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Original Research

Evaluation Of Efficacy Of Nebulized Dexamethasone Versus Nebulized Ketamine On Postoperative Sore Throat In Patients Undergoing Thyroid Surgeries

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ABSTRACT

Background and aims: Many studies have proven that with each endotracheal intubation, the chance of sore throats is as high as 21% to 40% which is more evident and significant in people undergoing thyroid surgeries. The occurrence of sore throat postoperatively (POST) after thyroid and neck surgeries have reached upto 80%. This draws attention, how important problem it is, to be solved in clinical practice.

Many promising treatments are available for POST, but the clinch in the study comes when prevention of complications is more focused than the treatment part. In light of this, we performed a study on sore throats following thyroid surgeries, where we compared the efficacy of dexamethasone and ketamine in nebulized form.

Methods: After satisfying inclusion and exclusion criteria, 90 individuals were selected between the age group of 18–60 years of age, belonging to ASA (American Society of Anesthesiologist) physical status I–II. Participants were allocated randomly into three equal batches, each consisting of 30 individuals. We administered dexamethasone 8 mg in 3 ml of NS as nebulization to batch Dex and ketamine 50 mg in 4 ml of NS as nebulization to batch Ket. On the other hand, the control batch was given 5 ml of normal saline as nebulization for 10–15 minutes before shifting to the operation theater. After induction and endotracheal intubation, these patients were monitored at regular intervals for heart rate (HR) and mean arterial blood pressure (MAP) intraoperatively and postoperatively for the intensity of their sore throat.

Results: The frequency and intensity of POST were significantly reduced in the dexamethasone batch compared to the ketamine batch at the following intervals; immediate (P = 0.05), 2 hours (P = 0.05), 6 hours (P = 0.044), and 12 hours (P = 0.028) postoperatively.

Conclusion: Prophylactic administration of single dose (8 mg) of nebulized dexamethasone is more effective in reducing the intensity and frequency of sore throats postoperatively than nebulized ketamine (50 mg) in patients undergoing thyroid surgeries following endotracheal intubation.

Keywords: Sore throat, POST, Ketamine, Dexamethasone, Nebulization, Thyroid surgeries

INTRODUCTION

Following tracheal intubation, sore throat is a side effect that can significantly worsen patient satisfaction and ability to recover [1]. It is frequently encountered following thyroid surgery and procedures involving the throat, where surgery involves repeated handling of the airway, as well as manipulation and positioning of the thyroid mass. This can lead to harm to the vocal cords and tracheal wall [2]. The most common clinical features that are visualized are pharyngeal dryness, throat discomfort, difficulty swallowing, coughing, and hoarseness of voice, which are frequently observed symptoms following extubation in the post-operative period[3,4].

There have been several attempts to reduce POST using both pharmacological and non-pharmacological methods, with mixed outcomes. Several techniques are employed, such as the utilization of narrow ET

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tubes, meticulous adjustment of the airway, insertion of tubes following adequate relaxation of cords, maintaining low intracuff pressures (at or below 20 cm of H2O), restricting the number of laryngoscopy attempts, performing careful oro-pharyngeal suction, and extubating once the endotracheal cuff is fully deflated[5]. Pharmacological techniques include spraying lidocaine on the vocal cords, applying beclomethasone to the endotracheal tube, gargling with ketamine and magnesium sulfate (MgSO4), nebulization with ketamine, MgSO4 lozenges, and inhalational steroids[6,7].

Ketamine, apart from its anesthetic effect, has the special properties of anti-nociception and anti-inflammation. Among all the routs, the inhalational (nebulization) route of administration has been found to be more advantageous, as this method avoids the unpleasant taste of ketamine and requires a smaller amount compared to gargling, reducing the risk of accidentally swallowing it and improving patient participation[8].

Compared to other steroids, dexamethasone is an effective and synthetically produced steroid with a longer duration of action that possesses anti-inflammatory properties. Systemic effects are absent when taken through the inhalational route, which delivers the medication to the airways. Numerous documented studies have supported its beneficial usage in alleviating POST [7,9].

In the current research, we have evaluated the two drugs dexamethasone and ketamine in nebulized form to observe their effect on avoiding sore throat complaints postoperatively following thyroid surgery.

