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A Comparative Study of Two Different Doses of Dexmedetomidine for Attenuating the Hemodynamic Response to Tracheal Intubation

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Abstract: ***Background:*** The new versions of SADs like i-gel and intubating laryngeal mask airway (ILMA), have advantage of hands-free airway maintenance without the need for tracheal intubation, they can be placed easily without direct visualization of the larynx, ensure predictable ventilation and can be used as conduit for tracheal intubation. ***Materials and Methods:*** The study was conducted in a tertiary care hospital between January 2020 and October 2020. A total of 120 patients of either sex were included in the study on an intention to treat analysis. Patients were age between 18 and 60 years, American Society of Anesthesiologists (ASA) physical status scores of I-II, 50–90 kg weight, and being scheduled to undergo surgical procedures requiring tracheal intubation. Patients with hypertension, obesity, pregnancy and gastro esophageal reflex disease, history of any cardiovascular and renal disease were excluded from the study. ***Result:*** A total of 120 patients were randomized into two groups of 60 each. The demographic variables such as age, sex, weight, height, ASA grade, Mouth opening, Thyromental distance and Neck circumference were similar in both the groups. SAD insertion first attempt success rate was 88.3% and overall success rate was 100% in both groups. Mean±SD insertion time at successful first attempt was 20.12±3.46 sec for group i-gel and 25.32±4.12 sec for group ILMA, and the difference was statistically significant (p value <0.0001). The overall insertion time was significantly higher for group ILMA (30.03±3.24 sec) than for group i- gel (21.35±3.31 sec) (p value <0.0001). Success rate of ET intubation through SAD at first attempt and overall was 71.6% and 83.3% respectively for group i-gel and 68.3% and 78.3% respectively for group ILMA. Mean±SD ET intubation time at successful first attempt was 19.32±3.47 sec for group i-gel and 27.64±3.37 sec for group ILMA, and the difference was statistically significant (p value <0.0001). The overall ET intubation time was significantly higher for group ILMA (32.32±4.84 sec) than for group i-gel (25.12±6.53) (p value <0.0001). ***Conclusions:*** I-gel is a better alternative supraglottic airway device than LMA in view of ease of insertion with minimal manipulations and minimal complications. Hemodynamic parameters, SPO2 and ETCO2 were maintained in both the groups.

Keywords: I-gel, Intubating LMA, Endotracheal intubation, Hemodynamic changes.

INTRODUCTION

The basic responsibility of an anaesthesiologist is to maintain adequate gas exchange in patients by securing a patent airway through face mask, supraglottic airway devices (SADs) or endotracheal (ET) intubation. Among these techniques patency of the airway is best ensured by an ET tube and direct laryngoscopy (DLS) is the gold standard method for placement of ET tube. However, training in ET intubation requires time, appropriate instruments, and adequate circumstances (McNeillis, N. J. D. *et al.*, 2001). Furthermore, ET intubation requires continued practice and carries with it its own set of complications. Technical problems with placement of ET tube have been the most frequent cause of anaesthetic deaths in published analysis from all over the world (Uppal, V. *et al.*, 2009).

The first supraglottic airway device was a Laryngeal Mask Airway (LMA) which was a combination of a face mask and endotracheal tube. I-Gel is a second generation LMA which is gaining popularity as an alternative to tracheal intubation in general anesthesia (Singh, I. *et al.*, 2009). I-Gel is a true anatomical device without an inflatable cuff which fits into the laryngeal, pharyngeal and para laryngeal framework mirroring the shape of epiglottis, aryepiglottic folds, pyriform fossa, parathyroid, posterior cartilages and spaces (Joo, H.S., & Rose, D.K. 1999). The non-inflatable cuff snugly fits onto the above structures and provides a tight seal sufficient for maintaining spontaneous as well as intermittent positive pressure ventilation (Kannaujia, A. *et al.*, 2009; & Ferson, D. Z. *et al.*, 2001). It was first used by Dr. Muhammad Nasir and it is made up of thermo elastic elastomer making it body temperature sensitive. It also has a gastric channel incorporated in it which provides additional protection against aspiration and regurgitation which in has made it a safe and effective tool for induction in laparoscopic surgeries under general anesthesia (Brain, A. I. *et al.*, 1997).

