ความชุกและปัจจัยที่เกี่ยวข้องกับการเกิดภาวะปวดศีรษะในผู้ป่วยที่ได้รับการรักษาทางจิตเวชด้วยไฟฟ้า

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บทคัดย่อ

วัตถุประสงค์ การรักษาทางจิตเวชด้วยไฟฟ้า (electroconvulsive therapy: ECT) เป็นการรักษาที่เป็นที่ยอมรับและโดยทั่วไปมีความปลอดภัย อย่างไรก็ตาม ภาวะปวดศีรษะเป็นผลข้างเคียงที่พบได้บ่อย ปัจจัยที่เกี่ยวข้องกับการเกิดภาวะนี้ยังคงไม่แน่ชัดและไม่ได้รับการศึกษามากนัก ดังนั้นงานวิจัยนี้จึงมีวัตถุประสงค์เพื่อศึกษาความชุกและปัจจัยที่เกี่ยวข้องกับการเกิดภาวะปวดศีรษะในผู้ป่วยที่ได้รับการรักษาทางจิตเวชด้วยไฟฟ้า

วิธีการศึกษา ทบทวนเวชระเบียนย้อนหลังของผู้ป่วยจิตเวช จำนวน 101 ราย ที่เข้ารับการรักษาทางจิตเวชด้วยไฟฟ้า แบบผู้ป่วยใน ณ โรงพยาบาลรามาธิบดี ระหว่างเดือนกันยายน 2560 ถึงเดือนกุมภาพันธ์ 2566 เพื่อศึกษาความชุกและปัจจัยที่เกี่ยวข้อง โดยภาวะปวดศีรษะในการศึกษานี้นิยามว่าเป็นอาการที่เกิดขึ้นภายใน 24 ชั่วโมง หลังการรักษาด้วยไฟฟ้า ซึ่งอาจเป็นอาการที่ผู้ป่วยรายงานด้วยตนเองหรือสอบถามโดยพยาบาล และได้รับยาบรรเทาปวดเป็นการรักษา

ผลการศึกษา ความชุกของภาวะปวดศีรษะในผู้ป่วยที่ได้รับการรักษาทางจิตเวชด้วยไฟฟ้าเท่ากับ ร้อยละ 52.5 (53/101 ราย) โดยปัจจัยที่เกี่ยวข้องอย่างมีนัยสำคัญ ได้แก่ อายุน้อย (อายุเฉลี่ย 40 ปี เทียบกับ 49 ปี; p = 0.01) และการวางขั้วไฟฟ้าแบบ right unilateral (ร้อยละ 68 เทียบกับ ร้อยละ 32; p = 0.001) กลุ่มที่มีอาการปวดศีรษะมีค่าปริมาณไฟฟ้าที่ได้สูงสุดเฉลี่ยต่ำกว่ากลุ่มที่ไม่มีปวดศีรษะ (333 ± 138.7 mC เทียบกับ 413 ± 154.5 mC; p = 0.01) โดยจากการวิเคราะห์พบว่าความเสี่ยงของภาวะปวดศีรษะลดลงเล็กน้อย แต่มีนัยสำคัญทางสถิติเมื่อค่าปริมาณไฟฟ้าเพิ่มขึ้น (adjusted OR = 0.99, p = 0.01)

สรุป ภาวะปวดศีรษะหลังการรักษาทางจิตเวชด้วยไฟฟ้าพบได้ร้อยละ 52.5 ของผู้ป่วยในงานวิจัยนี้ โดยมีปัจจัยที่สำคัญคืออายุที่น้อยกว่า และการใช้ขั้วไฟฟ้าแบบ right unilateral ความชุกที่สูงของอาการดังกล่าวแสดงถึงความจำเป็นในการศึกษาเพิ่มเติมเพื่อหาแนวทางป้องกันในกลุ่มประชากรที่มีความเสี่ยงสูงต่อไป

คำสำคัญ การรักษาทางจิตเวชด้วยไฟฟ้า ปวดศีรษะ ความชุก ปัจจัยเสี่ยง ภาวะแทรกซ้อน

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The Prevalence and Factors Associated with Headache in Patients After Electroconvulsive Therapy

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ABSTRACT

Objective: While electroconvulsive therapy (ECT) is generally well-tolerated, headaches have been widely reported for ages. The factors influencing their occurrence also vary in results and are poorly understood. Therefore, the study aimed to determine the prevalence of post-ECT headaches and identify associated risk factors.

