



Icahn  
School of  
Medicine at  
Mount  
Sinai

# Depressive disorders: Electroconvulsive therapy for treatment-resistant mood disorders in children and adolescents: A systematic review

Santiago Castaneda-Ramirez MD<sup>1</sup>; Timothy Becker MD<sup>2</sup>; Adriana Bruges-Boude MD<sup>2</sup>  
Lily Martin, MLIS<sup>2</sup>; and Timothy Rice MD<sup>2</sup>

NYC  
HEALTH+  
HOSPITALS

1. Lincoln Medical & Mental Health Center, New York, N.Y., U.S.A., 2. Icahn School of Medicine at Mount Sinai, New York, N.Y., U.S.A.

## INTRODUCTION:

- First-line treatment for moderate-to-severe depression in children and adolescents usually includes psychotherapy and pharmacotherapy<sup>6</sup>. Approximately 60% do not respond satisfactorily to first-line treatments<sup>8</sup>.
- Although ECT is generally considered to be safe in children and adolescents<sup>17</sup>, its use is much less common compared to adults due to inadequate knowledge among providers<sup>18,19,21</sup>, negative perceptions<sup>20</sup>, and legal restrictions<sup>22,23</sup>.
- Given the need for effective treatments for severe mood disorders in adolescents and the low use rate of ECT, this systematic literature review examines the existing literature on the effectiveness and adverse effect profile of ECT when used for treatment-resistant mood disorders in children and adolescents.

## METHODS :

- Review strategy designed in accordance with the PRISMA Statement<sup>30</sup> and registered in the Prospective Register of Systematic Reviews (PROSPERO) database (Registration ID CRD42021246518).
- A standardized data extraction tool was used to collect key information from each study. As most of the studies found were case series, the Joanna Briggs Institute Case Series Critical Appraisal tool<sup>35,36</sup> was used to assess quality. Studies were summarized by comparing findings across key study parameters.
- Quantitative Measure: Several studies used the same scales to assess symptoms before and after ECT treatment. We calculated the weighted arithmetic mean and aggregate the pooled standard deviation for each scale used.

### Inclusion Criteria (must meet all 5)

Quantitative or mixed-methods studies including cross-sectional and longitudinal observational studies, case series and case report

Patients ≤ 19 years old

Patients being treated with ECT

Majority of the sample with a diagnosis of treatment resistant mood disorder

Evaluates outcomes objectively through scales or subjectively by clinicians

### Exclusion Criteria (must meet any)

Not written in English

Non-human studies

Commentaries and expert statements

Non-peer reviewed (eg, dissertations, conference abstracts)

