

Original Research

Application of Cold Drink in Post-Operative Nausea and Vomiting (PONV) Appendectomy Cases in Lubuklinggau



Jhon Feri¹, Wella Juartika^{1*}, Eva Oktaviani¹, Derison Marsivova Bakara², & Gunardi Pome¹

¹Poltekkes Kemenkes Palembang, Palembang, Indonesia

²Poltekkes Kemenkes Bengkulu, Bengkulu, Indonesia

Article Info	Abstract
Article history: Received: 10 October 2022 Accepted: 16 January 2023	<i>Introduction:</i> Post-Operative Nausea and Vomiting (PONV) is one of the most common complications after surgery, it affects the patient's time recovery and causes discomfort including: pain, electrolyte imbalance, dehydration, risk of aspiration, risk of wound opening and bleeding. The purpose of this study was to see a decrease in post-operative nausea and vomiting scores.
Keywords: PONV, nausea, vomiting, cold drink	<i>Methods:</i> The research design used was quasi-experimental with 2 pretest-posttest groups. The sample in this study were 42 people with a total of 21 people in the intervention group and 21 people in the control group. The variable in the study looked at the score of postoperative nausea and vomiting. Instruments used Rhodes INVR. Data analysis used SPSS with Mann-Whitney test. <i>Results:</i> There was a significant difference in respondents' scores (p-value = 0.000, < 0.05). In addition, it showed a difference in the average score of the test between the control group (19.00) and the invention group (3.00), with an average difference of 16.00. <i>Conclusion:</i> The application of cold drinks in PONV has proven to be more effective in reducing vomiting nausea. This method can be used as an alternative method in meeting the needs of body fluids when getting complaints of nausea vomiting. To achieve the goal of preventing the occurrence of the impact of vomiting nausea such as preventing dehydration.

*Corresponding Author:

e-mail: ns.wellajuartika@gmail.com



This work is licensed under a Creative Commons Attribution 4.0 International License.

INTRODUCTION

Post-Operative Nausea and Vomiting (PONV) is one of the most common complications after surgery, it affects the patient's time recovery and causes discomfort including: pain, electrolyte imbalance, dehydration, risk of aspiration, risk of wound opening and bleeding [1], [2]. From these complications, the prevention of PONV becomes more important than the treatment of postoperative pain[3]. This research is important because it is to meet postoperative fluid needs and also affect serotonin in order to reduce nausea and vomiting scores.

It is estimated that around 75 million patients suffer from PONV every year [4], [5]. Neurokinin-1 antagonists is needed to avoid PONV, however according to studies that although patients use the aforementioned antiemetics, they have an incidence of about 30% to 45% having PONV [6]. English translation. The need for research of alternative pharmacological treatments arises from the serious side effects that antiemetic drugs can cause [7]. In some cases, drugs such as peridol have received warning from the FDA (Food and Drug Administration) because they are not recommended, as the main treatment. Currently only about 13% of anesthesiologists opt for non-pharmacological interventions in the prevention and treatment of PONV [2].

Post-Operative Nausea and Vomiting that are felt are not only caused by physical but also psychological complaints. PONV is caused by various stimulations of the vomiting center in the medulla oblongata. The vomiting center receives afferent impulses

from CTZ that go through direct or indirect stimulation of the gastrointestinal tract. In the vomiting center area, there are many receptors that play a role in the process of nausea and vomiting, and antiemetics generally work to inhibit neurotransmitters on these receptors. Efferent impulses through the cranial nerves V, VII, IX, X and XII leading to the gastrointestinal tract can cause nausea and vomiting [8]

The main impacts related to PONV become problems medically, psychologically and economically. Complications are medically not limited to dehydration, but also an imbalance of electrolytes, hypotension, delay in fluid and food intake, impossibility of administration of drugs, wound tearing, wound bleeding, hematomas, increased intracranial tachycardia, increased intraocular pressure, esophageal disorders, risk of aspiration pneumonia [9].

Psychological complications take into account the patient's feelings, including shyness, non-dignity. PONV ranks first in the survey regarding the concerns of pain patients in surgery. It is also associated with low patient satisfaction. PONVs lead to longer hospitalization periods and unexpected hospitalizations for those who are selected to undergo surgery but have to stay overnight, therefore the economic impact is obvious. Economic reasons do not also consider hospitalization but all resources such as personnel, medicines and equipment [10].

