

# Comparative study of Inj. dexmedetomidine and Inj. fentanyl on haemodynamic changes during laryngoscopy & tracheal intubation

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## ABSTRACT

### Aim and objectives:

- 1) To evaluate the effects of dexmedetomidine and Fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
- 2) To compare the effect of dexmedetomidine and fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
- 3) To compare the side effects.

### Materials & Methods

After approval of the institutional ethical committee, this prospective observational study was conducted on 60 patients of ASA Grade I & II, undergoing elective surgeries under general anaesthesia.

Group A : Inj. Dexmedetomidine 1mcg/kg diluted to 20ml with normal saline were given over 10 minutes.

Group B inj. Fentanyl 1mcg/kg diluted to 20ml with normal saline were given over 10 minutes.

All patient received Inj. Pentazocine 0.3mg/kg and were pre-oxygenated for 3min. Anaesthesia was induced with thiopantone sodium (5mg/kg IV) till loss of eyelash reflex over 30 second and mask ventilation was confirmed. Inj. succinylcholine 1.5mg/kg was given to facilitate laryngoscopy and intubation. anaesthesia was maintained with oxygen nitrous oxide, isoflurane with intermittent use of inj. Atracurium and controlled ventilation.

At the end of surgery the neuromuscular blockade was antagonized with inj. Glycopyrolate (.01mg/kg) I.V. and inj. Neostigmine (.05mg/kg) i.v. and patient were extubated.

### RESULT

Dexmedetomidine is more effective than Fentanyl in attenuation of haemodynamic changes during laryngoscopy and intubation

### CONCLUSION

Dexmedetomidine significantly attenuates the haemodynamic changes during laryngoscopy and intubation. Fentanyl also attenuates the haemodynamic changes during laryngoscopy and intubation. Thus we conclude that Dexmedetomidine is a better drug to attenuate the haemodynamic response during laryngoscopy and intubation.

**KEYWORDS:** Dexmedetomidine, Fentanyl, hemodynamic response, laryngoscopy and orotracheal intubation.

## 1. INTRODUCTION

Since the time of introduction of endotracheal intubation in anaesthesia in the last quarter of the 19<sup>th</sup> century it has become one of the frequently performed procedures in the practice of anaesthesia.

Endotracheal intubation is the translaryngeal placement of a tube into the trachea via nose or mouth. The technique of laryngoscopy and intubation induces noxious stimuli that lead to extreme haemodynamic stress which is associated with intense sympathetic activity marked by tachycardia and hypertension<sup>1</sup>.

The increase in pulse rate and blood pressure are usually transitory, variable & unpredictable. Normal, healthy persons tolerate this response, but in susceptible and high risk individuals, this transient sympathetic response can evoke life-threatening conditions.

Various non-pharmacological & pharmacological methods have been used to attenuate the haemodynamic response to laryngoscopy & endotracheal intubation.

Alpha-2 agonists and opioids have been used for attenuating the sympathetic response and among alpha-2 agonist Dexmedetomidine and among opioids fentanyl appear to fulfil all the above criteria. dexmedetomidine drug have actions on both alpha-1 and alpha-2 receptors but is highly specific and selective alpha-2 adrenoreceptor agonist with alpha2:alpha1 binding selectivity ratio of 1620:1.....

## AIMS AND OBJECTIVE

- 1) To evaluate the effects of dexmedetomidine and Fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
- 2) To compare the effect of dexmedetomidine and Fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
- 3) To compare the side effects, if any.

## 2. MATERIAL AND METHOD

The study was conducted on patients undergoing laryngoscopy and tracheal intubation in elective surgeries under general anaesthesia.

After approval of the institutional ethical committee, this prospective observational study was conducted on 60 patients in the age group of 20 to 50 years, ASA Grade I & II of either sex, undergoing elective surgeries under general anaesthesia.

Patients were divided in to two groups comprising 30 patients each:-

Group(D) Dexmedetomidine Group were given inj. Dexmedetomidine 1mcg/kg diluted to 20ml with normal saline over 10 minutes

Group(F) Fentanyl group were given inj. Fentanyl 1mcg/kg diluted to 20ml with normal saline over 10 minutes.

**Material:-** The study includes drugs dexmedetomidine hydrochloride 100mcg/ml 1ml vial and inj.Fentanyl citrate 100mcg/ml 2ml ampoule,

## PATIENT EXCLUSION CRITERIA:

Patients taking antihypertensives, analgesics, sedatives, beta-blockers.

