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Progressive Muscle Relaxation Effectively Reduces Nausea and Vomiting Postoperative Laparotomic Surgery

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Abstract
Nausea and vomiting are unpleasant effects that often occur after surgery. Some efforts to reduce the incidence of postoperative nausea and vomiting can be done with several strategies. Progressive muscle relaxation is a complementary approach to minimize physical and psychological stress. Peppermint aromatherapy by inhalation or inhalation in postoperative patients with general anesthesia can reduce the average frequency of nausea and vomiting**.** The method used in this research was quasi-experimental with a pre-post-test control group design. The population in this study was 60 postoperative laparotomy patients. The technique used in taking this research sample is a consecutive sampling technique. Data analysis used Wilcoxon and Kruskal-Wallis at $\alpha < 5\%$. In the treatment group, according to the hospital's SPO, there was a difference in the score of nausea and vomiting before or after treatment, but it was not significant, with a p-value of 0.090. Progressive muscle relaxation therapy for 15 minutes can reduce nausea and vomiting scores but not significantly in the intervention group, with a p-value of 0.003. Combination therapy of progressive muscle relaxation and peppermint aromatherapy for 15 minutes is effective and significantly reduces nausea and vomiting scores in the combination group with a p-value of 0.000**.** There was a significant difference in the nausea and vomiting scores of the three groups. Compared to other groups, the combination of progressive muscle relaxation and peppermint aromatherapy effectively reduced postoperative nausea and vomiting with a p-value score of 0.000.

Keywords: peppermint aromatherapy; postoperative nausea vomiting; progressive muscle relaxation

1. Introduction

The World Health Organization (WHO) reports that about 11% of diseases or health problems can be treated with surgery. Surgery cases are currently a health problem many people experience (WHO,2018). In 2018, in Indonesia, laparotomic surgery was ranked fifth as many as 1.2 million people, of which about 42% were laparotomic surgery (Kementrian Kesehatan RI, 2018).

Unpleasant side effects are often experienced after surgery, one of which is nausea and vomiting. Postoperative nausea and vomiting are common complications, especially after surgery using general anesthesia (Litalien et al.,2016). The incidence of postoperative nausea and vomiting in the recovery room mostly reaches 30%. The prevalence of nausea and vomiting can reach 70% in high-risk patients (Fransisca et al.,2019). Postoperative nausea and vomiting account for up to 30% of the 230 million major surgeries performed annually in each region, with an incidence of 69 million (80%) in people at high risk. The results of previous research found that the incidence of nausea and vomiting after laparotomic surgery reached 31.25% of cases (Wijaya et al.,2014). Postoperative nausea–vomiting can cause medical and psychological complications, thereby disrupting the treatment process and postoperative patient recovery and increasing the burden of medical costs during hospitalization (Cing et al., 2022).

Efforts to reduce the incidence of postoperative nausea and vomiting can be taken with various control and treatment strategies with pharmacological and non-pharmacological therapies. Antiemetics are the first-line treatment for postoperative nausea and vomiting, but they are not always effective and closely related

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to side effects affecting the patient's state (Stoicea et al., 2015). Another pharmacological therapy is to consume ondansetron drugs, which are ant-nausea drugs that are commonly used and have become the gold standard in dealing with nausea and vomiting (Gan et al., 2014). The ondansetron drug has some side effects that are dangerous for clients such as arrythmias and sedative effects. The collaborative action of combination with antiemetics also gives rise to some side effects of the drug (Stoicea et al., 2015). Complementary non-pharmacological approaches are carried out through music therapy, aromatherapy, acupuncture, acupressure, relaxation, and hypnotherapy (Shaikh et al.. Non-pharmacological therapeutic treatment for various health conditions is advantageous because it is relatively easy to perform and does not cause complications.

Progressive muscle relaxation is a complementary approach to minimizing physical and psychological stress. This movement is carried out by stretching and relaxing large muscles slowly, regularly, and sequentially (Astuti et al., 2021). Progressive muscle relaxation can reduce nausea and vomiting in ca mamae patients identified by reduced nausea and vomiting and make patients feel more relaxed (Putri et al., 2020). Xu Tian said that progressive muscle relaxation positively impacts nausea and vomiting during chemotherapy, especially on the frequency and degree of nausea and vomiting (Tian et al.,2020).

Based on the preliminary studies conducted at hospitals in Bantul in one month, there were 425-450 surgery patients, 100-150 patients under general anesthesia, and 25-75 patients experiencing postoperative complications in the form of nausea and vomiting every month. Studies that have been conducted previously do not concern any research on the combination of progressive muscle relaxation to reduce nausea, vomiting, and also anxiety in postoperative. This study is expected to reduce nausea and vomiting in laparotomic postoperative patients by providing progressive muscle relaxation. Based on the conditions mentioned above, the researcher was motivated to conduct a study entitled "The Effectiveness of Progressive Muscle Relaxation Against Nause Vomiting Post Laparotomic Surgery at PKU Muhammadiyah Bantul".

