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Original Research Article

Comparison of Dexmedetomidine Versus Midazolam as Premedication For Attenuation of Hemodynamic Response To Laryngoscopy And Intubation

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Conflict of interest: Nil

Abstract:

Background: Significant sympathetic activation during laryngoscopy and endotracheal intubation is linked to tachycardia and hypertension. Particularly in patients with cardiovascular comorbidities, these hemodynamic reactions may raise perioperative morbidity. Premedication with sympatholytic and sedative medications is crucial for reducing these reactions.

Aim: To compare the efficacy of dexmedetomidine and midazolam as premedication agents for attenuation of hemodynamic response to laryngoscopy and intubation.

Materials and Methods: This prospective comparative study was conducted at Nalanda Medical College and Hospital from March 2025 to November 2025. Ninety adult patients aged 18–60 years belonging to ASA grade I and II undergoing elective surgery under general anesthesia were included. Patients were randomly divided into two groups of 45 each. Group D received intravenous dexmedetomidine 1 µg/kg infusion, while Group M received intravenous midazolam 0.05 mg/kg before induction. Hemodynamic parameters including heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) were recorded at baseline, after premedication, during laryngoscopy, and after intubation. The Chi-square test and Student's t-test were used for statistical analysis. Statistical significance was defined as a p-value of less than 0.05.

Results: Patients receiving dexmedetomidine demonstrated significantly lower heart rate and blood pressure responses during laryngoscopy and intubation compared to the midazolam group. Mean heart rate during intubation was 82.4 ± 7.1 bpm in Group D compared to 96.8 ± 8.5 bpm in Group M ($p < 0.001$). Mean systolic blood pressure during intubation was significantly lower in Group D (124.6 ± 9.2 mmHg) compared to Group M (138.2 ± 10.1 mmHg; $p < 0.001$). Similar significant reductions were observed in DBP and MAP. Dexmedetomidine provided superior attenuation of sympathetic response with better perioperative hemodynamic stability.

Conclusion: Dexmedetomidine is more effective than midazolam in attenuating hemodynamic responses to laryngoscopy and endotracheal intubation. Its sympatholytic and sedative properties provide superior cardiovascular stability during induction of anesthesia.

Keywords: Dexmedetomidine, Anesthesia, Endotracheal Intubation, Laryngoscopy, Hemodynamic Responses.

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Introduction

Endotracheal intubation and laryngoscopy are essential techniques for administering general anaesthesia. However, mechanical irritation of the laryngotracheal and oropharyngeal tissues is linked to severe sympathetic activation during these procedures. Increased myocardial oxygen demand, hypertension, and brief tachycardia are the outcomes of this sympathetic discharge. In healthy people, these reactions are typically temporary, but in vulnerable patients, they may cause major consequences including arrhythmias, myocardial ischemia, pulmonary oedema, or cerebrovascular catastrophes [1]. To lessen the hemodynamic reaction brought on by laryngoscopy and intubation, a number of pharmaceuticals have been used. Opioids, beta-blockers, calcium channel blockers,

vasodilators, benzodiazepines, and alpha-2 adrenergic agonists are among them. Because of its sedative, anxiolytic, analgesic, and sympatholytic qualities without significantly impairing breathing, dexmedetomidine has drawn a lot of interest among these medications [2].

A highly selective alpha-2 adrenergic receptor agonist, dexmedetomidine works centrally by decreasing catecholamine release and sympathetic outflow. It has been demonstrated to improve perioperative sedation, reduce the need for anaesthesia, and offer stable hemodynamic conditions when administered prior to anaesthesia induction. Due to its anxiolytic, sedative, and amnestic qualities, midazolam, a short-acting benzodiazepine, is frequently used as a premedicant. It is somewhat ineffective at reducing the sympathetic reaction to laryngoscopy, though. In anaesthetic practice, hemodynamic stability during induction continues to be a key goal. Perioperative safety can be enhanced and cardiovascular fluctuations reduced by choosing the right premedication. Research comparing the effectiveness of midazolam and dexmedetomidine in reducing stress reactions during airway manipulation can be helpful [3].

