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ORIGINAL RESEARCH

Comparison of optimal doses of prophylactic dexmedetomidine for preventing post-operative shivering in patients undergoing elective laparoscopic cholecystectomy

[1]Dr. Nandita Kad, [2]Dr. Prerna Sharma, [3]Dr. Pardeep Kumar

[1]Professor, Anaesthesiology and Critical care , PGIMS Rohtak, Haryana India.
[2]Assistant Professor, Anaesthesiology and Critical care, MMIMSR Mullana medical college, Haryana India.
[3]Associate Professor, Anaesthesiology and Critical care, PGIMS Rohtak, Haryana India.

Corresponding Author
Dr. Pardeep Kumar
Associate Professor, Anaesthesiology and Critical care , PGIMS Rohtak , Haryana India.

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Abstract
Introduction: Postoperative shivering is an involuntary, oscillatory muscular activity during early recovery after anaesthesia. Postoperative shivering is a frequent complication of anaesthesia; it has been reported to range from 20 to 70% in general anaesthesia.Shivering is believed to increase oxygen consumption and increase the risk of hypoxemia; it might also increase postoperative complications. dexmedetomidine might provide a simple pharmacological intervention to suppress shivering and improve comfort without producing respiratory compromise in patients.
Methods: The study was conducted in department of anaesthesiology at Pt. B. D. Sharma PGIMS, Rohtak. Total one hundred thirty-two patients of either sex between 18- 60 years of age having physical status of grade I and II according to American Society of Anaesthesiologists (ASA) scheduled for elective laproscopic cholecystectomy under general anaesthesia were included in this study. It was a prospective, randomized and double blinded
study. All the patients were randomly divided into four groups of 33 each.
Group-I(DN)(n=33) Administration of 20 ml of normal saline over 10 min.
Group-II(D0.5)(n=33) Administration of 0.5 mcg kg-1 dexmedetomidine over 10 min.
Group-III(D0.75)(n=33) Administration of 0.75 mcg kg-1dexmedetomidine over 10 min.
Group-IV(D1.0)(n=33) Administration of 1.0 mcg kg-1 dexmedetomidine over 10 min.
Results: After studying various factors, we found from our study that i.v dexmedetomidine in the dose range of 0.5 mcgkg-1 , 0.75 mcgkg-1 and 1.0 mcgkg-1reduces the rise in heart rate, systolic blood pressure, diastolic blood pressure during general anaesthesia. Thus, dexmedetomidine provides better perioperative haemodynamic stability in ASA I and II grade patients during general anaesthesia as dexmedetomidine has sedative, anxiolytic and sympatholytic properties. The decrease in pain and shivering was greater in dexmedetomidine dose 0.75 mcgkg-1 and 1.0 mcgkg-1 than dexmedetomidine dose 0.5 mcgkg-1 and placebo and time of first rescue analgesic was more in dexmedetomidine dose 0.75 mcgkg-1 and 1.0 mcgkg-1 than dexmedetomidine dose 0.5 mcgkg-1 and placebo.
Conclusion: we recommend dexmedetomidinedose 0.75mcgkg-1 as an anaesthetic adjuvant can be used during general anaesthesia as an optimal dose to reduce post operative shivering in patients undergoing laproscopic cholecystectomy, because it significantly attenuates heart rate and blood pressures, it decreases pain and shivering and it facilitates smooth emergence from anaesthesia and the sedation and complication rate of dexmedetomidinedose 0.75mcgkg-1 is lower than other doses.
Keywords: Shivering, Dexmedetomidine, ASA

