

## The Role of Sedation and Pulse Oximetry During Upper Gastrointestinal Endoscopy

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### ABSTRACT

**Introduction:** To determine the changes in oxygen saturation, blood pressure and pulse rate during endoscopic procedure and to evaluate – oesophagogastroduodenoscopy (OGD) related discomfort assessed by the patient.

**Methods:** It is observational case control study. Baseline pulse, blood pressure and oxygen saturation were monitored before procedure, at one minute of procedure, at five minute and soon after procedure. Patients were randomly selected according to lottery system (1: without sedation and 2: with sedation) and divided into two groups; without and with sedation. Before leaving department they were asked about level of discomfort during and after procedure.

**Results:** Patient's mean age  $\pm$  SD: 36.65,  $\pm$  11.42 years and 53.3% were men. Base line mean oxygen saturation among sedated patient were 96.77  $\pm$  1.56 % and 97.23,  $\pm$  2.26 % respectively (P=0.358). Mild to moderate hypoxia was noted more in sedated patient than in non sedated patient. Severe hypoxia was noted in 3.3% of sedated patient. No statistically significant change was noticed in pulse and blood pressure in both the group. None or only slight discomfort was experienced by 9.4% in non sedated group and 90.6% in sedated group. Severe discomfort by 96.4% in non sedated group and 3.6% in sedated group .

**Conclusions:** There is slight more incidence of mild hypoxia in sedated group than in non sedated group but no change in pulse and blood pressure. However, sedated patient have significant less level of discomfort than in non sedated group. Though routine use of pulse oxymeter is not necessary, routine use of sedation during endoscopy is recommended.

**Key Words:** *discomfort, gastroscopy, oxygen saturation, pulse oximeter*

### INTRODUCTION

Upper gastrointestinal endoscopy is one of the commonest day care based procedure done throughout the world. Since its evolution from rigid oesophagoscopy to fibre optic flexible endoscopy to newer generation thin endoscopes, practice for anesthesia has also

evolved from general anesthesia to sedation to local anaesthesia. Due to vast difference in patient's response to surgical procedure, guidelines for conscious sedation and monitoring have been established.<sup>1-3</sup> Though it is often considered to be unpleasant, a number of centre in developed and developing countries perform the procedure without sedation.<sup>4-7</sup> And irrespective of

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sedation, randomized control trial have shown that hypoxia is a common problem during OGD and sedation significantly increases the incidence of hypoxia, thus requiring further monitoring and intervention, if required.<sup>8-10</sup> However, procedure is associated with substantial pre-procedural anxiety and procedure related discomfort despite a low rate of medical complications and endoscopist tend to underestimate patient's level of discomfort.<sup>11</sup>

So the objectives of this study are to determine changes in oxygen saturation, blood pressure and pulses rate during endoscopic procedure and to evaluate upper GI endoscopy related discomfort assessed by patient among sedated and non sedated group.

## METHODS

A prospective observational case control study was conducted in endoscopy unit of department of General Surgery, Kathmandu Medical College teaching hospital from July 1, 2008 to August 1, 2008. Approval from ethical committee was taken.

All patient who came for OGD after taking informed consent was evaluated according to ASA grading and patient were allotted according to lottery system into two groups, with sedation and without sedation.

All patients above 15 years and ASA I and II while exclusion criteria were ASA III and IV and all emergency including therapeutic procedure were included. Group A - patient who came to endoscopy unit after overnight fasting was taken and informed consent and Lignocaine Spray 100mg (Xylocaine, Astra Pharmaceuticals, and King Langley UK) to the pharyngeal area and total anesthesia was judged by absence of gag reflex.

Group B – Injection midazolam was administered at initial dose of 0.01 mg through intravenous route and post procedure were kept in the ward for 1 hour for observation. Prior to procedure, baseline pulse rate, blood pressure oxygen saturation was monitored followed by continuous monitoring at 1 minute, 5 minute and immediate after procedure using Necloor Pulse oxymeter.

Before leaving department, both the group was asked about level of discomfort during procedure which was graded into no discomfort, minimal, moderate and severe discomfort.

Difference between mean and proportion were assessed using Man whitey test for non parametric data and Chi –Square test was used for nominal data by using 13.0 version of SPSS for windows software package for windows.

## RESULTS

Total 100 patients underwent upper gastrointestinal endoscopy in 1 month (Table 1). Mean age group was 36.65 years  $\pm$  11.42(SD) with 53.3 % male.

