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Research Article

Inhalation Anesthetics for Postoperative Nausea and Vomiting in General Anesthesia Patients

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ABSTRACT

Background: Postoperative nausea and vomiting is an anesthetic complication which is related to various factors. Patients who experience postoperative nausea and vomiting have worse quality of recovery which causes delay in patient discharge from the hospital which will increase the cost of care. Objective: To knowing the effect of inhalation anesthetics on postoperative nausea and vomiting in general anesthesia patients at Dr Soedirman Hospital Kebumen. Method: The study is a quasi-experimental quantitative study with a pre-test-post-test design with a control group design. The population of the study were all patients undergoing general anesthesia at Dr Soedirman Hospital Kebumen. The study was conducted in September - October 2022 with a sample of 56 respondents for each group which was determined using a purposive sampling technique. Data analysis using the Wilcoxon test. Result: Results of analysis of the effect of inhalational anesthesia on postoperative nausea and vomiting in general anesthesia patients at Dr Soedirman Hospital Kebumenp (sig) 0.000. Conclusion: There is an effect of inhalation anesthetics on postoperative nausea and vomiting in general anesthesia patients

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INTRODUCTION

The World Health Assembly Strengthening Emergency and Essential Surgical Care and Anesthesia as a Component of Universal Health Coverage 2015 estimates that at least 11% of the disease burden in the world comes from diseases or conditions that can actually be treated with surgery. Patients undergoing surgical procedures require anesthesia. Anesthetic action means an action to relieve pain when surgical procedures and various other procedures that cause pain in the body are carried out. Most patients recover from anesthesia and surgery without special events, but a small number of patients develop an unpredictable number of complications. Complications that occur after anesthesia and surgery are hypoxemia, hypotension, hypertension, nausea and vomiting.¹⁻³

Postoperative Nausea and Vomiting (PONV) or postoperative nausea and vomiting is defined as nausea, retching, or vomiting that occurs during the first 24-48 hours

after surgery. Postoperative nausea and vomiting is one of the most common causes of patient dissatisfaction after anesthesia, with a reported incidence of 30% in all postoperative patients and up to 80% in high risk patients undergoing surgical procedures. Every three to four patients suffer postoperative nausea and vomiting following general anesthesia. The risk of postoperative nausea and vomiting is 9 times smaller in patients with regional anesthesia than in patients with general anesthesia.⁴⁻⁷

The incidence of postoperative nausea and vomiting is caused by several factors. These factors are categorized into influencing risk factors including patient factors, anesthetic factors, and surgical factors.³ Post-surgical nausea and vomiting that can be a serious complication of surgery. Patients with postoperative nausea and vomiting clinically have poorer quality of recovery and require twice as many antiemetic treatments. Vomiting three or more times and prolonged duration of nausea are key factors in clinically defining postoperative nausea and vomiting. These data are

used to obtain a scale of the intensity of postoperative nausea and vomiting. Based on this scale, 18% of patients experienced the severity of postoperative nausea and vomiting. Another study using a postoperative nausea and vomiting intensity scale conducted by Dalila et al stated that 25% of patients experienced severe nausea and vomiting at 6 hours after surgery and 34% experienced severity of nausea and vomiting at 24 hours after surgery.⁸⁻¹⁰

The Central Surgical Installation of Dr Soedirman Kebumen Hospital has developed a system for documenting perianesthesia procedures. The documentation develops a scoring system for risk assessment of postoperative nausea and vomiting and the degree of postoperative nausea and vomiting assessment as a basis for preparation to prevent complications of postoperative nausea and vomiting anesthesia. The information obtained was that the average number of operations in one month was 400 cases, with 200-300 cases of surgery using general anesthesia, while 100-200 cases of regional anesthesia. Description of the incidence of postoperative nausea and vomiting, which is about 30% of cases per month.

