

**A comparative study to evaluate the efficacy between propofol and etomidate as induction agent in geriatric cardiovascular disease patients posted for non cardiovascular surgeries.**

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**Abstract:**

**Back ground:** In General Anaesthesia changes in Hemodynamic parameters during induction is more common. In elderly patient with cardiovascular diseases profound changes in hemodynamic parameters<sup>2</sup>. To alleviate the profound changes in hemodynamic parameters we use either Propofol or Thiopentone Sodium regularly as induction agent. But recently we use Etomidate as choice of induction agent in cardiovascular patients.

**Aim:** The aim of the study is to compare the haemodynamic effects of Propofol and Etomidate during induction and intubation in geriatric patients with cardiovascular disease for non-cardiovascular surgeries.

**Materials and methods;** The present study included 80 patients aged between 60-80 years of ASA grade III and IV scheduled for elective non cardiac surgeries. The patients were randomly divided into two groups. Group P received Inj. Propofol 1% (2mg/kg of body weight) and group E received Inj. Etomidate (0.3mg/kg of body weight). The heart rate and mean arterial pressure were monitored continuously and recorded before induction, at induction and laryngoscopy followed by 1st, 3<sup>rd</sup>, 5<sup>th</sup> and 10<sup>th</sup> minutes after intubation.

**Results;** As compared to the Etomidate group, there were significant changes in systolic blood pressure, diastolic blood pressure and mean arterial pressure after intubation with Propofol induction<sup>1</sup>

**Conclusion;** The results showed that hemodynamic disturbances are more with Propofol when compared to Etomidate. We infer that Etomidate has higher hemodynamic stability as a result.

**Key words;** Propofol, Etomidate, non cardiovascular surgeries, hemodynamic changes, myoclonic jerks.

## **INTRODUCTION:**

General anaesthesia is a drug-induced, reversible central nervous system depression that causes a complete lack of perception of all exterior stimuli. It is typically described as a triad of muscle relaxation, analgesia and amnesia.

Since the development of general anaesthesia, no perfect induction drug that maintains stable hemodynamics throughout endotracheal intubation has been found. Propofol and Etomidate are two often utilized induction drugs with compromised cardiovascular systems<sup>3</sup>.

## **AIMS AND OBJECTIVES**

The aim of the study is to compare the haemodynamic and other effects of Propofol and Etomidate during induction and intubation in geriatric patients with cardiovascular disease for non-cardiovascular surgeries<sup>5</sup>.

## **OBJECTIVES OF THE STUDY:**

1. To compare the time of onset and efficacy between Propofol and Etomidate.
2. To compare hemodynamic parameters (systolic blood pressure, diastolic blood pressure, mean arterial pressure, pulse rate) in both the groups.
3. Pain on injection.
4. Incidence of apnoea
5. Incidence of bronchospasm during induction
6. Myoclonic movements

**STUDYCENTRE:** GOVERNMENT MEDICAL COLLEGE, ANANTHAPURAMU, 515001.

**DURATIONOFTHESTUDY:** JAN 2021– May 2022

**STUDY DESIGN:** Randomized double blinded controlled interventional study.

## **INCLUSION CRITERIA**

- 60 – 80 years of either sex
- Weight 40to80 kgs.
- ASA grade III and IV.
- Mallampati grade I, II and III.

## **EXCLUSION CRITERIA**

- Patient refusal.
- Emergency surgeries.
- Existence of considerable pathology in pharynx/larynx.
- Known history of allergy to Propofol or Etomidate.
- History of seizure disorder

## **SAMPLE SIZE -80**

### **MATERIALS:**

After obtaining due informed consent, 80 patients were included in the study. They were divided in to two groups of 40 in each group based on random numbers as group 1 and group 2. The patients in Group 1 given Inj. Propofol 1% (2mg/kg of body weight) and the patients in Group 2 received Inj. Etomidate (0.3mg/kg of body weight)<sup>1</sup>.