METHODS AND METHODOLOGY

This study was performed in a tertiary health care hospital for a period of 1 year. Institute Ethics Committee approval was obtained. The study population (90 patients) who opted for elective thyroid surgery were randomized by computer-generated slip into 3 batches: batch Dex, batch Ket, and batch Ns. Patients were sensitized about the study method and procedure and educated about the sore throat grading during the pre-anesthesia evaluation. Consent for the procedure was obtained.

Patients in the age group of 18–60 years pertaining to ASA (American Society of Anesthesiologist)physical status I–II were included in the study. Patient refusal, impaired thyroid function test, pre-existing sore throat, allergy to drugs used in the study, and anticipated difficulty intubation were omitted from the study.

The primary goal of the research was to assess and contrast the frequency and intensity of postoperative sore throats across participant batches. The next goal was to monitor the hemodynamic parameters intraoperatively.

We used computer-generated random numbers in sealed, opaque envelopes to randomly allocate the patients into three batches after NBM confirmation. We obtained baseline parameters in the preparation room. 15 minutes before induction, each batch was given its respective drug. Dexamethasone 8 mg (2 ml) with 3 ml of normal saline as nebulization was given to batch Dex; ketamine 50 mg (1 ml) with 4 ml of normal saline as nebulization to batch Ket; and 5 ml of normal saline as nebulization to batch Ns. The patients were subsequently taken to the operation theater, where standard monitors were attached. Premedicated with midazolam (0.025 mg/kg), ondansetron (0.15 mg/kg), and glycopyrrolate (0.02 mg/kg), followed by induction with propofol (2 mg/kg) and fentanyl (2 μg/kg), was done. Atracurium (0.5 mg/kg) was used to assist endotracheal intubation. Laryngoscopy was done, and patients were intubated using an endotracheal tube with an internal diameter of 8 or 8.5 mm for men and 7 or 7.5 mm for women. General anesthesia was maintained with 1.2% isoflurane, 50% O2, 50% N2O, and 0.15 mg/kg atracurium as needed. Throughout the surgery, heart rate and NIBP were monitored at 15-minute intervals for one and a half hours. We turned off the inhalational anesthetic at the end of the procedure, reversed the patient frommuscle relaxant, and extubated the trachea when the patient was completely aware. The frequency and intensity of the sore throat were measuredat 0, 2, 6, 12, and 24 hours postoperatively. We graded the sore throat using a four-point scale (0–3). 0 = no soreness in throat; I = mild soreness in throat (complains of sore throat only when asked); II = moderate soreness in throat (complains of sore throat on his or her own); and III = severe soreness in throat (change in voice or hoarseness, linked with throat discomfort).

The data obtained were entered in a Microsoft Excel sheet, and statistical analysis was performed using the statistical package for the social sciences (Version 20). Results were presented as mean±SD, median and interquartile range, frequency, percentages, and diagrams. For normally distributed continuous variables, three groups were compared using the ANOVA test; for non-normally distributed variables, Kruskal-Wallis's test was used.

RESULTS

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Fig. 1 consort diagram showing the flow of participants