On the day prior to surgery pre anesthetic evaluation was done and patients were explained about the procedure and technique and written informed consent was taken.

All routine investigations like Complete blood count,Urine (r &μ),Blood urea,creatinine, Blood sugar, Electrocardiogram were done prior to surgery.

**Pre-Medication:**

All patient were given Inj glycopyrolate 0.2mg IV, and inj. Ondansetran 4mgIV , Inj Ranitidine Hydrochloride 50mgIV before infusion.

**TECHNIQUE AND METHOD :-**

On the day of surgery, Anaesthesia machine and circuits were checked, resuscitation equipments were kept ready. after confirmation of NPO status , patients were shifted to the operating room and connected to monitor.

Preoperative base line parameters, were recorded after 5 min of settling in the operative room and also after infusion of Dexmedetomidine/Fentanyl. (T1)

All patient received Inj. Pentazocine 0.3mg/kg and were pre-oxygenated for 3min. Anaesthesia was induced with thiopantone sodium (2.5% 5mg/kg IV) till loss of eyelash reflex over 30 second and mask ventilation was confirmed. Inj succinylcholine 1.5mg/kg was given to facilitate laryngoscopy and intubation. At the onset of apnea using laryngoscope, intubation was done with a well lubricated appropriate size cuffed endotracheal Tube and anaesthesia was maintained with oxygen nitrous oxide ,halothane with intermittent use of inj. Atracurium and controlled ventilation.

At the end of surgery the neuromuscular blockade was antagonized with inj. Glycopyrolate (.01mg/kg)I.V.and inj. Neostigmine(.05mg/kg)i.v. and patient were extubated after complete reversal of neuromuscular blockade.

**DATA COLLECTION**

Sequence	TIME	SBP	DBP	HR
Basal reading when pt.is shifted to OT(T0)				— —
After Induction (T1)				
After intubation(T2)				
At 2 min after intubation(T3)				
At 6 min after intubation(T4)				
At 10 min after intubation(T5)				

**STATISTICAL ANALYSIS PLAN:** Statical analysis was done using statistical package for social sciences version 15.0.chi-square test ,Unpaired t-test were used.

**OBSERVATIONS AND RESULTS**

Observation duly recorded, have been tabulated and statistically analyzed in this section. Comparison of quantitative data between groups was done by unpaired t-test. A p<0.05 was considered clinically significant.

**Table 1: Demographic profile of patients:**

Demographic profile	Dexmedetomidine-GP Mean±SD	Fentanyl-GP Mean±SD	p-value
Age(yrs)	32.06±4.96	32.13±5.34	>0.05

Gender(M:F)	17:13	18:12	>0.05
Weight(kg)	48.13	48.06	>0.05

**Inference:-** Demographic profile in term of age ,sex, weight were comparable in both the groups.

**P-values;-**

p>0.05- Statistically not significant (NS),

p<0.05- Statistically significant (S),

p<0.01- Statistically highly significant (HS),

p<0.001- Very highly significant.

**Table 2: Age distribution in two groups**

Age Group (in years)	Dexmedetomidine-Group		Fentanyl -Group	
	No. of Pts.	%	No.of Pts.	%
20-29	11	36.66	10	33.33
30-39	15	50	15	50
40-49	04	13.33	05	16.66
Mean age and SD of Patients	32.06±4.96		32.13±5.34	
p value >0.05				

The above table shows age wise distribution in both the groups. the minimum age in Dexmedetomidine and Fentanyl groups were 26 and 25 years respectively. the maximum age in Dexmedetomidine and Fentanyl groups were 44 and 45 years respectively. there was no significant difference in the age of patients between the group-D and group-F. both group were similar with respect to age distribution

