International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article

Effects of Pre Anaesthetic, Single Low Dose Dexmedetomidine on Induction and Haemodynamic Parameters in Laparoscopic Cholecystectomy

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ABSTRACT

Background and Aims: The present prospective random and double blind study was designed to test the effect of single low dose dexmedetomidine on induction, haemodynamic parameters in patients undergoing laparoscopic cholecystectomy.

Material and Methods: For the proposed study total of 80 patients of age group 18-60 years, ASA grade I and II were taken after fulfilling inclusion criteria and verifying exclusion criteria. Patients were randomly allocated into 2 groups of 40 patients each. Group A (Control n=40): Patients recieved normal saline (0.9% NaCl) 20ml. Group B (Study n=40): Patients recieved dexmedetomidine 0.75µg/kg I/V prepared in normal saline to make a total volume of 20 ml. Cardiovascular parameters were observed continuously but recorded during intubation, every 3 minutes interval after intubation upto 30th minute and then after every 10 minutes interval intra operative extending upto 90th minute post-operative. Monitored for any incidence of complications for next 90 minutes. Modified Aldretes scores were recorded at 10, 20, 30, 40, 50, 60, 90 min. Modified Aldrete scoring >9 was considered criteria for recovery.

Results: Dexmedetomidine 0.75µg/kg I/V has significant attenuating effect on heart rate, systolic blood pressure, and diastolic blood pressure and mean arterial pressure during laparoscopic cholecystectomy. Dexmedetomidine produces dose-dependent anxiolysis, and analgesia so decreases the dose of requirement of anaesthetic agent for induction. There is a significant reduction in the adverse effects both intraoperatively and postoperatively in dexmedetomidine group of patients.

Conclusion: Single dose preanaesthetic dexmedetomidine significantly attenuates stress responses to various noxious stimuli during surgery, maintains haemodynamic stability, reduces the requirement of other anaesthetic agents without prolongation of recovery.

Keywords: Pre Anaesthetic, Dexmedetomidine, Induction, Haemodynamic, Cardiovascular, Laparoscopic Cholecystectomy.

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Article History:

Received: 14-02-2017, **Revised:** 02-03-2017, **Accepted:** 20-03-2017

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2017.3.2.046	

INTRODUCTION

Laparoscopy is a minimally invasive procedure used, as a diagnostic and therapeutic tool for abdominal and pelvic pathologies.[1] The use of pneumoperitoneum in combination with positional changes may cause significant haemodynaemic and respiratory changes.[2] The creation of pneumoperitoneum with CO_2 insufflation induces cardiovascular response characterized by sudden tachycardia, hypertension and increased myocardial oxygen requirement. CO_2 is readily absorbed from the peritoneal cavity into the circulation resulting in hypercarbia and acidosis. Apart from that, laparoscopic cholecystectomy is performed in reverse Trendelenburg position.[3] This position leads to decrease in cardiac output due to reduction in venous return.. These changes are mediated by mechanical and neurohumoral factors where catecholamine, renin-angiotensin system and vasopressin

are released during pneumoperitoneum.[2] To prevent and counteract these effects, appropriate monitoring and pharmacological interventions are required like preloading with intravenous fluids, direct vasodilators like nitroglycerine, high doses of opioids, infusion of propofol, xylocard, oral gabapentin and centrally acting α2 agonists like Clonidine and Dexmedetomidine.[4,5] The present study was proposed to conduct a prospective, randomised, double blind controlled study to observe the effects of pre-anaesthetic single dose of dexmedetomidine (0.75μg/kg) on induction and haemodynamic and cardiovascular parameters in patients undergoing elective laparoscopic cholecystectomy under general anaesthesia at GMC and Rajindra Hospital, Patiala.

MATERIALS AND METHODS

After institutional review board approval and informed written consent from the patients, the present prospective, randomized, double-blind, controlled clinical study was conducted in 80 patients of age 20–60 years with ASA physical status I and II scheduled for laparoscopic cholecystectomy under general anesthesia in Department of Anesthesiology and Intensive Care Unit , GMC and Rajindra Hospital Patiala. The patients were randomly allocated into 2 groups of 40 patients each.

Group A (Control n=40): Patients received normal saline (0.9% NaCl) 20ml.

Group B (Study n=40): Patients received dexmedetomidine 0.75μg/kg I/V prepared in normal saline to make a total volume of 20 ml.

Patients were randomly divided by picking up sealed envelope. The envelope was opened by independent anaesthetist who also prepared the study drugs, but otherwise was unaware of the study . Patients with history of bradycardia (heart rate <50 beats per minute), uncontrolled diabetes mellitus, pre-operative significant arrhythmias, renal or liver dysfunction, previous cerebrovascular accident, coronary artery disease, cardiopulmonary disease were excluded from the study.

During pre- anesthetic check-up, a detailed history and thorough general physical and systemic examination was done. Baseline blood pressure, pulse rate and respiratory rate were recorded. Routine investigations like Haemoglobin, bleeding time, clotting time, urine complete examination, fasting blood glucose, serum electrolytes (Na, K, Cl), renal function tests (Blood Urea, Serum Creatinine) and ECG was done.

All the patients were kept fasting overnight or for minimum 6 hours and baseline cardiovascular parameters were recorded. Injection Glycopyrrolate 0.2mg and injection promethazine 25mg intramuscular was given 30 minutes before surgery.

In the operation theatre, routine automatic multiparameter monitors were attached to record baseline pulse rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and oxygen saturation. Intravenous lines were secured with one 18 gauge and another 20 gauge cannula for infusion of study drug in all the patients and intravenous fluid was started.

To prepare the drug solution, dexmedetomidine 0.5 ml containing 50 μg of the drug was withdrawn in a 20 ml. Syringe and was diluted with normal saline resulting in the final concentration of 2.5 μg /ml. The dose of Dexmedetomidine was given depending on the weight of the patient.(0.75 μg /kg). Patients received 20ml of the drug solution according to the group allocated (Group A and B). The study drug was loaded in 20 ml syringe by an independent anaesthetist who was blinded to the drug present in the syringe for administration.

The drug was infused over 10 minutes intravenously, 10 minutes before induction of anaesthesia. Necessary drugs (routine & emergency) were loaded into labelled syringes. Airway equipments were checked and kept ready for use. After pre-oxygenation with 100% oxygen for 5 min via face mask using Bain's circuit, all patients were induced with propofol.