2. Research Methods

The method used in this study is quantitative with a quasi-experimental type of research with a pre-post test control group design. The population of this study was laparotomic postoperative patients, and the study was conducted from January 13 to February 28, 2023, at PKU Muhammadiyah Bantul. The sampling technique of this study uses a consecutive sampling technique by providing progressive muscle relaxation by the standard operating procedure for 15 minutes, which is expected to reduce nausea and vomiting in postoperative patients. Data analysis used univariate and bivariate, while the measuring instrument was Gordon's Standard vomit nausea observation sheet, which has been standardized and used to measure postoperative vomiting nausea. For the data collection procedure, patients were first measured for nausea and vomiting after entering the wardroom, then given progressive muscle relaxation measures, and two hours later, patients were reassessed for nausea and vomiting.

3. Results and Discussion

3.1.Results

3.1.1. Univariate Analysis

This study involved 40 respondents; 20 respondents were given progressive muscle relaxation measures, and 20 respondents became a group given SPO-appropriate measures from the hospital. The

characteristics of respondents to this study included age, weight, sex, history of smoking, history of nausea and vomiting, history of blood pressure, and history of surgery.

Table 1. Distribution of frequency of respondents based on age, sex, and length of surgery

Characteristics	Intervention		SPO		P
	f	%	f	%	
1. Age					
a. < 25 years	1	1,7	6	10,0	0,177
b. 25 - 45 years	12	20,0	9	15,0	
c. > 45 years	7	11,7	5	8,3	
2. Gender					
a. Male	7	11,7	10	16,7	0,631
b. Female	13	21,7	10	16,7	
3. Weight (BMI)					
a. Underweigh	0	0	1	1,7	0,443
b. Normal	8	13,3	6	10,0	
c. Overweight	12	20,0	13	21,7	
4. Smoking History					
a. Tidak	14	23,3	9	15,0	0,282
b. Ya	6	10,0	11	18,3	
5. Blood Pressure (MAP)					
a. Hypotension					
b. Normal	5	8,3	7	11,7	0,048
c. Hypertension	12	20,0	13	21,7	
	3	5,0	20	33,3	
6. Motion Sickness History					
a. No					0,576
b. Yes	16	26,7	14	23,3	
	4	6,7	6	10,0	

Source: Primary Data, 2023

Table 1 illustrates the characteristics of respondents in both groups. The average age in all groups was between 26 and 45. Both have a homogeneity value of 0.177 (p>0.05), which means that all three groups have similar values or no age difference in each group.

The average sex in the intervention group was 20% and 21.7% women, while in the control group, there were equal numbers of women and men. All three groups have a homogeneity value of 0.631 (p>0.05) which means that both groups have the same value or there is no sex difference between the groups.

The average body weight in the intervention and control groups averaged 20% and 21.7% of overweight, respectively. Both groups have a homogeneity value of 0.443 (p>0.05), which means that all three groups have similar values. There is no difference in body weight or BMI between groups.

The average smoking history in the control group was 18,3%, while the average in the intervention group with non-smoking respondents was 23.3 %. Both groups have homogeneity values of 0.048 (p>005), which means that both groups have different or inhomogeneous blood pressure values.

On average both groups had no history of nausea, vomiting was 26.7% in the intervention group and 23.3% in the control group. Both groups had a homogeneity value of 0.4766 (p>0.05), meaning that all three groups had the same value or no difference in travel nausea and vomiting history between groups.

3.1.2. Bivariate Analysis

Bivariate analysis aims to see the relationship between independent and dependent variables.

Table 2. Differences in the Incidence of Pre and Post Vomiting Nausea

Group	Category	Mean Ranks	Sum Ranks	Z	Signifikansi
SPO Hospital	pretest	7,70	77,00	-1,698	p=0,090
	posttest	7,00	28,00		
Progressive Muscle Relaxation	Pretest	7,21	86,50	-2,961	p=0,003
	Posttest	4,50	4,50		

Source: Primary Data, 2023

After being analyzed, the results in Table 2 showed a decrease in pre and post-v vomiting nausea scores of as many as 12 respondents; 1 respondent experienced an increase in vomiting nausea scores, while seven respondents had no difference between pre and post-vitance. The results of the Wilcoxon Test obtained a significance value p value = 0.003 (p<0,05), which means that there is a difference in the score of nausea and vomiting in the combination group given progressive muscle relaxation therapy before and after progressive muscle relaxation therapy. While the group given the hospital SPO showed a decrease in pre and post-v vomiting nausea scores, as many as 10 respondents, 4 experienced an increase in vomiting nausea scores, and 6 respondents had no difference between pre and post-vitance. The results of the Wilcoxon Test obtained a p-value = 0.090 (p>0.05), which means there is a difference in the score of nausea and vomiting but not significant in the control group or the group given hospital SPO.