Methods: This retrospective study reviewed the medical records of 101 psychiatric inpatients receiving ECT at Ramathibodi Hospital from September 2017 to February 2023. Post-ECT headache in our study was defined as a headache within 24 hours after treatment, either self-reported or identified by a nurse, and received medication afterwards.

Results: Post-ECT headaches were reported by 53 patients (52.5%). Significant factors associated with headaches included younger age (mean 40 vs. 49 years; p = 0.01) and right unilateral electrode placement (68% vs. 32%; p = 0.001). The headache group had a lower mean maximum charge across sessions (333 ± 138.7 mC vs. 413 ± 154.5 mC; p = 0.01). Adjusted analysis showed a slight but significant decrease in headache risk with increasing charge (adjusted OR = 0.99, p = 0.01).

Conclusions: Post-ECT headaches affected 52.5% of patients in this study, with younger age and right unilateral placement as key associations with post-ECT headaches. The high prevalence highlights the need for future research on preventing high-risk populations.

Keywords: electroconvulsive, headache, prevalence, risk, complication

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INTRODUCTION

Electroconvulsive therapy (ECT) is a well-established treatment for severe psychiatric disorders known for its efficacy and safety.[1-3] However, headaches are frequently reported side effects, with prevalence rates ranging from 21% to over 50% across studies.[4,5] In Thailand, the prevalence of post-ECT headache is 40% among psychiatric inpatients at King Chulalongkorn Memorial Hospital.[6] Post-ECT headaches typically follow a predictable pattern, with most headaches occurring within the first 24 hours after treatment.[7] These headaches can range from mild to severe and are usually transient, resolving within a day with appropriate management.[8] Despite the relatively short duration, these headaches can impact patient comfort and adherence to ECT sessions.[9]

Several factors have been suggested to influence post-ECT headache occurrence and severity. Studies indicate that electrode placement, seizure intensity, and patient characteristics, such as age and history of migraines, may play significant roles.[10,11] Sackeim et al. (2000) and Haghighi et al. (2016) found unilateral electrode placement and higher stimulus doses significantly increased post-ECT headache incidence.[10,12] Meanwhile, Dinwiddie et al. (2010) observed variations in headache intensity and duration based on patient-specific characteristics, highlighting the need for personalized management strategies.[8] Although the exact cause remains unclear, post-ECT headaches are thought to result from muscular contractions of the temporalis and masseter muscles, coupled with cerebral vasodilation.[13] These headaches are typically described as throbbing and may be accompanied by nausea and vomiting, suggesting a vascular component.[14] Current treatment options commonly include acetaminophen,[15] anti-inflammatory drugs such as ibuprofen,[16] and triptans.[17-19]

Given the variability in prevalence and the unclear etiology of post-ECT headaches, continued research is essential to better understand this side effect and improve clinical management. This study aimed to determine the prevalence of post-ECT headaches and identify associated risk factors among psychiatric patients undergoing ECT at Ramathibodi Hospital.

METHODS

Study design and participants

This retrospective cross-sectional descriptive study reviewed medical records of psychiatric inpatients aged 18 years and older who underwent electroconvulsive therapy (ECT) at the Department of Psychiatry, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand, from 1 September 2017 to 1 May 2023. The initial sample included 145 patient records of individuals who underwent ECT. After excluding incomplete records, 101 inpatients were ultimately included in the analysis. The sample size was computed using the n4Studies4 program with the following inputs: N = 145 (total number of patients who underwent ECT), P = 0.145 (prevalence rate based on previous research: Headache Associated with Electroconvulsive Therapy' by Selçuki D), and a significance level of 0.5. This computation resulted in a required sample size of 83 cases. All available records (145) were initially considered, but after reviewing the records, incomplete and excluded ones reduced the final sample to 101 patients.

Data collection

Data were systematically collected by a single investigator through thorough review of patient medical records. Information gathered included:

- *Demographic data:* Age, gender, duration of illness.
- *Clinical variables:* Diagnosis, history of migraines or other types of headaches, and pre-existing headache complaints during admission
- *ECT details:* Electrode placement (right unilateral or bilateral), type of anesthetic used (thiopental, propofol, or a combination of both), charge settings, and EEG seizure duration.