Present study aimed at comparing i-gel and LMA, in relation to ease and success rate of blind ET intubation through them in anaesthetized, paralyzed adult patients with normal airway posted for surgery under general anaesthesia (GA) with respect to success rate of SAD insertion and ET intubation; time taken for SAD insertion and for ET intubation through SAD. Haemodynamic changes and postoperative complications were also compared.

MATERIALS AND METHODS

The study was conducted in a tertiary care hospital between January 2020 and October 2020. A total of 120 patients of either sex were included in the study on an intention to treat analysis.

Inclusion Criteria:

Patients were age between 18 and 60 years, American Society of Anesthesiologists (ASA) physical status scores of I-II, 50–90 kg weight, and being scheduled to undergo surgical procedures requiring tracheal intubation.

Exclusion Criteria:

Patients with hypertension, obesity, pregnancy and gastro esophageal reflex disease, history of any cardiovascular and renal disease were excluded from the study.

The patients were randomised into two groups: I-Gel group (Group A, n = 60) and ILMA group (Group B, n = 60) based on computer generated random number table (generated by NB). Patients with an ASA score III or IV, any contraindication to the use of muscle relaxants, presence of predictors of difficulty in intubation or ventilation, any increased risk of aspiration, or having a history of symptomatic gastroesophageal reflux were excluded from the study. Patients with high arched palate, restricted neck movement, or tonsillar hypertrophy were also excluded from the study.

All patients fasted overnight and received premedication with oral alprazolam 0.25 mg and ranitidine 150 mg the night before and on the morning of surgery. Preinduction monitoring included electrocardiography (ECG), noninvasive blood pressure (NIBP), and oxygen saturation (SpO2). Neuromuscular monitoring using train of four (TOF) was instituted after induction of anesthesia. After securing intravenous access, patients were preoxygenated for 3 minutes. Anesthesia was induced with 2 μg/kg fentanyl and propofol 2 mg/kg. After confirming adequate bag-mask ventilation, atracurium 0.5 mg/kg was administered. Anesthesia was maintained with propofol infusion (100–150 μg/kg/min) and 100% oxygen. After complete neuromuscular blockade (TOF count 0) the supraglottic device size 4 was inserted according to the group allocation.

SGA was inserted keeping the patient's head in neutral position in both the groups and in the ILMA group the cuff was inflated with 30 mL of air. Blind intubation was attempted using 7.0 mm ID FST. Appropriate placement of the device and intubation was confirmed by observation of adequate chest expansion and appearance of ETCO2 waveform. Once the successful intubation was confirmed, SGA was removed using a stabilising rod. A maximum of three attempts were allowed per patient before considering the device as a failure. Intraoperatively, haemodynamic parameters were monitored every 1 minute for the first ten minutes and at 10-minute intervals thereafter till 30 minutes. Time (seconds) to successful insertion of the device (from picking the device to visible chest rise), number of attempts taken to insert the device, time to successful intubation (from the time of picking the tube from the table to visible chest rise), ease of intubation (easy/no resistance = 1, minimal resistance = 2, significant resistance = 3, or impossible = 4), airway reaction (laryngospasm, bronchospasm, coughing, and gagging), visible blood on the airway device, and any evidence of regurgitation were also noted.

On completion of the surgical procedure, propofol infusion was stopped. The duration of the surgical procedure and total propofol administered in the first hour were noted. When the TOF count was 3 or 4, neuromuscular blockade was reversed with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. ETT was removed at TOF ratio of 90% and patient's responsiveness was assessed.

In the Post-Anaesthesia Care Unit (PACU), patients were queried for sore throat (visual analogue scale (VAS); VAS > 3 was considered significant), dysphagia (dysphagia scoring system; 0 = able to eat normal diet/no dysphagia, 1 = able to swallow some solid foods, 2 = able to swallow only semisolid foods, 3 = able to swallow liquids only, and 4 = unable to swallow anything/total dysphagia), ear/jaw/neck pain, and hoarseness of voice soon after the procedure (0 hour) and after 24 hours.

Statistical Analysis

The statistical analysis was carried out using SPSS version 20th. Descriptive analysis was expressed as a mean ± SD. Independent *t*-test was used for parametric data, Chi-square test for nonparametric data and hemodynamic data were analyzed using repeated measures ANOVA to find the statistical difference within the groups.