The dose of propofol was controlled by the haemodynamic and cardiovascular parameters, loss of eyelash and corneal reflex. This was followed by injection succinylcholine 2mg/kg to facilitate tracheal intubation. Laryngoscopy was performed with a Macintosh laryngoscope, and endotracheal intubation was done with appropriate size orally cuffed, disposable endotracheal tube. Cardiovascular parameters were observed continuously but recorded during intubation, every 3 minutes interval after intubation upto 30th minute and then after every 10 minutes interval intra operative extending upto 90th minute post-operative. Lungs were mechanically ventilated with O_2 - N_2 O (50-50), isoflurane (1-2%), and vecuronium bromide 0.08 mg/kg to 0.1mg/kg bolus followed by maintenance dose 1/4th of the initial dose depending on requirement. If mean arterial pressure (MAP) of the patients exceeded more than 20% above the baseline value, injection fentanyl 1μg/kg was given for hemodynamic stability.

At the end of surgery, isoflurane was terminated at the start of skin closure and N_2O was discontinued after skin closure. Residual neuromuscular blockade was reversed with neostigmine 50 μg/kg and glycopyrrolate 10 μg/kg intravenous injections. After satisfying the extubation criteria, patients were extubated when they were able to execute simple verbal commands.

All subjects were transferred to the post anesthesia care unit (PACU), where they received O2 supplementation, monitored for Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Mean Arterial Pressure(MAP), SpO2, any incidence of complications for next 90 minutes and data for heart rate, SBP, DBP, MAP, and Modified Aldretes scores were recorded at 10, 20, 30, 40, 50, 60, 90 min. Modified Aldrete scoring >9 was considered criteria for recovery.

Statistical Analysis

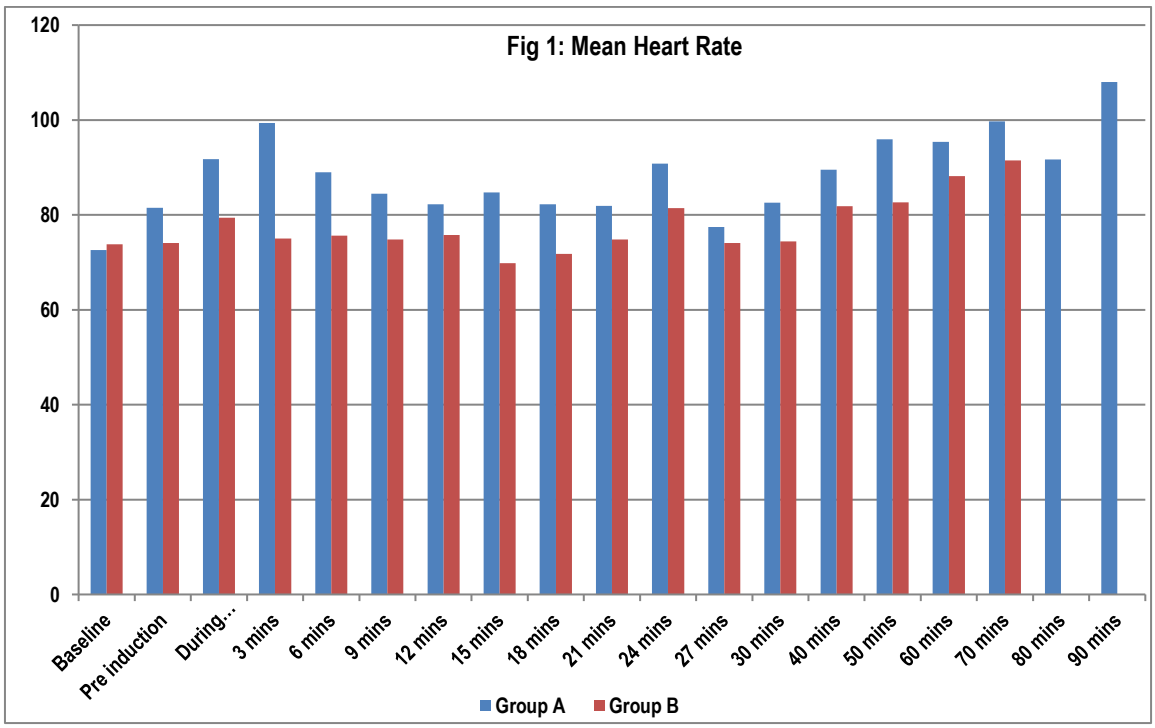
Descriptive and inferential statistical methods were used to analyze the data. In descriptive statistics, calculation of means, standard deviation and differences in average blood pressure and heart rate were done with the help of Microsoft Excel windows 7 on SPSS (Statistical Package for the Social Sciences) software version. In inferential statistics, Student's t-test of difference between two means was used to analyze the difference in proportion of males and females in both the groups. The results were expressed as Mean±SD. The p value<0.05 was regarded as statistically significant, p value<0.001 was taken as highly significant, and p value>0.05 was regarded as nonsignificant. The difference in the percentage change of mean arterial pressure from the baseline after intubation between the two groups was used to calculate the power of the study. Power of the study was calculated using online power calculator for two independent sample studies.

Table 1: Demographic Profile

	GROUP A		GROUP B		
	Mean	SD	Mean	SD	P
Age	40.775	12.95849	40.05	13.39144	0.80628
Weight	55.575	12.86196	55.4	11.15118	0.948326
ASA I/ASA II	34:6		35:5		
M:F	8:32		8:32		

