ORIGINAL ARTICLE

Effects of Using Two Different Dosing of Propofol as an Induction Agent in Patients Undergoing Electro Convulsive Therapy (ECT) at the Psychiatric Department, Hospital Kuala Lumpur

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ABSTRACT

Introduction: Electroconvulsive therapy (ECT) is one of the treatments in treating psychotic disorders. Indications for ECT are major depressive disorder, bipolar mood disorder, and schizophrenia. Propofol reduces the seizure activity for those patients who underwent the ECT. Still, considering the dose of propofol given by using a lower dosage of propofol based on recommended doses, it might increase seizure activity quality without harmful effects on the patients. **Methods:** A retrospective study was conducted to evaluate the seizure duration, quality of EEG, postictal suppression, and recovery time in 200 patients undergoing ECT treatment who were sedated with either low dose (<1.5 mg/kg) or high dose (> 1.5 mg/kg) of propofol at Psychiatric Department, Hospital Kuala Lumpur between June 2016 to June 2017. All the results were analyzed with the statistical software SPSS (v. 22.0). **Results:** Based on the finding in this study, the group of who received propofol at less than 1.5 mg/kg tend to get longer seizure motor duration compared to the group of more than 1.5 mg/kg. The result showed the mean duration of motor seizure in the group at less than 1.5 mg/kg of propofol is significantly higher than the group of more than 1.5 mg/kg. **Conclusions:** Thus, it is essential to titrate propofol using propofol towards the patients undergoing the ECT procedure and using a lower dose of propofol.

Keywords: Anesthesia, Electroconvulsive therapy, Propofol

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INTRODUCTION

Electroconvulsive Therapy (ECT) is one of the effective treatments which is safe with rapid relief symptoms and been practiced since 1938 to treat of various kind of mental illness such as depression with psychosis, multi-drug resistance, bipolar mood disorder (BMD), and treatment-resistant (1,2). The function of ECT is to deliver the current or amount of electrical charge to the front part of the brain to treat certain kinds of mental illness (3). Treatment of ECT needed by the patients varies and depends on the patient's response to this treatment. The ECT treatment program consists of 6 to 12 treatments for acute ECT. The number of treatments depends on the patient body response, and certain patients may need to undergo the ECT for the whole life to prevent relapse (4). If the patient gets well by few ECT treatment cycles, the psychiatrist will stop the ECT cycle and continue the treatment using medications (5).

Historically, during the introduction of ECT, there is no general anesthesia being used during the procedure. For almost 30 years, no anesthesia was being applied for the patients undergoing an ECT procedure called unmodified ECT. Later, it changed to modified ECT, where general anesthesia and muscle relaxants were applied to reduce physical and psychological trauma (6). The introduction of anesthesia in ECT treatment has been used since the 1950s, and its objective is to provide pleasant feelings and prevent complications intra and post-ECT procedures (7).Using modified anesthesia for the patients undergo ECT treatment and the anesthesia team's involvement in this treatment gives better outcomes and safe practice to the patients. General anesthesia is the interaction with the whole body. The central nervous system's function is depressed using intravenous, inhalation (volatile), combined, and balanced agents to produce hypnosis, which is pharmacological sleep, analgesic, lack of reflexes, and neuromuscular blockade (8).

Since ECT is a short procedure, there are few indications of anesthesia for patients undergo ECT treatment, such as the rapid onset of drugs action to the body, where the shorter time for patients to turn unconsciousness

