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A COMPARATIVE STUDY OF TWO DOSES OF INTRAVENOUS DEXMEDETOMIDINE IN THE ATTENUATION OF STRESS RESPONSE DURING LARYNGOSCOPY AND TRACHEAL INTUBATION

Dr C. Nandhini[1], Dr T. Santhosh[2], Dr Subbulakshmi Sundaram[3]

[1]Junior Resident, Department of anaesthesiology, Government Cuddalore Medical College and Hospital, Annamalai Nagar, Chidambaram 608002, India.
[2]Assistant Professor, Department of anaesthesiology, Government Cuddalore Medical College and Hospital, Annamalai Nagar, Chidambaram 608002, India.
[3]Associate Professor, Department of anaesthesiology, Government Cuddalore Medical College and Hospital, Annamalai Nagar, Chidambaram 608002, India.

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Corresponding Author: Dr C. Nandhini, Junior Resident, Department of anaesthesiology, Government Cuddalore Medical College and Hospital, Annamalai Nagar, Chidambaram 608002, India.
Email: kavinandhini155@gmail.com

ABSTRACT

Background: The augemented cardiovascular reflexes in the form of tachycardia and hypertension brought about by the noxious stimulus of laryngoscopy and intubation can prove to be detrimental for patients with cardiovascular and cerebrovascular diseases. Several drugs and techniques have been tried by anaesthesiologists to attenuate the stress response to laryngoscopy and endotracheal intubation. Alpha 2 agonist such as clonidine and dexmedetomidine have been used by some researchers for attenuation of the stress response during laryngoscopy. Although they found promising results, the higher doses of dexmedetomidine of 1mcg/kg was associated with increased incidence of cardiovascular compromise in the form of hypotension and bradycardia. Hence this study was undertaken with different doses of dexmedetomidine 0.5 mcg/kg and o.75 mcg/kg to arrive at an optimal dose of dexmedetomidine for attenuation of stress response to laryngoscopy and tracheal intubation.
Materials And Methodology: A comparative study was conducted in adult population of age group 18 to 60 years of 60 members into two equal groups A and B predesigned proforma was used. Informed consent obtained. Group A will receive 0.5mcg/kg and Group B will receive 0.75mcg/kg 20 minutes before intubation given intravenously. Patient vitals will be monitored. Confidentiality will be maintained. **Results:** Group B who received 0.75 mcg/kg of dexmedetomidine is more effective than Group A who received 0.5 mcg/kg of dexmedetomidine in the attenuation of stress response during laryngoscopy and tracheal intubation.
Keywords: Dexmedetomidine, attenuation of stress response, laryngoscopy, intubation

INTRODUCTION

Securing airway of the patient is an important role of an anaesthestist. Intubation procedure can cause high blood pressure and tachycardia due to elevated plasma catecholamine levels. These procedures may also trigger myocardial ischemia and irregular heart rhythms. The vascular constriction reflex typically occurs within moments, with tachycardia for two to five minutes and causes increase in blood pressure. Various approaches can be employed to minimize these

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responses, including intravenous administration of opioids, local anesthetics, β-blockers, or increasing anesthesia depth. Dexmedetomidine is an alpha agonist which is more potent . Notably, dexmedetomidine provides pain relief, cooperative sedation, and anxiety reduction without causing respiratory suppression.

A few studies have administered dexmedetomidine at doses of 0.5 and 1 µg/kg, demonstrating effectiveness in reducing the stress response during these procedures. However dexmedetomidine of 1 microgram/kg can cause decrease in heart rate and blood pressure.

Various drugs are given to decrease the above mentioned risks such as lignocaine, magnesium sulphate, esmolol, labetolol, fentanyl. Dexmedetomidine is most effective among the various drugs used to reduce the increase in blood pressure and heart rate during intubation. For patients with hypertension, diabetes mellitus it can be safely used to reduce the intubation response, It will also cause mild sedation and cause smooth emergence from general anaesthesia.

Sedation involves diminishing a patient's awareness of their surroundings and responsiveness to external stimuli, playing a crucial role in managing pain, anxiety, and insomnia. It promotes relaxation and facilitates recovery.