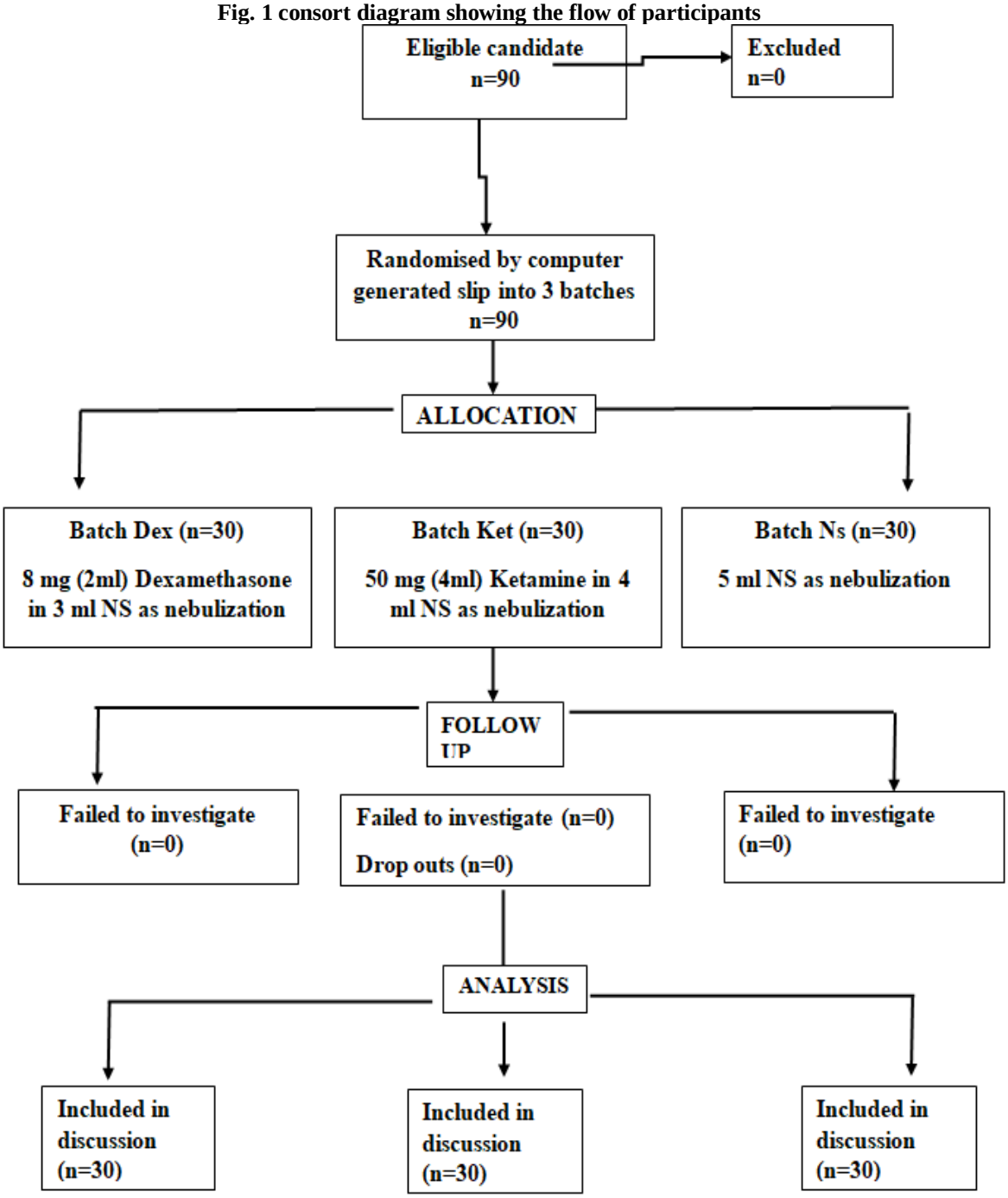

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Fig. 2 shows most of the participants were between 30-60 years old; among them >50 years old, 36.7%. The ages of the patients in all 3 batches were assessed using the Chi-Square test, and the groups were comparable (P = 0.7).

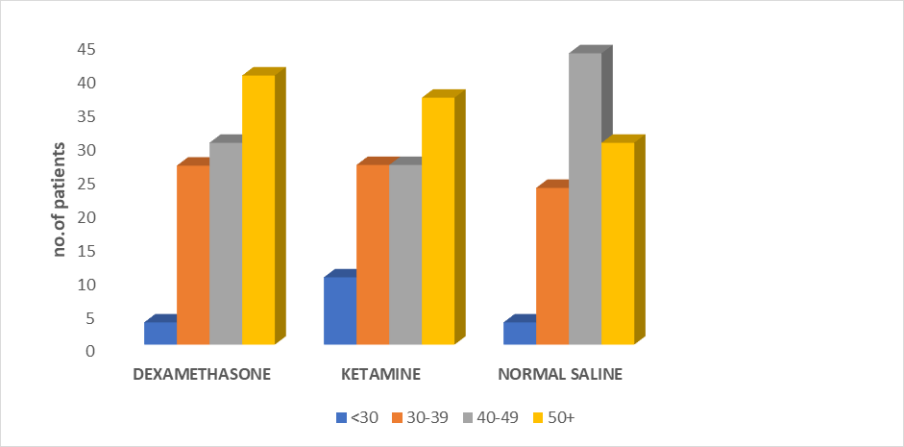

Fig. 3 demonstrates that most of the participants were females (85.5%) rather than males (14.5%). This is likely due to the fact that thyroid disorders are more common in females than in males. The number of male and female patients was compared among the study batches and evaluated using the Chi-square test. The batches were comparable, with a P value of 0.914.

