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Cognitive decline after electroconvulsive therapy, based on psychiatric disorders

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Although approximately eight decades has passed since the introduction of this method, ECT is still indicated in a great variety of disorders (Prudic, 2014) Among the frequent adverse consequences of ECT memory loss is the most concerning. Although near to all of the patients would regain their baseline cognitive status after 6 months, it is presented as the worst adverse effect of ECT by up to 75% of them. The severity of cognitive troubles is related with the intensity of electrical current and less responsiveness to the treatment (Prudic, 2014), characteristics of stimulations and the disorder itself. bilateral (Sackeim et al., 1993; Squire and Slater, 1978) and sine wave (Weiner et al., 1986; Sackeim et al., 2007) stimulations leads to worse cognitive outcomes, while right unilateral (Sackeim et al., 2000) ultra brief pulse wave (Sackeim et al., 2000) or focally electrical administered seizure therapy (Weiner et al., 1986) cause less adverse effects.

We conducted a prospective study to assess the effects of ECT on some different aspects of cognition, differentiated based on different diagnoses. We assessed 78 patients aged between 18 and 60 with minimum score of 24 in Mini Mental Status Examination from inpatient cases of Bahonar University Hospital in Karaj, Iran in 2016. Patients and their legal caregivers were informed about the study and beneficial and adverse effects of ECT and signed the agreement sheets.

All of them received bitemporal ECT for every 2 days up to 6 sessions. The length of convulsions was 20–30 seconds, and the patient who did not show any improvement after 4 sessions were excluded due to unresponsiveness. The statistical analyses were done by Chi-Square test, Independent *t*-test and Repeated Measures ANOVA.

We assessed the cases before the first session and after the 1st, 3rd and 6th sessions, by MMSE. The raw scores were assessed along the sessions considering age, gender and diagnoses as probable confounding factors, as well as the scores of four main subtests: orientation, calculation and attention, registration and recall (Diagram 1)

The samples included 32 males (41%) and 46 females (59%), with mean age of 38.9 (SD = 10.3). The repeated measures ANOVA showed a significant decline in total scores along the sessions (P = 0.005). The distribution of total scores in all assessments was independent of age, gender and diagnosis. (P > 0.05)

The fluctuations of cognitive scores during sessions were the least among schizophrenic cases. These results in BMD and MDD patients (with and without OCD comorbidity) were significant with p-values of 0.007 and 0.019 respectively. (All of the BMD cases were affected by Bipolar Disorder type I and affected by manic phase.) In contrast with the male cases, the results in females were significant. (P Value: 0.046 vs. 0.007).

The changes of scores in orientation, attention and calculation, and recall subtests showed an overall reductive pattern without statistical significance. Among 4 subtests, only registration showed an increasing pattern that might be because of the prominent role of attention in this task, in contrast with more complex cognitive functions such as calculation and recall that may get affected more.

The scores of MMSE showed a reduction after first session, an improvement after third session and an eventual decline after the final session. This fluctuating pattern can be explained by gradual amelioration of disorder's symptoms and immediate adverse effects of ECT. In other words, the ECT causes cognitive decline since the first session, which would be overwhelmed by cognitive improvement induced by its therapeutic effects along the time. This later improvement eventually melts into another decline due to increased number of sessions.

Although the differences of scores among males and females were not significant, cognitive decline in females could prove significance, while doesn't in males. Majority of females cases were affected by affective disorders with only 2 schizophrenic patients, versus 8 male schizophrenic cases. Underlying cognitive destruction in schizophrenia and different frequencies can justify the worse outcomes in females than males, including 4.3% versus 25% schizophrenic samples respectively. P values of repeated measures performed on schizophrenic and major depressive (± OCD) provide confirmatory evidence on difference in cognitive impairment mentioned above. (0.95 for schizophrenics vs. 0.19 for depressives)

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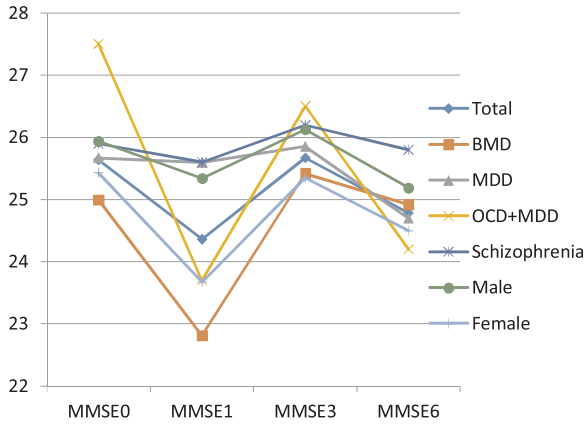

Diagram 1. The scores of MMSE in different disorders and genders.

Amazingly both of the PTSD patients experienced overall cognitive improvement; It seems valuable to assess the cognitive outcomes of ECT in PTSD cases in larger sample sizes.

Conclusively, these results are compatible with previous researches indicating cognitive decline after ECT. (Calev et al., 1995; Kumar et al., 2016; Brus et al., 2017) As evident from literature, majority of the studies have assessed outcomes in depressive patients or they have not mentioned diagnoses, while ECT may cause different cognitive effects in distinct disorder; hence, we suggest disorder oriented studies with larger sample sizes to evaluate cognitive outcomes of ECT in different psychopathologies and knowing whether modulation of protocols based on diagnoses is needed. However, it is crystal clear that the adverse effects of electroconvulsive therapy in patients differ according to their diagnoses, and this variability should be considered in educating patients and their caregivers.

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Declaration of Competing Interest

There is not any conflict of interest to declare.

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