In order to compare dexmedetomidine and midazolam as premedication agents for attenuating hemodynamic response to laryngoscopy and intubation in adult patients undergoing elective surgery under general anaesthesia, the current study was carried out at Nalanda Medical College and Hospital between March and November of 2025.

Materials and Methods

Study Design: Prospective randomized comparative study.

Study Setting: Department of Anesthesiology, Nalanda Medical College and Hospital.

Study Duration: March 2025 to November 2025.

Sample Size: 90 patients.

Study Groups

- **Group D (n=45):** Dexmedetomidine 1 μg/kg IV infusion.
- **Group M (n=45):** Midazolam 0.05 mg/kg IV.

Inclusion Criteria

- Age 18–60 years.
- ASA grade I and II.
- Elective surgery under general anesthesia.

Exclusion Criteria

- Cardiovascular disease.
- Difficult airway.
- Hepatic or renal dysfunction.
- Allergy to study drugs.
- Pregnancy.

Statistical Analysis: SPSS version 25 was used to analyse the data. The mean ± SD was computed. The Chi-square test and the student's t-test were used. Statistical significance was defined as $p < 0.05$.

Results

Table 1: Demographic Characteristics

Parameter	Group D	Group M	p-value
Mean Age (years)	39.4 ± 10.2	40.1 ± 9.8	0.72
Male/Female	27/18	29/16	0.65
Mean Weight (kg)	63.8 ± 8.4	64.5 ± 7.9	0.74
ASA I/II	30/15	28/17	0.62

Table 2: Comparison of Heart Rate (bpm)

Time Interval	Group D	Group M	p-value
Baseline	84.2 ± 6.8	83.9 ± 7.2	0.81
During Intubation	82.4 ± 7.1	96.8 ± 8.5	<0.001*
1 min After Intubation	80.5 ± 6.9	92.3 ± 7.4	<0.001*
5 min After Intubation	77.6 ± 5.8	87.5 ± 6.2	<0.001*

Table 3: Comparison of Systolic Blood Pressure (mmHg)

Time Interval	Group D	Group M	p-value
Baseline	126.8 ± 10.1	127.2 ± 9.8	0.84
During Intubation	124.6 ± 9.2	138.2 ± 10.1	<0.001*
1 min After Intubation	122.3 ± 8.8	135.1 ± 9.5	<0.001*
5 min After Intubation	118.7 ± 7.5	129.4 ± 8.6	<0.001*

Table 4: Comparison of Mean Arterial Pressure (MAP)

Time Interval	Group D	Group M	p-value
Baseline	91.6 ± 5.4	92.1 ± 5.7	0.73
During Intubation	89.4 ± 5.8	102.6 ± 6.5	<0.001*
1 min After Intubation	87.3 ± 5.2	98.4 ± 5.9	<0.001*
5 min After Intubation	84.2 ± 4.9	93.5 ± 5.1	<0.001*

