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THE PRACTICE OF ECT IN INDIA: II. THE PRACTICAL ADMINISTRATION OF ECT.

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SUMMARY

A questionnaire on ECT, tapping attitudes, opinions and usage, was mailed to all medical members of the Indian Psychiatric Society whose addresses were known; 263 (28.8%) responded. This paper, the second in a series that presents the results of the survey, describes the practical administration of ECT. Specific issues discussed are the availability of a cardiopulmonary resuscitation kit, ECT premedication, the ECT device, certain aspects of ECT stimulation, the electrode placement during ECT, administration of multiple ECT during a single treatment session and monitoring of the seizure duration. It is concluded that, in many respects, the practical administration of ECT in India in suboptimal; further research is required in certain areas.

INTRODUCTION

At the National Symposium on Electroconvulsive Therapy (ECT) held at the National Institute of Mental Health and Neurosciences in October 1990, it became apparent that there was considerable variation amongst Indian psychiatrists in attitudes, concepts and practice in relation to the field. A survey of the medical membership of the Indian Psychiatric Society (IPS) was therefore conducted to obtain an extensive database on ECT, covering opinions, attitudes and practice. It was hoped that the results would provide a platform for the evaluation of the use of ECT in India, and would form the basis for the development of a position statement and set of guidelines and recommendations by the Indian Psychiatric Society [IPS]. An earlier paper on the results of this survey (Agarwal et al, 1992) presented data on issues relating to the administration of ECT. This paper deals with the practical administration of ECT.

MATERIALS AND METHODS

An 8-page printed questionnaire, modified from the American Psychiatric Association Task Force on ECT (1978) and available from the authors of this paper on request, was mailed to all medical members of the IPS Directory (1990), updated to 1991 from the files of the General Secretary of the Society, and listed as 'current' for postal address veracity at the Editorial Office of the Indian Journal of Psychiatry. A self-addressed, stamped envelope was enclosed to facilitate the return of the completed forms.

Questionnaires returned over a 3 month period were scored using a coding system that yielded a span of 324 digits over 149 dependent variables (per respondent). The data was then transferred to the hard disc of an IBM-compatible central computer with multiple peripherals. A total data printout was manually verified for accuracy over 89,163 information bits which included computer categorization details as well as the actual data.

Subsequently, one way analyses (mean, standard deviation and frequency distribution) and, if indicated, two way analyses (intervariable dependance and relationships) were conducted using statistical software that was developed this purpose by an experienced biostatistical analysis computer programmer.

RESULTS

Of the 938 psychiatrists to whom the questionnaire had been mailed, 263 responded; 25 questionnaires were returned by the postal department marked addresses unknown. The response rate was therefore 263/913, or 28.8%. While the total sample size was 263, much difference in actual sample size across variables was observed. This was because of inadvertent omissions in the completion of the questionnaire by the respondents, illegible entries, and because certain variables were inapplicable to certain respondents. Effective sample size is hence indicated for each variable. Sociodemographic and other background variables of the respondents have been presented earlier (Agarwal et al, 1992). Twelve psychiatrists (4.6%) were not practicing, while 36 (13.7%) indicated that they practiced, but did not use ECT either themselves or through their junior doctors. Hence, only 215 (81.7%) respondents used or prescribed ECT.

The present paper deals with descriptors of the practical administration of ECT, as reported by these 215 respondents. Respondents subjective impressions about the adequacy of their cardiopulmonary resuscitation kit are presented in Table 1. Only 67 (31.2%) respondents felt that they were well-equipped.

TABLE 1

Respondents' subjective opinion about the adequacy of their cardiopulmonary resuscitation kit (n = 215)

Status of kit	No.	(%) of responders
Well-equipped	67	(31.2%)
Moderately equipped	119	(55.3%)
Poorly equipped	28	(13.0%)
(Invalid response)	1	(0.5%)

ECT premedication and related issues are detailed in Table 2. Nearly a third of the respondents expressed a preference for unmodified ECT. Over 10% of the respondents used parenteral diazepam instead of anaesthesia as premedication for ECT. While just a fifth of the respondents had formal training in anaesthesia administration, over half invariably involved anesthesiologists during ECT.