Definition of Post-ECT headache

Post-ECT headache in this study was defined as a headache occurring within 24 hours after any ECT session, either self-reported or documented by nursing staff, requiring analgesic medication. Thus, patients reporting headaches after any single session were considered to have post-ECT headaches.

ECT procedure

All patients underwent a comprehensive evaluation by psychiatrists and anesthesiologists before receiving electroconvulsive therapy (ECT). The ECT sessions were conducted in the Post-Anesthetic Care Unit (PACU) by a multidisciplinary team that included psychiatrists, psychiatric residents, anesthesiologists, psychiatric nurses, and anesthetic nurses.

Anesthesia was induced using either thiopental (2 - 5 mg/kg IV), propofol (1 - 2 mg/kg IV), or a combination of both, followed by muscle relaxation with succinylcholine (0.5 - 1 mg/kg IV). ECT was administered three times per week using brief (1.0 ms) or ultrabrief (0.5 ms) pulse widths) generated by either a Mecta Spectrum 5000Q (Mecta Corp, USA) or a Thymatron System IV (Somatics, Northampton, USA).

The seizure threshold was determined at the first session using a dose-titration method. Right unilateral electrode placement was typically performed at 500% above the seizure threshold, while bilateral placement was performed at 50% above the threshold. The choice of electrode placement (right unilateral or bilateral) was based on symptom severity as assessed by the treating psychiatrist. Treatment was continued until maximal clinical improvement was achieved or until adverse effects limited further sessions.

Statistical analysis

Descriptive statistics were used to summarize demographic and clinical characteristics. The chi-square test (χ^2) and independent t-tests were performed to compare variables between patients with and without post-ECT headaches. Multivariable logistic regression analysis was used to identify factors independently associated with post-ECT headaches. The predictors included in the model were age, electrode placement, and maximum charge. Adjusted odds ratios (OR) with 95% confidence intervals (CI) were reported. A p-value of < 0.05 was considered statistically significant.

RESULTS

Prevalence, demographic, and clinical Characteristics

This study initially recruited 145 consecutively enrolled participants through medical record screening. Following a comprehensive review, 44 cases were excluded due to incomplete documentation or missing data entries, resulting in a final cohort of 101 participants (representing all complete records) for subsequent analyses. All eligible patients' charts were included in the study, with 53 (52.5%) reporting post-ECT headaches. The demographic and clinical characteristics of patients with and without post-ECT headaches are summarized in Table 1. There was no significant difference in gender distribution between the groups, with females comprising 62.5% without headaches and 64.2% with headaches ($p = 1.00$). Patients who reported post-ECT headaches tended to be younger, with a mean age of 40 ± 15.8 years, compared to 49 ± 18.6 years in those without headaches ($p = 0.01$).

Regarding diagnosis, patients with major depressive disorder were significantly more likely to report post-ECT headaches (52.8%) compared to those without headaches ($p = 0.001$). (Table 1)

Factors associated with Post-ECT headaches

Regarding anesthetic use, thiopental was associated with a higher risk of post-ECT headaches ($\chi^2 = 4.71$, $p = 0.05$), while propofol and thiopental-propofol combinations showed no significant effect. Right unilateral electrode placement was associated with a higher prevalence of post-ECT headaches than bilateral placement (68.0% vs 32%; $\chi^2 = 12.07$, $p = 0.001$). This suggests that right unilateral placement increases the risk of post-ECT headaches, while bilateral placement may lower that risk.

Table 1 Demographic and Clinical Characteristics of Patients with and without Post-ECT Headaches

