

## Bridging Knowledge Gaps and Shaping Attitudes Towards Electroconvulsive Therapy (ECT): A Comprehensive Study Among Healthcare Providers and Medical Students in Ha'il, Saudi Arabia, with Educational Implications

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**Abstract Background:** Electroconvulsive therapy (ECT) is a well-established yet controversial psychiatric treatment, often hindered by stigma, misconceptions and limited knowledge among healthcare providers and medical students. Despite its efficacy in treating severe psychiatric disorders such as major depression, bipolar disorder and schizophrenia, its utilization is influenced by varying levels of awareness and attitudes. This study aimed to assess the knowledge of and attitudes towards ECT among healthcare providers and medical students in Ha'il, Saudi Arabia, while emphasizing educational implications and the need for targeted interventions. **Materials & Methods:** A cross-sectional survey was conducted between December 2022 and August 2023 using a structured, validated questionnaire. The questionnaire assessed demographic data, ECT-related knowledge and attitudes and was designed in both Arabic and English to ensure accessibility. Data were analyzed using chi-square tests and t-tests to explore associations and differences. Key variables such as age, education, specialty and clinical exposure were considered to control for potential confounders. Efforts to minimize response bias included clear participant instructions, anonymous responses and appropriate sampling strategies. **Results:** A total of 266 participants (healthcare providers and medical students) were included. Healthcare providers demonstrated significantly higher levels of ECT knowledge than medical students ( $p < 0.05$ ). Younger participants aged 19-25 exhibited better ECT knowledge than older groups ( $p < 0.05$ ). Healthcare providers specializing in psychiatry exhibited significantly more positive attitudes towards ECT compared with those in other specialties ( $p < 0.05$ ). While factors such as gender and nationality showed no significant impact on knowledge levels, healthcare providers were notably more willing to consent to ECT treatment than medical students. **Conclusion:** This study identifies significant gaps in knowledge and attitudes towards ECT, particularly among medical students and non-psychiatry healthcare providers. The findings underscore the urgent need for targeted educational interventions, including curriculum enhancements, clinical exposure, simulation training and interactive workshops, to improve understanding and promote positive attitudes towards ECT. By addressing these gaps, healthcare practitioners can improve informed decision-making and optimize patient outcomes. Future research should explore the role of cultural beliefs, media portrayals and broader public perceptions in influencing ECT acceptance in Saudi Arabia.

**Key Words** Electroconvulsive therapy (ECT), psychiatric treatment, mental health stigma, medical education, healthcare providers, medical students, Saudi Arabia, knowledge, attitudes, educational interventions, psychiatric disorders

## INTRODUCTION

Electroconvulsive therapy (ECT) is a well-established yet controversial psychiatric treatment that involves delivering a brief-pulse electrical current to the brain under controlled anesthesia and muscle paralysis to induce therapeutic seizures [1]. The ECT is widely recognized as an effective intervention for severe psychiatric conditions, particularly when other treatments such as medications and psychotherapy have failed. It is often indicated in urgent cases requiring rapid clinical improvement, such as in patients with severe depressive episodes or those at high risk of suicide [2,3].

Despite its effectiveness, ECT has faced resistance due to stigma, misconceptions and unfavorable media portrayals. Popular films and television have often depicted ECT as a cruel and barbaric procedure, contributing to public fear and skepticism [4]. As a result, these misconceptions continue to limit ECT's acceptance in clinical practice despite significant improvements in administration techniques and enhanced safety standards.

Advancements such as muscle relaxants and short-acting anesthetic agents have greatly improved the safety and comfort of ECT patients, reducing cognitive side effects and minimizing discomfort [5,6]. With a mortality rate of approximately 0.002%, ECT is now regarded as a low-risk intervention for treatment-resistant psychiatric conditions [7,8]. However, lingering concerns about potential cognitive effects, particularly short-term amnesia, continue to impact perceptions of ECT [9].

