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Original research article

Comparison of the effect of melatonin versus pregabalin in attenuation of blood pressure responses to laryngoscopy and intubation in general anaesthesia

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Abstract

Pregabalin shares structural similarities with the inhibitory neurotransmitter gamma-aminobutyric acid (GABA), but not functionally. It operates on the central nervous system by inhibiting the production of the neurotransmitter glutamate, and it has analgesic, anticonvulsant, and anxiolytic properties. Melatonin has a wide range of actions, many of which must be attributed to changes in the CNS. In the periphery, however, there are multiple melatonin target sites. A receptor is not required for any endogenous free-radical scavenging function. Fifty normotensive patients of status ASA grade 1 and 2 between age 20-45 years old, 40-65 kg body weight, undergoing elective surgeries under general anaesthesia were included in the study after ethical clearance. On the day of operation, the patient was evaluated preoperatively. After taking written and informed consent, indication for surgery, baseline heart rate and blood pressure were noted. Basic appropriate investigations like Hb, complete blood count, serum urea and creatinine, blood sugar, urine examination, chest X-ray and ECG were done. Comparison between systolic blood pressure at all time show statistically significant difference ($p< 0.05$) between the two study groups. Comparison between diastolic blood pressure at all time show statistically significant difference ($p< 0.05$) between the two study groups.
Keywords: Melatonin, pregabalin, blood pressure

Introduction

Melatonin (N-acetyl-5-methoxytryptamine), an endogenous sleep-regulating hormone, is secreted by pineal gland. Exogenous melatonin injections help people fall asleep faster and sleep better. It differs from benzodiazepines and its derivatives in that it induces a normal sleep pattern without causing cognitive impairment. Various studies have utilised this substance as a premedication in both adults and children in various dosing patterns. Studies have been done in view of pre-operative anxiolysis, sedation in the critical care unit and pre-operative cognitive and psychomotor skills [1, 2].

Pregabalin [(S)-3 amino methyl-5-methylhexanoic acid], is a gabapentinoid compound. Pregabalin shares structural similarities with the inhibitory neurotransmitter gamma-aminobutyric acid (GABA), but not functionally. It operates on the central nervous system by inhibiting the production of the neurotransmitter glutamate, and it has analgesic, anticonvulsant, and anxiolytic properties. It is also useful in suppressing the neuropathic component of acute nociceptive pain after surgery. After oral administration, it is effectively absorbed and tolerated, with peak plasma concentrations occluding within 1 hour. It has very little hepatic metabolism. It is non-narcotic and reduces pain and haemodynamic response in a clinically significant [3, 4].

Methodology

Study design: Observational Analytical Study.

Study Population

A total of 50 patients planned for general anesthesia admitted in various surgical departments was included in the study after a written informed consent.

Inclusion criteria

- Patients between ages 20 - 45 yrs undergoing elective surgery.

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- ASA class 1 and 2.
- Both sexes.

Exclusión criteria

- Younger than 20 yrs or older than 45 yrs.
- ASA grade 3 and 4.
- Anaemia.
- Patients with compromised renal status, Cardiac disease, hypertension, COPD and asthma, diabetes, psychiatry illness, antiepileptic drugs, sedatives, anxiolytics, allergy to any anaesthetic medication, pregnant and lactating women.
- Anticipated difficulty in intubation (mallampati class 3 and 4) and those requiring more than three attempt or more than 20s for laryngoscopy.

Fifty normotensive patients of status ASA grade 1 and 2 between age 20-45 years old, 40-65kg body weight, undergoing elective surgeries under general anaesthesia were included in the study after ethical clearance.

On the day of operation, the patient was evaluated preoperatively. After taking written and informed consent, indication for surgery, baseline heart rate and blood pressure were noted. Basic appropriate investigations like Hb, complete blood count, serum urea and creatinine, blood sugar, urine examination, chest X-ray and ECG were done.

Patients were advised 6-8 hours fasting prior to surgery and are received tablet ranitidine 150 mg the previous night.

1. Group A (n=25) patients received oral 6mg melatonin tablets (two tablets of 3mg each) 120 mins before surgery.
2. Group B (n=25) patients received 150 mg of pregabalin tablet 90 mins before surgery.

Total of 50 patients who received these tablets before surgery were observed and studied.

Patients were taken to the operation theatre, pulse oximeter, noninvasive blood pressure, ECG and end-Tidal CO_2 monitors were connected. Baseline vital parameters - HR, SBP, DBP and MAP were measured before induction.

Results

Table 1: Comparison of SBP between 2 groups

	Group	N	Mean	Std. Deviation	t	p value
SBP_Baseline	1	25	136.44	13.039	6.896	<0.001
	2	25	115.52	7.752		
SBP_B_Ind	1	25	111.24	15.447	-3.343	0.002
	2	25	122.40	6.325		
SBP_A_Ind	1	25	111.28	11.312	-6.830	<0.001
	2	25	129.84	7.526		
SBP_0 m	1	25	118.88	10.248	-2.783	0.008
	2	25	126.24	8.353		
SBP_3 m	1	25	120.40	10.153	-3.065	0.004
	2	25	127.76	6.411		
SBP_5 m	1	25	119.48	9.297	-3.674	0.001
	2	25	127.12	4.658		
SBP_10 m	1	25	120.40	7.724	-2.474	0.017
	2	25	126.36	9.242		