Introduction

Shivering is due to involuntary, repetitive activity of skeletal muscles. Shivering, a syndrome involving involuntary oscillatory contractions of skeletal muscles, is a common and challenging side effect of anaesthesia and targeted temperature modulation .[1] Shivering is a physiologic response to cold exposure and the body's next step in heat preservation after peripheral vasoconstriction.[2] Peri-operative hypothermia, can be a major cause of post anaesthesia shivering which is associated with adverse outcomes like metabolic acidosis, decreased platelet activity, impaired immune responses, prolonged drug metabolism delayed recovery and sympathetic nervous system stimulation.[3] Additionally, it increases oxygen consumption, CO2 production, catecholamine secretion along with increase in basal metabolic rate which can cause severe adverse effects in patients with cardiopulmonary insufficiency.[4]Due to undesirable effects such as hypoxia, lactic acidosis and increase in intra-ocular pressure, post-anaesthetic shivering needs to be prevented.[5] Shivering is defined as the fasciculation of the face, jaw, or head or muscle hyperactivity lasting longer than 15 seconds.[6]This phenomenon is a common

occurrence observed in the post anaesthesia care unit. Previous studies have reported an incidence of 5% to 65% after general anaesthesia and 30% to 33% after epidural procedures.[7]The overall shivering incidence in a recent metaanalysis was 34% .[1] Intra operative hypothermia is a major risk factor for post anaesthetic shivering but shivering can also occur in normothermic patients at the end of surgery.[8,9] Redistribution of core temperature during regional anaesthesia is typically restricted to legs and therefore core temperature decreases about half as much as regional anaesthesia as during general anaesthesia.[10] Various drugs decrease the threshold temperature for shivering and deep sedation or general anesthesia can completely eliminate shivering. Prior studies suggest that the alpha-2 adrenoceptor agonist dexmedetomidine reduces shivering without excessive sedation. Dexmedetomidine is useful for sedation of selected patients in the intensive care unit and for procedural sedation in paediatrics or special populations where respiratory compromise is undesirable.

Methods

The study was conducted in department of anaesthesiology at Pt. B. D. Sharma PGIMS, Rohtak. Total one hundred thirty-two patients of either sex between 18- 60 years of age having physical status of grade I and II according to American Society of Anaesthesiologists (ASA) scheduled for elective laproscopic cholecystectomy under general anaesthesia were included in this study. It was a prospective, randomized and double blinded study. All the patients were randomly divided into four groups of 33 each. Group-I(DN)(n=33) Administration of 20 ml of normal saline over 10 min. Group-II(D0.5)(n=33) Administration of 0.5 mcg kg-1 dexmedetomidine over 10 min. Group-III(D0.75)(n=33) Administration of 0.75 mcg kg-1dexmedetomidine over 10 min. Group-IV(D1.0)(n=33) Administration of 1.0 mcg kg-1 dexmedetomidine over 10 min. Statistical analysis was performed by the SPSS program for Windows, version 17.0. Continuous variables were presented as mean ± SD, and categorical variables were presented as absolute numbers and percentage. Data was checked for normality before statistical analysis using Shaipro Wilk test. Normally distributed continuous variables were compared using ANOVA. If the F value was significant and variance was homogeneous, Tukey multiple comparison test was used to assess the differences between the individual groups; otherwise, Tamhane's T2 test was used. The Kruskal Wallis test was used for those variables that were not normally distributed and further comparisons were done using Mann Whitney U test. Categorical variables were analyzed using the chi square test. For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

Results

Patients in all groups were comparable with respect to mean age, sex and ASA grading and there was no significant difference in demographic profile of all four groups(p>0.05).

TABLE : 1 Saturation of oxygen at various time interval

Spo2(%)	Group I	Group II	Group III	Group IV	p Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Baseline	99.55 ± 0.56	99.30 ± 0.81	99.67 ± 0.48	99.36 ± 0.70	0.094
30 Min Before Administration of study drug	99.79 ± 0.42	99.7 ± 0.47	99.7 ± 0.53	99.82 ± 0.39	0.600
Immediately After Administration of study drug	99.82 ± 0.39	99.79 ± 0.42	99.85 ± 0.44	99.85 ± 0.36	0.916
15 Min After Administration of study drug	99.85 ± 0.36	99.88 ± 0.33	99.91 ± 0.29	99.85 ± 0.36	0.867
After Extubation	99.42 ± 0.50	99.09 ± 0.91	99.06 ± 0.93	99.06 ± 0.90	0.218
After Shifting to Recovery Room	98.79 ± 1.19	99.09 ± 1.07	98.61 ± 1.17	99.09 ± 1.01	0.212