Studies conducted worldwide have revealed varying levels of knowledge and attitudes towards ECT among healthcare professionals and medical students. For example, a UK study found that psychiatrists displayed the highest levels of knowledge and the most positive attitudes towards ECT, followed by nurses, social workers and psychologists [10]. In Hungary, a survey of 127 fifth-year medical students found that many students harbored negative perceptions of ECT, with 67% unwilling to undergo the procedure even if clinically indicated. These negative attitudes were more prevalent among female students and those unfamiliar with psychiatric practices [11].

In India, a study found that 81.4% of psychiatrists supported ECT as a safe, effective and cost-efficient treatment. Additionally, 82.9% of psychiatrists actively using ECT indicated that they would consent to ECT treatment themselves if necessary. However, concerns regarding ECT's impact on children and potential for subtle brain damage persisted among some respondents [12].

Studies in Saudi Arabia have similarly highlighted gaps in ECT knowledge and attitudes. A study comparing psychiatrists and family doctors found that psychiatrists demonstrated significantly higher knowledge and more positive attitudes towards ECT, scoring an average of 8.12 out of 10 compared to 6.15 for family doctors [13,14]. While these studies have provided valuable insights,

there is limited research specifically exploring ECT knowledge and attitudes in Ha'il, Saudi Arabia.

Given the absence of region-specific data, this study aims to assess knowledge of and attitudes towards ECT among healthcare providers and medical students in Ha'il. Understanding these perceptions is crucial for addressing educational gaps, improving clinical practices and promoting the appropriate use of ECT.

## REVIEW OF LITERATURE

Numerous studies have examined knowledge of and attitudes towards ECT. In the UK, a study comparing attitudes among psychiatrists, psychologists, nurses and social workers found that psychiatrists were the most knowledgeable group, followed by nurses, social workers and psychologists. The study employed the Questionnaire on Attitudes and Knowledge of ECT (QuAKE) and revealed significant differences across professional disciplines, highlighting the need for enhanced ECT training [10].

In Hungary, a study involving 127 fifth-year medical students found that while 10 participants rated their ECT knowledge as mediocre, most reported minimal understanding. Negative perceptions were common, with 67% unwilling to undergo ECT and concerns about pain, brain damage and outdated practices being widespread. Female students showed significantly more negative attitudes than males ( $p = 0.031$ ), while students with greater psychiatric knowledge expressed more positive attitudes [11].

A Turkish study comparing medical students, psychology students and the public found that medical students exhibited the highest levels of ECT knowledge. Despite this, psychology students held more negative attitudes than the general public, emphasizing the need for enhanced theoretical and practical training to improve ECT perceptions [13].

In Saudi Arabia, a study involving psychiatrists and family doctors reported that psychiatrists had superior ECT knowledge and attitudes. The study revealed that psychiatrists were better informed about ECT indications, anesthesia requirements and clinical guidelines compared to family doctors. These findings underscored the need for improved training among non-psychiatric healthcare providers [14].

These global and regional findings highlight the vital role of education and clinical exposure in shaping ECT knowledge and attitudes. However, cultural differences, mental health stigma and variations in medical education systems must be considered when designing educational interventions to improve ECT acceptance.

## Objective

### Primary Objective

- To assess knowledge of and attitudes towards electroconvulsive therapy (ECT) among healthcare providers and medical students in Ha'il, Saudi Arabia

### Specific Objectives

- To assess the overall knowledge of and attitudes towards electroconvulsive therapy (ECT) among healthcare providers and medical students in Ha'il, Saudi Arabia
- To identify the key demographic and educational factors associated with knowledge of and attitudes towards ECT
- To explore common misunderstandings about ECT and suggest targeted educational interventions to address these gaps

### METHODS

A cross-sectional study was conducted to assess awareness levels, knowledge of and attitudes towards electroconvulsive therapy (ECT) and its associated misconceptions among healthcare providers and medical students in Ha'il, Saudi Arabia. The University of Ha'il Research Ethics Standing Committee (REC) reviewed and approved the study protocol and instrument on January 23, 2023 (study ID: H-2023-058). The study adhered to ethical principles, ensuring confidentiality, voluntary participation and informed consent from all participants. Participants were informed that their responses would be confidential and used solely for research purposes.