The mean ± standard deviation (M± SD) percentage

TABLE 2
ECT Premedication and Related Issues (n=215)

1. No. (%) of respondents who prefer:		
unmodified ECT	65	(30.2%)
modified ECT	149	(69.3%)
(invalid response)	1	(0.5%)
2. No. (%) of respondents who:		
use no premedication	21	(9.8%)
use parenteral diazepam instead of anaesthesia in premedication	25	(11.6%)
use thiopentone sodium in premedication	166	(77.2%)
use other anaesthetics (e.g. ketamine, methohexitone) in premedication	3	(1.4%)
3. No. (%) of respondents formally trained in the administration of anaesthesia	43	(20.0%)
4. No. (%) of respondents using the services of anaesthesiologists:		
always	123	(57.2%)
sometimes	52	(24.2%)
never	31	(14.4%)
(invalid responses)	9	(4.2%)

of respondents' patients who received unmodified ECT was 36.2 ± 43.9; when only data from respondents who used unmodified ECT was considered, the M± SD percentage was found to be to be 67.7 ± 38.3 (n=115). Details of differential use of modified and unmodified ECT are presented in Table 3. Psychiatrists preference for one or the other form of the treatment seemed rather clear cut, with few employing modified as well as unmodified techniques frequently.

TABLE 3
Frequency of use of Modified ECT (n=215)

Percentage of ECT-treated patients in whom modified ECT had been used	Number (%) of respondents
0%	52 (24.2%)
1-20%	33 (15.3%)
21-40%	2 (0.9%)
41-60%	6 (2.8%)
61-80%	3 (1.4%)
81-99%	17 (7.9%)
100%	95 (44.2%)
(invalid responses)	7 (3.3%)

Most respondents used constant voltage, sine wave stimuli and ECT devices of Indian origin. A surprisingly large number however did not known the nature of stimulus delivered or the nationality of manufacture of their ECT device (Table 4).

Table 4
Details of ECT apparatus (n=215)

1. Manufacturer of the ECT instrument	no.(%) respondents	
Indian manufacturer	116	(54.0%)
Foreign manufacturer	18	(8.4%)
Dd not know	79	(36.7%)
(Invalidresponses)	2	(0.9%)
2. Nature of stimulus delivered by the ECT instrument		
Constant voltage, sinewave	120	(55.8%)
Constant current, brief pulse	42	(19.5%)
Other	2	(0.9%)
Do not know	51	(23.7%)

TABLE 5
Aspects of ECT stimulation: use of glissando and manual timing of stimulus duration (n=215)

Percentage of ECT-treated patients	Glissando	Manual timing
0%	119 (55.3%)	74 (34.4%)
1-24%	28 (13.0%)	15 (6.9%)
25-49%	6 (2.8%)	3 (1.4%)
50-74%	1 (0.5%)	23 (10.7%)
75-99%	10 (4.7%)	10 (4.7%)
100%	25 (11.6%)	67 31.2%)
(invalid responses)	26 (12.1%)	23 (10.7%)

TABLE 6
Electrode Placement practice (n=215)

Electrode placement	Always	Sometimes	Never	Invalid responses
Bilateral	198 (92.1%)	13 (6.0%)	3 (1.4%)	1 (0.5%)
Left unilateral	1 (0.5%)	2 (0.9%)	212 (98.6%)	0 (0%)
Right unilateral	0 (0%)	10 (4.7%)	205 (95.3%)	0 (0%)
Unilateral+bilateral combination	3 (1.4%)	1 (0.5%)	208 (96.7%)	3 (1.4%)

Nearly half of the respondents used glissando stimulation while nearly two thirds manually timed the stimulus duration in at least some of their ECT-treated patients (Table 5). Bilateral electrode placement practice seemed almost invariable (Table 6).

