

# Comparing the Effects of Oral Gabapentin and Clonidine on Preoperative Anxiolysis and Attenuation of Stress Response to Endotracheal Intubation

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**Abstract:** Introduction: Attenuation of anxiety and stress response to endotracheal intubation are the cornerstone of good anesthetic outcome. Clonidine produces anxiolysis, sympatholysis and decrease intraoperative anesthetic requirements. Gabapentin, used to treat neuropathic pain, has been studied for attenuation of stress response to endotracheal intubation. In our study, we aim to evaluate and compare the effects of clonidine and gabapentin on pre-operative anxiolysis & stress response to endotracheal intubation. Material and Methods: The study was conducted in a double blind manner. 120 patients ASA 1 & 2, were randomly allocated into 3 groups receiving either oral Gabapentin (900mg) or oral Clonidine (300 µg) or placebo, 90 min before elective surgical procedures. The patients received i.v. thiopentone 5mg/kg and succinylcholine 1.5mg/kg. VAS anxiety score was recorded before and 90 minutes after the drug. Hemodynamic parameters (PR, SBP, DBP, MBP) were recorded before & 90 minutes after giving drug & 0, 1, 3, 5, 10 min after intubation. Results: During preinduction clonidine showed significant decrease in VAS compared to gabapentin and placebo. Clonidine showed significant attenuation of stress response compared to gabapentin and placebo. However no statistically significant difference found between gabapentin and placebo group. Conclusion: Clonidine is effective in attenuating pre-operative anxiety & stress response to endotracheal intubation.

**Keywords:** Gabapentin, clonidine, anxiolysis, stress response, endotracheal intubation

## 1. Introduction

Anxiety influences patients' subjective perceptions.<sup>1</sup> Preoperative anxiety is associated with higher level of postoperative pain.<sup>2-4</sup> Although the use of pre-operative benzodiazepines is the most common practice to decrease pre-operative anxiety, they do not have a positive effect on post-operative outcome.<sup>5-6</sup> Manipulation of airway, particularly during laryngoscopy and endotracheal intubation is associated with sympathetic nervous system stimulation and catecholamine release. This can cause serious complications in patients with underlying abnormalities such as coronary artery disease, reactive airways or intracranial neuropathology.<sup>7-10</sup> Various techniques and drugs have been used to attenuate the circulatory response due to laryngoscopy and tracheal intubation during general anaesthesia, which include laryngoscopy and intubation in deeper plane of anaesthesia with inhalation agents like halothane, topical anaesthesia of upper respiratory tract prior to laryngoscopy with lidocaine, intratracheal and translaryngeal nerve blocks. Gabapentin a GABA analogue has more recently been extended in the management of more acute conditions particularly in perioperative period; these include its potential role in post-operative analgesia, pre-operative anxiolysis, prevention of chronic post-surgical pain, attenuation of haemodynamic response to direct laryngoscopy and intubation and prevention of post-operative nausea and vomiting.<sup>11</sup> Clonidine is a central alpha-2 agonist & is a moderately potent antihypertensive drug.<sup>12</sup> Clonidine has been utilized

as a preoperative medication to provide anxiolysis, sedation, analgesia, hemodynamic stability, control of salivation, and antiemetic effects.

The present study was designed to evaluate & compare the effects of oral Gabapentin & oral Clonidine on pre-operative anxiolysis & attenuation of stress response to intubation.

## 2. Literature Survey

Hidalgo et al<sup>13</sup> (2005) conducted a study on 61 patients, ASA status I-II, undergoing abdominal hysterectomy, randomly assigned to receive either oral clonidine 100 µg (n = 29) or placebo (n = 32) before surgery and 24 h after surgery. They found that clonidine should be a good therapeutic alternative to other preoperative sedatives & further studies are necessary to compare its effects with those of different anxiolytics on postoperative outcomes over time.

Fassoulaki A et al<sup>14</sup> (2006), studied the effects of gabapentin on pressor response to direct laryngoscopy and tracheal intubation. The authors concluded that Gabapentin attenuates the pressor response but not the tachycardia associated with laryngoscopy and tracheal intubation.