Minimal sedation, or anxiolysis, provides drug-induced relief of anxiety with little impact on awareness. Moderate sedation results in a reduced level of consciousness, enabling patients to respond to verbal or tactile stimuli while preserving airway reflexes, spontaneous ventilation, & stable cardiovascular function. Pre-existing medical conditions also significantly influence a patient's response to sedatives. These factors are critical in clinical practice when prescribing sedatives, as they impact patient safety & treatment efficacy.

This study was conducted to evaluate different doses of dexmedetomidine—0.5 µg/kg and 0.75 µg/kg—to determine the optimal dose for attenuating the stress response associated with laryngoscopy and endotracheal intubation.

METHODOLOGY

This study aimed to evaluate the optimal dose of intravenous dexmedetomidine in the patients undergoing General anaesthesia for elective surgeries at Government Cuddalore Medical College, Chidambaram.

STUDY DESIGN – Comparative study

STUDY PERIOD- January 2023 –January 2024

INCLUSION CRITERIA:

1. Age group 18-50 yrs
2. Both sexes male and female
3. Patients posted for elective surgeries under general anesthesia such as Tonsillectomy, Laparoscopic appendicectomy, Laparoscopic cholecystectomy, Diagnostic laparoscopic surgeries, Breast surgeries , Thyroid surgeries.

EXCLUSION CRITERIA:

1. Patient with history of angina/myocardial Infarction, Hypertension, Diabetes mellitus.
2. Pt on antidepressants, antipsychotics, beta blockers.
3. Known drug allergy to Dexmedetomidine.
4. Patients who are physically dependent on narcotics, drug abuse, alcohol abuse.

STUDY PROCEDURE

A predesigned proforma will be utilized for the study. Informed consent will be obtained from all participants. Group A will receive an infusion of dexmedetomidine at a dose of 0.5 mcg/kg, while Group B will receive 0.75 mcg/kg, both administered over 10 minutes in 30 ml of normal saline

The primary outcome measures were hemodynamic response at 1,3,5 minutes after intubation. Confidentiality will be maintained.

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OBSERVATIONS AND RESULTS

This research was carried out at the Cuddalore Government College. Following the acquisition of well-informed permission, the study was done on 60 samples who met the inclusion/exclusion criteria.

The following observations are:

TABLE 1: DISTRIBUTION OF STUDY SUBJECTS BASED ON SYSTOLIC BLOOD PRESSURE

SBP	GROUP A		GROUP B		t value	Significance
	MEAN	SD	MEAN	SD		
1MIN	127.90	1.562	127.90	1.540	0.250	P>0.05
3MIN	131.50	3.627	131.07	3.667	0.460	P>0.05
5MIN	136.97	2.480	136.67	2.484	0.468	P>0.05

The mean systolic BP in group A & B in 1 min was 127.90, 3 min was 131.50, 5 min was 136.97 respectively. The association between SBP in group A & B were not significant (P > 0.05)

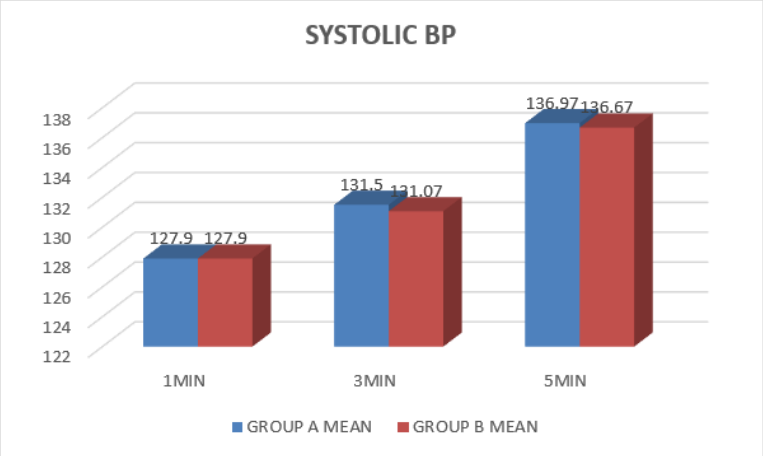

FIGURE 1: DISTRIBUTION OF STUDY SUBJECTS BASED ON SYSTOLIC BLOOD PRESSURE

TABLE 2: DISTRIBUTION OF STUDY SUBJECTS BASED ON MEAN ARTERIAL PRESSURE

MAP	GROUP A		GROUP B		t value	Significance
	MEAN	SD	MEAN	SD		
1MIN	87.47	1.570	84.87	2.609	4.676	P<0.05
3MIN	78.27	3.051	74.87	2.610	4.639	P<0.05
5MIN	75.53	2.662	73.30	2.818	3.156	P<0.05