Patient shifted to OT, Routine monitoring included ECG, Pulse-Oximetry and NIBP. Intravenous cannulation secured with 18G intravenous cannula. Premedication given with inj. Glycopyrrolate 0.2 mg i.v, inj. Midazolam 0.02 mg/kg i.v and inj. Fentanyl 2mg/kg I.V. Pre-oxygenation for 5 to 8 minutes. Induction with calculated dose of Propofol or Etomidate. Pain on injection and myoclonic movements at induction, if occurred were recorded. Patient was intubated with appropriate sized cuffed oral endotracheal tube 3 minutes after giving the intubating dose of Inj Vecuronium<sup>3</sup> (0.1mg/kg) I.V. Endotracheal tube was secured after assuring equivalent bilateral breath entry by 5 point auscultatory method. Positive pressure ventilation was initiated.

Anesthesia was maintained with oxygen and nitrous oxide (70:30), sevoflurane along with intermittent boluses of Vecuronium, as required throughout the surgery. At the end of surgery, the residual neuromuscular block was reversed with Neostigmine (0.05mg/kg) and Glycopyrrolate (0.01 mg/kg) I.V. Patient was extubated when patient was conscious, oriented, reflexes recovered, good muscle power, adequate respiration and with stable haemodynamics.

## **METHOD OF COLLECTION OF DATA**

80 patients were enrolled in the study who underwent elective surgeries under general anesthesia and had been assessed individually both intra-operatively and post-operatively.

The heart rate and mean arterial pressure were monitored continuously and recorded before induction, at induction and laryngoscopy followed by 1st, 3<sup>rd</sup>, 5<sup>th</sup> and 10<sup>th</sup> minutes after intubation<sup>2</sup>.

**Pain on injection** was measured using 4 graded scale<sup>3</sup>:

Grade 0 – no pain,

Grade 1 - verbal complaint of pain,

Grade 2- withdrawal of arm and

Grade 3 – both verbal complaint and withdrawal of arm

Incidence and degree of pain of **myoclonic movements**<sup>4</sup> recorded as

Grade0 - no myoclonic movements,

Grade 1- minor myoclonic movements

Grade 2 - moderate myoclonic movements,

Grade3 – major myoclonic movements. Episodes of apnea noted.

The obtained results were sent for statistical analysis

**STATISTICAL ANALYSIS:**

Entire data is analysed statistically using Statistical Package for Social Sciences [SPSS version 25.0, IBM Corporation, USA]. The inter group comparison of the categorical variables is done using Chi-square test or Fischer’s exact probability test. For continuous variables independent t-test or unpaired t-test is used. p value of <0.05 was considered to be statistically significant. The data was reported as mean +/- SD and frequency.

**Heart rate**

Variables	Group		Mean difference	t-value (P-value)
	GroupP (n=40)	GroupE (n=40)		
	Mean±SD	Mean±SD		

Pre-operative period Heart Rate	77.63±10.13	78.83±9.75	-1.200	0.540 <sup>@</sup> (0.591)
Pre medication	75.48±9.90	77.20 ±9.54	-1.725	0.793 <sup>@</sup> (0.430)
Induction	81.55±11.69	78.33 ±9.51	3.225	1.353 <sup>@</sup> (0.180)
Intubation	91.35±13.49	84.90 ±9.23	6.450	2.496* (0.015)
1Min	92.85±13.60	85.00 ±7.98	7.850	3.148** (0.002)
3Min	89.63±9.30	83.20 ±9.60	6.425	3.041** (0.003)
5Min	88.45±8.98	82.78 ±9.90	5.675	2.686* (0.009)
10Min	86.80±13.47	80.70 ±8.61	6.100	2.414* (0.018)

@-Notsignificant;\*significantat0.05level;\*\*significantat0.01level;

