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# COMPARATIVE STUDY OF TWO DIFFERENT DOSES OF FENTANYL CITRATE 2µg/kg & 4µg/kg IN ATTENUATION OF HAEMODYNAMIC RESPONSES DURING LARYGOSCOPY AND INTUBATION

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**ABSTRACT**

Cardiovascular responses to laryngoscopy and intubation of the trachea are recognised since long and various attempts have been made to attenuate these responses by use of different drugs, techniques or combination of both. To find a safe and effective dose of Fentanyl citrate in attenuating the pressure response to laryngoscopy and tracheal intubation, we have compared the effects oftwo different doses of Fentanyl citrate i.e.2 µg/kg and 4µg/kg given prior toinduction of anaesthesia. 60 adult patients under going major surgeries in which oral intubation was required. These were dividedinto two different groups (30 in each group). Intra Operative stress response due to Laryngoscopy and Intubation were reduced in study group that receive the Inj, Fentanyl Citrate 4 µg/kg compare to the other group. The intraoperative requirements of inhalational agent and muscle relaxants were significantly decreased throughout the surgery in the group 2 in which Inj. fentanyl was given in a dose of 4µg/kg whereas in group 1 requirements of both increased slightly after the first hour.

**Key Words**: Fentanyl, Analgesia, Stress Response, Laryngoscopy, Intubation.

## INTRODUCTION

Laryngoscopy and intubation in the patients who are in a lighter plane of anaesthesia is associated with significant increase in blood pressure and heart rate [1-4]. These increases in the pulse rate and blood pressure are usually of short duration and well tolerated by healthy patients. However, in patients with hypertension, myocardial ischemia & cardiovascular disease these changes may lead to further deterioration & complications like myocardial infarction, dysrhythmia (like VPC's, Bigemini, etc), cardiac failure and cerebrovascular catastrophes [5-8]. These changes occur from reflex sympathetic discharge resulting from pharyngeal and laryngotracheal stimulation with increases in plasma concentration of epinephrine and nor-epinephrine. These hemodynamic responses are usually notcompletely attenuated by usual premedication. So many methods have been identified to attenuate these responses including intravenous agents like narcotics, vasodilators, adrenergic and calcium channel blockers. Fentanyl citrate has been identified as an effective agent in this regard [8-14].

Fentanyl citrate is effective in blunting the pressure response to laryngoscopy and intubation with different potency with different dose titration [15-19]. Off course it would have some side effects like respiratory depression and chest wall rigidity insusceptible persons. But with doses used in clinical setting to attenuate this pressure response, side effects are minimal [20-23].

This study was therefore designed to compare the two different doses of fentanyl citrate that is 2µg/kg and 4µg/kg in attenuation of haemodynamic effects during laryngoscopy and intubation [24-26].

## METHODS

Approval from institutional board & ethical committee was obtained. Written informed consent was taken from 60 adult patients undergoing major surgeries in

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which oral intubation was required. These were divided into two different groups (30 in each group).
Group 1: Receives Inj. Fentanyl Citrate 2 µg/kg
Group 2: Receives Inj, Fentanyl Citrate 4 µg/kg

Patients were instructed to remain NBM for at least 8 hours before surgery. Anaesthetic technique was identical in all the patients.

After arrival in the operation theatre patients were applied basic routine monitors like non-invasive blood pressure, pulse oxymetry and E.C.G. H.R., S.B.P., D.B.P., M.A.P. were recorded as a baseline value & was designated as "A".

After securing intravenous line all the patients were preloaded with one unit of Inj. Ringer Lactate. Premedication in the form of Inj. Glycopyrrolate 4 µg/kg & Inj.Ondensetron (0.15 mg/kg) were given in both groups prior to injection of the study drug.

Now, patients in group 1 study received Inj. Fentanyl citrate in a dose of 2 µg/kg and group 2 received Fentanyl citrate in a dose of 4 µg/kg. After five minutes H.R., S.B.P., M.A.P., D.B.P. were recorded and designated as B- pre induction value.
Then patients were preoxygenated with 100% O2. After 10 minutes of Inj.Fentanyl patients were induced with Inj. Thiopentone Sodium 5-7mg/kg followed by Inj.Succinylcholine 2mg/kg.

Trachea was intubated with appropriate size cuffed endotracheal tube after cessation of fasciculations. Endotracheal tube was fixed & properly secured after confirming presence of bilateral equal air entry.

Anaesthesia was maintained with O2 (50%) +N2O (50%) + Isoflurane/sevoflurane and intermittent doses of inj. Vecuronium bromide.

