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Comparative study of the effect of beclomethasone inhaler versus topical lidocaine on the attenuation of post-intubation throat symptoms in pregnant patients undergoing cesarean section

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***Abstract*---**Background: Sore throat, cough and hoarseness are common problems after endotracheal general anesthesia. They may be very distressing to the patient, they may have many unwanted sequelae .Various preparations of lidocaine, and corticosteroids have been frequently used to prevent or attenuate these complications. Aim: To compare between beclomethasone inhaler and topical lidocaine lubricant for the reduction in incidence of post-operative sore throat, cough and hoarseness of voice. Patients and method: Ninety pregnant women (18–35 years of age) with I undergoing elective cesarean section were allocated into 3 groups of 30 patients in each as follows (group A: Topical lidocaine, group B: Beclomethasone inhaler , group C: Control). The endotracheal tubes in-group (A) were lubricated with lidocaine gel 5%. Group (B) patients receive 2 puffs (100 ug) of beclomethasone inhaler. In the group C patients, no medication was administered or applied. Patients were interviewed by a blind investigator for sore throat, cough and hoarseness (as none, mild, moderate, or severe), at 2 h, 6 h,12 h. and 24 h. after full recovery. Results: Beclomethasone inhaler significantly decreases the incidence and severity of sore throat in comparison with lidocaine lubricant and control groups especially in the first 6 hours postoperatively (P-value < 0.05). Conclusion: Beclomethasone inhalation preoperatively was an effective method in decreasing the incidence and the severity of post-intubation sore throat compared to lidocaine lubricant.

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Keywords---beclomethasone inhaler, lidocaine lubricant, sore throat, cough, hoarseness, tracheal intubation.

Introduction

Postoperative pulmonary complications can lead to a prolonged hospital stay [1]. Although there is no standard definition of postoperative pulmonary complications, most of studies focused on atelectasis, and airway complications (ex: bronchospasm, larygospasm, throat related complications….) [2]. The sore throat is also reported as a common complication[3].Causative factors include the size of the ETT used, cuff pressure, duration of anesthesia, use of dry and cool anesthetic gas, site of surgery and various instrumentations [4-6]. The incidence of sore thoat is higher after ETT than after laryngeal mask[8]. The wide variation is due to difference in technical skills and patients susceptibility for developing such symptoms. [2]

Cough may trigger a sudden increase in the intraocular and intracranial pressures; with CVS and airway complications, like in patients with asthma. Moreover, coughing can affect the healing of surgical wound [9, 10]. There is a wide variation in the incidence of hoarseness of voice following ETT ([11, 12] and maybe a long-term complication is about 1% [13]. However, the condition resolve within few days. In some cases, it may worsen and complicated to a more serious state.

Among the non-pharmacological methods for prevention of such complications, use of suitable size ETT, lubrication of ETT, careful airway instrumentation, use of good relaxation prior to ETT and reduction in the pressure of cuff of ETT. [14-18]
Among pharmacological measures, the most frequently used drugs are lidocaine and steroid preparations: Postoperative complications can be assessed using a (4-points scale) as in tables below :[19, 20]

Sorethroat

SCORE	SIGN
0	No
1	mild
2	moderate
3	severe

Cough

SCORE	SIGN
0	No
1	Minimal cough (lighter than what is seen in the common cold) or (isolated cough, without additional symptoms)
2	Moderate cough (as seen in the common cold) or (paroxysmal cough, without or with minimal additional symptoms)

3	Severe cough (worse than what is seen in the common cold) or (strenuous cough, accompanied by chest discomfort)

Hoarseness of voice

SCORE	SIGN
0	No
1	mild
2	Moderate
3	severe

Aim of the study

To evaluate the effect of lidocaine lubricant gel (on ETT) and beclomethasone inhalation preoperatively on the development of postoperative airway complications.