Table 1: Comparison of Heart Rate

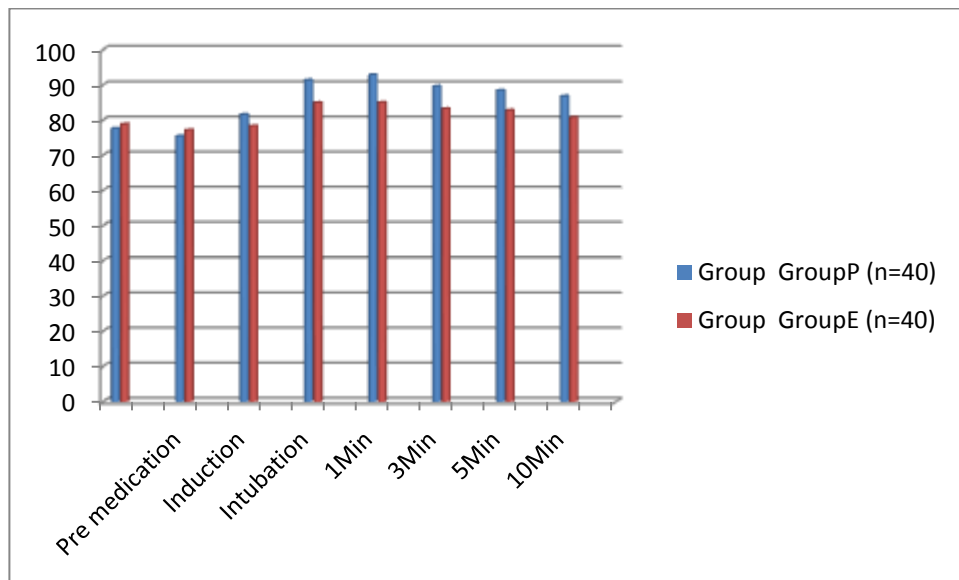


Figure 1: Comparison of Heart Rate

**Systolic Blood Pressure**

Variables	Group		Mean difference	t-value (P-value)
	GroupP (n=40)	GroupE (n=40)		
	Mean±SD	Mean±SD		
Pre-operative period	126.13±8.45	127.35±7.90	-1.225	0.670 <sup>@</sup> (0.505)
Premedication	120.85±10.30	122.65±7.54	-1.800	0.892 <sup>@</sup> (0.375)
Induction	109.88±18.30	117.65±19.17	-7.775	1.855 <sup>@</sup> (0.067)

Intubation	115.40±12.35	126.43±10.31	-11.025	4.336** (0.000)
1Min	108.32±16.35	120.45±10.62	-12.125	3.934** (0.000)
3Min	97.25±8.81	113.12±10.59	-15.875	7.290** (0.000)
5Min	96.90±8.82	112.83±11.66	-15.925	6.888** (0.000)
10Min	99.30±11.09	114.53±9.69	-15.225	6.538** (0.000)

@-Notsignificant;\*\*significantat0.01level;

