

# Scope of add on repetitive transcranial magnetic stimulation in treating depression in Parkinson's disease

## Editorial

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Parkinson's disease is a common neurological disorder in the elderly population with a prevalence of 1%; however, in the general population, its prevalence is 0.1% to 0.2%.<sup>1</sup> It is a neurodegenerative disease commonly affecting the dopaminergic neurons of the nigrostriatal pathway; however, as the disease progresses, pathological changes occur in other cortical regions.<sup>1</sup> Though it is classically thought to be a motor disorder, the manifestation of Parkinson's disease is diverse, and nonmotor symptoms are present in many patients.<sup>2</sup> Often the disease has a progressive course. There occur aggregates of proteins in various cortical areas during the pathogenesis. A complex interplay of genetic and environmental factors attribute to the development and progression of illness.<sup>2</sup>

The core clinical manifestations of Parkinson's disease are rigidity, resting tremor, and bradykinesia, often known as the classical symptom triad of Parkinson's disease.<sup>3,4</sup> Other symptoms of Parkinson's disease include—dysarthria, dysphagia, short-shuffling gait, dystonia, sialorrhoea, autonomic dysfunction, cognitive disturbances, and neurobehavioral abnormalities.<sup>3</sup>

Depression is one of the common psychiatric comorbidities among patients who have Parkinson's disease, with prevalence ranging from 20% to 40%.<sup>5</sup> Comorbid depression adversely affects the quality of life, increases the disability, and hampers the cognitive performances of patients with Parkinson's disease.<sup>6,7</sup> Antidepressants are the mainstay treatment of depression. Electroconvulsive therapy is recommended for depression resistant to antidepressant treatment. Alternatively, repetitive transcranial magnetic stimulation (rTMS) has been used as treatment augmentation in resistant depression.<sup>8</sup>

Dopamine agonists are often used in the treatment of Parkinson's disease. In addition, specific neuromodulation techniques like deep brain stimulation are used to treat Parkinson's disease. It has been reported that treatment of Parkinson's disease causes improvement of depression in many patients.<sup>5</sup> There is the possible implication of mesolimbic and mesocortical dopaminergic circuits in developing depression in Parkinson's disease.<sup>5</sup> Electroconvulsive therapy has been used to treat depression in Parkinson's disease, and the depressive and motor symptoms of Parkinson's disease improved significantly after electroconvulsive therapy.<sup>9</sup> Recently, newer therapeutic modalities like—deep brain stimulation, rTMS have been used as alternative treatment to pharmacological treatment.<sup>10</sup>

In a randomized sham-controlled trial, multifocal rTMS has been tried over the M1 area (motor cortex) and dorsolateral prefrontal cortex (DLPFC), where 50 patients were recruited in four different groups.<sup>11</sup> This study concluded that rTMS over M1 improves motor functions; however, improving depressive symptoms through rTMS over DLPFC is not superior to sham TMS. Small sample size is a significant limitation of this study. Another randomized controlled trial also supports that high-frequency rTMS on the foot area of the motor cortex results in improvement of motor symptoms of Parkinson's disease.<sup>12</sup> Several recent meta-analyses also support the role of high-frequency rTMS targeting the motor area to alleviate motor symptoms of Parkinson's disease.<sup>13–15</sup> The more is the number of pulses delivered per session, the better the therapeutic effect.<sup>13</sup>

Makkos et al<sup>16</sup> carried out a randomized controlled trial, where high-frequency rTMS has been used over the bilateral motor cortex, which resulted in a significant reduction of the depressive symptoms and improvement in the quality of life. Left DLPFC stimulation using high-frequency rTMS was useful in improving the depressive features, anxiety cognition, and motor features.<sup>17–19</sup> Evidences support that there are various technical parameters and target site of stimulation, predicting the therapeutic response in depression.<sup>20</sup> Identifying the appropriate target area and appropriate protocol of TMS will guide clinicians in better management of depression in Parkinson's disease.

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