Patients and Method

90 consenting pregnant women prepared for elective cesarean section under general anesthesia were involved in this prospective, randomized, and double blind study.
Inclusion criteria: Age between (18-35 yrs.), Elective C\S, ASA physical status II
Exclusion criteria: Patient with ASA > II, patients with airway symptoms or airway disease (ex: asthma, allergic bronchitis, obstructive sleep apnea …), smokers, patients allergic to drugs in the study, patients using inhaled or oral steroids, anticipated airway difficulty, morbidly obese patient, preeclampsia and pregnancy-induced hypertension and emergency surgery

Dropped cases:
Unanticipated difficult airway, patients needed to be re-intubated for any cause, extubation problems and intubation time more than 60 min.
They were assigned to one of three groups of equal number (30 n) (all groups received the same induction and maintenance anesthetic doses): (A) Topical lidocaine lubricant, (B): Beclomethasone inhaler and (C): Control group (no medication will be applied).

Group A: A lubricated standard PVC (cuffed) endotracheal tubes (size 7-7.5) with lidocaine gel 5% were used.
Group B: Patients received two puffs of inhaled beclomethasone (100 µg) via a spacer device during two deep inspirations (in sitting position) prior to induction of anaesthesia. Patients were intubated with a PVC cuffed endotracheal tubes (size 7-7.5) with no medication was applied on it.
Group C: Endotracheal intubation with a PVC cuffed endotracheal tubes (size 7-7.5) with no premedication or any medication applied on it (control group), followed by the same maintenance and awakening technique in all groups.
Postoperative assessment of patients was done by a double-blind technique. Patients were interviewed at 2 hr., 6 hr., 12 hr., and 24 hr. after full recovery for post-operative sore throat (and related symptoms), cough, and hoarseness using the questionnaire based on the scoring system previously mentioned. Patients

with moderate - severe sore throat should receive proper treatment. IV dexamethasone (8mg) given in severe cases, and oto-rhino-laryngology consultation had been requested.

Results

Table 1: Comparison in vital signs, among the three groups

Variables	Group	Mean (SD)	p-value
MAP (mmHg)	Lidocaine	88.8(7.57)	0.971
	Beclomethasone	89.2(7.31)	
	Control	89.2(7.31)	
HR (beat/min.)	Lidocaine	84.57(8.5)	0.769
	Beclomethasone	84.07(8.2)	
	Control	83.07(7.71)	

Table 1 shows non-significant difference when comparing the three groups in vital signs, including MAP (mmHg) and HR (beat/min.); (p-values>0.05).

Table 2: Comparison in operative details among the three groups.

Operative details	Group	Mean (SD)	p-value
Duration of laryngoscopy and intubation (sec.)	Lidocaine	11.97(1.7)	0.098
	Beclomethasone	11(2.34)	
	Control	10.8(2.15)	
Tube size(mm)	Lidocaine	7.27(0.25)	0.958
	Beclomethasone	7.25(0.25)	
	Control	7.25(0.25)	
Duration of surgery(min.)	Lidocaine	40.47(4.61)	0.966
	Beclomethasone	42.37(4.54)	
	Control	41.17(4.25)	
Intubation time(min.)	Lidocaine	49.43(6.41)	0.988
	Beclomethasone	48.3(6.89)	
	Control	48.57(6.72)	

Table 2 shows non-significant association when comparing the three groups in duration of laryngoscopy and intubation, tube size, intubation time and duration of surgery (p-values>0.05).

