

**Development in Psychiatry**

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*Transcranial magnetic stimulation (TMS) – a new therapeutic tool in psychiatry is out on the block. Researchers discuss about its benefits and performance*

Transcranial magnetic stimulation (TMS) – a new therapeutic tool in psychiatry- is an exciting development. Despite new anti-depressant drugs, a significant percentage of depressed individuals do not respond to treatment. Now research has shown that TMS provides the patients with same beneficial benefits without the side effects of the electroconvulsive (ECT) therapy.

In the April-June issue of the Medical Journal of Armed Forces Of India (MJAFI) Surgeon Captain A A Pawar, senior advisor, INHS, Ashvini, Colaba, Mumbai, Colonel D Saldanha, head of the department of Psychiatry, Armed Forces Medical College (AFMC) and others talked about the benefits of TMS.

The researchers point out that TMS works on the principle that when a current is passed through a coil, a magnetic field is generated perpendicular to the current flow. By rapidly changing the magnetic field near a conducting medium such as brain, a current is generated which is parallel but opposite in direction to the current in the coil. In ECT also the cortical neurons are depolarised but the dose of current required is large due to the high resistance of the skull.

In contrast, TMS can stimulate the patient's cerebral cortex even while the patient is awake since the impedance does not affect the magnetic field. Focal stimulation can be given repeatedly unlike the ECT. The magnetic field used in TMS has the strength of two Tesla -- the same intensity as in magnetic resonance imaging. The TMS magnetic field declines logarithmically with distance from the coil. This limits the area of depolarisation to a depth of about two cm below the brain's surface.

The magnetic energy is typically delivered as a series of pulses. When delivered in this manner the technique is called as repetitive TMS (rTMS). Low frequency rTMS (< 1 Hz) is said to reduce the excitability of cortical neurons whereas high frequency rTMS (>1 Hz) causes cortical excitability and increased cortical blood flow.

Unlike ECT, no anaesthesia is required and the procedure usually takes about 15 minutes. A magnetic coil is placed over the left or right prefrontal cortex. In research laboratories where precise brain mapping is required a mounted coil with EEG mapping is used. Both the patient and the operator use earplugs to protect against the loud clicking noise produced by the rapid change in magnetic pulse. The patient usually feels a tingling sensation over the scalp and occasionally a twitch over the muscles of the face or hand.

A review of the studies on trans cranial magnetic stimulation in depression summarises that TMS as a novel anti-depressant treatment shows great promise. Systematic and large-scale studies are needed to identify patient populations most likely to benefit and treatment parameters most likely to produce success.

Unlike ECT however rTMS causes no neurocognitive deficits. No worsening of performance on any of the cognitive domains over the baseline-post rTMS period was seen when tests were conducted on attention, working memory, executive function, objective memory and motor speed. On the contrary, evidence of modest but statistically significant improvement in performance was seen in working memory, executive function, objective memory and fine motor speed domains over the rTMS treatment period, they pointed out in their paper.