Nanotechnology Perceptions
ISSN 1660-6795
www.nano-ntp.com

Awareness about Desflurane among Allied Health Science Students

Nishanthana Murali[1], Mohammed Shoaib[2], Anitha Gangampanni[3], D. Jagadeeswaran[4], Dhanraj Ganapathy[5*]

[1]Undergraduate student, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India, 151701004.sdc@saveetha.com
[2]Student of allied health sciences, Third year, Department of operation theatre and anesthesia technology, Saveetha college of allied health sciences, Saveetha institute of medical and technical sciences, Chennai India.
[3]Tutor, Department of Operation Theater and Anesthesia Technology, Saveetha College of Allied Health Sciences, Saveetha Institute of Medical and Technical Sciences, Chennai - India.
[4]Principal & Professor, Saveetha College of Allied Health Sciences, Saveetha Institute of Medical and Technical Sciences, Chennai - India.
[5]Professor & HOD, Department of Prosthodontics, Saveetha Dental College & Hospital, Saveetha Institute of Medical and Technical Sciences, Chennai – India, dhanraj@saveetha.com

Introduction: Inhalation anesthetics are substances that are brought into the body via the lungs and are distributed with the blood into the different tissues. The main target of inhalation anesthetics is the brain. Inhalation anesthetics act either by amplifying inhibitory function or decreasing excitatory transmission at the nerve endings in the brain. The role of inhalation agents in general anesthesia is changing. Volatile anesthetics are seldom used alone in our days. A combination of inhalation anesthetics and intravenous drugs is called balanced anesthesia. Currently used inhalation anesthetics include enflurane, halothane, isoflurane, sevoflurane, desflurane, and nitrous oxide. Older volatile anesthetics include ether, chloroform, and methoxyflurane. The use of desflurane provides a favorable hemodynamic profile intraoperatively and is not accompanied with the development of clinically significant side effects. Desflurane reduces the probability of certain adverse effects in the immediate postoperative period, provides a faster awakening, and has the possibility of reliable assessment of neurological status after surgery. Aim: To assess the knowledge levels and create awareness about Desflurance among allied health sciences. Materials and Method: This cross-sectional research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 Allied Health science students. The questionnaire assessed the awareness about Desflurane, uses, structure, mechanism of action, dosage &toxicity, adverse effects. The responses were recorded and analyzed. Results: 45% of the respondents are aware of the structure of desflurane 82%are aware of uses of desflurane 89% were aware of adverse effects 64%were aware of mechanism of action of desflurane 70%were aware of normal adult dosage of desflurane 57%were aware of overdose & complications of desflurane. Conclusion: There is moderate awareness amongst AHS students about use of desflurane. However, enhanced awareness

initiatives and educational programmes together with increased importance for curriculum improvements that further promote knowledge and awareness of enflurane should be initiated for further understanding and benefits.

Keywords: Awareness, desflurane, mechanism of action, uses, students, adverse effects.

1. Introduction

Desflurane an ideal inhalational general anesthetic agent.Desflurane, which was recently introduced in the Indian market, possesses favorable pharmacokinetic and pharmacodynamic properties and is closer to the definition of an ideal agent. It offers the advantage of precise control over depth of anesthesia along with a rapid, predictable, and clear-headed recovery with minimal postoperative sequelae, making it a valuable anesthetic agent for maintenance in adults and pediatric patients in surgeries of all durations. The agent has advantages when used in extremes of age and in the obese. Its use may increase the direct costs of providing anesthetic care. Methods or techniques, such as low-flow anesthesia, to reduce the overall cost and along with minimal environmental implications must be followed.(1)

It should have a rapid and smooth onset of action. Efficiency is a particularly important factor in the ambulatory setting. There should be a rapid recovery of cognitive functioning without clinically-significant discomfort. Postoperative pain is a major limiting factor in determining when a patient can be discharged home after surgery. The absence of adverse effects such as nausea and vomiting is extremely important as emetic symptoms affect not only recovery times but also the incidence of unanticipated hospital admissions after day-case surgery, and patient satisfaction with their overall anesthetic experience.(2)