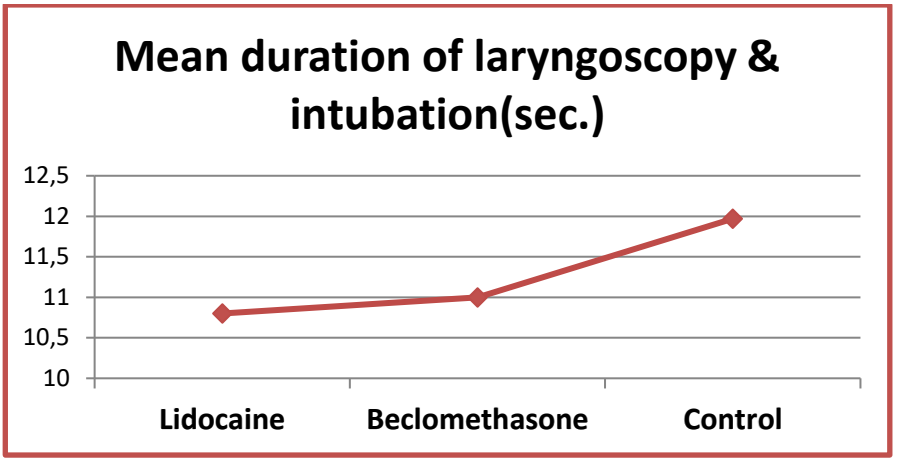

Figure 1: Comparison in the mean duration of laryngoscopy and intubation (in seconds) among the three groups

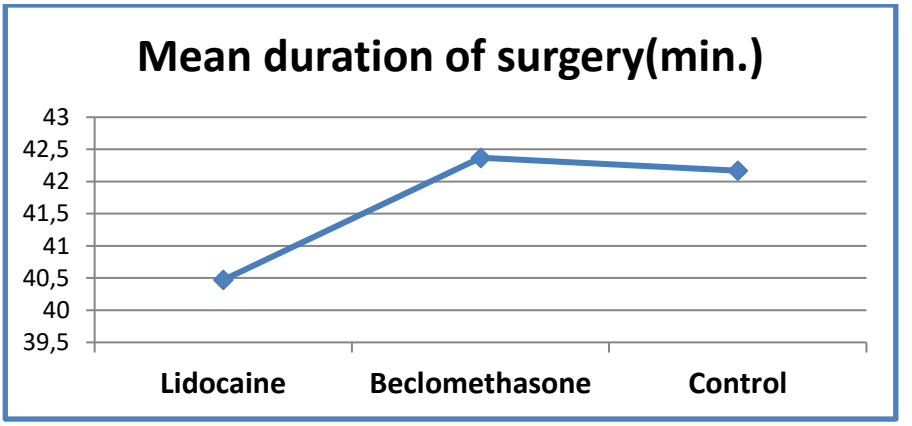

Figure 2: Comparison in the mean duration of surgery (in minutes) among the three groups

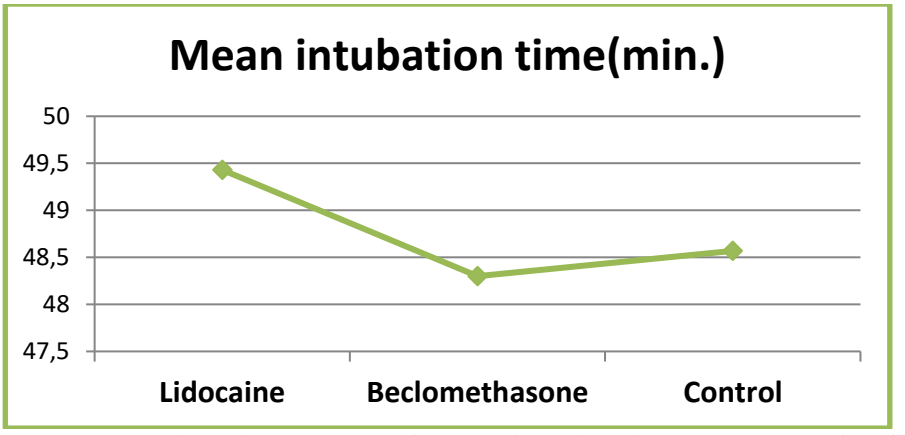

Figure 3: Comparison in mean intubation time (in minutes) among the three groups

Table 3: Comparison in incidence, and severity of sore throat among the three groups