Table 2: Comparison of Systolic Blood Pressure

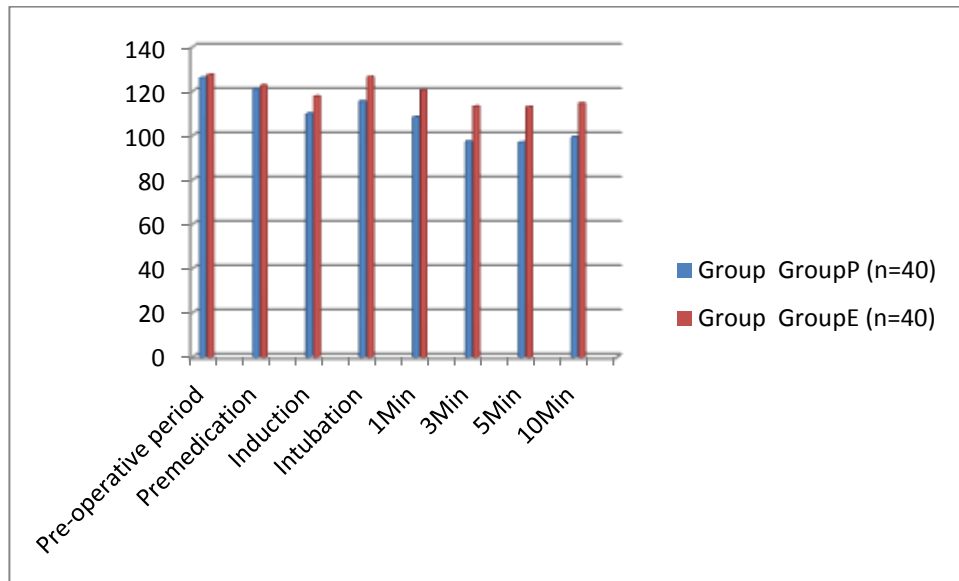


Figure 2: Comparison of Systolic Blood Pressure

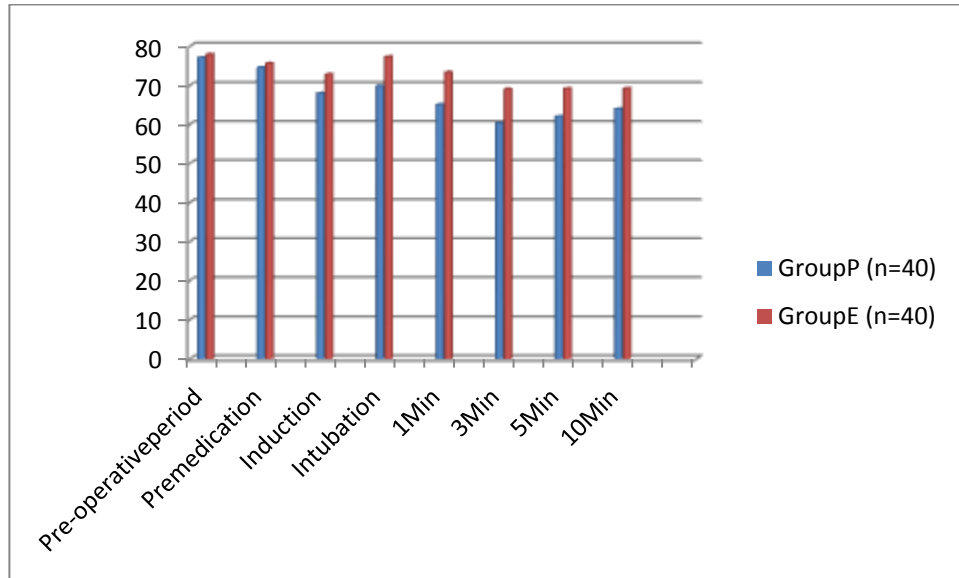
**Diastolic blood Pressure**

Variables	Group		Mean difference	t-value (P-value)
	GroupP (n=40)	GroupE (n=40)		
	Mean±SD	Mean±SD		
Pre-operative perio	77.08±10.67	77.95±10.46	-0.875	0.370 <sup>@</sup> (0.712)
Premedication	74.55±9.97	75.63±8.87	-1.075	0.509 <sup>@</sup> (0.612)
Induction	67.98±7.55	72.82 ±8.67	-4.850	2.667* (0.009)
Intubation	69.85±9.46	77.30±11.63	-7.450	3.143** (0.002)
1Min	65.10±8.83	73.35±10.46	-8.250	3.813** (0.000)

3Min	60.30±7.38	69.10 ±9.01	-8.800	4.780** (0.000)
5Min	62.05±8.00	69.22 ±8.52	-7.175	3.883** (0.000)
10Min	63.95±7.42	69.23 ±7.51	-5.275	3.159** (0.002)

@-Notsignificant;\*significantat0.05level;\*\*significantat0.01level;

