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Demographic and Clinical Profile of Patients Receiving Electroconvulsive Therapy at a Tertiary Care Hospital in Oman: A Cluster Analysis

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ABSTRACT

Objectives: We sought to identify subgroups of psychiatric patients in a sample of patients admitted at a tertiary care hospital in Oman who received electroconvulsive therapy (ECT) based on their demographic and clinical outcomes. ***Methods:*** We retrospectively collected data from patients who received ECT at Al Massarah Hospital, Muscat, Oman, between January 2015 and December 2019. Sociodemographic characteristics, clinical profiles, and psychiatric comorbidities were examined. ***Results:*** A total of 179 psychiatric patients received ECT; 96 (53.6%) were females. The average age at diagnosis was 42.5 years. Two-step cluster analysis showed 70 (39.1%) patients in cluster one and 109 (60.9%) patients in cluster two. Patients in cluster one included more (61.4%) females, were older (mean = 55.2 years), married (95.7%), and unemployed (88.6%). They reported they had comorbidities (55.7%) and less frequent ECT use (mean = 8.7) than patients in cluster two. Clusters differences were found on gender ($p = 0.001$), age ($p < 0.001$), marital status ($p < 0.001$), and occupation ($p = 0.001$). Significant differences were found for diagnosis ($p < 0.001$), comorbid medical conditions ($p < 0.001$), and use of ECT sessions ($p = 0.006$). ***Conclusions:*** Psychiatric patients receiving ECT are heterogeneous, with different demographic and clinical outcomes. Our study has shown that patients in cluster one are older females, unemployed, with more comorbidities, and depressive disorders, but received fewer ECT sessions. This study provides important information for clinicians to identify strategies to promote the use of ECT on its effectiveness and safety issues for each group.

Electroconvulsive therapy (ECT) is a neuromodulatory procedure in which seizures are induced by passing electrical stimulus to the brain to improve a patient's mental state.[1] ECT is an effective and safe treatment for various psychiatric disorders, including mood disorders and schizophrenia.[2] ECT is performed in many countries worldwide, and several national surveys of ECT practice have been published.[3] ECT can achieve response rates of 50%–70% with treatment-resistant depression, while standard antidepressant therapies achieve responses of 16%–17% for such patients.[4] Recent data showed that ECT is associated with a 46% lower risk of 30-day readmission among psychiatric inpatients compared with a matched group of patients with severe depression who did not receive ECT.[4] A retrospective chart review of eight years in a tertiary psychiatric institution in Beijing reported that patients who received ECT had a shorter hospitalization length than the non-ECT group.[5] However, despite the effectiveness of ECT due to different attitudes towards the advantages and disadvantages of its use, it is only considered in some countries after medications have failed to treat the psychiatric illness.[6] A study conducted in the Netherlands found that 40% of psychiatrists did not have the correct knowledge about some technical details regarding ECT.[7] The practice of ECT and utilization rates vary among countries and regions within a country, which depend on several factors, including the prevalence of psychiatric illness, availability of service,[8] number of trained doctors, and awareness and concern about its efficacy and side effects.[9] The underutilization of

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ECT is thought to reflect a combination of factors, including cultural beliefs, stigma,[10] risk of cognitive side effects, and restricted access because of limited availability.[4] In Asia, a survey of 257 institutions in 23 countries suggested that the practice may be seen as suboptimal; schizophrenia was the main indication, unmodified ECT is commonly used, and no formal training was given.[11]

A meta-analysis about ECT use in 12 countries showed that patients in western countries that received ECT tended to be older[12] and had depression.[13] In Norway, a study found that the male to female ratio in ECT use was 1:2.[14] It also noted that in western countries, the main indication for ECT was depression (78% in Sweden, 70% in Denmark, and 80.2% in Spain).[4,15,16] A retrospective study in South Africa showed that the most common indication for ECT was depression, with most patients aged between 18 and 59 years old.[17] In contrast, in Asian countries, the patients tended to be younger men with schizophrenia.[13] The majority of ECT patients aged 24–44 years old were illiterate or had school diploma level education.[18] Another study on the ECT practices in Iraq reported that the main indication for ECT was schizophrenia (51%), followed by severe depression (31.5%), resistant mania (10.4%), catatonia (2.4%), and others (4.4%).[16] According to a study done in Thailand, patients with schizophrenia most frequently received ECT (74%), followed by mania (8%) and major depression (7%).[15] The authors suggested that this difference in age group trends could be caused by the demographics of the Asian population and the fact that schizophrenia (with higher prevalence in younger patients) is the main indication for ECT in Asian patients.[13] Previous studies have addressed the practice of ECT internationally, but no local studies are available in Oman. This study was conducted to identify subgroups of psychiatric patients who received ECT and to explore whether patients in the subgroups differed based on their demographic and clinical outcomes.

