

Brain Stimulation in the Treatment of Late-Life Severe Mental Illness Other than Unipolar Nonpsychotic Depression

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Late-life mental illness is a growing concern. Current medications have limited efficacy and are associated with safety concerns. A variety of brain stimulation approaches offers alternative treatments. We performed a systematic literature search on the efficacy and safety of brain stimulation in late-life mental illnesses, excluding unipolar nonpsychotic depression. Studies on deep brain stimulation, electroconvulsive therapy (ECT), repetitive transcranial magnetic stimulation (rTMS), and vagal nerve stimulation that enrolled exclusively older adults (≥ 65 years) or analyzed older adults as a separate group were included. The search identified 1,181 publications, of which 43 met the above inclusion criteria: 24 were related to the treatment of non-unipolar depression (ECT: 21; rTMS: 2; ECT and rTMS: 1), 14 related to dementia (ECT: 7[2 of these studies were also related to depression]; vagal nerve stimulation: 2; rTMS: 4; deep brain stimulation: 1), and 7 to schizophrenia (ECT: 7). These studies reported a high degree of variability in efficacy and safety with promising results in general, particularly in the treatment of dementia and schizophrenia. Most publications were limited by small sample sizes, lack of control conditions, and lack of randomization. Large studies with a randomized controlled design or other designs such as crossover or off-on-off-on are needed. In contrast to the empiric and nonspecific use of ECT, future studies using modalities other than ECT could focus on novel biologically based interventions that target specific circuitry. These interventions could also be combined with other non-brain stimulation treatments for possible synergistic effects. (Am J Geriatr Psychiatry 2013; ■:■-■)

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INTRODUCTION

With the worldwide aging of the population, the number of older adults with severe psychiatric and cognitive disorders is increasing.^{1,2} Efficacy of psychiatric medications in the treatment of late-life mental illnesses is affected by age-related pharmacokinetic changes, increased probability of drug–drug interactions, pharmacodynamic changes (e.g., increased sensitivity to adverse effects), and difficulties with adherence.³ Safety of psychiatric medications is also a concern in late life. For example, anticonvulsants are associated with an increased risk of suicidal acts or violent deaths,^{4,5} antidepressants are associated with an increased risk of falls⁶ or bleeding,⁷ and antipsychotics are associated with an increased risk of mortality.^{8–10}

Given the limitations of psychotropic medications, alternative treatments are needed. Brain stimulation approaches offer a viable alternative for some older patients, especially those who do not respond to or tolerate medications.¹¹ This article systematically reviews current evidence relevant to the use of brain stimulation interventions in older adults for the treatment of severe mental illness. However, we exclude unipolar nonpsychotic depression because the literature on the use of brain stimulation in its treatment is immense and necessitates a separate review.

METHODS

Search Strategy

EMBASE, Ovid Medline, and PsycINFO were searched on March 7, 2012. No date limits were applied. The following search terms were used: ((electroconvulsive therapy) OR (transcranial magnetic stimulation) OR (transcranial direct current stimulation) OR (vagus nerve stimulation) OR (deep brain stimulation) OR (rTMS) OR (magnetic seizure therapy)) AND ((psychosis) OR (anxiety) OR (dementia) OR (addiction) OR (mental* ill*) OR (schizophrenia) OR (cognition) OR (bipolar)). To focus on studies with older adults, the search was limited to "all aged (65 and over)" OR "aged (80 and over)." Other limitations used were "human," "English," and "peer-reviewed journal."

Inclusion and Exclusion Criteria

We included studies that either enrolled only older adults or analyzed older adults as a separate sample. We excluded publications that did not use brain stimulation, used brain stimulation only as an investigational rather than as a treatment tool, or reported only on unipolar depression or on a neurologic disorder without a comorbid psychiatric illness. Investigational use was defined as the use of brain stimulation to assess the function of a brain region or circuit, typically by applying the brain stimulation once to that region. In contrast, therapeutic use was defined as the use of brain stimulation to assess its effect on a clinical outcome, typically through a repetitive course.

Classification and Description of Studies

If a publication met the above eligibility criteria, we classified it based on the psychiatric illness that was treated with brain stimulation. After selection and classification, we recorded the journal name, title, first author, and year of publication. Other information recorded included the aim, sample size, participants' ages and genders, brain stimulation protocol, and major findings. Then, we summarized information about efficacy, safety, and predictors of response when available.

RESULTS

The search identified 1,181 publications; 1,138 were excluded and 43 publications were retained: 24 were classified under non-unipolar depression (electroconvulsive therapy [ECT]: 21; repetitive transcranial magnetic stimulation [rTMS]: 2; ECT and rTMS: 1), 14 under dementia (ECT: 7; vagal nerve stimulation [VNS]: 2; rTMS: 4; deep brain stimulation [DBS]: 1), - note that 2 ECT studies were included under both depression and dementia -and 7 under schizophrenia (ECT: 7). No publications retrieved reported on the use of brain stimulation in the treatment of addiction or anxiety, or on the use of transcranial direct current stimulation or magnetic seizure therapy (MST).

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