Desflurane contraindications include induction of anesthesia in nonintubated pediatric patients because of a high incidence of moderate to severe upper airway adverse events. Pediatric patients are at high risk of laryngospasm. Desflurane is also contraindicated in patients with known or suspected susceptibility to malignant hyperthermia. If the patient has a history of moderate to severe hepatic impairment following general anesthesia with desflurane, the use of desflurane should be avoided. Additionally, if a patient has intracranial hypertension, desflurane is contraindicated, as is the case with all such volatile agents.Thedesflurane vaporizer contains a heated and pressurized chamber. We measured the electrical requirements of the desflurane vaporizer and calculated its cost to our hospital.(4)

The use of desflurane provides a favorable hemodynamic profile intraoperatively and is not accompanied with the development of clinically significant side effects. Desflurane reduces the probability of certain adverse effects in the immediate postoperative period, provides a faster awakening, and has the possibility of reliable assessment of neurological status after surgery.(5)

2. Materials and method:

This cross-sectional research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 Allied Health science students.The students were

randomly selected across various disciplines of Allied Health Sciences.The study setting was designated in the university campus.The survey instrument was a questionnaire pre tested and evaluated for validity and reliability concerns. The questionnaire included ten questions eliciting the demographic data through open ended responses and multiple choice questions for the other responses.The study was approved by the Institutional Ethical Committee and informed consent was obtained from the participants. The questionnaire was posted in an online platform and the identity of the respondents were kept confidential.

The questionnaire assessed the awareness about desflurane,their structure, mechanism of action,uses, adverse effects,dose&toxicity.The responses were recorded and analysed.There were no incomplete responses and no dropouts from the study.The final data obtained was organized,tabulated and subjected to statistical analysis. The salient questions in the study are

1. NAME
2. AGE
3. SEX
4. YEAR OF STUDYING
5. STRUCTURE OF DESFLURANE
6. MECHANISM OF ACTION OF DESFLURANE
7. USES OF DESFLURANE
8. ADVERSE EFFECT OF DESFLURANE
9. NORMAL ADULT DOSAGE
10. OVERDOSE MANAGEMENT

3. Results:

(Fig.1) 45% of the respondents are aware of the structure of desflurane, (Fig.2) 82% were aware of uses of desflurane,(Fig.3) 89% were aware of adverse effects, (Fig.4) 64% were aware of mechanism of action of desflurane,(Fig.5) 70% were aware of normal adult dosage of desflurane,(Fig.6) 57% were aware of overdose & complications of Desflurane