Table 2: Preoperative Hemodynamic Parameters: Heart Rate

Heart Rate	Group A			Group B			P value Unpaired
	N	Mean	SD	N	Mean	SD	t Test
Baseline	40	72.575	4.90884	40	73.825	6.63667	0.34117
Pre induction	40	81.475	4.93541	40	72.1	6.8418	0.00000041
During Intubation	40	91.75	5.9431	40	74.375	6.67059	0
3 mins	40	99.4	5.15304	40	75	6.61776	0
6 mins	40	88.95	7.13586	40	75.6	6.33184	0
9 mins	40	84.45	5.86143	40	74.8	5.97945	0
12 mins	40	82.2	5.4828	40	75.75	6.3478	0.00000587
15 mins	40	84.725	10.9004	40	70.825	4.993489	0
18 mins	40	82.2	6.93264	40	71.8	6.5131	0
21 mins	40	81.875	7.73002	40	74.8	5.82743	0.00001
24 mins	40	90.7948	9.82526	40	71.425	7.75882	0.00001
27 mins	40	77.475	5.88778	40	74.05	5.86143	0.01092
30 mins	40	82.55	6.83486	40	74.425	5.01734	0
40 mins	40	89.5526	7.36939	40	71.8	5.52476	0.00001
50 mins	40	95.92	5.79453	40	72.6363	7.06126	0
60 mins	40	95.3846	6.30526	40	80.1666	5.734	0.0066
70 mins	40	99.7142	4.2706	40	81.5	4.79583	0.01639
80 mins	40	91.6666	23.288	40			
90 mins	40	108	-	40			



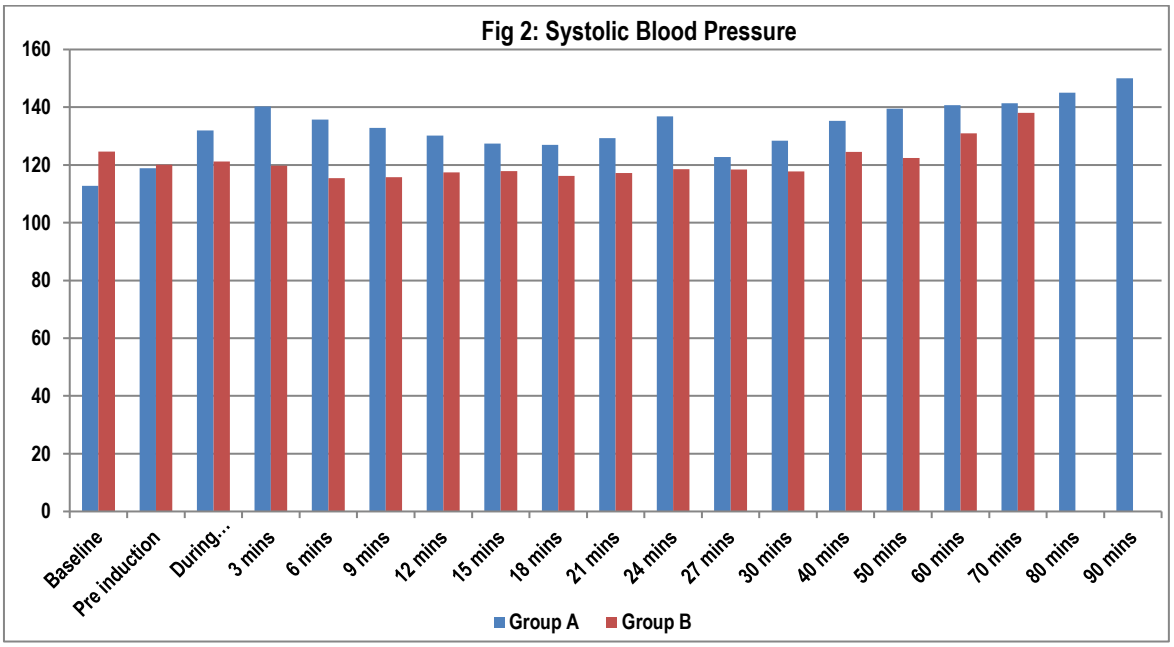


Fig 2: Systolic Blood Pressure
160
140
120
100
80
60
40
20
0
Baseline
Pre induction
During...
3 mins
6 mins
9 mins
12 mins
15 mins
18 mins
21 mins
24 mins
27 mins
30 mins
40 mins
50 mins
60 mins
70 mins
80 mins
90 mins
Group A
Group B

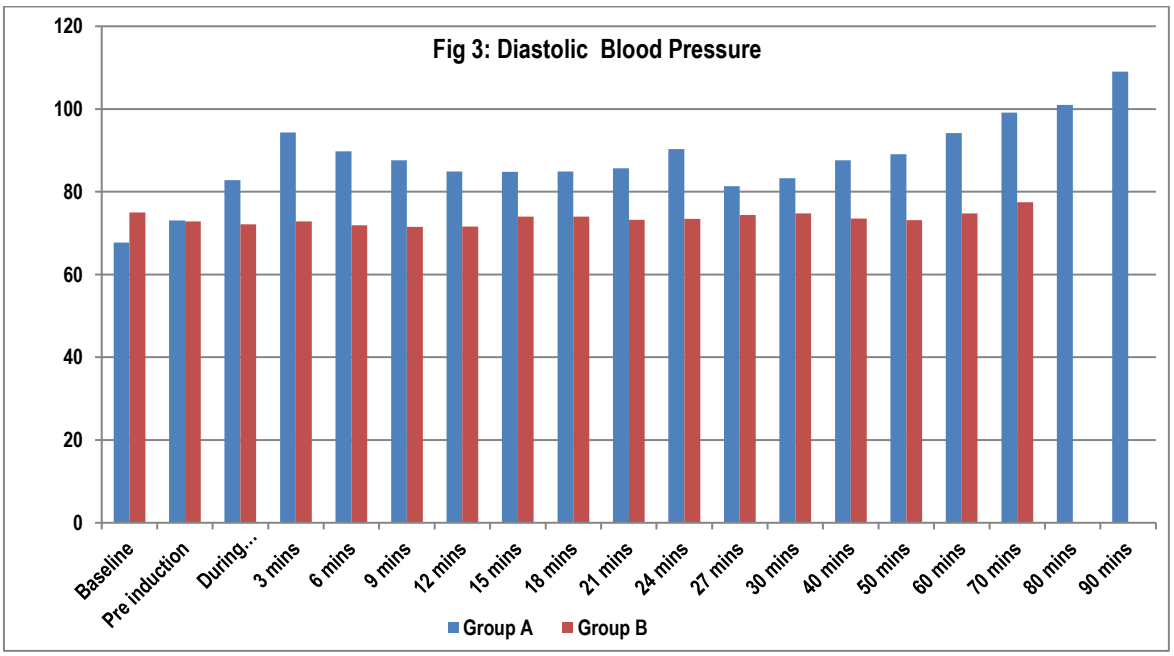


Fig 3: Diastolic Blood Pressure
120
100
80
60
40
20
0
Baseline
Pre induction
During...
3 mins
6 mins
9 mins
12 mins
15 mins
18 mins
21 mins
24 mins
27 mins
30 mins
40 mins
50 mins
60 mins
70 mins
80 mins
90 mins
Group A
Group B