Time	Variables		Group (A)Lidocaine No. (%)	(B)Beclomethasone No. (%)	(C)Control No. (%)	p-value
2H sore throat	Total incidence		10(33.3%)	5(16.7%)	12(40.0%)	A&C=0.592
	Severity	Mild	8(26.6%)	5(16.7%)	7(23.3%)	B&C=0.0497
		Moderate	2(6.6%)	0	3(10%)	A&B=0.01
		Severe	0	0	2(6.6%)	
6H sore throat	Total incidence		9(30%)	3(10%)	13(43.3%)	A&C=0.02
	Severity	Mild	6(20%)	3(10%)	9(30%)	B&C=0.0012
		Moderate	3(10%)	0	2(6.6%)	A&B=0.0023
		Severe	0	0	2(6.6%)	
12H sore throat	Total incidence		7(23.3%)	3(10%)	10(33.3%)	A&C=0.078
	Severity	Mild	5(16.6%)	3(10%)	8(26.6%)	B&C=0.034
		Moderate	2(6.6%)	0	1(3.3%)	A&B=0.01
		Severe	0	0	1(3.3%)	
24H sore throat	Total incidence		3(10%)	2(6.6%)	4(13.3%)	A&C=0.78
	Severity	Mild	3(10%)	2(6.6%)	3(10%)	B&C=0.698
		Moderate	0	0	1(3.3%)	A&B=0.209
		Severe	0	0	0(0%)	

Table 4: Comparison in incidence, and severity of cough among the three groups

Time	Variables		Group (A)Lidocaine NO.(%)	(B)Beclomethasone NO.(%)	(C)Control NO. (%)	P-value
2H cough	Total incidence		4(13.3%)	6(20%)	9(30%)	A&C=0.264
		Mild	2(6.6%)	4(13.3%)	5(16.6%)	B&C=0.786
		Moderate	2(6.6%)	2(6.6%)	3(10%)	A&B=0.098
		Severe	0	0	1(3.3%)	
6H cough	Total incidence		4(13.3%)	5(16.6%)	10(33.3%)	A&C=0.389
	Severity	Mild	3(10%)	4(13.3%)	6(20%)	B&C=0.128
		Moderate	1(3.3%)	1(3.3%)	2(6.6%)	A&B=0.498
		Sever	0	0	2(6.6%)	
12H cough	Total incidence		3(10%)	2(6.6%)	6(20%)	A&C=0.096
	Severity	Mild	2(6.6%)	1(3.3%)	4(13.3%)	B&C=0.823
		Moderate	1(3.3%)	1(3.3%)	2(6.6%)	A&B=0.13
		Severe	0	0	0	
24H cough	Total incidence		1(3.3%)	2(6.6%)	4(13.3%)	
	Severity	Mild	1(3.3%)	1(3.3%)	2(6.6%)	A&C=0.067
		Moderate	0	1(3.3%)	2(6.6%)	B&C=0.36
		Severe	0	0	0	A&B=0.143
	Severity	Mild	1(3.3%)	0	2(6.6%)	
		Moderate	0	0	0	
		Severe	0	0	0	

Table 5: Comparison in incidence, and severity of hoarseness among the three groups

Time	Variables		Group			P-value
			(A)Lidocaine NO. (%)	(B)Beclomethasone NO. (%)	(C)Control NO. (%)	
2H hoarseness	Total incidence		4(13.3%)	5(16.6%)	7(23.3%)	A&C=0.230
	Severity	Mild	3(10%)	5(16.6%)	5(16.6%)	B&C=0.789
		Moderate	1(3.3%)	0	1(3.3%)	A&B=0.088
		Sever	0	0	1(3.3%)	
6H hoarseness	Total incidence		5(16.6%)	4(13.3%)	6(13.3%)	A&C=0.39
	Severity	Mild	5(16.6%)	4(13.3%)	4(13.3%)	B&C=0.088
		Moderate	0	0	2(6.6%)	A&B=0.09
		Sever	0	0	0	
12H hoarseness	Total incidence		2(6.6%)	1(3.3%)	4(13.3%)	A&C=0.630
	Severity	Mild	2(6.6%)	1(3.3%)	4(13.3%)	B&C=0.78
		Moderate	0	0	0	A&B=0.142
		Sever	0	0	0	
24H hoarseness	Total incidence		1(3.3%)	0	2(6.6%)	A&C=0.897
	Severity	Mild	1(3.3%)	0	2(6.6%)	B&C=0.078
		Moderate	0	0	0	A&B=0.230
		Sever	0	0	0	

At the time intervals of 2 hours and 6 hours, beclomethasone inhaler significantly reduces sore throat, which occurred significantly as mild cases only in the beclomethasone group, no severe cases occurred in both topical lidocaine, and beclomethasone inhaler groups. At 12 hours interval, sore throat there was obviously reduced in the beclomethasone group compared to lidocaine and control groups. No obvious effect were recorded in both lidocaine and control groups.

