Al-Azhar International Medical Journal

Volume 4 | Issue 6 Article 34

2023
Section: Anesthesiology

Prevention of pre-operative anxiety in pediatric tonsillectomy using intranasal dexmedetomidine versus intranasal midazolam

Ahmed Mahmoud Mohammed AbdElnaby
Anesthesia and Intensive Care departments, Faculty of Medicine, Al-Azhar University, Egypt, aabdelnaby595@gmail.com

Hamed Ahmed Sanad Al Ezza
Anesthesia and Intensive Care departments, Faculty of Medicine, Al-Azhar University, Egypt

Ali Abdallah Al Kumity
Anesthesia and Intensive Care departments, Faculty of Medicine, Al-Azhar University, Egypt

How to Cite This Article

AbdElnaby, Ahmed Mahmoud Mohammed; Ezza, Hamed Ahmed Sanad Al; and Kumity, Ali Abdallah Al (2023) "Prevention of pre-operative anxiety in pediatric tonsillectomy using intranasal dexmedetomidine versus intranasal midazolam," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 6, Article 34.
DOI: https://doi.org/10.58675/2682-339X.1864

ORIGINAL ARTICLE

Prevention of Pre-operative Anxiety in Pediatric Tonsillectomy Using Intranasal Dexmedetomidine Versus Intranasal Midazolam

Ahmed Mahmoud Mohammed AbdElnaby*, Hamed Ahmed Sanad Al Ezza, Ali Abdallah Al Kumity

Anesthesia and Intensive Care Departments, Faculty of Medicine, Al-Azhar University, Egypt

Abstract

Background: **The preoperative stage is an important frustrating process for almost all patients who need operations, especially children. As a consequence, an anesthesiologist's first concern involves reducing patient stress prior to surgery.**

Aim and objectives: **The aim of this study was to make a comparison between the impact of intranasal dexmedetomidine versus intranasal midazolam in prevention of preoperative anxiety in children group undergoing tonsillectomy.**

Patients and methods: **The current study is a randomized clinical trial carried out at department of Anesthesia and Intensive Care and pain management, Al-Azhar Faculty of Medicine. 75 children aged 5−10 years, of either sex, BMI between fifth and 85th percentile for age, with American Society of Anesthesiologists (ASA) physical status (1) and undergoing elective tonsillectomy under general anesthesia Patients were categorized into three equal groups (25 each): group C: Control group ($n = 25$) received intranasal 2 ml normal saline 45 min before surgery. Group D: Dexmedetomidine Group ($n = 25$) received intranasal dexmedetomidine at a dose of 1 μg/kg in 2 ml volume 45 min before surgery. Group M: Midazolam group M ($n = 25$) received intranasal midazolam at a dose of 0.2 mg/kg in 2 ml volume 45 min before surgery.**

Results: **There was no statistically significant difference between the studied groups as regard heart rate and Separation Score.**

Conclusion: **When compared with intranasal midazolam 0.2 mg/kg, premedication with intranasal dexmedetomidine 1 μg/kg was linked with lower drowsiness and discomfort rates and simpler child parent separation. Additionally, all medications were equally successful in lowering the child's anxiety using Separation Score: Intranasal dexmedetomidine seems to offer some advantages compared with midazolam. Thus, it can be used effectively and safely as a preanesthetic medication in children undergoing any surgical procedures under general anesthesia.**

Keywords: Dexmedetomidine, Intranasal, Midazolam, Pre-anesthetic medication

1. Introduction

The preoperative stage is a traumatic experience for most people undergoing operation, especially children. As a consequence, an anesthesiologist's highest concern has become reducing patients stress before operation. When conducting tonsillectomy anesthesia, the anesthesiologist has a challenging job. The most of pediatric patients experience anxiety during the preoperative period, which can be due to family breakdown, needles phobia, or the surgery theater.[1]

Preoperative anxiety is connected to hypotension, metabolism adverse reactions, increased postoperative suffering, and developing restlessness. As a consequence, pharmacological treatments are used to reduce preoperative anxiety and accelerate anesthetic initiation without postponing recovery. The premedicant must be given in a non-aversive, acceptable way with no significant side effects. Due to the obvious nasal mucosa's high vascularization, intranasal administration had been investigated to be a very efficient, simple, noninvasive technique with higher efficacy and rapid onset of action.[2]