The mean arterial pressure in group A in 1 min was 87.47, 3 min was 78.27, 5 min was 75.53 & group B in 1 min was 84.87, 3 min was 74.87, 5 min was 73.30 respectively. The association between MBP in group A & B were significant (P < 0.05)

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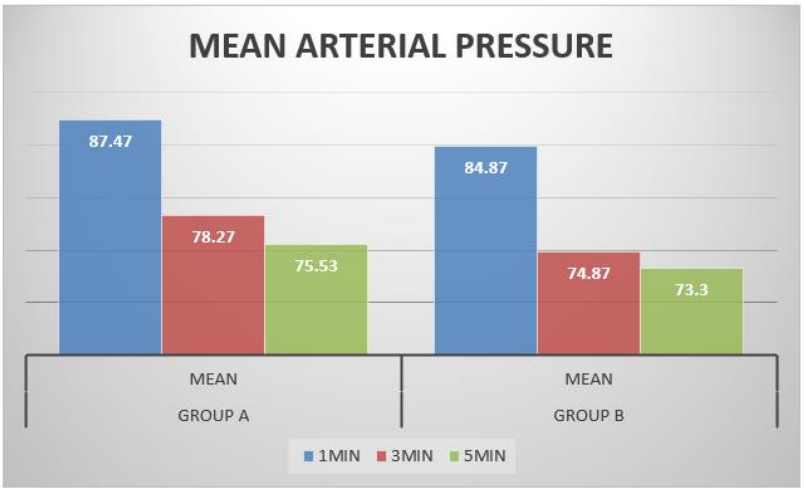

FIGURE 2: DISTRIBUTION OF STUDY SUBJECTS BASED ON MEAN ARTERIAL PRESSURE

TABLE 3: DISTRIBUTION OF STUDY SUBJECTS BASED ON DIASTOLIC BLOOD PRESSURE

DBP	GROUP A		GROUP B		t value	Significance
	MEAN	SD	MEAN	SD		
1MIN	76.20	3.764	76.00	2.877	0.231	P>0.05
3MIN	84.07	1.437	82.00	1.673	3.520	P<0.05
5MIN	88.60	1.673	86.40	3.255	3.293	P<0.05

In Group A, the diastolic blood pressure (DBP) measurements were 76.20 mmHg at 1 minute, 84.07 mmHg at 3 minutes, and 88.60 mmHg at 5 minutes. In Group B, the DBP readings were 76.0 mmHg at 1 minute, 82.0 mmHg at 3 minutes, and 86.40 mmHg at 5 minutes. The comparison of mean blood pressure (MBP) between Groups A and B showed significant differences at 3 minutes and 5 minutes ($P < 0.05$), while the difference at 1 minute was not significant ($P > 0.05$).