and rapid recovery where the patient takes a shorter time for patients to regain consciousness(9). The goal of ECT is to achieve therapeutic effectiveness. The mean by therapeutic effectiveness is the outcomes for every patient undergoing ECT treatment must have good quality seizure activity,good quality of seizure activity means the patients must have a motor seizure activity of more than 15 seconds, electroencephalography (EEG) seizure activity must be more than 20 seconds, and the postictal suppression is more than 50% (4). Propofol is one of the anesthetic drugs that are commonly used for ECT procedures(10). Based on the study done by Geretsegger et al. (2007), propofol is one of the anesthetic induction agents that have characteristics such as the fast onset of action and quicker emergence post-procedure on the body (11). However, propofol's disadvantage is its anti-convulsion properties, where it may reduce the seizure duration and might prevent from achieving therapeutic effectiveness (12, 13). Propofol can prevent seizure activity by inhibiting the sodium currents inside the sodium channels by binding to the channel's inactivated state (14,15,16). Other than that, propofol will take action at the allosteric GABA (GABAA) receptors, such as ganaxolone, and inhibit seizure activity (17). According to a study done by Alok et al. (2012), the larger dose of propofol used to the patient can significantly reduce the seizure duration and affect the quality of the seizure (18). The rationale of this research is to clarify the advantages of using a low dose of propofol at less than 1.5 mg/kg compared to a high dose of propofol more than 1.5 mg/kg in achieving a good quality of the seizure activity, increasing the duration of the motor and EEG seizure duration, reduce the number of attempts for every course of ECT, better recovery and give good outcomes to the patients who underwent the ECT procedure. The drug used in the ECT treatment should not interfere with the seizure activity during the procedure and provide better outcomes for every patient who underwent the ECT treatment. Thus, the modification of anesthesia drugs is needed for ECT procedure.

MATERIALS AND METHODS

This study was done using a retrospective study randomized sampling method. The data collected are from the medical records on patients undergoing ECT procedures from 2016 to 2017 at Psychiatric Department, Hospital Kuala Lumpur. This study was carried out on 200 male and female patients from 17 to 80 years with ASA I or II and underwent the ECT procedure. Patients with a history of allergic reactions to drugs or medication given, such as patients allergic to soybean oil or propofol, were excluded. This study also has been approved by the National Malaysia Research Registration (NMRR) and Medical Research and Ethical Committee (MREC).This research work is approved by the Medical Research & Ethics Committee Ministry of Health Malaysia, vide letter number KKM/NIHSEC/P17-1527(6) dated 6th October 2017. This study was also approved by the Deputy Director of Hospital Kuala Lumpur and the head of the department of psychiatric department, Hospital Kuala Lumpur, Malaysia, on 15th September 2017.

Every patient recorded in this study is confidential. Consent is not required since the data was collected from the patient medical report. Every data reported in the medical file records will be transfer to the form. In the form, they are data required such are the registration number (RN), age, sex, weight, race, diagnosis, ECT cycle, the volume of propofol, EEG quality, number of attempt for current delivered, intensity (%), duration of motor seizure, duration of EEG, postictal suppression, time is taken to regain consciousness, recovery time and vital sign.

All these patients will be given intravenous (IV) Propofol through a peripheral line using 20 G branulla. The anesthetist will start with a low dose of propofol (1.0 mg/kg/body weight) and waited for 30 to 45 seconds for the drugs to take effect. If the patient is still awake after 45 seconds, the anesthetist will add up another 20 to 30 mg of propofol until the patient loses consciousness. All the medications and observation (vital sign) data intra and post-procedure will be recorded in the GA form by the anesthetist incharge of the ECT on that day. Whereas the psychiatrist will record all the documentation inside the ECT form. The patients were randomly selected with a different dose of propofol during induction. Patients are to be observed after giving IV propofol. The group of patients' selection is based on using IV propofol at less than 1.5mg/kg/body weight and more than 1.5 mg/kg/body weight. During the observations, we will look at the seizure activity of the patients where the motor seizure is more than 15 seconds, and the EEG seizure is more than 20 seconds, postictal suppression (adequacy) is more than 50%. Other than that, we look at the vital sign of the patients and the recovery phase.

Based on 200 samples collected, it was divided into two groups of population statistics. The first group was induced with propofol at less than 1.5 mg/kg, and another group was induced with propofol of more than 1.5 mg/kg. Also, the parameter needed in this study such as motor, EEG seizure duration, postictal suppression, and EEG quality. The motor and EEG duration are recorded in seconds, the postictal suppression in percentage (%), and the quality of EEG is based on three categories either good, poor, or absent. The data were analyzed using Chi-square and independent t-test to compare the groups of propofol dosage. This study will also determine the number of attempts based on the group of propofol at less than 1.5 mg/kg and more than 1.5 mg/kg of propofol. Fisher's exact test was used, and the p-value <0.05 to show the significant difference.

