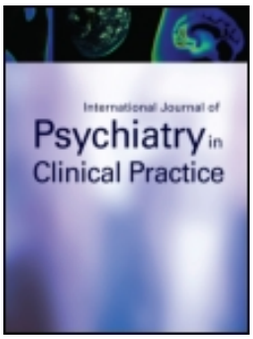

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ORIGINAL ARTICLE

Comparing ECT data of two different inpatient clinics: propofol or thiopental?

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Abstract

Objective. This study compares the data of (modified) electroconvulsive theraphy (ECT) applications from two different inpatient clinics in Turkey: Kocaeli Derince Training and Research Hospital (Clinic-I) and Kocaeli University (Clinic-II). *Methods.* Recorded files of patients from the two clinics were compared in terms of ECT indications, number and duration of seizures, and anesthetic agents used (propofol vs. thiopental). ECT applications occurring between January 2011 and January 2013 were included in the study. *Results*. A total of 86 patients (9.5% of the inpatients) received ECT in Clinic-I and 103 patients (21.1% of the inpatients) in Clinic-II during the period studied. The yearly ECT rate (treated person rate per 10,000 per year) was 0.59/10,000 for Kocaeli (Turkey) as a whole. The overall number of ECT applications was 539 in Clinic-I and 999 in Clinic-II, and the average number of ECT sessions for each patient was 6.4 ± 2.33 in Clinic-I and 9.69 ± 4.66 in Clinic-II. The majority of indications were depressive disorders and insufficient response to medicine. Patients in the clinic which utilized thiopental as the anesthetic agent experienced more cardiovascular and respiratory side effects than the one which used propofol. The number of ECT sessions required was greater for patients with schizoaffective disorder than for others. *Conclusions*. The administration of ECT was considered to be a reliable method of treatment in these clinics. With respect to specific anesthetic agents, propofol was found to have less hemodynamic side effects and shorter seizure durations than thiopental.

Key words: ECT, Turkey, Thiopental, Propofol

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Introduction

Electroconvulsive Therapy (ECT) is an effective treatment option which has been applied worldwide since 1930 and is used primarily in the treatment of mental diseases such as depression, schizophrenia, bipolar affective disorder, and schizoaffective disorder. Many differences are witnessed in the way that ECT is administrated between countries, between institutions, and between the approaches of individual physicians (Leiknes et al. 2012). Recently, classic ECT has been replaced by anesthetic (modified) ECT. Modified ECT is a more reliable method as it minimizes the complications of the old ECT method. These often included problems such as death, injury, fractures originating from the intensity of contraction in muscles, fatigue, and amnesia (Tomruk et al. 2007a). However, the fact that it is a modern method in comparison to classical ECT is an issue open for research as it requires giving additional anesthetic and muscle relaxant medicines to patients who currently use many psychotropic medicines.

While non-modified (without anesthesia) ECT method applications still continue in Asian countries (20% in Japan in 2001–2003, 100% in Nepal in 2008), Europe appears to have almost completely switched over to modified ECT usage (Leiknes et al. 2012). Turkey, the location of this study, has totally shifted to modified ECT application.

Bipolar and unipolar depressions lead the way as the main ECT indications in Austria and New Zealand. Likewise, depression constitutes 72–92% of ECT indications in the United States, while schizophrenia/schizoaffective disorders remain between 8% and 24%. ECT is also mostly applied following depression diagnosis in Europe, whereas schizophrenia is the primary illness in Hungary and the Asian countries (Leiknes et al. 2012).

In a study conducted in Turkey, it was reported that among the patients who were given ECT, 30% were diagnosed with bipolar affective disorder—mania, 30% had schizophrenia, 15% had depression, 14% had other psychotic disorders, 6% had schizoaffective disorder, 4% had psychological disorders due to the use of alcohol and drugs, and 1% exhibited catatonia (Saatcioglu and Tomruk 2008). A further study performed in a university hospital revealed that 16% of the hospital patients were prescribed ECT, and of these, 66% had been diagnosed with depression (Yıldız et al. 2003).