RESULTS

Table 1: Distribution of respondent characteristics in the experimental and control groups

| No | Characteristics | Experiment Group | | Control Group | |
|----|--|------------------|----|---------------|----|
| | | f | % | f | % |
| 1 | Age | | | | |
| | < 50 years | 26 | 52 | 41 | 82 |
| | ≥ 50 years | 24 | 48 | 9 | 18 |
| 2 | Gender | | | | |
| | Women | 23 | 46 | 33 | 66 |
| | Man | 27 | 54 | 17 | 34 |
| 3 | Smoking History | | | | |
| | No | 34 | 68 | 39 | 78 |
| | Yes | 16 | 32 | 11 | 22 |
| 4 | History of sickness in Land/Sea/Air Travel | | | | |
| | Yes | 5 | 10 | 7 | 14 |
| | No | 45 | 90 | 43 | 86 |

Table 1 shows that most of the research respondents were aged <50 years, namely 52% in the experimental group and 82% in the control group, while the respondents were dominated by women, 46% in the experimental group and 66% in the control group. Thirtyfour (68%) in the

Based on these data, patients who experience nausea and vomiting after surgery can cause delays in patient discharge from the hospital, thereby increasing treatment costs. These patients need effective treatment, especially in patients who experience the severity of postoperative nausea and vomiting.¹¹

METHODS AND MATERIALS

This research is a quasi-experimental study with a pre test-post test with control group design. Taking place at Dr Soedirman Kebumen Hospital which was carried out from September to October 2022. The population in this study were all patients undergoing general anesthesia at the Surgical Installation of Dr Soedirman Hospital Kebumen. The sampling technique in this study used purposive sampling, where in this study the respondents were two groups of patients with general anesthesia at Dr. Soedirman Kebumen Hospital as many as 56 in each of the intervention group and the control group. Data analysis used the Wilcoxon hypothesis test.

experimental group and thirty nine (78%) in the control group said they had no history of smoking. Respondents who stated that they had no history of land/sea/air travel sickness were 90% in the experimental group and 86% in the control group.

Table 2: Distribution of history of nausea and vomiting before anesthesia in the intervention and control groups

| History of Nausea and Vomiting | Experiment Group | | Control Group | |
|--------------------------------|------------------|----|---------------|----|
| | f | % | f | % |
| Yes | 16 | 32 | 8 | 16 |
| No | 34 | 68 | 42 | 84 |

Based on the table above, it shows that most of the respondents in the experimental group and the control group

did not have a history of nausea and vomiting, namely 68% and 84% respectively.

Table 3: Distribution of postoperative nausea and vomiting assessment results in the intervention and control groups

| Postoperative nausea and vomiting assessment | Experiment Group | | Control Group | |
|---|------------------|----|---------------|----|
| | f | % | f | % |
| Score ≥ 50 (clinically important nausea and vomiting) | 38 | 76 | 9 | 18 |
| Score < 50 (normal nausea and vomiting) | 12 | 24 | 41 | 82 |

Table 3 shows that the majority of respondents had an assessment of postoperative nausea and vomiting with a score of ≥ 50 which means clinically important postoperative nausea and vomiting, namely 76% in the

experimental group, while in the control group, an assessment of postoperative nausea and vomiting was 82% of respondents with a score < 50 which means normal nausea and vomiting.

Table 4: Data Analysis Test Results Differences in the Assessment of nausea and vomiting between the Pre-test and Post-test in the Experiment Group and the Control Group in Patients with General Anesthesia

| Variable | Group | | p (sig) |
|---|------------|-----------|---------|
| Assessment of Postoperative Nausea and Vomiting | Experiment | Pre-test | 0,000 |
| | | Post-test | |
| | Control | Pre-test | 0,000 |
| | | Post-test | |

The table above shows that nausea and vomiting between the pre-test and post-test in the experimental group and the control group with a p (sig) value of $0.000 < 0.05$, then H_a is accepted and H_o is rejected so that there is a difference between pre-test and post-test nausea and vomiting in the experimental group and the control group. Data analysis test results using Wilcoxon the effect of inhalational anesthesia on postoperative nausea and vomiting in patients with general anesthesia at Dr Soedirman Kebumen Hospital with a p (sig) value of $0.000 < 0.05$ means there is a significant effect of inhalational anesthesia on postoperative nausea and vomiting surgery in patients under general anesthesia