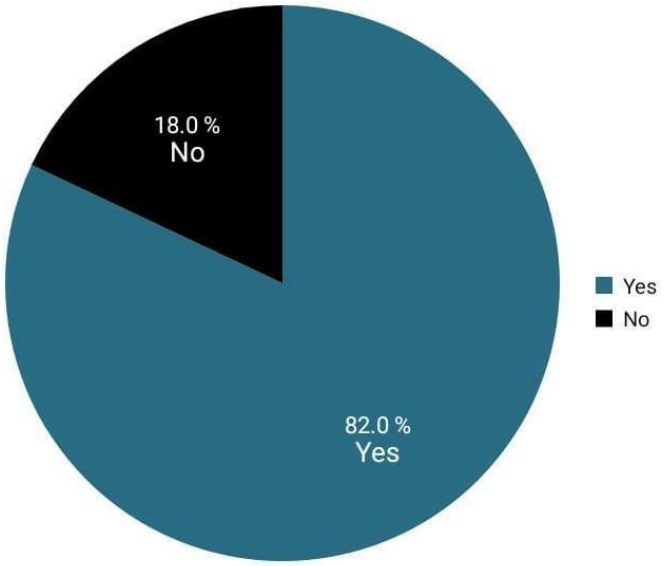

Fig 1: awareness about structure of desflurane

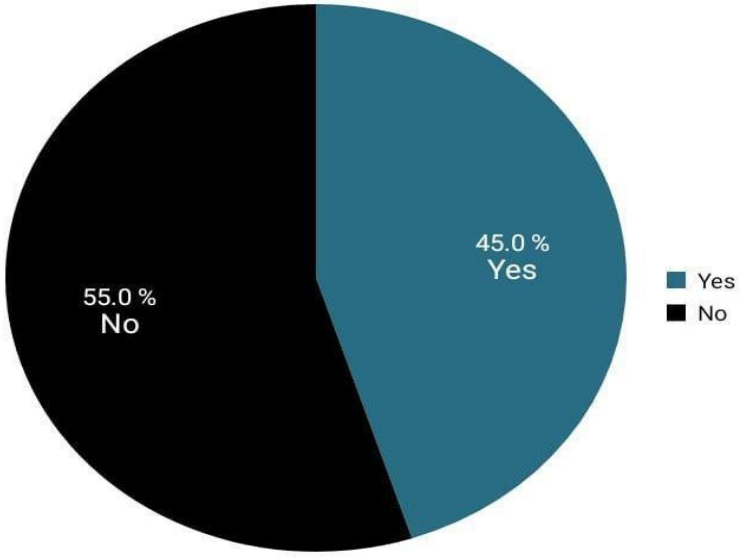

Fig 2: awareness about uses of desflurane

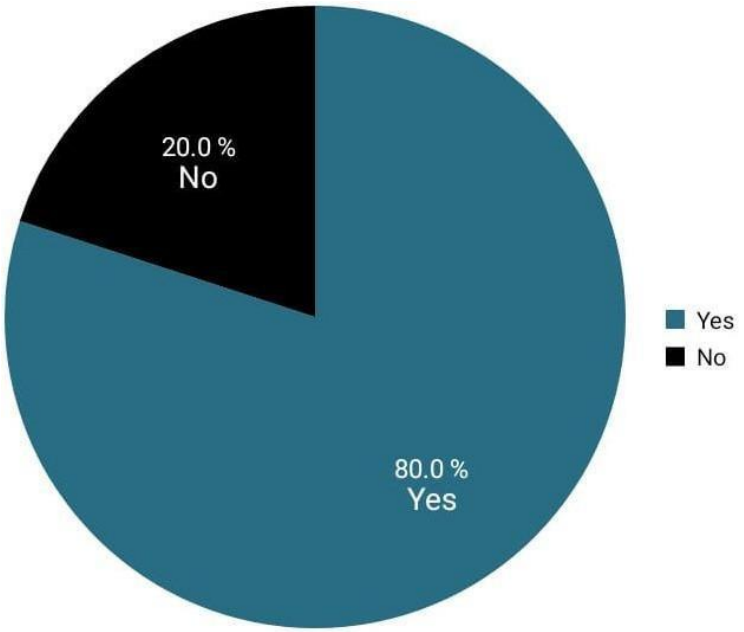

Fig 3: awareness about adverse effects of desflurane

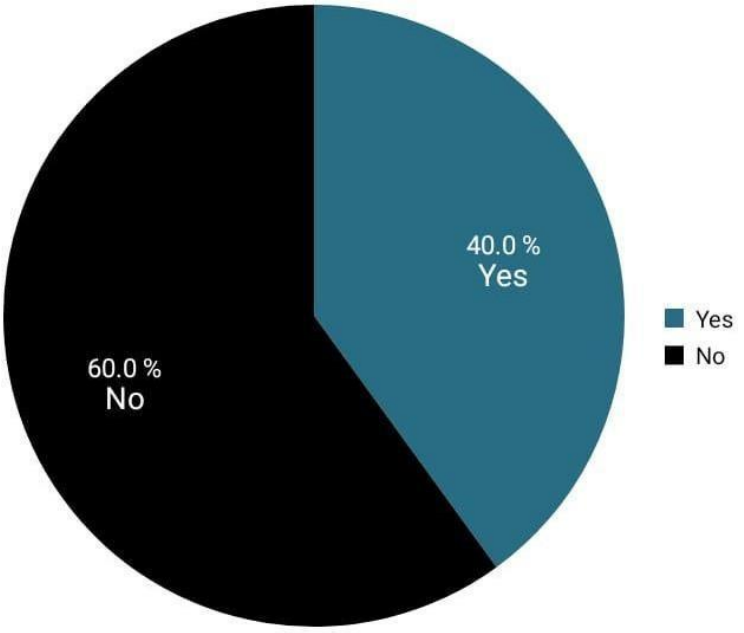

Fig 4 : awareness about mechanism of action of desflurane

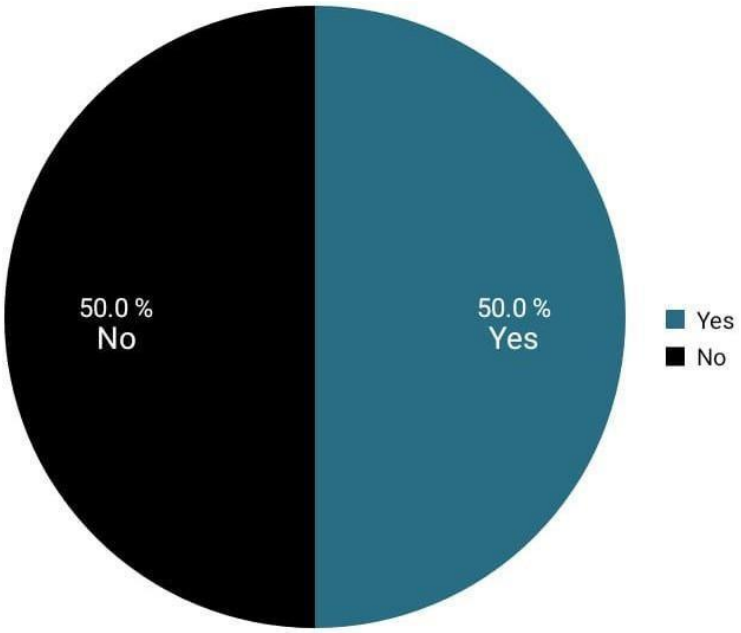

Fig 5: awareness about normal adult dose of desflurane

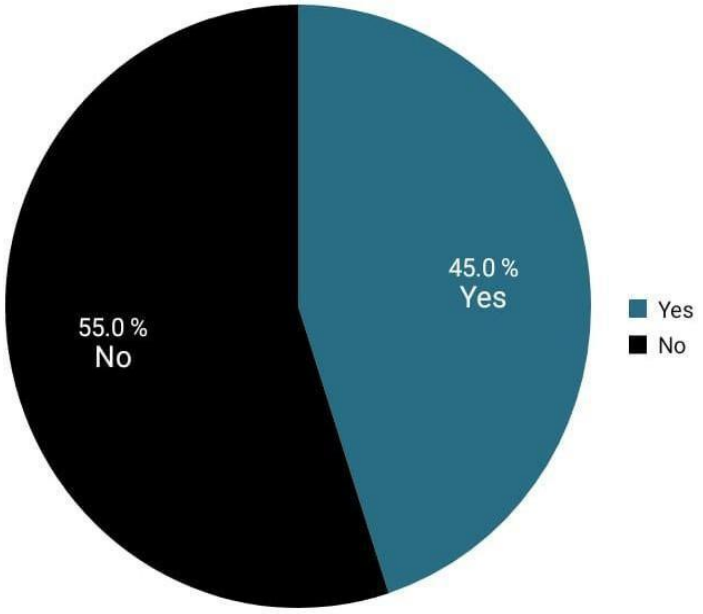

Fig 6 : awareness about overdose complications of desflurane

4. Discussion:

The geometric structure and the conformational properties of Desflurane (2-chloro-1-

(difluoromethoxy)-1,1,2-trifluoroethane, CHFCl−CF2−O−CHF2) have been studied by gas electron diffraction (GED) and by quantum chemical methods. The GED intensities are reproduced best with a mixture of three conformers, which possess a trans configuration of the C−C−O−C skeleton and gauche orientation of the CHF2 group (H gauche with respect to the central C−O bond). The three conformers differ by the rotational orientation of the CHFCl group, with either C−Cl, C−H, or C−F trans to the central C−O bond.(6) There is moderate awareness amongst AHS students about stricter of desflurane development need to be intiated.

Desflurane and other halogenated inhaled anesthetics is still poorly understood. these agents act on different ion channels within the nervous system by blocking excitatory channels and augmenting inhibitory channels. In particular, volatile anesthetics can depress ventral horn neurons, causing immobilization. Forenflurane, 30% of depressant effects on the spinal cord are mediated by the gamma-aminobutyric acid type A (GABA-A) receptor, and glycine receptors mediate 20 % of the effects.(7)

Desflurane is a medication used in the induction and maintenance of general anesthetics. It is in the inhaled anesthetics class of drugs. This activity outlines the indications, action, and contraindications for desflurane as a valuable agent in the maintenance of general anesthetics(9). There is moderate awareness amongst AHS students about use of desflurane development need to be intiated.

