



ORIGINAL RESEARCH ARTICLE

LABORATORY SCREENING PRIOR TO MODIFIED ELECTROCONVULSIVE THERAPY SR Adhikari¹*

¹ Department of Psychiatry, Chitwan Medical College Teaching Hospital, Bharatpur, Chitwan, Nepal.

*Correspondence to: Dr Shailendra Raj Adhikari, Department of Psychiatry, Chitwan Medical College Teaching Hospital, Bharatpur-10, Chitwan, Nepal.
Email: shailendra_adhikary@hotmail.com

ABSTRACT

Laboratory screening for subtle medical disease is critical prior to modified electroconvulsive therapy (MECT). It is important to rule out medical condition since MECT is performed under general anesthesia. 25 patients planned for MECT were evaluated with complete blood count, hemoglobin, serum sodium, serum potassium, serum creatin, blood sugar, electrocardiogram (ECG), chest radiograph(X-ray chest). Investigations showed some abnormal values in blood sugar, serum sodium, serum potassium, ECG and X-ray chest. Proper guideline is needed for evaluation of patients who undergo MECT. Medical conditions along with other subtle diseases are important to rule out before undergoing MECT.

Key words: ECT, ECG, X-ray chest, Screening.

DOI: <http://dx.doi.org/10.3126/jcmc.v5i2.13154>

INTRODUCTION

Electroconvulsive therapy (ECT) one of the oldest somatic treatments since it was started in 1938 in Italy (Professor Ugo Cerletti and Luigi Bini) and is used for more than 70 years with established safety and efficacy in variety of psychiatric illnesses. Modified ECT is given under anesthesia, requiring evaluation of patients prior to the procedure. No laboratory investigations are specific to ECT, but pre-ECT evaluation will help to rule out subtle medical conditions and other medical diseases- diabetes, hypertension, cardiac diseases, renal diseases and pulmonary conditions¹. American Psychiatric Association guidelines² and other standard textbooks on ECT³ and psychiatry⁴ give rational behind “medical history and physical examination along with other ancillary tests” to rule out medical conditions that will not complicate post ECT status. Though ECT is considered extremely safe and very efficacious treatment, mortality in post ECT condition is due to either anesthetic complications or prior cardiovascular diseases in patients, rather than seizure related events. Mortality rate due to ECT is between two and ten per 100,000 in some large scale studies⁵.

Current study is done to evaluate the rational of investigating patients having ECT treatment to rule out medical conditions, especially cardiac pathologies. This is the first kind of study done in Nepal.

METHODS

Study Design- This was a prospective study of patients who were admitted in the Psychiatry ward of Chitwan Medical College. Patients were assessed by qualified psychiatrists. Psychiatric diagnosis was done as per ICD-10⁶.

Inclusion criteria:

- Patients who had previous response to MECT
- Patients who were violent and difficulty in controlling in ward.
- Patients with self-harm & harm to others.
- Patients who are refractory to medical treatments.

Exclusion criteria:

- Patients and legal guardians who refused to give consent.
- Current history of alcohol and substance abuse
- Other general medical conditions that led to

psychotic symptoms.

- Apart from informed consent from patients and relatives, ethical guidelines for biomedical research on human subjects by Nepal Health Research Council (NHRC) were also adhered to, in addition to principles enunciated in the “declaration of Helsinki”.

Of all the patients that were admitted in the Psychiatric ward, 125 subsequently admitted patients were chosen for the study. All patients were eligible for MECT, but following inclusion criteria 47 patients were given ECT (considered as ECT-receivers or ECT-R) and 78 patients did not receive ECT (considered as ECT-non-receivers or ECT-NR), though they were evaluated with history and physical examination along with laboratory analysis.

Assessment

- Demographic form: This form collected demographic variable- age, gender, educational level, marital status and occupation.
- Detail psychiatric assessment, medical history taking and physical examination were done
- Investigations were done as follows- complete blood count, blood sugar, serum sodium, serum potassium, serum urea, serum creatinine, urine-routine and microscopic, electrocardiograph (ECG) and X-ray-chest.

After investigations were analyzed, medical opinion and anesthetic opinion were taken prior to ECT procedure. If needed, cardiologist/pulmonologist and other specialization consultation were also done^{7, 8, and 9}. Basic laboratory investigations including ECG and chest X-ray were done. Any abnormalities found in any investigations that make patient unfit for procedure were excluded from the study^{10, 11}.

Statistical Analysis: Statistical analysis was performed with SPSS program (version 12).

RESULT

There were 47 patients who received ECT (as ECT receivers / ECT-R and 78 patients who did not receive ECT (as non-receivers / ECT-NR). Among ECT-NR, male patients were 46 while female patients were 32. Among ECT-R, male patients were 34 and female patients were 13. Mean age of ECT-NR was 30 years while mean age of ECT-R was 29 years.