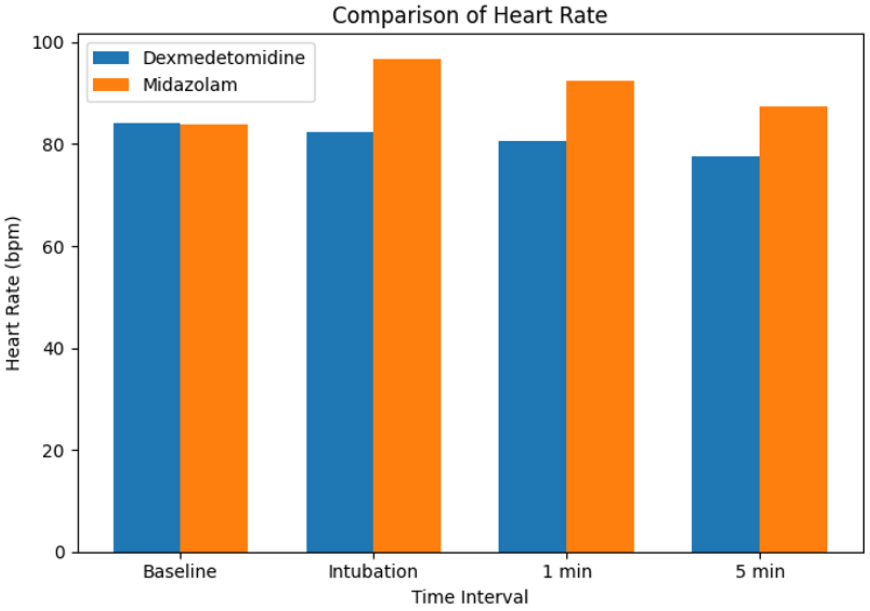

Figure 1: Comparison of heart rate

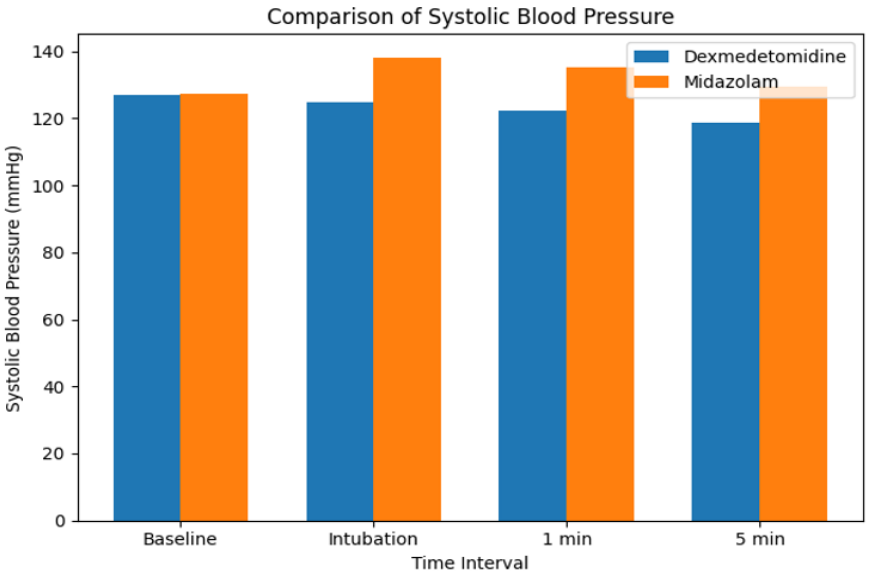

Figure 2: Comparison of systolic blood pressure

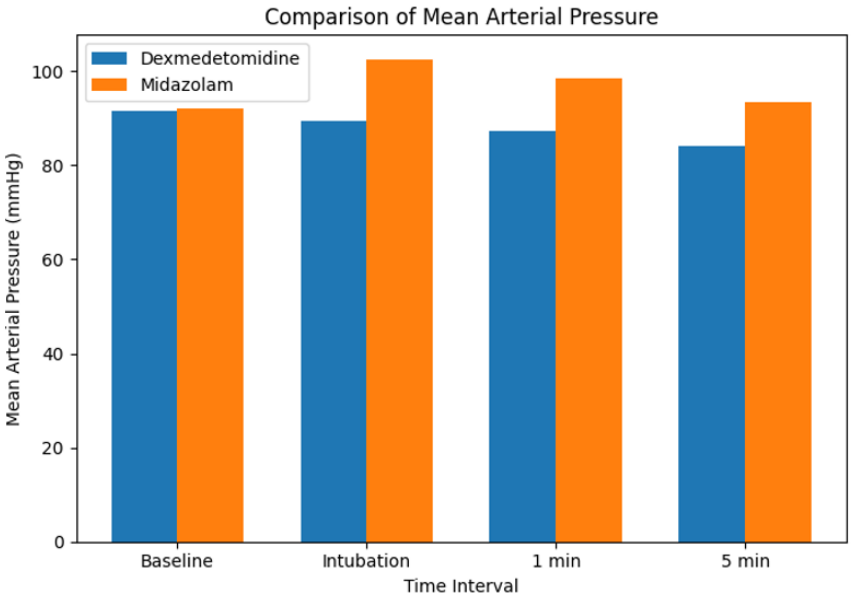

Figure 3: Comparison of mean arterial pressure

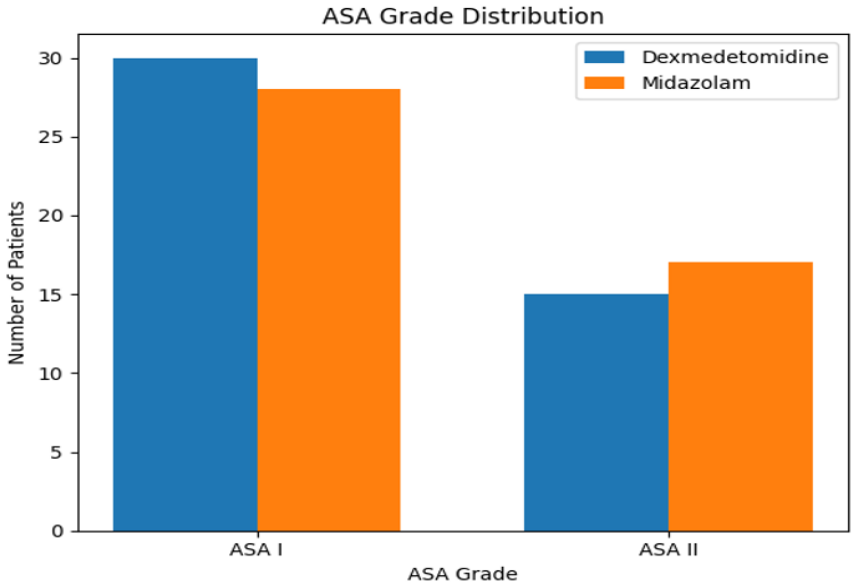

Figure 4: ASA grade distribution

Discussion

In order to reduce hemodynamic reactions to laryngoscopy and endotracheal intubation, the current study examined the premedication drugs dexmedetomidine and midazolam. The results showed that dexmedetomidine considerably outperformed midazolam in controlling blood pressure and heart rate responses [4]. Due to the release of catecholamines, laryngoscopy and intubation are known to cause severe sympathetic activation, which can lead to tachycardia and hypertension. Particularly in individuals with cerebral pathology, hypertension, or cardiovascular illness, these hemodynamic swings may be dangerous. Thus, reducing the stress response continues to be a crucial objective in the practice of anaesthesia [5].

Age, sex, body weight, and ASA grade were among the demographic factors in the current study that were statistically comparable across the two groups, suggesting that the study population was homogeneous. This made it possible to compare the two medications' pharmacological effects with confidence. During and after intubation, dexmedetomidine showed greater attenuation of the heart rate response [6]. During the peri-intubation interval, patients in Group D maintained heart rates close to baseline, while the midazolam group

experienced severe tachycardia. This result can be explained by dexmedetomidine's central sympatholytic effect, which suppresses sympathetic activity and lowers norepinephrine release [7].