After 24 hr, there were no obvious differences in all groups regarding sore throat Regarding cough,the incidence was comparable between the beclomethasone group and the lidocaine group. Both having a lower value in comparison with the control group but failed to reach statistical significance. Most of the documented cases of hoarseness were mild and moderate in severity, there was one documented severe case at 2-hour interval in control group.

Discussion

In many previous studies, various steroids and lidocaine preparations used to attenuate throat symptoms. Steroid preparations are synthetic glucocorticoids that attenuate airway symptoms mainly through their anti-inflammatory and immunosuppression effects, also, they have an antiemetic, and analgesic effects.[21] Lidocaine has a cell membrane stabilizing effect by which it reduces the hyperreactivity of airways.[22] The present study demonstrated that the postoperative sore throat was reduced in the beclomethasone inhaler group compared with lidocaine lubricant and control groups. The frequency of cough insignificantly reduced in both lidocaine and beclomethasone groups' interval.

The effects of beclomethasone inhaler in the attenuation of sore throat has been reported by El Hakim and colleagues.[23] Comparable results about the effect of beclomethasone inhaler on sore throat were found by Bashir, I., & Masood, N. [24] they used a single puff (50 ug) in their study. Another study by Honarmand A. & Safavi M. [25] reported that beclomethasone inhaler (50 ug) is comparable with intravenous lidocaine (1-1.5 mg\kg). Thomas et al. focused on the effect of dexamethasone in attenuation of sore throat following ETT [26].A systematic meta-analysis by Jian Yu et al.[27] showed that nebulized corticosteroid was an effective way in preventing POST. This supports the findings of El Hakim [23] and Tazeh-Kand et [28].

Sumathi et al. and Upadhyay et al[18,29]. found that the betamethasone gel is better than lidocaine in the attenuation of such complictions. This finding does not agree with this study regarding hoasrseness of voice. Some other studies does not support our findings [30] . Banihashem, N.et al. [31] compared beclomethasone and lidocaine spray in their study, they concluded that beclomethasone spray is obviously reduces the occurrence of sore throat and cough while lidocaine was only get a good response in the prevention of sore throat. A meta-analysis by Alan His, Wen Liao, and others [32] showed that lidocaine lubricants in jelly, ointment, or spray-form, if not more harmful, did not demonstrate statistically significant effectiveness in preventing POST, PC, and PH. The main two predisposing factors for the occurrence of postoperative hoarseness are trauma and trauma [33], both of them are difficult to be attenuated by the recommended dose of topical lidocaine or inhaled beclomethasone.

Conclusion

This study concluded that beclomethasone inhalation preoperatively was an effective method in decreasing the incidence and the severity of post-intubation sore throat compared to lidocaine lubricant. The incidence of cough also decreased with use of beclomethasone inhaler or lidocaine lubricant but to a lesser extent.

Recommendations

Preoperative use of beclomethasone inhalation is recommended to attenuate post-intubation sore throat. More study is recommended about different preparations, dosages, and routes of administrations of both corticosteroids and lidocaine to reach a definitive conclusion.

Conflict of interest: Nothing to disclose

References

1. Agarwal A, Nath S, Goswami D, Gupta D, Dhiraaj S, Singh P. An Evaluation of the Efficacy of Aspirin and Benzydamine Hydrochloride Gargle for Attenuating Postoperative Sore Throat: A Prospective, Randomized, Single-Blind Study. Anesthesia & Analgesia. 2006 Oct ;103(4):1001-1003.