Accepted 18 October 2022.
Available online 30 December 2023

* Corresponding author. Anesthesia and Intensive Care Departments, Faculty of Medicine, Al-Azhar University, 5832456, Egypt. Fax: 0453218886.
E-mail address: aabdelnaby595@gmail.com (A.M.M. AbdElnaby).

https://doi.org/10.58675/2682-339X.1864

Because of its sedative, anxiolytic, amnesic, quick onset, and restricted emergence of treatment, midazolam, a water-soluble benzodiazepine, is often used as a preanesthetic medication in children. Despite its advantages, it is not ideal as a premedicant since it causes reactions, breathing difficulties, and agitation.[3]

A two-adrenoceptor agonist, dexmedetomidine, has greater sedating properties while having a negative effect on pulmonary function. It also has a sympathomimetic impact, lowering the hemodynamic stress reaction. It can be utilized as a premedication anesthetic even with these features.[4]

The present study assessed intranasal dexmedetomidine verses intranasal midazolam as a premedication to evaluate sedation degree, ease of child parent separation, hemodynamics, and emerging agitation in pediatric patients who had tonsillectomy.

The objective of the current survey was to make a comparison between the effects of intranasal dexmedetomidine versus intranasal midazolam in prevention of preoperative anxiety in children undergoing tonsillectomy.

2. Patients and methods

The current study is a randomized clinical trial performed at department of Anesthesia and Intensive Care and pain management, Al-Azhar Faculty of Medicine. The study included 75 children aged from 5 to 10 years, of either sex, BMI between fifth and 85th percentile for age, with American Society of Anesthesiologists (ASA) physical status (1) and undergoing elective tonsillectomy surgeries under general anesthesia.

Exclusion criteria: Children with a documented allergic or hypersensitive response to any of the medications used in the experiment, those with nasal diseases, pathology, large adenoids, or who were taking any other sedatives.

2.1. Methods

The study was conducted from March 2021 to September 2021. Detailed history taking from parents: age, sex, presence of parental consanguinity, family history, comorbidities, associated complications drug history.

Thorough clinical examination: Weight, height, arterial blood pressure, and other vital signs are all evaluated as part of the physical appearance. Temperature, heart rate, respiration rate, and blood pressure were all removed.

The operating room was kept at a temperature of 21 °C–22 °C (measured by a wall thermometer). Irrigation and intravenous fluids were delivered at room temperature with no inline warming.

During the procedure, all patients were draped in one layer of surgical drapes over the chest, thighs, and calves, followed by one cotton blanket over the entire body. There was no additional heating equipment used. Hypothermia was defined as a core temperature of less than 36 °C.

Patients were categorized into three equal groups (25 each):

Group C: Control group ($n = 25$) received intranasal 2 ml normal saline 45 min before surgery. Group D: Dexmedetomidine group ($n = 25$) received intranasal dexmedetomidine at a dose of 1 μg/kg in 2 ml volume 45 min before surgery. Group M: Midazolam group M ($n = 25$) received intranasal midazolam at a dose of 0.2 mg/kg in 2 ml volume 45 min before surgery.

With a secret code and a private file for each patient, all of the patient's information was kept private. All of the information provided was only for the purpose of current medical research. Preoperative preparation and premedication were performed, as well as a thorough history collection and clinical examination of the patients to rule out cardiovascular, pulmonary, neurological, and metabolic problems. Complete blood count (CBC), Hemostatic profile study (Bleeding time, Clotting time, Prothrombin time (PT), Partial thromboplastic time (PTT), Prothrombin activity) are all routine laboratory tests.