#### Study Design and Population

The study targeted both male and female medical students from the College of Medicine, University of Ha'il, as well as healthcare workers from various specialties and professional backgrounds working in Ha'il city. The study aimed to include a diverse participant pool, accounting for differences in age, education level and nationality to ensure comprehensive insights.

#### Sample Size Calculation and Sampling Procedure

The sample size was calculated using the Raosoft sample size calculator, ensuring a 95% confidence level and a 5% margin of error. A minimum sample of 200 participants was determined to achieve statistical significance. To ensure adequate representation, healthcare providers from psychiatry and non-psychiatry specialties were included. The sampling strategy targeted participants through professional networks, university channels and healthcare institutions to minimize selection bias and increase diversity.

#### Data Collection Tool

A structured, validated and self-administered online questionnaire was used for data collection. The questionnaire was designed in both Arabic and English to ensure accessibility and comprehension for all participants. The tool was divided into three primary sections:

- **Demographic Information:** Included age, gender, nationality, educational background and specialty

- **Knowledge Assessment:** Contained multiple-choice and true/false questions evaluating participants' understanding of ECT, its indications, side effects and safety profile
- **Attitude Assessment:** Featured Likert-scale statements exploring participants' beliefs, concerns and willingness to consent to ECT if indicated

To improve the questionnaire's validity and reliability, it underwent pilot testing on a small sample before full implementation. This ensured clarity, cultural appropriateness and relevance of the content.

#### Data Collection Procedure

The questionnaire was distributed via multiple digital platforms, including social media apps, professional groups and university communication channels to maximize reach. The online format ensured flexibility for participants to respond at their convenience. To reduce response bias, clear instructions were provided, emphasizing the importance of honest responses. Anonymity was ensured to encourage candid participation.

#### Data Management and Statistical Analysis

Collected data were securely stored and managed using Microsoft Excel before being imported into the Statistical Package for the Social Sciences (SPSS) software version 25 (SPSS Inc., Chicago, IL, USA) for analysis. Descriptive statistics were used to summarize demographic data, while chi-square tests and t-tests were employed to explore associations between demographic variables, knowledge and attitudes. Potential confounding factors, such as academic exposure, family history and clinical experience with ECT, were carefully considered in the analysis to ensure accurate interpretation of results

### RESULTS

Our study included a total of 266 participants from the University of Ha'il, Saudi Arabia. All of the participants agreed to participate in the study and completed the questionnaire. Among 266 participants, male respondents represented 48.1% of the total sample (n = 128) and females represented 51.9% (n = 138). In total, 62.4% of the respondents (166 out of 266) were aged between 19 and 25, 23.3% of the respondents (62 out of 266) were aged between 26 and 35 and 14.3% of the respondents (38 out of 266) were aged above 35. A majority of the participants in this study were Saudi nationals, accounting for 85% (n = 226) of the sample, while non-Saudi participants comprised 15% (n = 40) of the total sample. Among all the participants, 133 (50%) were medical students, 73 (27.4%) were residents and 58 (21.8%) were healthcare providers. Among the healthcare providers, a very small proportion (8.5%) were specialists in psychiatry. A further 108 participants were specialists in other