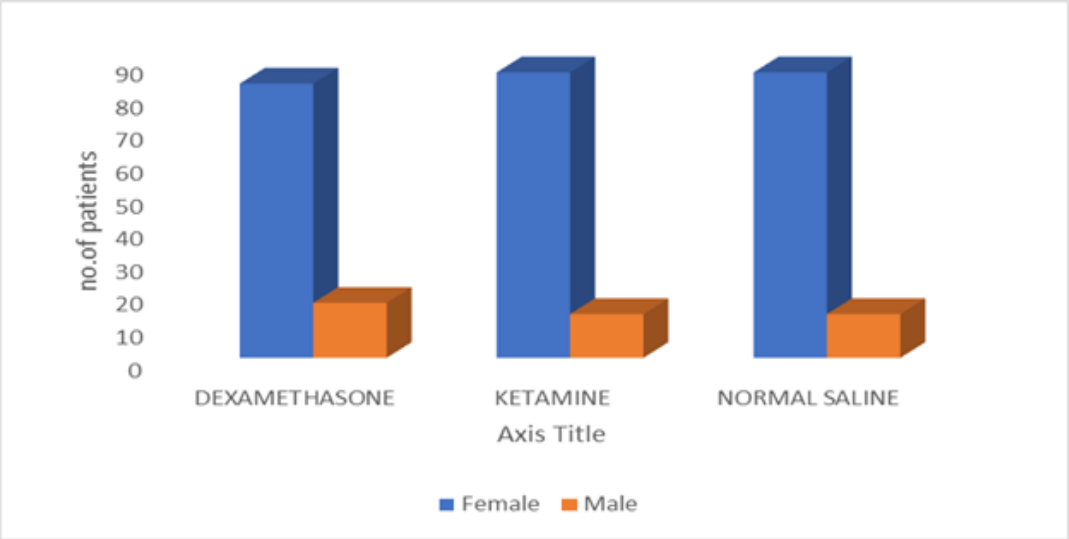

Fig. 4 demonstrates that between the studied batches, there was no considerable change in mean arterial pressure (MAP) and heart rate (HR) at its initial state, prior to nebulization, during induction, upon induction, at 15, 30, 45, 60, 75, and 90 minutes of the surgical procedure, and following extubation.

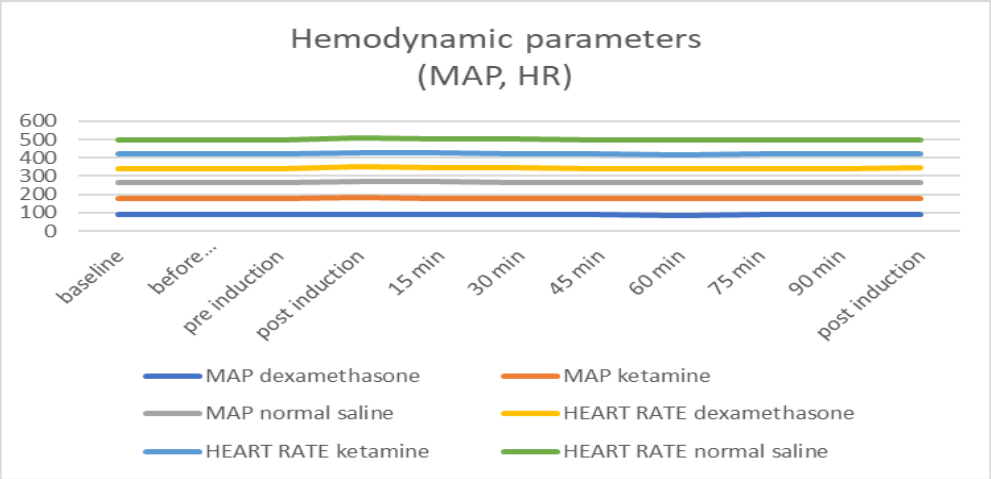

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Table 1. When comparing the control batch to the dexamethasone and ketamine batches, there was a notable rise in the frequency of throat pain complaints at 0, 2, 6, 12, and 24 hours postoperatively. The ketamine batch showed increased chances of throat pain than the dexamethasone batch immediately,2,6, and 12 hours post-surgery, but at the 24th hour, no difference was found.
***represents statistical significance (level of significance set at p-value<0.05). all data were represented as numbers (percentages).**

Table.1Frequency of POST among study group.

