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# ORIGINAL ARTICLE

## HEMODYNAMIC STUDY DURING INDUCTION OF GENERAL ANAESTHESIA WITH PROPOFOL USING PRIMING PRINCIPLE

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**ABSTRACT:** Propofol is a popular intravenous induction agent, hypotension is known complication of propofol, hence priming technique is adopted to reduce the induction dose and hence reduce the incidence of hypotension. Current study is undertaken to evaluate the haemodynamic changes with bolus dose and priming dose of propofol. **METHODS:** the study population is divided into two groups - PRIMING GROUP: After calculating the total dose of Propofol induction agent (2mg/kg) 20% was injected as bolus and remaining drug is administered till the loss of eye lash reflux and verbal response at the rate of 30mg/10sec. NON PRIMING GROUP: intravenous injection of propofol bolus (2mg/kg) iv in 30 seconds was given. **RESULT:** A mean induction dose of Propofol required in priming group is 88.26mg and in non-priming group it is 106.28mg. Reduction in dose requirement in priming group is by 16.74%.Haemodynamic stability was better in non-priming group. Complications like apnoea, involuntary movements, were seen in both the groups. **CONCLUSION:** Induction dose of Propofol is reduced in priming group and there is greater fall of blood pressure compared to non-priming group, both groups had fewer side effects like apnoea and involuntary movements.

**KEYWORDS:** Priming, Propofol, Apnoea.

**INTRODUCTION:** Propofol is the most efficient intravenous anesthetic agent to be introduced into clinical practice as it has rapid onset of action, smoother and rapid recovery. It attenuates laryngeal, pharyngeal and tracheal reflexes, and provides adequate depth of anesthesia during intubation. It is widely used as a sedative agent in intensive care unit and has antiemetic properties. The major disadvantage of rapid induction with Propofol is considerable fall in systemic arterial blood pressure, so studies were undertaken to reduce these side effects and utilize the advantages provided by Propofol.

The Priming Principle is applied for induction agents to reduce the side effects. This principle was applied during induction with propofol to assess whether it affects the total induction dose requirement and prevent fall of blood pressure following induction. This Priming technique in relation to induction agents aims at utilizing the sedative, anxiolytic and amnestic properties at sub hypnotic dosage of induction agent when given a few minutes prior to induction. Various methods are available to reduce the induction dose of Propofol like use of Opioids along with Propofol, concurrent use of Nitrous Oxide,[1] the study is conducted to evaluate the effect of priming technique on dosage of induction and on the hemodynamics with propofol.

**Methodology:** After obtaining institutional ethical committee clearance and written informed consent, total of 60 patients belonging to ASA I and II category, aged between 18 to 55years, undergoing elective surgeries under general anesthesia were selected and then they were divided in

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to two groups of 30 each randomly by closed envelope method. Patients with known propofol allergies anticipated difficult airway and pregnant women were excluded from the study.

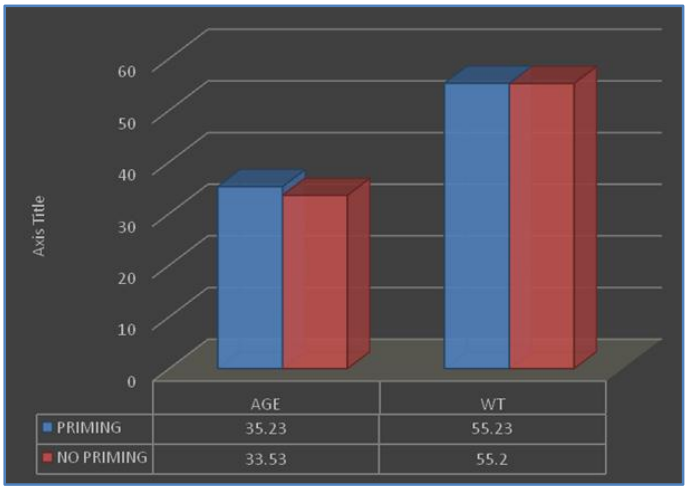
A thorough pre-anesthetic evaluation was performed by taking history and clinical examination. All patients' weight, pulse rate and blood pressure were recorded. Special investigations like blood sugar, ECG, and chest X- ray were performed whenever required.

All patients were pre-medicated the night before surgery with Tab. Lorazepam 1mg and Tab. Ranitidine 150mg. On the day of surgery baseline values of heart rate and blood pressure were recorded before induction. Inj. Fentanyl 1mcg/kg was administered to all patients 5mins before induction. Study group, Priming Group -After calculating total dose of Propofol induction agent (2mg/kg), 20% of it was injected as priming dose within 30 secs. After 60seconds, remaining Propofol was injected as bolus until loss of eye lash reflex and verbal response. Speed of injecting propofol was at the rate of 30 mg per 10 seconds.