In this study, it also determines the hemodynamic

state when using propofol in ECT procedure, and the parameter used to measure the hemodynamic are blood pressure (mmHg), heart rate (bpm), and oxygen saturation (%) using pulse oximetry for pre-and post-procedure. An independent t-test was used to show the significance of these findings. This study will compare the patients' time to regain consciousness and recovery time for the two groups: the group of propofol at less than 1.5 mg/kg and more than 1.5 mg/kg. Chi-square is used to define the findings. All the data collected from this study were analyzed using Statistical Package Social Sciences (SPSS). In this study, descriptive statistical was used to measure all the data and information. All the data collected in this study were analyzed using independent t-test, Fisher exact test, chi-square, and if the p-value is less than 0.05 (P<0.05). It is considered a significant difference between the groups of propofol.

RESULTS

Based on this study's finding, the group who received propofol at less than 1.5 mg/kg tend to get longer seizure motor duration than the group of more than 1.5 mg/kg. The result showed the mean duration of motor seizure in the group at less than 1.5 mg/kg of propofol is significantly higher than the group of more than 1.5 mg/kg. The mean duration of motor seizure for the group at less than 1.5 mg/kg is 20.62 seconds compared to the group who were induced with more than 1.5 mg/kg of propofol, the mean duration of motor seizure activity is 11.83 seconds. The t-test result is significant (p <0.05), and the value showed a significant difference between the group at less than 1.5 mg/kg and the group of more than 1.5 mg/kg of propofol.

An independent-sample t-test was used to indicate EEG duration between the group at less than 1.5 mg/kg and more than 1.5 mg/kg of propofol. The result showed that the mean EEG duration for the group at less than 1.5 mg/kg of propofol is significantly higher than the group of more than 1.5 mg/kg of propofol. The mean duration of EEG at less than 1.5 mg/kg of propofol is 29.18 second, whereas the mean duration of EEG for the group of more than 1.5 mg/kg of propofol is 12.23 second. The mean difference between these two groups is 16.93. The t-test result is significant (p <0.05),and this shows there is a significant difference between the group at less than 1.5 mg/kg and more than 1.5 mg/kg.

EEG pattern quality was divided into three categories: absent, poor, and good. Table 1 shows the comparison between two groups of patients receiving propofol at less than 1.5mg/kg and more than 1.5mg/kg to see the effects on EEG quality. Based on table I shown 124 (94.7%) patients who were induced with less than 1.5 mg/kg of propofol produced good EEG quality compare to the other group, with only 2 (2.9%) patients having a good EEG quality. Other than that, 61 (88.4%) patients induced with more than 1.5 mg/kg of propofol have poor EEG quality, compared to the group induced with less than 1.5 mg/kg of propofol 5 (3.8%) patients have poor EEG quality. The least number of sample in the group of less than 1.5 mg/kg of propofol produced absent EEG quality, which is only 2 (1.5%) compare to the group who were induced with more than 1.5 mg/kg of propofol where 6 (8.7%) patients are absent of EEG quality. The result is significant (p <0.05), and there is a significant difference between the EEG quality and the groups of different dosing of propofol.

Table I: Percentage of the comparison between the qualities of EEG between group of propofol at less than 1.5 mg/kg and the group of propofol more than 1.5 mg/kg

Group	Absent		Poor		Good	
	N	%	N	%	N	%
≤ 1.5 mg/kg of propofol	2	1.5	5	3.8	124*	94.7
> 1.5 mg/kg of propofol	6	8.7	61	88.4	2	2.9

*Significant difference (p < 0.05); *chi-square

Postictal suppression or adequacy is another measurement to measure the efficacy of the ECT procedure. An independent t-test was used to compare the postictal suppression or adequacy value between the propofol group at less than 1.5 mg/kg and the group of propofol with more than 1.5 mg/kg. The result showed the mean reading of postictal suppression in the group at less than 1.5 mg/kg of propofol is significantly higher than the group of more than 1.5 mg/kg of propofol. The mean of postictal suppression or adequacy in the group of propofol at less than 1.5 mg/kg is 56.45 %, whereas the mean of postictal suppression or adequacy in the group of more than 1.5 mg/kg of propofol is 18.84 %. The mean difference between these two groups is 37.61. The result is significant (p< 0.05), and this shows a significant difference between the group at less than 1.5 mg/kg and more than 1.5 mg/kg.