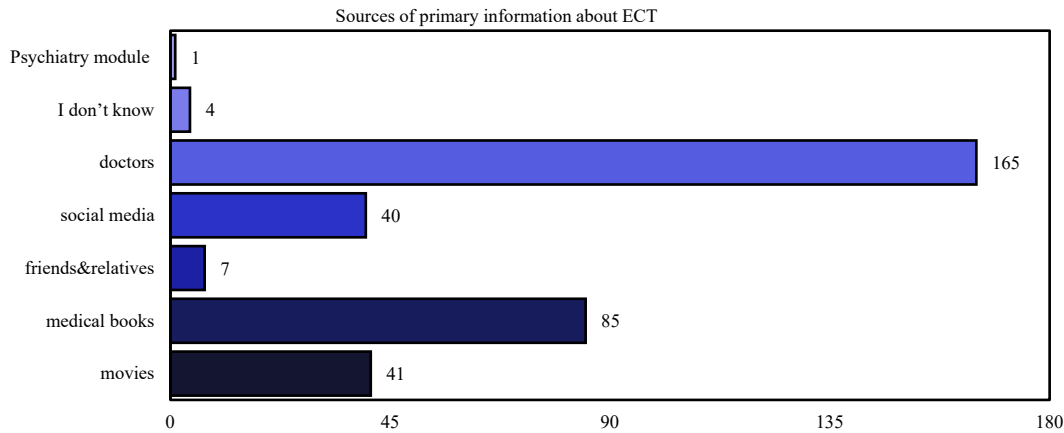


Figure 1: Sources of primary information about ECT

Table 1: Demographics data

Variables	Overall (266)
<b>Age</b>	
19-25	166 (62.4%)
26-35	62 (23.3%)
>35	38 (14.3%)
<b>Gender</b>	
Male	128 (48.1%)
Female	138 (51.9%)
<b>Nationality</b>	
Saudi	226 (85%)
Non-Saudi	40 (15%)
<b>Education</b>	
Medical student	133 (50%)
Resident	73 (27.4%)
Specialist	58 (21.8%)
Others	2 (0.8%)
<b>Specialty-only for healthcare providers</b>	
Psychiatry	10 (8.5%)
Others	108 (91.5%)

fields, accounting for 91.5% of the healthcare provider subgroup. These findings were used for further analysis in the research (Table 1).

Figure 1 shows the graphic representation of each group, indicating their sources of information about ECT. The major sources of primary information about ECT were doctors. A large percentage of our participants reported that they obtained their information about ECT mainly from doctors, followed by medical books, movies, social media, then family and relatives. Only a small proportion of respondents did not know what ECT is.

**Knowledge**

The results of our study compared the knowledge scale of healthcare providers and medical students regarding electroconvulsive therapy (ECT) and related factors. The frequencies and percentages of participants in each category both for healthcare providers and medical students were also calculated. The p-values indicate the statistical significance of the differences observed between the two groups.

Compared with 12.1% of medical students, about 87.9% of healthcare providers had higher knowledge about ECT. Additionally, healthcare providers showed a significantly higher percentage (82.1%) of experience of working in departments that utilized ECT, compared with medical students (17.9%). Regarding the referral of patients for ECT, all healthcare providers had referred patients for ECT, while none of the medical students had done so. There was no significant difference between healthcare providers and medical students in terms of having psychiatric illness in their family or among their acquaintances or having individuals in their family or among their acquaintances who had undergone ECT treatment. About 62.9% of healthcare providers stated that they would be willing to consent to ECT treatment, compared with 37.1% of medical students. Overall, the results suggest that healthcare providers have higher levels of knowledge about ECT than medical students. These findings highlight the differences in knowledge and experience between these two groups and may have implications for their roles and responsibilities in the field of care and treatment for mental health (Table 2).