Control group, Non Priming Group - Induction done with Propofol bolus calculated dose of 2mg/kg IV in 30seconds and additional doses if required until the loss of eye lash reflex and verbal response. All patients were looked for verbal response and eye lash reflex during induction. Heart rate changes, systolic blood pressure, diastolic blood pressure and mean arterial pressure changes were recorded after induction. Following induction with Propofol, Suxamethonium (1mg/kg) was administered to all patients to facilitate endotracheal intubation. Immediately after intubation, heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure changes were recorded every five minutes for the next 10 minutes. Further anaesthesia was maintained with Vecuronium as a non-depolarising relaxant, nitrous oxide, oxygen and Isoflurane. The end point of study was taken as 10 minutes after intubation. Any complications during this period like apnea, vomiting, involuntary movements, laryngospasm and coughing were noted.

Group sample sizes of 60 was achieved by 84% power to detect a difference of 13.5 between the null hypothesis that both group means are 20.5 and the alternative hypothesis that the mean of group 2 is 7.0 with estimated group standard deviations of 16.2 and 18.7 and with a significance level (alpha) of 0.05000 using a two-sided two-sample t-test.

**RESULTS:** Demographic data were comparable for age, weight and gender as shown in the following graphs 1 and 2.




**Bar Graph 1: Comparison of Age and Weight Between two Groups**

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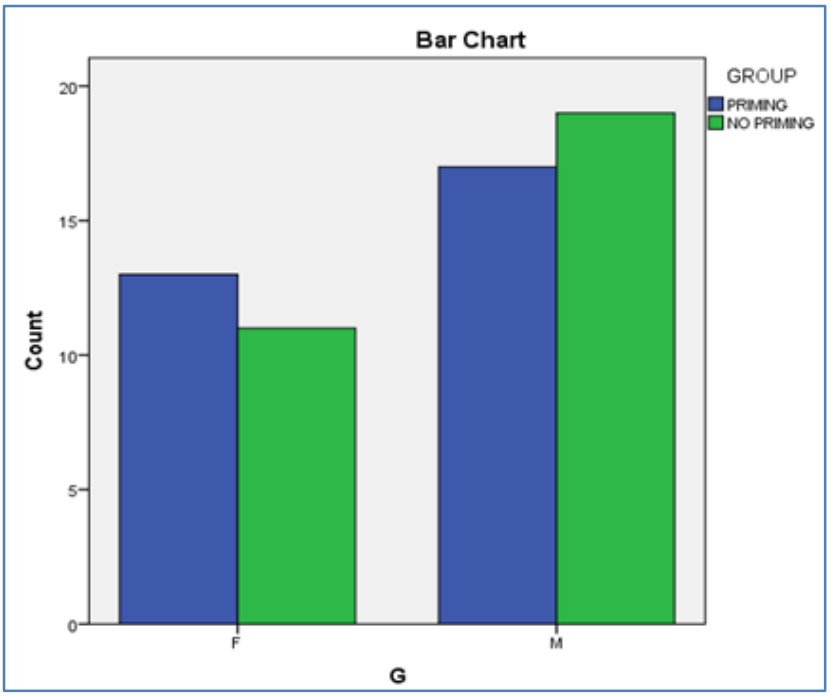
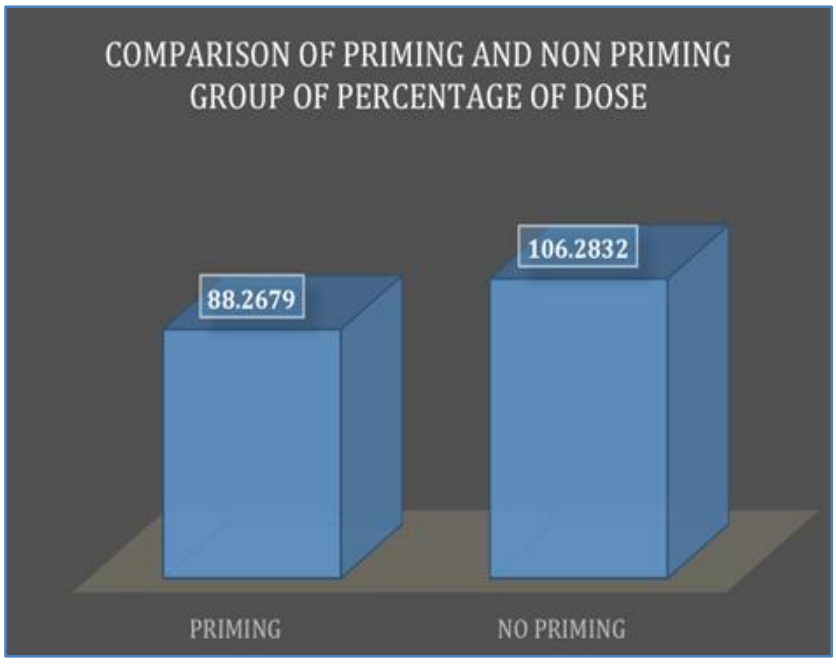



**Bar Graph 2: Comparision of Gender between the Two Groups**

Mean induction dose in priming group is 88.26±16.07 mg for loss of eyelash reflex and verbal response. In Non-priming group dose is 106.28±17.85 mg. P value is 0.001 which is (<0.05) highly significant. Reduction in induction dose requirement in priming group is by 16.74%. (Graph 3 and 4).




