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Effectiveness of Chewing Gum Therapy as Prevention of Post-Operative Ileus (POI) in Post-Laparotomy

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Abstract

Background: Post-operative ileus or POI is one of the most common problems found and disruptive after laparotomy or laparoscopy, both electively and emergency. Potential complications that can arise from POI with a prolonged period include increased post-operative pain, increased nausea and vomiting, complications in the lungs, worsening of the surgical wound healing process, inadequate oral intake, delayed post-operative mobilization, a long hospitalization period, and increased healthcare costs. Therefore, a non-pharmacological approach is needed to minimize the incidence of POI, including chewing gum therapy. **Purpose:** To determine the effectiveness of chewing gum therapy in preventing Post-Operative Ileus (POI) in post-laparotomy patients. **Method:** A case study involving two patients: intervention patients and comparison patients. Chewing gum therapy is given as much as two pieces with a chewing time of 10-15 minutes in a total of 3 times/day, and observations are carried out every 6 hours. **Results:** The average pain scale was lower in intervention patients, nausea occurred in comparison patients, the average bowel sounds were higher in intervention patients, and the time to the first fart after surgery was shorter in intervention patients compared to comparison patients. **Conclusion:** Chewing gum therapy can reduce symptoms of POI complications and accelerate the reactivation of gastrointestinal motility after surgery.

Keywords: Non-pharmacological intervention, Chewing gum therapy, Post-Operative Ileus, Post-laparotomy surgery

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1. BACKGROUND

Surgery is an action performed on a person for treatment through an invasive approach. One of the parts of surgery is laparotomy. Laparotomy is a surgical model procedure that is performed by making an incision in the abdominal area as an intervention to remove body parts that are suspected of having problems such as bleeding, cancer, perforation, and blockage (Cristiyaningsih & Purwanti, 2023). Post-operative ileus or POI is one of the most common problems found and is disturbing after laparotomy or laparoscopy, either

electively or in an emergency. Post-operative ileus is an abnormal pattern of slow or absent gastrointestinal motility in response to surgical procedures (Buchanan & Tuma, 2023). Potential complications that can arise from POI over a long period include increased post-operative pain, increased nausea and vomiting, complications in the lungs, worsening of the surgical wound healing process, inadequate oral intake, delayed post-operative mobilization, long hospitalization periods, and increased health care costs (Bhatti et al., 2021).

The population of patients undergoing surgery has increased yearly, one of which is laparotomy surgery. Data from the World Health Organization (WHO) states that the number of patients undergoing laparotomy surgery has increased by 10% yearly. In 2018, 90 million patients underwent laparotomy surgery in hospitals around the world. In 2019, there was an increase in cases of post-laparotomy surgery, namely 98 million (Marsaid et al., 2024). The number of laparotomy surgeries in the United States has increased by 50% in the last ten years (Oktalio et al., 2024). Based on tabulation data from the Indonesian Ministry of Health, it is known that surgical procedures in 2020 in Indonesia reached 1.2 million people. Meanwhile, in 2021, surgical procedures were ranked 11th out of 50 of Indonesia's total treatment of diseases (32% of elective surgical procedures). The percentage of laparotomy procedures in Indonesia ranks 5th with a value of 42% (Mufidah et al., 2022). The incidence of POI in Indonesia was recorded at 7059 cases of paralytic ileus obstruction and obstructive without hernia health problems that were hospitalized, while 7024 patients occurred in outpatient care in 2004 (Djamaludin & Chrisanto, 2021).

Patients undergoing abdominal surgical procedures may experience some temporary disturbances in gastrointestinal motility. Several things, such as neurogenic, inflammatory, and pharmacological effects, can cause prolonged POI. This will have an adverse impact if not managed. POI is also one of the problems highlighted in nursing. The nursing problem raised is gastrointestinal motility dysfunction. A non-pharmacological approach can be applied by using a gum-chewing mechanism.

In recent years, chewing gum has emerged as a new and straightforward modality to reduce the incidence of POI after laparotomy. Chewing gum has been reported to increase intestinal motility by activating the cephalic-vagal pathway,

stimulating intestinal myoelectric activity and bowel movements. This vagal stimulation is also thought to have anti-inflammatory effects (Muhumuza et al., 2023). This therapy is still not widely applied by several healthcare providers. Therefore, research is needed on providing chewing gum therapy in post-laparotomy patients to prevent POI. Thus, the results of this study are expected to accelerate the process of gastrointestinal motility recovery so that POI is not found in post-laparotomy patients.