Item	Mean ± SD or Number (%)		χ^2	T	p-value
	No Post-ECT Headache (N = 48)	Post-ECT Headache (N = 53)			
Gender			0.030		1.000
Female	30 (62.5)	34 (64.2)			
Male	18 (37.5)	19 (35.8)			
Age (years)	49 ± 18.6	40 ± 15.8		2.527	0.013*
Body mass index (kg/m^2)	21.6 ± 9.4	21.9 ± 11.5		-0.145	0.885
Duration of illness (years)	14.2 ± 11.5	9 ± 10.6		2.344	0.021*
Diagnosis					
Schizophrenia	14 (29.2)	10 (18.9)	1.475		0.250
Schizoaffective disorder	10 (20.8)	6 (11.3)	1.710		0.276
Bipolar disorder	14 (29.2)	9 (17.0)	2.127		0.162
Major depressive disorder	10 (20.8)	28 (52.8)	10.988		0.001*
Psychiatric comorbidity					
Anxiety disorder	0. (0.0)	2 (3.8)	1.848		0.496
OCD	0. (0.0)	2 (3.8)	1.848		0.496
ADHD	0. (0.0)	3 (5.7)	2.800		0.244
Non-psychiatric comorbidity					
Metabolic	22 (45.8)	20 (37.7)	0.680		0.427
CNSa	4 (8.3)	2 (3.8)	0.937		0.420
Hormonal	3 (6.3)	1 (1.9)	1.261		0.344
OSAb	5 (10.4)	3 (5.7)	0.781		0.472
Autoimmune	1 (2.1)	1 (1.9)	0.005		1.000
Cancer	3 (6.3)	0 (0.0)	3.414		0.104
Respiratory	1 (2.1)	3 (5.7)	0.847		0.619
Musculoskeletal	3 (6.3)	2 (3.8)	0.328		0.666
History of previous ECT	23 (47.9)	17 (32.1)	2.643		0.153
Time to last ECT (years)	1.7 ± 3.7	2.5 ± 5.4		2.334	0.338
Concurrent medication					
Antipsychotic	45 (93.8)	45 (84.9)	2.030		0.204
Antidepressant	17 (35.4)	25 (47.2)	1.432		0.312
Antiepileptic	9 (18.8)	4 (7.5)	2.819		0.137
Lithium	2 (4.2)	0 (0.0)	2.253		0.223
Anxiolytic	13 (27.1)	10 (18.9)	0.967		0..352
Anticholinergic drug	7 (14.6)	3 (5.7)	2.248		0.186

Table 1 Demographic and Clinical Characteristics of Patients with and without Post-ECT Headaches (Con)

Item	Mean ± SD or Number (%)		χ^2	T	p-value
	No Post-ECT Headache (N = 48)	Post-ECT Headache (N = 53)			
History of headache					
Migraine	0 (0.0)	6 (11.3)	5.777		0.028*
Other headaches	0 (0.0)	4 (7.5)	3.772		0.119
Headache complaint during admission before ECT	1 (2.1)	9 (17.0)	6.267		0.017*
History of substance use	2 (4.2)	1 (1.9)	0.454		0.603
Anesthetic agent					
Thiopental (2 - 5 mg/kg)	37 (77.1)	49 (92.5)	4.705		0.048*
Propofol (1 - 2 mg/kg)	10 (20.8)	4 (7.5)	3.724		0.082
Thiopental and Propofol	1 (2.1)	0 (0.0)	1.115		0.475
Succinylcholine (mg)	75 ± 21	72 ± 23		0.593	0.555
Electrode placement			12.066		0.001*
Right unilateral	16 (33.3)	36 (68.0)			
Bilateral	32 (66.7)	17 (32.0)			
Number of ECT sessions	12.5 ± 6.2	11.5 ± 4.4		0.919	0.361
Multiple charges at first session	25 (52.1)	20 (37.7)	2.099		
Charge at first session (mC)	156 ± 149	73 ± 80.3		3.429	0.001*
Maximum charge across all sessions (mC)	413 ± 154.5	333 ± 138.7		2.731	0.007*
EEG seizure duration (seconds)	52 ± 21	66 ± 32		- 2.501	0.014*

*p < 0.05 indicates statistical significance. χ^2: Chi-square test; SD: Standard Deviation; ECT: Electroconvulsive Therapy; mC: Millicoulombs; aCentral nervous system; bObstructive sleep apnea

Longer EEG seizure duration (mean 66 ± 32 seconds vs. 52 ± 21 seconds; p = 0.01) was significantly associated with post-ECT headaches. Notably, the headache group had a lower mean maximum charge (333 ± 138.7 mC) than the no-headache group (413 ± 154.5 mC; p = 0.01). Our analysis also showed a slight but significant decrease in headache risk with increasing charge (adjusted OR = 0.996, 95% CI (0.993 - 0.999), p = 0.018). These findings suggest that maximum charge might not be directly linked to headache risk.