In a current review on ECT application around the world, the number of average ECT sessions was reported to be 7–12 in Austria and New Zealand, 1–10 in Europe, 5–12 in the USA, 8 in Brazil, and 6–8 in Asia overall (Leiknes et al. 2012). Additional studies performed in Turkey revealed the

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number of ECT sessions to be between 1 and 18, usually averaging around 7–10 (Saatcioglu and Tomruk 2008).

Seizure duration is deemed one of the most important parameters in predicting the effectiveness of ECT, and 25–75 s is considered the optimal seizure time. Below 15 s is too short, and above 125 s is viewed as an elongated seizure (Kumar et al. 2012). In the Electroconvulsive Treatment Clinic Application Handbook published in Turkey, it is recommended that seizure duration should preferably be 25 s or longer so that the treatment can be most effective; seizures below 20 s were included in the definition of sufficient seizure (Tomruk et al. 2007b).

The selection of the anesthetic agent to be used during ECT application is critical. The ideal hypnotic medicine used for anesthesia in ECT should have a short half-life; it should not influence the duration and quality of the seizure, nor should it disrupt the hemodynamic balance (Folk et al. 2000). Propofol and thiopenthal are between the most commonly used intravenous medicines which are employed in anesthesia induction (Tomruk et al. 2007a).

In this study, the ECT data of two psychiatric inpatient clinics which work independently from each other in Kocaeli city were reviewed. The number and rates of patients, number of ECTs, durations, number and rates of successful seizures, anesthetic agents used (thiopental and propofol), and side effects were all evaluated. Additionally, the study also aimed to examine the natural procedures of the institutions and to compile the ECT information of Kocaeli city as a whole.

Methods

In this study, information regarding the ECT applications made in Kocaeli Derince Training and Research Hospital Psychiatry Clinic (Clinic-I) and Kocaeli University Psychiatry Clinic (Clinic-II) between January 1, 2011 and January 1, 2013 was examined retrospectively. Data was obtained from the ECT record notebooks and patient files. General data regarding the number and rates of patients and who was admitted to the psychiatry clinic and service within the same period were supplied by the systems of both hospitals.

ECT is administered in both Clinic-I and Clinic-II within specialized units. The preparation, narcotizing, and post-anesthesia follow-up of the patient are made here by the anesthesia team.

While propofol is the chosen agent for ECT anesthesia induction in Clinic-I, thiopental is used in Clinic-II. Succinylcholine is used as the muscle relaxant in both of the clinics.

The frequency of ECT application occurs twice a week or over three seizures in both clinics. Patients who require ECT are hospitalized; it is not applied while patients are ambulant. Furthermore, both clinics utilize ECT subscription treatment.

The functioning and administration of ECT application is similar in both clinics. ECT is performed by the anesthesia and psychiatry teams following the written consent of the patient and/or the patient's relatives, and after the routine hunger time has elapsed. During the session, the usual procedures for oxygen masks, ECG, tension measuring, pulse follow-up, and oxygen saturation monitorizations are followed for every patient.

Bifrontal placement of ECT is made using the MECTA-SPECTRUM brand ECT device, giving a "brief pulse", "square wave" type, 500–800 mA (miliamper) current. It is applied two or three times a week depending on the clinical procedure of the hospital.

Statistical analysis

The SPSS15.0 program was employed for analysis of the data. The chi-square test was used in the comparison of the cluster data, and a t-test and one-way ANOVA were used to evaluate the averages. Furthermore, post-hoc (LSD) analyses were made in the advanced comparison of multiple groups.

Results

General data

In Clinic-I, 9.5% of inpatients ($n = 86$) and in Clinic-II 21.1% inpatients ($n = 103$) were received ECT between January 2011 and January 2013. Detailed information is given in Table I. Clinic-I and Clinic-II are inpatients psychiatry clinics of Kocaeli city, Turkey. There are other institutions in Kocaeli which perform ambulant patient follow-up, but ECT application is only made in these two institutions. Therefore, in terms of the entire Kocaeli city population, which is 1,601,702 based on 2012 data from the Turkish Statistical Institute (TurkStat), the yearly ECT rate (treated person rate per 10,000 per year) was 0.59/10,000. This was calculated as follows:

Total number of patients who received ECT in 2 years: 189

In 1 year: 189/2 = 94.5

1,601,702 persons admitted, with 94.5 receiving ECT in 1 year.

