

## A COMPARATIVE STUDY BETWEEN PROPOFOL AND THIOPENTONE FOR MODIFIED ELECTRO CONVULSIVE THERAPY (MECT).

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### ABSTRACT

Back ground : Electroconvulsive therapy ( ECT) is a unique therapy that provokes a generalized epileptic seizure by applying low voltage electrical current to the scalp . The perfect induction agent for ECT should ensure rapid unconsciousness , less haemodynamic effects ,minimal effects on seizure duration / amplitude ,rapid recovery and should be inexpensive . Thiopentone sodium is widely used induction agent for ECT . Propofol is gaining popularity for its better recovery profile . Present study is done to compare the effects of IV propofol 1mg/kg vs thiopentone sodium 2.5mg/kg used as IV induction agents in MODIFIED ECT as regards to attenuation of haemodynamics & recovery time .

Materials &methods : 60 patients of ASA II &III posted for ECT was randomized into 2 groups ; Group A (N =30 ) received Propofol 1mg/kg and Group B received Thiopentone (2.5mg/kg) for induction . Time required for recovery ,duration of seizure activity,time taken for induction, Heart rate( HR), systolic blood pressure (SBP) , Diastolic blood pressure (DBP), saturation ( SPO2) @ basal, after induction and 1 min ,2,5 ,10 ,20,30 min following ECT were noted .

Results : Time required for recovery in group A was 309 seconds compared to group B 433 seconds which is statistically significant in group A ( P <0.001).

Duration of induction was shorter in group A (32.16 secs ) compared to group B ( 41.36 secs ) with statistical significance (P<0.001) ,where as duration of seizure and haemodynamic parameters were almost similar in both groups .

Conclusion : Propofol is a better alternative to thiopentone in view of its similar seizure duration, faster induction and rapid recovery compared to thiopentone .

Key words : Modified ECT ,thio pentone sodium, propofol ,major depression , seizure duration, psychomotor recovery .

**INTRODUCTION:** Electroconvulsive therapy<sup>1</sup> ( ECT) is a unique therapy that provokes a generalized epileptic seizure by applying low voltage electrical current to the scalp . It has well established role in the treatment of patients with psychiatric disorders especially those who have not responded adequately to psychopharmacology . ECT produces severe transient disturbances which can lead to dangerous sequelae in patients who have cardiac ,cerebrovascular diseases and undiagnosed illnesses in the elderly . Parasympathetic <sup>2</sup>and Sympathetic stimulation with adrenomedullary catecholamine release is responsible for haemodynamic changes . Anaesthesia is used to avoid unpleasant feelings<sup>3</sup> the patient may have during seizure activity .It prevents the sensation of general paralysis after administration of neuromuscular blocking drugs and lowers opposition to therapy. The anaesthetic requirements include <sup>4</sup>amnesia ,airway management, prevention of bodily injuries ,attaining haemodynamic stability ,smooth &rapid emergence without suppressing the seizure Activity . Thiopentone has been used as an induction agent for Ect since decades and now it has been replaced with Propofol<sup>5</sup> because of its faster induction and emergence ,with clear neurological recovery . The ideal induction agent<sup>6</sup> for ECT should ensure rapid unconsciousness ,less haemodynamic effects ,minimal effects on seizure duration or amplitude ,rapid recovery and should be inexpensive .The quest for ideal induction agent was never ending .Propofol is gaining popularity for its better recovery profile . In our study we have compared propofol and thiopentone for modified ElectroConvulsive therapy for Seizure duration,time taken for recovery ,induction time and haemodynamic parameters .

**Methods :** After obtaining institutional ethical committee approval , this prospective randomized interventional study was registered at clinical trial registry with no : CTRI/2022/04/042213 .This study was conducted on 60 patients scheduled for Modified electro convulsive therapy at Narayana medical college Nellore during the of period may 2022- November 2022 .

Informed and written consent was obtained from the patients and patient attenders . Inclusion criteria : Patients posted for modified ECT , ASA 2 and 3, Age between 18 to 60 years and whose attenders given consent was included in the study . patients whose attenders refused for giving consent and ASA 4 , age <18 &>60 yrs ,patients with coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD),MORBID OBESITY ,RENAL COMPRIMISE ,pregnant &lactating mothers were excluded from the study .