Anyway, the data indicated that a prior incidence of migraine headaches and other headache types were found solely within the post-ECT headache group. In contrast, using a combination of intravenous anesthetic agents was observed exclusively in the non-headache group. Consequently, these variables were excluded from the associative analysis in Table 2.

Multivariable analysis

The detailed results of the multivariable logistic regression analysis are presented in Table 3. Prior to the analysis, multicollinearity was primarily run in a linear regression model, which was not significant among factors. As for the logistic regression analysis, younger age remained a significant predictor of post-ECT headaches (adjusted OR = 0.975, 95% CI (0.950 - 1.000), p = 0.047). Right unilateral electrode placement also increased headache risk (adjusted OR = 3.936, 95% CI

Table 2 Univariate Associations of Potential Confounders for Post-ECT Headache

Variables	Post-ECT Headache			
	Odds Ratio	95% Confidence Interval		p-value
		Lower	Upper	
Gender (Male)	0.931	0.141	2.094	0.863
Age (years)	0.971	0.948	0.994	0.015*
Body mass index (kg/m^2)	1.003	0.966	1.041	0.883
Duration of illness (years)	0.957	0.921	0.995	0.026*
Diagnosis				
Schizophrenia	0.565	0.223	1.428	0.227
Schizoaffective disorder	0.485	0.162	1.455	0.197
Bipolar disorder	0.497	0.192	1.284	0.149
Major depressive disorder	4.256	1.764	10.271	0.001*
Non-psychiatric comorbidity				
Metabolic	0.716	0.324	1.585	0.410
Neurological disorder	0.431	0.075	2.469	0.345
Hormonal-related	0.288	0.029	2.872	0.289
Obstructive sleep apnea	0.516	0.116	2.286	0.384
Autoimmune	0.904	0.055	14.860	0.944
Respiratory	2.820	0.283	28.069	0.377
Musculoskeletal	0.588	0.094	3.680	0.571
History of ECT	0.513	0.229	1.152	0.106
Time to last ECT (years)	1.043	0.955	1.140	0.348
Concurrent medication				
Antipsychotic	0.375	0.093	1.505	0.167
Antidepressant	1.628	0.731	3.625	0.233
Antiepileptic	0.354	0.101	1.235	0.103
Anxiolytic	0.626	0.245	1.599	0.328
Anticholinergic drug	0.351	0.085	1.445	0.147
Headache complaint during admission	9.614	1.170	79.018	0.035*
History of substance use	0.442	0.039	5.039	0.511
Anesthetic agent				
Thiopental (2 - 5 mg/kg)	3.642	1.074	12.353	0.038*
Propofol (1 - 2 mg/kg)	0.310	0.090	1.066	0.063
Succinylcholine (mg)	0.995	0.977	1.012	0.551
Electrode placement				
Right unilateral	4.235	1.842	9.736	0.001*
Bilateral	0.236	0.103	0.543	0.001*
Number of ECT sessions	0.965	0.896	1.040	0.350
Multiple charges at first session	0.558	0.252	1.232	0.149
Charge at first session (mC)	0.992	0.987	0.998	0.005*
Maximal charge from all sessions (mC)	0.996	0.993	0.999	0.009*
EEG seizure duration (seconds)	1.020	1.003	1.036	0.019*

*p < 0.05 indicates statistical significance. OR: Odds Ratio; CI: Confidence Interval; N/A: Not Applicable. The variables were assessed using univariate logistic regression. Results are presented as OR (95% CI).

(1.631 - 9.499), p = 0.002). Interestingly, a higher maximum charge was linked to a slight decrease in headache risk (adjusted OR = 0.996, 95% CI (0.993 - 0.999), p = 0.018). These findings highlight younger age, right unilateral placement, and lower maximum charge as key associations with post-ECT headache of post-ECT headaches.

Table 3 Multivariable logistic regression analysis for major factors of post-ECT Headache

Variables	Adjusted OR (95% CI)	p-value
Age	0.975 (0.950 - 1.000)	0.047*
Electrode placement: Right unilateral	3.936 (1.631 - 9.499)	0.002*
Maximal charge from all sessions	0.996 (0.993 - 0.999)	0.018*

*p < 0.05 indicates statistical significance. OR: Odds Ratio; CI: Confidence Interval. Multivariable analysis included age, electrode placement, and maximum charge across all sessions. Adjusted OR (95% CI) and corresponding p-values are presented.