A change in the oxygen saturation at different stages of endoscopy was noted (Figure 1). There were no significant changes in pulse rate among two groups (Table 2). However, mild to moderate hypoxia was noted more in sedated patient than in non sedated patient and significant hypoxia was noted in 3.3% of sedated patient.

No statistically significant change was noticed in pulse and blood pressure in both the group (Figure 3-5 and Table 2-4). However, none or only slight discomfort was experienced by 9.4% in non sedated group and 90.6% in sedated group (p value - 0.00) whereas severe discomfort was experienced by 96.4% in non sedated group and 3.6% in sedated group (p value - 0.00).

## DISCUSSION

Upper gastrointestinal endoscopy has been used as one of the most frequently used diagnostic tool as a day care service. Though the complication rate has been very low during diagnostic endoscopy, it is not free from mortality.<sup>12</sup> Moreover, procedure related discomfort and anxiety is yet another factor which is underestimated by endoscopists while doing unsedated endoscopy. In most of developed countries after development of guidelines more number of patients undergo diagnostic gastroscopies with so called conscious sedation.<sup>13</sup> Main objective of sedation during procedure are to relieve patient anxiety and discomfort and improve quality of examination.

Studies have demonstrated episodes of significant hypoxia and arrhythmias occur during upper gastrointestinal endoscopy with or without sedation,<sup>14</sup> however exact cause for it is not know though many reasons have been coined for it like age, size of endoscopy, endoscopist experience.<sup>15-18</sup> According to Murray et al,<sup>19</sup> there is rise in pulse rate and systolic blood pressure after insertion of endoscope significantly, however study done by Shahzad et al,<sup>20</sup> found no change in pulse rate and blood pressure during unsedated upper gastrointestinal endoscopy. Similarly in our study there was no statistically significant difference in pulse rate and blood pressure both systolic and diastolic between pre procedure, intraprocedure and post procedure.

Though many study have noticed hypoxemia during procedure, in our study as well no significant difference in oxygen saturation pre procedural, intra and post procedural. However mild to moderate hypoxia was noticed more in non sedated group and two patients in sedated group (3.33%) had significant hypoxia.

**Table 1. Difference in oxygen saturation level means at different stages of procedure**

Injection midazolam	N	Mean Rank	P value
Oxygen saturation before procedure	no	30	26.8
	yes	30	34.1
	Total	60	0.98
Oxygen Saturation in 5 in 1min	no	30	32.58
	yes	30	28.42
	Total	60	0.346
Oxygen Saturation in 5 in 1min	no	30	28.60
	yes	30	32.40
	Total	60	0.391
Oxygen Saturation post procedure	no	30	28.97
	yes	30	32.02
	Total	60	0.490

Mann-Whitney Test

**Table 3. Changes in systolic blood pressure during procedure**

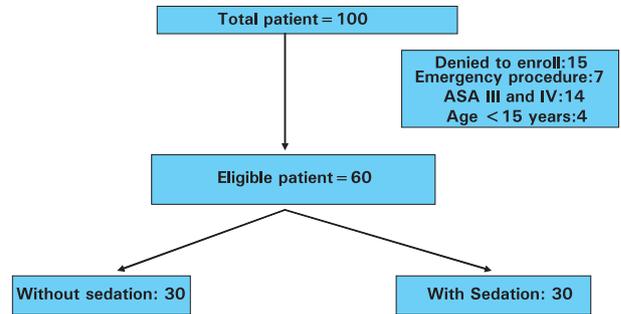
Injection midazolam	N	Mean Rank	P value
Systolic BP before procedure	no	30	29.47
	yes	30	31.53
	Total	60	0.65
Systolic BP at 1 minute	no	30	31.17
	yes	30	29.83
	Total	60	0.77
Systolic BP at 5 minute	no	30	33.08
	yes	30	27.92
	Total	60	0.25
Systolic BP post procedure	no	30	30.98
	yes	30	30.02
	Total	60	0.83