All patients were ventilated with mechanical ventilators and adjusted to maintain an end tidal CO2 concentration between 30-40 mm of Hg. All the parameters including heart rate, systolic arterial pressure, diastolic arterial pressure, and mean arterial pressure were recorded at following intervals.

During laryngoscopy & intubation : E
- 1minute after intubation : E + 1
- 3 minute after intubation : E + 3
- 5 minute after intubation : E + 5
- 10 minute after intubation : E + 10

We had defined following parameters for study
1. Hypotension was defined as SBP < 25% of baseline value or 90 mm of Hg, whichever was lower.
2. Hypertension was defined as SBP >25 % of baseline value or 150 mm of Hg, whichever was greater.
3. Tachycardia was defined as HR > 25 % of baseline value
4. Bradycardia was defined as HR < 60 beats per minute
5. An arrhythmia was defined as any ventricular or supraventricular premature beat or any rhythm other then sinus.

Incidences of all these parameters were recorded in all the groups.
- Fast I.V. fluids were given if there was hypotension.
- After 15 minutes, if hypotension persisted even after giving adequate I.V. fluids, Isoflurane was discontinued.
- Concentration of isoflurane was increased if there was hypertension.
- If hypertension persisted even after increasing the concentration of Isoflurane bolus dose of injection Metoprolol hydrochloride 0.5-2 mg I.V. was given.
- Bradycardia was treated with injection Atropine sulphate 0.6mg I.V.

**Post-operative Data**

After completion of surgery neuromuscular blockage was reversed with Inj. Glycopyrrolate (8 µg/kg) and Inj. Neostigmine bromide(40-70 µg/kg). After thorough oral suction & endotracheal suction (when required) trachea was extubated after confirming adequate tone & power.

After confirming that there were no side effects related to study drug fentanyl like nausea, vomiting, pruritus, chest wall rigidity, hypotension, respiratory depression etc. patients were shifted to post-operative ward. Vital data was recorded.

**RESULTS**

Group 1: Receives Inj. Fentanyl Citrate 2 µg/kg
Group 2: Receives Inj, FentanylCitrate 4 µg/kg.
There was no significant difference in the parameters mentioned above in both the groups.
Age: pValue:0.2853
Weight:-pValue:0.32091
Both groups were comparable demographically.

Above table shows the changes in heart rate in each of the two groups during the study. It shows that heart rate increased during intubation in the group1 patients while it either remained stable or decreased in group2 patients. These data indicates that there was a persistent & significant decrease in heart rate from baseline in group2. It was transiently increased during the time of intubation in the first group but returned to baseline in10min.

Above table shows the changes in systolic blood pressure during the study period. Looking from the data in the table we can see that there was a persistent decrease in S.B.P. in group 2 from the baseline throughout the study period.

Above table shows S.B.P.in group2 was decreased below baseline throughout the study period. It was transiently increased during the time of intubation in the

first group but returned to baseline in10min.

Above table shows the changes in diastolicarterial blood pressure during the study period. Looking from the data. In the table we can see that there is consistent decrease in D.B.P. in group2 from the baseline throughout the study period. It was transiently increased during the time of intubation in the first group but returned to baseline in10min.

Above table shows D.B.P. in group 2 was decreased below baseline throughout study period. It was transiently increased during the time of intubation in the first group but returned to baseline in10min.

Above table shows the changes in mean arterial blood pressure during the study period. Looking from the data In the table we can see that there is consistent decrease in M.A.P. in group2 from the baseline throughout the study period. It was transiently increased during the time of intubation in the first group but returned to baseline in10min.

Above table shows M.A.P.in group 2 was decreased below baseline throughout study period. It was transiently increased during the time of intubation in the first group but returned to baseline in10min.

Above tables shows the changes in Rate Pressure Product during the study period. Looking from the data In the table we can see that there is consistent decrease in group2 from the baseline throughout the study period. It was transiently increased during the time of intubation in the first group but returned to baseline in10min.

Above tables shows R.P.P. in group 2 was decreased below baseline throughout the study period. It was transiently increased during the time of intubation in the first group but returned to baseline in10min.