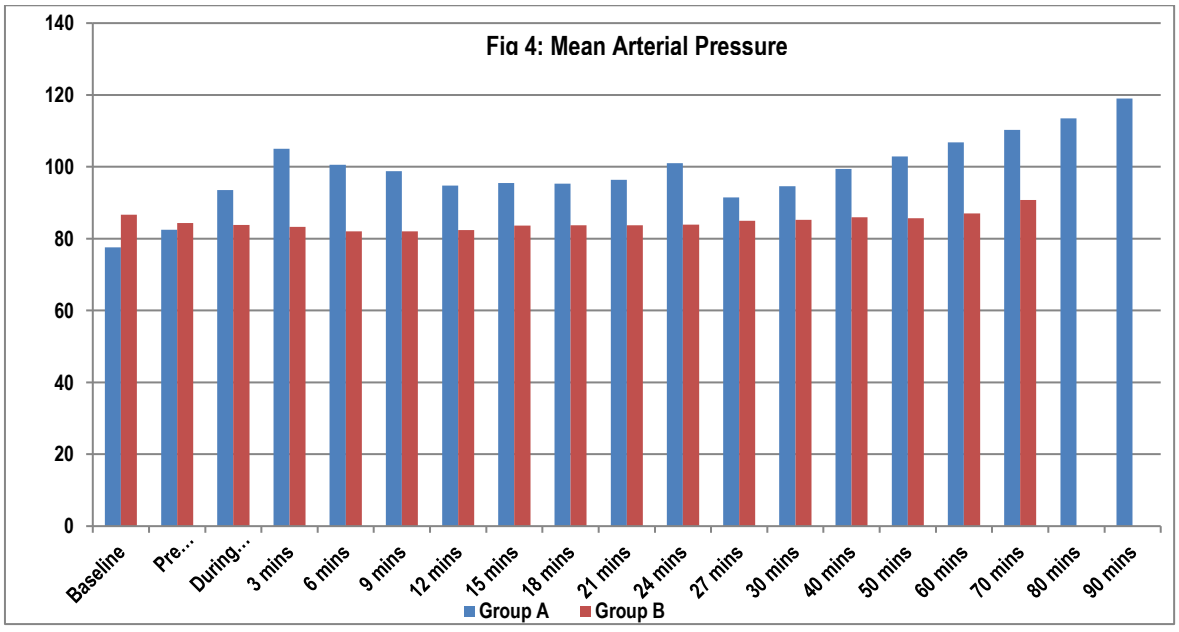


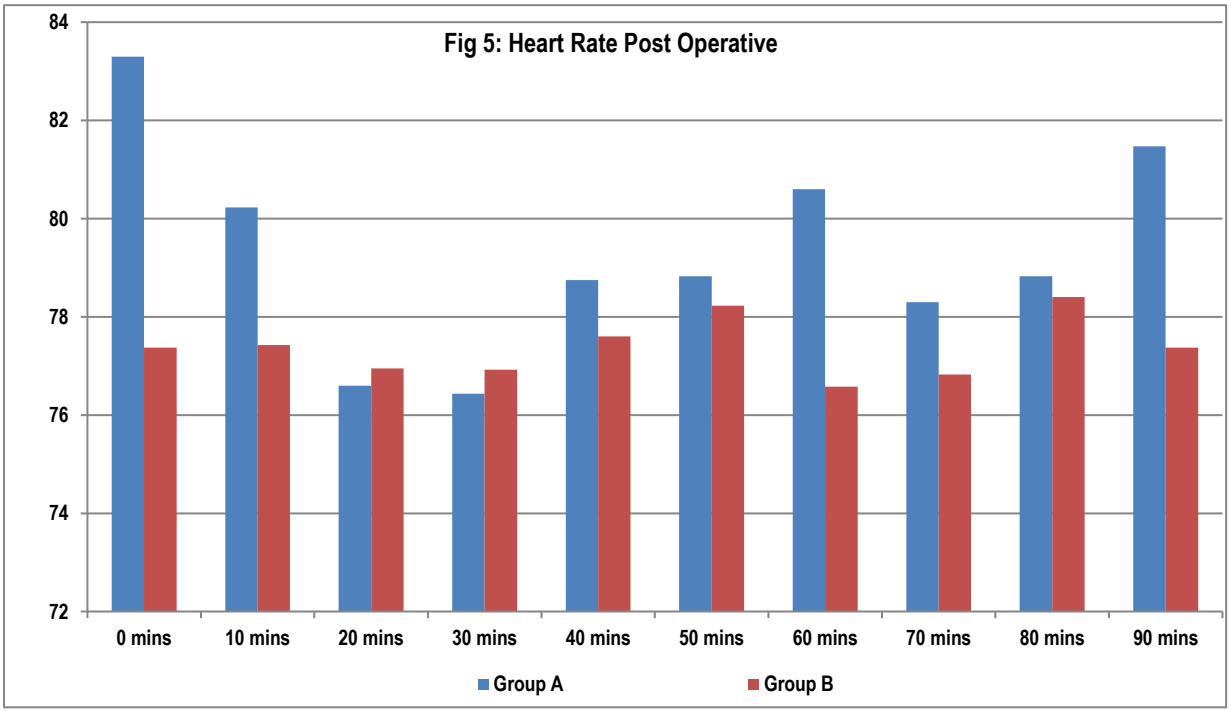
Fig 4: Mean Arterial Pressure
140
120
100
80
60
40
20
0
Baseline
Pre...
During...
3 mins
6 mins
9 mins
12 mins
15 mins
18 mins
21 mins
24 mins
27 mins
30 mins
40 mins
50 mins
60 mins
70 mins
80 mins
90 mins
Group A
Group B