RESULTS

A total of 120 patients were randomized into two groups of 60 each. The demographic variables such as age, sex, weight, height, ASA grade, Mouth opening, Thyromental distance and Neck circumference were similar in both the groups. The mean age in both the

groups was around 35 years (Table 1). The average weight being similar was around 60 kg in both groups. In both the groups, a majority of the patients were in the range of 61-75 kg.

Table 1: Demographic profile of the patients in both the groups

Variable		Group A	Group B	p - value
Age (years)		34.73±8.53	37.43±9.63	0.823
Sex (Male/female)		23/37	27/33	0.965
Weight (kg)		63.21±4.21	64.21±5.12	0.671
Height (m)		162.31±6.73	160.31±6.21	0.523
ASA grade	ASA I	47	46	0.437
	ASA II	11	13	
	ASA III	2	1	
Mouth opening, cm (mean±SD)		5.22±0.64	5.26±0.85	0.613
Thyromental distance, cm (mean±SD)		7.23±0.43	7.41±0.64	0.503
Neck circumference, cm (mean±SD)		33.32±3.75	34.13±3.54	0.438

Table 2: Comparison of baseline and intraoperative vitals (HR, MAP and SpO_2) between the groups

Variable	Group A			Group B		
	HR (bpm)	MAP(mmHg)	SpO2 (%)	HR (bpm)	MAP(mmHg)	SpO2 (%)
Baseline	82.43±9.73	91.32±7.72	97.36±0.63	77.32±6.48	95.03±6.81	97.63±0.73
After SAD insertion	83.63±9.63	91.79±8.64	100±0.00	79.38±6.54	95.57±6.55	100±0.00
After ET intubation	84.12±8.27	92.36±7.42	100±0.00	80.38±6.48	98.16±7.49	100±0.00
At 1 min	84.93±9.64	94.75±8.61	100±0.00	79.03±6.63	98.94±7.42	100±0.00
At 3 min	84.06±10.12	93.03±7.49	100±0.00	79.97±7.74	97.48±7.33	100±0.00
At 5 min	82.14±9.74	92.64±7.85	100±0.00	78.32±7.32	96.61±6.21	100±0.00

Comparison of baseline and intraoperative vitals (mean HR, MAP and SpO2) at various time intervals didn't show any significant difference between the groups (*p* value >0.05) in table 2.

Table 3: Success rate Time required for SAD insertion and ET intubation in both groups

		Group A	Group B	p - value
SAD Insertion Success Rate [n(%)]	1st Attempt	54 (90%)	53 (88.3%)	
	2nd Attempt	6 (10%)	7 (11.6%)	
	3rd Attempt	0	0	
	Overall	100%	100%	
SAD Insertion Time (Mean±SD)	Successful 1st Attempt	20.12±3.46	25.32±4.12	<0.0001
	Overall	21.35±3.31	30.03±3.24	<0.0001
ET Intubation Success Rate [n(%)]	1st Attempt	43 (71.6%)	41 (68.3%)	
	2nd Attempt	6 (10%)	5 (13.3%)	
	3rd Attempt	1 (1.6%)	1 (1.6%)	
	Overall	50 (83.3%)	47 (78.3%)	
Et Intubation Time (Mean±SD)	Successful 1st Attempt	19.32±3.47	27.64±3.37	<0.0001
	Overall	25.12±6.53	32.32±4.84	<0.0001

SAD insertion first attempt success rate was 88.3% and overall success rate was 100% in both groups. Mean±SD insertion time at successful first attempt was 20.12±3.46 sec for group i-gel and 25.32±4.12 sec for group ILMA, and the difference was statistically significant (*p* value <0.0001). The overall insertion time was significantly higher for group ILMA (30.03±3.24 sec) than for group i- gel (21.35±3.31 sec) (*p* value <0.0001) in table 3.

Success rate of ET intubation through SAD at first attempt and overall was 71.6% and 83.3% respectively for group i-gel and 68.3% and 78.3% respectively for group ILMA. Mean±SD ET intubation time at successful first attempt was 19.32±3.47 sec for group i-gel and 27.64±3.37 sec for group ILMA, and the difference was statistically significant (*p* value <0.0001). The overall ET intubation time was significantly higher for group ILMA (32.32±4.84 sec) than for group i-gel (25.12±6.53) (*p* value <0.0001) in table 3.

Table 4: Comparison of postoperative complication between the groups

	Group A	Group B	p - value
Blood staining	3	3	0.538
Sore throat	1	5	0.032
Dysphonia	5	1	0.074
Pain on swallowing	7	9	0.432

Postoperative complications in both the groups were comparable. However, dysphonia was more in the group I but still i-gel proved to be slightly safer than LMA Fastrach in table 4.