Table 3. The Effectiveness of Progressive Muscle Relaxation Against Postoperative Nausea and Vomiting

Category	Frequency	Mean Ranks	Sum Ranks	Chi-Square	Sig
Hospital SPO	20	40,55	77,00	14,255	p=0,001
Relaxation Intervention	20	30,20	28,00		

Source: Primary Data, 2023

Table 3 clearly explains that the results of the difference in the incidence of nausea and vomiting in the three groups tested by Mann Whitney obtained a p-value of 0.001 (p < 0.05). It can be interpreted that there is an effect of progressive muscle relaxation on postoperative vomiting nausea compared to the hospital SPO group.

3.2.Discussion

3.2.1. Differences in Incidence of Pre and Post-Vomiting Nausea in the Hospital SPO Group

The paired control obtained a p-value = 0.090, meaning there was a difference in nausea-vomiting scores but not significant in the group given the action of the hospital SPO.

Vomiting stimulation in postoperative patients can be caused by various factors, including risk factors from patients (Wahyuda et al., 2023). Each factor will increase the risk of postoperative nausea and vomiting by 18-22%. Increased postoperative vomiting nausea response in most patients experiencing a slow nausea vomiting response or other factors such as high injection area or spinal block and surgical risk factors. Risk factors include age, sex, motion sickness or previous vomiting, history of migraines, diet, and postoperative anxiety.

3.2.2. Differences in the Incidence of Pre and Post-Nausea Vomiting in the Progressive Muscle Relaxation Intervention Group

It obtained a significant value of p = 0.003, which explains a difference in the score of nausea and vomiting in the group given progressive muscle relaxation therapy pre and post-surgery. The incidence of nausea vomiting in respondents is individual and influenced by other factors that trigger the occurrence of nausea vomiting after anesthesia. Progressive muscle relaxation therapy can reduce muscle tension, anxiety, depression, high blood pressure, mild phobias, and stuttering. The parasympathetic nervous system controls the activities during rehabilitation, such as decreased heart rate after a phase of tension and increased blood flow to the gastrointestinal system (Oktaviani et al., 2014; Rahmawati, 2017).

The decrease in the nausea and vomiting response in the intervention group is due to progressive muscle relaxation therapy. Respondents will feel tense, and there is a nausea-vomiting response, but after being given progressive muscle relaxation therapy, respondents will feel relaxed and inhibit the nausea-vomiting response. Another research found that cancer patients undergoing chemotherapy who were given PMR (progressive muscle relaxation) exercises showed increased average functional status. PMR can reduce nausea and vomiting (Putri et al., 2020).

3.2.3. Differences in the Incidence of Nausea and Vomiting in Each Group

The three groups were tested with Mann-Whitney and obtained a value of p=0.001. It can be interpreted that there is a significant difference in the scores of nausea and vomiting from the three groups. To find out the best treatment for reducing nausea and vomiting, researchers continued statistics using post hoc tests. A combination of progressive muscle relaxation and peppermint aromatherapy treatment was more effective in reducing postoperative vomiting than only progressive muscle relaxation interventions.

In this study, progressive muscle relaxation therapy and peppermint aromatherapy were given 15 minutes to laparotomic postoperative patients with general anesthesia from the combination group or the group given progressive muscle relaxation treatment and peppermint aromatherapy. Progressive muscle relaxation can improve relaxation by decreasing sympathetic nerve activity and increasing parasympathetic nerve activity, resulting in vasodilation of arteriole diameter (Anaabawati et al., 2021). The parasympathetic nervous system controls the activities during rehabilitation, such as decreased heart rate after a phase of tension and increased blood flow to the gastrointestinal system. Inhaling peppermint aromatherapy affects the nerves in the brain so that the effect can be felt directly by the patient after inhaling it. Pharmacologically, fragrances from essential oils (EO) can involuntarily transmit effects on the central nervous and endocrine systems. Through inhalation, volatile molecules of essential oils that pass through olfactory receptors in the nose recognize these molecular characteristics and send signals to the brain through nerves. Some of the constituents of these molecules enter the bloodstream through the lungs and directly affect the nerves in the brain after passing through the blood barrier in the brain (Alfarisi et al., 2020; Lisnawati et al., 2021; Rihiantoro et al., 2018; Sunaeni, 2022). This makes the combination therapy

of progressive muscle relaxation and peppermint aromatherapy more effective in reducing laparotomy postoperative vomiting nausea.

4. Conclusion

From this study, it can be concluded that the treatment group with hospital SPO had differences in nausea and vomiting scores before or after treatment but not significant, as seen from the result of the p = 0.090. Progressive muscle relaxation therapy for 15 minutes can reduce the score of nausea and vomiting but not significantly in the intervention group, with a value of p = 0.003. There was a significant difference in the nausea and vomiting scores of the two groups. The provision of progressive muscle relaxation was more effective in reducing nausea and vomiting after laparotomic surgery than the group not given progressive muscle relaxation, as indicated by a score of p = 0.000. From this study, hospitals need to implement complementary therapies such as progressive relaxation therapy as one of the nursing care measures based on standard operating procedures (SOP) in surgical wards to reduce postoperative nausea and vomiting.

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