desflurane may be used to provide analgesia for vaginal delivery. Low concentrations of enflurane may also be used to supplement other general anesthetic agents during delivery by Cesarean section. Higher concentrations of enflurane may produce uterine relaxation and an increase in uterine bleeding(8)

The most common adverse effect of inhaled anesthetic agents is postoperative nausea and vomiting (PONV) and delirium. There has been some evidence showing that intravenous anesthesia instead of inhaled agents reduces the risk of PONV.Independent of the source, usually antiemetic agents such as ondansetron, metoclopramide, and/or dexamethasone are administered both prophylactically and symptomatically to reduce the incidence of nausea and vomiting. Malignant hyperthermia (MH) is also an adverse effect that can occur with the administration of inhaled anesthetics.(9)

Surgical levels of anesthesia may be maintained with 0.5 to 3.0% enflurane. Maintenance concentrations should not exceed 3.0%. desflurane 0.25 to 1.0% provides analgesia for vaginal delivery equal to that produced by 30 to 60% nitrous oxide. desflurane should ordinarily be administered in the concentration range of 0.5 to 1.0% to supplement other general anesthetics for C-section.Like many inhaled anesthetics, desflurane has associated adverse effects. Amongst the effects are hepatotoxicity, nephrotoxicity, and neurotoxicity. (enflurane, USP), like some other inhalational anesthetics, can react with desiccated carbon dioxide (CO2) absorbents to produce carbon monoxide which may result in elevated levels of carboxyhemoglobin in some patients. Case reports suggest that barium hydroxide lime and soda lime become desiccated when fresh gases are passed through the CO2 absorber cannister at high flow rates over many hours or days. When a clinician suspects that CO2 absorbent may be desiccated, it should be replaced before the administration of ETHRANE.(10-12)

5. Conclusion:

There is moderate awareness amongst AHS students about use of desflurane. However, enhanced awareness initiatives and educational programmes together with increased importance for curriculum improvements that further promote knowledge and awareness of enflurane should be initiated for further understanding and benefits.

References

1. Kapoor MC, Vakamudi M. Desflurane-revisited. Journal of anaesthesiology, clinical pharmacology. 2012 Jan;28(1):92.
2. Lee J, Jung JH, Kim WW, Lim YS, Lee RK, Kwak KH, Park HY. Oncologic Results of Breast Conserving Surgery under Procedural Sedation in Elderly Patients. Journal of Breast Disease. 2019 Jun 30;7(1):9-15.
3. Khan J, Liu M. Desflurane. InStatPearls [Internet] 2021 Jun 15. StatPearls Publishing..
4. Goodman EJ, Hudson IM, Douglas A. Desflurane vaporizer uses minimal electricity. Anesthesia & Analgesia. 1999 May 1;88(5):1189..
5. Kozyrev AS, Aleksandrovich YS, Zaletina AV, Ivanov MD, Pavlova MS, Strelnikova AS. Comparative evaluation of desflurane and sevoflurane anesthesia during surgical correction of vertebral and spinal cord injury in children. Pediatric Traumatology, Orthopaedics and Reconstructive Surgery. 2018 Sep 28;6(3):47-55.
6. Pfeiffer A, Mack HG, Oberhammer H. Enflurane: structure and conformational properties. Journal of the American Chemical Society. 1998 Jul 1;120(25):6384-8.
7. Chung E, Muzio MR. Enflurane. StatPearls [Internet]. 2020 May 23.
8. Cheung M, Parmar M. Continuing Education Activity.
9. Anderson S, Atkins P, Bäckman P, Cipolla D, Clark A, Daviskas E, Disse B, Entcheva-Dimitrov P, Fuller R, Gonda I, Lundbäck H. Inhaled Medicines: Past, Present, and Future. Pharmacological reviews. 2022 Jan 1;74(1):48-118.
10. Quail AW. Modern inhalational anaesthetic agents: A review of halothane, isoflurane and enflurane. Medical Journal of Australia. 1989 Jan;150(2):95-102.
11. Hadi, Najlaa Mohammad, Adnan Falh Hassan, and Talib Mohsen Abaas. "Nanomaterial Mixed with Dyes to Make Solar Cell Concentrator." Acta Innovations 51 (2024): 29-35.
12. Lirios, Cruz García, et al. "Network of Water Problems in the Press of Mexico City During the COVID-19 Era." Metallurgical and Materials Engineering 29.4 (2023).