Table 1 shows various investigations and their findings- hemoglobin, blood sugar, urea, creatin, sodium, potassium, ECG and X-ray chest. There were abnormal findings in hemoglobin [ECT-NR=13; ECT-R=12], blood sugar [ECT-NR=4; ECT-R=2], blood urea [ECT-NR=7; ECT-R=11], serum creatin [ECT-NR=3; ECT-R=5], serum sodium [ECT-NR=1; ECT-R=2], serum potassium [ECT-NR=0; ECT-R=0], ECG[ECT-NR=7; ECT-R=7], X-chest [ECT-NR=11; ECT-R=6].

Table 1: Investigation findings, ECT non-receivers VS ECT receivers

INVESTIGATIONS FINDINGS	ECT Non receivers (N=78)	ECT Receivers (N=47)
Hemoglobin ¹² Male=14.0 – 17.4 g/dL Female=12.3 – 15.7 g/dL Mean	12.03	12.3
Blood sugar ¹³ (mg/dl)(up 120mg/dl) Mean	92	99.5
Blood urea ¹⁴ [7-22mg/dl] Mean	19.5	20
Serum creatinine ¹⁵ Male=0.8 – 1.4 mg/dL Female=0.56 – 1.0mg/dL Mean	0.85	1.03
Serum sodium ¹⁶ [135-145meq/l] Mean	133.8	139.9
Serum potassium ¹⁶ [3.5-5meq/l] Mean	3.8	3.98

DISCUSSION

There is tendency for minimization of laboratory tests in psychiatric populations, with the hypothetical concepts that these tests would have normal values for almost all of the time in psychiatric conditions. But it is not always thought to be true. Evidences have shown that there are medical co-morbidities in patients with psychiatric disorders especially those who needed to be admitted in tertiary level institute like medical

college and those who were planned for ECT. This becomes critical to detect when patients undergo ECT treatment since they are exposed to anesthetic agents. Seizure-related sympathetic discharges result in transient hypertension/tachycardia with nearly every treatment. Though patients were screened routinely, comparing with Non-ECT users gave little evidence of abnormalities in patients who received ECT. Abnormalities were detected in ECG and chest radiography, which further needed evaluation from other specialists- pulmonologists, cardiologists and anesthesiologists as similarly done in other studies^{8, 12, 13, and 14}. Though caution was needed for these abnormalities, most complications were transient and did not prevent completion of ECT.

As discussed in result, there were abnormalities detected in laboratory investigations as it is not possible to detect in history and physical examination. Psychiatric disorders and psychotropic drugs can cause abnormal sodium value¹⁵. Many drugs can cause hyponatremia- haloperidol¹⁶, risperidone¹⁷, carbamazepine¹⁸, sodium valproate¹⁹, tricyclic antidepressants²⁰, venlafaxine²¹; selective serotonin reuptake inhibitors (SSRIs)²². Similarly screening for hypokalemia/hyperkalemia is also of value since ECT is not done without normal value as abnormal values cardiac conduction defects, as shown in various studies^{14, 23}. Abnormalities in hemoglobin and other hematological parameters did not predicted complications of ECT. As of in this studies, anemia is quite common in patients with psychiatric disorders and use of psychotropic medications, due to various factors and stresses, as is leucocytosis^{24, 25, 26}. Hematological abnormalities are indicator of disease, not disease itself.

Conclusion

It can be argued that laboratory tests have limited roles while patients undergo MECT and some authorities claim and doubt the usefulness and rational of these tests. But in the medico legal contexts and diagnosing subtle medical conditions, investigations are very useful in detecting abnormalities as future management of medical co-morbidities.

There are certain limitations of this study. Sample size is small and it is quite difficult to generalize in large population. Most of the patients who underwent have long duration of illness, thus there may be abnormalities in investigations (especially ECG and chest radiograph) compare to other studies. Cost/benefit analysis was not performed as part of the

study because even routine tests are costly²⁷. Further audit is needed for the rational of performing these investigations.

ACKNOWLEDGMENTS

Author likes to thank all the staffs of psychiatry inpatient unit and operation theatres for helping me conduct this research.

REFERENCES

1. Lafferty JE, North CS, Spitznagel E, Laboratory screening prior to ECT. 2001; 17(3):158-65.
2. American Psychiatric Association. The Practice of Electroconvulsive Therapy: Recommendations for treatment, Training and Privileging: A Task Force Report of the American Psychiatric Association. American Psychiatric Association Press. Washington, DC. 2001; 77.
3. Abrams R. Electroconvulsive therapy. New York: Oxford University Press. 1997.
4. Morihisa JM, Rosse RB, Cross B, et al. Laboratory and other diagnostic tests in Psychiatry. In: Hales RE, Yudofsky SC, and Talbott JA Ed. The American Psychiatric Press Textbook of Psychiatry. 3rd Ed. Washington, DC: American Psychiatric Press, 1999:297.
5. Shiwach RS, Reid WH, Carmody TJ. An analysis of reported deaths following electroconvulsive therapy in Texas, 1993-1998. Psychiatry Serv. 2001; 52(8):1095-7.
6. World Health Organization (WHO) (1992) The ICD – 10 classifications of mental and behavioral disorders: Diagnostic criteria for research. Geneva: World Health Organization.
7. Roizen MF, Foss JF, Fischer SP. Preoperative evaluation. In: Miller RD, ed. Anesthesia. 5th Ed. Philadelphia: Churchill Livingstone. 2000: 824-83.
8. Applegate RJ. Diagnosis and management of ischemic heart disease in the patient scheduled to undergo electroconvulsive therapy. Convulsive Therapy. 1997; 13: 128-44.
9. Burchell HB, Tuna N. The interpretation of gross left axis deviation in the electrocardiogram. Eur J Cardiology. 1979; 10: 259-77.
10. Narr BJ, Warner ME, Schroeder DR, et al. Outcome of patients with no laboratory