2.2. Measurements

The following parameters were measured preoperative:

Level of sedation: The Ramsay Sedation Scale is one of the most widely applied sedation tests. It categorizes a patient's sedation into six levels, varying from extreme agitation to deeper unconsciousness. Anxiety every 10 min was assessed using a five and six-point scale: 1 = cooperative and peaceful, 2 = nervous but reassured, 3 = worried but not reassured, and 4 = resistive or weeping. At the time of transporting the patient to the operating room, the Child Parent Separation score was recorded. 3 = patient sobbing and terrified, not quieted with reassurance; 2 = patient mildly crying and/or fearful, quieted with reassurance; 1 = patient unafraid, cooperative, or sleepy. Hemodynamics: The mean heart rate and mean arterial blood pressure were measured, then every 5 min for the first 20 min following intranasal drug delivery, and then after 20 min (5 min before induction of anesthesia). Respiratory rate and arterial oxygen saturation were

assessed, then every 5 min for the first 20 min after intranasal administration of drugs, and then after 20 min (5 min before induction of anesthesia). Adverse effects such as respiratory depression, nausea, vomiting were recorded every 15 min till the beginning of the surgery.

Operational design: Before explaining the study's purpose, the researcher presented himself to the parents of all research participants and requested them to join. All chosen individuals' parents were given detailed information about the study's goal and predicted benefits. All through project, all ethical considerations were taken into account.

Administrative design: Approvals: An informed written consent was signed by the parents of each participant, and the data were kept confidential. The dean of the faculty of medicine at Al-Azhar Faculty of Medicine University, as well as the head of the anesthesia and intensive care section and pain management at the same university provided an official written administrative approval letter. To secure their participation, the title and objectives of the research were presented to them.

Statistical analysis: Statistical Program for Social Science version 20 was used to analyze the data (SPSS Inc., Chicago, IL, USA). Testing the normality of distribution was used. The mean and standard deviation were used to characterize quantitative variables. Qualitative features were described using numbers and percentages. To contrast parametric quantitative variables between two categories, the χ^2 test has been used. When the frequency of qualitative variables was less than five, Fisher's exact test was used to compare them. The ANOVA test was used to perform analysis of variance. It is found to be significant if the *P* value is less than 0.05.

3. Results

In terms of demographic information, the preceding Table 1 demonstrates that there was no statistically significant difference between the three classes.

Table 2 shows that there was no significant difference among three categories on the basis of mean arterial blood pressure (mmHg) at baseline, after 5 min, and after 10 min, but there was statistically significant difference between three categories on the basis of average arterial blood pressure (mmHg) at baseline, after 15 min, 20 min, and 40 min.

Table 3 reveals that there was a highly statistically difference in heart rate between the three categories.

Table 4 revealed that there was no statistically significant difference found between three categories as regard SPO_2.

Table 5 shows that there was no statistically significant difference found between three groups regarding Sedation After 10 min, and there was highly statistically significant difference found among the three categories After 20 min, After 30 min, and After 40 min.

Table 6 shows that there was highly statistically significant difference observed among three categories as regard Separation Score.

Table 1. A comparison among three groups regarding demographic data.

History data	Group C	Group D	Group M	Test value	*P*-value
	No. = 25	No. = 25	No. = 25		
Age (Year)					
Mean ± SD	7.44 ± 1.53	7.20 ± 1.55	8.08 ± 1.80	1.940•	0.151
Range	5–10	5–10	5–10		
Sex					
Female	17 (68.0%)	13 (52.0%)	15 (60.0%)	1.333	0.513
Male	8 (32.0%)	12 (48.0%)	10 (40.0%)		
Body Weight (kg)					
Mean ± SD	22.35 ± 3.68	23.88 ± 3.74	22.75 ± 3.80	1.129•	0.329
Range	17.8–29.1	17.6–29.5	17.6–29.4		
Height (cm)					
Mean ± SD	119.76 ± 10.34	123.68 ± 8.80	120.40 ± 9.88	1.176•	0.314
Range	106–140	108–140	105–140		
BMI (kg/m^2)					
Mean ± SD	17.44 ± 0.97	18.02 ± 1.39	17.58 ± 1.42	1.392•	0.255
Range	15.8–19	16–20	16–22.3		

P value greater than 0.05: *P* value less than 0.05: Significant.

Table 2. Comparison between three groups regarding Mean Arterial Blood Pressure (mmHg).