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DISCUSSION

In this prospective, randomized and parallel study, we compare tracheal intubation through intubating laryngeal mask airway LMA and i-gel in terms of total time taken for intubation and ease of tracheal intubation.

There are various types of supraglottic devices are widely used for securing and maintaining a patent airway for surgery requiring general anaesthesia and are alternative to tracheal intubation (Langeron, O. *et al.*, 2001). The advantages of the supraglottic airway devices include avoidance of tachycardia, hypertension response to laryngoscopy and intubation, less invasive for the respiratory tract, better tolerated by patients, increased ease of placement by inexperienced personnel, improved hemodynamic stability in emergence, less coughing and sore throat (Sinha, P. K., & Misra, S. 2005). The LMA a novel device is inserted blindly into the pharynx, forming a low-pressure seal around the laryngeal inlet and permitting gentle positive-pressure ventilation. It allows the administration of inhaled anaesthetic agents through a minimally stimulating airway (Levitan, R. M., & Kinkle, W. C. 2005).

I-gel is a new single use non-inflatable supraglottic airway device. Its shape and contours accurately mirror the perilaryngeal anatomy to create the perfect fit. I-gel works in harmony with the patient's anatomy so that compression and displacement trauma are significantly reduced or eliminated (Brimacombe, J., & Keller, C. 2000). Its drain tube allows access to the gastrointestinal tract and it is designed to reduce the risk of gastric inflation and regurgitation (Sharma, S. *et al.*, 2007). The bowl of i-gel has three dimensional structures that mirror to perilaryngeal anatomy. The small width and height of i-gel tip is intended to fit into the postcricoid cervical oesophagus just proximal to distal tip. The bowl enlarges slightly in width but more significantly in height (Evans, N. R. *et al.*, 2002).

In our study, the baseline mean HR and MAP values were comparable and not clinically significant The HR for the after 5 min after insertion of LMA was persistently high from the baseline when compared to i-gel and clinically significant $P = 0.0001$. Michalek P *et al.*, and Siddiqui AS *et al.*, observed increase in heart and BP in LMA group compared to i-gel (Michalek, P. *et al.*, 2008; & Siddiqui, A. S. *et al.*, 2012). Bamgbade OA *et al.*, observed no significant difference in hemodynamic data 1 min after insertion of devices among the three groups (Bamgbade, O. A. *et al.*, 2008). Kapoor S *et al.*, attributed the increase in hemodynamic to the minimal sympathetic response caused by inflation of the cuff in LMA group (Kapoor, S. *et al.*, 2014). In our study, there were no episodes of desaturation (SpO_2 <95%) with both the groups during insertion, maintenance and removal of the airway device. In a study published by Campbell J on comparative study between i-gel and LMA in eighty patients who were scheduled for surgery under general anesthesia maintaining spontaneous ventilation, there was no significant difference between both the groups SpO_2 (Campbell, J. *et al.*, 2009).

We observed that both the devices were easy to insert <two attempts, but the success rate in the first attempt of ET intubation through SAD was 90% with i-gel and 88.3% with LMA, which is statistically significant ($P < 0.0001$). Sharma B *et al.*, also reported similar findings for i-gel (Sharma, B. *et al.*, 2010). Uppal V *et al.*, observed ease of insertion was more with i-gel 96% (24/25) compared to ProSeal LMA 80% (20/25) and LMA Classic 88% (22/25) (Uppal, V. *et al.*, 2009). But the results were not statistically significant ($P = 0.194$) (Kundra, P. *et al.*, 2015). Halwagi AE *et al.*, observed the higher rate of failure of i-gel insertion can be attributed to the overlap in size selection according to body weight as recommended by the manufacturer (Halwagi, A. E. *et al.*, 2012). Kapoor S *et al.*, have also observed a similar problem with size selection of i-gel in pediatric patients (Kapoor, S. *et al.*, 2014).