2. Alexopoulos C, Lindholm CE . Airway complaints and laryngeal pathology after intubation with an anatomically shaped endotracheal tube. Acta Anaesthesiologica Scandinavica.1983Aug; 27(4): 339-344.
3. Al-Qahtani AS, Messahel FM. Quality improvement in anesthetic practice- the incidence of sore throat after using a small tracheal tube. Middle East Journal of Anesthesiology. 2005 Feb;18(1):179-183
4. Annals of Saudi Medicine. 2008 Feb: 28(1); 11-16
5. Bagchi D, Mandal MC, Das S, Sahoo T, Basu SR, Sarkar S. Efficacy of intravenous dexamethasone to reduce the incidence of postoperative sore throat: A prospective randomized controlled trial. Journal of Anaesthesiology and Clinical Pharmacology.2012 Oct;28(4) :479.
6. Banihashem, N., Alijanpour, E., Hasannasab, B., & Zarei, A. Prophylactic Effects of Lidocaine or Beclomethasone Spray on Post-Operative Sore Throat and Cough after Orotracheal Intubation. Iranian journal of otorhinolaryngology.2015 May; 27(80), 179–184.
7. Baron S, Kohlmoos H. LXIX Laryngeal Sequelae of Endotracheal Anesthesia. Annals of Otology, Rhinology & Laryngology. 1951 Sep;60(3):767-792.
8. Bashir, I., & Masood, N. Prophylaxis of postintubation sore throat by the use of single puff inhalation of beclomethasone dipropionate preoperatively. Pakistan Armed Forces Medical Journal. March 2014Mar; 64(1), 145-149.
9. Bidwai A, Bidwai V, Rogers C, Stanley T. Blood-pressure and Pulse-rate Responses to Endotracheal Extubation with and without Prior Injection of Lidocaine. Anesthesiology. 1979;51(2):171-172.
10. Branson R, Campbell R, Davis K, Porembka D. Anesthesia Circuits, Humidity Output, and Mucociliary Structure and Function. Anesthesia and Intensive Care. 1998 Apr; 26(2):178-183.
11. Christensen A, Willemoes-Larsen H, Lundby L, Jakobsen K. Postoperative throat complaints after tracheal intubation. British Journal of Anesthesia.1994; 73(6):786-787.
12. Dingley J, Whitehead M, Wareham K. A comparative study of the incidence of sore throat with the laryngeal mask airway. Anesthesia. 1994 Mar; 49(3):251-254.
13. El Hakim M. Beclomethasone prevents postoperative sore throat. Acta Anaesthesiol Scand. 1993 Apr;37(3):250-252.
14. Elhakim M, Ali NM, Rashed I, Riad MK, Refat M. Dexamethasone reduces postoperative vomiting and pain after pediatric tonsillectomy. Can J Anaesth 2003; 50: 392-7.
15. Hamelberg W. Complications of endotracheal intubation. Journal of the American Medical Association.1958 Dec;168(15):1959.
16. Honarmand A. & Safavi M. Beclomethasone inhaler versus intravenous lidocaine in the prevention of postoperative airway and throat complaints: a randomized, controlled trial.
17. Hung NK, Wu CT, Chan SM, Lu CH, Huang YS, Yeh CC, et al. Effect on postoperative sore throat of spraying the endotracheal tube cuff with benzydamine hydrochloride, 10% lidocaine, and 2% lidocaine. Anesthesia and Analgesia. 2010; 111(4):882–6.
18. Jaensson M, Gupta A, Nilsson UG. Risk factors for development of postoperative sore throat and hoarseness after endotracheal intubation in women: a secondary analysis. AANA Journal. 2012 Aug; 80(4):67–73. 53.