The results in Table 3 show the factors associated with knowledge of ECT. The p-values indicate the statistical significance of the associations. The table shows the distribution of respondents with poor and good knowledge, according to their ages. A p-value of 0.00\* suggests there was a significant association between respondents' age and their knowledge of ECT. Specifically, younger individuals (19-25 years old) had a higher percentage of good knowledge compared with older groups. A p-value of 0.314 indicates that gender did not have a significant association with knowledge of ECT and a p-value of 0.251 suggests that nationality did not have a significant association with knowledge of ECT. Meanwhile, a p-value of 0.048\* indicates a significant association between education and knowledge of ECT. Medical students had a higher percentage of good knowledge compared with residents and specialists. A p-value of 0.00\*

Table 2: Knowledge differences between healthcare providers and medical students

Variables	Health care providers	Medical student	p-value
<b>My knowledge about ECT:</b>			
Minimal	29 (40.3%)	43 (59.7%)	0.00* <sup>^</sup>
Medium level	53 (39.0%)	83 (61.0%)	
High level	51 (87.9%)	7 (12.1%)	
<b>Have you ever worked in a department utilizing ECT?</b>			
Yes	64 (82.1%)	14 (17.9%)	0.00* <sup>^</sup>
No	69 (36.9%)	118 (63.1%)	
<b>Have you ever referred patients for ECT?</b>			
Yes	15 (100.0%)	0 (0%)	0.00* <sup>^</sup>
No	118 (47.0%)	133 (53.0%)	
<b>Do you have a psychiatric illness in your family or among your acquaintances?</b>			
Yes	19 (45.2%)	23 (54.8%)	0.501
No	114 (50.9%)	110 (49.1%)	
<b>Is there an ECT-treated person in your family or among your acquaintances?</b>			
Yes	8 (44.4%)	10 (55.6%)	0.625
No	125 (50.4%)	123 (49.6%)	
<b>I would consent to my ECT treatment if I were in a psychotic/depressive condition</b>			
Yes	73 (62.9%)	43 (37.1%)	0.00* <sup>^</sup>
No	60 (40.0%)	90 (60.0%)	
Total knowledge score: Mean (SD)	1.42 (1.18)	0.73 (1.04)	0.00* <sup>#</sup>

#p-values were calculated using the t-test, <sup>^</sup>p-values were calculated using the chi-square test, \*significant at p-value <0.05

Table 3: Factors associated with knowledge of ECT

Variables	Poor Knowledge	Good Knowledge	p-value
<b>Age</b>			
19-25	156 (94.0%)	10 (6.1%)	0.00*
26-35	45 (72.6%)	17 (27.4%)	
>35	30 (78.9%)	8 (21.1%)	
<b>Gender</b>			
Male	114 (89.1%)	14 (10.9%)	0.314
Female	117 (84.8%)	21 (15.2%)	
<b>Nationality</b>			
Saudi	194 (85.8%)	32 (14.2%)	0.251
Non-Saudi	37 (92.5%)	3 (7.5%)	
<b>Education</b>			
Medical student	123 (92.5%)	10 (7.6%)	0.048*
Resident	59 (80.8%)	14 (19.2%)	
Specialist	47 (81.0%)	11 (19.0%)	
Others	2 (100.0%)	0 (0.0%)	
<b>Speciality-only for health care providers</b>			
Psychiatry	2 (20.0%)	8 (80.0%)	0.00*
Others	92 (85.2%)	16 (14.8%)	

p-values were calculated using the chi-square test, \*Significant at p-value <0.05

suggests a significant association between specialty and knowledge of ECT. Specifically, healthcare providers specializing in psychiatry had a higher percentage of good knowledge compared with those in other specialties.

### Attitude

The results of our study also indicate a significant difference between healthcare providers and medical students in terms of their attitudes towards ECT. For all the variables listed in Table 4, healthcare providers showed a higher percentage of agreement compared with medical students. This includes beliefs such as ECT being used to control violent patients, causing pain, causing permanent brain damage, being dangerous and potentially causing death, requiring deep anesthesia, being an outdated procedure and being dangerous during pregnancy and lactation. Healthcare providers also included a higher percentage who believed that ECT should

only be used as a last resort, that it can be done without muscle relaxants, that it can be used over the age of 65 and that the longer the seizure duration during ECT, the more effective the treatment. The total attitude score, which reflects overall attitudes towards ECT, was significantly higher for healthcare providers compared with medical students (Table 4).

