

## Positive effect of chewing gum on the recovery of intestinal peristalsis in post-laparotomy patients : pre-experimental study

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### ABSTRACT

**Background:** Laparotomy is an invasive treatment that involves surgery on the lining of the abdominal wall. The effect of laparotomy using general anesthesia is gastrointestinal motility and vomiting, and if it lasts more than 24 hours, and causes postoperative ileus (IPO). Chewing gum is a form of artificial feeding to stimulate the intestinal recovery process after surgery. A preliminary study at Waras Wiris Regional Hospital in Boyolali revealed that there were cases of post-appendectomy patients who experienced decreased or no increase in intestinal peristalsis. Various efforts are needed to accelerate the return of intestinal peristalsis in post laparotomy patients to accelerate flatus time, including developing independent nursing interventions for chewing gum.

**Objectives:** This research examined how chewing gum affected intestinal peristalsis in Waras Wiris Hospital post-laparotomy patients.

**Methods:** This quantitative pre-experimental research used a one-group pre- and post-test design. This research sampled 90 postoperative laparotomy patients using purposive sampling. Instruments included a stethoscope, Xylitol gum and observation sheets. All respondents were monitored regularly until they were discharged from the hospital, and the time until the first bowel sound was heard normal bowel sounds, the time until the first gas was passed, the time until the first feeling of hunger, and the time until the first defecation were documented. Surgical data, tolerance of chewing gum after surgery, and postoperative complications was recorded. Data analysis has used the paired t-test.

**Results:** The average value (mean) of digestive peristalsis increased from 0.001 to 16.27 following the intervention. Chewing gum affects intestinal peristalsis in post-laparotomy patients, according to the paired t-test, which had p value of 0.001. Meaning there is an effect of chewing gum on restoration of intestinal peristalsis.

**Conclusions:** Chewing gum may boost intestinal peristalsis after laparotomy.

**KEYWORD:** chewing gum ; intestinal peristalsis ; laparotomy

Article info : Received 18 June, 2025; 1<sup>st</sup> revision 12 November ,2025; 2<sup>nd</sup> revision 03 February, 2026; accepted March 11, 2026; available online March 14 , 2026; published March 31, 2026

## INTRODUCTION

Laparotomy is an invasive treatment by performing surgery on the lining of the abdominal wall (1). Laparotomy treats bleeding, perforation, cancer, and blockage in appendicitis, inguinal hernia, gastric, colon, rectal, intestinal obstruction, chronic intestinal inflammation, cholecystitis, and peritonitis (2). Laparotomy patients are increasing by 15% each year. Surgery in Indonesia in 2020 reached 1.2 million people, and it is estimated that 32% of them were laparotomy surgeries (3,4).

Laparotomy postoperative patients with general anesthesia will experience physiological system disorders in the central nervous, circulatory, and respiratory systems (5). The side effects of using general anesthesia are gastrointestinal motility and vomiting, and if it lasts more than 24 hours and causes postoperative ileus (IPO), and if not addressed, it can cause pain, nausea, abdominal distension, dietary intolerance, and prolongation of hospital days, thus increasing hospital costs (6,7). The problem often experienced by post-laparotomy patients is abdominal distension due to gas accumulation due to decreased intestinal peristalsis. The length of time patients stay in the hospital will cause a high risk of infection and a high cost of care (8). Due to poor pain management, 75% of post-surgical patients have significant pain (9). Previous research states that the prevalence of major postoperative patients must immediately

restart food intake after undergoing a fairly intensive or major surgical procedure to maintain adequate nutrition. Excessive fasting can cause protein and energy malnutrition, inhibit the surgical wound healing process, impair immune function, prolong hospitalization, and increase health care costs (10).

Restoration of digestive system function can be recognized by the appearance of peristaltic movements in the intestine. When intestinal peristalsis is not yet active and the patient has eaten and drunk, there is the potential that the intestines are not yet operating the way they should, increasing the risk of obstruction as food passes through the intestines. If peristalsis does not return to normal within 2-3 hours after surgery, it can result in ongoing intestinal paralysis, serious complications, and the emergence of paralytic ileus (11). Restoring intestinal peristalsis requires nursing self-interventions and other measures. One nurse self-intervention to speed intestinal peristalsis is chewing gum for 15 minutes, which is given three times, namely at 4, 6, and 8 hours after undergoing laparotomy surgery (12,11).