**Table 3: Showing Mean Heart rate of patients in both the groups**

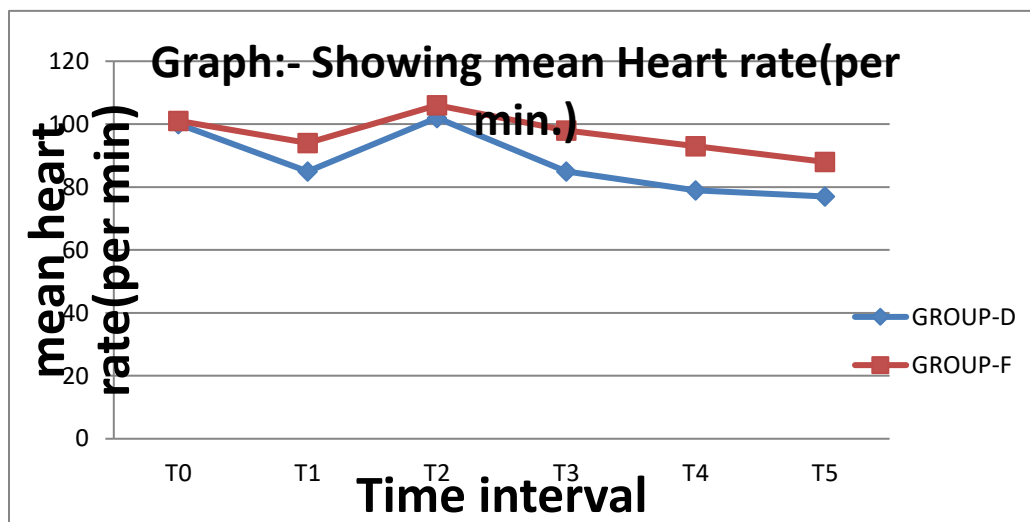
Time	Dexmedetomidine-Group		Fentanyl -Group		P-Value
	mean ±SD	% Change from baesline	mean ±SD	% Change from baseline	
Basal reading when pt.is shifted to OT(T0)	100.06 ±4.56		101.66 ±1.74		>0.05
After induction(T1)	85.33 ±3.30	14.72	94.13 ±1.67	7.40	<0.05
After intubation(T2)	102.13 ±3.30	2.06	106.73 ±2.11	3.01	<0.01

At 2 min after intubation(T3)	85.63 ±3.03	14.42	98.93 ±1.36	3.30	<0.05
At 6 min after intubation(T4)	79.83 ±4.21	20.21	93.43 ±1.38	8.09	<0.05
At 10min after intubation (T5)	77.16 ±2.90	22.88	88.66 ±1.39	12.78	<0.05

**Inference:-**

The baseline heart rate was comparable in both the group( $p>0.05$ ).

At the time of laryngoscopy and intubation, heart rate increased in both Dexmedetomidine & Fentanyl group but more in Fentanyl group ( $p<0.01$ ). There was continuous decrease in heart rate at 2,6,10 minutes after intubation in both groups, but the mean heart rate at any time was lower in the Dexmedetomidine group than in the Fentanyl group which was statistically significant ( $p<0.05$ ).

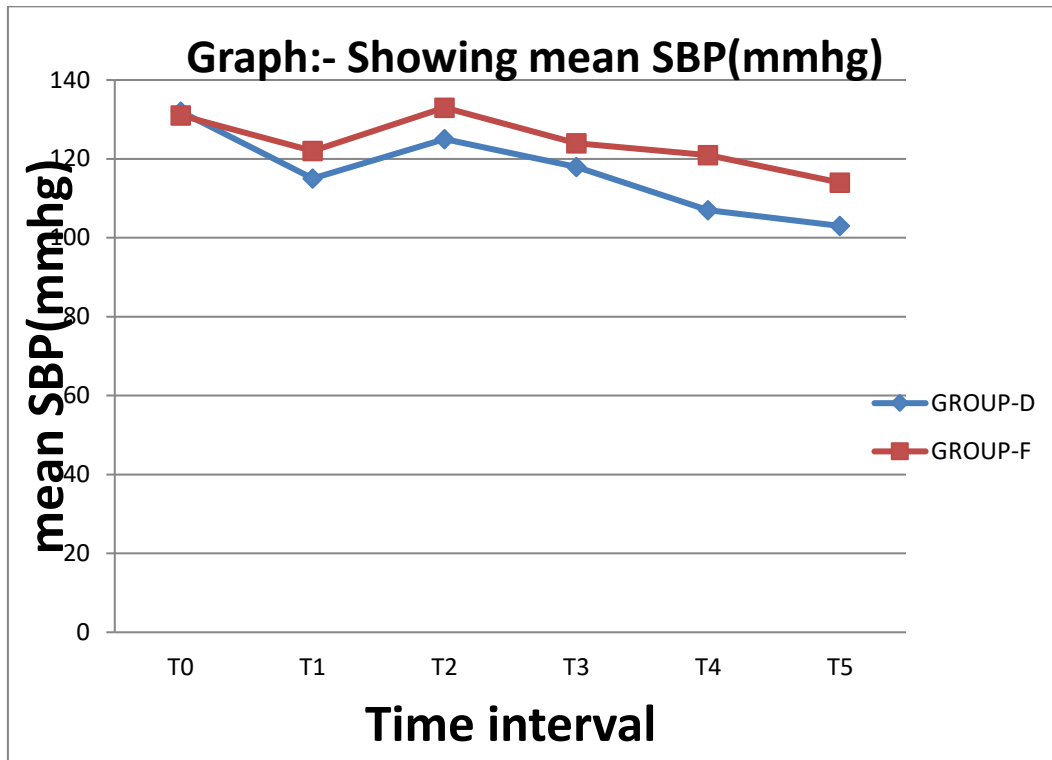
**GRAPH SHOWING MEAN HEART RATE OF BOTH THE GROUP**