Kamran Montazeri et al<sup>15</sup> (2011) carried out the study to compare the efficacy of oral gabapentin and clonidine premedication for controlling the pressor responses to laryngoscopy and tracheal intubation. In conclusion, study

showed that oral gabapentin 800 mg or clonidine 0.3 mg, given 1 h before operation, comparably blunted the pressor response to laryngoscopy and endotracheal intubation.

### 3. Material and Methods

After obtaining approval of the institutional Ethics Committee and informed consent of the patients, a randomized double blind placebo controlled study was conducted on 120 patients of either sex and ASA I & II physical status, aged 18- 65 years scheduled to undergo elective surgery under general anaesthesia. Patients with ASA grade III, anticipated difficult intubation, multiple intubation(>1) attempts at laryngoscopy, severe renal or hepatic disease, h/o hypertension, IHD, LVF, major cardiac disorders, obesity were excluded from the study.

A similar size 120 thick opaque envelopes were divided into 3 groups A,B,C of 40 each and a staff nurse separated the capsule of Gabapentin, tablets of Clonidine & Placebo capsules into 3 equal groups of 40 each. All patients were examined pre-operatively and details regarding clinical history, general physical examination were recorded and all routine investigations were carried out. All patients were assessed the day before surgery, Visual Analogue scale(VAS) for Anxiety (0=no anxiety, 100= worst imaginable anxiety) was explained to them. Patients were randomly allocated into 3 groups of 40 each. Group A (n=40) received placebo (containing sugar), Group B(n=40) received oral clonidine 300µg and Group C(n=40) received 900 mg Gabapentin, 90 minutes prior to surgery with oral sips of water.

Upon arrival in the operating room, intravenous access was secured. 18 G intravenous cannula was inserted in a peripheral vein and a Ringer lactate solution was started at 6 ml/kg. Monitoring of non invasive blood pressure (NIBP), heart rate, electrocardiogram, SpO2 monitoring and EtcO2 was started and carried out throughout the intraoperative and postoperative period.

After 3 min of preoxygenation, anaesthesia was induced with i.v thiopentone 5mg/kg; i.v succinylcholine 1.5mg/kg to facilitate endotracheal intubation.

Direct laryngoscopy & intubation was performed by an experienced anaesthetist. The duration of laryngoscopy and intubation was limited to less than 15 seconds for all patients. Monitoring of vitals was done by anaesthetist, who was blinded to the drug used in each group. Heart rate (bpm) and Non invasive Systolic blood pressure(mmHg), Diastolic blood pressure(mmHg), Mean Arterial Pressure (mmHg) was recorded before and after administration of the i.v. anaesthetic agent, during laryngoscopy and immediately after intubation and cuff inflation ( 0 min) and 1, 3, 5 & 10 min after intubation and cuff inflation, post extubation and in postoperative room. Maintenance of anaesthesia was carried out using 67% N2O in 33% O2 and halothane 0.5% using controlled ventilation. Neuromuscular blockade was achieved using vecuronium 0.08-0.12 mg/kg. Intra operative analgesia was provided with 1-1.5ug/kg fentanyl. Side-effects pertaining to clonidine and gabapentin were noted pre-operatively as well as post-operatively.

At the end of the study, results were represented as Mean±SD and percentage changes. Paired t test was used for intragroup comparisons of changes from baseline to different study periods (for each group separately). One way ANOVA was used for multiple group comparisons followed by Posthoc Tukey's test for graphic comparisons (Intergroup comparisons). Chi-square test was used for categorical data (Age, gender, ASA grade). A p-value of 0.05 or less was considered for statistical significance. All the analysis was done using SPSS Statistical package version 17.0.

### 4. Results

In our study the demographic data with respect to age, sex, ASA grade, were statistically comparable in the three groups ( table 1).