Factors associated with attitudes towards ECT were also evaluated. Participants aged 19-25 had a significantly higher percentage of positive attitudes towards ECT compared with older age groups ( $p < 0.05$ ). Males had a significantly higher percentage of negative attitudes towards ECT compared with females ( $p < 0.05$ ). Non-Saudi participants had a significantly higher percentage of positive attitudes towards ECT compared with Saudi participants ( $p < 0.05$ ). Medical students had a significantly higher percentage of positive attitudes towards ECT compared with residents and specialists

Table 4: Attitude differences between healthcare providers and medical students

Variables	Health care providers	Medical student	p-value
ECT is used to control violent patients (F)	83 (75.5%)	27 (24.5%)	0.00 <sup>^</sup>
ECT causes pain (F)	108 (71.5%)	43 (28.5%)	0.00 <sup>^</sup>
ECT causes permanent brain damage (F)	108 (70.1%)	46 (29.9%)	0.00 <sup>^</sup>
ECT is dangerous and may cause death(F)	108 (71.5%)	43 (28.5%)	0.00 <sup>^</sup>
The anesthesia level during ECT should be as deep as possible(F)	82 (70.7%)	34 (29.3%)	0.00 <sup>*^</sup>
ECT can be performed without muscle relaxant (F)	105 (55.6%)	84 (44.4%)	0.005 <sup>*^</sup>
ECT should only be used as a final resort (F)	38 (74.5%)	13 (25.5%)	0.00 <sup>*^</sup>
ECT is more effective and helps to lift depression faster than drugs do (T)	29 (52.7%)	26 (47.3%)	0.650 <sup>^</sup>
ECT must not be used in patients with prior history of myocardial infarction (F)	47 (45.2%)	57 (54.8%)	0.209 <sup>^</sup>
ECT is an outdated, obsolete procedure (F)	81 (67.5%)	39 (32.5%)	0.00 <sup>*^</sup>
ECT can be used over the age of 65 (T)	62 (71.3%)	25 (28.7%)	0.00 <sup>*</sup>
The longer the seizure duration, the more effective is the treatment (F)	38 (38.8%)	60 (61.2%)	0.005 <sup>*^</sup>
ECT is dangerous and unsafe during pregnancy (F)	101 (57.4%)	75 (42.6%)	0.001 <sup>*^</sup>
ECT is dangerous and unsafe during lactation (F)	84 (70.0%)	36 (30.0%)	0.00 <sup>*^</sup>
The recommended frequency of ECT sessions is two or three per week (T)	68 (71.6%)	27 (28.4%)	0.00 <sup>*^</sup>
Total attitude score: mean (SD)	8.58 (3.29)	4.77 (3.15)	0.00 <sup>#*</sup>

#p-values were calculated using the t-test, ^p-values were calculated using the chi-square test, \*Significant at p-value <0.05

Table 5: Factors associated with attitudes towards ECT

Variables	Poor attitude	Good attitude	p-value
<b>Age</b>			
19-25	118 (71.1%)	48 (28.9%)	0.00 <sup>*</sup>
26-35	28 (45.2%)	34 (54.8%)	
>35	8 (21.1%)	30 (78.9%)	
<b>Gender</b>			
Male	83 (64.8%)	45 (35.2%)	0.027 <sup>*</sup>
Female	71 (51.4%)	67 (48.6%)	
<b>Nationality</b>			
Saudi	141 (62.4%)	85 (37.6%)	0.00 <sup>*</sup>
Non-Saudi	13 (32.5%)	27 (67.5%)	
<b>Education</b>			
Medical student	111 (83.5%)	22 (16.5%)	0.00 <sup>*</sup>
Resident	18 (24.7%)	55 (75.3%)	
Specialist	24 (41.4%)	34 (58.6%)	
Others	1 (50.0%)	1 (50.0%)	
<b>Speciality-only for healthcare providers</b>			
Psychiatry	5 (50.0%)	5 (50.0%)	0.352
Others	38 (35.2%)	70 (64.8%)	

p-values were calculated using the chi-square test, \*Significant at p-value <0.05

