

Traumatic Brain Injury and the use of stimulants

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Traumatic Brain Injury (TBI) is the most common cause of acquired morbidity in childhood with 12,700 children under the age of 15 in Australia estimated to have disability related to TBI. After TBI, problems emerge such as attention and concentration disorders, executive dysfunction, emotional dysregulation, fatigue, aggression or impulsivity. These problems can lead to problems in the rehabilitation and quality of life of many patients and their families, with on-going implications for further learning and skill development. Rehabilitation is an important step in helping the child recover from their brain injury, as the child's behaviour may affect their education, family situation, employment and independence in their future.

Although central nervous system (CNS) stimulants, such as methylphenidate and dexamphetamine, are used clinically in the rehabilitation of adults and children with acquired brain injuries, few studies have demonstrated efficacy with scientific validity. A large majority of the literature uses methylphenidate as the stimulant to treat children. Studies that have investigated stimulant use for brain injury symptoms have small sample sizes, with varied methodologies and outcome measures, resulting in mixed information. One retrospective study used qualitative data of 10 children treated with methylphenidate (MPH) to report with improvements in attention, impulsivity and activity. Stopping treatment led to a worsening of behaviour (Hornyak). A double-blind placebo-controlled study of 14 children with attention problems showed significant improvements in attention with stimulants (Mahalick). Another double blind placebo controlled trial of stimulant medication in 21 brain injured children, showed that nearly half of the participants had a positive response to stimulants, with 6/10 responding positively to dexamphetamine. At 6 month follow-up, these 6 children were still on medication and had maintained the initial improvements in attention (Bakker & Waugh). Despite the encouraging results above, another double blind placebo-controlled trial of 10 children did not bring about any significant change in neuropsychological measures of attention and memory (Williams).

Mixed results mean that the role of stimulants in the management of brain injury symptoms remains unclear. This is consistent with verbal reports from rehabilitation paediatricians, with some patients responding to stimulant treatment and others simply, not responding. This highlights the need for a case by case analysis for each child.

A multiple-cycle, double blind, placebo-controlled N-of-1 crossover trial using standardized measures, with randomisation order independently generated for each participant, in 42 participants in QLD and NSW is nearly complete (ACTRN12609000873224). N-of-1 trials provide the strongest evidence possible about treatment efficacy in an individual participant. This study will inform rehabilitation medicine about the benefits, if any, of using stimulants in children with a brain injury.

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