There was no statistical difference in spo2 in different groups at baseline, thirty minutes before administration of dexmedetomidine, immediately after administration of dexmedetoidine, fifteen minutes after administration of dexmedetomidine and after shifting to recovery room. (p>0.05)

TABLE-2

Changes in systolic blood pressure compared to baseline in four groups at various time interval

SBP(Mm Hg)	Group I	Group II	Group III	Group IV	p Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Baseline	125.88 ± 9.69#	128.18 ± 12.3#	127.12 ± 12.44#	122.3 ± 12.41#	0.203
30 Min before Administration of study	125.27 ± 6.80#	125.7 ± 10.86#	126.33 ± 11.18#	121.88 ± 11.39#	0.294

drug					
Immediately after Administration of study drug	129.52 ± 6.50*	123.03 ± 8.11*	120.85 ± 9.03*	114.97 ± 9.84*	<0.001
15 Min after Administration of study drug	129.76 ± 8.44*	121.27 ± 8.69*	117.76 ± 7.82*	115.39 ± 9.86*	<0.001
After Extubation	137.27 ± 8.42*	129.7 ± 9.34*	125.15 ± 7.25*	123.7 ± 6.77*	<0.001
After Shifting to Recovery Room	130.00 ± 6.87*	119.03 ± 6.69*	119.76 ± 6.48*	120.73 ± 6.83*	<0.001

#There was no significant difference in the baseline systolic blood pressures and 30 minutes before administration of dexmedetomidine. (p>0.05) *The increase in systolic blood pressure was highly significant in group I as compared to group II, III, IV at different time intervals.(p<0.001)

TABLE:3
Changes in Diastolic blood pressure compared to baseline in four groups in various time intervals

DBP(mm hg)	Group I	Group II	Group III	Group IV	p Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Baseline	78.21 ± 6.40#	80.06 ± 9.14#	77.76 ± 9.28#	77.21 ± 9.1#	0.561
30 Min before Administration of study drug	76.55 ± 6.66#	78.48 ± 8.14#	77.45 ± 8.28#	76.30 ± 8.00#	0.660
Immediately after Administration of study drug	79.64 ± 8.48*	75.03 ± 6.31*	76.79 ± 6.48*	71.94 ± 5.95*	<0.001
15 Min after Administration of study drug	79.52 ± 10.82*	74.58 ± 7.87*	73.88 ± 5.85*	72.48 ± 5.34*	0.002
After Extubation	92.36 ± 8.07*	81.27 ± 6.85*	80.06 ± 4.65*	80.00 ± 6.61*	<0.001
After Shifting to Recovery Room	84.61 ± 6.55*	75.03 ± 4.67*	76.67 ± 5.35*	77.09 ± 5.2*	<0.001

#Baseline diastolic blood pressure of all groups are comparable to each other, difference is not significant. (p>0.05)#Diastolic blood pressure in all groups was comparable to each other in all four groups 30 minutes before administration of dexmedetomidine and there is no statistical difference between them (p>0.05)*The decrease in diastolic blood pressure was highly significant in III and IV group as compared to group I and group II.(p<0.001)

Table:4
Changes in heart rate compared to baseline in four groups at various time intervals

HR(per mint)	Group I	Group II	Group III	Group IV	p Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Baseline	81.09 ± 10.03#	79.48 ± 13.36#	83.06 ± 13.61#	82.61 ± 9.04#	0.594
30 Min before Administeration of study drug	93.94 ± 7.97*	76.18 ± 9.06*	80.94 ± 10.89*	84.36 ± 7.24*	<0.001
Immediately after Administration of study drug	104.09 ± 8.10*	75.30 ± 5.86*	77.39 ± 7.08*	69.52 ± 5.90*	<0.001
15 Min after Administration of study drug	102.79 ± 8.73*	75.73 ± 6.1*	74.70 ± 6.56*	72.21 ± 5.21*	<0.001