**Bar Graph 3: Comparison of Propofol Dose in Both Groups**

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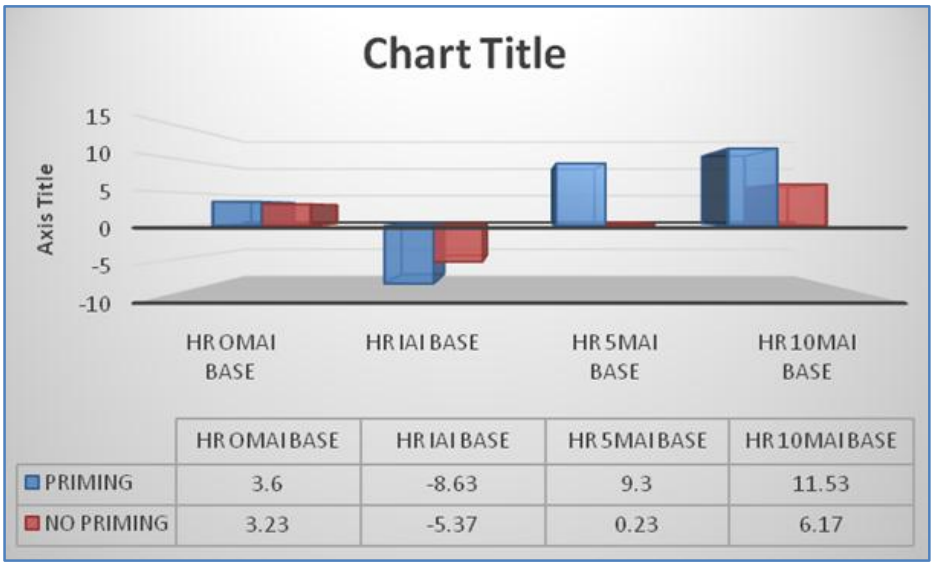
**Bar Graph 4: Comparison of CD, PD, ID and TD in Both Group**

- CD- calculated dose.
- PD- Priming dose.
- ID- induction dose.
- TD- total dose- priming and induction dose.

Mean HR values after induction is higher in priming group compared to non-priming group. It was observed that 5mins after induction using priming principle technique shows statistically significant increase in HR, as p value is <0.05. i.e., 0.032 Mean pulse rate in priming group is 9.3± 15.155. In Non priming group is 0.23±16.841.




**Bar Graph 5: Comparison of HR at Varied Intervals from Baseline in Both Groups**

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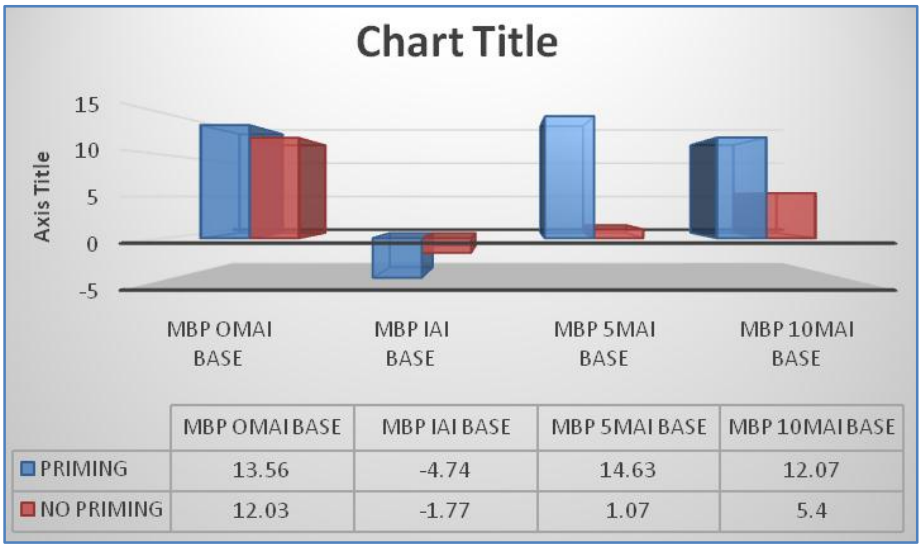
Change in SBP, DBP and MBP from baseline were observed at 1MAI (One minute after induction), IAI (Immediately after intubation), 5MAI (Five minutes after intubation) and 10MAI (Ten minutes after intubation).