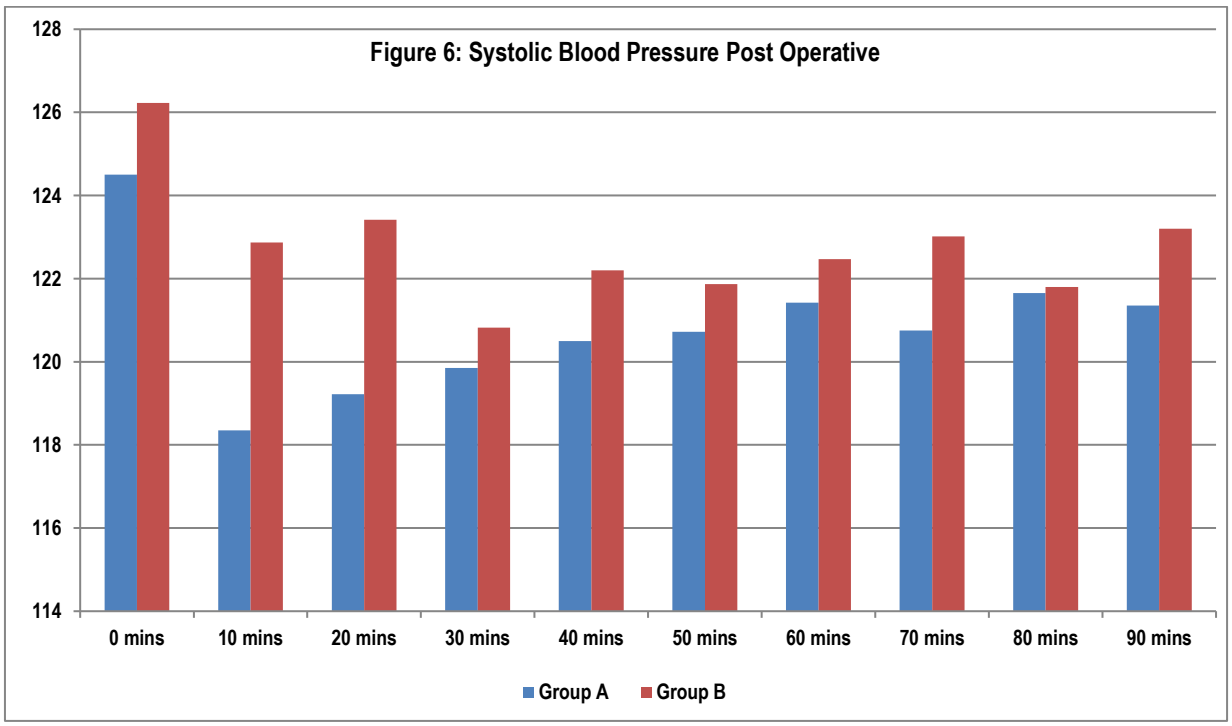
Table 3: Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP)

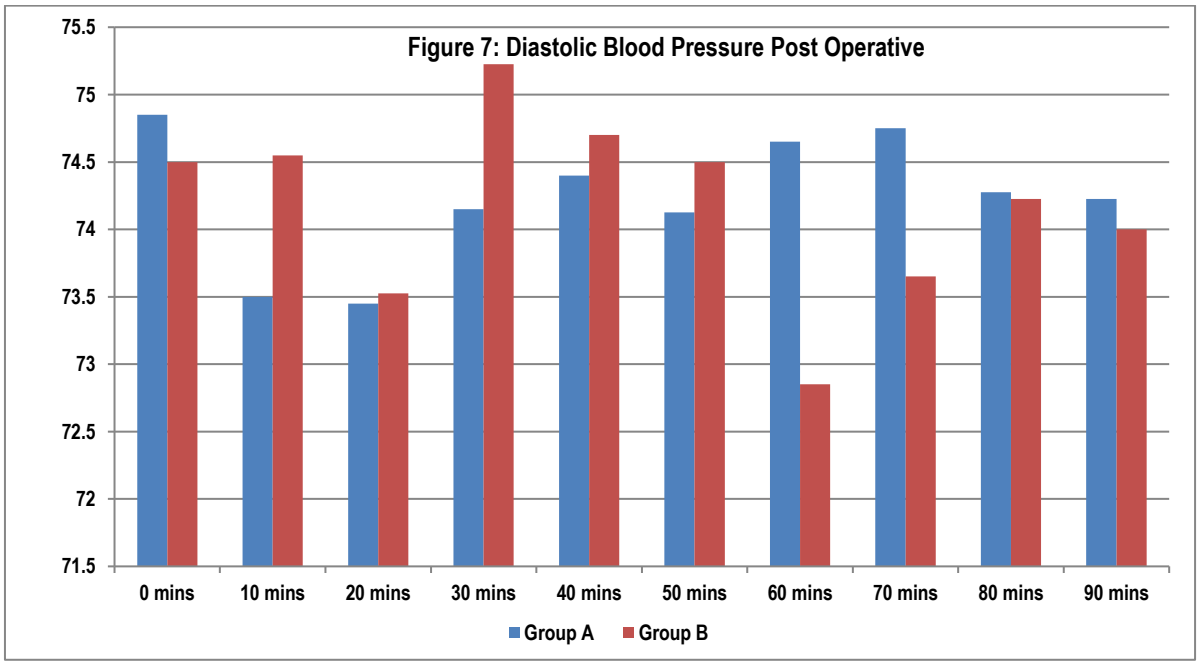
	SYSTOLIC BLOOD PRESSURE					DIASTOLIC BLOOD PRESSURE					MEAN ARTERIAL PRESSURE				
	Group A		Group B			Group A		Group B			Group A		Group B		
	Mean	SD	Mean	SD	P	Mean	SD	Mean	SD	P	Mean	SD	Mean	SD	P
Baseline	118.875	10.6727	120.1	10.7412	0.61033	73.05	8.249165	72.8	7.314194	0.886331	82.45	8.164809	84.4	8.126563	0.287658
Pre induction	112.725	13.0698	124.675	11.7721	0.00004	72.75	9.314312	70.025	8.928455	0.000623	77.6	10.54368	86.7	9.030433	8.54E-05
During Intubation	131.975	9.00566	121.25	11.0331	0.00008	82.775	8.429154	72.15	6.47896	1E-08	93.575	8.409053	83.85	7.205945	3.7E-07
3 mins	140.275	7.3554	119.75	10.2725	0	94.35	9.205767	72.825	6.01659	0	105	8.867445	83.25	5.87367	0
6 mins	135.75	8.28885	115.45	9.25687	0	89.775	10.78576	71.875	5.272996	0	100.6	9.448375	82.05	5.453533	0
9 mins	132.8	9.04178	115.775	8.58587	0	87.6	8.980891	71.55	5.349095	0	98.775	8.639467	82	5.551623	0
12 mins	130.175	6.89811	117.475	8.62312	0	84.925	8.786317	71.6	5.601282	0	94.825	8.174029	82.375	5.318991	0
15 mins	127.425	11.3496	117.875	9.34574	0.00009	84.8	10.67516	73.975	6.711977	6.2E-07	95.475	10.07405	83.61539	5.976337	1E-08
18 mins	127	12.0106	116.2	8.2188	0.00001	84.925	10.55483	73.975	6.145616	2.3E-07	95.3	10.18596	83.7	5.756602	2E-08
21 mins	129.3	9.85068	117.175	8.286187	7E-08	85.7	8.774088	73.25	5.504078	0	96.375	8.325702	83.7	5.08996	0
24 mins	136.775	9.84622	118.525	8.85492	0	90.35	11.53267	73.425	5.615398	0	101	11.22269	83.9	5.212411	0
27 mins	122.75	9.50236	118.475	7.118007	0.025509	81.325	8.191263	74.4	5.037297	1.91E-05	91.475	7.877223	84.975	4.627053	2.34E-05
30 mins	128.35	9.89314	117.75	6.636148	2.8E-07	83.25	9.209109	74.8	4.804912	1.94E-06	94.575	8.0762	85.25	4.253204	1E-08
40 mins	135.3158	11.3354	124.525	7.867452	5.19E-06	87.57895	11.76259	73.55	4.355662	0	99.4473	10.97343	86	3.829708	0
50 mins	139.52	9.46537	122.4546	9.545516	1.9E-07	89.04	10.99803	73.13636	5.064305	1.5E-07	102.88	8.913099	85.72727	3.614545	0
60 mins	130.6923	8.58666	120.9167	7.378819	0.005811	94.15385	13.20887	74.75	7.337637	0.000168	106.846	10.5186	87	5.575922	6.28E-06
70 mins	131.4286	4.89411	128	10.61446	0.473729	99.14286	5.984106	77.5	9.036961	0.000933	110.285	4.498677	90.75	7.719024	0.000435
80 mins	135	5.65685	-	-	-	101	7.071068				113.5	0.707107			
90 mins	138	-	-	-	-	109					119				