About a quarter of the sample used multiple ECT - a procedure referring to the administration of more than one seizure in a single ECT session. Most of these practitioners confined themselves to the administration of 2 seizures per session - usually in a small proportion of their ECT -treated

TABLE 7
Practice of multiple ECT

1. Frequency of use of multiple ECT	No.(%) of respondents*	
0% of ECT-treated cases	161	(74.9%)
1-25% of ECT-treated cases	45	(20.9%)
26-75% of ECT-treated cases	4	(1.9%)
over 75% of ECT-treated cases	4	(1.9%)
(invalid response)	1	(0.5%)
2. Average number of seizures per multiple ECT session	No. (%) of respondents**	
2 seizures	18	(8.4%)
3 seizures	5	(2.3%)
4 seizures	1	(0.5%)
5 seizures	2	(0.9%)
(invalid responses)	28	(13.0%)

*n=215
**n=54: the number of respondents who indicated that they use multiple ECT; percentages are based on the entire ECT using sample (n=215)

TABLE 8
Respondents' seizure monitoring practice*

Cuff method	29 (13.5%)
EEG method	1 (0.5%)
No method (other than visual monitoring)	175 (81.4%)
Invalid responses	10 (4.7%)

n = 215.

clientele (Table 7).

While a few respondents used the cuff (n=29) or the EEG (n=1) methods for monitoring seizure duration, over 80% of respondents who used ECT (n=175) used no method other than visual inspection, thus merely confirming that a seizure had been induced (Table 8).

It may be noted here that, unless specifically stated otherwise, numbers and percentage are based on 215, the number of respondents who use ECT. Finally, all data refers to the respondents practice over the 6 months immediately preceding the completion of the questionnaire (in effect, approximately the first half of 1991) as it was felt that this cut-off would represent current practice and yet provide sufficient data for valid estimations.

DISCUSSION

As methodological and background issues have been discussed in the earlier paper (Agarwal et al, 1992), the present paper will focus on the reported findings only.

The majority of respondents indicated that their cardiopulmonary kit was moderately to well equipped (Table 1). While this is reassuring, it must be acknowledged that subjective opinions about adequacy will very from clinician to clinician; hence it is advisable to adhere to prescribed guidelines (American Psychiatric Association, 1990; Kuruvilla, 1992).

The data in Tables 2 and 3, describing ECT premedication and related issues, are disquieting on two counts. First, many respondents used parenteral diazepam instead of anaesthesia as premedication. This practice should be discouraged because of several reasons: [a] the recovery phase is unnecessarily prolonged; [b] sedation and psychomotor impairment cumulate across the ECT course due to the very long half-life of diazepam; [c] diazepam raises the seizure threshold, thus necessitating the use of high intensity stimuli which in turn increase cognitive morbidity; and [d] because the efficacy of ECT itself may be compromised (Pettinati et al, 1990).

Next, many respondents (n=115; 53.5%) indicated that they used unmodified ECT for an average of 67.7% of their ECT-treated clientele. Four decades after the introduction of succinylcholine for the modification of the (peripheral) ECT seizure, there seems little excuse for the continued use of unmodified ECT (except in exceptional circumstances), particularly when it is well established that unmodified ECT occasions considerably more (physical) morbidity than does modified ECT (Fink, 1979). Official guidelines issued by the Royal College of psychiatrists (Freeman et al, 1989) and the American Psychiatric Association (1990) are unequivocal in describing the practical administration of ECT as invariably involving modification with anaesthesia and muscle relaxants; to this extent, the use of unmodified ECT may (in some quarters) even be considered unethical.