After Extubation	109.12 ± 10.01*	95.45 ± 8.48*	89.39 ± 8.22*	87.24 ± 6.62*	<0.001
After Shifting to Recovery Room	85.45 ± 13.7*	79.85 ± 7.71*	80.73 ± 5.34*	80.18 ± 9.60*	0.064

#Baseline heart rate of all patients of all groups are comparable to each other and there is no statistical difference between them (p>0.05)*The decrease was highly significant in group IV and III as compared to group II and I, 30 min before administration of dexmedetomidine, immediately after administration of dexmedetomidine, 15 min after administration of dexmedetomidine and after extubtion. (p<0.001) *After shifting to recovery room, the difference in heart rate was not significant. (p>0.05)

Table:5
Changes in tympanic temperature as compared to baseline in all four groups at different time intervals

Tympanic Temp	Group I	Group II	Group III	Group IV	p Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Baseline	37.04 ± 0.3	37 ± 0.18	36.87 ± 0.33	36.94 ± 0.34	0.105
30 Min before Administration of study drug	36.46 ± 0.3.7	36.9 ± 0.19	36.3 ± 0.45	36.67 ± 0.4	<0.001
Immediately after Administration of study drug	36.24 ± 0.41	36.86 ± 0.21	36.25 ± 0.37	36.66 ± 0.35	<0.001
15 Min after Administration of study drug	36.17 ± 0.34	36.73 ± 0.2	36.36 ± 0.34	36.661 ± 0.3	<0.001
After Extubation	36.17 ± 0.34	36.45 ± 0.2	36.31 ± 0.29	36.68 ± 0.23	<0.001
After Shifting to Recovery Room	36.16 ± 0.3	36.12 ± 1.69	36.24 ± 0.25	36.69 ± 0.25	0.035

#Baseline tympanic temperature of all patients of all groups are comparable to each other and there is no statistically significant difference between them(p>0.05) *The decrease in tympanic temperature was highly significant inGroup I and Group II as compared to Group III and Group IV.(p<0.001)

Table:6
Extubation time in different groups

	Group I	Group II	Group III	Group IV	p Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Extubation Time	4.23 ± 1.01	4.06 ± 1.37	5.11± 1.28	4.46 ± 1.31	0.005

Table:6.1
Inter Group Comparison of Extubation time

GROUP	GROUP	Mean Difference
Group I	Group II	0.1667
	Group III	-0.8788
	Group IV	-0.3364
Group II	Group III	-1.0455
	Group IV	-0.503
Group III	Group IV	0.5424

There is significant increase in extubation time in groups IV and III as compared to group I and II. (P=0.005).

Table :7
Total duration of surgery and anaesthesia in all four groups

	Group I	Group II	Group III	Group IV	P Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Total Duration of Surgery	72.03 ± 23.93	74.42 ± 13.27	69.18 ± 10.28	70.73 ± 11.76	0.581
Total Duration of Anaesthesia	77.88 ± 11.67	83.18 ± 12.88	88.73 ± 10.09	92.85 ± 12.56	<0.001

The difference in total duration of surgery was comparable in all four groups and there was no statistically significant difference. (p>0.05) However, the difference in total duration of anaesthesia was highly significant in all four groups (p<0.001).Duration of anaesthesia was highest in Group IV and lowest in Group I.

Table :8

Comparison of Pain in all four groups in recovery room at different time intervals through verbal rate scale

Verbal Rate Scale (Pain)	Group I	Group II	Group III	Group IV	p Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
10 min	1.91 ± 0.72	0.64 ± 0.65	0.64 ± 0.65	0.52 ± 0.62	<0.001
20 Min	2.33 ± 0.54	0.45 ± 0.56	0.48 ± 0.57	0.45 ± 0.51	<0.001
30 Min	2.64 ± 0.65	0.55 ± 0.56	0.48 ± 0.51	0.45 ± 0.51	<0.001
40 Min	2.58 ± 0.71	0.64 ± 0.55	0.52 ± 0.62	0.45 ± 0.51	<0.001

The statistical difference in pain was highly significant between all four groups. The decrease in pain was highly significant in group IV and group III as compared to group I and II.