Chewing gum is a treatment that is believed to provide results in stimulate the small intestine to return to normal work after surgery (13). Chewing gum is a process similar to eating, where there is a mass in the mouth, and there is a chewing process that causes the occurrence of the vagal

cholinergic mechanism. Vagal cholinergic (parasympathetic) mechanisms stimulate the gastrointestinal tract, which is the same as the process of eating orally, but in theory, this process is less likely to cause vomiting responses in patients and prevent aspiration (14,15).

Chewing gum improved digestive issues in primiparous women following cesarean procedure (16). Post-cesarean section patients who chewed gum had better intestinal peristalsis (17). Chewing gum promotes intestinal peristalsis in post-abdominal surgery patients (18). Chewing gum helps post-abdominal surgery patients regain intestinal peristalsis. Thus, chewing gum treatment may help post-abdominal patients restore intestinal peristalsis and improve intestinal peristalsis (19).

The results of a preliminary study conducted by researchers at Waras Wiris Boyolali Hospital in May 2024 on 12 post-laparotomy patients found that in 9 respondents (75%), after laparotomy surgery, intestinal peristalsis appeared at 12-15 hours, and in 3 other respondents (25%), intestinal peristalsis appeared at 12-15 hours. The nurse's actions at Waras Wiris Boyolali Hospital that are often carried out so that intestinal peristalsis appears are by observing and encouraging patients to do simple early mobilization, such as moving their legs and hands according to the patient's ability. However, these actions are still not able to accelerate the appearance of intestinal peristalsis in less

than 12 hours. This study is a quantitative analytical study with a pre-experimental design and aimed to analyze the effect of chewing gum on increasing intestinal peristalsis after laparotomy surgery. The outcome to be measured in this study was intestinal peristalsis per minute. Based on this background, the researcher is interested in researching the effect of chewing gum on intestinal peristalsis of post laparotomy patients at Waras Wiris Boyolali Hospital.

## **MATERIALS AND METHODS**

Pre-experimental research involves treating or intervening on research subjects to determine whether chewing gum improves intestinal peristalsis in laparotomy patients at Waras Wiris Boyolali Hospital. This study used the One-Group Pretest-Posttest Design. This research included all laparotomy patients from April to June 2024 who were purposively sampled with 90 respondents. A pre-experiment was chosen because the researchers wanted to observe changes in the same subjects before and after the intervention (chewing gum), rather than comparing them with another group (focusing on individual changes). This study only used one intervention group without a control group. This was because the sample size of 90 was focused on providing the same intervention. In addition, determining the size and characteristics of the control sample required a homogeneity test, which was impossible to perform on patients who

had undergone laparotomy. Patients after laparotomy with perforated appendicitis, cholelithiasis, peritonitis, and peptic ulcers, general anesthesia, and age 20–50 were included. The exclusion criteria were patients with a history of domperidone administration, patients with complications such as bleeding, respiratory arrest, cardiac arrest, and patients with Naso Gastric Tube (NGT) and dentures.

The research process begins after obtaining research permission and ethical approval. Before the study, researchers screened respondents according to the criteria, explained the procedure, and asked respondents to sign an informed consent. The intervention given was chewing gum with the amount of chewed sugar-free gum as much as 2 pieces for 15 minutes one times daily from 4 hours post-laparotomy. The measuring instruments used in this study were a Litmann Classic III brand stethoscope and a sheet to record intestinal peristalsis. Intestinal sounds after laparotomy are checked by placing a stethoscope on the four quadrants of the abdomen (upper right, upper left, lower right, and lower left) in sequence. The main focus of this examination is on the lower right quadrant or abdomen to detect signs of normal peristalsis. Observations were conducted for 5 minutes to ensure accurate bowel sound frequency. To minimise the influence of other variables, the postoperative feeding regimen was standardised for all respondents. Intestinal

sound measurement was performed by research assistants by measuring the level of consistency, agreement, or similarity of perception between two assessors. The interrater reliability test yielded a Kappa value of 0.61, which means that the perceptions were the same or significant.