Sore throat	Batches			
	Dexamethasone batch	Ketamine batch	Normal saline batch	P value
Immediately				
absent	24(80%)	17(56.6%)	6(20%)	<0.001
present	6(20%)	13(43.3%)	24(80%)	
chi square (p)	P1=0.052	P2=0.0034	P3=0.0001	
2nd hour				
absent	24(80%)	17(56.6%)	6(20%)	<0.001
present	6(20%)	13(43.3%)	24(63.3%)	
chi square (p)	P1=0.052	P2=0.0034	P3=0.0001	
6th hour				
absent	25(83.3%)	18(60%)	7(23.3%)	<0.0001
present	5(16.9%)	12(40%)	23(76.6%)	
chi square (p)	P1=0.044	P2=0.0039	P3=0.0001	
12th hour				
absent	27(90%)	23(76.6%)	12(40%)	<0.0054
present	3(10%)	7(23.3%)	18(60%)	
chi square (p)	P1=0.028	P2=0.0384	P3=0.0004	
24th hour				
Absent	27(90%)	26(86.6%)	18(60%)	<0.0077
present	3(10%)	4(13.3%)	12(40%)	
chi square (p)	P1=0.65	P2=0.0195	P3=0.007	

Table 2. In the control batch, there was a considerable increase in the intensity of soreness in the throat at 0, 2, 6, 12, and 24 hours postoperatively. There was considerable variation between the dexamethasone batch and the ketamine batch in terms of the intensity of the sore throat right after surgery and 2, 4, 6, and 12 hours later, but there was no obvious difference between the two batches at 24 hours following surgery. *represents statistical significance (level of significance set at p-value<0.05).

Table.2 Intensity of POST among study groups

Sore throat	Batches			
	Dexamethasone batch	Ketamine batch	Normal saline batch	P value
Immediatly				
0	24	17	6	
I	6	13	19	P<0.001
II	0	0	5	
III	0	0	0	
chi square (p)	P1=0.052	P2=0.0034	P3=0.0001	
2 hours				
0	24	17	6	
I	6	13	19	P<0.001
II	0	0	5	
III	0	0	0	
chi square (p)	P1=0.052	P2=0.0034	P3=0.0001	
6 hours				
0	25	18	7	
I	5	12	18	
II	0	0	5	P<0.001
III	0	0	0	

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chi square (p)	P1=0.044	P2=0.0039	P3=0.0001	
12 hours				
0 I II III	27 3 0 0	20 10 0 0	12 18 0 0	P<0.001
chi square (p)	P1=0.028	P2=0.0384	P3=0.0004	
24 hours				
0 I II III	27 3 0 0	26 4 0 0	18 12 0 0	P=0.007
chi square (p)	P1=0.687	P2=0.0195	P3=0.007	

DISCUSSION

In the era of advanced medical technology, where bloodless surgeries with minimal operating site are performed in view of early recovery and minimal hospital stay, all efforts are made to make the patients comfortable so that they can return to their daily activities as soon as possible. Keeping this in mind, as perioperative physcians we should be more concerned regarding post-extubation complications, of which the most common is 'post-operative sore throat'.

Following endotracheal intubation, POST is a common but unpleasant condition that is especially noticeable in people undergoing thyroid surgeries. POST may occur for many reasons, including high intracuff pressures, repeated efforts during intubation, mechanical injury to the airway causing inflammation to the mucosa during laryngoscopy,orthyroidmassmanipulation[10].

A number of pharmacological and alternative strategies have been tried in the past to avoid postoperative sore throat (POST). In previous studies, numerous pharmaceuticals were administered through various methods to decrease postoperative pain. However, several medications are linked to undesirable side effects and require the patient's approval and participation. Inhalation was chosen as a drug delivery method for our study because it required the least amount of drug to have the desired effect, was cost-effective, was easy to use, improved patient compliance, and, most importantly, did not cause any systemic adverse events compared to other methods like intravenous administration, gargling, and topical application[8].

