

Adverse effects of electroconvulsive therapy on cognitive performance

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Electroconvulsive therapy (ECT) has historically been shown to be a highly effective method of treating major depression and catatonic state otherwise resistant to psychopharmacotherapy.¹⁻⁵ However, ECT has also been associated with a variety of transient impairments in cognitive performance during and following the treatment.⁶⁻¹⁰ The side effects, often subjectively reported by the patients, include deficits in orientation, short term memory function, attention, speech fluency, and executive functions lasting from hours to perhaps months in a number of cases.⁶⁻¹⁰ These reported attributes often lead to limited use of ECT as an acute treatment of treatment-resistant depression and other conditions where it can potentially produce positive overturning effects. There appears to be a lack of clarity and consensus in the literature regarding ECT-related adverse effects on cognitive performance. While some studies have reported absence of any effects on memory and implicit learning,⁶ several others have shown diverse negative impacts across various domains of cognition including greatest global decline associated with bitemporal ECT, major deterioration of verbal memory attributed to bifrontal ECT, and largest decline in visual memory related to right unilateral ECT, as measured by tests such as Mini Mental State exam,⁷ Trail-Making,^{11,12} Rey Auditory Verbal Learning,^{11,12} autobiographical memory, visual memory, and verbal fluency.^{11,13} Therefore, this topic remains much debatable, and can still benefit from investigations that would add to the body of evidence to further elucidate and clarify different aspects and extent of these adverse effects in terms of factors such as distinction between immediate versus delayed impacts, different electrode placement methods and dosing, as well as the appropriate measurement methods sensitive to particular cognitive domains.

Authors of this study¹⁴ investigated the potential immediate short-term adverse effect of right unilateral ECT on cognitive function using digital ascending number tapping test (DANTT) as a novel psycho-

metric measurement modality. Using DANTT, the authors specifically studied speed of processing, executive function, and visual search before and after treatment in patients of both genders between the ages of 36 to 76 years. They concluded that ECT does not significantly alter cognitive performance in those domains up to 2 hours after receiving therapy, which is in stark contrast to the results of previous investigations.¹⁴ Results of this study revealed no measurable impairment of concentration resulting from single or multiple ECT treatments. In addition, patients with a longer seizure duration elicited by ECT did not exhibit greater concentration impairment as evidenced by absence of any significant difference in performance times.¹⁴

Adverse effects of ECT on cognitive function has been the subject of investigation in several studies. However, current literature does not provide sufficient and specific data in order to draw reliable conclusions as to the degree and extent of potential impairments in various particular domains of cognitive performance.¹⁻¹³ In contrast to previous studies, this study did not reveal any significant post-ECT deficit in select cognitive domains, namely speed of processing, executive function, and visual search as measured by DANTT.¹⁴ This finding raises the possibility that perhaps some elements of cognition may be immune to ECT, whereas other domains, shown to have exhibited deficits in other studies, might be more susceptible. This demands further subtyping of cognitive domains and deficits, as well as designing measurement tools tailored to more accurately and specifically target those areas. Use of DANTT introduced in this study in lieu of tests used in previous studies such as trail-making and MMSE, which provide only an overall score without localizing function to particular cognitive domains, is an example of this approach. This novel modality for measuring visual search and speed of processing in particular allows for higher precision and accuracy by eliminating problems associated with trail-making test such as memorization biases and line drawing which can hinder identification of numbers, and can be employed in future trials to reproduce the findings of this study.

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