Table:9

Comparison of grade of shivering in recovery room between all four groups at different time intervals

Shivering Grade		Groups				p Value
		Group I	Group II	Group III	Group IV	
		Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	
10 min	0	11 (33.3%)*	22 (66.7%)*	26 (78.8%)*	28 (84.8%)*	<0.001
	1	13 (39.4%)*	7 (21.2%)*	7 (21.2%)*	4 (12.1%)*	
	2	9 (27.3%)*	4 (12.1%)*	0 (0.0%)*	1 (3.0%)*	
20 min	0	9 (27.3%)*	23 (69.7%)*	27 (81.8%)*	29 (87.9%)*	<0.001
	1	16 (48.5%)*	10 (30.3%)*	6 (18.2%)*	4 (12.1%)*	
	2	8 (24.2%)*	0 (0.0%)*	0 (0.0%)*	0 (0.0%)*	
30 min	0	12 (36.4%)*	28 (84.8%)*	30 (90.9%)*	30 (90.9%)*	<0.001
	1	21 (63.6%)*	5 (15.2%)*	3 (9.1%)*	2 (6.1%)*	
	2	0 (0.0%)*	0 (0.0%)*	0 (0.0%)*	1 (3.0%)*	
40 min	0	27 (81.8%)#	30 (90.9%)#	33 (100%)#	30 (90.9%)#	0.108
	1	6 (18.2%)#	2 (6.1%)#	0 (0.0%)#	3 (9.1%)#	
	2	0 (0.0%)#	1 (3.0%)#	0 (0.0%)#	0 (0.0%)#	

*In first ten minutes interval the reduction in shivering was highly significant in group IV and group III as compared to group I and II.(p<0.001)*The reduction in shivering grade was highly significant in group IV and III as compared to group II and group I at time intervals of 10,20 and 30 minutes.(p<0.001)#The shivering grade was comparable in all four groups at 40 minutes. However, the difference was not significant.(p>0.05)

Table:10

Comparison of sedation in all four groups at different time intervals with the help of modified observer' assessment of sedation score in recovery room

Modified Observer's Assessment Of Alertness/Sedation	Group I	Group II	Group III	Group IV	P Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
10 min	4.55 ± 0.51*	3.52 ± 0.71*	2.91 ± 0.68*	3.03 ± 0.77*	<0.001
20 MIN	5.00 ± 0.00*	4.73 ± 0.45*	4.15 ± 0.57*	3.73 ± 0.57*	<0.001
30 MIN	5.00 ± 0.00*	5.00 ± 0.00*	4.79 ± 0.42*	4.58 ± 0.5*	<0.001
40 MIN	5.00 ± 0.00*	5.00 ± 0.00*	5.00 ± 0.00*	4.82 ± 0.39*	<0.001

*The decrease in sedation score was highly significant in group IV and III as compared to group III and I.

Table:11

Time for first rescue analgesic

	Group I	Group II	Group III	Group IV	P Value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Time for First Rescue Analgesic	19.94 ± 4.98	32.00 ± 9.03	81.00 ± 4.24	61.75 ± 9.00	<0.001

The difference in time for rescue analgesic was significantly more in group IV and group III as compared to Group II and Group I.

TABLE: 12

Complications due to drug administration

There was no significant difference in the complications due to drug administration in all four groups(p>0.05).