Based on the concept of dehydration and loss during preparation for surgery is also a problem of nausea vomiting. The preparation for surgery must undergo fasting, so this needs to be a reference to find a solution. The

solutions provided such as non-pharmacological interventions for PONV based on nursing experience such as conducting fluid management [11].

Fluid management is the identification and management of fluid balance and preventing complications due to fluid imbalances. Interventions that can be done are to monitor hydration, provide fluid intake, record inputs and outputs for 24 hours and provide intravenous fluids if needed [12]. Non-pharmacological therapies that include fluid management that can be done according are to overcome dehydration with cold drinks. Cold Drink is the most loved and chosen drink, because the type of water that does not contain many risks [13]–[15]

Based on a review of Eccles, Du-plessis, Dommels, & Wilkinson (2013) says that cold stimulation in the mouth gives a pleasant taste, this is related to thirst and a refreshing effect [16]. Evidenced by the results of Juartika's research (2019) on the effect of cold drinks on reducing CINV in Post-Breast Cancer Chemotherapy patients at RSUP M. Djamil Padang. Based on the study, the administration of cold drinks is given continuously and regularly [15].

Drinking cold water also affects the hormones endorphins and serotonin which affect pleasure [19]. Endorphin and serotonin hormones are receptors that stimulate CTZ and vomiting centers [7]. The advantages of the use of drinking cold water are quite safe to use, the recommended amount is at least 2 liters (8 glasses) [15].

Based on research it is explained that the regulation in the amount of drinking water cannot be determined because each

individual is different according to the needs of the body [13]. Giving cold water has the same content as bottled water that is in accordance with the standards. Water that contains natural minerals obtained directly from nature such as sodium, potassium, fluoride, calcium and magnesium which are very beneficial for the body [20]. The water we drink not only quenches thirst, but also benefits the body, namely as the main component of blood that supplies cells with oxygen and nutrients and carries waste out of the body. The use of cold water here is different from ordinary water. Ordinary water temperature can reach 20 degrees Celsius. In cold water the temperature used is 15-16 degrees Celsius which can affect pleasure. This pleasure affects the emphasis on the hormone serotonin and endorphins which are useful for suppressing nausea and vomiting. The goal is to increase the hormone of happiness which can reduce the incidence of nausea and vomiting.

METHODS

The research design uses quasi-experimental with 2 pretest-posttest groups with quantitative study research types. The population of this study was 42 post-op appendectomy patients at Siti Aisyah Hospital, Lubuklinggau City, starting from April 19th, 2022 to August 2022. Using accidental sampling, 21 patients (intervention) and 21 patients (control group) were included in the study sample, which followed the research process as a whole. The inclusion criteria for participants were: 1) patients with post-op appendectomy, 2) patients aged 26-

55 years, 3) cooperative, 4) experiencing acute or delayed vomiting nausea, 5) using minimal antiemetics ondansetron, dexamethasone, and ranitidine.

Data from the observation sheets were entered into the SPSS and analyzed using the Wilcoxon test (with a significance level of 0.05) to compare the results between the 2 intervention groups and the control group. Questionnaire used with Rhodes INVR. A normality test that shows that scores from pre and post are not distributed normally. All sequences of the research process have been approved with Number 601 / KEPK / Adm2 / VIII / 2022.

RESULTS

Characteristics of Respondents

Referring to table 1, the number of respondents in the control group was 21

people, and completed the entire research series. In the intervention group, 21 people also completed the entire study series. The characteristics show data about the age and education of the respondents in both control and intervention groups. The average age in the control group was 32.05 years and the majority with high school education were 9 people. In the intervention group, the average age was 31.90 years and there were 9 people with undergraduate education.

A Value Between the Two Groups

There was a significant difference in respondents' scores (p -value = 0.000, < 0.05). In addition, it showed a difference in the average score of the test between the control group (19.00) and the intervention group (3.00), with an average difference of 16.00.

Table 1

Characteristics of respondents

Group	n	Age		Education				
		Min-max	Mean \pm SD	Elementary School	Junior High School	Senior High School	S1	S2
Control	21	18-45	32,05 \pm 8,309	1 (4,8%)	2 (9,5%)	9 (42,9%)	8 (38,1%)	1 (4,8%)
Intervention	21	20-45	31,90 \pm 6,978	2 (9,5%)	1 (4,8%)	8 (38,1%)	9 (42,9%)	1 (4,8%)

Table 2

Difference in post-test score between control and treatment groups

	n	Median	Min-Max	Mean \pm SD	p
Cold drink	21	3,00	0-23	4,67 \pm 5,370	0,000
Drink Normally	21	19,00	16-22	18,90 \pm 1,814	

DISCUSSION

Based on the results of the study, there was a difference in the median value, which is an image of the nausea and vomiting score. Using cold drinks helps reduce complaints of vomiting nausea. This is because cold drinks use a temperature of 16 degrees Celsius which can affect pleasure. Corroborated by the amount given is not too much in one drink. At the standard post-operative protocol for nausea and vomiting including making ondansetron 4 mg available intravenously every 6 hours for all patients. It is administered when the patient supports symptoms of nausea or after a confirmed episode of emesis, when the nausea was not documented before. No additional corticosteroids were administered during the post-operative phase (10).