The hemodynamic is very important to evaluate propofol's effects on the hemodynamic stability for every patient who underwent the ECT procedure. The vital signsfor pre-and post- ECT procedures were taken to evaluate the hemodynamic stability in this study. The result showed the mean for pre-ECT heart rate is 83.22 bpm for the group of propofol at less than 1.5 mg/kg. Whereas in the propofol groupof more than 1.5 mg/kg, the mean for pre-ECT heart rate is 82.06. The mean difference between these two groups is 1.77. There is no significant difference (p-value is >0.05). The heart rate (HR) post-procedure is very important to be monitored to detect and prevent any incident of arrhythmias. The result showed the mean heart rate post-procedure is 88.48 bpm for less than 1.5 mg/kg of propofol, and for the group of propofol more than 1.5 mg/kg, the mean heart rate post-ECT procedure is 85.48 bpm. The mean difference is 3.00. There is no significant difference (p> 0.05).

This study also looks at oxygenationby monitoring pre-

ECT SP02 as a parameter to monitor the oxygenation level inside the body to prevent any eventful incident such as hypoxia and hypoxemia. The mean for saturation oxygen for pre-ECT in the group of propofol at less than 1.5 mg/kg of propofol is 99.05 %, and the mean of SPO2 for the group of propofol more than 1.5 mg/kg of propofol is 99.01 %. The mean difference on the SPO2 reading between the propofol group at less than 1.5 mg/kg and the group of propofol more than 1.5 mg/kg of propofol is 0.03. The p-value is >0.05, and this is shown there is no significant difference between the group of propofol at less than 1.5 mg/kg and the group of more than 1.5 mg/kg of propofol. The mean of the SPO2 for the post-ECT procedure in the propofol group at less than 1.5 mg/kg of propofol is 98.86 %, whereas, for the group of propofol, more than 1.5 mg/kg is 99.00 %. The p-value for this measurement is > 0.05, and this is shown there is no significant difference between the group of propofol at less than 1.5 mg/kg and the group of more than 1.5 mg/kg of propofol.

The measurements were used to evaluate the blood pressure in this study using an independent t-test to measure the pre and post-procedure. The mean systolic pressure reading for pre-ECT in the propofol group at less than 1.5 mg/kg of propofol is 126.14 mmHg, and the systolic pressure reading for the group of more than 1.5 mg/kg of propofol is 124.86 mmHg. The mean difference between these two groups is 1.28 mmHg. Therefore, there is no significant difference between the group of propofol at less than 1.5 mg/kg and the group of more than 1.5 mg/kg of propofol (p > 0.05). The reading of diastolic pressure also important. If the diastolic pressure is reading more than 100 mmHg, most of the anesthetist will cancel the case, and the patients will refer to the medical team for further management. The mean for diastolic pressure in the group of propofol at less than 1.5 mg/kg for pre-ECT is 76.81 mmHg, and the mean diastolic blood pressure for the group of propofol at more than 1.5 mg/kg for pre-ECT is 75.61 mmHg. The mean diastolic pressure difference between the propofol group at less than 1.5 mg/kg and the group of propofol more than 1.5 mg/kg for pre-ECT is 1.19 mmHg. Therefore, there is no significant difference (P > 0.05). The mean diastolic pressure for the post-ECT procedure in the propofol group at less than 1.5 mg/kg is 74.79 mmHg, whereas, for more than 1.5 mg/kg is 75.58 mmHg. The mean difference between the propofol group at less than 1.5 mg/kg and more than 1.5 mg/kg of propofol is -0.79 mmHg. (P > 0.05) and there is no significant difference.

In this study, the comparison between the numbers of the trial of current delivered with the groups of propofol was made. Fisher's exact test was used to test the number of trials for this study. In the ECT procedure,the psychiatrist only can deliver a maximum of 3 trials only. Only three trials are allowed because the anesthetic agent may not last longer than three trials. After each trial may need a gap of at least 30 seconds before giving the next stimulus dose (4). The number of trials depends on the quality of the seizure after the stimulus is given. If the quality of seizure is poor, the psychiatrists might need another trial to be delivered to the patient. The Fisher exact test reading is 28.962, and the p-value is <0.05, and this is shown that there is a significant difference between the group of propofol more than 1.5 mg/kg and the group of propofol at less than 1.5mg/kg.