**Table 2. Showing no significant changes in pulse rate among two groups**

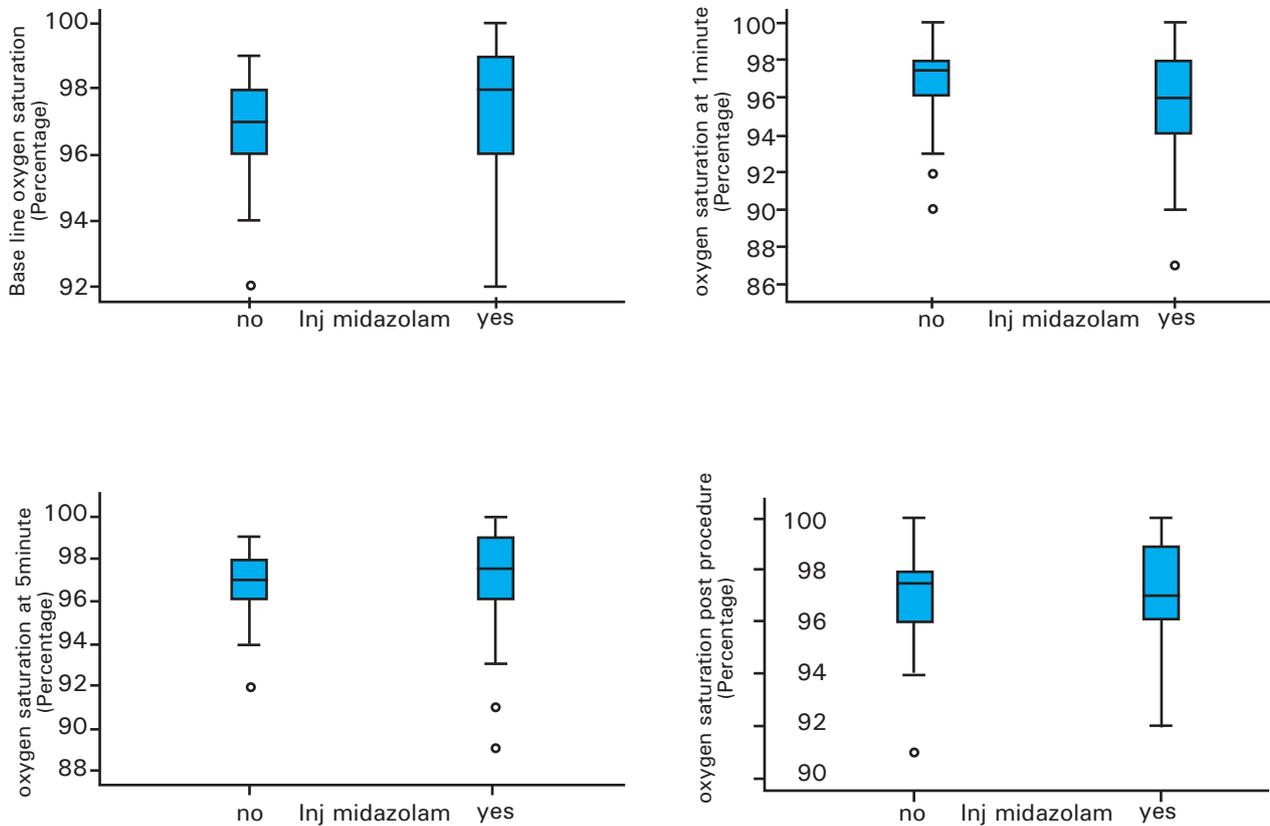
Injection midazolam	N	Mean Rank	P value
pulse before procedure	no	30	28.47
	yes	30	32.53
	Total	60	0.367
pulse in 1 minute	no	30	27.32
	yes	30	33.68
	Total	60	0.158
pulse in 5 minute	no	30	26.85
	yes	30	34.15
	Total	60	0.105
pulse post procedure	no	30	28.02
	yes	30	32.98
	Total	60	0.270

**Table 4.** Changes in diastolic blood pressure during procedure

Injection midazolam	N	Mean Rank	P value	
Diastolic BP before procedure	no	30	30.07	0.85
	yes	30	30.93	
	Total	60		
Diastolic BP at 1 minute	no	30	30.08	0.85
	yes	30	30.92	
	Total	60		
Diastolic BP at 5 minute	no	30	29.68	0.72
	yes	30	31.32	
	Total	60		
Diastolic BP post procedure	no	30	30.50	1.00
	yes	30	30.50	
	Total	60		