10,000 94.5/1,601,702 = 0.589*

The average number of ECT sessions was 6.4 ± 2.33 in Clinic-I and 9.69 ± 4.66 in Clinic-II, for each patient. On examination of the patient files, it was determined that the threshold for duration was applied differently between the clinics and physicians so as not to accept a seizure to be valid in ECT and give energy again. A range of 15–25 s constituted

Table I. Two-year general data for Clinic-I and Clinic-II.

	Clinic-I *n* (%)	Clinic-II *n* (%)
Total number of patients	74,239	28,055
Patients received inpatient treatment	905 (1.21)	488 (1.73)
Inpatients receiving ECT	86 (9.5)	103 (21.1)
Female	51 (59.3)	50 (48.5)
Male	35 (40.7)	53 (51.5)
Mean age of patients receiving ECT	39.29	40.01
Female	40.31	40.8
Male	37.8	39.2

n: number of patients.

%: percentage of patients within the upper class.

the limit; seizures of 20 s and longer were accepted and not repeated when the general tendency was considered. This limit was accepted as the threshold value in our study as well in terms of statistical calculation, with seizures of 20 s and longer being considered successful. The duration and number of seizures were also calculated. Three patients in Clinic-I and four patients in Clinic-II were given subscription ECT. Seven patients in Clinic-I and 9 patients in Clinic-II had repeated hospitalizations. The general ECT data from both clinics are shown in Table II.

The diagnosis distribution of the patients who received ECT in Clinic-I and Clinic-II is shown in Table III and percentages are shown in Figure 1.

Indications for ECT

The most common reason for ECT application in Clinic-I was that the response to medication was insufficient. Insufficient response to medicine constituted reason at the rate of 65.1%, insufficient response to medicine together with suicidality was 22.1%, and insufficient response with excitation was 4.7%. Furthermore, the best response to ECT occurred with previous anamnesis and eating rejection indications. In Clinic-II, on the other hand, insufficient response was 50.5%, 24.3% with suicidality, and 19.4% with excitation. Four patients were given ECT (3.9%) due to pregnancy, while eating rejection and previous positive response to ECT were also among the reasons for ECT application at Clinic-II.

Complications of ECT

Complications resulting from ECT application such as death, injury due to ECT, permanent disruption in hemodynamic parameters, or sequel development due to severe ability loss could not be fully determined. However, bradycardia, respiratory distress, and temporary complications which usually get better without intervention, such as reactions against the anesthetic agent, were observed. Details for clinics are shown in Table IV. The majority of complications consisted of bradycardia (47.7%). Other issues including respiratory distress, hypertension, and reactions such as skin erythema and skin eruptions against anesthesia are recorded in Figure 2.

The comparison of clinics

The data comparison of both clinics is given in Table V. Overall, it was determined that more ECT was applied in Clinic-II, and the seizure rate exceeding 20 s within the total number of ECT sessions was 69.3%. This was 87.01% in Clinic-I. The total number of ECT sessions and seizures per patient at Clinic-II was found to be significantly higher than at Clinic-I. Likewise, the seizure duration experienced at Clinic-II was also longer than at Clinic-I ($p < 0.05$). When the total succinylcholine dosage given to patients in both hospitals was evaluated, it was discovered that Clinic-II used higher doses. Furthermore, on examining the amount of energy given in ECT sessions, Clinic-II was found to administer sessions by initially giving a lower dosage of energy and then ending with higher doses of energy. The average amount of energy given was higher in Clinic-II than in Clinic-I.

Table II. Two-year ECT application data from two different clinics.

	Clinic-I	Clinic-II	Total
Number of patients	86	103	189
Total number of ECT applications	539	999	1,539
Number of seizures 20 s and longer	469	693	1,162
Number of seizures shorter than 20 s	70	306	376
Subscription ECT	3	4	7
Repeated hospitalization*	7	9	16

*Patients who had repeated hospitalization and ECTs.

Table III. Diagnoses of the patients who were given ECT.