Mean values are higher in priming group at both 5MAI and 10MAI compared to non-priming group SBP at OMAI, IAI values are not significant as p values are 0.428 and 0.2 respectively.

DBP at 5MAI is significant as p value is 0.002 which is < 0.05. Mean values in priming group is 11.4±12.748. Non Priming Group is - 0.1±14.873. DBP values at OMAI, IAI and 10MAI are not significant as p value is <0.05 i.e., 0.489, 0.46 and 0.638 respectively. MBP values at 5MAI are significant as p value is 0.002. Mean values of MBP at 5MAI in priming group is 14.63±12.26. Non Priming Group is 1.07±18.405. MBP in priming group is decreased by 15.4% from baseline at 5MAI compared to non-priming group which is 1.2% fall from baseline. MBP at OMAI, IAI, 10MAI p values are 0.65, 0.492 and 0.106 respectively which is statistically not significant P value for MBP at 5MAI is 0.002 is statistically significant in both the groups. P value at OMAI, IAI and 10MAI are 0.65, 0.492 and 0.106 respectively are not significant in both the groups. Mean value of MBP at 5MAI in priming 14.63±12.22, Non priming 1.07±18.405. (Graph 6).




| | MBP OMAI BASE | MBP IAI BASE | MBP 5MAI BASE | MBP 10MAI BASE |
|---|---|---|---|---|
| PRIMING | 13.56 | -4.74 | 14.63 | 12.07 |
| NO PRIMING | 12.03 | -1.77 | 1.07 | 5.4 |

**Bar Graph 6: Mbp Values at Varied Intervals Groups**

Percentage of complications like apnoea, involuntary movements is more in non-priming group (13.26%) than in priming group (6.6%).

**DISCUSSION:** Induction is important part of the general anaesthesia. Maintaining stability in haemodynamics during induction is very essential. Propofol is one of the most widely used induction agent and it is known to have a biphasic effect on the cardiovascular system. Firstly, immediately after injection, decrease in the systemic vascular resistance and mean arterial pressure predominate. This decrease in the systemic vascular resistance causes reflex increase in the sympathetic activity, which is mediated by the baroreceptors present in the carotid sinus and aortic arch, thereby causing an increase in the heart rate. Secondly, from 2 minutes after injection, despite less than normal systemic vascular resistance, the heart rate and stroke volume are decreased to less than baseline. This is attributed to `resetting' of the baroreceptor reflex to a smaller pressure value than normal by propofol.[2]

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This study was undertaken to study the effect of priming principle on propofol induction.in this study demographic data were comparable for age, weight and gender.

Mean induction dose in priming group is 88.26±16.07 for loss of eyelash reflex and verbal response. In Non-priming group dose is 106.28±17.85. P value is 0.001 which is (<0.05) highly significant, this was comparable to results by A Kumar et al in their study where there was 27.48%reduction in the induction dose requirement of propofol by applying 'Priming Principle' [3].

In this study the change in heart rate from baseline is more in priming group compared to non-priming group, which was contradictory from the study done by Maroof et al where mean heart rate at one minute after induction was high in non-priming group.[4]

Mean systolic bp is higher in priming group at both 5MAI and 10MAI compared to Non-priming group. SBP at OMAI, IAI values are not significant as p values are 0.428 and 0.2 respectively. In the study by Roopam Kataria et al[5] mean SBP observed to be maintained at induction in control group and slight fall observed in other two groups i.e propofol auto co induction and Midazolam co induction group.

DBP at 5MAI is significant as p value is 0.002 which is < 0.05. Mean values in priming group is 11.4±12.748. Non Priming Group is - 0.1±14.873. DBP values at OMAI, IAI and 10MAI are not significant as p value is <0.05 i.e 0.489, 0.46 and 0.638 respectively. MBP values at 5MAI are significant as p value is 0.002. Mean values of MBP at 5MAI in priming group is 14.63±12.26. Non Priming Group is 1.07±18.405. MBP in priming group is decreased by 15.4% from baseline at 5MAI compared to Non priming group which is 1.2% fall from baseline. MBP at OMAI, IAI, 10MAI p values are 0.65, 0.492 and 0.106 respectively which is statistically not significant. This study showed that there is greater fall of blood pressure in priming group compared to non-priming group which shows that dose of Propofol is not related to fall of blood pressure.

The complications like apnea, involuntary movements was more in non-priming group than in priming group probably due to the higher dose used for induction.

**CONCLUSION:** Total dose of propofol required for induction was less in priming group, the fall in blood pressure was greater in priming group when compared to non-priming group. Both the groups had fewer complications like apnea and involuntary movements**.**

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