Table 4: Post-operative

Pulse Rate		0 mins	10 mins	20 mins	30 mins	40 mins	50 mins	60 mins	70 mins	80 mins	90 mins
Group A	N	40	40	40	40	40	40	40	40	40	40
	Mean	83.3	80.225	76.6	76.435	78.75	78.825	80.6	78.3	78.825	81.475
	SD	4.09001	4.3233	4.1062	4.8547	3.9532	4.1068	4.7974	5.0393	3.8556	3.6019
Group B	N	40	40	40	40	40	40	40	40	40	40
	Mean	77.375	77.425	76.95	76.925	77.6	78.225	76.575	76.825	78.4	77.375
	SD	4.99583	4.6788	4.4603	4.5931	3.9405	4.2395	4.6348	3.9992	4.8452	4.9958
P value Unpaired t Test		0.00000	0.0068	0.4089	0.6252	0.0605	0.1773	0.0215	0.1151	0.0255	0.0018







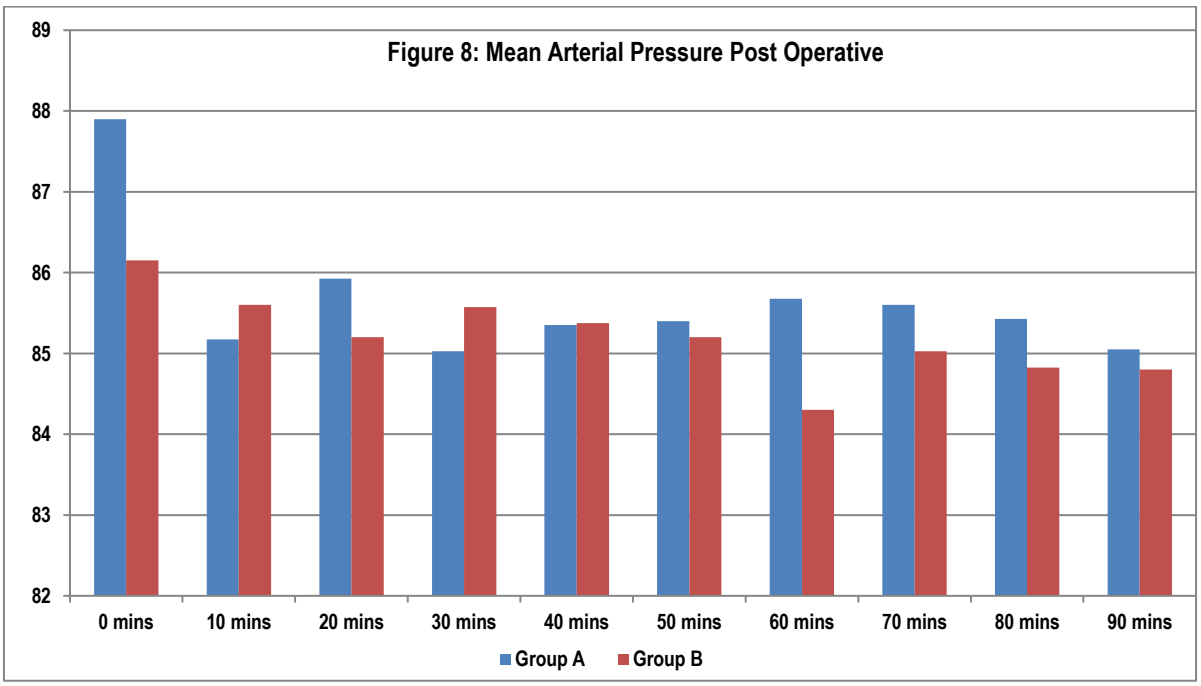


Table 5: Postoperative SBP, DBP, MAP (mmHg)