	Number of patients		
Diagnosis	Clinic-I (*n*:86)	Clinic-II (*n*:103)	Total (*n*:189)
Depressive disorder	48	64	112
Schizophrenia	17	13	30
Bipolar mania	16	19	35
Schizoaffective disorder	3	7	10
Other	2	0	2

n: number of patients.

Number of ECT sessions according to diagnosis

During analysis of the data of both clinics and the whole sample; the disease diagnosis, number of ECTs, seizure duration, and the amount of energy given were evaluated with a one-way ANOVA test. While no significant differences could be found in the Clinic-I data, a significant relationship was identified between the number of seizures and disease diagnosis in the Clinic-II data and in the whole sampling ($p < 0.05$). In the post-hoc (LSD) analyses conducted for the entire sample, it was determined that schizoaffective disorder was different from all other groups, and depressive disorder was different from schizophrenia (Table VI).

Discussion

This study reflects on the data of two independent clinics in Kocaeli, one of the biggest cities in Turkey, as well as presenting 2-year ECT data for the city as a whole. The application similarities and differences regarding both clinics (the university hospital and training and research hospital in Turkey) are reviewed and the data are also evaluated in general.

The results indicate that the 1-year ECT rate for the Kocaeli population is 0.59 per 10,000. This can be compared with rates of 0.11 in Poland, 0.26 in Germany, 3.7 in England, 1.15 in Thailand, 1.26 in the South Africa, and 2.38–5.1 in the United States (Leiknes et al 2012).

In evaluating the ECT ratios of the hospitals, the study determined these to be 9.5% for patients in Clinic-I, with 1.21% in all applications, and 21.1% for patients in Clinic-II, with 1.73% in all applications. An earlier study conducted by Bakırköy Training and Research Hospital reported that 12.4% of the inpatients who received ECT while in a university hospital demonstrated an ECT ratio of 16.5%. Moreover, a Norwegian study found that 5.3% of inpatients were given ECT (Schweder et al. 2011), and in a review conducted in 2012, the ECT ratio among inpatients was 20–22% in Africa, 9–26% in Asia, and 1–8% in Australia (Leiknes et al.

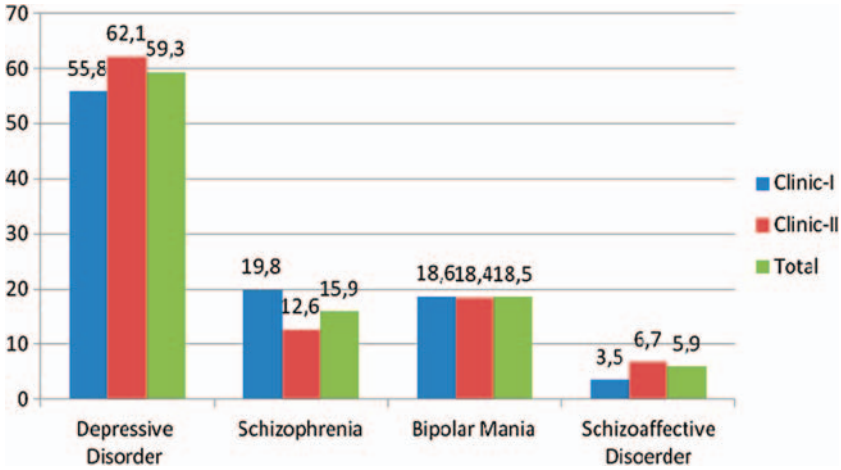

Figure 1. Percentages within the diagnoses of patients who were given ECT.

2012). It has also been reported that 0.9% of 1-year applications are made in London and 8.1% in Bangalore (Eranti et al. 2011). When it is considered that university hospitals accept the most severe cases which are directed from all hospitals in the region, including training and research hospitals, it can be better understood why a higher ratio of hospitalization is made and ECT is applied.

This study Shows that both Clinic-I and Clinic-II tend to accept 20 s as the sufficient seizure duration time during ECT. While there are publications which consider effective duration to be between the range of 15–120 s and 25 s in general across the world (Kumar et al. 2012), in previous studies performed in Turkey (Algül et al. 2009; Yıldız et al. 2003) 20 s was accepted as the standard for sufficient seizure duration in the Psychiatric Association of Turkey handbook (Tomruk et al. 2007b) and 25 s for active seizure. During this study, it was observed that psychiatrists who have received different training and worked independently from each other exhibit a common approach in applying ECT. Hence, this is an important study in that it reflects the figures which are used in clinical application beyond those specified in the guides and other experimental studies.