DISCUSSION

This study explored the prevalence and factors associated with post-ECT headaches, identifying significant associated factors such as younger age, right unilateral electrode placement, and lower maximum charge across all ECT sessions.

Comparison with other studies: prevalence of post-ECT headache

In our study, 52.5% of patients reported post-ECT headaches within 24 hours. This prevalence is higher than that reported by Haghighi et al. (2016), who found a rate of 21.9%, likely due to their shorter assessment window (6 hours) and inclusion of all headache cases, regardless of severity.[12] In contrast, Dinwiddie et al. (2010) reported a prevalence of around 46% by assessing headache intensity over 24 hours, capturing even mild, transient headaches.[8] The reported rate variability could stem from methodology variations, patient populations, or ECT protocols. Our study focused on clinical headaches, defined by the subjective need for medication within 24 hours, which was more sensitive than the visual analog scale, likely contributed to our broader and higher prevalence than using specific cut-off points in which the given medication, in other studies, was mainly moderate to severe pain.

When post-ECT headaches are monitored over a more extended period, as in our study and Dinwiddie's, prevalence tends to be higher, capturing headaches that develop later rather than immediately. Our study highlights the importance of consistent follow-up by focusing on headaches requiring medication within 24 hours. It also suggests that early interventions, such as pre-treatment with analgesics, may help reduce headache occurrence and severity. Supporting this, a recent trial by Isuru et al. found that preemptive acetaminophen significantly reduced post-ECT headache incidence—affecting 36% of treated patients versus 71% in the placebo group (p < 0.001), with an NNT of 3 [10]. Future studies should explore prophylactic medications for headache prevention before ECT to determine their impact on patient outcomes.

Age and Post-ECT headache

Our findings align with previous studies suggesting that younger patients are more susceptible to post-ECT headaches. Dinwiddie et al. (2010) noted that patients under 45 are likelier to experience severe headaches post-ECT, with headache intensity inversely correlating with age.[8] This could be due to the lower seizure threshold seen in younger individuals,[11,20] which results in more intense seizures and, consequently, a higher likelihood of headaches. Even after adjusting for other factors, younger age remained a key predictor in our study. This heightened susceptibility might be explained by the fact that post-ECT headaches are thought to involve the contraction of temporalis and masseter muscles. In younger patients, the intensity of muscle contraction may be more pronounced, contributing to the increased severity of headaches observed in this age group.

Electrode placement and headache risk

Our study found that right unilateral electrode placement was significantly associated with an increased likelihood of post-ECT headaches. While higher electrical charges in unilateral placements have been suggested as a factor, our findings and others indicate that this association is not solely due to the charge. Research suggests that right unilateral electrode placement is associated with a higher prevalence of headaches than bilateral placement, likely due to the focused stimulation on one hemisphere, which may heighten the activation of pain-sensitive areas in the brain. This asymmetrical stimulation and the need for higher stimulus intensities can contribute to increased headache risk.[12] Additionally, the specific seizure characteristics influenced by electrode placement may contribute to headache development and are independent of the charge used.[8]

Furthermore, Mulder and Grootens (2020) observed that bilateral electrode placement generally results in fewer headaches, supporting our finding that unilateral placement carries a higher risk. Their review also highlights that procedural factor beyond electrode placement could contribute to headache risk. Although bilateral placement tends to involve more cognitive side effects, it appears to be less associated with headaches, as confirmed by our results and existing literature.[21]

Maximum charge and headache severity:

Our study suggests that maximum charge may not be strongly associated with post-ECT headaches. Although the headache group had a lower mean maximum charge (333 ± 138.7 mC) compared to the no-headache group (413 ± 154.5 mC), the adjusted analysis showed only a marginally significant decrease in headache risk with increasing charge (adjusted OR = 0.996, 95% CI (0.993 - 0.999), p = 0.018), indicating that maximum charge may not be a primary factor in the development of post-ECT headaches.