METHODS

This retrospective cohort study was conducted among psychiatric patients admitted to Al Massarah Hospital, Muscat, Oman, who received ECT. We included all psychiatric patients aged 18 years and above who received ECT from January 2015 to December 2019. Patients lacking information in their records were excluded from the study. Our patient cohort had a mixture of different psychiatric diagnoses. In Oman, the healthcare system is free with universal access for Oman citizens and expatriates employed by the government. Al Massarah Hospital is a tertiary care facility with full-fledged facilities in psychiatry with referrals from different regions of the country. ECT is mainly provided for inpatients. The courses of ECT usually comprise six to 12 sessions for an adult under general anesthesia, three times a week, between 9:00 a.m. and 11:00 a.m.

The following variables were obtained using a data collection sheet from the hospital information system (ALSIFA 3 plus). The medical records of each patient who underwent ECT were obtained, including the following variables: age, gender, marital status (single, married, and divorced), occupation status (employed, unemployed, and student), and place of residency (rural and urban areas). The primary psychiatric diagnosis were classified as schizophrenia, bipolar affective disorder (BAD), schizoaffective disorder, and major depressive disorder. The presence of medical comorbidities was recorded. We also looked at the indication of ECT in this cohort of patients (treatment resistance, contraindication of antidepressant use, catatonia, and immediate risk for suicide), the number of ECT sessions, and whether the patient had previous ECT.

All statistical analysis was carried out using IBM SPSS (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp.). Descriptive statistics (i.e., mean, SD, median, range, frequency, and percentage) were used to explore the demographic and clinical outcomes of the patients. The two-step cluster analysis identified the number of the subgroup. All demographic and clinical outcomes were used in the cluster analysis. The silhouette measure average was used to determine how many subgroups were in this cohort.[19] A silhouette value > 1 indicated that all samples are located directly on their cluster centers. Differences between clusters were evaluated using an independent *t*-test and chi-square test/Fisher's exact test for numerical and nominal outcomes. All tests were two-tailed, and a $p < 0.05$ was considered statistically significant.

Ethical approval was granted by the Ministry of Health Research and Ethics Committee (MH/DGHS/DPT/536/2020). The study was conducted

as per the Declaration of Helsinki and the American Psychological Association regarding ethical human research including confidentiality, privacy, and data management.

RESULTS

A summary of 179 psychiatric patients who received ECT is given in Table 1. Over half (n = 96, 53.6%) the patients were females. The average age at diagnosis was 42.5±15.8 years (range = 16.0–88.0 years old). Half (50.3%) were single, 60.3% lived in urban areas, and 75.4% were unemployed. The primary diagnosis of schizophrenia and schizoaffective disorder was 101 (56.4%) and 33 (18.4%), respectively. Of all patients, 60 (33.5%) had comorbidities, 129 (72.1%) were treatment-resistant to ECT, 57 (31.8%) had received previous ECT treatment. The average number of ECT sessions received was 9.7±3.7 times (range = 1.0–18.0).

Table 1: Demographic and clinical outcomes of 179 patients that received electroconvulsive therapy (ECT).

Variables	n (%)
Demographics	
Gender	
Female	96 (53.6)
Male	83 (46.4)
Age, years	
Mean ± SD	42.5 ± 15.8
Median (range)	40.0 (16.0–88.0)
Marital status	
Single	90 (50.3)
Married	68 (38.0)
Divorced	21 (11.7)
Place of residence	
Urban	108 (60.3)
Rural	71 (39.7)
Occupation	
Employed	32 (17.9)
Student	12 (6.7)
Unemployed	135 (75.4)
Clinical	
Primary diagnosis	
Schizophrenia	101 (56.4)
Bipolar affective disorder	25 (14.0)
Schizophrenia affective disorder	33 (18.4)
Major depressive disorder	20 (11.2)
Comorbidities medical conditions	
No	119 (66.5)
Yes	60 (33.5)
Indication of ECT	
Treatment-resistant	129 (72.1)
Catatonia	11 (6.1)
History of previous good responses to ECT	18 (10.1)
Risk to others	21 (11.7)
Previous ECT treatment	
Yes	57 (31.8)
No	122 (68.2)
Number of ECT sessions received	
Mean ± SD	9.7 ± 3.7
Median (range)	10.0 (1.0–18.0)