The dexmedetomidine group also showed significantly reduced mean arterial pressure and systolic blood pressure during the intubation and recovery phases. Despite being a potent sedative and anxiolytic, midazolam has weak sympatholytic effects, which limits its ability to prevent stress-related cardiovascular reactions. The current study's findings are in line with earlier research that shown that dexmedetomidine enhanced hemodynamic stability. Numerous researchers have shown that dexmedetomidine reduces the need for anaesthetics and opioids while also successfully blunting increases in HR and BP linked to airway manipulation. Its sedative qualities enable cooperative sedation without severe respiratory depression and mimic natural slumber [8].

Smoother induction and better perioperative stability were two other benefits of dexmedetomidine. Higher doses, however, may result in bradycardia or hypotension, therefore close observation is required. There were no serious side effects that needed to be addressed in the current trial. Due to its quick onset, anxiolysis, and forgetfulness, midazolam is still often employed as a premedication. However, it seems to be less successful in reducing sympathetic reactions during laryngoscopy. During airway instrumentation, patients on midazolam showed more variations in blood pressure and heart rate [9].

There are several restrictions on the study. Only ASA I and II patients were included in the very limited sample size. Additionally, the study did not assess serum catecholamine levels, analgesic needs, or postoperative sedation scores. It is advised to conduct additional multicentric studies with bigger populations and more comprehensive clinical data. Notwithstanding these drawbacks, the current study offers important proof that dexmedetomidine is a useful premedication for reducing hemodynamic stress reactions during laryngoscopy and intubation [10].