In both clinical units, the majority of patients were those with depressive disorder (bipolar and unipolar). These findings generally conform to European and American data, although schizophrenia is ahead of depression as an indication in Asia (Chanpattana et al. 2010; Leiknes et al. 2012). In a 2008 study conducted in Turkey in a training and research hospital, mania was found to be the most common diagnosis in which ECT is applied (Saatcioglu and Tomruk 2008), while an earlier study conducted in 2003 revealed depression to be the most frequent diagnosis (Yıldız et al. 2003).

Insufficient response to medicine was established as the primary reason for making ECT decisions in both Clinic-II and Clinic-I in this particular study. Excitation was also more commonly seen alongside insufficient response to medicine in Clinic-II. Furthermore, while there were pregnancy-period ECT applications in the university hospital, nobody was pregnant in Clinic-I, and ECT was administered less due to excitation. At this point, it is possible to suggest that more severe and complicated patients applied or were directed to the university hospital. Indications in both clinics were similar to the indications shown globally in the literature (Leiknes et al. 2012).

ECT-based fatal or permanent complications were not observed in either of the clinics. This can likely be attributed to the improved ECT application conditions which have been initiated throughout Turkey. In particular, there is the transition to modified ECT and enhancements in physical conditions, anesthesia induction, ECT application, and compiling. Despite this, disruption ratios were determined to be higher in the hemodynamic parameters in the ECTs applied in Clinic-II. Anesthesia variance steps in as the key difference in the applications of both

Table IV. Complications resulting from ECT applications.

Complication	Clinic-I *n*:86 (Propofol)	Clinic-II *n*:103 (thiopental)	*p**
Bradycardia	5	16	0.038**
Apnea-respiratory distress	0	6	0.033**
Hypertension	0	7	0.016**
Reaction against anesthetic agent	1	4	0.379
Hypotension	0	1	1.000
Other	1	3	0.607
Total number of complications	7	37	0.001**

*Shows Fisher's exact test values.

**$p < 0.05$.

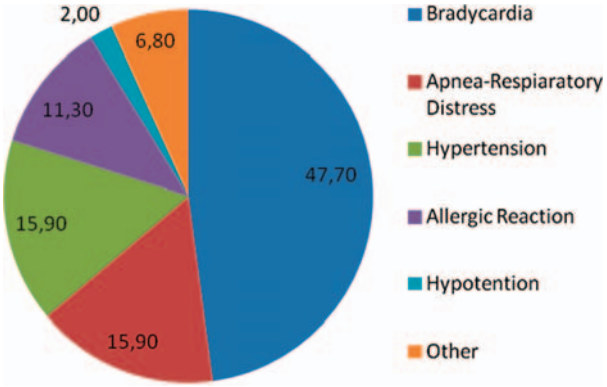

Figure 2. Total percentages within all complications of ECT.

Table V. Comparison of ECT data of the clinics per patient.

	Clinic-I (*n*:86)	Clinic-II (*n*:103)	*t**	*P*
Total number of ECT sessions	6.40 ± 2.33	9.69 ± 4.66	− 5.95	0.000**
Number of seizures	5.59 ± 2.36	6.72 ± 3.02	− 2.82	0.005**
Seizure duration	32.52 ± 6.66	35.77 ± 11.38	− 2.33	0.021**
Average succinylcholine dosage	37.0 ± 11.08	55.53 ± 12.62	− 10.61	0.000**
Energy (first session)	27.98 ± 6.95	22.88 ± 9.39	4.17	0.002**
Energy (last session)	41.30 ± 19.98	52.91 ± 30.28	− 3.04	0.003**
Energy (average)	34.64 ± 11.66	37.89 ± 16.85	− 1.51	0.000**

n: number of patients.
**t* values for student *t* test.
***p* < 0.05.
****Number of seizure and seizure durations are calculated for successful seizures with durations longer than 20 s.