2. METHODS

The study was conducted in the Mawar Room of RSD dr. Soebandi Jember during the period of 13-17 January 2025. The research method applied in this study is descriptive research using a case study research design approach. The researcher used a two-category patient approach: intervention patients and comparison patients. The selection of patients was adjusted to the inclusion and exclusion criteria the researcher had set. The inclusion criteria in this study were patients who underwent laparotomy surgery and were willing to follow and comply with the research procedures from start to finish. The exclusion criteria were unconscious patients, confirmed allergic to components in chewing gum, mental health problems, and oral problems (chewing limitations). Intervention patients were given chewing gum therapy of 2 pieces each chewing period, with a total treatment carried out three times a day for 10-15 minutes. At the same time, comparison patients were not given chewing gum therapy. Each patient was evaluated periodically every 6 hours (except when the patient was resting/midnight) until the patient passed gas for the first time after laparotomy surgery. The indicators assessed in this study were pain; nausea; vomiting; abdominal distension; need for Naso Gastric Tube (NGT); frequency of intestinal noise/peristalsis; and duration of first fart after laparotomy. The results of the periodic evaluation were recorded in the research observation sheet. Then, a univariate analysis was carried out as an average of each observation result. In relation to the number of samples involved in this study, the researcher acknowledges that there are limitations in knowledge, so further research is needed with an appropriate number of samples.

3. RESULTS

At the beginning of the study, both patients were observed according to the

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indicators determined by the researcher as initial data. Mr. H, as the intervention patient, was given chewing gum therapy of 2 pieces with a chewing time of 10-15 minutes in a total of 3 times/day and was observed every 6 hours (except when the patient was resting/midnight), while Mrs. A was only observed every 6 hours (except when the patient was resting/midnight). Mr. H received a total of 3 gum chewing therapy times, namely (evening 19.00 [1/16], morning 05.30 [1/17], and afternoon 13.00 [1/17]). Mr. H passed gas for the first time after the laparotomy operation at 13.48 [1/17], so the gum-chewing therapy was stopped. The total time Mr. H passed gas was 8 hours 48 minutes.

Meanwhile, Mrs. A was not given any intervention because she was a comparison patient. Mr. A passed gas for the first time after laparotomy surgery at 11:00 [1/15], with initial observation conducted at 20:00 [1/13]. Mrs. A passed gas at 39 hours or 1 day and 1 night at 15 hours. Other indicators are also listed in the following table:

Table 1. The research results are based on the indicators carried out by comparing intervention and comparison patients.

Indicators	Intervention patient	Comparison patient
First fart time	8 hours 48 minutes	39 hours
Use of NGT	No NGT installed	No NGT installed
Nauseous	No nausea	Feeling nauseous
Vomit	No vomiting	No vomiting

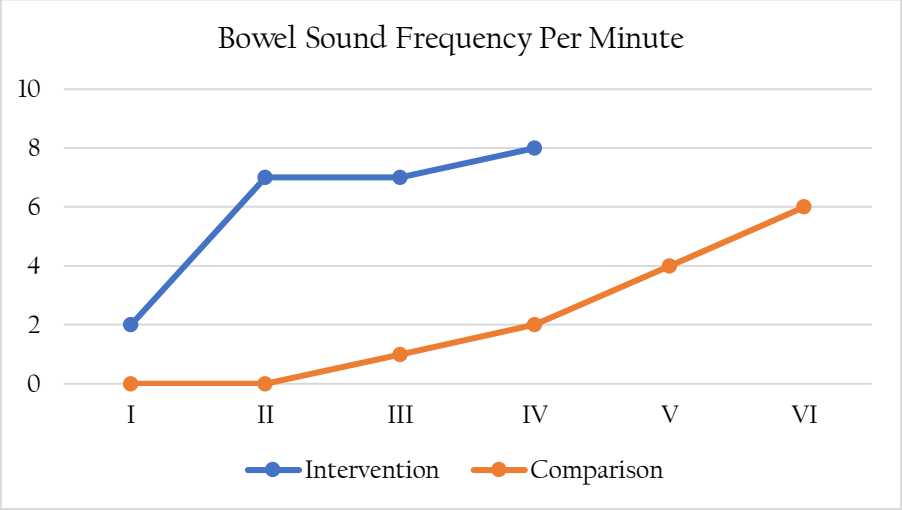

Figure 1. Observation graph of bowel sound frequency per minute between intervention and comparison patients.

Table 2. Comparison of the average results of bowel sound frequency per minute between intervention and comparison patients.