Mean Arterial Blood Pressure (mmHg)	Group C	Group D	Group M	Test value•	*P*-value
	No. = 25	No. = 25	No. = 25		
Baseline					
Mean ± SD	86.97 ± 5.08	85.05 ± 4.57	86.17 ± 3.21	1.223	0.300
Range	80–90	80–90	80–90		
After 5 min					
Mean ± SD	86.12 ± 4.21	84.25 ± 4.51	85.28 ± 1.24	2.541	0.418
Range	80–90	82–90	81–90		
After 10 min					
Mean ± SD	85.88 ± 3.18	82.84 ± 3.54	83.71 ± 4.77	4.053	0.061
Range	79–90	75.67–89	75–90		
After 15 min					
Mean ± SD	86.61 ± 3.61	77.45 ± 8.46	83.71 ± 4.94	15.081	0.000*
Range	80–90	60–87.33	74.67 90		
After 20 min					
Mean ± SD	85.44 ± 4.29	78.00 ± 7.56	83.63 ± 4.71	11.545	0.000*
Range	74.67–90	60–87.33	75–90		
After 40 min					
Mean ± SD	85.121 ± 3.22	77.24 ± 6.87	82.41 ± 3.14	15.427	0.000*
Range	73–90	65–88	77–90		

P value greater than 0.05: Nonsignificant; *P* value less than 0.05: Significant.

Table 3. Comparison between three groups regarding Heart rate (beat/min).

Heart rate	Group C	Group D	Group M	Test value•	*P*-value
	No. = 25	No. = 25	No. = 25		
Baseline					
Mean ± SD	87.08 ± 10.61	95.32 ± 9.93	96.96 ± 13.95	5.712	0.061
Range	72–100	85–115	75–120		
After 5 min					
Mean ± SD	85.56 ± 10.25	90.28 ± 11.22	109.72 ± 22.05	17.155	0.000*
Range	71–107	75–110	75–145		
After 10 min					
Mean ± SD	84.20 ± 16.49	88.84 ± 10.83	108.00 ± 24.50	12.065	0.000*
Range	70–143	74–105	75–143		
After 15 min					
Mean ± SD	83.16 ± 8.82	87.56 ± 9.82	107.32 ± 20.95	20.250	0.000*
Range	70–99	73–103	75–140		
After 20 min					
Mean ± SD	83.12 ± 7.43	84.76 ± 10.02	109.48 ± 22.49	24.726	0.000*
Range	73–94	69–102	77–143		
After 40 min					
Mean ± SD	83.16 ± 8.70	81.76 ± 10.88	110.36 ± 19.69	33.506	0.000*
Range	69–98	67–101	80–145		

P value greater than 0.05: Nonsignificant; *P* value less than 0.05: Significant.

Table 4. Comparison between three groups regarding SPO_2.

SPO_2	Group C	Group D	Group M	Test value•	*P*-value
	No. = 25	No. = 25	No. = 25		
Baseline					
Mean ± SD	96.80 ± 2.77	95.68 ± 1.97	96.20 ± 2.78	1.220	0.301
Range	90–99	92–99	90–99		
After 5 min					
Mean ± SD	96.08 ± 2.14	95.04 ± 1.74	96.04 ± 1.93	2.300	0.108
Range	92–99	92–98	93–99		
After 10 min					
Mean ± SD	96.28 ± 2.11	95.12 ± 2.35	96.20 ± 2.27	2.077	0.133
Range	93–99	92–98	93–99		

(*continued on next page*)

Table 4. (continued)

SPO_2	Group C	Group D	Group M	Test value•	*P*-value
	No. = 25	No. = 25	No. = 25		
After 15 min					
Mean ± SD	96.12 ± 1.51	95.36 ± 2.04	96.28 ± 1.49	2.096	0.130
Range	93–99	92–99	94–99		
After 20 min					
Mean ± SD	96.20 ± 1.91	95.72 ± 2.34	96.08 ± 2.18	0.337	0.715
Range	93–99	93–99	93–99		
After 40 min					
Mean ± SD	96.12 ± 1.79	95.92 ± 2.22	96.00 ± 1.41	0.075	0.928
Range	93–99	93–99	93–98		

P value greater than 0.05: Nonsignificant; *P* value less than 0.05: Significant.