This contrasts with earlier studies that linked higher charges to increased headache risk.[10,12] Some studies also supported the idea that electrical power was not likely related to clinical headaches,[22,23] showing the inconsistency about this factor. Notably, our results emphasize that younger age was a significant predictor of post-ECT headaches, regardless of the charge used. This suggests that younger patients may be inherently more susceptible to headaches due to factors beyond electrical charge, such as increased neurological sensitivity or more vigorous seizure activity.

Anesthesia and headache risk:

After adjusting for confounders, our study did not find a significant link between thiopental use and post-ECT headaches. This aligns with Haghighi et al. (2016), who found no anesthetic to be a predictor.12 While Dinwiddie et al. (2010) suggested that factors like seizure duration and age might influence headache severity more than the anesthetic used, our findings suggest that anesthetic choice may not be a key factor.8 A larger sample size might reveal more, but other factors, like electrode placement and seizure dynamics, appear more critical in headache risk.

Limitations and future directions

This study has several limitations that should be considered when interpreting the results. The small sample size limits the generalizability of our findings, and as a retrospective descriptive study based on chart reviews, our ability to control for potential confounding factors was restricted. The accuracy of the data also depended heavily on the completeness and consistency of medical records.

Additionally, the study was conducted exclusively on inpatients, which may not fully capture the headache dynamics seen in outpatient settings, where patients may present with different profiles. Premedication analgesia during some sessions introduced variability in headache risk, complicating the analysis. Moreover, the study did not assess headache severity, limiting our understanding of the full impact of post-ECT headaches and restricting comparisons with studies that grade headache intensity. Future research could explore the potential benefits of premedication in reducing post-ECT headaches.

Comparing headache incidence and severity between patients who receive premedication and those who do not may offer valuable insights, helping to refine strategies for managing post-ECT headaches and improving patient care.

Clinical implications and recommendations

Our study's high prevalence of post-ECT headaches, especially among younger patients and those receiving right unilateral placement, underscores the need for effective management strategies. Premedication with analgesics could be a valuable approach to reduce headache severity and improve patient comfort, potentially enhancing adherence to ECT treatment.

The high frequency of post-ECT headaches in our study, particularly in the younger age groups and right unilateral placement patients, underscores the need for active management practices. The possible escalation of headache-induced patient discomfort and ECT compliance necessitates the following recommendations:

1. Risk assessment: Practitioners need to comprehensively screen patients for post-ECT headache risk factors of younger age, headache history, and planned electrode placement strategy.

2. Prophylactic analgesia: Preoperative analgesic premedication, such as with acetaminophen or NSAIDs, can be indicated, particularly in high-risk patients. The Isuru et al. (2017) trial demonstrated the efficacy of preemptive acetaminophen in reducing post-ECT headache occurrence,[15] in support of this practice.

3. Tailored treatment planning: ECT parameters, including placement and intensity of electrodes, have to be personalized based on patient profile and desired clinical effect. While right unilateral placement may be preferable in some cases to limit cognitive side effects, the hazard of increased headache must be given serious thought.

4. Close monitoring and management: Close monitoring must be performed in patients for headache development following ECT. There must be a standard protocol of headache assessment and management, which could include the administration of analgesics and other supportive interventions.

5. Patient psychoeducation: Patients need to be advised regarding post-ECT headache risk and available management strategies. This could minimize anxiety and maximize compliance with treatment.

CONCLUSION

This study found that post-ECT headaches are frequent, affecting 52.5% of patients. Major associated factors included younger age and unilateral placement. At the same time, a lower maximum charge was found to have marginal significance in the headache group, which might lead to a lesser impact of energy intensity on headache risk.

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Ethical Approval

This study, which involved human participants, was under the institution's ethical standards, the 1964 Declaration of Helsinki, and its later amendments. The ethical standards were also approved by the Faculty of Medicine Ramathibodi Hospital, Mahidol University (MURA2023/683). While the written informed consent was granted to be exempted due to not exceeding the minimal risk, the data collection in all case report forms excluded the identification of any participants.

Conflict of Interest

There are no competing interests to declare that are relevant to the article.

Data Availability Declaration

The identification-blinded data was obtained from the recording database of the Brain Stimulation unit and inpatient chart review in Ramathibodi Hospital. They are available from the corresponding author upon reasonable request.

Author Contribution

Besides N.T. carried out the data collection, drafted the manuscript, designed tables and figures, all authors contributed to the study design and implementation of the research, to the analysis of the results and the writing of the final manuscript

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