	POST OPERATIVE														
	SYSTOLIC BP					DIASTOLIC BP					MEAN ARTERIAL PRESSURE				
	GROUP A		GROUP B		p	GROUP A		GROUP B			GROUP A		GROUP B		P
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	P	Mean	SD	Mean	SD	
0 mins	144.5	10.198	126.225	10.5453	0. 04530	74.85	6.96345	74.5	5.71996	0.03593	87.9	6.39631	86.15	4.80144	0.17035
10 mins	138.35	8.6751	122.87	8.5999	0.0216	73.5	6.377	74.55	4.6406	0.0216	85.175	5.5093	85.6	4.337	0.7025
20 mins	139.22	9.3684	123.42	8.7526	0.0415	73.45	5.1238	73.525	5.0585	0.0415	85.925	4.8536	85.2	4.2256	0.4782
30 mins	139.85	9.1862	120.82	8.938	0.0355	74.15	6.7503	75.225	4.3174	0.0355	85.025	5.929	85.575	4.3257	0.6368
40 mins	129.5	7.9097	122.2	9.7143	0.0393	74.4	6.2912	74.7	4.8527	0.0393	85.35	5.4375	85.375	4.6996	0.9825
50 mins	128.72	8.9899	121.87	8.8497	0.0559	74.125	5.4827	74.5	4.7985	0.0459	85.4	5.0677	85.2	4.1952	0.848
60 mins	127.42	9.6712	122.47	8.7471	0. 061	74.65	5.428	72.85	4.666	0.042	85.675	4.8642	84.3	4.014	0.1718
70 mins	129.75	10.394	123.02	9.5232	0.3105	74.75	5.4431	73.65	4.4981	0.3105	85.6	5.5229	85.025	4.5544	0.612S
80 mins	128.65	8.2727	121.8	9.9077	0.9416	74.275	5.6249	74.225	4.6048	0.9416	85.425	4.9814	84.825	4.7441	0.5827
90 mins	127.35	9.3412	123.2	8.1183	0.3473	74.225	5.6861	74	4.8885	0.3473	85.05	5.3395	84.8	4.6087	0.8232

RESULTS

Demographic characteristics are comparable in both groups A and B for age, sex, ASA grading, weight as per table 1 and did not show any statistical significant difference.(p> 0.05)

Baseline mean heart rate difference was not statistically significant (p=6.63) and both groups were comparable at baseline .Pre induction mean heart was highly statistically significant (p=0.000041).During intubation mean heart difference was highly statistically significant (p=0.000000). Post intubation highly significant differences were found in the heart rates between the two groups (p<0.0000).

BLOOD PRESSURE

SBP

In our study the baseline mean systolic blood pressure shows no significant difference among two groups.(p =0.61) The pre-induction mean systolic blood pressure shows highly significant difference among two groups.(p =0.00004) During intubation mean SBP It shows highly significant difference among two groups. (p =0.00008) .The mean SBP post shows highly significant difference among two groups.(p <0.05) Thus, our findings demonstrate that the mean SBP in the dexmedetomidine group was significantly lower after intubation and at all the subsequent intervals as compared to saline group.

DBP

In our study the mean DBP shows no significant difference among two groups at baseline.(p =0.886) The pre-induction mean DBP shows highly significant difference among two groups. (p =0.00062) During intubation mean shows highly significant difference among two groups. (p =0.000001) The mean DBP readings post intubation shows highly significant difference among two groups.(p <0.05)

MAP

In our study the mean arterial blood shows no significant difference among two groups at baseline.(p =0.61) The pre-induction MAP shows highly significant difference among two groups. (p =0.00004) During intubation MAP shows highly significant difference among two groups. (p =0.00008) The MAP readings post intubation shows highly significant difference among two groups. (p <0.05)

Post operatively Significant difference was found in mean heart rate values between two groups (p<0.05).

Significant difference was found in mean systolic blood pressure values between two groups (p<0.05).

Significant difference was found in mean diastolic blood pressure values between two groups (p<0.05).

No significant difference was found in mean arterial pressure values between two groups (p>0.05).

DISCUSSION

In the present study, we demonstrated that single bolus dose of (0.75 mcg/kg) dexmedetomidine decreased hemodynamic responses to various noxious stimuli perioperatively in laparoscopic cholecystectomy. Its hemodynamic effects are due to central sympatholytic and peripheral vasoconstrictive effects. It causes a dose dependent decrease in arterial BP and HR associated with a decrease in serum norepinephrine concentrations. It activates receptors in the medullary vasomotor center, reducing norepinephrine turnover and decreasing central sympathetic outflow, resulting in alterations in sympathetic function, thereby suppressing the hemodynamic response to intubation, extubation without any side effects like respiratory depression and PONV. Additional effects result from the central stimulation of parasympathetic outflow and inhibition of sympathetic outflow from the locus coeruleus in the brainstem.

These actions may have contributed to the findings in the hemodynamic profile in our patients who received low dose dexmedetomidine (0.75 mcg/kg) which shows that dexmedetomidine was effective in blunting the cardiovascular responses to intubation and stress response of laparoscopic surgery.

Statistical analysis showed, there was significant difference in hemodynamic variables between Group A and B at all intervals till the end of surgery ($P < 0.05$).

Our results are in concordance with Basar et al [2008] who evaluated the effects of pre anesthetic single dose dexmedetomidine on hemodynamics and cardiovascular parameters in laparoscopic cholecystectomy in 40 patients randomly divided into two groups ($n = 20$) and observed a significant decrease in mean SBP,DBP,MAP in patients who received dexmedetomidine ($p < 0.05$).[6] Our observations are also similar to Keniya V M et al [2011] who assessed the efficacy of dexmedetomidine in attenuating sympathoadrenal response to tracheal intubation in 60 patients randomly divided into two groups ($n = 30$) and observed that significant increase in SBP,DBP,MAP in control group as compared to dexmedetomidine group (P=0.00).[7]

Our study shows the same findings as Kim et al [2012] who assessed the efficacy of dexmedetomidine on intra operative hemodynamics in 20 patients and observed that the MAPs at induction, Intubation, incision, T-incison30 and T-extubation were significantly lower statistically in dexmedetomidine group when compared with the control and esmolol group (p<0.001).[8]