The analysis produced two clusters as the best solution. When the cluster number was two, the silhouette measures were the largest at 1.56. Two-step cluster analysis showed 70 patients in cluster one (39.1%) and 109 patients in cluster two (60.9%). Both demographic and clinical profiles of the clusters are presented in Table 2. Patients in cluster one included more females (n = 43, 61.4%), were older (mean = 55.2±14.7 years), and the majority were married (n = 67, 95.7%) and unemployed (n = 62, 88.6%). They reported they had comorbidities (n = 39, 55.7%) and less frequent ECT use (mean = 8.7±4.0) than patients in cluster two. Patients in cluster two included more males (n = 69, 63.3%), were younger (mean = 32.5±10.0 years), and the majority (82.6%) were single. They reported more schizophrenia (n = 79, 72.5%), no comorbidities (n = 88, 80.7%), and more frequent use of ECT (mean = 10.3±3.5) than patients in cluster one. Clusters differences were found on gender ($p = 0.001$), age ($p < 0.001$), marital status ($p < 0.001$), and occupation ($p = 0.001$). In clinical outcomes, significant differences were found on diagnosis ($p < 0.001$), the presence of comorbidities ($p < 0.001$), and use of ECT sessions ($p = 0.006$).

DISCUSSION

This is the first study to examine the subgroups of psychiatric patients who received ECT in tertiary care hospitals in Oman and explore whether patients in the subgroups differed based on their demographic and clinical outcomes. Our findings indicate that patients who received ECT are not homogeneous in their demographic and clinical profiles.

Cluster one was characterized by older females, and more are married and unemployed with more comorbidities and depressive disorders but received fewer ECT sessions. The profiles of patients in

Table 2: Comparison of demographic and clinical outcomes by clusters.

Variables	Cluster		*p*-value
	1 (n = 70, 39.1%)	2 (n = 109, 60.9%)	
	n (%)	n (%)	
Demographics			
Gender			
Female	43 (61.4)	40 (36.7)	0.001#
Male	27 (38.6)	69 (63.3)	
Age, years			
Mean ± SD	55.2 ± 14.7	32.5 ± 10.1	< 0.001¨
Median (range)	56.0 (19.0–88.0)	34.0 (16.0–68.0)	
Marital status			
Single	0 (0.0)	90 (82.6)	< 0.001*
Married	67 (95.7)	1 (0.9)	
Divorced	3 (4.3)	18 (16.5)	
Place of residence			
Urban	36 (51.4)	72 (66.1)	0.051#
Rural	34 (48.6)	37 (33.9)	
Occupation			
Employed	8 (11.4)	24 (22.0)	0.001#
Student	0 (0.0)	12 (11.0)	
Unemployed	62 (88.6)	73 (67.0)	
Clinical			
Primary diagnosis			
Schizophrenia	22 (31.4)	79 (72.5)	< 0.001*
Bipolar affective disorder	18 (25.7)	7 (6.4)	
Schizophrenia affective disorder	12 (17.1)	21 (19.3)	
Major depressive disorder	18 (25.7)	2 (1.8)	
Comorbidities medical conditions			
No	31 (44.3)	88 (80.7)	< 0.001#
Yes	39 (55.7)	21 (19.3)	
Indication of ECT			
Treatment-resistant	47 (67.1)	82 (75.2)	0.534*
Catatonia	4 (5.7)	7 (6.4)	
History of previous good responses to ECT	8 (11.4)	10 (9.2)	
Risk to others	11 (15.7)	10 (9.2)	
Previous ECT treatment			
Yes	24 (34.3)	33 (30.3)	0.574#
No	46 (65.7)	76 (69.7)	
Number of ECT sessions received			
Mean ± SD	8.7 ± 4.0	10.3 ± 3.5	0.006¨
Median (range)	8.0 (1.0–18.0)	12.0 (1.0–18.0)	