Table 5. Comparison between three groups regarding Sedation.

Sedation	Group C	Group D	Group M	Test value•	*P*-value
	No. = 25	No. = 25	No. = 25		
After 10 min					
Median (IQR)	2 (2–2)	2 (2–3)	2 (2–2)	3.000	0.223
Range	2–2	1–4	2–3		
After 20 min					
Median (IQR)	2 (2–3)	4 (3–5)	2 (2–3)	32.338	0.000*
Range	2–3	2–6	2–3		
After 30 min					
Median (IQR)	2 (2–2)	5 (4–6)	3 (2–4)	32.850	0.000*
Range	2–3	2–6	2–5		
After 40 min					
Median (IQR)	2 (2–2)	5 (4–6)	3 (2–5)	37.014	0.000*
Range	2–3	2–6	2–5		

P value greater than 0.05: Nonsignificant; *P* value less than 0.05: Significant.

Table 6. Comparison between three groups regarding Separation Score.

	Group C	Group D	Group M	Test value•	*P*-value
	No. = 25	No. = 25	No. = 25		
Separation Score					
Mean ± SD	1.00 ± 0.00	2.00 ± 0.86	2.16 ± 0.80	21.324	0.000*
Range	1–1	1–3	1–3		
Range	1–3	0.5–2	1–3		

P value greater than 0.05: Nonsignificant; *P* value less than 0.05: Significant(S).

4. Discussion

Anxiety before surgery may cause hemodynamic instability, metabolic adverse impact, greater preoperative discomfort, and agitation. As a result, pharmaceutical interventions are recommended for relieving any postoperative anxiety and facilitating anesthetic initiation without delaying recovering Saad and colleagues.[5]

The premedicant should be administered in a nontraumatic, accurate way with no substantial negative impacts. Because of the great vascularization of the nasal mucosa, intranasal administration was already proved to become a very efficient, simple, noninvasive method with high bioavailability and quick beginning of activity Saad and colleagues.[5]

Midazolam, a water-soluble benzodiazepine, is commonly included as a preanesthetic medicine in pediatrics treatment due to its sedative, anxiolytic, anterograde amnesia, rapid onset, and limited longer duration. Despite its benefits, it is far from optimal as a pre-mendicant because it induces uneasiness, paradoxical violent behaviors, cognitive impairment, and cardiogenic shock Delewi and colleagues.[6]

Dexmedetomidine, a α2-adrenoceptor agonist, gives better sedative and analgesic qualities while having a negative impact on respiratory function. It also has a sympatholytic effect, which reduces the hemodynamic stress reaction. Because of these characteristics, it could be used as a premedication anesthetic Giovannitti and colleagues.[7]

According to investigations, a single injection of 84 g intranasal dexmedetomidine has a bioavailability of 65% in healthy persons and a peak plasma level of 38 min Nasal administration requires more time to become effective than intravenous administrations Iirola and colleagues.[8]

Yuen and colleagues[9] intranasally administrated dexmedetomidine of 1 μg/kg in children, proved that the length of time required for sedation to start is 25 (25–30) minutes, and it lasts for 85 (35–100) minutes.

Depending on these characteristics, it is possible that administering dexmedetomidine intranasal 25–40 min preceding operation may give sedative and antianxiety benefits in infants. Furthermore, it has the potential to minimize postoperatively agitation after minor surgery (e.g., adenoidectomy and tonsillectomy) without prolonging recovery.[10] The purpose of this study is to compare the effects of intranasal dexmedetomidine against intranasal midazolam in preventing pre-operative anxiety in children under the age of 18 who are having tonsillectomy.

This study reported that there was no statistically significant difference between the studied groups as regard demographic data.

In the current study the intranasal route for drug administration was chosen as a relatively quick, simple method showing benefits over other routes which require more patient cooperation. Midazolam has earlier been found to be an effective prevention activity agent for infants when administered intranasal. The sense of burning and nasal discomfort, on the other hand, could be regarded drawbacks of this approach Zedie and colleagues[11]

In agreement with our results, Saad and colleagues[5] did a study planned a study investigating the preanesthetic drug in infants, contrast intranasal dexmedetomidine to intranasal midazolam. In this comparison potential, double blind study, randomized medical trial, 48 infants with age ranged from 3 to 7 years, from either sex, weigh approximately 13–22 kg, with American Society of Anesthesiologists (ASA) physiological condition 1 and currently conducting optional adenotonsillectomy surgical procedure were registered. The results showed that there were no distinguished demographic differences between the two groups in terms of age, sex, body weight, and ASA physical status.