The objective of the current research is to evaluate the two drugs dexamethasone and ketamine in nebulized form to observe their effect on avoiding sore throat complaints postoperatively following thyroid surgery.

In terms of heart rate, the batches under study demonstrated P values at initial state, prior to nebulization, during induction, upon induction, and at 15, 30, 45, 60, 75, and 90 minutes of the procedure and following extubation: P = 0.828, P = 0.849, P = 0.930, P = 0.837, P = 0.852, P = 0.789, P = 810, P = 0.855, P = 0.813, P = 0.821, and P = 0.894, respectively. Similarly, with mean arterial pressure, the P values were P = 1, P = 0.99, P = 0.99, P = 0.978, P = 0.98, P = 0.932, P = 1, P = 0.99, P = 0.979, P = 0.964, and P = 0.859, respectively. This was supported by a randomized, prospective, double-blind study by Osama et al. who looked at the cardiovascular responses to nebulized ketamine and nebulized dexamethasone on postoperative sore throats following thyroid surgeries and found that there was no statistically significant variation in the mean arterial blood pressure and heart rate. Instead, he discovered that there was a notable variation in the frequency and intensity of sore throats after surgery [11].

In our study, we observed an overall incidence of 48.8%, of which 7 (16%) patients belong to group D (dexamethasone), 13 (29%) belong to group K (ketamine), and 24 (54%) patients belong to group C (normal saline). In agreement with our study, Lee,et al**.** reported a reduction in the incidence of POST to 27.5% in their study on the effect of topical dexamethasone on POST, which indicates that the nebulized form is much more effective than the topical (local) form [12].

In our research, the incidence of sore throat was higher in the ketamine group at 0, 2, 6, and 12 hours after surgery than in the dexamethasone group. This difference is statistically significant with P = 0.05, p = 0.05, p = 0.044, and p = 0.028, respectively. While there is no significant difference between the dexamethasone and ketamine groups at 24 hours, It was supported by AtefK.Salama,et al**.**who demonstrated that a single dose of 8 mg of nebulized dexamethasone reduced the incidence of POST at 0, 2, 4, 6, and 12 hours post-extubation of post-operative assessment [5].

Likewise, Kumari,et al**.**observed in their research that there was a significantly significant ($p<0.05$) decrease in the incidence of POST in the dexamethasone group at 2, 4, 6, and 12 hours after surgery as compared to the ketamine group [13].

In our investigation, there was a significant distinction in the frequency of sore throats between the batches receiving dexamethasone and ketamine at 0, 2, 6, and 12 hours after surgery. However, after 24 hours following surgery, there was no discernible

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difference between the ketamine and dexamethasone batches.

Our study was supported by shakya,et al**.**who assessed POST at 0, every 2 hours for 8 hours, and then at 24 hours. She found out sore throat frequency in the normal saline batch was much higher than the ketamine batch. In comparison to the ketamine group, the patients in the normal saline group not only had a larger incidence of POST, but their severity was also higher [14].

In Accordance to our research, in a trial by Ahuja,et al**.** 108 patients were observed for the efficiency of ketamine and normal saline nebulization in lowering the frequency and intensity of postoperative sore throat (POST). At 2 hours (P = 0.01) and 4 hours (P = 0.03) following surgery, the results revealed a substantial difference across the two groups. Similar to this, our study's analysis of the incidence of POST at 2 and 4 hours (P = 0.01) after surgery revealed a substantial and statistically significant difference between the saline and ketamine groups [8].

In a trial comparing nebulized dexamethasone to MgSO4 for minimizing the risk of POST, Ashwini, et al. found that the frequency of sore throat post-surgery in the dexamethasone group was 27.5%. In contrast to their study, our investigation demonstrated a comparatively decreased frequency (16%) among the dexamethasone group [15].

CONCLUSION

After completion of research, we came to a conclusion that prophylactic administration of single dose (8 mg) of nebulized dexamethasone is more effective in reducing the intensity and frequency of sore throats postoperatively than nebulized ketamine (50 mg) in patients undergoing thyroid surgeries following endotracheal intubation. There were no systemic adverse effects noticed. Sometimes big problems are best solved with small preventive measures, this particular approach enhances the repertoire of the anesthetist in the management of POST.

