Comparison of Electroconvulsive Therapy Practice Between London and Bengaluru

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Objective: To compare electroconvulsive therapy (ECT) practice between London in the United Kingdom and Bengaluru in India.

Methods: A retrospective case note study was conducted to compare patterns of referrals for ECT in university teaching hospitals in London (n = 46) and Bengaluru (n = 345) during a 1-year period. Further comparison of ECT practice was made for a consecutive series of depressed patients between London (n = 104) and Bengaluru (n = 125).

Results: The rates of ECT referral were 0.9% of total annual admissions at the London site and 8.2% at the Bengaluru site. At the Bengaluru site, a higher proportion of patients were referred for ECT with a diagnosis of schizophrenia ($P < 0.0001$). Compared to the Bengaluru sample, depressed patients treated with ECT in London (n = 104) were older with more treatment resistance ($P < 0.0001$), had longer inpatient stays, and were less responsive to ECT.

Conclusions: The practice of ECT differed substantially between the London and Bengaluru sites. The relatively limited use of ECT in London reflects local treatment guidelines and may reflect the stigma associated with ECT. Electroconvulsive therapy is more widely used in Bengaluru with good outcomes. Further cross-cultural research is required to study the reasons for such contrasting practices and what constitutes the optimal practice of ECT for health systems in different countries.

Key Words: transcultural, electroconvulsive therapy, India, United Kingdom

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Although electroconvulsive therapy (ECT) is the most effective short-term treatment of severe major depressive disorder,[1,2] ECT practice varies widely both within and between countries.[3] For example, the rate of ECT use within different regions of the United States is highly variable, largely as a result of individual state legislation and lack of consensus among psychiatrists.[4,5] A European postal survey showed variation in the availability of ECT, frequency of use, and associated legal procedures, although there was broad consensus on clinical indications.[6] Similarly, variations in ECT use and practice have been noted within smaller countries such as the United Kingdom.[7] Although use of ECT has declined in the United Kingdom in recent decades, ECT is commonly used in other countries, such as parts of India and Nigeria.[8] However, direct comparisons of clinical experience with ECT between different countries have not been reported. To help develop a better understanding of possible differences, we sought to compare ECT practice between university teaching hospitals based in London, UK, and Bengaluru, India.

METHODS

Design and Subjects

A retrospective case note comparison between centers of all patients referred for ECT during a 1-year period (2001 in London and 2002 in Bengaluru) was conducted. In parallel, to compare ECT practice and outcomes, we studied consecutive series of patients with major depressive disorder (*International Classification of Diseases, version 10* [*ICD-10*]) treated with ECT during this period. The Operational Criteria (OPCRIT) computerized program (OPCRIT, version 3.4)[9] was used to generate *ICD-10* diagnoses from the case notes in the London sample, whereas diagnosis in Bengaluru was made by the lead clinician in the treating team.

Study Centers

The populations of London and Bengaluru (7,172,091 and 6,523,110, respectively) are comparable (2001 census in India and the United Kingdom). Electroconvulsive therapy services in university teaching hospitals were chosen at both sites. The Maudsley and Bethlem Royal hospitals, South London and the Maudsley NHS Trust, provide public psychiatry services to a catchment area of 841,622 persons (2001 census in the United Kingdom) in addition to being a national center for tertiary referrals. The National Institute of Mental Health and Neurosciences in Bengaluru caters to all of the local population and also acts as a national tertiary referral center. Ethics approval was obtained to study the case notes at both hospital sites in London and Bengaluru.

Patients are given ECT twice weekly at the London site and thrice weekly at the Bengaluru site. Both centers practice modified ECT using an anesthetic agent and a muscle relaxant. At the London site, methohexitone (Brietal) was used in 1999 until it ceased production in May 1999. Propofol was used for 5 months between May and September 1999, after which etomidate was used for 11 months until methohexitone (Brevimytal) became regularly available again in August 2000. Suxamethonium was used as the muscle relaxant at the London site during this period at the recommended dose.[8,10] At the Bengaluru site,

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thiopentone was used as the anesthetic agent, and suxamethonium was used as the muscle relaxant at the recommended doses.