Complications If Any	Groups				P Value
	Group I	Group II	Group III	Group IV	
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	
Brady	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.0%)	0.413
Hypotension	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.0%)	
No	33 (100%)	33 (100%)	33 (100%)	31 (93.9%)	
Total	33 (100%)	33 (100%)	33 (100%)	33 (100%)	

However, in group IV, there was episode of bradycardia in one patient so atropine had to be given and one patient in the same group had episode of hypotension so mephentermine had to be given. There were no such episodes in the rest of the three groups.

Discussion

In our study, we enrolled one hundred and thirty two patients of ASA grade I and II who were scheduled to undergo elective laparoscopic cholecystectomy under general anaesthesia. Both male and females aged 18-60 years were included and there was no statistical difference between the sex ratios in the control and study groups. This helped us to judge the clinical significance of our study as the distribution, metabolism, excretion and action of drug are undoubtedly varied in different age groups.All four groups were statistically compared at baseline, thirty minutes before administration of dexmedetomidine, immediately after administration of dexmedetomidine, fifteen minutes after administration of dexmedetomidine, after extubation and after shifting to recovery room.There was no statistical difference in spo2 in different groups at baseline , thirty minutes before administration of dexmedetomidine, immediately after administration of dexmedetoidine, fifteen minutes after administration of dexmedetomidine and after shifting to recovery room.(p>0.05)(Table 1)There was no significant difference in baseline systolic blood pressure, diastolic blood pressure and heart rate in all four groups. (Table 2,3,4; p>0.05) At 30 min before administration of dexmedetomidine the difference was not significant in systolic and diastolic blood pressure in all four groups. Immediately after administration of study drug and 15min after administration of study drug there was a significant decrease in systolic and diastolic blood pressures and heart rate in group IV and III as compared to group II and I.(p<0.001)After extubation the rise in systolic and diastolic blood pressures and heart rate was significantly high in group 1 as compared to group II,III and IV(p<0.001).The rise in blood pressures and heart rate was significantly high in group II as compared to group III and IV. However, there was no significant difference in blood pressures and heart rate in group III and IV.Bajwa et al observed that the pre-op mean HR and MAP were comparable in both the groups and did not reveal any statistical significance (P> 0.05). Postoperatively, however, there was significant difference between the two groups as group D patients had a lower mean HR and MAP as compared to group N patients. HR and NIBP fluctuations were minimal in the group D as compared to group N during the period ranging from extubation to recovery in the postanesthesia care unit (PACU).[11]In our study, there was a significant difference in heart rate and blood pressure among all four groups. Group IV and group III, had lower mean heart rate and blood pressure after giving the drug as compared to group II and Group I.When tympanic temperature was compared amongst the different groups at different time intervals, at baseline and 30 min before surgery there was no significant difference in tympanic temperature of all four groups(p>0.05).Immediately after administration of study drug and 15 min after administration of study drug there was highly significant increase in tympanic temperature group II and IV as compared to group I, group III as compared to group II, Group IV as compared to group III.(p<0.001).After extubation there was highly significant increase in tympanic temperature group II and IV as compared to group I and Group IV as compared to group III.(p<0.001). There was no significant difference in tympanic temperatures between group II, III andIV(Table 5; p>0.05).Elvan et al conducted a study on dexmedetomidine and postoperative shivering in patients undergoing abdominal hysterectomy. Ninety female patients, ASA I-II , Aged 35-60 years were included who were scheduled for total abdominal hysterectomy with or without bilateral salpingo - oophorectomy were randomized into two groups, dexmedetomidine group and saline group. The tympanic temperatures in both groups showed a statistically significant reduction at the end of the operation when compared with the baseline values (P < 0.05). There were