DISCUSSION

Based on Table 1 it shows that some of the respondents in the experimental group had a history of nausea and vomiting, namely 32%, while based on Table 2 it shows that most of the respondents had postoperative nausea and vomiting with a score of ≥ 50 which means postoperative nausea and vomiting is clinically important, namely 76% in the experimental group. This is in accordance with the opinion of Tinsley and Barone that patients with a history of motion sickness or postoperative nausea and vomiting previously have a lower tolerance threshold, which can increase the risk of postoperative nausea and vomiting episodes in the future two to three times.¹² In addition, there are most respondents aged < 50 years with female sex. Respondents with a history of non-smoking and no history of land/sea/air travel sickness. These results are in accordance with Tinsley and Barone, Pierre and Whelan the incidence of postoperative nausea and vomiting decreases after the age of 50 years in adult patients.^{11,12} In pediatric patients, age increases the risk of postoperative vomiting (POV), children over 3 years of age have a higher risk of postoperative vomiting compared to children under 3 years of age, so patients between the ages of 3 and 50 are most at risk of experiencing postoperative nausea and vomiting. According to Fujii, female patients have an incidence of postoperative nausea and vomiting 1.5-3 times greater than that of males, due to increased plasma progesterone levels during the menstrual cycle. Opinion of Sweis et al the high risk of postoperative nausea and vomiting in women is influenced by fluctuations in hormone levels with the highest risk occurring in the third and fourth week of the menstrual cycle and the fourth and fifth day of the menstrual period. During the menstrual and preovulatory phases of the menstrual cycle exposure to follicle stimulating hormone (FSH), progesterone, and estrogen on the chemoreceptor

trigger zone (CRTZ) and vomiting center can result in postoperative nausea and vomiting. Whereas Yi et al patients who do not smoke have a higher risk of experiencing post-operative nausea and vomiting than smokers. Volatile anesthetic substances are a factor in postoperative nausea and vomiting during the early postoperative period. Volatile anesthetic agents are metabolized by cytochrome P450 2E1, which can be induced by nicotine and polycyclic aromatic hydrocarbons from smoking. Thus, increased hepatic enzyme induction in patients who smoke may contribute to a higher metabolic rate and to a quicker recovery from general anaesthesia. Nicotine inhibits 5HT3 receptor function, which will also affect postoperative nausea and vomiting.¹³⁻¹⁵

The results showed that nausea and vomiting between the pre-test and post-test in the experimental group and the control group with a p-value (sig) $0.000 < 0.05$, then H_a was accepted and H_o was rejected so that there was a difference between pre-test and post-test nausea and vomiting in the group experimental and control groups. These results are in accordance with the opinion of Pierre and Whelan; Shaikh, Nagarekha, Hegade, and Marutheesh stated that the use of volatile anesthetics can double the risk of postoperative nausea and vomiting. The volatile effects of anesthetics are prominent in the first 2-6 hours after surgery, depending on the dose administered.^{11,16} In addition to the use of volatile anesthetics, the use of nitrous oxide gas increases the risk of postoperative nausea and vomiting by 20%. The study of Myles et al showed a higher risk of severe postoperative nausea and vomiting with increasing exposure time to nitrous oxide when surgery was more than 2 hours. In addition, in the study by Aziz et al, the results showed that patients using volatile anesthetics had the opportunity to get a postoperative nausea and vomiting assessment with a score of ≥ 50 , which means nausea and vomiting are clinically important by 41 times compared to patients who do not use anesthetic volatiles.¹⁷⁻¹⁹

Anesthesiologists must understand the use of volatile anesthetics and their association with postoperative nausea and vomiting. This is important so that when using volatile anesthetics, the anesthetist can choose based on the side effects that arise related to nausea and vomiting when using volatile anesthetics. From this description it can be concluded that the effect of inhalation anesthesia is significant on postoperative nausea and vomiting in patients with general anesthesia at Dr Soedirman Kebumen Hospital.