**Table 4: Showing mean systolic blood pressure( in mmHg) of patients in both the groups**

Time	Dexmedetomidine-Group		Fentanyl -Group		P-value
	mean±SD	% Change from baseline	mean±SD	% Change from baseline	
Basal reading when pt.is shifted to OT(T0)	132±1.72		131.73±2.54		>0.05
After induction(T1)	115.2±2.73	12.72	122.8±5.24	6.77	<0.05
After intubation(T2)	125.26±3.58	5.10	133.96±2.49	1.69	<0.01
At 2 Min.after intubation(T3)	118.26±3.87	10.15	124.8±3.54	5.48	<0.05
At 6 min after intubation(T4)	107.36±2.93	18.66	121.13±4.94	8.04	<0.05
At10 min after intubation(T5)	103.26±1.85	21.77	114.86±2.82	12.80	<0.05

**Inference:-**

The baseline SBP were comparable in both the group( $p>0.05$ ). At time of laryngoscopy and intubation, SBP increased in both Dexmedetomidine & Fentanyl group but more in Fentanyl group ( $p<0.01$ ). There was continuous decrease in SBP at 2,6,10 minutes after intubation in both groups but the mean SBP at any time was lower in the Dexmedetomidine group than in the Fentanyl group which was statistically significant ( $p<0.05$ ).



ABOVE GRAPH SHOWING MEAN SBP OF BOTH THE GROUP

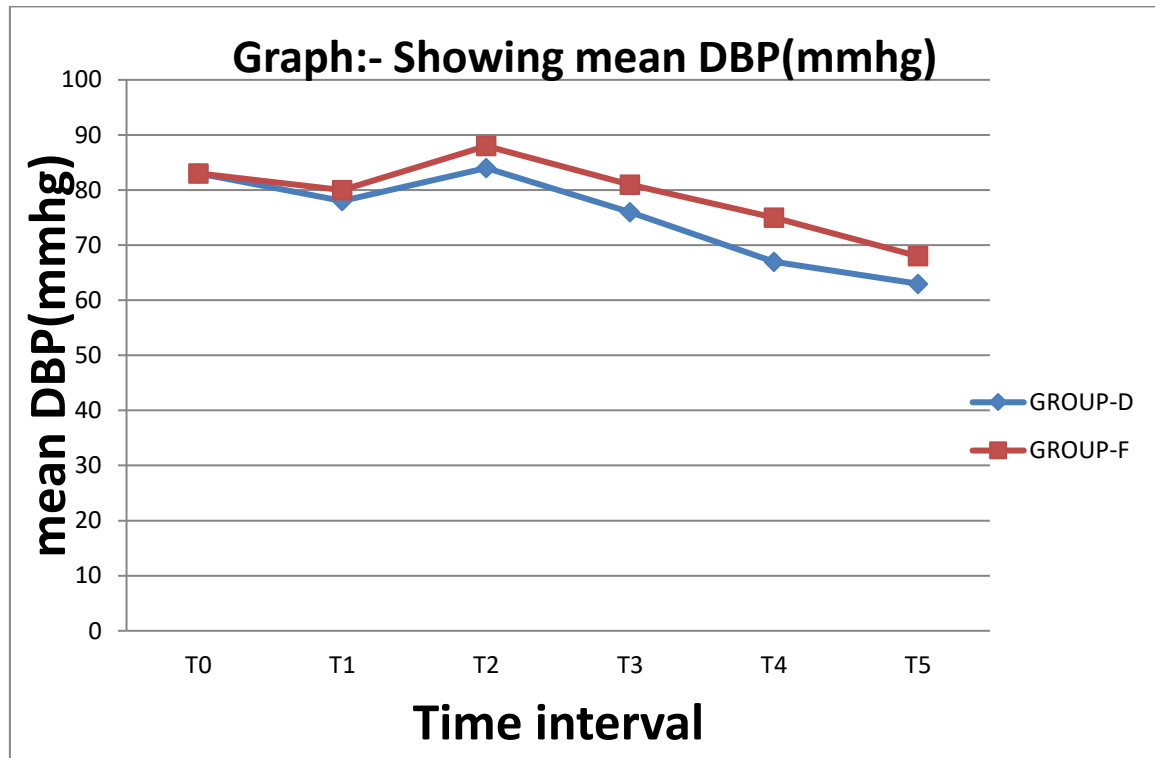
**Table 5: Showing mean Diastolic blood pressure( in mmHg) of patients in both the groups**