Regrettably, the questionnaire did not tap the reasons underlying the respondents' preference for unmodified ECT. One possible reason is a reluctance to use anaesthesia in the absence of an anesthesiologist, or in the absence of formal training in the use of anaesthesia. While such reluctance is understandable, it must be borne in mind that psychiatrists can administer anaesthesia for ECT as safely as anesthesiologists, and that modification of the seizure should be the overriding concern (Various authors, 1980; Pearlman et al, 1990).

Arousing concern in Table 4 is the high percentage of respondents who do not know either the make of their ECT device or the type of stimulus that it delivers. The make of the ECT device is important as it testifies to the potential fidelity of the instrument - a virtue vital to the integrity of the ECT procedure (Pippard & Ellam, 1981). In countries like the USA, ECT devices come under strict regulations laid down by the Food and Drug Administration. In sharp contrast in India, no standards - ISI or otherwise - exist to regulate safety and fidelity of ECT devices; in fact, it is perfectly permissible for even a garage engineer to design and market such an instrument.

Regrettably, the questionnaire did not tap the frequency at which respondents serviced their ECT instruments (if they did so at all), and their experiences therefrom. From personal experience, the authors of this paper believe that such should be done at least twice a year; variations of 20% or more can otherwise be expected in the specified stimulus settings.

Knowledge of the nature of the stimulus delivered during ECT has become an important issue in recent years as the electrical dose is germane to both beneficial and adverse effects (Gangadhar & Andrade, 1989a & b; Andrade, 1990, 1991a & 1992a). For reasons of cost, the constant voltage, sinusoidal wave ECT device is likely to remain popular for long; for theoretical reasons, the constant current, brief-pulse instrument is however to be preferred. This latter device delivers less current than the sine wave device; hence, cognitive and other adverse effects are fewer. Furthermore, the stimulus so delivered is as effective as the sinewave stimulus, granted that the dose is adequately suprathreshold. Finally, the constant current specification permits accurate measurement of the seizure threshold, and quantification of the ECT electrical dose in coulombs of charge.

There is little to recommend other types of ECT devices, such as those which deliver a constant energy stimulus. Such devices are subject to the vagaries of interelectrode impedance, which varies widely across subjects and, in the same subject, across time (Gordon, 1982). A note is made here that more than one respondent may be using the same ECT device (Table 4).

The glissando technique refers to the procedure whereby the intensity of the stimulus is gradually increased until the patient convulses. The procedure is controlled by the smooth rotation (through an arc) of the ectonus knob, available on most indigenously manufactured ECT devices. The procedure supposedly smoothly induces the convulsion with special emphasis on the component of muscular contractions; this, in turn, supposedly reduces motor apparatus morbidity. There is no evidence, however, that glissando is of any benefit, particularly in an era in which modified ECT has become the rule (Fink, 1979); it is therefore unfortunate that the facility still exists on contemporary devices, and that psychiatrists continue to use it (Table 5).

The timer circuit in the ECT device permits accurate stimulus dosing. More important, it prevents inadvertent excessive dosing. It is therefore a cause for concern that only 34.4% of respondents always use the timer control during ECT, while the remaining respondents bypass this control some or all of the time (Table 5). Today, there seems to be no justification whatsoever for manual timing of the ECT stimulus - not even the situation wherein the patient fails to convulse despite the delivery of the maximum stimulus that the device is capable of delivering. This is because numerous alternatives exist to induce a convulsion in such a situation, and because even double stimulation to elicit an adequate convulsion can be effected within the provisions of the timer circuit (Fink, 1987; Andrade, 1991b).

It is deplorable therefore, that to economize, many contemporary ECT devices manufacturers in this country continue to market ECT devices without timer controls, and that, when such controls are present, the facility is offered to override the timer circuit and function in the manual mode. It hardly needs to be said that both glissando and (potentially) manually-timed stimuli deliver more electricity to the brain than may be necessary; this predisposes to increased ECT-induced cognitive morbidity.