**Table 1. Demographic data: age, sex and weight distribution**

| Group | Age mean± s.d.(years) | Weight mean±s.d.(kg) | Sex m:f | Duration of surgeries (hours) |
|---|---|---|---|---|
| **Group 1(n=30)** | 41.4333±10.2945 | 50.6333±5.9797 | 12:18 | 2.04±0.26 |
| **Group 2(n=30)** | 44.0066±8.5376 | 52.4333±7.8242 | 14:16 | 1.94±0.36 |

**Table 2. Mean Heart rate in Two Groups**

| Time Interval | Group1 (n=30) Heart rate(/min) | Group2 (n=30) Heart rate(/min) |
|---|---|---|
| **Basal(A)** | 82.15 | 85.3 |
| **Pre-Induction(B)** | 79 | 81.53 |
| **E** | 89.53 | 86.13 |
| **E+1** | 90.6 | 82.4 |
| **E+3** | 90.53 | 79.6 |
| **E+5** | 86.86 | 76.56 |
| **E+10** | 82.8 | 75.13 |

**Table 3. Mean changes in Heart rate in two groups**

| Time Interval | Group1(n=30) | Group2(n=30) |
|---|---|---|
| **B** | -3.15 | -3.77 |
| **E** | 7.38 | 0.83 |
| **E+1** | 8.45 | -2.9 |
| **E+3** | 8.38 | -5.7 |
| **E+5** | 4.71 | -8.74 |
| **E+10** | 0.65 | -10.17 |

**Table 4. Mean S.B.P. in both Groups**

| Time Interval | Group1(n=30)(mmHg) | Group2(n=30)(mmHg) |
|---|---|---|
| **A** | 130.27 | 134.46 |
| **B** | 128.36 | 127 |
| **E** | 138.56 | 124.9 |
| **E+1** | 139.93 | 122.86 |
| **E+3** | 138.93 | 118.5 |
| **E+5** | 128.6 | 113.93 |
| **E+10** | 120.83 | 111.53 |

**Table 5. Mean changes in S.B.P.**

| Time Interval | Group1(n=30) | Group2(n=30) |
|---|---|---|
| **B** | -1.91 | -7.46 |
| **E** | 8.29 | -9.56 |
| **E+1** | 9.66 | -11.6 |
| **E+3** | 8.66 | -15.96 |
| **E+5** | -1.67 | -20.53 |
| **E+10** | -9.44 | -22.53 |

**Table 6. Mean D.B.P. in both Groups**

| Time Interval | Group1(n=30) | Group2(n=30) |
|---|---|---|
| **A** | 78.9 | 78.83 |
| **B** | 78.73 | 77.46 |
| **E** | 86.83 | 77.73 |
| **E+1** | 87.76 | 75.23 |
| **E+3** | 85.6 | 72.26 |
| **E+5** | 80.53 | 69.66 |
| **E+10** | 76.6 | 68.6 |

**Table 7. Mean changes in D.B.P**

| Time Interval | Group1(n=30) | Group2(n=30) |
|---|---|---|
| **B** | -0.17 | -1.37 |
| **E** | 7.93 | -1.1 |
| **E+1** | 8.86 | -3.6 |
| **E+3** | 6.7 | -6.57 |
| **E+5** | 1.63 | -9.17 |
| **E+10** | -2.3 | -10.23 |

**Table 8. Mean M.A.P.in both Groups**

| Time Interval | Group1(n=30) | Group2(n=30) |
|---|---|---|
| **A** | 96.02 | 96.5 |
| **B** | 95.27 | 93.26 |
| **E** | 103.73 | 93 |
| **E+1** | 104.83 | 89.9 |
| **E+3** | 103 | 86.96 |
| **E+5** | 96.33 | 84.06 |
| **E+10** | 91.53 | 82.36 |

**Table 9. Mean changes in M.A.P**

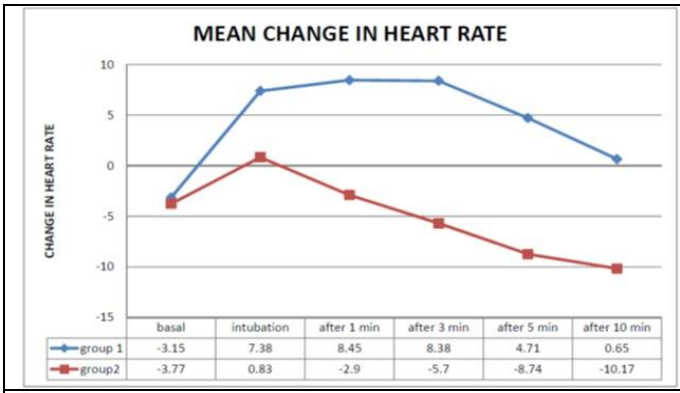
| Time Interval | Group1(n=30) | Group2(n=30) |
|---|---|---|
| **B** | -0.75 | -3.24 |
| **E** | 7.71 | -3.5 |
| **E+1** | 8.81 | -6.6 |
| **E+3** | 6.98 | -9.54 |
| **E+5** | 0.31 | -12.44 |
| **E+10** | -4.49 | -14.14 |