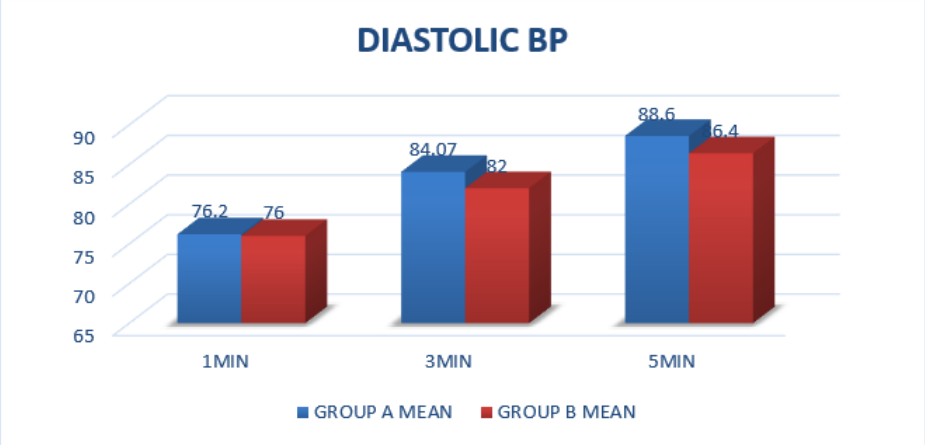

FIGURE 3: DISTRIBUTION OF STUDY SUBJECTS BASED ON DIASTOLIC BLOOD PRESSURE

TABLE 4: DISTRIBUTION OF STUDY SUBJECTS BASED ON HEART RATE

	GROUP A	GROUP B		

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HEART RATE	MEAN	SD	MEAN	SD	t value	Significance
1MIN	76.73	3.039	76.53	2.675	0.271	P>0.05
3MIN	83.80	1.424	82.53	2.675	2.290	P<0.05
5MIN	88.53	1.814	87.00	3.051	2.366	P<0.05

In Group A, the heart rate measurements were 76.73 bpm at 1 minute, 83.80 bpm at 3 minutes, and 88.53 bpm at 5 minutes. In Group B, the heart rates were 76.53 bpm at 1 minute, 82.53 bpm at 3 minutes, and 87.0 bpm at 5 minutes. The comparison of heart rate between Groups A and B revealed significant differences at 3 minutes and 5 minutes ($P < 0.05$), while the difference at 1 minute was not significant ($P > 0.05$).

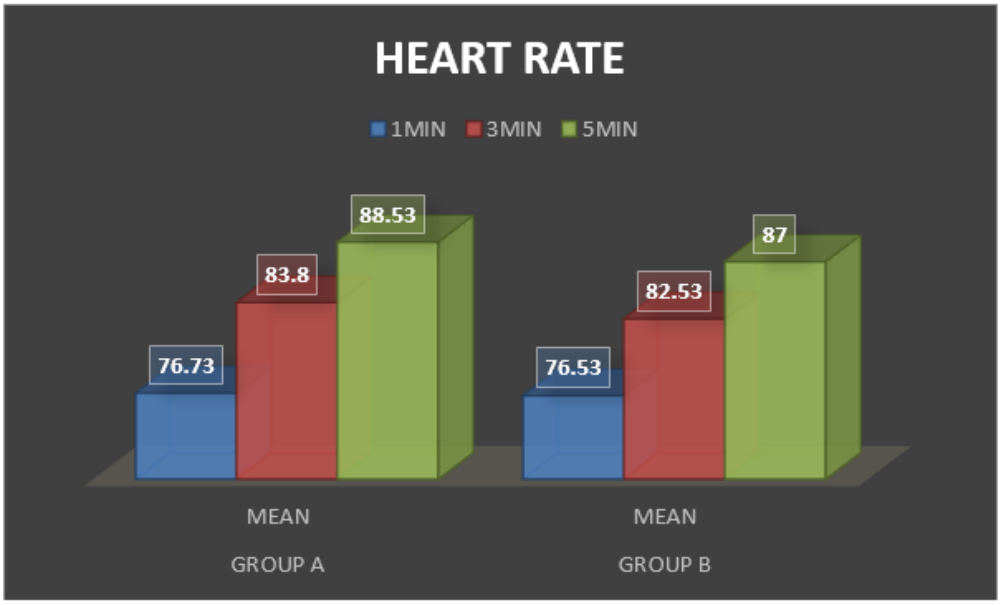

FIGURE 4: DISTRIBUTION OF STUDY SUBJECTS BASED ON HEART RATE

SUMMARY

The current study shows Comparison of two doses of intravenous Dexmedetomidine in the attenuation of stress response during laryngoscopy & endotracheal intubation at Government Cuddalore Medical College and Hospital. Dexmedetomidine, a highly specific alpha-2 agonist, has been shown to possess sedative and analgesic properties, as well as the ability to reduce anesthetic requirements. It promotes hemodynamic stability by regulating stress-induced sympathoadrenal responses associated with intubation, both during surgical procedures and when emerging from anesthesia.