Tabari M, Soltani G, Zirak N, Alipour M, Khazaeni K. Comparison of Effectiveness of Betamethasone gel Applied to the Tracheal Tube and IV Dexamethasone on Postoperative Sore Throat: A Randomized Controlled Trial. Iranian Journal of Otorhinolaryngology. 2013 Sep;25(73):215-220.
19. Jaensson M, Olowsson LL, Nilsson U. Endotracheal tube size and sore throat following surgery: a randomized-controlled study. Acta Anaesthesiologica Scandinavica. Jan 2010; 54(2):147–153.
20. Jones G, Hale D, Wasmuth C, Homi J, Smith E, Viljoen J. A survey of acute complications associated with endotracheal intubation. Cleveland Clinic Journal of Medicine. 1968;35(1):23-31.
21. Kambič V, Radšel Z. Intubation lesions of the larynx. British Journal of Anesthesia. 1978 Jun;50(6):587-590.
22. Leech P, Barker J. Fitch W.Changes in intracranial pressure and systemic arterial pressure during the termination of anesthesia. British Journal of Anesthesia. 1974 Apr;46(4):315-316.
23. Liao, A.HW., Yeoh, SR., Lin, YC. *et al.* Lidocaine lubricants for intubation-related complications: a systematic review and meta-analysis. Canadian Journal of Anesthesia.2019 June; 66**:** 1221–1239.
24. Macario A, Weinger M, Carney S, Kim A. Which Clinical Anesthesia Outcomes Are Important to Avoid? The Perspective of Patients. Anesthesia & Analgesia. 1999 Sep ;89(3):652.
25. Park H, Im J, Park J, Joe J, Lee S, Yon J et al. A comparative evaluation of humidifier with heated wire breathing circuit under general anesthesia. Korean Journal of Anesthesiology. 2009 Jul.;57(1):32.
26. Ratnawati, I. G. A. A., Sutapa, G. N., & Ratini, N. N. (2018). The concentration of radon gas in air-conditioned indoor: Air quality can increase the potential of lung cancer. *International Journal of Physical Sciences and Engineering*, *2*(2), 111–119. https://doi.org/10.29332/ijpse.v2n2.169
27. Rock P, Rich P. Postoperative pulmonary complications. Current Opinion in Anaesthesiology. 2003Apr ;16(2):123-131.
28. Rudra A, Ray S, Chatterjee S, Ahmed A, Ghosh S. Gargling with ketamine attenuates the postoperative sore throat. Indian Journal of Anaesthesia Feb 2009; 53(1):40–43.
29. Santi, L. K. S., Sudewi, A. A. R., Duarsa, D. P., & Lesmana, C. B. J. (2021). The effect of pregnancy massage on level of depression, anxiety and stress in pregnant women. *International Journal of Health & Medical Sciences*, *4*(2), 220-225. https://doi.org/10.31295/ijhms.v4n2.1692
30. Smetana G. Preoperative Pulmonary Evaluation. New England Journal of Medicine.1999 Mar ;340(12):937-944.
31. Sumathi P, Shenoy T, Ambareesha M, Krishna H. Controlled comparison between betamethasone gel and lidocaine jelly applied over the tracheal tube to reduce postoperative sore throat, cough, and hoarseness of voice. Br J Anesthesia. 2008 Feb; 100(2):215-218.
32. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). Health and treatment of diabetes mellitus. *International Journal of Health Sciences*, *5*(1), i-v. https://doi.org/10.53730/ijhs.v5n1.2864
33. Tazeh-kand N, Eslami B, Mohammadian K. Inhaled Fluticasone Propionate Reduces Postoperative Sore Throat, Cough, and Hoarseness. Anesthesia & Analgesia. 2010 Oct;111(4):895–898.

34. Thomas S, Beevi S. Dexamethasone reduces the severity of postoperative sore throat. Canadian Journal of Anesthesia. 2007 Nov; 54(11):897–901.
35. Upadhyay N, Gupta R, Prakash S, Bhalla S. Controlled comparison between betamethasone gel and lidocaine jelly applied over the endotracheal tube in reducing postoperative sore throat, cough, and hoarseness of voice. Indian Anesthetists' Forum 2018;19(2):65-72
36. Yu J, Ren L, Min S, Yang Y, Lv F. Nebulized pharmacological agents for preventing postoperative sore throat: A systematic review and network meta-analysis. PLOS ONE. 2020 Aug;15(8):e0237174.
37. Yukioka H, Yoshimoto N, Nishimura K, Fujimori M. Intravenous lidocaine as a suppressant of coughing during tracheal intubation in elderly patients. Anesthesia and Analgesia 1985 Dec; 64(12): 1189-1192.