**Table 1: Demographic Profile of the studied groups**

Patient Characteristics	Group A	Group B	Group C	P value
Number of cases	40	40	40	-
Drop outs	4	3	3	-
Age (yrs) Mean ± SD	39.9± 12.9	35.1 ±10.9	36.9 ±12.0	0.24(NS)
Gender (M:F)	12:24	9:28	13:24	0.56(NS)
ASA 1 : 2	22:14	25:12	24:13	0.85(NS)

Anxiety was assessed using VAS scale before and after giving the drug. The change in the values from baseline was significant in all the 3 groups as p value is <0.01(table 2). However clonidine group (Group A) shows decrease in mean VAS score significantly better as compared to gabapentin group and placebo group (table 3).

**Table 2: Mean Visual Analogue Scale (VAS) anxiety score in the studied groups.**

	Group A (n =36)	Group B (n =37)	Group C (n =37)	p value
Before drug (Baseline)	68.3 ±14.2	67.8± 14.9	66.6±17.6	0.89(NS)
90 minutes after taking drug (preinduction)	58.6± 14.4	31.4±10.9	49.3± 14.1	<0.001(S)

**Table 3: Intergroup comparison of Visual analogue scale(VAS) anxiety score**

	*A - B	**B -C	#A - C
Before giving the drug(baseline)	NS	NS	NS
Pre-induction	<0.01(S)	<0.01(S)	0.01(S)

p<0.05= S, p>0.05=NS ; \*A - B = Placebo compared with clonidine ; \*\*A - C = Placebo compared with gabapentin ; # B - C = Clonidine compared with gabapentin

Hemodynamic parameters HR,SBP and MAP are shown in Tables 3,4,5,6,7,8 respectively and represented graphically in Figures 1,2 and 3. Clonidine group shows less increase in HR(12%) during laryngoscopy and intubation compared to Gabapentin group (33%) and placebo group (37%) group(table 3). There was statistically significant difference in the HR values when clonidine was compared with placebo & gabapentin(table 4).

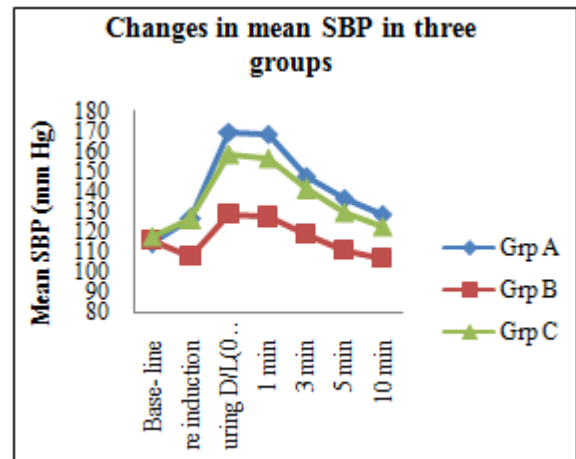
**Table 3: Intragroup Comparison of Changes of Mean Heart Rate**

	Group A (n =36)				Group B (n =37)				Group C (n =37)			
	Mean ±SD	Diff. from BL	% Diff.	P value	Mean ±SD	Diff. from BL	% diff.	P value	Mean ±SD	Diff. from BL	% diff.	P value
Baseline	80.7±14.0	-	-	-	80.8±6.8	-	-	-	80.0±10.3	-	-	-
Preinduction	89.0±14.0	8.3	10%	<0.01 (S)	81.9±5.5	1.1	1%	>0.25(NS)	88.4±10.9	8.4	11%	<0.01 (S)
During D/L (0 min)	110.4±14.2	29.7	37%	<0.01 (S)	90.2±8.7	9.4	12%	<0.01 (S)	106.0±9.1	26	33%	<0.01 (S)
1 min	100.4±13.4	19.7	24%	<0.01(S)	90.1±9.5	9.3	12%	<0.01(S)	102.8±12.3	22.8	28%	<0.01 (S)
3 min	95.3±12.1	14.6	18%	<0.01 (S)	88.1±10.0	7.3%	9%	<0.01 (S)	98.7±13.4	18.7	23%	<0.01 (S)
5 min	91.5±14.8	10.8	13%	<0.01 (S)	82.0±10.0	1.2	2%	>0.07(NS)	93.1±15.6	13.1	16%	<0.01 (S)
10 min	85.9±13.7	5.2	6%	0.01(S)	82.1±9.3	1.3	2%	>0.31(NS)	88.1±13.2	8.1	10%	<0.01 (S)

**Table 4: Intergroup Comparison of Heart Rate (beats /min) changes**

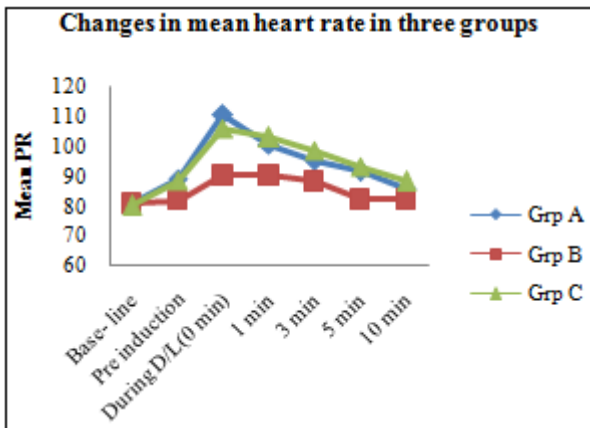
	*A - B	**B - C	#A - C
Baseline	1.0 (NS)	1.0 (NS)	1.0 (NS)
Pre induction	<0.05 (S)	<0.05 (S)	1.0 (NS)
During D/L(0 min)	0.01 (S)	<0.01 (S)	0.21 (NS)
1 min	0.01 (S)	<0.01 (S)	0.66 (NS)
3 min	<0.05 (S)	0.01 (S)	0.43 (NS)
5 min	<0.05 (S)	<0.05 (S)	0.87 (NS)
10 min	0.39( NS)	0.10 (NS)	0.72 (NS)

p<0.05= S, p>0.05=NS; D/L=direct laryngoscopy; min = minutes; \*A - B = Placebo compared with clonidine ; \*\*B - C = Clonidine compared with gabapentin ; #A - C = Placebo compared with gabapentin



**Figure 2**

SBP (clonidine group) remained below baseline at all times except during intubation when transient rise was seen of 11% from the baseline. Subsequently SBP starts settling down and reached almost baseline in 3 minutes which is not seen in other two groups. In gabapentin(group C) and placebo (group A) group SBP remained elevated even after 10 minutes (table 5). There was statistically significant difference in the SBP values when clonidine was compared with placebo & gabapentin(table 6).



**Figure 1**

**Table.5: Intragroup Comparison of changes in mean SBP ( mmHg)**

	Group A (n =36)				Group B (n =37)				Group C (n =37)			
	Mean ±SD	Diff from BL	% diff	P value	Mean ±SD	Diff from BL	% diff	P value	Mean ±SD	Diff from BL	% diff	P value
Baseline	114.4±12.6	-	-	-	116.2±10.9	-	-	-	117.9±11.5	-	-	-
Pre induction	126.4±13.1	12	10%	<0.01 (S)	108.2±11.8	8.0	7%	<0.01 (S)	126.2±12.2	8.3	7%	<0.01 (S)
During D/L (0 min)	169.6±11.7	55.2	48%	<0.01 (S)	128.8±16.1	12.6	11%	<0.01 (S)	158.5±20.8	40.6	34%	<0.01 (S)
1 min	168.8±13.1	54.4	47%	<0.01 (S)	127.1±19.2	10.9	9%	0.01 (S)	156.4±19.8	38.5	33%	<0.01 (S)
3 min	147.9±16.7	33.5	29%	<0.01 (S)	118.7±19.4	2.5	2%	0.45 (NS)	141.1±20.4	23.2	20%	<0.01 (S)
5 min	136.9±	22.5	20%	<0.01	110.9±	5.3	5%	0.07	129.6±	11.7	10%	<0.01

	16.7			(S)	17.7			(NS)	17.2			(S)
10 min	128.6± 17.3	14.2	12%	<0.01 (S)	106.9± 13.0	9.3	8%	<0.01 (S)	123.1± 12.0	5.2	4%	<0.05 (S)

**Table 6:** Intergroup comparison of SBP changes

	*A – B	**A - C	#B - C
Baseline	0.79 (NS)	0.41 (NS)	0.8 (NS)
Pre induction	<0.01 (S)	1.0 (NS)	<0.01(S)
During D/L (0)	<0.01 (S)	0.014 (S)	<0.01(S)
1 min	<0.01 (S)	0.82 (NS)	<0.01(S)
3 min	<0.01 (S)	0.3 (NS)	<0.01(S)
5 min	<0.01 (S)	0.2 (NS)	<0.01(S)
10 min	<0.01 (S)	0.22 (NS)	<0.01(S)

Mean arterial pressure (MAP) showed significant attenuation during intubation in clonidine group as compared to gabapentin and placebo group. MAP in group B returned to almost baseline after 3 minutes, not seen in other two groups(table 7).There was no stastically significant difference in MAP values when placebo compared to gabapentin group(table 8).

**Table 7:** Intragroup Comparison of changes in mean MAP (mmHg)

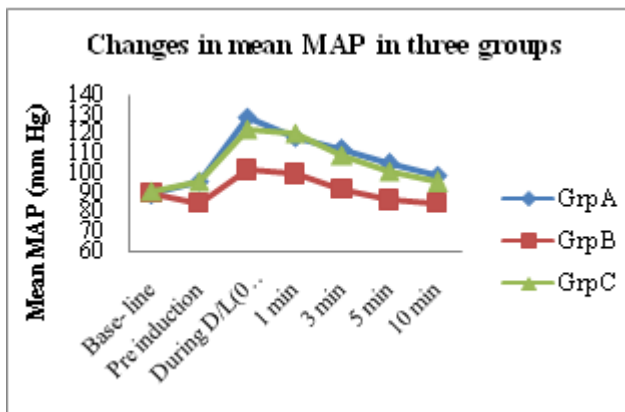
	Group A n =36				Group B n =37				Group C n =37			
	Mean ±SD	Diff from BL	% diff	P value	Mean ±SD	Diff from BL	% diff	P value	Mean ±SD	Diff from BL	% diff	P value
Baseline	88.9± 9.3	-	-	-	89.9± 8.4	-	-	-	90.4± 8.4	-	-	-
Pre induction	95.5± 10.1	6.6	7%	<0.01 (S)	84.7± 7.9	5.2	6%	<0.01 (S)	95.6± 9.0	5.2	6%	<0.01 (S)
During D/L (0 min)	128.8± 8.8	39.9	45%	<0.01 (S)	101.5± 11.7	11.6	13%	<0.01 (S)	122.4± 14.5	32	35%	<0.01 (S)
1 min	118.3± 10.0	29.4	33%	<0.01 (S)	99.3± 14.0	9.4	10%	<0.01 (S)	120.7± 13.3	30.3	34%	<0.01 (S)
3 min	111.7± 10.8	22.8	26%	<0.01 (S)	91.5± 14.7	1.6	2%	0.53 (NS)	109.3± 14.3	18.9	21%	<0.01 (S)
5 min	104.4± 10.7	15.5	17%	<0.01 (S)	86.0± 13.7	+3.9	4%	0.11 (NS)	101.1± 12.2	10.7	12%	<0.01 (S)
10 min	98.9± 9.9	10.0	11%	<0.01 (S)	84.6± 8.9	+5.3	6%	<0.01 (S)	95.1± 9.1	4.7	5%	<0.05 (S)

**Table 8:** Intergroup comparison of MAP changes

	A – B*	B – C**	A – C#
Baseline	0.87(NS)	0.73(NS)	0.96(NS)
Pre induction	<0.01 (S)	<0.01 (S)	1.0 (NS)
During D/L(0 min)	<0.01 (S)	<0.01 (S)	0.06 (NS)
1 min	<0.01 (S)	<0.01 (S)	0.71 (NS)
3 min	<0.01 (S)	<0.01 (S)	0.72 (NS)
5 min	<0.01 (S)	<0.01 (S)	0.49 (NS)
10 min	<0.01 (S)	<0.01 (S)	0.2(NS)

## 5. Discussion

Stress and anxiety activate hypothalamous-hypophysis-adrenal axis and increase glucocorticoid level. Interventions to reduce preoperative anxiety include pharmacological therapy, provision of information, distraction, attention focusing, and relaxation prodedures. Laryngoscopy & intubation can cause striking changes in hemodynamics probably as a result of intense sympathetic nervous system responses to stimulation. Clonidine and other  $\alpha$ -adrenoceptor agonists like dexmedetomidine are under intense investigation as an adjunct to anesthesia.<sup>13</sup> Hypnotic-sedative, analgesic and anxiolytic actions of clonidine may be modulated via the  $\alpha$ 2A adrenoceptor subtype<sup>17</sup>.By its central sympatholytic action, it tends to attenuate the hemodynamic response to any surgical nociceptive stimulus and to improve overall perianesthetic cardiovascular stability<sup>18</sup>.Gabapentin was introduced as an antiepileptic drug in 1993. The mechanism by which gabapentin attenuates the pressor response to laryngoscopy and intubation is unknown, the drug inhibits membrane voltage-gated calcium channels, thus acting in the manner similar to calcium channel blockers<sup>19</sup>. The aim of the present study was to evaluate and to compare the effect of clonidine and gabapentin on preoperative anxiety and attenuating stress response to laryngoscopy and intubation in ASA 1&2 patients undergoing elective surgery.



**Figure 3**

In our study the demographic data with respect to age, sex, ASA grade, were comparable in the three groups (Table 1). We choose VAS scale because it is easy to assess and reliable. Patient was given a scale marked from 0 to 100 and asked to mark on the scale the degree of anxiety he or she is experiencing ranging from 'No anxiety at 0 to Maximum anxiety at 100 point'. Hidalgo et al<sup>20</sup> observed decrease in anxiety in clonidine group(100ug) compared to placebo group which was statistically significant ( $p<0.05$ ). We observed similar results in our study. In our study decrease in mean VAS anxiety score in clonidine group was 54% compared to placebo group (14%) which is statistically significant ( $p<0.05$ ). Christophe Ménigaux et al<sup>21</sup> found that preoperative VAS anxiety scores were lower in the Gabapentin group (1200 mg) than in the Control group ( $P < 0.0001$ ). Our study also shows statistically significant ( $p<0.05$ ) decrease in VAS anxiety scores in gabapentin group (900 mg) i.e. 26% compared to placebo group (14%). The effect of clonidine on hemodynamic parameters is similar to the study done by H.Talebi et al<sup>22</sup>. They observed decrease in HR and SBP with clonidine 200 mcg compared to placebo group which is highly significant. Fassoulaki A et al<sup>23</sup> observed that gabapentin 1600 mg given at various time intervals decreases blood pressure but HR did not differ at all time intervals. But in our study gabapentin 900 mg did not show significant difference in hemodynamic parameters compared to placebo. Memis et al,<sup>24</sup> found a single dose of 800 mg of gabapentin, administered orally 1 hour before surgery to be effective in attenuating the hemodynamic responses to laryngoscopy and intubation. On the contrary we did not find significant attenuation of HR & BP in gabapentin group (with 900 mg dose). Seyed Mojtaba et al<sup>25</sup> evaluated the effect of clonidine 200 mcg and gabapentin 900 mg premedication in modifying the hyperdynamic response following laryngoscopy and tracheal intubation and found that both clonidine and gabapentin have effective role in blunting hyperdynamic responses after laryngoscopy, more so with gabapentin. Our study is contrary in our study we used 300 mcg clonidine and 900 mg gabapentin and found better attenuation of pressor response with clonidine which was statistically significant( $p<0.01$ ) compared to gabapentin. A study done by S.K. singhal et al<sup>26</sup> is similar to our study, comparing the effects of oral clonidine 200mcg and oral gabapentin 900mg observed that clonidine is better than gabapentin in preoperative anxiolysis and attenuating stress response to tracheal intubation. Both clonidine and gabapentin have certain adverse effects.. Most common side-effects with clonidine are dry mouth and sedation, hypotension and marked bradycardia.<sup>27</sup>The most frequent side-effects reported with gabapentin are somnolence, dizziness, ataxia, fatigue, unsteadiness, headache and nausea<sup>28</sup>.It is also pertinent to mention here that these side-effects are transient and usually abolish on their own. <sup>20</sup> However in our study we noted high incidence of dryness of mouth (50%) in clonidine group.Other side effects observed in clonidine group were hypotension(15%) and bradycardia(20%).In Gabapentin group we also observed significant side effects as somnolence(50% cases) and dizziness(5% cases).

## 6. Conclusion

From the present study we conclude that Clonidine, an alpha-2 agonist, when administered 90 minutes prior to surgery, in a dose of 300 micrograms, is effective in decreasing preoperative anxiety and blunting stress response to laryngoscopy and tracheal intubation compared to 900 mg of gabapentin.

## 7. Future Scope

However there is scope of measurement of stress mediators in plasma during intubation. Dose related study to confirm the optimal per kg dose of gabapentin.

## References

- [1] Spielberger C. Anxiety as an emotional state. Anxiety: current trends in theory and research. Vol. 1. New York: Academic Press, 1972
- [2] Lamontagne LL, Hepworth JT, Salisbury MH. Anxiety and postoperative pain in children who undergo major orthopedic surgery. Appl Nurs Res 2001;14:119–24
- [3] de Groot KI, Boeke S, van den Berge HJ et al. The influence of psychological variables on postoperative anxiety and physical complaints in patients undergoing lumbar surgery. Pain 1997;69:19–25
- [4] Kain ZN, Mayes LC, Caldwell-Andrews AA et al. Preoperative anxiety, postoperative pain, and behavioral recovery in young children undergoing surgery. Pediatrics 2006;118:651–8
- [5] Kain ZN, Sevarino FB, Rinder C et al. Pre-operative anxiolysis & post operative recovery in women undergoing total abdominal hysterectomy. Anaesthesiology 2001;94:415-42
- [6] Caumo, M. P. L. Hidalgo, A. P. Schmidt et al. Effect of pre-operative anxiolysis on post operative pain responses in patients undergoing total abdominal hysterectomy. Anaesthesia 2002;57:740- 746.
- [7] Hoda MQA, Khan MU, Abbas MQ et al. Haemodynamic response of intravenous tramadol and intravenous morphine during laryngoscopy and endotracheal intubation. JPMA 2008; 58 : 30.
- [8] Rao MS, Airway management. In: editor(s) Barash PG, Cullen BF, Stoelting RK. Clinical anesthesia 3rd ed Philadelphia: Lippincott - Raven,1997 : 586 - 7.
- [9] Loeb HS, Saudye A, Croke RP et al. Effects of pharmacologically-induced hypertension on myocardial ischemia and coronary hemodynamics in patients with fixed coronary obstruction. Circulation 1978; 57: 41-6.
- [10] Dohi S, Gold MI. Pulmonary mechanics during general anaesthesia. The influence of mechanical irritation on the airway. Br J Anaesth 1979 ; 51 : 205-14.
- [11] Kong VKF and Irvin MG. Gabapentin: a multimodal drug? Br. J Anaesth 2007; 99 : 775-86
- [12] K D Tripathi. Antihypertensive drugs: Essentials of medical pharmacology 5th ed. Jaypee Brothers Medical Publishers Ltd 2003;Chapter 38:p510.
- [13] Maria Paz Loayza Hidalgo, Jorge Alberto SzimanskiAuzani, Leandro CarpenedoRumpelet al. The Clinical Effect of Small Oral Clonidine Doses on Perioperative Outcomes in Patients Undergoing

Abdominal Hysterectomy. Anaesth Analg 2005;100(3): 795-802

- [14] Fassoulaki A, Melemeni A, A. Paraskeva, et al. Gabapentin attenuates the pressor response to direct laryngoscopy and tracheal intubation Br J Anaesth 2006; 96: 769–73.
- [15] Kamran Montazeria, ParvizKashefi a, AzimHonarmanda. Attenuation of the pressor response to direct laryngoscopy and tracheal Intubation: oral clonidine vs. oral gabapentin premedication. *JRMS*.2011;16((Special Issue): ):377-386
- [16] Moyers JR. Preoperative medication. In: Barash PG, Cullen BF, Stoelting RK, eds. Clinical anesthesia. 3rd ed. Philadelphia: Lippincott-Raven, 1997:519–33.
- [17] Caumo, M. P. L. Hidalgo, A. P. Schmidt et al. Effect of pre-operative anxiolysis on post operative pain responses in patients undergoing total abdominal hysterectomy. *Anaesthesia* 2002;57:740- 746.
- [18] Iftikhar T, Taqi A, Sibtain A et al. Oral gabapentin reduces hemodynamic response to direct laryngoscopy and tracheal intubation. *Anaesth Pain & Intensive Care* 2011; 15 (1): 17-20.
- [19] Kayhan Z, Aldemir D, Mutlu H et al. Which is responsible for the haemodynamic response due to laryngoscopy and tracheal intubation? Catecholamines, vasopressin or angiotensin? *European journal of Anesthesiology* 2005; 22 : 780-85.
- [20] Maria Paz Loayza Hidalgo, Jorge Alberto Szimanski Auzani, Leandro Carpenedo Rumpel et al. The Clinical Effect of Small Oral Clonidine Doses on Perioperative Outcomes in Patients Undergoing Abdominal Hysterectomy. *Anaesth Analg* 2005;100(3): 795-802
- [21] Meningaux C, Frédéric Adam, Bruno Guignard et al. Pre operative Gabapentin decrease anxiety & improves early recovery from knee surgery. *Anaesth &Analg* 2005; 100:1394-1399.
- [22] Talebi H, Nourozi A, Fateh S, et al. Effects of oral clonidine premedication on haemodynamic response to laryngoscopy and tracheal intubation *Pak J Biol Sci* 2010; 13: 1146-50.
- [23] Fassoulaki A, Melemeni A, A. Paraskeva, et al. Gabapentin attenuates the pressor response to direct laryngoscopy and tracheal intubation Br J Anaesth 2006; 96: 769–73.
- [24] Memis D, Turan A, Karamanlioglu B et al Gabapentin reduces cardiovascular responses to laryngoscopy & tracheal intubation. *Eur J Anaesthesiol* 2006;23:686-690.
- [25] Seyed Mojtaba Marashi, Mohammad Hossein Ghafari and Alireza Saliminia “Attenuation of hemodynamic responses following laryngoscopy and tracheal intubation.” *M.E.J. anesth* 2009;20 (2):233 237
- [26] Suresh K. Singhal, Kiranpreet Kaur, Promila Arora, et al.: Oral clonidine versus gabapentin. *Saudi Journal of Anesthesia*. Vol. 8, Issue 2, April-June 2014
- [27] Westfall TC, Westfall DP. Adrenergic agonist and antagonist. In: Bruton LL, Lazo JS, Parker JS, editors. Goodman and Gilman’s the Pharmacological Basis of Therapeutics. 11th ed. USA: McGraw-Hill; 2006. p. 255-6.
- [28] Memiş D, Turan A, Karamanlioğlu B, Seker S, Türe M. Gabapentin reduces cardiovascular responses to

laryngoscopy and tracheal intubation. *Eur J Anaesthesiol* 2006;23:686-90.

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