Post-operative fluid management remains a controversial aspect of surgical treatment, with restrictive fluid regimens and goal-directed fluid therapy being the main recommendations. Patients receive surrogate postoperative fluids to reduce perioperative dehydration, which is often associated with nausea and vomiting. Preoperative fasting contributes to perioperative hypovolemia. There are several studies that evaluate the postoperative fluid status of patients after carbohydrate loading. Ljunggren and Hahn found that pre-operative water or beverage nutrition did not affect the hemodynamic status of patients. The study showed that patients who received post-operative bolus tended to differ between treatment and control groups. These findings may suggest

that patients who do not have post-operative fluid need abnormalities can avoid bolus with pre-operative fluid intake. Prevention of PONV should be adjusted to the patient's condition risk score to avoid side effects and unnecessary costs associated with administering some antiemetic drugs (11,12).

The pathophysiology of post-operative vomiting nausea is caused by various factors such as surgical stress that causes the release of counter regulatory hormones so that there is an increase in catecholamines, the release of the hormone cortisol, glucagon and growth hormones that cause an increase in serotonin. The process causes glucose uptake in peripheral tissues as a source of energy during operation. This release of serotonin is captured by the chemoreceptor trigger zone (CTZ) as an emetic substance that causes PONV. In preoperative CHO administration, glucose levels in circulation are maintained so that glucose retrieval from peripheral tissues due to the release of counter regulatory hormones is reduced because glucose is still obtained in circulation and indirectly decreases the release of serotonin so that PONV is reduced (13).

Drinking cold water also affects the hormones endorphins and serotonin which affect pleasure [19]. Endorphin and serotonin hormones are receptors that stimulate CTZ and vomiting centers [7]. The advantages of the use of drinking cold water are quite safe to use, the recommended amount is at least 2 liters (8 glasses) [15]. This is supported by the research of Pangesti & Sofiani (2016) by comparing three types of cold drinks with a temperature of 10°C -15°C in 30 breast

cancer patients who have undergone chemotherapy which is divided into 3 groups with sweet iced tea drinks, melon juice and iced milk. In this study, it was explained that cold drinks provide a pleasure effect, open appetite and stabilize emotions [17]. In general, cold drinks cause the body's response to vasoconstriction so that excessive calorie expenditure does not occur. This is reinforced by Adams & Casa (2013) that the use of a temperature of 15°C in beverages affects fluid consumption in maintaining optimal hydration [18].

The results of the study obtained were the same as the previous, Pangesti & Sofiani (2016) showed that the score decreased before giving cold drinks, the lowest was 4 and the highest was 7. And it is known that the amount of vomiting nausea after administration of cold drinks 10-15 °C, the lowest is 1 and the highest is 3, as well as p value = 0.000.

Giving cold drinks is absorbed in the body faster than warm water and helps in rehydration so that it provides a sense of freshness and opens up appetite and stabilizes emotions in overcoming vomiting nausea. In accordance with the theory of Aapro (2015), that vomiting nausea often occurs after chemotherapy is performed. Vomiting nausea is vomiting nausea that cannot be controlled and can affect the therapeutic response to the cure rate of the cancer. The reflex response of vomiting by spraying the contents of the stomach through the mouth, usually starts from the sensation of nausea. Nausea is a disorder of the central nervous system receiving and processing emetic stimuli (Perry & Doll, 2012).

This system produces efferent signals that are sent to a number of organs and tissues in the process that eventually results in vomiting. The process of vomiting does not depend on a unique area but involves several areas of the body (Bayo et al., 2012). These areas are the trigger zones of chemoreceptors and vomiting centers in the brain, as well as vagal afferent pathways and enterochromaffin cell in the gastrointestinal system (Silbernagl & Lang, 2016).