Bowel Sound Frequency Per Minute	Mean (average)
Intervention patient	6
Comparison patient	1,857143

Based on the graph and table above, it is known that the average bowel sounds in Mr. H as an intervention patient are higher than the average bowel sounds in Mrs. A as a comparison patient.

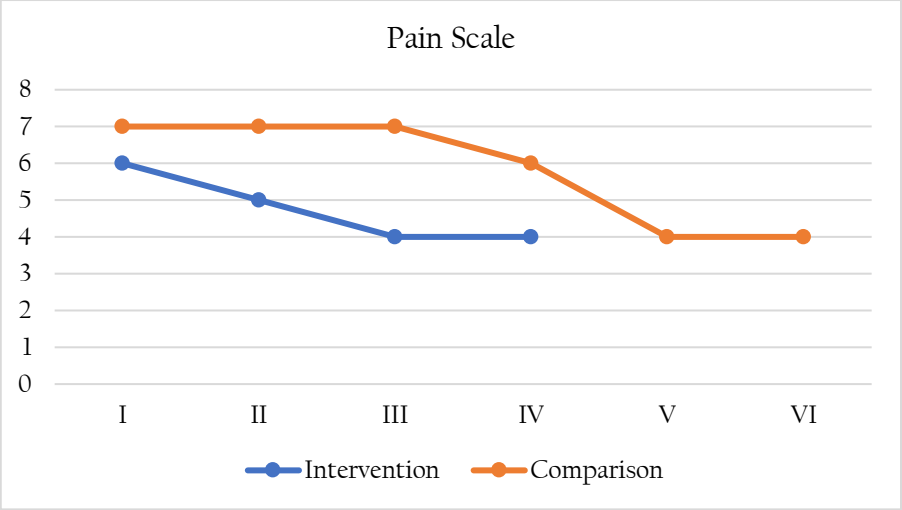

Figure 2. Observation graph of pain scale between intervention and comparison patients

Table 3. Comparison of mean pain scale results between intervention and comparison patients.

Pain Scale	Mean (average)
Intervention patient	4,75
Comparison patient	5,833333

Based on the graph and table above, it is known that the average pain scale in Mr. H as an intervention patient is lower than that of Mrs. A as a comparison patient.

4. DISCUSSION

Based on the table in the previous sub-chapter, it is known that the average bowel noise per minute was higher in Mr. H (6 times/minute) as a gum-chewing intervention patient when compared to Mrs. A (1.8 times/minute) as a comparison patient. This is in line with a study conducted by Ramasari et al., tahun 2024, which stated that the frequency of intestinal peristaltic movement after chewing gum in postpartum mothers with cesarean section in the Postpartum Room of Dr. Abdul Rivai Hospital, Berau Regency

showed an increase of 1.63 times per minute. Meanwhile, the period for the first fart after laparotomy surgery was shorter in Mr. H (8 hours 48 minutes) as a gum-chewing intervention patient when compared to Mrs. A (139 hours) as a comparison patient. This is in line with research by Sitindaon & Nirnasari in 2021, which stated that the average value or meantime for the first flatus after laparotomy cesarean section in the gum chewing intervention group (140.67 minutes or 2 hours 34 minutes) was shorter when compared to the control group (257.33 minutes or 4 hours 29 minutes).

Post-operative laparotomy patients with general anesthesia during recovery will experience decreased intestinal peristalsis. In this condition, patients are advised not to eat or drink for some time until intestinal activity returns, which is usually indicated by the release of angina or farts. Early intestinal peristalsis recovery efforts are significant because they will speed up the patient to end the post-operative fast and begin to meet the nutritional needs lost during the surgical process. Patients will feel more comfortable because they will not be tortured by the length of the fasting time. However, some post-operative patients stated that these complaints are often found because they cause nausea, pain, and abdominal distension (Rahmadina et al., 2023). Therefore, interventions that can accelerate the process of restoring intestinal motility are indeed needed. One effort can be made by providing chewing gum therapy to stimulate sham feeding (pretend eating).