60 patients were randomized into 2 groups using simple randomization using sealed envelope method 30 patients in each group .

Group A received propofol 1mg/kg

Group B received thiopentone 2.5mg/kg .

A detailed preanaesthetic checkup was done a day before the procedure and patient was kept on NPO 6 hrs for solids and 2 hrs for clear fluids .On the day of procedure all emergency drugs and resuscitative equipment should be kept ready .After shifting the patient to procedure room ECG,NIBP,SPO2 monitors were connected and recorded. Intravenous line was secured . Patients were preoxygenated with 100% oxygen for 3min. Heart rate and spo2 was monitored continuously. Intravenous glycopyrrolate 0.2 mg was given . General anaesthesia was induced with IV anaesthetic agent as per group allocated with Propofol or Thiopentone. After induction Bp cuff was applied to patients arm and inflated to 60 mmHg above patients systolic blood pressure.Succinyl choline 0.5mg/kg was given after the cuffed forearm was isolated . Patients were ventilated at the rate of 12-16 breaths per min with 100% Oxygen. once the fasciculations were subsided and adequate neuromuscular relaxation was obtained ,an adequate sized bite block was inserted to prevent tongue bite .A brief pulse stimulus for about 1-3 secs of 60-90 HZ frequency & pulse width of 1 was given to produce seizures .Seizure duration was monitored and recorded . Subsequently all patients were mask ventilated. All the patients were monitored for changes in heart rate , systolic blood pressure ,diastolic blood pressure ,spo2 at basal ,after induction and 1 min,2min,3min ,5,10,20,30 mins following ECT . Time taken for recovery was recorded from injection of anaesthetic agent to time taken to obey verbal commands such as opening of eyes ,time for ability to sit unaided& time taken to meet discharge criteria .

Statistical analysis :

Statistical analysis was performed using SPSS version 20 software.

•Descriptive statistics of the explanatory and outcome variables were calculated by mean, standard deviation for quantitative variables, frequency and proportions for qualitative variables.

Statistical difference between both the study groups was determined by student 't' test .

p value <0.01 was taken as statistically significant.

#### SAMPLE SIZE ESTIMATION

Sample size was calculated keeping two sided alpha error at 5 % and a power @ 80% by using formula

$$N = 2(Z_{\alpha} + Z_{\beta})^2 \sigma^2 / (\mu_1 - \mu_2)^2$$

N=Sample size

Z $\alpha$  =Level of significance

$Z\beta$  =Required power

$\Sigma$ = Anticipated standard deviation

$\mu_1 - \mu_2$  = Meaningful difference between two means

Minimum of 20 patients in each group was required . For better validation 30 patients are selected in each group .

Results : Demographic parameters were comparable. There is no significant difference in hemodynamic parameters and duration of seizure activity in both the group. Duration of recovery is significantly shorter in Propofol group ( $p < 0.01$ ).

Discussion: ECT induces cardiovascular<sup>7</sup> changes secondary to activation of the autonomic nervous system, initially there is parasympathetic discharge lasting for 10-15 secs including bradycardia ,hypotension. Myocardial o<sub>2</sub> consumption increases ,followed by activation of sympathetic system . Because of these changes we need to be extra cautious during ECT .Different induction agents are used to provide anaesthesia thus preventing all these undesirable effects to ECT. Among the anaesthetic induction drugs propofol has proven its superiority for regular general anesthesia . But for ElectroConvulsive therapy it is less explored so we have compared Propofol and Thiopentone sodium .

sharma ,T et al<sup>8</sup> (2022 ) conducted study comparing thiopentone 3-5mg/kg ;propofol 1.5-2mg/kg as induction agents for modified electroconvulsive therapy (MECT) in terms of induction time ,haemodynamic variables like heart rate(HR), systolic blood pressure (SBP), diastolic blood pressure(DBP) and seizure duration ,recovery time and concluded that induction (41.9 ±5.21 secs) and recovery time, seizure duration (16.54±2.87 secs) was faster with propofol compared to thiopentone induction time ( 47.60± 5.68), seizure duration ( 20.19±3.98 secs ) where as in our study we used propofol 1 mg /kg and thiopentone 2.5mg/kg and results were almost similar to above study .

