

Interhemispheric imbalance in motor cortex excitability in affective disorders – a systematic review

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Background and aims: Both Major Depressive Disorder (MDD) and Bipolar Disorder (BD) have been consistently associated to lateralized brain dysfunction. MDD has been associated with left-sided lesions and decreased left-hemisphere activity, while BD has recently been associated with right-sided lesions. Equivalent trends have been reported regarding asymmetry of cortical excitability, assessed using TMS. Here we aim to review the literature on the latter.

Objectives: Collect available evidence on interhemispheric asymmetries of cortical excitability among patients with affective disorders (AD).

Materials and methods: Systematic review of the evidence concerning interhemispheric differences in motor cortex excitability acquired by TMS in patients with ADs using four databases, in compliance with PRISMA guidelines.

Results: From 1105 articles, 16 were included. From the 16 articles, 87.5% included patients with MDD, and the remaining patients with BD. The most frequently reported measures of cortical excitability were resting motor threshold (87.5%) and paired-pulse assessments, namely intracortical-inhibition and intracortical-facilitation (68.75%). While the methods were not fully homogenous between studies, most reported interhemispheric differences of excitability within the clinical population or enhanced interhemispheric asymmetry of excitability in patients with AD relative to control subjects. These differences are suggestive of reduced excitability in left, and/or increased excitability in the right hemisphere, in patients with MDD. For BD, in 2 case-reports, similar results were found during depressive states, and the opposite trend during mania. Interestingly, several studies reported an association between cortical excitability changes in MDD and BD and clinical severity.

Conclusion: In patients with MDD or BD there is an imbalance of interhemispheric cortical excitability, further suggesting the relevance of lateralized brain function in patients with ADs.

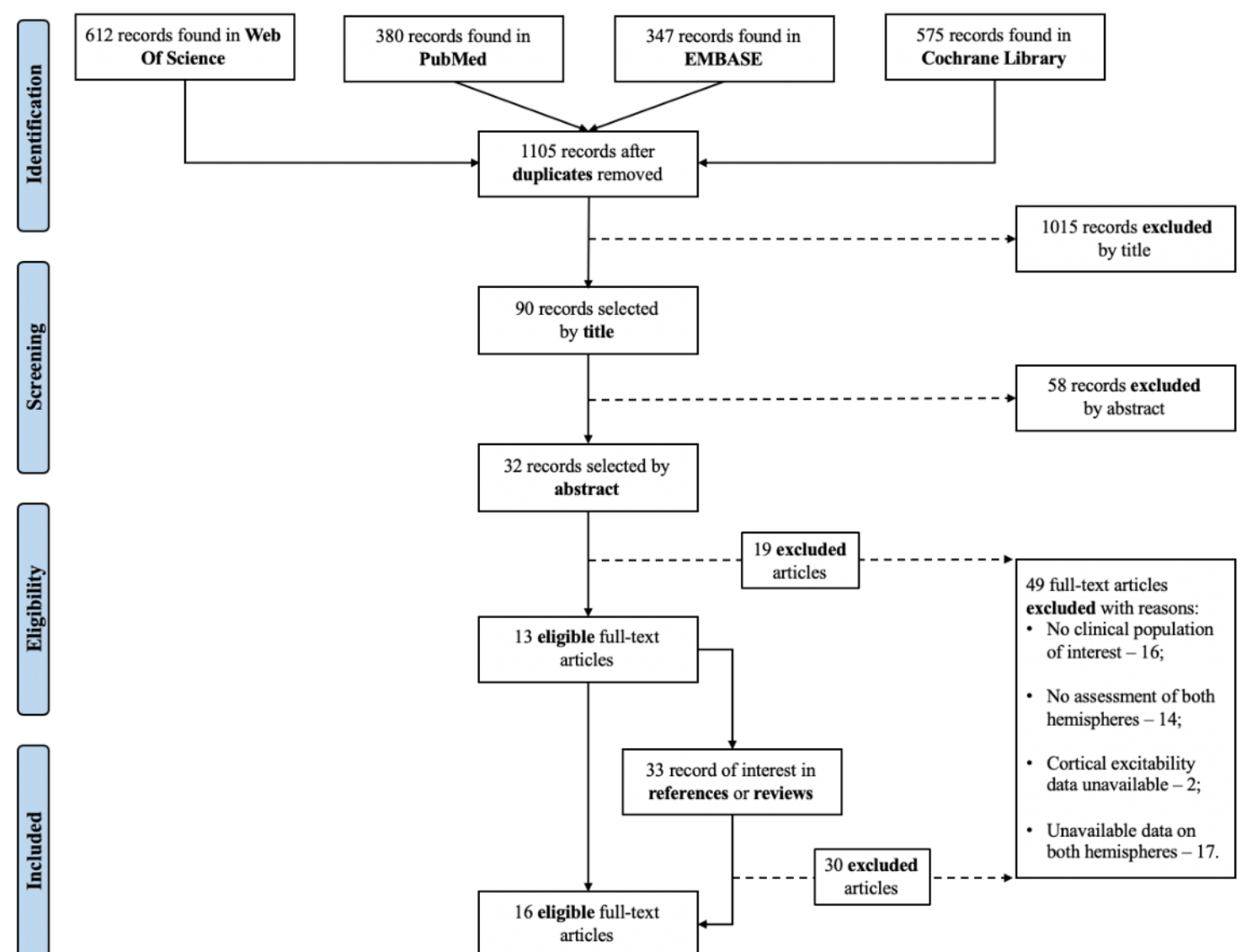


Figure 1 – Article Selection Flowchart

Publication	N	BD	Cont.	Cortical Excitability					
				Vs. Controls				Right-Left	
				Dep.		Man.		Dep.	Man.
				L	R	L	R	R-L	R-L
Maeda et al. 2000	16	No	Yes	↑	↑↑			+	
Bajbouj et al. 2003	12	No	No					+	
Fitzgerald et al. 2004	60	Yes	No					-	
Bajbouj et al. 2005	30	No	No					+	
Chistyakov et al. 2005	22	No	No					+	
Bajbouj et al. 2006	40	No	Yes	↑	↑↑			+	
Bajwa et al. 2008	27	No	Yes	↓*	↓*			+	
Lefaucheur et al. 2008	70	No	Yes					+	
Navarro et al. 2009	91	No	No					-	
Pallanti et al. 2012	28	No	No					+	
Concerto et al. 2013	33	No	Yes	=	=			-	
Fitzgerald et al. 2013	179	Yes	Yes					-	
Malsert et al. 2013	11	Yes	Yes	↑	↑↑	↑	↑↑	++	+
Spampinato et al. 2013	22	No	No					+	
Ruiz-Veguilla et al. 2016	43	Yes	Yes			↓	↑		-
Veronezi et al. 2016	81	Yes	Yes	↓↓	=			+	

Table 1 – Cortical excitability in Affective Disorders. BD – Bipolar Disorder patients; Cont. – Controls; Dep. – Depression; L – Left; Man. – Mania; N – Sample size; R – Right; R-L – Right-Left difference; * Cortical excitability modulation measures.