Sham Feeding can stimulate vagal and the release of several gastrointestinal hormones so that there is an increase in saliva secretion, pancreatic juice, gastrin, and neurotensin, which can affect the motility activity of the intestine, duodenum, and rectum (Rahmadina et al., 2023). This will trigger hunger, desire to eat, intestinal motility, and accelerate the recovery of ileus in a person. This process starts from "chewing" (mastication), one of which is stimulated by chewing gum, involving not only teeth but also periodontal tissue consisting of two soft tissues, namely gums and periodontal ligaments, and two calcareous tissues, namely tooth cementum and alveolar bone. The movement of the jaw requires the activity of the chewing muscles and the temporomandibular joint. When this occurs, impulses will be sent simultaneously by the brain, precisely in the medulla oblongata, through nerve X of the human cranial nerve system, namely the vagus/vagal nerve, to the lower digestive tract. These impulses stimulate

myoelectric activity, causing the stomach and intestines to produce several glands and hormones. Myoelectric activity results from Pepsinogen, HCl, intrinsic factor, neurotensin, pancreatic polypeptide, duodenal alkali, and gastrin. Gastrin is a hormone produced by G cells in the pylorus of the stomach. One of the functions of gastrin is to stimulate motility in the stomach and intestines (Prince & Wilson, 2006).

Therefore, providing chewing gum therapy can accelerate the recovery of gastrointestinal motility in post-laparotomy patients through the mechanism of chewing, myoelectric activation, and production of digestive hormones, thereby accelerating the recovery of peristalsis and the release of the first flatus after the operation period.

The average pain scale from the results of this study was found to be lower in Mr. H (4.75) as a gum-chewing intervention patient when compared to Mrs. A (5.83) as a comparison patient; nausea occurred in Mrs. A as a comparison patient. Still, it did not happen in Mr. H as a gum-chewing intervention patient, and neither patient appeared to have abdominal distension and did not use an NGT tube.

Pain is one of the symptoms that appear when intestinal motility is not active after laparotomy surgery. Prolonged pain also describes complications of POI (Basri & Sulistiyawati, 2018). However, the pain scale is not appropriate if used as a benchmark because pain is subjective, and each person's threshold or perception of pain will differ. Similar to pain, increased nausea and vomiting are potential complications of prolonged POI (Marwah et al., 2012). Postoperative nausea and vomiting occur due to brain pathways being stimulated by inhalation anesthesia and opioids, namely the vestibular nucleus, area postrema, and vagal afferent fibers from the gastrointestinal tract; this is thought to lead to the solitary tract nucleus, which has a pathway to the local brainstem, resulting in the emergence of a gag reflex. In addition, this pathway also goes to the midbrain and forebrain, which can cause the perception of nausea (Suryaman et al., 2024). Chewing activity, one of which can use stimulus from chewing gum, can stabilize the function of the autonomic nerves throughout the body so that there is an increase in relaxation of the autonomic nerves and an impact on reducing mental and physical tension (Suryaman et al., 2024). Another indication is the use of NGT. NGT cannot accelerate the recovery of intestinal motility function after surgery. However, reducing stress, pain killers, fluid therapy, additional

interventions (such as antibiotics, thrombotic prophylaxis, oxygen therapy), principles of care (drainage, tubes, catheters, bowel cleansing), oral nutrition, and exercise are facilities for postoperative recovery interventions. Chewing gum therapy can also minimize the occurrence of other complications related to POI, such as pain, nausea, vomiting, and abdominal distension.

This study has several limitations, namely, the selection of patient conditions inappropriate for gum chewing therapy. The condition of the patients involved in this study did not experience disorders of post-operative gastrointestinal motility. Both study patients did not plan to fast long but were immediately given a diet according to their needs. It would be better if the patients involved in the gum-chewing therapy study had conditions related to inadequate gastrointestinal motility, such as paralytic ileus. The following limitation is that the type of case between the intervention patient and the comparison patient in this study did not have the exact correlation (intervention patients with a medical diagnosis of liver abscess while the comparison patient with a medical diagnosis of Ca rectum 1/3 distal) due to limited time for data collection and case findings in the room. The selection of patient cases involved in the study is better equated, both in terms of medical diagnosis (if possible) and the organs or organ systems that are the target areas of surgery. These limitations are expected to be correction points for subsequent researchers conducting research with the same therapeutic approach. Moreover, in relation to the number of samples involved in this study, for further research is needed with an appropriate number of samples.

5. CONCLUSION

Gastrointestinal motility was assessed to help Mr. H recover faster as an intervention patient or a patient with chewing gum therapy. Other typical complications that could lead to POI were found in Mrs. A as a comparison patient or a patient who did not receive chewing gum therapy. Future research using larger randomized control trials is needed to determine the significance of the findings related to the administration of chewing gum therapy on the recovery of gastrointestinal performance in post-operative patients before recommending it as standard practice in health care settings.

AUTHOR CONTRIBUTIONS

The author contributes all research activities. Conceptualization, analysis, writing and manuscript revisions.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in this research.

DATA AVAILABILITY STATEMENT

The data are available from the corresponding author upon reasonable request.

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