In the present study, time required for ET intubation (at first attempt and overall) was significantly shorter in group i-gel than group LMA (19.32±3.47 sec *vs.* 27.64±3.37 sec) and (25.12±6.53 sec *vs.* 32.32±4.84 sec) respectively (*p* value <0.0001). Similarly, Bhandari G *et al.*, found that ET intubation time (at first attempt and overall) was significantly lesser in group i-gel than group LMA (18.73±1.41 sec *vs.* 29.63 ±1.39 sec) and (20.41±3.79 sec *vs.* 30.68 ±3.197 sec) respectively (*p* value <0.0001) (Bhandari, G. *et al.*, 2013). Singh J AE *et al.*, found that overall ET intubation time in group i-gel was significantly lesser than group ILMA (22±13 sec *vs.* 30±31 sec) (*p* value =0.04) (Trivedi, V., & Patil, B. 2011).

The incidence of postoperative complications was comparable in both the groups. In the present study, dysphonia was more in I group which was similar to study conducted by Badheka JP *et al.*, (2015). While the incidence of sore throat was lesser in I group when compared to F group; this observation is similar to that of Maltby JR *et al.*, (2002).

Limitation of the study

It was single center and we have not used flexible intubating fiberscope for assessing the airway placement position. All the patients were ASA grade I or II with no anticipated difficult intubation. This does not represent the general population. Although ETT is

more effective in providing adequate airway seal, we have not tested the airway leak pressure in I-gel.

CONCLUSION

Both the devices LMA and i-gel were tolerated well and a clear airway were maintained throughout the anaesthesia. I-gel is comparatively easier to insert than LMA. I-gel effectively confirms to the perilaryngeal anatomy despite of lack of inflatable cuff and it consistently achieves proper positioning for supraglottic ventilation. Further, there is minimal risk of tissue compression and trauma to the peripheral tissues with i-gel than LMA. I-gel is a better alternative supraglottic airway device than LMA in view of ease of insertion with minimal manipulations and minimal complications.