Table 6: Correlation between knowledge of and attitudes towards ECT

Scale	Knowledge	Attitude
Knowledge	1	0.590 <sup>**</sup>
Attitude		1

\*p<0.05 (significant), \*\*p<0.05 (highly significant)

(p<0.05). There was no significant difference in attitudes towards ECT between healthcare providers specializing in psychiatry and those in other specialties (p>0.05) (Table 5).

### Knowledge and Attitude

Table 6 shows the correlation between knowledge and attitude towards electroconvulsive therapy (ECT). The table presents the correlation coefficients between the two variables. The correlation coefficient between knowledge and attitude is 0.590, which indicates a positive correlation. The correlation coefficient of 1.000 between attitude and itself represents perfect correlation, as it compares the variable to itself.

The asterisks (\*) denote the level of significance. In this case, the correlation between knowledge and attitude is significant at the p<0.05 level. The double asterisks (\*\*) indicate that the correlation is highly significant at the same level (p<0.05).

### DISCUSSION

The findings of our study reveal notable differences in the levels of knowledge and attitudes towards electroconvulsive therapy (ECT) between healthcare providers and medical students. Healthcare providers demonstrated significantly higher levels of knowledge and more positive attitudes towards ECT, consistent with previous studies [15]. Interestingly, healthcare providers' attitudes towards ECT in our study were more positive than anticipated, contrasting with an Australian study that reported negative attitudes among healthcare professionals [16].

Our results align with existing research that suggests sociocultural factors may influence attitudes towards

ECT [17]. However, conflicting evidence exists, with some studies reporting no significant association between sociocultural factors and ECT attitudes [18]. Medical students in our study exhibited limited knowledge of ECT basics and its working principles. This finding is consistent with previous studies by Gazdag *et al.* [11] and Clothier *et al.* [19], which reported that medical students often perceive ECT as a form of punishment for uncontrollable patients or as a dangerous and outdated procedure. Approximately 30% of students in those studies believed ECT was misused by psychiatrists and 40% considered it to cause permanent brain damage.

Conversely, our findings are somewhat comparable to a 2013 study where medical students demonstrated positive attitudes and considerable knowledge about ECT [13]. The discrepancy in results may be attributed to differences in educational curricula, cultural contexts and exposure to psychiatric clinical practice.

The higher levels of ECT knowledge observed among healthcare providers may stem from their increased exposure to ECT cases during training and practice. In contrast, medical students, particularly those in earlier stages of training, may lack such exposure, contributing to gaps in knowledge and fostering more negative attitudes. Addressing this knowledge gap through improved clinical exposure, targeted educational interventions and psychiatry rotation enhancements is essential to ensuring students are well-informed about ECT as a viable treatment option for psychiatric conditions [20].

Our study also examined the controversial belief that "the longer the seizure duration, the more effective the treatment." While some evidence supports this view, other studies have refuted this claim, citing no direct relationship between seizure duration and therapeutic efficacy [14,21]. This discrepancy highlights the need for a deeper understanding of ECT's physiological effects on the brain.

A significant proportion of participants in our study perceived ECT as dangerous and potentially life-threatening. These misconceptions contrast with findings from prior studies that concluded ECT is a safe procedure with minimal risk of mortality [14,22]. Such misconceptions reinforce the importance of integrating accurate information about ECT safety into medical education programs.

Our study also underscores the influence of information sources on attitudes towards ECT. Participants identified doctors, medical books, social media and television as primary sources of ECT information. Previous studies have highlighted the media's role in perpetuating negative ECT portrayals, contributing to persistent misconceptions. Limited clinical exposure and brief psychiatry rotations have also been identified as contributing factors to poor knowledge and negative attitudes among medical students and non-psychiatry healthcare providers, as reported in studies from Nigeria and Texas [23,24,25].