At the London site, the protocol used in 2001 was a half-age method to calculate the stimulus charge at the first session of ECT. The Bengaluru site determined motor seizure threshold to calculate the stimulus charge. Thereafter, at both sites, stimulus dose was titrated to ensure seizure durations were greater than 25 seconds on electroencephalographic monitoring or 15 seconds on observation of the motor seizure. The ECT machine used at the London site was Thymatron DGx device (Somatics, Inc) and that at the Indian site was NIVIQURE machine (Technonivilac, Bangalore, India).

Measures

Data were collected on a standardized proforma at both centers following retrospective review of case notes. This included sociodemographic data, indication for ECT referral, diagnosis, prescribed psychotropic medication, and previous history of ECT. Referral from inpatient or outpatient setting and use of mental health legislation were also recorded. Scores for treatment resistance were given based on nonresponse to the number of antidepressant (tried with adequate dose for at least 6 weeks in duration) or augmentation treatments. The time of inpatient stay before patients started ECT was recorded in addition to total length of inpatient stay.

The ECT treatment variables such as anesthetic (type and dosage) used, ECT treatment parameters, number of ECTs used in the course of treatment, adverse effects, and reason for cessation of ECT were recorded. The ECT treatment parameters included motor seizure duration and electroencephalographic seizure duration. The latter was available only for the London sample. Electroencephalographic seizure duration was not recorded routinely in the Bengaluru sample. Prolonged seizure was defined as motor seizure duration greater than 90 seconds. Response to ECT was recorded under 5 categories: "complete recovery," "major improvement," "minor improvement," "no change," or "worse."

Statistical Analyses

Data were analyzed using SPSS version 15 (SPSS, Inc, Chicago, Ill). Categorical data were compared using χ^2 or Fisher exact test. Continuous variables were compared between the 2 groups using independent-samples *t* test. Data are presented as mean (SD).

RESULTS

Referrals for ECT

The total number of psychiatry referrals to National Institute of Mental Health and Neurosciences in Bengaluru in 2002 was 8879 patients, of whom 4200 were inpatients. All ECT referrals at the Bengaluru site were inpatients. Therefore, the rate of ECT referrals was 8.2% of all inpatients. The total number of admissions at the Maudsley and Bethlem sites was 4927 patients, and the rate of referral to ECT was 0.9%.

During the 1-year comparison period, there were 46 ECT referrals at the London site and 345 referrals at the Bengaluru site. Comparisons between the 2 groups are summarized in Table 1. The mean age of the patient group at Bengaluru site (30.3 ± 10.4 years) was nearly half that at the London site (62.8 ± 16.0 years, $P < 0.0001$). There were no outpatient ECT treatments at the Bengaluru site, whereas there were 2 at the London site. The diagnostic breakdown of patients was significantly different at the 2 sites. Of all patients at the Bengaluru site referred for ECT, 40.7% had a diagnosis of schizophrenia and other nonaffective psychosis, with depression being the second most common diagnosis (40.4%, n = 135). In contrast, 89.1% of patients at the London site had a diagnosis of depression (n = 41), whereas only 2.2% (n = 1) had schizophrenia. Another striking difference is the absence of patients with catatonia referred to ECT at the London center compared with 6.9% of patients at the Bengaluru center.

Depressed Patients and ECT

Only patients with a major depressive episode were included for further comparisons. From the above sample, 41 patients at the London site and 135 patients at the Bengaluru site were referred to treat a depressive episode. Because the sample for comparison at London site was relatively small, a larger sample of consecutively treated patients was used for comparison purposes. Thus, all patients with a depressive episode receiving ECT between 1999 and 2001 in the London site (n = 110) were compared with depressed patients receiving ECT in 2002 in Bengaluru (n = 135). Data were available for

TABLE 1. Diagnoses and Sociodemographic Features of the 1-Year South London and Bengaluru Samples

	London (n = 46)	Bangalore (n = 345)	Statistical Analysis, *P*
Age, yr	62.8 (16.0)	30.3 (10.4)	<0.0001*
Male	14 (30.4%)	168 (48.8%)	0.19
Total no. admissions	4927	4200	
% of admissions in the year referred to ECT	0.9%	8.2%	
Inpatient ECT	41 (91.1%)	345 (100%)	<0.0001*†
Diagnoses			
Depression	41 (89.1%)	135 (40.4%)	<0.0001*
Manic episodes	2 (4.3%)	24 (7.2%)	0.76
Schizophrenia and Other nonaffective psychosis	1 (2.2%)	136 (40.7%)	<0.0001*
Schizoaffective disorder	2 (4.3%)	13 (3.9%)	0.70
Organic psychosis	0	3 (0.9%)	
Catatonia	0	23 (6.9%)	

*Other tests include χ^2 and *t* tests as relevant significant results.