REFERENCE

1. Badheka, J. P., Jadliwala, R. M., Chhaya, V. A., Parmar, V. S., Vasani, A., & Rajyaguru, A. M. (2015). I-gel as an alternative to endotracheal tube in adult laparoscopic surgeries: A comparative study. *Journal of minimal access surgery*, *11*(4), 251.
2. Bamgbade, O. A., Macnab, W. R., & Khalaf, W. M. (2008). Evaluation of the i-gel airway in 300 patients. *European Journal of Anaesthesiology*, *25*(10), 865-866.
3. Bhandari, G., Shahi, K. S., & Bhakuni, R. (2013). A comparative study of tracheal intubation through i-gel® and Intubating Laryngeal Mask Airway (ILMA®). *6*, 24-9.
4. Brain, A. I., Verghese, C., Addy, E. V., Kapila, A., & Brimacombe, J. (1997). The intubating laryngeal mask. II: a preliminary clinical report of a new means of intubating the trachea. *British journal of anaesthesia*, *79*(6), 704-709.
5. Brimacombe, J., & Keller, C. (2000). The ProSeal Laryngeal Mask AirwayA Randomized, Crossover Study with the Standard Laryngeal Mask Airway in Paralyzed, Anesthetized Patients. *Anesthesiology: The Journal of the American Society of Anesthesiologists*, *93*(1), 104-109.
6. Campbell, J., Michalek, P., & Deighan, M. (2009). I-gel supraglottic airway for rescue airway management and as a conduit for tracheal intubation in a patient with acute respiratory failure. *Resuscitation*, *80*(8), 963.
7. Evans, N. R., Gardner, S. V., James, M. F. M., King, J. A., Roux, P., Bennett, P., ... & Visu, D. (2002). The ProSeal laryngeal mask: results of a descriptive trial with experience of 300 cases. *British journal of anaesthesia*, *88*(4), 534-539.
8. Ferson, D. Z., Rosenblatt, W. H., Johansen, M. J., Osborn, I., & Ovassapian, A. (2001). Use of the intubating LMA-Fastrach™ in 254 patients with difficult-to-manage airways. *Anesthesiology: The Journal of the American Society of Anesthesiologists*, *95*(5), 1175-1181.
9. Halwagi, A. E., Massicotte, N., Lallo, A., Gauthier, A., Boudreault, D., Ruel, M., & Girard, F. (2012). Tracheal intubation through the I-gelTM supraglottic airway versus the LMA FastrachTM: a randomized controlled trial. *Anesthesia & Analgesia*, *114*(1), 152-156.
10. Joo, H.S., & Rose, D.K. (1999). The intubating laryngeal mask with and without fibreoptic guidance. *Anesth Analg J*, *88*, 662-666.
11. Kannaujia, A., Srivastava, U., Saraswat, N., Mishra, A., Kumar, A., & Saxena, S. (2009). A preliminary study of i-gel: a new supraglottic airway device. *Indian Journal of Anaesthesia*, *53*(1), 52.
12. Kapoor, S., Jethava, D. D., Gupta, P., Jethava, D., & Kumar, A. (2014). Comparison of supraglottic devices i-gel® and LMA Fastrach® as conduit for endotracheal intubation. *Indian journal of anaesthesia*, *58*(4), 397.
13. Kapoor, S., Jethava, D. D., Gupta, P., Jethava, D., & Kumar, A. (2014). Comparison of supraglottic devices i-gel® and LMA Fastrach® as conduit for endotracheal intubation. *Indian journal of anaesthesia*, *58*(4), 397-402.
14. Kundra, P., Sujata, N., & Ravishankar, M. (2005). Conventional tracheal tubes for intubation through the intubating laryngeal mask airway. *Anesthesia & Analgesia*, *100*(1), 284-288.
15. Langeron, O., Semjen, F., Bourgain, J. L., Marsac, A., & Cros, A. M. (2001). Comparison of the intubating laryngeal mask airway with the fiberoptic intubation in anticipated difficult airway management. *Anesthesiology: The Journal of the American Society of Anesthesiologists*, *94*(6), 968-972.
16. Levitan, R. M., & Kinkle, W. C. (2005). Initial anatomic investigations of the I-gel airway: a novel supraglottic airway without inflatable cuff. *Anaesthesia*, *60*(10), 1022-1026.
17. Maltby, J. R., Beriault, M. T., Watson, N. C., Liepert, D., & Fick, G. H. (2002). The LMA-ProSeal™ is an effective alternative to tracheal intubation for laparoscopic cholecystectomy. *Canadian Journal of Anesthesia*, *49*(8), 857-862.
18. McNeillis, N. J. D., Timberlake, C., Avidan, M. S., Sarang, K., Choyce, A., & Radcliffe, J. J. (2001). Fibreoptic views through the laryngeal mask and the intubating laryngeal mask. *European journal of anaesthesiology*, *18*(7), 471-475.
19. Michalek, P., Hodgkinson, P., & Donaldson, W. (2008). Fiberoptic intubation through an I-gel supraglottic airway in two patients with predicted difficult airway and intellectual disability. *Anesthesia & Analgesia*, *106*(5), 1501-1504.
20. Sharma, B., Sehgal, R., Sahai, C., & Sood, J. (2010). PLMA vs. I-gel: a comparative evaluation of respiratory mechanics in laparoscopic cholecystectomy. *Journal of anaesthesiology, clinical pharmacology*, *26*(4), 451.

21. Sharma, S., Rogers, R., & Popat, M. (2007). The i-gel™ airway for ventilation and rescue intubation. *Anaesthesia*, *62*(4), 419-420.
22. Siddiqui, A. S., Ahmed, J., Siddiqui, S. Z., Haider, S., & Raza, S. A. (2012). New single use supraglottic airway device with non-inflatable cuff and gastric tube channel. *Journal of the College of Physicians and Surgeons Pakistan*, *22*(7), 419-423.
23. Singh, I., Gupta, M., & Tandon, M. (2009). Comparison of clinical performance of I-Gel™ with LMA—Proseal™ in elective surgeries. *Indian journal of anaesthesia*, *53*(3), 302-305.
24. Sinha, P. K., & Misra, S. (2005). Supraglottic airway devices other than laryngeal mask airway and its prototypes. *Indian J anaesth*, *49*(4), 281-292.
25. Trivedi, V., & Patil, B. (2011). A clinical comparative study of evaluation of proseal LMA V/S I-GEL for ease of insertion and hemodynamic stability; a study of 60 cases. *Internet J Anesthesiol*, *27*(27), 1-7.
26. Uppal, V., Fletcher, G., & Kinsella, J. (2009). Comparison of the i-gel with the cuffed tracheal tube during pressure-controlled ventilation. *British journal of anaesthesia*, *102*(2), 264-268.
27. Uppal, V., Gangaiah, S., Fletcher, G., & Kinsella, J. (2009). Randomized crossover comparison between the i-gel and the LMA-Unique in anaesthetized, paralysed adults. *British journal of anaesthesia*, *103*(6), 882-885.