clinics in this regard. While Clinic-II uses thiopental as the main anesthetic agent, Clinic-I uses propofol, and it is shown in the literature that thiopental can adversely affect hemodynamic parameters (Safaee et al. 2007). Complications can thus be related to thiopental here. Indeed, during a study in which thiopental and propofol were compared, propofol was found to be more reliable in terms of hemodynamic parameters (Kumar et al. 2012). And when complications were examined in this particular case, there was greater allergic reaction against the anesthetic agent used in Clinic-II. A broad study which was carried out in France discovered that allergic reactions in anesthesia typically originated from muscle relaxants, and succinylcholine was most commonly responsible for them (Dong et al. 2012). The higher succinylcholine dosage which was used in Clinic-II might have triggered the anesthetic reactions experienced by patients.

Seizure duration is considered to be a significant parameter in predicting ECT effectiveness (Kumar et al. 2012). In this study, it was observed that the seizure duration of the patients who were given thiopental was longer than those who were given propofol, though in contrast, the escapee/insufficient amount of seizure was much greater with thiopental (below 20 s). When the energy levels given to the patients were examined, Clinic-II was found to begin sessions with a lower energy level, and this might have resulted in escapee seizures. Clinic-II would then increase the amount of energy toward the end of the session and administered much more energy per patient in total. When propofol and thiopental were compared in a recent external study, it was revealed that the patients who received propofol were exposed to longer seizure duration, more seizures in number, and more energy (Kumar et al. 2012), while in another experiment, propofol was shown to have less hemodynamic side effects (Zaidi and Khan 2000). Likewise, in another comparative study, it was reported that thiopental was related to longer, more effective seizures (Ingram et al. 2007). The findings of this particular study correlate with most of these results, demonstrating that thiopental is related to longer seizure duration and greater hemodynamic side effects.

Table VI. The relationship between the disease diagnosis and number of seizures and number of ECTs in the whole sampling.

Diagnosis	Number of patients	Number of successful seizures*	Number of ECTs**
Depressive disorder	112	5.73 ± 2.54	7.96 ± 4.12
Bipolar (mania)	35	6.28 ± 2.06	8.82 ± 4.13
Schizophrenia	30	6.96 ± 3.36	7.70 ± 4.01
Schizoaffective disorder	10	9.40 ± 3.71	10.90 ± 3.60

**P*:0.00 F:6.702 ***P*:0.116 F:2.00 in one-way ANOVA test for difference between diagnostic groups.

This study also examines the relationship between the diagnosis of the patient and the number of successful (effective) seizures given. With patients who received a diagnosis of schizoaffective disorder, it was determined that the number of seizures was higher when compared with patients with other diagnoses. In a similar vein, schizophrenia patients required more ECT applications when measured against depression patients. As a result, the order of diagnoses requiring a greater number of ECT applications was (from more to less) schizoaffective disorder, bipolar affective disorder, and finally, depressive disorder. This may be related to the fact that schizoaffective disorder and schizophrenia progress with more severe clinical states, resulting in a slower clinical response.

Limitations of the study

The primary limitation of this study is that the scales in which the clinical states and treatment responses of the patients were documented are not presented. This is a retrospective file scanning study and no data can be displayed as there is no standard scaling in the relative files of the two different units. If the same study was to be carried out prospectively, it would be possible to scale all the patients and obtain the net results by comparing these scales.

Conclusions

This study has demonstrated that the two clinical units, working independently from each other in Turkey, have both successfully applied ECT as a reliable method of treatment for mental disorders. It has also shown that characteristics such as diagnosis distribution, indication, and number of applications in these clinics are parallel with the world norms. In the study, the main difference in the application of ECT was the use of propofol as an anesthetic

agent by one clinic and thiopental by the other. Importantly, propofol was found to have less hemodynamic side effects and shorter seizure durations, while thiopental was related to more hemodynamic side effects and longer seizure durations. This study also compared different disease diagnoses, and it was determined that schizoaffective disorder and schizophrenia required more ECT sessions than the other disorders examined.