REFERENCES

1. Mazzotta E, Soghomonyan S, Hu LQ. Postoperative sore throat: prophylaxis and treatment. Frontiers in Pharmacology. 2023 Nov 23;14:1284071. 10.3389/fphar.2023.1284071
2. Hisham AN, Roshilla H, Amri N, Aina EN. Post-thyroidectomy sore throat following endotracheal intubation. ANZ journal of surgery. 2001 Nov;71(11):669-71.10.1046/j.1445-1433.2001.02230.x
3. McHardy FE, Chung F. Postoperative sore throat: cause, prevention and treatment. Anaesthesia. 1999 May;54(5):444-53. 10.1046/j.1365-2044.1999.00780.x
4. Scuderi PE. Postoperative sore throat: more answers than questions. Anesthesia & Analgesia. 2010 Oct 1;111(4):831-2. 10.1213/ANE.0b013e3181ee85c7
5. Salama AK, El-badawy AM. Does nebulized dexamethasone decrease the incidence of postextubation sore throat?: a randomized controlled study. Ain Shams Journal of Anesthesiology. 2016 Jan 1;9(1).10.4103/1687-7934.178888
6. Wang G, Qi Y, Wu L, Jiang G. Comparative efficacy of 6 topical pharmacological agents for preventive interventions of postoperative sore throat after tracheal intubation: a systematic review and network meta-analysis. Anesthesia & Analgesia. 2021 Jul 1;133(1):58-67. 10.1213/ANE.0000000000005521
7. Mostafa RH, Saleh AN, Hussein MM. A comparative study of three nebulized medications for the prevention of postoperative sore throat in the pediatric population. The Open Anesthesia Journal. 2018 Dec 24;12(1). 10.2174/2589645801812010085.
8. Ahuja V, Mitra S, Sarna R. Nebulized ketamine decreases incidence and severity of post-operative sore throat. Indian journal of anaesthesia. 2015 Jan 1;59(1):37-42.10.4103/0019-5049.149448
9. Zhao X, Cao X, Li Q. Dexamethasone for the prevention of postoperative sore throat: a systematic review and meta-analysis. Journal of clinical anesthesia. 2015 Feb 1;27(1):45-50. 10.1016/j.jclinane.2014.06.014
10. Kadri IA, Khanzada TW, Samad A, Memon W. Post-thyroidectomy sore throat: a common problem. www.pjms.com.pk/issues/aprjun209/article/article13.html
11. Ben Sasi OE, Attia ZM, Hassn AM, Aamer RM. Effect of Nebulized Dexamethasone versus Nebulized Ketamine on Postoperative Sore Throat after Thyroid Surgeries. The Egyptian Journal of Hospital Medicine. 2022 Apr 1;87(1):1613-8. 10.21608/EJHM.2022.227008
12. Lee JH, Kim SB, Lee W, Ki S, Kim MH, Cho K, Lim SH, Lee KM, Choi DN, Oh M. Effects of topical dexamethasone in postoperative sore throat. Korean journal of anesthesiology. 2017 Feb 1;70(1):58-63. 10.4097/kjae.2017.70.1.58
13. Kumari SA, Bhashyam S, Lakshmi BS. Effects of nebulized dexamethasone versus nebulized ketamine on the attenuation of post-operative sore throat following endotracheal intubation. International Journal of Scientific Study. 2019;7(9):10-5.pesquisa.bvsalud.org/portal/resource/pt/sea-209232
14. Bhatta PD, Shakya BM, Bista NR, Marhatta MN, Shrestha N. Effect of preoperative nebulized ketamine on incidence and severity of postoperative sore throat in patient undergoing general anaesthesia with endotracheal intubation. Journal of Institute of Medicine Nepal. 2020 Apr 30;42(1):12-6.www.nepjol.info/index.php/JIOM/article/view/37418/28945
15. Ashwini H, Kumari S, Lavanya R. Comparative study of dexamethasone nebulisation with magnesium sulphate nebulisation in preventing post operative sore throat following endotracheal intubation. Indian Journal of Clinical Anaesthesia. 2023 Jan 23;5(3):341-7. 10.18231/2394-4994.2018.0065