**Table 3: Comparison of Diastolic Blood Pressure**



**Figure 3: Comparison of Diastolic Blood Pressure**

**MAP**

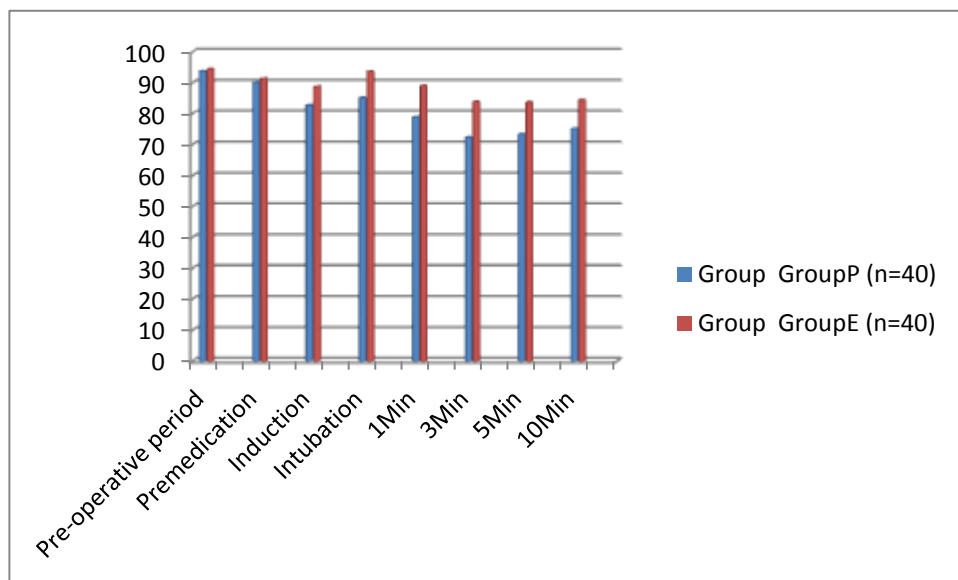
**Table 3: Comparison of Mean Arterial Blood Pressure**

Variables	Group		Mean difference	t-value (P-value)
	GroupP (n=40)	GroupE (n=40)		
	Mean±SD	Mean±SD		
Pre-operative period	93.70±9.26	94.48 ±8.95	-0.775	0.381 <sup>@</sup> (0.704)
Premedication	90.10±9.07	91.35 ±7.52	-1.250	0.671 <sup>@</sup> (0.504)
Induction	82.78±6.96	88.72±7.82	-5.950	3.597** (0.001)
Intubation	85.15±8.96	93.62±10.06	-8.475	3.980** (0.000)
1Min	78.95±8.65	89.00 ±9.63	-10.050	4.909** (0.000)
3Min	72.35±6.81	83.85 ±8.46	-11.500	6.697** (0.000)

5Min	73.35±7.49	83.73 ±9.20	-10.375	5.531** (0.000)
10Min	75.18±6.60	84.38 ±7.48	-9.200	5.834** (0.000)

@-Notsignificant;\*significantat0.05level;\*\*significantat0.01level;

**Figure 4: Comparison of Mean Arterial Blood Pressure**



## DISCUSSION

In this study, we examined the hemodynamic response to endotracheal intubation using Etomidate and Propofol as induction agents in 80 patients, 40 patients in each group, within the age range of >60 years of either sex, weighing 40-80 Kg with heart diseases like ischemic heart disease and valvular heart disease.

In this study, the hemodynamic parameters like heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and other effects like pain on injection, myoclonic jerks, bronchospasm and postoperative nausea and vomiting were compared between the Propofol and Etomidate groups.

The two groups were designated as, Group P who received Propofol and Group E – who received Etomidate

## RESULTS

There was no discernible variation in the underlying variables among the patient's gender, age, weight, and ASA physical status



As compared to the Etomidate group, there were significant changes in systolic blood pressure, diastolic blood pressure and mean arterial pressure after intubation with Propofol induction

HEART RATE – No incidence of bradycardia noted with Propofol or Etomidate<sup>5</sup>.

1 out of 40 patients had myoclonus with Etomidate induction.

22 out of 40 patients (55%) reported pain on injection with Propofol induction.

Both groups did not have any incidence of nausea or vomiting.

Variations in systolic blood pressure, diastolic blood pressures and mean arterial pressure were fewer in the Etomidate group compared to the Propofol group

## CONCLUSION

The results showed that hemodynamic disturbances are more with Propofol when compared to Etomidate. We infer that Etomidate has higher hemodynamic stability as a result<sup>1, 2, and 3</sup>.

Etomidate-based anaesthesia was associated with fewer cardiovascular events and smaller hemodynamic changes than Propofol – based anaesthesia.

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