†Fisher exact test.

TABLE 2. Sociodemographic and Clinical Characteristics of the South London and Bengaluru Depressed Patient Groups

	London (n = 104)	Bangalore (n = 125)	Statistical Analysis, *P*
Age, yr	63.11 (14.7)	31.58 (11.2)	<0.0001*
Male	24 (23.1%)	54 (43.2%)	0.002*
Ethnicity			
White	92 (88.4%)	0	
Afro Caribbean	8 (7.7%)	0	
South Asian	4 (4%)	125 (100%)	<0.0001*
Inpatients	97 (94.2%)	124 (99.2%)	0.08
Previous ECT	70 (68.6%)	29 (23.2%)	<0.0001*
Treatment resistance (>2 failed treatments)	73 (70.2%)	8 (8.6%)	<0.0001*
No. psychotropic medications			
Selective serotonin reuptake inhibitors	38 (36.5%)	45 (36.0%)	1.0†
Tricyclic antidepressant	19 (18.3)	40 (32.2)	0.02†
MAOI	5 (4.8%)	0	
Other antidepressants	31 (21.8%)	0	
Lithium	13 (12.5%)	1 (0.8)	
Carbamazepine	4 (3.8%)	0	
Other mood stabilizer (eg, sodium valproate, lamotrigine)	3 (2.9%)	0	
Benzodiazepines	22 (21.2%)	35 (28.0%)	0.28
Typical antipsychotics	20 (19.2%)	9 (7.2%)	0.009*
Atypical antipsychotics	38 (36.5%)	34 (27.2%)	0.15
Indications for ECT			
Not eating and drinking	22 (21.2%)	7 (5.7%)	0.001*
Stupor	6 (5.8%)	12 (9.8%)	0.32
Suicide	15 (14.4%)	40 (32.8%)	0.002
Previous good response to ECT	19 (18.3%)	14 (11.5%)	0.186
Treatment resistance	39 (37.5%)	14 (11.5%)	<0.0001*
Duration of hospitalization, d‡			
Inpatient length of stay	187.5 (163.6)	29.6 (17.4)	<0.0001*
Length of stay before ECT	73.13 (89.2)	7.65 (9.75)	<0.0001*
Length of stay after ECT	84.5 (113.3)	7.34 (10.16)	<0.0001*

*Other tests include χ^2 and *t* tests as relevant significant results.

†Fisher exact test.

‡Data missing for less than 5% of patients in some of the categories.

104 (94.5%) patients at the London site and 125 (92.6%) patients at the Bengaluru site.

Sociodemographic and clinical data are provided in Table 2. Patients from the south London group were significantly older ($P < 0.0001$) with a greater proportion of females ($P = 0.002$), whereas nearly all patients in both groups were inpatients. Unlike the London group, most of the patients in the Bengaluru group had no previous treatment with ECT ($P < 0.0001$), and they had a significantly lower degree of treatment resistance ($P < 0.0001$). There was more use of mood stabilizers and antidepressants other than selective serotonin reuptake inhibitors or tricyclic antidepressants in the London group, possibly reflecting the greater degree of treatment resistance in this group. Moreover, treatment resistance and self-neglect (ie, not eating and drinking) were more common indications for ECT in the south London group, whereas suicide was significantly more common in the Bengaluru group. The duration of hospitalization was significantly higher at the London site both before and after completing the ECT course.

Treatment Parameters and Outcomes

Results are summarized in Table 3. The mean number of ECT treatments received per course was higher at the London site by about 2 treatments. However, mean stimulus charges and seizure durations were both significantly greater in Bengaluru. Mean number of failed seizures was not different at both sites.