Mrudul patil et al<sup>2</sup> (2021); conducted study on 60 patients comparing propofol 1.5 mg/kg ,thiopentone 2mg/kg as induction agents and observed that seizure duration (34.70 ±8.68 secs), recovery time (326.57± 4.78 secs ) in propofol group which is earlier compared to thiopentone group (50.83± 8.45 secs ) ,(358.87± 51.11 secs ) where as in our study seizure duration for propofol group (28.43±3.75 secs ),recovery time (309±80.46secs ) which was earlier compared to thiopentone group and the results were almost similar to above study .

Conclusion :propofol is a better alternative to thiopentone in view of its faster induction and rapid recovery ,similar seizure duration as compared to thiopentone .

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TABLE 1;COMPARISION BETWEEN INDUCTION TIME, SEIZURE DURATION ,RECOVERY TIME IN TWO GROUPS

PARAMETERS	GROUP	SAMPLE	MEAN (secs)	SD	PVALUE
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Duration of induction	A	30	32.167	7.49	<0.001
	B	30	41.36	8.83	
Duration of seizure	A	30	28.43	3.75	0.120
	B	30	30.1	4.4	
Time required for recovery	A	30	309	80.46	<0.001
	B	30	433	86.30	

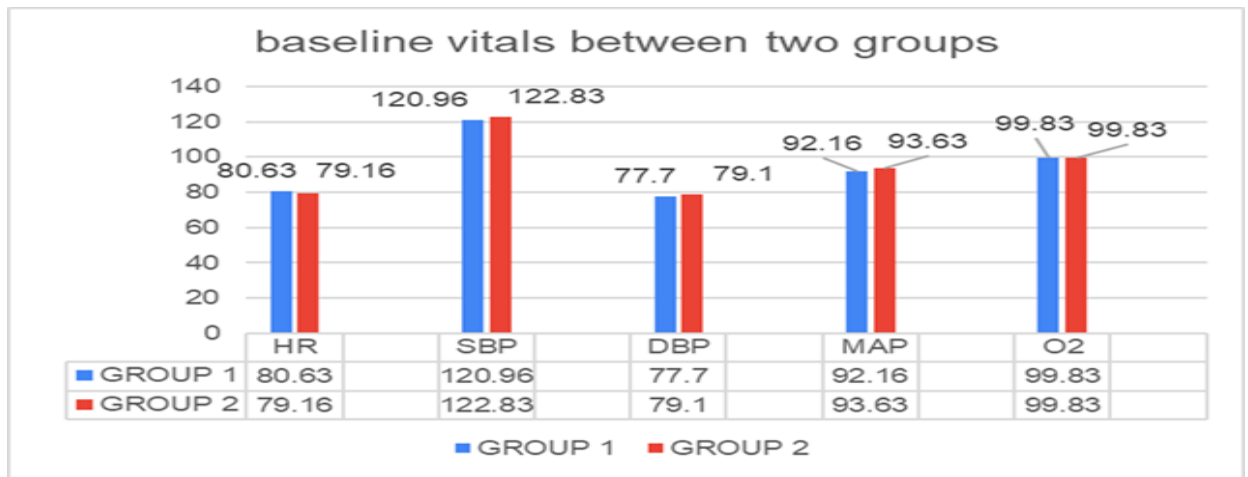
TABLE 2; COMPARING VITALS BETWEEN THE 2 GROUPS USING INDEPENDENT T TEST

Vitals	Group	Mean value	SD	P value
Heart rate	A	80.63	7.49	0.437
	B	79.16	7.02	
Systolic BP	A	120.96	12.33	0.603
	B	122.83	14.41	
Diastolic BP	A	77.7	6.34	0.463
	B	79.1	8.22	
Mean arterial pressure	A	92.167	93.63	0.508
	B	93.63	9.60	
O2 saturation	A	99.83	0.37	1
	B	99.83	0.37	

TABLE 3; COMPARISON SIDE EFFECTS BETWEEN 2 GROUPS

SIDE EFFECTS	GROUP A	GROUP B
Nausea & vomiting	0	2
Hypotension	0	0
Bradycardia	1	0

Side effects like nausea & vomiting were seen in 2 patients in thiopentone group , where as bardycardia was seen in propofol group .



GRAPH Showing comparision of baseline vitals

GROUP 1/A - PROPOFOL

GROUP 2/B-THIOPENTONE SODIUM

CONSORT FLOW DIAGRAM