**Figure 1.** Randomization of eligible patients



**Figure 2.** Changes in oxygen saturation between two groups at different stages of endoscopy

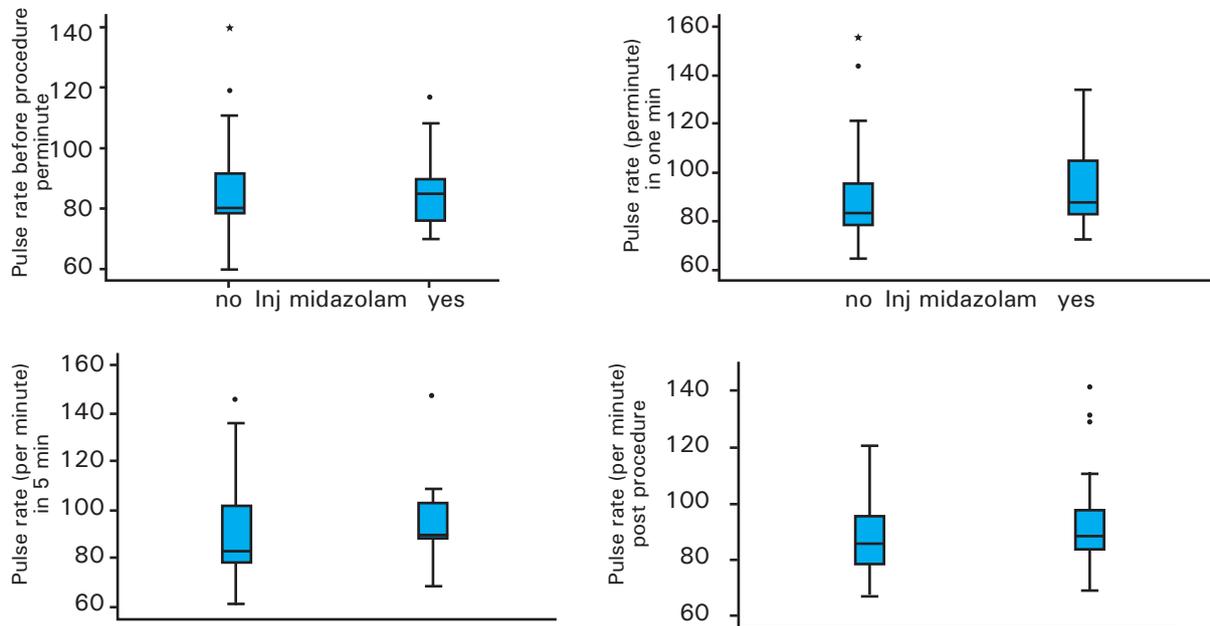


Figure 3. Changes in pulse rate (per minute) at different stages of procedure

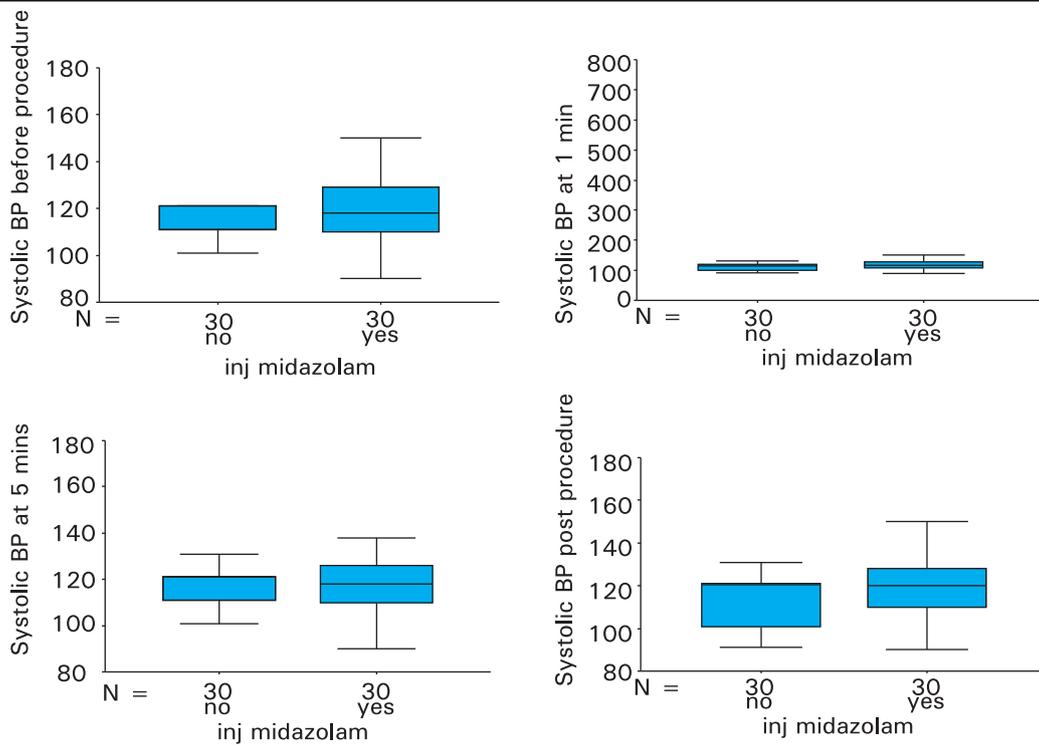
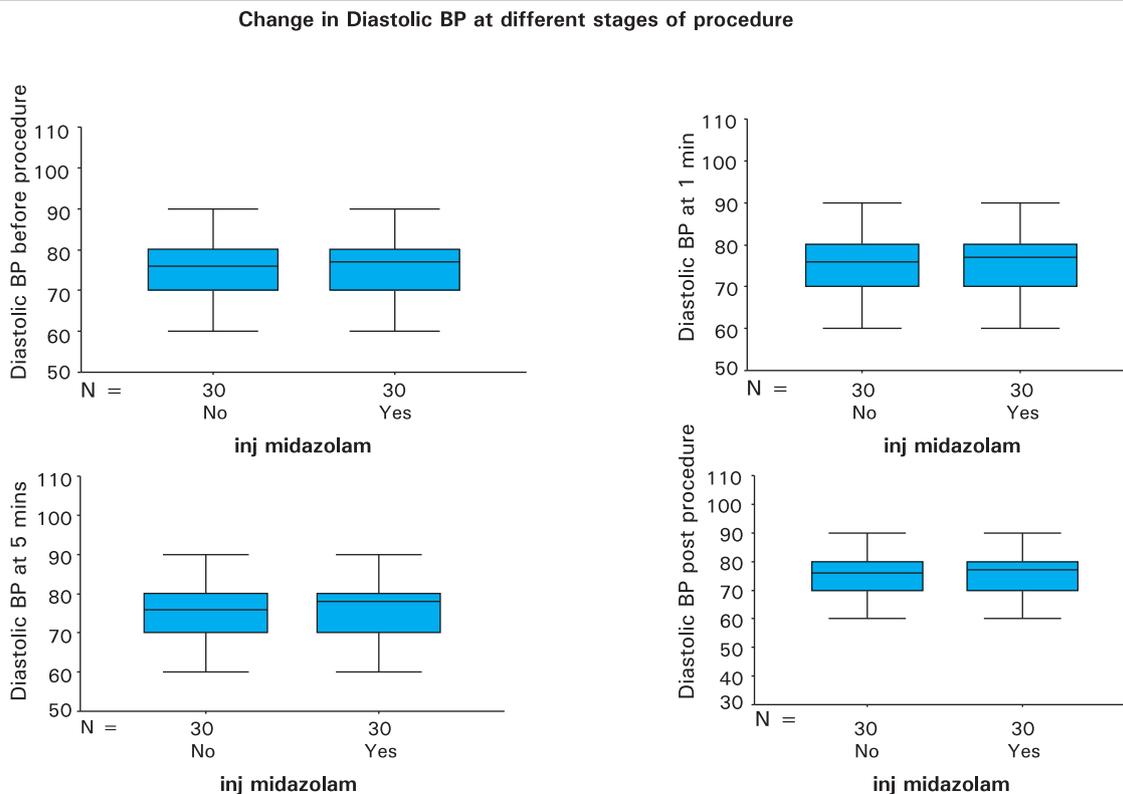


Figure 4. Changes in systolic blood pressure



**Figure 5. Changes in diastolic blood pressure**

Since every procedure intervening is associated with significant procedure induced anxiety and discomfort; however as an endoscopist we tend to underestimate patient feeling. In our study 90.6% of patient felt no or slight discomfort where as only 3.6% felt severe discomfort. Similar to our study Brigitte et al found that 68% of sedated patient felt none or slight discomfort while 14 % felt severe discomfort.<sup>21</sup>

## CONCLUSIONS

There is slight more incidence of mild hypoxia in sedated group than in non sedated group but no change in pulse and blood pressure. However, sedated patient have significant less level of discomfort than in non sedated group. Though routine use of pulse oxymeter is not necessary, routine use of sedation during endoscopy is recommended.