Overall, patients responded better to ECT in Bengaluru with nearly 80% deemed to have either a complete recovery or major improvement compared with 60% of the London group. Indeed, subjective report of "recovery" was the most common reason for stopping ECT in Bengaluru (82.5% of patients), whereas this accounted for just less than half the London group. The lower response rate in the London group may be related to the higher degree of treatment resistance and older age. These possibilities were further tested using logistic regression. The outcome variable was response to ECT as a dichotomous variable (response present or absent); independent variables included age and treatment resistance, that is, nonresponse to 2 or more antidepressant treatments given for adequate duration of time. Only treatment resistance was a significant predictor ($P = 0.002$) with a β coefficient of −1.147. Age was not a significant predictor of response to ECT ($P = 0.14$).

There were no ECT-related deaths at either site. Regarding postictal adverse effects, confusion or amnesia was significantly

TABLE 3. ECT Parameters, Response, and Adverse Effects in London and Bangalore Depressed Patient Groups

	London (n = 104)	Bangalore (n = 125)	Statistical Analysis, *P*
No. treatments per ECT course	8.75 (6.02)	6.67 (2.83)	0.001*
Anesthetic dosage (mg/kg)			
Thiopentone		3.51 (0.53)	
Methohexitone	1.24 (0.18)		
Propofol	1.35 (0.28)		
Etomidate	0.78 (1.08)		
Suxamethonium dosage (mg/kg)	0.67 (0.27)	0.76 (0.16)	0.34
Mean stimulus charge (mC)	66.87 (60.88)	113.99 (49.81)	<0.0001*
Mean motor seizure duration (s)	29.73 (10.92)	50.23 (14.58)	<0.0001*
Mean EEG seizure duration (s)	42.7 (16.1)	Not applicable	
Mean number of failed seizures (<15 s of motor seizure duration)	1.70 (5.79)	0.87 (1.11)	0.16
Treatment response†			
Complete recovery	10 (10%)	32 (26.4%)	<0.0001*
Major improvement	50 (50%)	66 (54.5%)	
Minor improvement or no change	40 (40%)	23 (19%)	
Postictal complications†			
Confusion/amnesia	30 (28.8%)	15 (12.4%)	0.003*‡
Anesthetic complication	6 (5.8%)	16 (13.2%)	0.07‡
Headache	1 (1%)	45 (37.2%)	<0.0001*‡
Injuries	0	2 (1.7%)	
Reason for stopping ECT†			
Recovery	46 (46.5%)	99 (82.5%)	<0.0001*‡
Adverse effects	21 (21.2%)	7 (5.8%)	
Nonrecovery	12 (12.1%)	6 (5%)	
Withdrawn consent	3 (3.0%)	3 (2.5%)	

*Other tests include χ^2 and *t* tests as relevant significant results.
†Data missing for less than 5% of patients in some of the categories.
‡Fisher exact test.
mC indicates millicoulombs.

more common in the London group ($P = 0.003$), whereas headache was more commonly reported by the Bengaluru group ($P < 0.0001$). Adverse effect, as a cause for cessation of ECT, was much higher at the London site ($P < 0.0001$).

DISCUSSION

Summary of Results and Meaning of Findings

To our knowledge, this is the first transcultural report of direct comparison of ECT practices. Compared to Bengaluru, ECT was less frequently used in London where it was mainly reserved for depressed patients who were older and more treatment resistant. In contrast, diagnosis was varied in the Bengaluru sample, with schizophrenia being the most common group (40.7%). Only 40.4% of patients in Bengaluru were referred for major depression compared with 89.1% of the London sample. Catatonia was not reported in the London sample.

With regard to the depressed group of patients, in the London sample, older age group with treatment resistance showed poor response to ECT, having longer inpatient stays. In contrast at the Bengaluru site, younger, non–treatment-resistant depressed patients were referred with better response to ECT. The longer hospital stays in London are possibly due to ECT referrals in treatment-resistant stage, and this has significant cost implications.