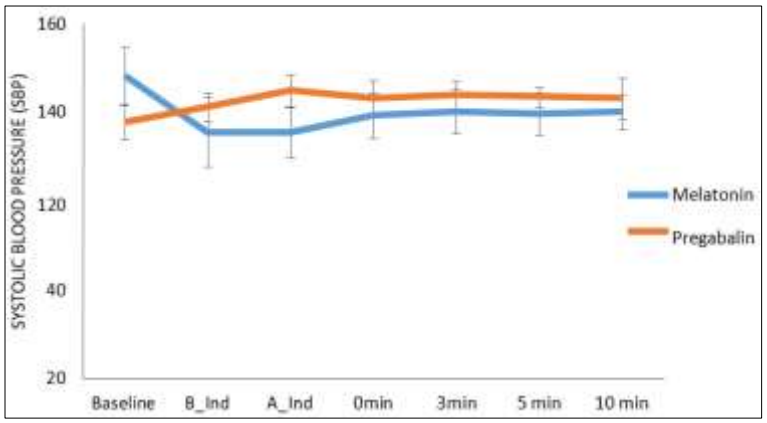

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Fig 1: Comparison of SBP between 2 groups

Comparison between systolic blood pressure at all time show statistically significant difference ($p< 0.05$) between the two study groups as seen in the above table and graph.

Table 2: Comparison of DBP between 2 groups

	Group	N	Mean	Std. Deviation	T	P
DBP_Baseline	1	25	88.00	9.274	-3.445	0.001
	2	25	80.40	5.972		
DBP_B_Ind	1	25	67.28	8.080	-7.531	<0.001
	2	25	82.16	5.684		
DBP_A_Ind	1	25	66.88	7.721	-7.685	<0.001
	2	25	81.76	5.840		
DBP_0 m	1	25	68.32	8.076	-11.562	<0.001
	2	25	90.16	4.896		
DBP_3 m	1	25	73.12	7.002	-8.750	<0.001
	2	25	87.92	4.743		
DBP_5 m	1	25	75.44	7.036	-5.520	<0.001
	2	25	85.12	5.231		
DBP_10 m	1	25	78.28	6.742	-2.746	0.008
	2	25	82.88	4.969		

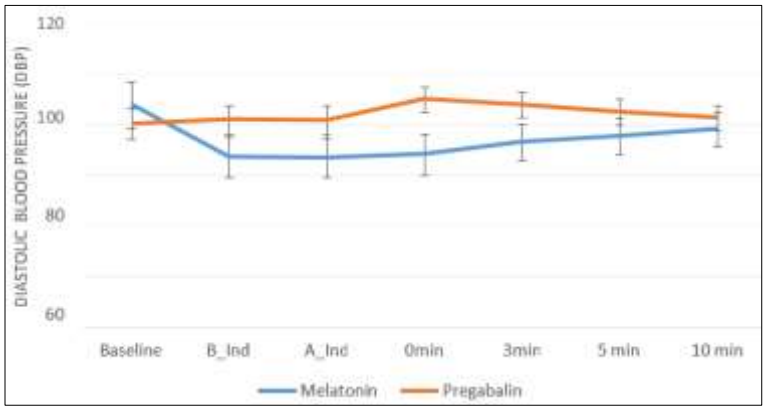

Fig 2: Comparison of DBP between 2 groups

Comparison between diastolic blood pressure at all time show statistically significant difference ($p< 0.05$) between the two study groups as seen in the above table and graph.

Discussion

In our study, the Melatonin group had lower systolic, diastolic and mean arterial blood pressure than the Pregabalin group at all times until 10 minutes after intubation, whereas the Pregabalin group had a considerable rise.

Mohammed *et al*. compared the effects of oral melatonin 6 mg and 9 mg with placebo administered 1 hour prior to surgery on the pressor response to LETI. They found that both melatonin groups had lower blood pressure in terms of systolic, diastolic, and mean blood pressure, as well as a lower perfusion index, as compared to the placebo group [5].

Dr. Debkamal Mukherjee conducted a comparative study of oral melatonin 6 mg and oral pregabalin 150 mg for attenuation of hemodynamic stress response to laryngoscopy and endotracheal intubation in laparoscopic cholecystectomy and discovered that both oral melatonin 6 mg and oral pregabalin 150 mg are effective in blunting haemodynamic stress response to laryngoscopy and tracheal intubation. Melatonin was found to be more effective than pregabalin in lowering of blood pressure and heart rate changes and myocardial oxygen demand associated with laryngoscopy and tracheal intubation without any significant adverse effect [6].

Banu A *et al*. conducted a hospital-based comparative study to assess the efficacy of 150 mg oral pregabalin and 6 mg oral melatonin as premedication to reduce stress and haemodynamic responses during cholecystectomy during laparoscopic surgery. They observed that SBP, DBP in Melatonin was slightly lower as compare to Pregabalin [7].

Syed Faheem Maqbool *et al*. did a comparative study on preoperative oral Pregabalin and Melatonin for attenuation of haemodynamic responses to LETI and observed all three groups had similar baseline values for heart rate, systolic, diastolic, and mean arterial blood pressures. All haemodynamic parameters in the pregabalin and control groups increased significantly after induction. There was a statistically

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significant increase in heart rate in the melatonin group from baseline values at the time of induction. The difference in mean haemodynamic parameter values between the three groups at induction was statistically significant [8].

The findings of this investigation are consistent with those of Rastogi B *et al*., who discovered that 150 mg of pregabalin successfully reduced the haemodynamic response to airway instrumentation [9].

The impact of pregabalin premedication on hemodynamic responses to laryngoscopy and intubation was studied in a research by Bhandari G *et al*. They discovered that during laryngoscopy and intubation, the pregabalin group had significantly lower SBP and DBP, than the placebo group [10].

Conclusion

There was significant statistical difference in SBP and DBP between Melatonin and Pregabalin groups. Melatonin group showed significant decrease in SBP and during study period compared to Pregabalin group.

Melatonin was more effective in attenuating the hemodynamic pressor responses to laryngoscopy and endotracheal intubation when compared to the Pregabalin group.

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