Nausea occurs for more than 6 hours as much as 7 times more and makes the patient feel severe. The perceived vomiting occurs 7 times more and makes the patient suffer. The amount of vomit that comes out varies from half a cup to 3 cups more. For nausea empty vomiting is felt a little makes suffering as much as 5-6 times in the last 12 hours [15].

Dehydration can affect the work of the brain where 75% of the brain is water. Adams & Casa (2013) explains that the temperature of beverages has been shown to increase fluid consumption. Low fluid intake is even capable of affecting cognition and mood (Benton, 2011). The cold effect given also causes a pleasure effect. This pleasure is influenced by endorphins and serotonin. In vomiting nausea, serotonin plays a role in stimulating the vomiting center. If there is a decrease in the incidence of serotonin, vomiting nausea will also have an effect (Navari, 2015; Newman, 2017; Pangesti & Sofiani, 2016; Von Duvillard, Braun, Markofski, Beneke, & Leithäuser, 2004).

The actual ideal temperature may be culturally conditioned but more water is consumed at a temperature of 50°C - 150°C.

Shirreffs (2009) explains that dehydration can negatively impact fluid activity and balance. Drinking during activities has been shown to improve performance during activities. The results of the research of Hosseinlou, Khamnei, & Zamanlu (2013) support this study in using cold temperatures. Where at a temperature of 15°C makes fluid intake higher (optimal level of hydration), so this temperature is highly recommended. So, from previous studies, we can use it as a reference where maintaining hydration of the body can maintain and increase the activity of patients who experience vomiting nausea.

Based on the researcher's findings on the results of patient observations following the instructions in carrying out the intervention, the number of administration calculations needs to be considered. The need to drink is adjusted to the BB and the amount secreted from vomiting, urine and also sweat to balance the fluids in the body to maintain hydration. Based on the total number of drinks of the intervention group above 800 - 1400 cc per 12 hours. As for the control group, there was less drinking water consumption, namely 100 - 1200 cc per 12 hours. This proves that cold drinks affect the amount of liquid consumed [15].

According to the view of researchers, drinking cold water is one of the alternatives in reducing vomiting nausea. For example, in the treatment that can be done at home issued by Hendro, Pradian and Indrisari, (2018) which states that drinking cold water is one way that can be applied to reduce nausea vomiting due to PONV. Based on these findings, it is hoped that drinking cold water

can be applied to help patients in order to reduce nausea vomiting due to PONV.

CONCLUSION AND SUGGESTION

The application of cold drinks in PONV has proven to be more effective in reducing vomiting nausea. This method can be used as an alternative method in meeting the needs of body fluids when getting complaints of nausea vomiting. To achieve the goal of preventing the occurrence of the impact of vomiting nausea such as preventing dehydration. It was suggested that in the next study respondents had other options besides using ordinary drinking water and other beverage options could be developed.

LIMITATIONS

In conducting this study both groups used drinking water, which distinguished the drinking temperature used. In the initial intervention group when carrying out the use of temperature, there was some rejection because it was not commonly done and never.

ACKNOWLEDGEMENT

This research is the result of research financed by the DIPA Poltekkes Palembang.

CONFLICT OF INTEREST

The authors report no conflicts of interest.

REFERENCES

- [1] M. S. Yi et al., "Relationship between the incidence and risk factors of postoperative nausea and vomiting in