This investigation found a statistically significant variation in sedation between the studied traits at 10 min, 20 min, and 30 min In accordance with our findings, Saad and colleagues[5] showed that Sedation levels were measured in both categories preceding intranasal drug administration and every 10 min afterward for 45 min At 10 and 20 min following administration of the medication, the sedation rating in the midazolam group was significantly lesser ($P < 0.001$). Furthermore, at 30 and 45 min, group D had a statistically significant lower sedation rating than group M ($P = 0.002$ and <0.001, correspondingly).

In agreement with our results, Ezz[12] showed that at 10 min following medication delivery, the UMSS was substantially higher in group I than in group II, with a P value of 0.012. Then, at initiation, 5 and 10 min following awake, there has been no notable difference. At 15 and 30 min after waking up, there was a substantial clinical and statistical rise in UMSS in group II compared with group I.

Abdelmoneim and colleagues[13] agreed with our study and stated that At 30 and 45 min before surgery, intranasal dexmedetomidine caused higher sedation than midazolam.

On the other hand, Singla and colleagues[14] showed that at 30 min following intranasal dexmedetomidine, the MOAA/S became considerably lower. While a study by Mehran and colleagues[15] also showed that when compared with other methods, intranasal midazolam 0.2 mg/kg provides a faster onset of sedation.

Dexmedetomidine, a α2-receptor agonist, had actually been found to be beneficial for premedication in infants. These medicines primarily block noradrenaline production by acting on central 2 transmitters situated at the presynaptic cell. Dexmedetomidine acts in the locus coeruleus, causing EEG activity comparable to that of proper sleeping. This produces anxiolytic, sedative, and analgesic impacts without causing severe sleepiness. In our research, we utilized the intranasal method since it is noninvasive, unlike intravenous and intramuscular approaches, and has a faster beginning of effect than the oral route Saad and colleagues.[5]

Abdel-Ghaffar and colleagues[16] contrasted intranasal dexmedetomidine with intranasal midazolam and ketamine and found that dexmedetomidine accomplished quicker sedation and improved child–parent divorce rating scale.

In a study by Jun and colleagues[17] intranasal dexmedetomidine was indicated to generate more sedation than oral midazolam.

Singla and colleagues[14] showed that when opposed to intranasal midazolam, patients require intranasal dexmedetomidine premedication exhibited reduced feelings of stress, improved masks compliance, and family discord.

Preoperative stress, pain, and particular surgical techniques (ophthalmological and otorhinolaryn gological), character features, preschool age, too

increasing the surface, and kind of inhalational anesthetics are all linked to emergence agitation (EA) (high incidence with sevoflurane). EA could be caused by a variety of factors Stein18.

This study showed that there was no statistically significant difference found between the studied groups regarding Mean Arterial Blood Pressure (mmHg) Baseline, after 5 min and After 10 min, and there was highly statistically significant difference found after 15 min, After 20 min and After 40 min.

In agreement with our results, Saad and colleagues.[5] showed that each categories' initial preoperative SBP and DBP were approximately equivalent. Likewise, no statistically significant variation in vital statistics was seen between the two categories following 10 and 20 min after intranasal medication administration. However, after 30 min of premedication, group D's blood pressure was considerably lower than cohort M's.

Singla and colleagues[14] showed that although statistically meaningful hypotension or bradycardia was not found in kids in category 1, dexmedetomidine decreases overall pulse rate and systolic blood pressure in the early stages of the disease.

Messeha and El-Morsy[19] showed that On comparing the dexmedetomidine and midazolam groups, hemodynamic data revealed that MBP and HR were considerably lower 10, 20, and 30 min following medication administration in the dexmedetomidine cohort.

The results of this investigation demonstrated that there was a strongly measurable difference in heart rate between the analyzed parameters.