Conclusion

The current study suggests that dexmedetomidine considerably outperforms midazolam in reducing hemodynamic reactions related to endotracheal intubation and laryngoscopy. During peri-intubation intervals, patients on dexmedetomidine showed superior control over mean arterial pressure, systolic blood pressure, and heart rate than patients on midazolam. Without having any major side effects, dexmedetomidine maintained more cardiovascular stability and produced superior sympatholytic effects. Smoother induction and better perioperative circumstances were also facilitated by its sedative and anxiolytic qualities. On the other hand, midazolam showed relatively little effectiveness in reducing sympathetic reactions brought on by stress.

In patients having general anaesthesia, where attenuation of hemodynamic response is clinically significant, the results of this study support the use of dexmedetomidine as a preferable premedication drug. Its safety profile can be further improved with diligent monitoring and appropriate dosage. To establish wider therapeutic applications of dexmedetomidine in anaesthetic practice, more research with bigger sample numbers, high-risk cardiovascular patients, and postoperative outcome evaluation is advised.

References

1. Shah RM, Ahad S, Gani SU. Comparative Study of IV Dexmedetomidine and Lignocaine for Attenuation of Cardiovascular Stress Response to Laryngoscopy and Endotracheal Intubation. Int J Med Pharm Res. 2025;6(6):1104–10.
2. Kumar H, Kumar M. Comparison of Intranasal Versus Intravenous Dexmedetomidine to Attenuate Haemodynamic Response of Laryngoscopy and Endotracheal Intubation in Elective Lumbar Spine Surgery: A Randomized Controlled Study. Futur Heal. 2023;1(1):1–7.
3. Khafagy AG, Rezkalla PP. Dexmedetomidine vs. Fentanyl-Midazolam Combination to Mitigate the Stress Response in Microlaryngoscopy : A Randomized Double-blind Clinical Trial. Anesth Pain Med. 2023;13(3):1–8.
4. Raiger LK, Gokulakrishnan L, Chandramohan M, Aseri A. Attenuation of pressor response to laryngoscopy and intubation: Dexmedetomidine Vs. fentanyl premedication. Indian J Clin Anaesth. 2018;5(4):486–90.
5. Singh G, Kaur H, Aggarwal S, Sharda G, Singh A. Intravenous dexmedetomidine vs. lignocaine in attenuating the hemodynamic responses during laryngoscopy and endotracheal intubation : a randomized double-blind study. Anaesthesia, Pain Intensive Care. 2017;21(2):181–6.
6. Patel TD, Joshi SA, Vansia JK, Pandya MJ. A comparison of intravenous dexmedetomidine with intravenous fentanyl for attenuation of stress response to laryngoscopy and endotracheal intubation during general anaesthesia. Eur J Cardiovasc Med (EJCM). 2025;15(10):568–74.
7. Rathod S, Haque M, Patra S, Biswas C. Comparative study between dexmedetomidine and midazolam as pre-medication for the prevention of etomidate-induced myoclonus and attenuation of stress response at endotracheal intubation in laparoscopic

cholecystectomies. Asian J Med Sci. 2024;15(7):1–6.
8. Das M, Das S, Mishra D, Maharana PK. Attenuation of Haemodynamic Responses to Laryngoscopy and Intubation with Three Different Doses of Dexmedetomidine - A Randomised Prospective Control Trial. J Evid Based Med Heal. 2020;7(52):3166–70.
9. Dey S, Kumar M. Comparison of pretreatment with dexmedetomidine with midazolam for prevention of etomidate - induced myoclonus and attenuation of stress response at intubation: A randomized controlled study. J Anaesthesiol Clin Pharmacol. 2018; 34:94–8.
10. Chauhan J, Zankat P. Comparison of Dexmedetomidine and Esmolol for Attenuation of Hemidynamic Response to Endotracheal Intubation. Eur J Cardiovasc Med (EJCM). 2025;15(06):261–9.