Table 6 reveals that electrode placement in India is almost invariably bilateral. The controversy about the relative efficacy of unilateral and bilateral ECT is yet to be resolved (Andrade, 1991a). Various opinions have been expressed in the management of depression that, granted certain optimization, unilateral ECT is as effective as bilateral ECT (Weiner & Coffey, 1986; Weiner et al, 1986; Ottoson, 1991); that bilateral ECT nevertheless retains an advantage although many issues remain to be addressed in research (Sackeim, 1991); that left unilateral ECT is superior to right unilateral ECT (Abrams et al, 1981) etc. Although much less researched, the controversy extends to the management of mania (Small et al, 1985; Mukherjee, 1989) and schizophrenia (Bagadia et al, 1988) as well. In view of the above, it is understandable that a preference for bilateral ECT exists. However, as unilateral ECT is indisputably less cognitively toxic than bilateral ECT, a considered opinion is expressed that with appropriate optimization and in selected cases (Abrams, 1988; Andrade, 1991a) unilateral electrode placement may be the more appropriate choice.

Multiple ECT refers to the administration of more than one ECT during the same ECT session. It's proponent in recent years has been Maletzky (Maletzky, 1986). The principle underlying this procedure is that response to ECT putatively depends upon the number of convulsions delivered/ the rate of administration of ECT/ the cumulative seizure duration experienced by the patient rather than then time-dependent neuroreceptor and other changes induced by ECT. Considering the high percentage of respondents using multiple ECT (Table 7), more research on the safety and efficacy of the procedure is required. At present, however, no satisfactory (or otherwise) double-blind, controlled, prospective study exists to support the use of multiple ECT, while cognitive risk to the patient is increased by the procedure (Abrams, 1987). Recently however, Roemer et al (1990) found 'double ECT' to purvey faster recovery but at the risk of greater cognitive adverse effects.

Several methods have been proposed to measure the ECT seizure duration. Of these, electrocardiography, electromyography and changes in the galvanic skin response are unsuitable for routine clinical practice. The cuff method, which measures the motor seizure duration at the periphery and the electro-encephalographic (EEG) method, which measures the duration of ictal activity in the brain, are popular and are recommended for clinical use (Freeman et al, 1989; American Psychiatric Association, 1990). The EEG method involves expensive technology and is largely inapplicable for routine use in India. The cuff method, which has been described elsewhere (Addersley & Hamilton, 1953; Channabasavanna, 1992; Kuruvilla, 1992), is however practicable within the resources available at any ECT unit, and has hence been recommended for routine use in India (Andrade, 1990);

Monitoring seizures is necessary because seizures below 20-25 seconds in duration are probably subtherapeutic while seizures exceeding 180 seconds in duration are potentially harmful (Freeman et al, 1989; American Psychiatric Association, 1990). A recent study has suggested that, using the cuff method, a cut-off point of 20 seconds defines the adequate seizure for depression (Andrade, 1993). In the absence of seizure duration monitoring, the clinician has no way of knowing whether the seizure administered is inadequate, adequate or excessive; visual confirmation that a seizure has merely 'occurred' obviously conveys insufficient information. The very high percentage of respondents who do not monitor the ECT seizure duration is hence alarming (Table 8).

In conclusion, despite the sample being biased towards a more idealized practice of ECT because many (n=90) respondents had been involved with ECT research (see Agarwal et al, 1992), the practical administration of ECT in India is in many respects suboptimal; in other areas, more research is necessary. While official guidelines to define the ideal as well as the minimally acceptable are

definitely necessary for India, it is hoped that after two Tilak Venkoba Rao Orations on ECT (Abhyankar, 1985; Andrade, 1990), one National Workshop on ECT (Gangadhar, 1992), one Presidential Address on ECT to the Indian Psychiatric Society (Channabasavanna, 1992), and innumerable research publications on the subject in the Indian Journal of Psychiatry, the practical administration of ECT in India will at last witness a sea change.

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