The process of administering anesthesia, performing laryngoscopy, and carrying out intubation is known to cause substantial changes in hemodynamics and trigger autonomic reflexes, which can be especialy concerning in high-risk patients. Traditionally, laryngoscopy & endotracheal intubation have been essential for securing the airway in these individuals. While offering benefits like safeguarding the airway, preventing aspiration, and efficiently delivering anesthetic gases, this procedure is not free from potential issues. Both the process of laryngoscopy and intubation are invasive stimuli that can elicit various stress reactions in the body. These responses may include an accelerated heart rate, increased blood pressure, spasms in the larynx or bronchi, heightened pressure within the skull, and elevated pressure inside the eye.

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The aforementioned techniques are linked to elevations in cardiac rate, arterial pressure, and the occurrence of heart rhythm irregularities. While these alterations are generally short-lived and subside within 5 minutes, they may present considerable dangers to high-risk individuals, especially those with heart conditions, increased pressure within the skull, or vascular anomalies

Multiple elements influence the circulatory system changes related to laryngoscopy and intubation, such as patient age, pharmaceutical interventions, the nature and length of the procedures, anesthetic depth, oxygen deficiency, and excessive carbon dioxide levels in the blood. Among these, the duration of laryngoscopy is the most significant factor impacting cardiovascular responses

In the present study, the mean systolic blood pressure (SBP) in Groups A & B was measured at 127.90 mmHg at 1 minute, 131.50 mmHg at 3 minutes, & 136.97 mmHg at 5 minutes, with no significant difference between the groups ($P > 0.05$).

The mean arterial pressure (MAP) in Group A was 87.47 mmHg at 1 minute, 78.27 mmHg at 3 minutes, and 75.53 mmHg at 5 minutes, while in Group B, it was 84.87 mmHg at 1 minute, 74.87 mmHg at 3 minutes, 73.30 mmHg at 5 minutes. The differences in MAP between Groups A & B were significant ($P < 0.05$).

In the current study, the diastolic blood pressure in Group A was 76.20 mmHg at 1 minute, 84.07 mmHg at 3 minutes, 88.60 mmHg at 5 minutes. In Group B, the values were 76.0 mmHg at 1 minute, 82.0 mmHg at 3 minutes, 86.40 mmHg at 5 minutes. The differences in mean blood pressure (MBP) between Groups A & B were significant at 3 minutes and 5 minutes ($P < 0.05$), but not at 1 minute ($P > 0.05$).

In the current study, the heart rate in Group A was measured at 76.73 bpm at 1 minute, 83.80 bpm at 3 minutes, 88.53 bpm at 5 minutes. In Group B, the heart rates were 76.53 bpm at 1 minute, 82.53 bpm at 3 minutes, 87.0 bpm at 5 minutes. The differences in mean blood pressure (MBP) between Groups A & B were significant at 3 minutes and 5 minutes ($P < 0.05$), while the difference at 1 minute was not significant ($P > 0.05$).

CONCLUSION

A prospective comparative study was conducted at Government Cuddalore Medical College and Hospital over 12 months, examining the effects of two intravenous doses of dexmedetomidine on the stress response during laryngoscopy &endotracheal intubation. The study included 60 patients, selected based on specific inclusion &exclusion criteria.

Overall, Dexmedetomidine demonstrated significant effects on hemodynamic parameters, particulary in reducing Mean arterial pressure and diastolic blood pressure fluctuations during the stress response associated with intubation.

REFERENCES

1. Sarkar A, Tripathi R, Choubey S, Singh RB, Awasthi S. Comparison of effects of intravenous clonidine and dexmedetomidine for blunting pressor response during laryngoscopy and tracheal intubation: A randomized control study. Anesthesia, Essays and Researches. 2014; 8(3):361.
2. Yallapragada SV, Vidadala KS, Vemuri NN, Shaik MS. Comparison of the efficacy of dexmedetomidine with that of esmolol in attenuating laryngoscopic and intubation response after rapid sequence induction. Anesthesia, Essays and Researches. 2014; 8(3):383.
3. Shibman AJ, Smith G, Achola KJ. Cardiovascular and catecholamine responses to laryngoscopy with and without tracheal intubation. Br J Anaesth 1987;59:295-9.

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4. Longnecker DE. Alpine anesthesia: Can pretreatment with clonidine decrease the peaks and valleys? Anesthesiology 1987;67:1-2.
5. Virtanen R, Savola J, Nyman L. Characterization of the selectivity, specifity and potency of medetomidine as an α-2 adrenoceptor agonist. Eur J Pharmacol 1988:9-14.