CONCLUSION

Based on the results of the above study, it can be concluded that there is an effect of inhalational anesthesia on postoperative nausea and vomiting in general anesthesia patients at Dr Soedirman Hospital Kebumen.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

- Smith G, D'Cruz JR, Rondeau B, Goldman J. General anesthesia for surgeons. 2018;
- Saller AM, Werner J, Reiser J, Senf S, Deffner P, Abendschön N, et al. Local anesthesia in piglets undergoing castration—A comparative study to investigate the analgesic effects of four local anesthetics on the basis of acute physiological responses and limb movements. *PLoS One*. 2020;15(7):e0236742.
- Gwinnutt CL. Catatan Kuliah Anestesi Klinis. Jakarta EGC. 2011;
- Forget P. Opioid-free anaesthesia. Why and how? A contextual analysis. *Anaesth Crit Care Pain Med*. 2019;38(2):169–72.
- Jeyabalan S, Thampi SM, Karuppusami R, Samuel K. Comparing the efficacy of aprepitant and ondansetron for the prevention of postoperative nausea and vomiting (PONV): A double blinded, randomised control trial in patients undergoing breast and thyroid surgeries. *Indian J Anaesth*. 2019;63(4):289.
- De Cassai A, Geraldini F, Boscolo A, Pasin L, Pettenuzzo T, Persona P, et al. General anesthesia compared to spinal anesthesia for patients undergoing lumbar vertebral surgery: a meta-analysis of randomized controlled trials. *J Clin Med*. 2020;10(1):102.
- Elsaid RM, Namrouti AS, Samara AM, Sadaqa W, Zyoud SH. Assessment of pain and postoperative nausea and vomiting and their association in the early postoperative period: an observational study from Palestine. *BMC Surg*. 2021;21(1):1–9.
- Chiu C, Aleshi P, Esserman LJ, Inglis-Arkell C, Yap E, Whitlock EL, et al. Improved analgesia and reduced post-operative nausea and vomiting after implementation of an enhanced recovery after surgery (ERAS) pathway for total mastectomy. *BMC Anesthesiol*. 2018;18(1):1–9.
- Wengritzky R, Mettho T, Myles PS, Burke J, Kakos A. Development and validation of a postoperative nausea and vomiting intensity scale. *Br J Anaesth*. 2010;104(2):158–66.
- Dalila V, Pereira H, Moreno C, Martinho C, Santos C, Abelha FJ. Postoperative nausea and vomiting: validation of the portuguese version of the postoperative nausea and vomiting intensity score. *Rev Bras Anestesiol*. 2013;63:340–6.
- Pierre S, Whelan R. Nausea and vomiting after surgery. *Contin Educ Anaesthesia, Crit Care Pain*. 2013;13(1):28–32.
- Tinsley MH, Barone CP. Preventing postoperative nausea and vomiting: refresh your knowledge of how to recognize and respond to this common complication. *Plast Aesthetic Nurs*. 2012;32(3):106–11.
- Fujii Y. Postoperative nausea and vomiting and their sex differences. *Masui*. 2009;58(1):59–66.
- Sweis I, Yegiyants SS, Cohen MN. The management of postoperative nausea and vomiting: current thoughts and protocols. *Aesthetic Plast Surg*. 2013;37:625–33.
- Yi MS, Kang H, Kim MK, Choi G-J, Park Y-H, Baek CW, et al. Relationship between the incidence and risk factors of postoperative nausea and vomiting in patients with intravenous patient-controlled analgesia. *Asian J Surg*. 2018;41(4):301–6.
- Shaikh SI, Nagarekha D, Hegade G, Marutheesh M. Postoperative nausea and vomiting: A simple yet complex problem. *Anesth essays Res*. 2016;10(3):388.
- Peyton PJ, Wu CY. Nitrous oxide-related postoperative nausea and vomiting depends on duration of exposure. *Anesthesiology*. 2014;120(5):1137–45.
- Myles PS, Chan MT V, Kasza J, Paech MJ, Leslie K, Peyton PJ, et al. Severe nausea and vomiting in the evaluation of nitrous oxide in the gas mixture for anesthesia II trial. *Anesthesiology*. 2016;124(5):1032–40.
- Aziz MA, Palestin B, Induniasih I. Faktor-Faktor yang Mempengaruhi Mual dan Muntah Pasca Bedah pada Pasien Anestesi Umum di Rumah Sakit Umum Daerah Dr Soedirman Kebumen. *Anaesth Nurs J*. 2021;1(1).