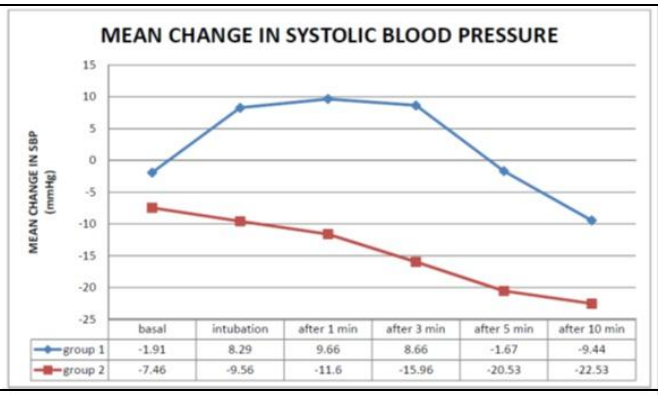
**Table 10. Mean R.P.P in both Groups**

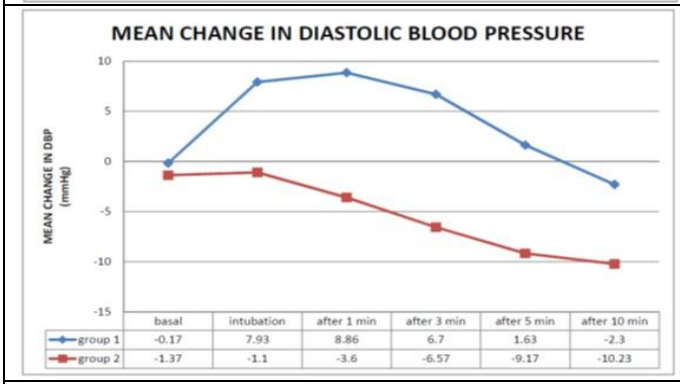
| Time Interval | Group1(n=30) | Group2(n=30) |
|---|---|---|
| **A** | 10701.68 | 11517.86 |
| **B** | 10140.44 | 10354.31 |
| **E** | 12444 | 10783.4 |
| **E+1** | 12748.56 | 10167.6 |
| **E+3** | 12596.1 | 9462.6 |
| **E+5** | 11238 | 8773.33 |
| **E+10** | 10033.96 | 8430.26 |

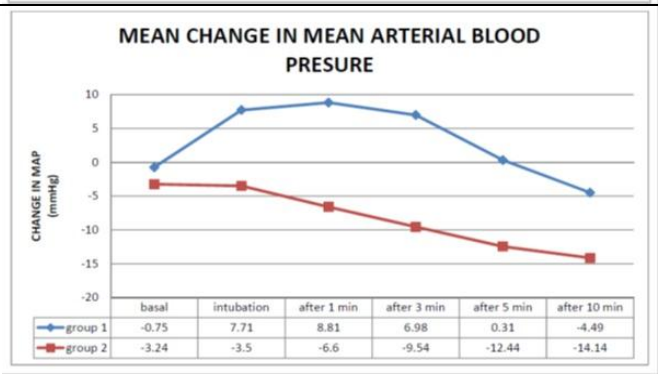
**Table 11. Mean changes in RPP**

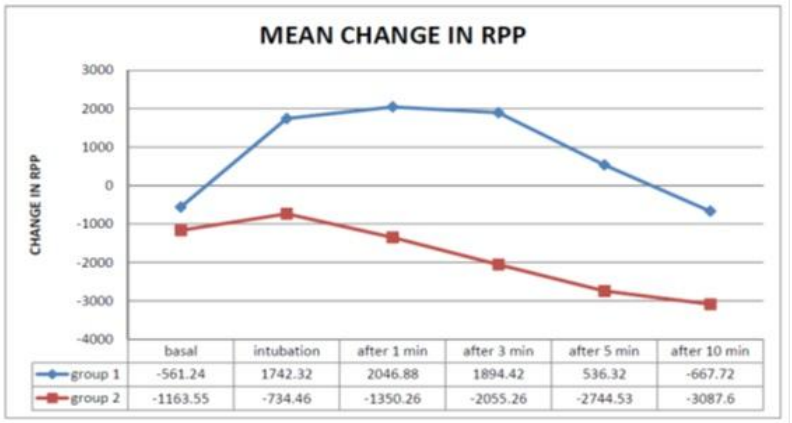
| Time Interval | Group 1 (n=30) | Group 2 (n=30) |
|---|---|---|
| **B** | -561.24 | -1163.55 |
| **E** | 1742.32 | -734.46 |
| **E+1** | 2046.88 | -1350.26 |
| **E+3** | 1894.42 | -2055.26 |
| **E+5** | 536.32 | -2744.53 |
| **E+10** | -667.72 | -3087.6 |

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