Table II shows the number of trials between the groups of propofol. Most numbers of sample 119 (90.8%) patients who were induced with less than 1.5 mg/kg of propofol need first trials during the ECT session, compare to the patient who was induced with more than 1.5 mg/kg of propofol only 40 (50.8%) number of sample in the first trials. The higher number of samples need for second trials in the group who were induced with more than 1.5 mg/kg of propofol 26 (37.78%) of patients compare to the group who were induced with less than 1.5 mg/kg of propofol only 10 (7.6%) patients. Besides, for the third trials, the number of patients who were induced with propofol more than 1.5 mg/kg of propofol is high, which is 3 (4.3%) compare to the patient who was induced with less than 1.5 mg/kg of propofol only 2 (1.5%) patient need until third trials.

Table II: Number of trials of ECT current based on the group of propofol at less than 1.5 mg/kg and the group of propofol more than 1.5 mg/kg.

Groups of Propofol	Trial of current deliver					
	First		Second		Third	
	N	%	N	%	N	%
Less than 1.5 mg/kg	119	90.8	10	7.6*	2	1.5
More than 1.5 mg/kg	40	50.8	26	37.7	3	4.3

*Significant difference (p < 0.05); *fisher exact test

This study also measures the time taken for each patient to regain consciousness after given IV propofol. The comparison between the time taken to regain consciousness and between the two groups of propofol was made. The result showed in the group who were induced with less than 1.5 mg/kg of propofol, 124 (94.7%) patients took less than 5 minutes to regain consciousness, whereas 7 (5.3%) patients are taking more than 5 minutes to regain consciousness. For another group of propofol, which is more than 1.5 mg/kg, almost 63 (91.3%) samples took more than 5 minutes to regain consciousness, and only 6 (8.7%) sample from this group takes less than 5 minutes to regain consciousness. (p<0.05). The propofol groups at less than 1.5 mg/kg give a shorter time to regain consciousness than the propofol group more than 1.5 mg/kg.

Another study's findings also measured the recovery time taken for every patient before discharge to the

ward. Recovery time is recorded based on patients being pushed into the recovery area until the patients are stabilized and discharged to their respective ward. In this study, 131 (65.5%) patients who were induced with propofol at less than 1.5mg/kg, and from that number, almost 128 (97.7%) patients are taking less than 15 minutes to be in the recovery area before discharge to the ward, whereas 3 (2.3%) patients recorded need less than 30 minutes in the recovery area. The total number of patients who were induced with propofol more than 1.5 mg/kg is 68 (34.0%) patients. From this number, only 4 (5.8%) patients are required less than 15 minutes of recovery time, whereas 65 (94.2%) of samples need more than 15 minutes or less than 30 minutes to be monitored in the recovery area before the patients discharged to their respective ward. The p-value is <0.05, and this is shown that there is a significant difference between the group of propofol at less than 1.5 mg/kg and the group of propofol more than 1.5 mg/kg.

Based on the finding shown, the minimum dose of propofol was used to induce patients in this study is 0.5 mg/kg, and the maximum dose was used is 3.0 mg/kg of propofol. The most frequent dose used and provided a good quality of seizure activity is 1.4 mg/kg of propofol. The comparison between the number of patients and the quality of the EEG was made, and the result showed the patient who was induced with 1.4 mg/kg of propofol is 27 (13.5%), showing the higher number of patients is using this dose than the other dose. From 27 (13.5 %) samples that were induced with 1.4 mg/kg of propofol, 26 (13.0 %) of the samples produced a good quality of EEG activity. Therefore, there is a significant difference between the dose and EEG quality ($p < 0.05$).

DISCUSSION

Electroconvulsive therapy (ECT) is one of the procedures that will deliver some intensity of current to the patients to produce an artificial seizure. ECT has been reported as an effective treatment and safe treatment used for severe mental illness for many years. In this study, the collaboration between anesthetists and psychiatrist is essential to achieve therapeutic effectiveness and give better outcomes to the patients who underwent the ECT procedure. The application of propofol as an anesthetic agent for ECT is well known because of this drug's characteristics that can provide hemodynamic stability, rapid onset, and fast recovery, and suitable for the ECT procedure (18,19). Based on the previous study, propofol is the best agent to provide hemodynamic stability during and after the ECT procedure compare to other anesthetic agents such as metohexitone or thiopentone (20,21).

The collaboration and the communication between the psychiatrist and anesthetist areessential during this procedure to achieve better care for every patient undergoing the ECT procedure(22). At the same time, it will increase the psychiatrist's satisfaction level when the patients achieved therapeutic effectiveness. According to Loughnan et al. (2004), the relation between seizure duration and seizure quality produces ECT effectiveness (23). The longer seizure duration provides better quality of the seizure. The observation of vital signs for Pre-ECT is crucial to prevent them from getting any complications post-ECT procedure.