Time	Dexmedetomidine-Group		Fentanyl -Group		P- value
	mean±SD	% Change from baseline	Mean±SD	% Change from baseline	
Basal reading when pt. shifted to OT (T0)	83.33±3.74	-	83.93±4.50	-	>0.05
After induction(T1)	78.76±2.62	8.02	80.53±5.30	4.05	<0.05
After intubation(T2)	84.20±4.00	1.33	88.26±4.37	5.32	<0.01
At 2 Min. after intubation(T3)	76.83±4.15	10.09	81.26±4.85	3.18	<0.05
At 6 Min. after intubation(T4)	67.26±2.51	21.29	75.56±7.36	9.97	<0.05
At 10 Min. after intubation (T5)	63.73±2.65	25.42	68.73±7.30	18.11	<0.05

**Inference:-**

The baseline DBP were comparable in both the group( $p>0.05$ ). At time of laryngoscopy and intubation, DBP increase was seen in both Dexmedetomidine & Fentanyl group but more in

Fentanyl group ( $p < 0.01$ ). There was continuous decrease in DBP at 2,6,10 minutes after intubation in both groups, but the mean DBP at any time was lower in the Dexmedetomidine group than in the Fentanyl group which was statistically significant ( $p < 0.05$ ).



**Table 6: Showing complication of patients in both the groups**

COMPLICATION	Dexmedetomidine-group	Percentage (%)	Fentanyl -group	Percentage (%)
Hypotension	-	-	2	6.66
Bradycardia	1	3.33	1	3.33

The above table showing that in Dexmedetomidine Group 1 patient had bradycardia intraoperatively which was statistically insignificant. it was immediately corrected with atropine 0.6 mg. In the Fentanyl group 2 patients developed hypotension . it responded with 500ml of IV ringers lactate administration within 10 minutes . 1 patient had bradycardia it was immediately corrected with atropine 0.6 mg. it was also statistically insignificant.



### 3. RESULT

Both groups were comparable in their age, gender and body weight distribution ( $p>0.05$ ).

The basal mean HR $\pm$ SD in the present study Group D and Group F was 100.06 $\pm$ 4.56 and 101.66 $\pm$ 1.74 bpm respectively.

Both groups had rise in HR after intubation that was 2.06% in group D and 3.01% in group F and difference was statistically highly significant ( $p<0.01$ ).

Difference in HR between two groups remained statistically significant at 2,6 and 10 min after intubation ( $p<0.05$ ).

The basal mean SBP in the present study in, Group D and Group F were 132 $\pm$ 1.72, 131 $\pm$ 2.54 mmHg respectively.

Both group had maximum rise in SBP after intubation that was 5.10% in group D and 1.69% in group F which was statistically highly significant ( $p<0.01$ ).

Difference in SBP between two groups remained statistically significant at 2,6 and 10 min after intubation ( $p<0.05$ ).

The basal mean $\pm$ SD, DBP in the present study in Group D and Group F were 83.46 $\pm$ 3.74, 83.93 $\pm$ 4.50 mmHg respectively.

Both group had maximum rise in DBP after intubation that was 1.33% in group D and 5.32% in group F which was statistically highly significant ( $p<0.01$ ).

Difference in DBP between two groups remained statistically significant at 2,6 and 10 min after intubation ( $p<0.05$ ).