- patients with intravenous patient-controlled analgesia," *Asian J. Surg.*, vol. 41, no. 4, pp. 301–306, 2018, doi: 10.1016/j.asjsur.2017.01.005.
- [2] S. Imtiaz Shaikh and D. Nagarekha, "Postoperative nausea and vomiting: A simple yet complex problem," *Anesth. Essays Res.*, vol. 10, no. 3, pp. 388–396, 2016, doi: doi: 10.4103/0259-1162.179310.
- [3] P. F. White, O. L. Elvir-Lazo, R. Yumul, and H. Cruz Eng, "Management strategies for the treatment and prevention of postoperative/postdischarge nausea and vomiting: An updated review," *F1000Research*, vol. 9, 2020, doi: 10.12688/f1000research.21832.1.
- [4] Y. Chen and J. Chang, "Anti-emetic Drugs for Prophylaxis of Postoperative Nausea and Vomiting After Craniotomy: An Updated Systematic Review and Network Meta-Analysis," *Front. Med.*, vol. 7, no. February, pp. 1–12, 2020, doi: 10.3389/fmed.2020.00040.
- [5] C. McCaul, M. Buckley, and A. Hegarty, "Ambulatory anesthesia and postoperative nausea and vomiting: predicting the probability," *Ambul. Anesth.*, vol. Volume 3, pp. 27–35, 2016, doi: 10.2147/aa.s54321.
- [6] M. H. Sudjito, Mulyata, and T. Setyawati, "Kejadian Mual Muntah Pasca-Laparotomi (PONV) setelah Pemberian Granisetron Dibandingkan setelah Pemberian Kombinasi Ondansetron - Deksametason," *Cermin Dunia Kedokt.*, vol. 45, no. 3, pp. 172–175, 2018.
- [7] P. Mayestika and M. H. Hasmira, "Artikel Penelitian," *J. Perspekt.*, vol. 4, no. 4, p. 519, 2021, doi: 10.24036/perspektif.v4i4.466.
- [8] P. D. Baker, S. L. Morzorati, and M. L. Ellett, "The Pathophysiology of Chemotherapy-Induced Nausea and Vomiting," *Gastroenterol. Nurs.*, vol. 28, no. 6, pp. 469–480, 2005, doi: 10.1097/00001610-200511000-00003.
- [9] A. I. Ardiansah, M. D. CIPTANING, and ..., "Hubungan Dosis Dan Durasi Oksigen Dengan Postoperative Nausea and Vomiting (Ponv) Pada Pasien Post Anestesi Umum," ... *Terap.*, vol. 06, no. 02, pp. 121–127, 2020, [Online]. Available: <https://ojs.poltekkes-malang.ac.id/index.php/JKT/article/view/299>
- [10] W. Juartika, P. K. Harmi, and R. Fatmadona, "Gambaran Skor INVR (Index of Nausea, Vomiting and Retching) pada CINV (Chemotherapy Induced Nausea and Vomiting) Kanker Payudara di RSUP M Djamil Padang," *J. Kesehat. Andalas*, vol. 8, no. 4, pp. 209–214, 2020, doi: 10.25077/jka.v8i4.1142.
- [11] B. M. Popkin, K. E. D'Anci, and I. H. Rosenberg, "Water, hydration, and health," *Nutr. Rev.*, vol. 68, no. 8, pp. 439–458, 2010, doi: 10.1111/j.1753-4887.2010.00304.x.
- [12] E. Jéquier and F. Constant, "Water as an essential nutrient: The physiological basis of hydration," *European Journal of Clinical Nutrition*. 2010. doi: 10.1038/ejcn.2009.111.
- [13] T. P. Backes and K. Fitzgerald, "Fluid consumption, exercise, and cognitive performance," *Biol. Sport*, 2016, doi: 10.5604/20831862.1208485.

- [14] W. M. Sun, L. A. Houghton, N. W. Read, D. G. Grundy, and A. G. Johnson, "Effect of meal temperature on gastric emptying of liquids in man," *Gut*, 1988, doi: 10.1136/gut.29.3.302.
- [15] W. Juartika, "The Effect of Drinking Cold Water on Nausea and Vomiting among Patient with Post-Chemotherapy Breast Cancer," *J. Palembang Nurs. Stud.*, vol. 1, pp. 74–85, 2022, doi: 10.55048/jpns.v1i3.15.
- [16] R. Eccles, L. Du-plessis, Y. Dommels, and J. E. Wilkinson, "Cold pleasure . Why we like ice drinks , ice-lollies and ice cream," *Appetite*, vol. 71, pp. 357–360, 2013, doi: 10.1016/j.appet.2013.09.011.
- [17] D. N. Pangesti and Y. Sofiani, "Eektifitas Perbandingan Pemberian Minuman Dingin Terhadap Penurunan Sensasi Mual dan Muntah Setelah Kemoterapi pada Klien Kanker Payudara di RS Umum dr. H. Abdul Moeloek Propinsi Lampung," vol. 7, no. 2, pp. 189–196, 2016.
- [18] william M. Adams and D. J. Casa, "The beverages temperature and influens on hydration," Korea, 2013.
- [19] V. Newman, "The Effects of Cold Drinks on Digestion," *Lifstrong.com*, 2017. <https://www.livestrong.com/article/541077-does-green-tea-cause-heart-palpitations/>
- [20] D. N. Pascapurnama, A. Murakami, H. Chagan-Yasutan, T. Hattori, H. Sasaki, and S. Egawa, "Integrated health education in disaster risk reduction: Lesson learned from disease outbreak following natural disasters in Indonesia," *Int. J. Disaster Risk Reduct.*, no. July, pp. 0–1, 2017, doi: 10.1016/j.ijdrr.2017.07.013.