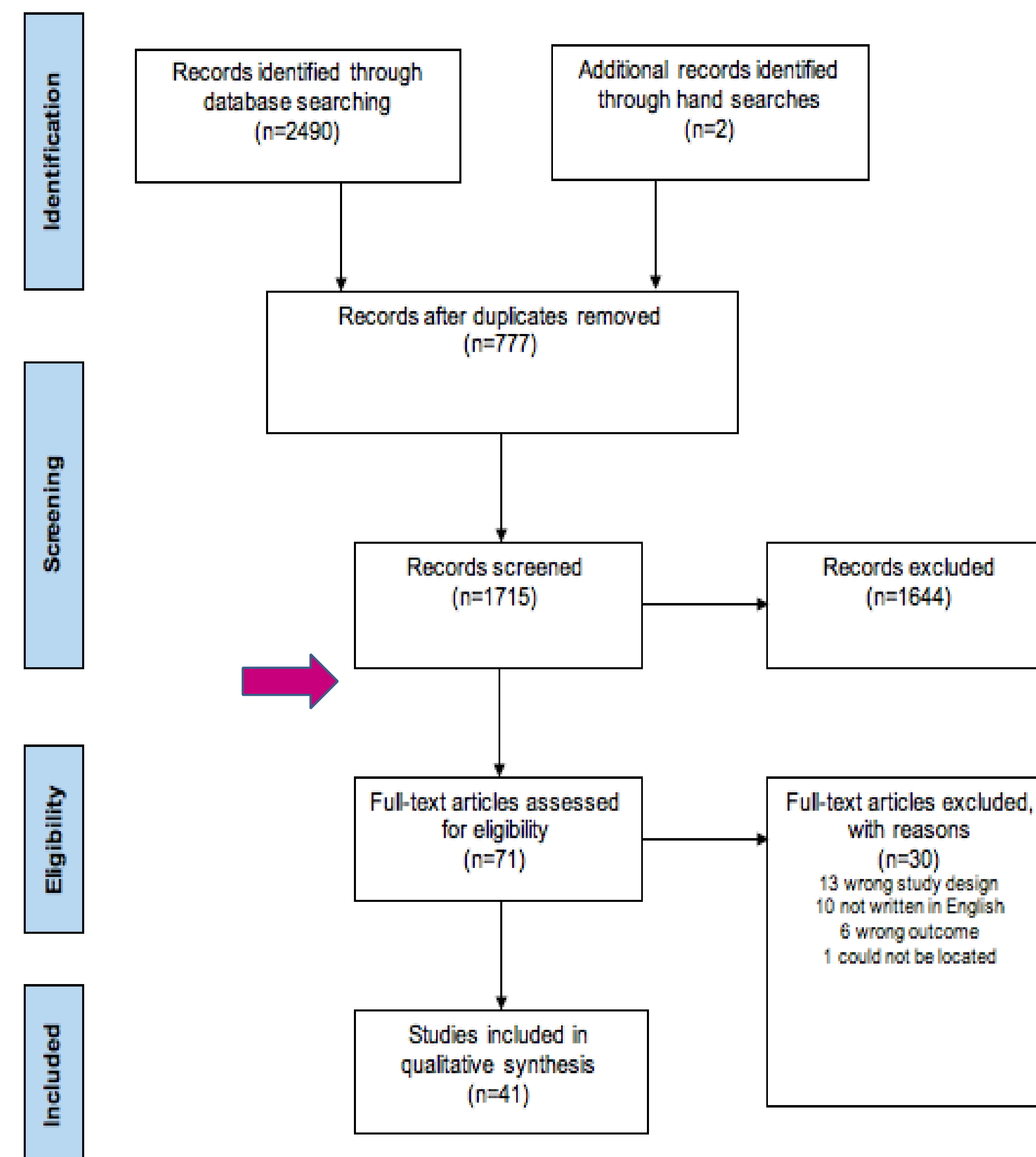
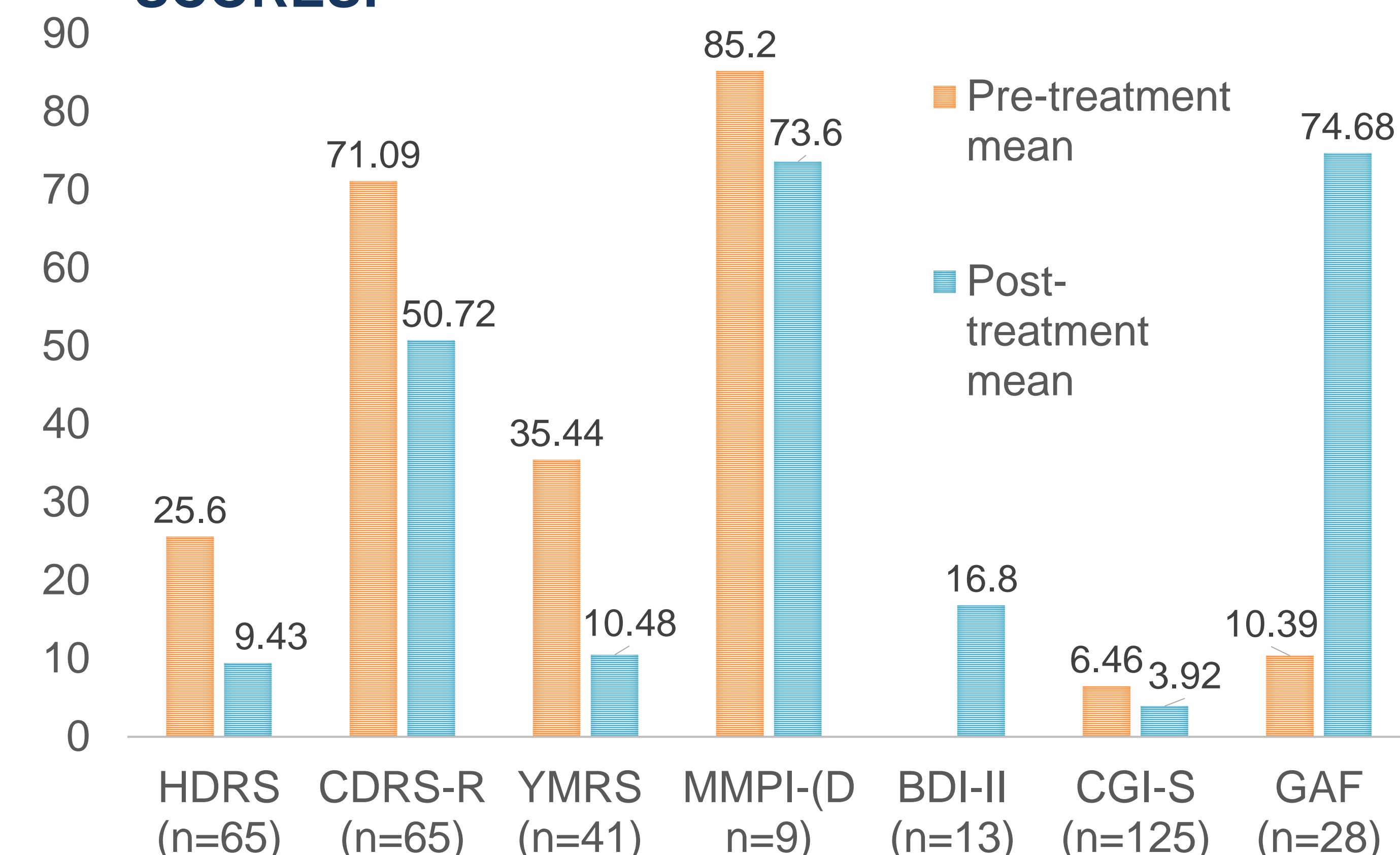