## REFERENCES

1. Faigel DO, Baron TH, Goldstein JL, et al. Standards practice Committee, american society for gastrointestinal Endoscopy: guidelines for the use of deep sedation and anesthesia for GI endoscopy. *Gastrointest Endosc.* 2002;56:613-7.
2. Bell GD, McCloy RF, Charlton JE et al. Recommendations for standards of sedation and patient monitoring during gastrointestinal endoscopy. *Gut.* 1991;32:816-30.
3. Cohen LB, Delegge MH, Aisenberg J, et al. AGA institute review of endoscopic sedation. *Gastroenterology.* 2007;133:675-701.
4. Fisher NC, Bailey S, Gibson JA. A prospective, randomized controlled trial of sedation vs. no sedation in out-patient diagnostic upper gastrointestinal endoscopy. *Endoscopy.* 1998;30:17-25.
5. Abraham NS, Fallone CA, Mayrand S, Huang J, Wiczorek P, Barkun AN. Sedation versus no sedation in the performance of diagnostic upper gastrointestinal endoscopy: a Canadian randomized controlled cost-outcome study. *Am J Gastroenterol.* 2004;99:1692-9.
6. Iwao T, Toyonaga A, Harada H, Harada K, Ban S, Ikegami M, et al. Arterial oxygen desaturation during non-sedated diagnostic upper gastrointestinal endoscopy. *Gastrointest Endosc.* 1994;40:277-80.
7. Abraham N, Barkun A, Larocque M, Fallone C, Mayrand S, Baffis V, et al. Predicting which patients can undergo upper endoscopy comfortably without conscious sedation. *Gastrointest Endosc.* 2002 Aug;56(2):180-9.
8. Christopher P. Steffes, Choichi Sugawa, Robert F. Wilson, and Sharon R. Hayward. Oxygen saturation monitoring during endoscopy. *Surg Endosc (1990) 4:* 175-178.
9. Trevisani L, Sartori S, Gaudenzi P, Gilli G, Matarese G, Gullini S, et al. Upper gastrointestinal endoscopy: are preparatory

- interventions or conscious sedation effective? A randomized trial. *World J Gastroenterol.* 2004;10:3313-7.
10. Reed MWR, O'Leary DP, Duncan JL, Majeed AW, Wright B, Reilly CS. Effects of sedation and supplemental oxygen during upper alimentary tract endoscopy. *Scand J Gastroenterol.* 1993;28:297-341.
  11. Hart R, Classen M. Complications of diagnostic gastrointestinal endoscopy. *Endoscopy.* 1990;22:196-262.
  12. Lieberman DA, Wuerker CK, Katon RM. Cardiopulmonary risk of oesophagogastroduodenoscopy. Role of endoscope diameter and systemic sedation. *Gastroenterology.* 1985;88:396-540.
  13. Waring JP, Baron TH, Hirota WK, et al. Guidelines for conscious sedation and monitoring during gastrointestinal endoscopy. *Gastrointest Endosc.* 2003;58:317-22.
  14. Teague R. Guidelines on Safety and Sedation During Endoscopic Procedures.[online].2003 sep; Available from: URL:<http://www.bsg.org.uk/clinical-guidelines/endoscopy/guidelines-on-safety-and-sedation-during-endoscopic-procedures.html>
  15. Quine MA, Bell GD, McCloy RF, Charlton JE, Devlin HB, Hopkinsj A. Prospective audit of upper gastrointestinal endoscopy in two regions of England: safety, staffing and sedation methods. *Gut.* 1995;36:462-7.
  16. Lavies NG, Creasy T, Harris K, Hanning CD. Arterial oxygen saturation during upper gastrointestinal endoscopy: influence of sedation and operator experience. *Am J Gastroenterology.* 1988;83:618-22.
  17. Dhariwal A, Plevris JN, Finalyson NDC, Heading RC, Hayes PC. Age anemia and obesity-associated oxygen desaturation during upper gastrointestinal endoscopy. *Gastrointest. Endosc* 1992;38:684-8.
  18. Patterson KW, Noonan N, Keeling NW, Kirkham R, Hogan DF. Hypoxemia during outpatient gastrointestinal endoscopy: the effects of sedation and supplemental oxygen. *J Clin Anesth.* 1995;7(2):136-40.
  19. Murray AW, Morran CG, Kenny GNC, Macfarlane P, Anderson JR. Comparison of monitoring of arterial oxygen saturation, arterial pressure and the electrocardiogram Anaesthesia. 1991;46:181-4.
  20. Sarwar S, Alam A, Khan AA. Pulse oximetry during gastrointestinal endoscopic procedures. *J Coll Physicians Surg Pak.* 2006 Feb;16(2):97-100.
  21. Seip B, Huppertz-Hauss G, Sauar J, Bretthauer M, Hoff G. Patient's satisfaction: an important factor in quality control of gastroscopies. *Scand J Gastroenterol.* 2008;43:8,1004-11.