*#χ^2 test; *fisher's exact test; ¨independent t-test; ECT: electroconvulsive therapy.*

cluster one align with similar results from different studies done in western countries like Norway and Spain, where the patients who received ECT tended to be older women.[15,17,20] A patient's gender has no role in ECT treatment, but a study conducted by Schweder et al,[17] shows that the male-female ratio receiving ECT was 1:2, which is lower than our finding (1:1.6) in cluster one. Nordanskog et al,[18] found that the mean age of the patients receiving ECT was > 50 years, similar to the patients in cluster one (55.2 years). In cluster one, > 51% of patients had a depressive disorder (25.7%) and BAD (25.7%), which is similar to a previous study that showed that depressed female patients were more referred to ECT.[21] The average number of ECT sessions delivered to patients in cluster two was 8.7±4.0, similar to previous studies in Asia. The average number of ECT sessions for patients with depressive disorder was 6–9 treatments.[7,8]

In contrast with cluster one, patients in cluster two were more young single men. The majority had schizophrenia and affective disorder, more without other comorbidities, and received more ECT sessions. The mean age of our patients in cluster two was 32.5 years. Our finding is opposite to what was found in other studies done in the region, like Iraq and Iran, with similar studies tended to be younger men with schizophrenia.[16,22] In this study, most of the patients in cluster two who had ECT had a primary diagnosis of schizophrenia and schizophrenia affective disorder (91.8%). In addition, > 75% who underwent ECT were treatment-resistant to medications. This finding is similar to a study conducted in Iran and Iraq, where the main indication for ECT was the resistant treatment of schizophrenia.[16] The average number of ECT sessions received for patients in cluster two was 10.3±3.5, significantly higher than patients in cluster one. However, our finding is similar to studies by Gonzalez-Pinto et al,[23] and Krossler et al,[24] who found that the number of ECTs given per patient was 9.7±3.7 and 11.0±3.1, respectively. There is high variability in the average number of ECT sessions delivered to patients from 1 to 22 worldwide.[14] This high variability could result from differences in demographic and clinical profiles of the patients or may instead be related to differences in resources or practice. Why are young male patients with schizophrenia receiving more ECT reported in cluster one? One likely explanation is the small budget for mental health care in Oman. As a result,

we have limited alternatives for treating these patients. In addition, there are many more psychiatric beds for men than women also contribute to the predominance of male patients with schizophrenia receiving ECT in this subgroup.

Despite that fact, more antipsychotic and antidepressant drugs were used frequently in psychopharmacological treatment, with ECT used only after drug treatments failed.[8,15,22] However, ECT is an effective and safe treatment for various psychiatric disorders, including mood disorders and schizophrenia. In Oman, future challenges to optimize the efficacy of using ECT include documenting the effectiveness and cognitive side effects of ECT and expanding the types of ECT available to different patient profiles in terms of their demographic and clinical outcomes. A clinician should understand each subgroup's profile by establishing tailor-made consultation and help drive ECT development for different subgroups. A study in Singapore shows that patients' quality of life with depression improves after receiving ECT.[21] In Oman, further research on ECT is recommended, especially regarding its effect on patients' quality of life in each subgroup.

There are several limitations to our study. We did not check the percentage of ECT per number of inpatients admitted to the target hospital, which might give a general impression about the rate of ECT use per year. Few patients have ECT courses more than once throughout our study, which might affect the outcome somehow. Moreover, our results only represent one hospital. Further study should expand to other hospitals to ensure the results are generalizable.

CONCLUSION

Psychiatric patients receiving ECT are heterogeneous with different demographic and clinical outcomes. Patients in cluster one are older females, mostly married and unemployed, with more comorbidities and depressive disorders but received fewer ECT sessions. However, patients in cluster two were mostly young single men. The majority had schizophrenia and affective disorder, more without comorbidities, and received more ECT sessions. The findings may help address why previous research revealed inclusive findings of psychiatric patients receiving ECT because the patients group are heterogeneous regarding their demographic and clinical outcomes. This study provides important information for clinicians to identify strategies to promote the use of ECT on its effectiveness and safety issues for each group. It also helps a clinician to understand each group's needs to help improve other psychological issues such as quality of life.

Disclosure

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