In Dexmedetomidine group no any patients had hypotension and one patient had bradycardia, while in Fentanyl group 2 patients had hypotension and 1 patient had bradycardia.

### 4. DISCUSSION

Laryngoscopy and tracheal intubation are considered as the most critical events during administration of general anaesthesia as they provoke transient but marked sympatho-adrenal response manifesting as hypertension and tachycardia. Many drugs have been tried by various authors for blunting haemodynamic responses to laryngoscopy and intubation like Recently  $\alpha$ -2 agonists like dexmedetomidine and opioids like fentanyl have been tried for suppressing the response to intubation and have been found to have better effects compared to others drugs, without any of the side effects like respiratory depression or increased incidence of PONV.

#### Demographic criteria:-

Two groups were comparable and there was no statistically significant Difference between the mean ages,sex and weight .

In this study optimal age range was 20 to 50 years. The mean values of age with standard deviations are 32.06 $\pm$ 4.96 and 32.13 $\pm$ 5.34 for Dexmedetomidine and Fentanyl groups respectively. there were no significant difference between two groups. ( $P>0.05$ )

The basal mean HR $\pm$ SD in the present study Group D and Group F was 100.06 $\pm$ 4.56 and 101.66 $\pm$ 1.74 bpm respectively.

After intubation in Group D there was only 2.06%(102.13 $\pm$ 3.30) increase in mean HR was observed from its basal value(100.06  $\pm$ 4.56), whereas in Group F there was 3.01% (106.73 $\pm$ 2.11) increase in mean HR was observed from its basal value (101.66  $\pm$ 1.74), which was statistically highly significant compared to Group-D ( $P<0.01$ ).

At 2,6 minutes after intubation in Group D there was only 14.42%(85.63±3.03), 20.21%(79.83±4.21) respectively decrease in mean HR was observed from its basal value(100.06 ±4.56), whereas in Group F there was 3.30%(98.93±1.36), 8.09%(93.43±1.38) respectively decrease in mean HR was observed from its basal value(101.66 ±1.74), which was statistically significant compared to Group-D (P<0.05) Similar to our result Shareef SM et.al. [2]

#### **Systolic blood pressure changes:-**

The basal mean SBP in the present study in, Group D and Group F were 132±1.72, 131±2.54 mmHg respectively.

After intubation in Group D there was 5.10%(125.26±3.58) increase in mean SBP was observed from its basal value(132±1.72), in Group F there was 1.69%(133.96±2.49) increase in mean SBP was observed from its basal value(131.73±2.54), which was statistically highly significant compared to Group-D (P<0.01).

At 2, 6, minutes after intubation in Group D there was 10.15%(118.26±3.87), 18.66(107.36±2.93) respectively decrease in mean SBP was observed from its basal value(132±1.72). whereas in Group F there was 5.48%(124.8±3.54) ,8.04%(121.13±4.94) respectively decrease in mean SBP was observed from its basal value(131.73±2.54), which was statistically significant compared to Group-D (P<0.05).

Similar to our study Supartoet al [4] Martin DE et al [9]

#### **Diastolic blood pressure changes:-**

The basal mean±SD, DBP in the present study in Group D and Group F were 83.46±3.74, 83.93±4.50 mmHg respectively.

After intubation in Group D there was 1.33%(84.33±4.00) increase in mean DBP compared to basal value (83.46±3.74), Group F there was 5.32% (88.4±4.37) increase in mean DBP compared to basal value(83.93±4.50), which was statistically highly significant from compared to Group-D (P<0.05).

At 2,6 minutes after intubation in Group D there was 10.09% (76.83±4.15), 21.29%(67.26±2.51) respectively decrease in mean DBP was observed from its basal value (83.46 ±3.74) ,in Group F there was 3.18 % (81.26 ±4.85), 9.97 % (75.56 ±7.36) respectively decrease in mean DBP compared to basal value (83.93 ±4.50) ,which was statistically significant compared to Group-D (P<0.05).

Similar to our result; Dahlgreen N et al [7]

### **5. CONCLUSION**

Following conclusion are drawn from the present study:-

- Dexmedetomidine and Fentanyl significantly attenuates the haemodynamic changes during laryngoscopy and intubation.
- Dexmedetomidine is more effective than Fentanyl in attenuation of haemodynamic changes during laryngoscopy and intubation.
- Thus we conclude that Dexmedetomidine is a better drug to attenuate the haemodynamic response during laryngoscopy and intubation.

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