no significant differences in the intraoperative values between the groups. Postoperative tympanic temperature measurements in the dexmedetomidine group were lower than that of the saline group ($P < 0.05$). At 60 min, postoperative temperatures were higher than baseline values in both groups ($P < 0.05$).[12]In our study, Group III and IV had longer extubation time as compared to group II and Group I and the difference was statistically significant. However, there was no statistically significant difference in extubation time in group III and IV. (Table 6,6.1)The difference in verbal rate scale for pain in all four groups at different time intervals post operatively was highly significant. The decrease in pain was significantly more in group D1.0 and D0.75 as compared to D0.5 and DN.(Table 8)Kim yong et al observed that more patients in group S required rescue analgesia compared to group D0.75 and D1.0 ($P < 0.001$). Time to rescue analgesia in group D1.0 was significantly longer than that in group S ($P < 0.001$) and the time to rescue analgesia was the shortest in group S and the longest in group D1.0.[13]We found that reduction in shivering in first ten minutes was highly significant in group IV and group III as compared to group I and II.($p<0.001$). The reduction in shivering grade was highly significant in group IV and III as compared to group II and group I at time intervals of 10,20 and 30 minutes.($p<0.001$). The shivering grade was comparable in all four groups at 40 minutes (Table 9). Elvan et al. compared a loading dose of 1mcg/kg and continuous infusion of 0.4 mcg/kg/hr of dexmedetomidine with placebo to prevent post anaesthetic shivering. The incidence of shivering was 18% with dexmedetomidine and 53% with placebo.[12]Bicer et al. observed that intravenous dexmedetomidine 1.0mcg/kg reduces postanaesthetic shivering with effects compared to those of meperidine 0.5mg/kg. Incidence of post anaesthetic shivering in the meperidine group was 10% and dexmedetomidine group was15% and 55% in placebo group.[14]Bajwa et al conducted a study on reduction in the incidence of shivering with perioperativedexmedetomidine80 patients were taken, in American Society of Anesthesiologists I and II, aged 22–59 years, who underwent general anesthesia for laparoscopic surgical procedures. The most striking statistics during recovery period pertained to the absence of any shivering in 95% of the patients who were administered intra-op dexmedetomidine as compared to only 57.5% of the patients in group N ($P = 0.002$).[11]In our study, the decrease in sedation score (MOAA/S) was highly significant in group IV and III as compared to group III and I (Table 10). Kim yong et al. observed that the MOAA/S was significantly lower in the dexmedetomidine groups compared with the saline group on arrival in the recovery room ($p< 0.05$) but there were no significant differences among the groups at 20 min and 40 min after arrival in the PACU.[13]There was no significant difference in the complications due to drug administration in all four groups($p>0.05$). However, in group IV, there was episode of bradycardia in one patient so atropine had to be given and one patient in the same group had episode of hypotension so mephentermine had to be given. There were no such episodes in the rest of the three groups.

Conclusions

After studying various factors, we conclude from our study that i.v dexmedetomidine in the dose range of 0.5 mcgkg-1, 0.75 mcgkg-1 and 1.0 mcgkg-1, reduces the rise in heart rate, systolic blood pressure, diastolic blood pressure during general anaesthesia.Thus dexmedetomidine provides better perioperative haemodynamic stability in ASA I and II grade patients during general anaesthesia as dexmedetomidine has sedative, anxiolytic and sympatholytic properties. The decrease in pain and shivering was greater in dexmedetomidine dose 0.75 mcgkg-1 and 1.0 mcgkg-1 than dexmedetomidine dose 0.5 mcgkg-1 and placebo and time of first rescue analgesic was more in dexmedetomidine dose 0.75 mcgkg-1 and 1.0 mcgkg-1 than dexmedetomidine dose 0.5 mcgkg-1 and placebo. The sedation was highest in dexmedetomidine dose 1.0 mcgkg-1 as compared to others. Also, the complications were more in dexmedetomidine dose 1.0 mcgkg-1 as compared to others. Hence, we recommend dexmedetomidinedose 0.75mcgkg-1 as an anaesthetic adjuvant can be used during general anaesthesia as an optimal dose to reduce post operative shivering in patients undergoing laproscopic cholecystectomy, because it significantly attenuates heart rate and blood pressures, it decreases pain and shivering and it facilitates smooth emergence from anaesthesia and the sedation and complication rate of dexmedetomidinedose 0.75mcgkg-1 is lower than other doses.

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