Key Points

- This study is significant due to its natural structure which investigates and compares the ECT applications of the clinics in a retrospective way. ECT applications are not conducted according to a research design, and thus it more accurately reflects the reality of treatment and spontaneous experiences of the clinics.
- The differences in clinical procedures for performing ECT applications are listed in the study.
- Although there are minor differences between the applications of the two clinics, the results were similar in terms of diagnosis distribution, indications, and number of applications. And it was clear that schizoaffective disorder and schizophrenia required more ECT sessions in both clinics.
- The differences between side effects and interactions with seizures related to anesthetic agents are documented.
- This study reflects the ECT data of Kocaeli in Turkey as a whole, a city with a population of over 1.5 million people.

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None.

Statement of interest
None of the authors reports conflicts of interest.

References

Algül A, Şen H, Ateş MA, Yen T, Durmaz O, Özkan S, et al. 2009. Propofol versus propofol-remifentanil combination anaesthesia in electroconvulsive therapy: effects on seizure duration and hemodynamics. Bull Clin Psychopharmacol 19:24–28

Chanpattana W, Kramer BA, Kunigiri G, Gangadhar BN, Kitphati R, Andrade C. 2010. A survey of the practice of electroconvulsive therapy in Asia. J ECT 26:5–10.

Dong SW, Mertes PM, Petitpain N, Hasdenteufel F, Malinovsky JM, GERAP. 2012. Hypersensitivity reactions during anesthesia. Results from the ninth French survey (2005–2007). Minerva Anestesiol 78:868–878.

Eranti SV, Thirthalli J, Pattan V, Mogg A, Pluck G, Velayudhan L, et al. 2011. Comparison of electroconvulsive therapy practice between London and Bengaluru. J ECT 27:275–280.

Folk JW, Kellner CH, Beale MD, Conroy JM, Duc TA. 2000. Anesthesia for electroconvulsive therapy: a review. J ECT 16:157–170.

Ingram A, Schweitzer I, Ng CH, Saling MM, Savage G. 2007. A comparison of propofol and thiopentone use in electroconvulsive therapy: cognitive and efficacy effects. J ECT 23:158–162.

Kumar A, Sharma DK, Mani R. 2012. A comparison of propofol and thiopentone for electroconvulsive therapy. J Anaesthesiol Clin Pharmacol 28:353–357.

Leiknes KA, Jarosh-von Schweder L, Hoie B. 2012. Contemporary use and practice of electroconvulsive therapy worldwide. Brain Behav 2:283–344.

Saatcioglu O, Tomruk NB. 2008. Practice of electroconvulsive therapy at the research and training hospital in Turkey. Soc Psychiatry Psychiatr Epidemiol 43:673–677.

Safaee MH, Sepidkar A, Eftekharian HR. 2007. Hemodynamic variation following induction and tracheal intubation–thiopental vs propofol. Middle East J Anesthesiol 19:603–610.

Schweder LJ, Lydersen S, Wahlund B, Bergsholm P, Linaker OM. 2011. Electroconvulsive therapy in Norway: rates of use, clinical characteristics, diagnoses, and attitude. J ECT 27:292–295.

Tomruk NB, Kutlar MT, Mengeş OO, Canbek Ö, Soysal H. 2007a. EKT anestezisi (Anesthesia For ECT). Elektrokonvülsif tedavi klinik uygulama el kitabı (Guide for Clinical Practice of Electroconvulsive Therapy) T.C. Health Ministery Bakırköy Prof.Dr.Mazhar Osman Training And Research Hospital. İstanbul: Ece matbacılık. p. 35.

Tomruk NB, Kutlar MT, Mengeş OO, Canbek Ö, Soysal H. 2007b. Yan etkiler (Side Effects). Elektrokonvülsif tedavi klinik uygulama el kitabı (Guide for Clinical Practice of Electroconvulsive Therapy) T.C. Health Ministery Bakırköy Prof.Dr.Mazhar Osman Training And Research Hospital. İstanbul: Ece Matbacılık. p. 20–23.

Yıldız A, Gökmen N, Turgut K, Yücel G, Tunca Z. 2003. Place of electroconvulsive therapy among the somatic treatments in a university clinic psychiatric inpatients. Bull Clin Psychopharmacol 13:65–71.

Zaidi NA, Khan FA. 2000. Comparison of thiopentone sodium and propofol for electro convulsive therapy (ECT). J Pak Med Assoc 50:60–63.