According to Avramov et al. (1995), even though propofol has an anti-convulsion effect and it may reduce the efficacy of ECT treatment but, practice using the minimal dose as low as 0.75 mg/kg can increase the effectiveness of ECT treatment without interrupting the seizure activity during the ECT procedure (24). In this study, titration of the dose of propofol according to body weight is very important. Propofol will produce amnesia and comfort effects to the patient during the procedure. The result showed the group of propofol at less than 1.5mg/kg gives a better effect of seizure activity than the group of propofol more than 1.5 mg/kg. Based on the finding, the mean duration of motor seizure in the propofol group at less than 1.5 mg/kg of propofol is significantly higher than the group of more than 1.5 mg/kg of propofol. Other than that, the mean of the EEG duration in the group of less than 1.5 mg/kg was significantly longer compared to the group of more than 1.5 mg/kg of propofol. In the ECT procedure, the psychiatrist will depend on a few criteria and measurements to determine the seizure quality. According to Scoot (2010), to achieve therapeutic effects in the ECT procedure, the seizure of motor duration, which is generalized tonic and clonic is must be more than 15 seconds, and the electroencephalography (EEG) must more than 25 seconds (1).

Suppose the quality of the seizure activity is not good and the psychiatrist is not satisfied. In that case, the psychiatrist may request another attempt to deliver the current, and at the same time, they will increase the intensity (%) dose. Based on the finding in this study, the result showed that the number of re-attempted of current deliveries for the group of propofol more than 1.5 mg/kg is higher than the group of less than 1.5 mg/kg of propofol. Suppose the anesthetist does the titration dose of the propofol to the patients. In that case, they might reduce the number of trials or re-stimulation of current to the patient undergoing ECT treatment. Administering a higher dose of propofol might alter the seizure duration and increase sub-threshold seizure activity risk (25). Other than that, it also might increase the necessity of re-stimulation by giving another attempt of current to be delivered to the patients for every ECT course. The repetition number of re-stimulations may cause bradycardia and postictal agitation (26). Propofol act on gamma-aminobutyric acid (GABA) receptors that enable patients to go into sleep or produce amnesia. They found that the anesthetized group with a lower dose of propofol gives better quality or good seizure

duration (27).

Based on the finding, the mean intensity for second attempts stimulus delivery is significantly higher in the group of more than 1.5 mg/kg compared to the group of propofol at less than 1.5 mg/kg of propofol. This result showed the dose of propofol would affect the number of attempts and increase the intensity (%) for every patient who underwent the ECT procedure. This finding is also supported by Cronholm and Ottosom (1996) found the number of attempts and the elevation of stimulus dose are affected by the volume of propofol given to the patients (28). According to Geretsegger (1998), Avramov et al.(1995), Fear et al. (1994), and Aytuluk et al. (2019) found that propofol has a more potent anticonvulsant, and propofol may interfere with the seizure activity during the ECT procedure (24,25,29,30). Thus, this is very important to use a lower dose of propofol to induce or put the patient to sleep. Every anesthetist must avoid using the maximum amount of propofol.

In every session of the ECT procedure, the maximum number of trials allowed is only three trials. The only three maximum number of trials because anesthetic agents may not last longer more than three trials. Every trial, there will be a gap every 30 seconds before giving another dose of stimulus (4). Re-stimulation of current is needed if the quality of seizure is poor or absent. This study showed the group of propofol who were using more than 1.5 mg/kg need more than one attempt for every ECT procedure, whereas the group who are used less than 1.5mg/kg of propofol shown most of the sample requires only one attempt of current delivery. Based on the previous study done by Guy and Pinhas (2014), the stimulus dose is higher in the group of propofol and etomidate than thiopentone, and the patient who was induced with propofol receive a higher treatment dose of intensity compare to thiopentone (31). This finding showed an essential point of why titration of the propofol dosing is required towards the patients undergoing ECT treatment. At the same time, practicing using a lower dose of propofol will produce a good quality of seizure and reduce the number of attempts for every course of ECT procedure.