Our results are in concordance with Laha A et al [2013] who evaluated the effect of a single pre-induction intravenous dose of dexmedetomidine 1 µg/kg on cardiovascular response resulting from laryngoscopy and endotracheal intubation in 50 patients randomized in two groups(n=25) and observed that SBP,DBP,MAP increased after 1 and 2 min of administration of dexmedetomidine compared to control group and the increase was statistically significant at 1 min (P value 0.01 for SBP and 0.003 for DBP).The DBP was significantly lower at all other intervals in patients who received dexmedetomidine.[9]

Our results are in concordance with Reddy et al [2014] who compared the effects of dexmedetomidine with esmolol and control in attenuating the presser response during laryngoscopy in 90 patients randomly divided into three groups and observed the mean SBP,DBP,MAP levels in dexmedetomidine group were significantly lower than control as well as esmolol group immediately after intubation and until the end of surgery ($p< 0.001$, $p > 0.001$ respectively).[10] Our observations are very similar to Srivastva et al [2015] studied comparative evaluation of dexmedetomidine and esmolol on hemodynamic responses during laparoscopic cholecystectomy and observed that SBP ,DBP,MAP values were significantly lower statistically in dexmedetomidine group when compared with the control and esmolol group (p<0.001).[11] So the findings in our study are in concordance with Reddy et al (2014), Laha A et al (2013), Kim et al (2012).

DOSE OF ANALGESICS

Propofol

Dose of Propofol (mg)	Group A	Group B
N	40	40
Mean	120.5	82
SD	22.18222897	19.37484491

Fentanyl

Analgesic Dose (µg)	Group A	Group B
N	40	4
Mean	104.75	56.25
SD	30.77940537	12.5

In our study the mean dose of propofol used for induction was 120.5 ± 22.18 mg for saline group patients and 82 ± 19.37 mg for dexmedetomidine group patients. There is a significant reduction noticed in the dose required for induction in dexmedetomidine group patients.

This finding is consistent with study conducted by Srivastva et al [2015] they observed propofol induction dose was significantly lower in the dexmedetomidine group (73.33±11.47 mg) and esmolol group [89.83±12.90 mg] than in control group (105.83±14.27 mg) (p<0.0001).[11]

Sreenatha et al [2015] observed the dose required of propofol in control group is 97.00±5.96 mg and 64.33±11.94 for dexmedetomidine group patients. (p<0.001) There is a significant reduction noticed in the dose required for induction in dexmedetomidine group patients. This finding is in concordance with our study.[12]

Laha A [2013] observed the mean dose of propofol used for induction was 95± 7.43 mg for saline group patients and 55 ± 7.31 mg for dexmedetomidine group patients. There is a significant reduction noticed in the dose required for induction in dexmedetomidine group patients. This finding is consistent with our study.[9] The reducing effects of α-2 agonists on sympathetic neural activity and catecholamine in circulation are responsible for the decrease in anesthetic requirement.

In our study the mean dose of fentanyl used for control group was 104.75 ± 30.77 µg and 56.25 ± 12.5 µg for dexmedetomidine group patients. There is a significant reduction noticed in the dose required in dexmedetomidine group patients.

Yildiz M et al [2006] studied the effect of dexmedetomidine on haemodynamic responses to laryngoscopy and intubation, perioperative haemodynamics and anaesthetic requirements They observed fentanyl requirement was 74.20 +/- 10.53microg in the dexmedetomidine group and 84.00 +/- 27.04microg in the saline group (p < 0.05). This observation is in concordance with our results.[13] Sreekantha et al [2015] compared the fentanyl requirement in control group (202.5±23.99 mcg) and in dexmedetomidine group patients (121.67±28.42 mcg) (p < 0.001). They noticed significant reduction in the dose required in dexmedetomidine group patients. These findings are in concordance with our results.[12] Srivastva et al [2015] observed intraoperative fentanyl requirement were significantly lower in dexmedetomidine group (41.90±11.76 mcg) and in esmolol group (50.86±15.01 mcg) than in the group C (59.64±14.78 mcg) (p<0.0001).This observation is in concordance with our results.[11]

In our study, we found that there was minimum requirement of rescue analgesic.So the usage of dexmedetomidine decreases the requirement for anesthetics both intraoperative and postoperative.

Side Effects	Group A	%	Group B	%
Hypertension	12	30	3	7.5
Bradycardia	0	0	2	5
Nausea	14	35	0	0
Vomiting	4	10	1	2.5
Hypotension	0	0	1	2.5
Tachycardia	18	45	0	0

Adverse Effects

Postoperative hypertension is observed in 30% control group patients vs 7.5% in dexmedetomidine group patients, nausea in 35% control group vs 10% in dexmedetomidine group, vomiting in 4% control group vs 2.5% in dexmedetomidine group, tachycardia in 18% control group vs hypotension in only 2.5% dexmedetomidine group. These observations show significant reduction in adverse effects in dexmedetomidine group. Sreekantha et al observed dexmedetomidine group has absolutely no risk of hypertension or tachycardia and at the same time has statistically insignificant hypotension, bradycardia and postoperative nausea and vomiting. Thus the study pattern of these relative changes gives the idea of the hemodynamic stability brought in by dexmedetomidine as compared to saline group. Dexmedetomidine has been used in anaesthesia practice because of their anxiolytic, sedative, sympatholytic and analgesic sparing properties.

CONCLUSION

Dexmedetomidine has significant attenuating effect on heart rate, systolic blood pressure, and diastolic blood pressure and mean arterial pressure during laparoscopic cholecystectomy. Dexmedetomidine produces dose-dependent anxiolysis, and analgesia so decreases the dose of requirement of anaesthetic agent for induction.

Dexmedetomidine significantly blunts the haemodynamic response to emergence from anaesthesia and extubation. There is a significant reduction in the adverse effects both intraoperatively and postoperatively in dexmedetomidine group of patients**.**

Single dose preanaesthetic dexmedetomidine significantly attenuates stess responses to various noxious stimuli during surgery, maintains haemodynamic stability and reduces the requirement of other anaesthetic agents without prolongation of recovery.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Balwinder Kaur Rekhi, Harnam Singh Rekhi, Sahil Satish Arora, Kamini Singla, Sandeep Sidhu, Sushil Mittal, Amita Mhatre Arora. Effects of Pre Anaesthetic, Single Low Dose Dexmedetomidine on Induction and Haemodynamic Parameters in Laparoscopic Cholecystectomy. Int J Med Res Prof. 2017; 3(2):226-35. DOI:10.21276/ijmrp.2017.3.2.046