Dexmedetomidine reduces sympathetic output and circulation catecholamine concentrations while increasing cardiac vagal tone, hence the drop in HR and BP was anticipated Joshi and colleagues.[20]

Similarly, Abdel-Ghaffar and colleagues[16] had found that Compared with kids who got intranasal midazolam of 0.5 mg/kg, average BP and HR fell considerably after 30 min after intranasal dexmedetomidine of 1 g/kg intranasal dexmedetomidine of 1 g/kg intranasal dexmedetomidine of 1 g/kg intranasal dexmedetomidine of 1 g/kg intranasal dexmed.

Also, a study by Singla and colleagues[14] has found that in the pre-operative phase, 1 μg/kg dexmedetomidine considerably lowers either HR or BP. All through the postoperative surveillance period in our research, the SpO_2 was nicely controlled. However, this does not mean that midazolam will not produce respiratory depression. As a result, additional research with a higher rating than ours is required.

In agreement with our results, Saad and colleagues[5] showed that each groups' baseline preoperative HR, SBP, DBP, as well as SpO_2 proved significantly equal. Likewise, no statistically meaningful variation in vital statistics was seen between the two groups after 10 and 20 min following intranasal medication administration. However, after 30 min of premedication, cohort D's HR and BP were considerably less than cohort M's.

The results of this study demonstrate that there had been no significance difference in SPO_2 levels across the categories investigated.

In agreement with our results, Saad and colleagues[5] showed that there seemed to be no notable change in SpO_2 between the two groups ($P > 0.05$), and neither medication caused oxygen desaturation during the surgery.

Singla and colleagues[14] showed that in terms of oxygen saturation, there has been no significant difference among the categories. While the study by Messeha and El-Morsy[19] showed that All through the trial period, there was no notable change in peripheral arterial SpO_2 between the categories.

The time of drug delivery is a key study constraint. Dexmedetomidine exceeds the threshold sedative impact after 30–45 min of intranasal dosing, whereas midazolam achieves its maximum sedative effect after 10–20 min Taking midazolam 45 min before induction of anesthesia is a lengthy time since its optimum sedative impact would be worn off.

Whenever intranasal drug delivery system precedes anesthesia generation by less than 45 min, this amount of time could be very short for dexmedetomidine. However, the medicine could have an impact on some infants. We might have seen more sedative impacts in the dexmedetomidine group if we could have stayed longer, but in this case, the midazolam advantage might have vanished.

Additional research drawback is the lack of use of nasal atomizer sprays, which deposited drug formulations more anteriorly and resulting in delayed medication clearance and greater absorbing since the medication stays in the nasal cavity for longer. We attempted not to surpass the exact max capacity of premedication in our investigation, which was 1 ml per naris. As more fluid flows into the nasopharynx and is ingested, the volume generally increases.

In our study, there were no side effects observed throughout the trial, leading to the conclusion that intranasal dexmedetomidine could be administered easily and successfully as a preanesthetic drug in infants attending general anesthesia for any medical operation.

4.1. Conclusion

As compared with intranasal midazolam 0.2 mg/kg, premedication with intranasal dexmedetomidine

1 μg/kg was linked with lower drowsiness and anxiety degrees, simpler child-parent divorce, and high masks adherence. Furthermore, both medicines were equally efficient at lowering the kid's agitation. As a result, infants having general anesthesia for any surgical operation would receive intranasal dexmedetomidine as a pre-anesthetic drug.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

The authors declared that there were no conflicts of interest.

