al., 2011), the epilepsy diagnosis should be evaluated and AEDs optimized in conjunction with input from a neurologist if applicable, including gaining better seizure control, decreasing polypharmacy, and switching to an AED with fewer cognitive and behavioural effects if possible (Gonzalez-Heydrich et al., 2006; Koneski et al., 2011).

After initiation of the stimulant, close monitoring for changes in seizure frequency should be undertaken, which can include parents keeping a seizure log. Since EEG monitoring may not be a good predictor of seizure occurrence in the context of MPH treatment (Gucuyener et al., 2003), it should not be routinely recommended. Koneski et al. (2011) also suggest regular serum AED levels, and if possible MPH levels; careful observation for drug interactions; and not using MPH longer than necessary. If a seizure occurs while on MPH, the MPH can be held until reassessment of the seizure disorder and ADHD occurs. In conclusion, the risk/benefit analysis may indicate that given the academic, social, emotional, and functional impacts of untreated ADHD, cautious usage of MPH may be warranted in children with stable epilepsy who are impaired by ADHD symptoms.

Acknowledgements/Conflicts of Interest

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