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flow diagram.

## RESULTS:

- Searches identified 1715 unique articles. The full text of 71 selected articles were reviewed, leading to 41 studies included in this review. Of these studies, Studies included: 18 were retrospective case series, 2 prospective case series, 2 case-control, and 19 case reports (i.e., n <3). 46% of the studies were conducted in the United States.
- There were a total of 715 patients. 79% of patients had an affective disorder or schizoaffective disorder. Bitemporal lead placement was most commonly used in 62.75% of cases. The weighted mean of total treatment sessions was 12.00.
- Affective disorders: 54% were diagnosed with unipolar depressive disorder, 23% with bipolar disorder, and 3.2% with Schizoaffective disorder.
- Clinical Global Impression (CGI) was the most commonly used outcome measure. In unipolar depression, response rates ranged from 53-82%. On the other hand, the response rate was 88-93% for bipolar disorders.
- Headache was the most common side effect reported in up to 80% of the cases. Side effects included nausea, vomiting, muscle soreness, switch to mania and agitation. They were generally transient and quickly subsided. Prolonged seizures was seen in 104 out of 715 cases. Transient subjective memory loss was commonly reported with prevalence varying widely from 0 to 85%. There was a lack of any significant changes in objective cognitive measures (Mini-mental state exam-MMSE or Montreal Cognitive Assessment-MoCA).
- Tardive seizures was reported only four times in our included literature<sup>39,53,56,47</sup>. ECT was stopped due to side effects in 11 cases<sup>19,40,46,49,63</sup>. No fatalities were reported.

## PRE-TREATMENT AND POST-TREATMENT SCORES:



## DISCUSSION:

- Literature has expanded in recent years, existing evidence consist mostly of case series and case reports and remains lacking in controlled studies.
- The overall response rates for ECT were high and ranged between 51% to 92%. Among studies with n>30, response rates were largely 70-82% for depression and 88-93% for mania. This finding is similar to what was found in previous literature in children and adolescents<sup>14,65</sup> and the adults<sup>15,16,66</sup>.
- ECT was generally well tolerated and was seldom discontinued due to side effects (reported in only 1.5% of cases).
- Studies that used cognitive screening tests (e.g. MMSE and MoCA) found no significant post-ECT cognitive deficits. Although data are limited, existing evidence suggests that despite short-term cognitive side effects, post-treatment cognitive side effects are limited and resolve over time.
- Limitation of studies included but not limited to lack of RCT, no studies with long term evaluations and possible publication bias.
- Limitation of review included but not limited to focus on mood disorders, lack of inclusion of comorbidities and the effect of concomitant treatments, implications of different anesthetics and muscle relaxers used.

## CONCLUSIONS:

- Our data suggests that ECT is safe and effective for the treatment of mood disorders in child and adolescent populations, and should be considered in severe and treatment-refractory cases. Controlled studies with objective measures and long-term follow-up are needed to advance the evidence base. Optimal treatment should be clearly defined to maximize benefits and safety of intervention.

## REFERENCES:

