



ROLE OF ORAL GABAPENTIN IN ATTENUATING CARDIOVASCULAR RESPONSE TO LARYNGOSCOPY AND TRACHEAL INTUBATION.

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ABSTRACT... Objectives: To determine the role of 800 mg oral gabapentin in attenuating cardiovascular response to laryngoscopy and tracheal intubation. **Study Design:** Double Blind Randomized Control Trial. **Setting:** Independent University Hospital/Independent Medical College, Faisalabad, Pakistan. **Period:** Six months from January 1st 2019 to June 30th 2019. **Material & Methods:** This study included 60 patients which were divided into two equal groups. 800 mg oral gabapentin was given to group I while capsule placebo was administered to group II patients in pre-operative area one hour prior to surgery. Heart rate, systolic, diastolic and mean arterial blood pressure were taken after induction of anesthesia at base line and then 1,2,3,4,5,10 and 15 minutes after endotracheal intubation. SPSS version 11 was used to analyze the data. Heart rate systolic, diastolic and mean arterial blood pressure were dependent variables while placebo and gabapentin were independent variables. **Results:** Out of total 60 patients there were 36 (60 %) males and 24 (40 %) females. In group I mean age was 37.1 while in group II it was 36.3. As compare to group II there was decreased cardiovascular response in group I. There was a significant decrease in systolic blood pressure at 1,2 and 10 minutes; diastolic blood pressure at 3 minutes; heart rate at 10 and 15 minutes and mean arterial blood pressure at 3 minutes after induction in group I. **Conclusion:** Cardiovascular response to laryngoscopy and intubation is significantly reduced with oral gabapentin.

Key words: Cardiovascular Response, Gabapentin, Laryngoscopy and Endotracheal Intubation.

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INTRODUCTION

Endotracheal tube (ETT) is passed for airway maintenance and protection from aspiration of gastric contents.¹ This endotracheal intubation needs laryngoscopy to visualize vocal cords so that ETT can be placed in right position.

The response of the body to this laryngoscopy and tracheal intubation is stress response, which may include secretion of stress hormones e.g. catecholamines, glucagon, and antidiuretic hormone.² There is a significant increase in intracranial pressure, intraocular pressure, heart rate and blood pressure caused by stress hormone.³ Such change in B.P and HR is called cardiovascular response or presser response.

Cardiovascular response is well tolerated by

young children and adults not having any cardiac problem, but this response can be catastrophic in cardiac patients, geriatric patients⁴ and very sick patients, who have decreased cardiac reserves, because of increase in myocardial oxygen demand which is not properly met in compromised patients. This is due to increase in blood pressure and heart rate which may result in myocardial ischemia, infarction, and cardiac failure, depending upon the severity of the disease. The cardiovascular response can be minimized mainly by two strategies; one is avoiding the endotracheal intubation and laryngoscopy by using supraglottic airways, secondly when intubation is indispensable, to use different drugs which can help to decrease the pressor response.

The most commonly used equipment's include, oropharyngeal airway⁵, laryngeal mask airway⁶, laryngeal tube⁷, and I Gel.⁸

Many drugs have been used to attenuate the cardiovascular response to tracheal intubation and laryngoscopy. Lidocaine either sprayed directly on the vocal cords or given intravenously not only decreases the sensitivity of upper airway but also attenuate the heart rate and blood pressure changes during laryngoscopy.⁹

There is increase in anesthetic depth and decrease in cardiovascular response to laryngoscopy and intubation with ultra-short acting opioids like fentanyl, ramifentanil and sufentanil.¹⁰

Beta blockers are also used to decreased the laryngoscopy and tracheal effects on cardiovascular system. Among the beta blockers the ultra-short acting esmolol is used frequently due to its cardio selective adrenergic receptor blocking properties.^{11,12}

There are recent recommendations on the role of gabapentin to attenuate the cardiovascular effects of laryngoscopy and intubation.¹³ With combination of other anti-seizure drugs gabapentin was recommended to be used for treatment of partial seizures by FDA in 1994.¹⁴ It was recommended to be used in the treatment of nerve related pain, post herpetic neuralgia¹⁵ and other painful neuropathies in 2002.¹⁶ It also has limited role in the treatment of anxiety, depression, and restless leg syndrome.

Gabapentin, anticonvulsant is also effective in neuropathic pain management. It is used for decreasing opioid requirement postoperatively and treating acute post-operative pain in human studies. We conducted this study to evaluate the effect of gabapentin in attenuating cardiovascular response to laryngoscopy and intubation in patients undergoing elective surgery.

MATERIAL & METHODS

This randomized controlled trial was conducted at Independent University Hospital Faisalabad over six months from January 1st 2019 to June 30th 2019. Sample size of sixty cases (30 in each group) was calculated with 80 percent power of test and 9 percent confidence interval. After taking informed consent, non-probability consecutive sampling was done in sixty patients. The inclusion criteria were patient of 20-30 years of age, ASA I&II undergoing elective surgical procedures. Patients in whom laryngoscopy time exceeds fifteen seconds, pregnant patients and patients known case of hypertension and ischemic heart disease were excluded.

Demographic data, ASA status and information regarding surgical procedure were recorded. One hour before induction of anaesthesia 800 mg oral gabapentin was given to group I and placebo capsule was given to group II.

Every patient was premedicated with midazolam 2mg I/V. After standard induction with inj. Propofol 2mg / kg, inj. Rocuronium 0.6 mg/ kg and waiting for 2 minutes patient were intubated after direct laryngoscopy. Anaesthesia was maintained with sevoflurane.

Study variables, pulse and non-invasive blood pressure were taken from the monitor at 1,2,3,4,5, 10 and 15 minutes. A designed proforma was used to record the data of study variables and demographic data like name, age, sex.

SPSS version 11 was used to analyse the data. Standard deviation and mean were used for age description while sex was described in percentage. Paired t-test was used to compare systolic, diastolic and mean blood pressures. P-value < 0.05 was considered significant.

RESULTS

Gender	Count/Percentage	Study Groups		Total
		Gabapentin	Placebo	
Male	Count	16	20	36
	%	57.7	63.3	60.0
Female	Count	14	10	24
	%	43.33	36.67	40.0
Total	Count	30	30	60
	%	100	100	100

Table-I. Sex distribution of the subject under study

Study Groups	N	Mean	Std. Deviation
Gabapentin	30	38	12
Placebo	30	35	14

Table-II. Comparison of mean age of the subject under study

Heart Rate Observation Baseline and After Intubation	I (Gabapentin) N=30		II (Placebo) N=30		P-Value for t-test
	Mean	Standard Deviation	Mean	Standard Deviation	
Baseline	85	10	90	16	0.188 (>0.05)
1-minute postintubation	102	14	106	12	0.077 (>0.05)
2-minute postintubation	105	14	108	15	0.198 (>0.05)
3-minute postintubation	100	15	107	14	0.242 (>0.05)
4-minute postintubation	100	13	105	18	0.231 (>0.05)
5-minute postintubation	94	14	105	19	0.125 (>0.05)
10-minute postintubation	92	15	100	18	0.041 (<0.05)
15-minute postintubation	88	14	98	16	0.002 (<0.05)

Table-III. Comparison of mean heart rates in series of observations before and after induction with Gabapentin and placebo as pre-anesthetic drugs.

Systolic BP Observation Baseline and After Intubation	I (Gabapentin) N=30		II (Placebo) N=30		P-Value for t-test
	Mean	Standard Deviation	Mean	Standard Deviation	
Baseline	122	12	125	13	0.302 (P>0.05)
1-minute after intubation	135	22	148	23	0.026 (P<0.05)
2- minute after intubation	118	21	134	24	0.01 (P<0.05)
3-minute after intubation	119	16	125	21	0.234 (P>0.05)
4-minute after intubation	115	14	118	13	0.156 (P>0.05)
5-minute after intubation	107	13	115	11	0.101 (P>0.05)
10-minute after intubation	106	12	118	16	0.008 (P<0.05)
15-minute after intubation	106	13	115	13	0.007 (P<0.05)

Table-IV. Comparison of mean systolic BP before and after induction with Gabapentin and placebo as preanesthetic drugs.

Diastolic BP Observation Baseline and After Intubation	I (Gabapentin) N=30		II (Placebo) N=30		P-Value for t-test
	Mean	Standard Deviation	Mean	Standard Deviation	
Baseline	77	12	78	11	0.946 (>0.05)
1-minute after intubation	86	19	95	19	0.187 (>0.05)
2- minute after intubation	72	16	84	17	0.018(>0.05)
3-minute after intubation	69	15	75	17	0.187 (>0.05)
4-minute after intubation	70	13	70	14	0.590 (>0.05)
5-minute after intubation	62	12	66	10	0.480 (>0.05)
10-minute after intubation	62	11	69	13	0.081 (>0.05)
15-minute after intubation	60	12	66	13	0.075 (>0.05)

Table-V. Comparison of mean diastolic BP in series of observation before and after induction with Gabapentin and placebo as preanesthetic drugs.

Mean BP Observation Baseline and After Intubation	I (Gabapentin) N=30		II (Placebo) N=30		P-Value for t-test
	Mean	Standard Deviation	Mean	Standard Deviation	
Baseline	93	12	97	11	0.412 (P>0.05)
1-minute after intubation	105	20	112	20	0.106 (P>0.05)
2- minute after intubation	91	18	103	18	0.011 (P<0.05)
3-minute after intubation	92	16	95	20	0.325 (P>0.05)
4-minute after intubation	86	12	89	13	0.367 (P>0.05)
5-minute after intubation	80	12	85	11	0.065 (P>0.05)
10-minute after intubation	79	12	88	13	0.01 (P<0.05)
15-minute after intubation	78	14	87	12	0.020 (P<0.05)

Table-VI. Comparison of mean of mean BP in series of observation before and after induction with Gabapentin and placebo as preanesthetic drugs.

DISCUSSION

Our study result showed that as compared to placebo group there was trends of less cardiovascular response in gabapentin group.

Statistically it was observed that as compared to placebo mean heart rate with Gabapentin was falling at lower side but at 10 and 15 minutes after intubation it was significant. However, it was also significantly low at 1 minute at $P=0.1$.

Statistical analysis also showed that as compared to placebo the mean systolic blood pressure was at lower side but after intubation at 1,2,10 and 15 minutes it was significant $P=0.05$.

As compared to placebo mean diastolic with gabapentin was generally falling at lower side but at it was significant 3 minute after intubation.

As compared to placebo mean BP with Gabapentin was generally falling at lower side but after intubation at 2, 10 and 15 minutes it was significant $P=0.05$.

In their study Fassoulaki and colleagues observed the same effect of gabapentin.¹⁷ They took 46 patients, placebo capsule to the one group and giving 1600 mg of gabapentin to other group, starting the day before surgery at 6 hours interval. They observed the results at 1, 3, 5 and 10 minutes of interval after intubation before and after the anesthetic. Their results were not very

different from our study and their results showed that systolic blood pressure at 1, 3, 5, and 10 minutes post intubation period was significantly lower. The difference that why in our study at 3, 4, and 5 minutes interval systolic blood pressure was not significantly low could be explained that in our study the dose of gabapentin used was 800 mg and given one hour before anesthesia while 1600 mg of gabapentin was used by Fassoulaki and his colleagues and given the drug one day before.

The effect of gabapentin in attenuation of hemodynamic responses to laryngoscopy and tracheal intubation was evaluated by Shashi Kiran and Deepak Vermal.¹⁸ A total of one hundred patients were studied. Gabapentin 800 mg were given to patients in group A while placebo capsules were given to group B the night before and on the morning of surgery. At 0, 1, 3, 5 and 10 min after intubation systolic blood pressure was significantly lower in the gabapentin as compared to the control group. At 0, 1, 3, and 5 min after intubation diastolic blood pressure was lower in the gabapentin group. At 0, 1, 3, and 5 min after intubation mean atrial pressure was also lower in the gabapentin group. Because of the use of same strength of gabapentin 800 mg as we used the results were similar in both studies.

Another study comparing the effect of gabapentin on arterial blood pressure and heart rate at after induction and endotracheal intubation was conducted by D. Memis, A. Turan, B. Karamanlioglu, S. Seker and M. Ture.¹⁹ There was a significant increase in arterial blood pressure and heart rate associated with endotracheal intubation in patients receiving gabapentin 400 mg.

The results showed that 800 of gabapentin which we used in our study was sufficient in attenuating cardiovascular response to tracheal intubation. Dose of 400 mg of gabapentin was not sufficient in this regard.

CONCLUSION

It was concluded that gabapentin given in a dose of 800 mg orally one hour before the induction

of anesthesia showed significantly decrease in cardiovascular response to laryngoscopy and intubation as compared to placebo. Although 1600 mg of gabapentin used in one study by Fassoulaki has shown to be more effective in attenuating cardiovascular response to laryngoscopy and intubation but we did not use this dose because of the general observation that with this much dose there is prolonged post-operative sedation.

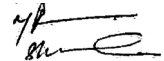
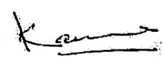
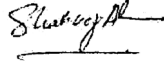
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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Mohsin Riaz Askri	Concept, Write up, Data collection.	
2	Shumyala Maqbool	Data collection, Abstract conclusion, Methodology.	
3	Kausar Abbas Shah	Proof reading and analysis.	
4	Shahbaz Ahmad	Literature review, Data analysis and referencing.	