Postictal suppression or adequacy is another parameter that measures the effectiveness of every ECT session(32). Standard hospital protocol required the postictal suppression of more than 50% (4). According to Ingram (2019), the postictal suppression index is one of the criteria needed to achieve the therapeutic effects and show the quality for every seizure(32). The postictal suppression is the value that we can get from the flattening line of EEG following the seizure (4). This study shows that 87 (43.5%) patients have more than 50% of postictal suppression from the propofol group at less than 1.5 mg/kg. In contrast, only 12 (6%) patients taken from the propofol group more than 1.5 mg/kg having postictal suppression of more than 50%. These data show that the postictal suppression or adequacy is affected by the volume of propofol given to the patients. In this study, we find out that mostof the samples taken, equal to 95.3% from the propofol group at less than 1.5 mg/kg, took less than 5 minutes to regain consciousness. In contrast, only 10% of the samples from the propofol group more than 1.5 mg/kg took less than 5 minutes to regain consciousness. This finding shows that the volume of propofol affects the duration of the patient to regain consciousness. The more we delivered the propofol to the patients, the longer the patient regained consciousness. Propofol is the best drug that provides a short recovery time for patients who underwent the ECT procedure (33). However, if propofol usage is high or using a total range dosage of propofol might increase the recovery time. Based on this study, we found that almost 128 samples from the group that has been induced by propofol at less than 1.5 mg/kg provide recovery time of fewer than 15 minutes compared to the group that induced by more than 1.5 mg/kg of propofol where the majority of the samples are taken more than 15 minutes to be monitored in the recovery area before discharge to the ward. According to Omprakash et al. (2008), the patients induced with propofol will have better recovery and hemodynamic response than thiopentone (34).

In this study, almost the majority frequency 128 (64.0%) of the samples taken from the group of propofol at less than 1.5 mg/kg took less than 15 minutes. In contrast, almost 65 (32.5%) samples taken from the group of propofol more than 1.5mg/kg need more than 15 minutes in the recovery area. This finding is also supported by the study done by Bauer et al. (2009) study on propofol and also compare with thiopentone. The result showed that propofol is a drug that provides rapid recovery compare to thiopentone (35). A unique characteristic of propofol, a lipophilic drug, fastens the drug action towards the patient's body within seconds to minutes and quickly crosses the blood-brain barrier (36). Propofol is sedation that has rapid redistribution of the drug into the metabolic clearance and peripheral tissues. Thus, it provides rapid recovery (37).

In this study, the data obtained showed that the vital sign for pre and post- ECT procedure is stable. There is no abnormal finding such as hypotensive or hypertensive crisis incidence after the procedure or desaturation of oxygenation associated with bradycardia. This finding showed that propofol is the best drug of choice for this ECT procedure due to this drug's ability to provide hemodynamic stability (38). A study done by Rampton (1989) mentioned a comparison between methohexital and propofol, and they found that propofol can provide hemodynamic stability for every patient who underwent the ECT procedure (39).

Medications review is required before commencing, during the course, and towards the completion of ECT. Several reports on selective serotonin reuptake inhibitors

(SSRIs) shown on prolonged seizures during ECT (40). SSRIs are recommended to continue throughout the ECT course, and the combination may enhance antidepressant response (40). Tricyclic antidepressants (TCAs) are to continue throughout the ECT course. Based on the studies by Dursun et al. (2001) and Baghai et al. (2006) shown TCAs are safe to be used with ECT at recommended therapeutic dose. Monoamine oxidase inhibitors (MAOI) are recommended to continue throughout the ECT course (40,41). The combination may enhance antidepressant response. The anesthetist must be informed if the patient on MAOI generally does not need to be withheld during ECT (42).

CONCLUSION

There are many advantages of using propofol for this procedure, and titrating propofol dosage according to body weight to the patients undergoing ECT procedure is a must. So from this study, we can conclude that using of lower dose or volume to the patients will give better seizure activity, prevent interruption of the seizure duration, reduce recovery time, prevent multiple attempts of current stimulation, provide hemodynamic stability and provide a short time duration for the patients to regain consciousness. If the anesthetist follows the proper way, they will increase the psychiatrist's satisfaction and give better outcomes to the patients.

ACKNOWLEDGMENT

This work is supported by the Department Of Anesthesiology And Intensive Care Unit Hospital Kuala Lumpurand the Department Of Psychiatric Hospital Kuala Lumpur.

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