- assessment before anesthesia and surgical procedure. *Mayo Clinic Proc.* 1997; 72: 505-9.
11. Dolan JG, Mushlin AI. Routine laboratory testing of medical disorders in psychiatric patients. *Arch Intern Med.* 1985; 145:2085-8.
 12. Hudson-Thomas M, Bingham KC, Simmons WK. An evaluation of the Hem Cue for measuring hemoglobin in field studies in Jamaica. *Bulletin WHO.* 1994; 72:423-426.
 13. Henry JB. *Clinical Chemistry Diagnosis and Management by Laboratory Methods.* Twentieth Edition. WB Saunders Company. Philadelphia; PA 2001; pp214-219.
 14. Burtis C, Ashwood E. Eds. *Tietz Fundamentals of Clinical Chemistry.* 5th edition. Philadelphia; WB Saunders. 2001; 415.
 15. Wu A ed. *Tietz Clinical Guide to Laboratory Tests.* 4th edition. Philadelphia; WB Saunders Company. 2006; p316-320.
 16. Tietz, N.W., "Specimen Collection and Processing; Sources of Biological Variation," *Textbook of Clinical Chemistry, 2nd Edition,* W.B. Saunders, Philadelphia, PA (1994).
 17. Zielinski RJ, Roose SP, Devanand DP, et al. Cardiovascular complications of ECT in depressed patients with cardiac disease. *Am J Psychiatry.* 1993; 150: 904-9.
 18. Eagle KA, Brundage BH, Chaitman BR, et al. Guidelines for perioperative cardiovascular evaluation for noncardiac surgery: Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). *Circulation.* 1996; 93: 1278-317.
 19. Dolinski SY, Zvera DA. Anesthetic considerations of cardiovascular risk during electroconvulsive therapy. *Convulsive Therapy.* 1997; 13: 157-64.
 20. De Leon J, Verghese C, Tracy JI, et al. Polydipsia and water intoxication in psychiatric patients: a review of the epidemiological literature. *Biol Psychiatry.* 1994; 35:408-19.
 21. Peck V, Shenkman L. Haloperidol-induced syndrome of inappropriate secretion of antidiuretic hormone. *Clin Pharmacol Ther.* 1979; 26: 442-4.
 22. Whitten JR, Ruehler VL. Risperidone and hyponatremia: a case report. *Ann Clin Psychiatry.* 1997; 9: 181-3.
 23. Kahn A, McMurray JS, et al. Carbamazepine and SIADH. *Am J Psychiatry.* 1989; 146: 1639.
 24. Branten AJ, Wetzels JF, Weber AM, et al. Hyponatremia due to sodium valproate. *Ann Neurol.* 1998; 43: 265-67.
 25. Abbott R. Hyponatremia due to antidepressant medications. *Ann Emerg Med.* 1983; 12: 708-10.
 26. Masood GR, Karki SD, Patterson WR. Hyponatremia with venlafaxine. *Ann Pharmacotherapy.* 1998; 32: 49-51.
 27. Bouman WP, Pinner G, Johnson H. Incidence of selective serotonin reuptake inhibitor (SSRI) induced hyponatremia due to the syndrome of inappropriate antidiuretic hormone (SIADH) secretion in the elderly. *Int J Geriatric Psychiatry.* 1998; 13: 12-5.
 28. Schaner PJ, Brown RL, Kirksey TD, et al. Succinylcholine- induced hyperkalemia in burned patients. *Anesth Analg.* 1969; 48: 764-70.
 29. Bugby GC. Hematology. In Bennett JC, Plum F, eds. *Cecil Textbook of Medicine.* 20th Ed. Philadelphia: Saunders, 1996: 916.
 30. Kronfol Z, Turner R, House JD, et al. Elevated blood neutrophil counts in mania. *J Clin Psychiatry.* 1986; 47: 63-5.
 31. Lindenbaum J. An approach to the anemia's. In: Bennett JC, Plum F, eds. *Cecil Textbook of Medicine.* 20th Ed. Philadelphia: Saunders, 1996: 823.
 32. Sheline Y, Kehr C. Cost and utility of routine admission laboratory testing for psychiatric inpatients. *Gen Hosp Psychiatry.* 1990; 12: 329-34.