Interestingly, one study reported no significant association between knowledge of and attitudes towards ECT [26]. Nevertheless, our findings indicate a clear positive correlation between knowledge and attitudes, reinforcing the value of educational interventions in shaping ECT perceptions.

### Implications for Clinical Practice and Medical Education

The findings of this study carry significant implications for improving clinical practice and medical education. Addressing knowledge gaps through targeted educational interventions, including enhanced curricula, simulation-based training and extended psychiatry rotations, can significantly improve ECT awareness. By providing medical students and healthcare providers with accurate, up-to-date information about ECT, its indications, benefits and potential risks, the medical community can better equip future healthcare professionals to make informed decisions regarding ECT.

Additionally, incorporating healthcare providers with expertise in ECT into educational initiatives may provide firsthand insight into the procedure, fostering positive attitudes and dispelling misconceptions. Strengthening ECT education may also reduce stigmatization and improve patient outcomes by ensuring informed consent and appropriate treatment referrals.

### CONCLUSION

This study provides valuable insights into the knowledge of and attitudes towards ECT among healthcare providers and medical students in Ha'il, Saudi Arabia. Our findings reveal that knowledge and attitudes significantly influence perceptions and willingness to accept ECT as a psychiatric treatment.

Healthcare providers demonstrated superior knowledge and more positive attitudes, while medical students exhibited notable gaps in understanding. These results emphasize the importance of targeted educational initiatives that address these gaps. By integrating improved ECT education into medical curricula and enhancing clinical exposure, healthcare providers and medical students can develop a more informed, positive perspective on ECT as a valuable psychiatric treatment option.

Future educational interventions should include practical training opportunities, interactive workshops and exposure to real-life ECT cases to dispel myths and ensure informed decision-making. By addressing these gaps, the medical community can promote ECT as a safe and effective treatment, ultimately improving psychiatric care and patient outcomes.

### Limitations

Our study has several limitations. The cross-sectional design captures knowledge and attitudes at a single point in time, limiting our ability to observe changes over time or establish

causality. Future research employing longitudinal designs could better assess changes in ECT perceptions following educational interventions.

Furthermore, the study's reliance on a self-administered online questionnaire may have introduced response bias, with participants potentially giving socially desirable responses. Although anonymity measures were implemented to mitigate this concern, the risk cannot be eliminated entirely. Additionally, the study's sampling method may have introduced selection bias, as individuals with pre-existing interest in ECT may have been more inclined to participate. Lastly, the study focused exclusively on healthcare providers and medical students in Ha'il, Saudi Arabia, limiting the generalizability of the findings to other regions. Future research should include broader participant groups, including non-healthcare individuals and participants from different cultural backgrounds, to provide a more comprehensive understanding of ECT perceptions.

### Ethical Considerations

This study was conducted in accordance with the ethical standards set by the University of Ha'il Research Ethics Standing Committee (REC). The research protocol and instrument were reviewed and approved on January 23, 2023 (Study ID: H-2023-058). Participants were informed about the study's objectives, their right to voluntary participation and the confidentiality of their responses. Informed consent was obtained from all participants before they proceeded with the questionnaire. Data were anonymized to ensure participant privacy and the collected information was used strictly for research purposes.

### Conflict of Interest

The authors declare no conflicts of interest related to this study. The research was conducted independently and no financial, professional, or personal interests influenced the study's design, data collection, analysis, or conclusions.

### Acknowledgments

The authors would like to express their sincere gratitude to the University of Ha'il for their support in conducting this research. Special thanks are extended to all healthcare providers and medical students who participated in the study. The authors also acknowledge the valuable guidance provided by the University of Ha'il Research Ethics Standing Committee for ensuring the study adhered to ethical standards.

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