References

1. Seyedhejazi M, Sharabiani BA, Davari A, Taghizadieh N. A comparison of preoperative psychological preparation with midazolam premedication to reduce anxiety in children undergoing adenotonsillectomy. *Afr J Paediatr Surg*. 2020;17: 10–14.
2. Dattatri R, Jain VK, Iyengar KP, Vaishya R, Garg R. Anaesthetic considerations in polytrauma patients. *J Clin Orthop Trauma*. 2021;12:50–57.
3. Kogan A, Katz J, Efrat R. Premedication with midazolam in young children. A comparison of four routes of administration. *Pediatric Anaesth*. 2002;12:685–689.
4. Afonso J, Reis F. Dexmedetomidine: Current role in anesthesia and intensive care. *Rev Bras Anesthesiologist*. 2012;62: 118–133.
5. Saad BB, Tharwat AI, Ghobrial HN, Elfawal SM. Intranasal dexmedetomidine versus intranasal midazolam as pre-anesthetic medication in pediatric age group undergoing adenotonsillectomy. *Ain Shams J Anaesthesiol*. 2020;12:1–10.
6. Delewi R, Vlastra W, Rohling WJ, et al. Anxiety levels of patients undergoing coronary procedures in the catheterization laboratory. *Int J Cardiol*. 2017;228:926–930.
7. Giovannitti JA, Thoms SM, Crawford JJ. Alpha-2 adrenergic receptor agonists: a review of current clinical applications. *Anesth Prog*. 2015;62:31–38.
8. Iirola T, Vilo S, Manner T, et al. Bioavailability of dexmedetomidine after intranasal administration. *Eur J Clin Pharmacol*. 2011;67:825–831.
9. Yuen VM, Hui TW, Irwin MG, Yao TJ, Wong GL, Yuen MK. Optimal timing for the administration of intranasal dexmedetomidine for premedication in children. *Anaesthesia*. 2010; 65:922–929.
10. Lin Y, Chen Y, Huang J, et al. Efficacy of premedication with intranasal dexmedetomidine on inhalational induction and postoperative emergence agitation in pediatric undergoing cataract surgery with sevoflurane. *J Clin Anesth*. 2016;33: 289–295.
11. Zedie N, Amory DW, Wagner BK, O'Hara DA. Comparison of intranasal midazolam and sufentanil premedication in pediatric outpatients. *Clin Pharmacol Therapeut*. 2016;59:341–348.
12. Ezz HA. Preoperative intranasal dexmedetomidine versus intranasal ketamine for prevention of emergence agitation after sevoflurane in myringotomy patients: a randomized clinical trial. *Egypt J Anaesth*. 2017;33:141–146.
13. Abdelmoneim HM, Hamouda SA, Mahfouz GA, Hashem AE. Intranasal dexmedetomidine versus midazolam in preoperative sedation for noncomplex pediatric congenital cardiac surgeries. *Res Opin Anesth Intens Care*. 2016;3:129.
14. Singla D, Chaudhary G, Dureja J, Mangla M. Comparison of dexmedetomidine versus midazolam for intranasal premedication in children posted for elective surgery: a double-blind, randomised study. *South Afr J Anaesth Analg*. 2015;21:12–15.
15. Mehran M, Tavassoli-Hojjati S, Ameli N, Zeinabadi MS. Effect of intranasal sedation using ketamine and midazolam on behavior of 3–6 year-old uncooperative children in dental office: a clinical trial. *J Dent*. 2017;14:1.
16. Abdel-Ghaffar HS, Kamal SM, El Sherif FA, Mohamed SA. Comparison of nebulised dexmedetomidine, ketamine, or midazolam for premedication in preschool children undergoing bone marrow biopsy. *Br J Anaesth*. 2018;121:445–452.
17. Jun JH, Kim KN, Kim JY, Song SM. The effects of intranasal dexmedetomidine premedication in children: a systematic review and meta-analysis. *Can J Anesth J canadien d'anesthésie*. 2017;64:947–961.
18. Stein C. *The Impact of a Recommended Clinical Practice Guideline Educational Module on Anesthesia Providers' and Registered Nurses' Confidence and Self-Efficacy in Identifying and Managing Postoperative Pediatric Emergence Delirium*. Doctoral dissertation, State University of New York; 2020:65–99.
19. Messeha MM, El-Morsy GZ. Comparison of intranasal dexmedetomidine compared to midazolam as a premedication in pediatrics with congenital heart disease undergoing cardiac catheterization. *Anesth Essays Res*. 2018;12:170.
20. Joshi VS, Kollu SS, Sharma RM. Comparison of dexmedetomidine and ketamine versus propofol and ketamine for procedural sedation in children undergoing minor cardiac procedures in cardiac catheterization laboratory. *Ann Card Anaesth*. 2020;20:422.