In Bengaluru, the higher number of depressed patients prescribed tricyclic antidepressants could reflect free availability of theses drugs via the health service. Headache was the most reported adverse effect at the Bengaluru site, possibly due to thiopentone anesthesia that has more prolonged recovery.[11] Higher levels of amnesia reported at the London site could be related to treatment-resistant depression responding poorly to ECT, although lower subjective reports at the Bengaluru site may be related to remission of depression. This may also reflect ECT being perceived more positively with less stigma attached to it in developing countries such as India. Indeed, there were reports of patients directly requesting ECT at Bengaluru site.

Comparison of Results to Available Literature

Use of ECT has declined in the United Kingdom in recent decades, and the rate of use was low at the London site in this study. Annual ECT use showed a progressive fall to half of earlier rates from 1985 to 1995 to 1999.[12] The rate of ECT use at the London site is in keeping with 1.2% to 7.4% of hospital patients receiving ECT in the United States.[8] The lowest rates are reported from Hungary (0.6%) and Hong Kong (1.34%–1.88% of inpatients).[13,14] Reasons reported for low rates include legal regulations and negative attitudes toward ECT.[13] The rate of ECT use in India is similar to that reported in most countries in the Asia Pacific region, which was 9% or less.[8] This is, on the higher side, compared with the western countries or Australia. Much higher rates of ECT referral are reported from studies in Nigeria (27.7%–62.5% of

hospitalized patients)[15,16] with the majority diagnosed with schizophrenia.

A survey in Japan showed 6.8% of ECT referrals with a diagnosis of catatonia similar to the Bengaluru site.[17] The lack of patients with catatonia in the London sample is possibly because of the lack of referrals to ECT in the acute phase of the illness. Only 1.7% of patients in Australia were referred with catatonia.[18] Most patients in London (91.3%) being referred for a major depressive disorder is in keeping with similar majorities reported in New England in the United States (81.4%)[19] and in Australia (82.3%).[18]

A point of note is the large number of patients with schizophrenia referred for ECT in the Bengaluru sample. Similar trends are reported in other parts of India, Nigeria, and Japan. A survey covering 74 institutions in India showed that patients received ECT most commonly for schizophrenia (36.5%) followed closely by major depression.[20] In 1 Nigerian study, approximately 50% of ECT referrals were for schizophrenia.[16] A Japanese survey reported that schizophrenia was the most common diagnosis (48.9%) of ECT referrals, although overall ECT use was low.[17] Similarly, a recent survey from 45 Asian countries showed that schizophrenia was the commonest indication for ECT.[21]

A Cochrane review[22] revealed that there is a role for use of ECT combined with antipsychotics in schizophrenia when rapid response is needed or in treatment-resistant patients. However, ECT guidelines in the western hemisphere rarely support the use of ECT in schizophrenia[23,24] It is unclear if ECT should be indicated in schizophrenia from the research evidence available at present. The high rate of ECT use for schizophrenia in the countries mentioned above could inform others who lack equivalent experience.

Limitations of the Study

The retrospective design of the study relied on routinely collected clinical information from case records rather than standardized outcome measures. Nonetheless, the high level of case note retrieval enhances the validity of our findings, whereas the response rates to ECT are similar to those previously reported in clinical trials in London[25] and Bengalaru.[26] The 2 centers used different anesthesia and ECT protocols with different frequencies of administration. However, twice-weekly ECT is as effective as thrice-weekly treatments,[27] although the latter may increase adverse effects such as amnesia due to increased total stimulus charge applied each week, but this was not seen in the current study. Both centers now follow the guidelines for ECT practice as outlined by the Royal College of Psychiatrists.[23]

Conclusions

Practice of ECT varies widely across, and within, countries. The precise reasons for this are not clear. Although the evidence base for ECT in treating severe treatment-resistant depression is of the highest order,[1] this is not so clear for nonaffective psychoses. Electroconvulsive therapy practice in western industrialized nations seems to be relatively restricted compared to developing nations. However, it is possible that because of restricted ECT prescription, patients who require ECT are denied the treatment in countries such as the United Kingdom. On the other hand, in sites such as Bengaluru, frequent use of ECT in patients who may have benefited from medication alone may put these patients at risk for cognitive adverse effects.[28] What constitutes the optimal use of ECT is unclear at present. Further research in transcultural ECT practice may clarify this, especially the role of ECT for schizophrenia and where medications may not be readily accessible.

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