Biological measuring instruments do not need to be tested for validity and reliability; they only need to be calibrated to prove that they function correctly and measure accurately. The validity and reliability of biological measuring instruments, such as intestinal peristalsis, namely the stethoscope, have been tested or calibrated at Waras Wiris Boyolali Hospital. Researchers also used an intervention side effect sheet, such as nausea and vomiting, for patients who were not used to it, and also for patients who had a history of Diabetes Mellitus (DM) with intolerance to sudden increases in blood glucose due to chewing gum. The chewing gum used in this study is the Happydent Xpert Peppermint brand, which is free of glucose and alcohol. Data that has been collected is then subjected to univariate analysis and bivariate analysis. The analytical test used in this study is the Paired T-Test because the data distribution is normally distributed.

This study has obtained research ethical permission with ethical clearance number: 1.537/VI/HREC/2024 on the research proposal at KEPK Dr. Moewardi Hospital Surakarta.

## RESULTS AND DISCUSSION

This study was conducted from April to June 2024. The research criteria used purposive sampling techniques, taking into account inclusion and exclusion criteria. This determination used a screening sheet to decide whether respondents were eligible to participate in this study. The characteristics of post-laparotomy patients at Waras Wiris Boyolali Hospital in this pre-experiemntal study consisted of age,

gender, type of indication for action which can be seen in **Table 1**.

According to **Table 1**, 33 respondents were 51-60 years old. The traits of highest number of male responses 48. Characteristics of work, mostly as many as 39 respondents with entrepreneurial jobs. Characteristics of the indications for laparotomy, the highest number of respondents was appendicitis as many as 51 respondents.

**Table 1. Frequency distribution of respondents**

Respondent Characteristic		Frequency (f)	Percentage (%)
Age	20-30 year old	18	20
	31-40 year old	12	13.3
	41-50 year old	27	30
	51-60 year old	33	36.6
Gender	Female	42	46.6
	Male	48	53.3
Profession	Farmer	30	33.3
	Student	21	23.3
	Enterpreneur	39	43.3
Laparotomy Indications	Appendicitis	51	56.6
	Bowel cancer	3	3.3
	Peritonitis	18	20
	Ulkus Peptikum	3	3.3
	Kolitis Ulseratif	15	16.6
Total		90	100

**Table 2. Average intestinal peristalsis before and after intervention of chewing gum**

Variable	N	Mean ± SD	Min	Max	Median	Mean Difference	P Value
Pre-test	90	5.45 ± 1.81	0	8	6	10.82	0.001*
Post-test	90	16.27± 5.43	10	21	17		

**Table 2** shows that before the intervention, the treatment group's mean intestinal peristalsis was 5.45 x/minute with a minimum of 0, a maximum of 8, and a

median of 6.00. After the intervention, it was 16.27 x/minute with a minimum of 10, a maximum of 21, and a median of 17.00. Data analysis utilizing paired t test ( $\alpha$  0.05)

in the treatment group revealed a significant difference between pre-test and post-test findings ( $p = 0.001$ ).

One of the anesthetics given to patients with laparotomy surgery is general anesthesia. The occurrence of a decrease in the gastrointestinal system in post-laparotomy patients is due to anesthesia affecting the peripheral nervous system, which is then passed on to the unconscious (autonomic) nerves, where autonomic nerve activity is influenced by the hypothalamus. Postoperative measures to aid recovery include early mobilization. However, this intervention can cause difficulty in passing urine and faeces, gastric distension, respiratory distress, and cardiovascular disorders (20,21). The anesthetic agents used during surgery cause peristalsis to stop temporarily; this condition is referred to as paralytic ileus, which generally occurs between 24 and 48 hours. Bowel movements may be inhibited for several days due to trauma and bowel irritation from abdominal surgery, such as cesarean section. Small intestinal peristalsis returns to normal after 24 - 48 hours, and colonic movements after 48 hours (22).

Postoperative patients are often faced with the problem of an acute inflammatory process and pain that results in limited movement. As a result of postoperative pain, the patient becomes immobilized, which is a contraindication that affects the patient's condition. Stimulation of the lateral and posterior parts of the hypothalamus will

reduce the work of smooth muscles in the digestive tract, so that intestinal peristalsis becomes slow and causes flatulence and difficulty with flatus (23). Hypomotility often causes postoperative mild abdominal distension due to gas pressure. In the first 48 - 72 hours of the postoperative period, there is usually no bowel noise. The return of normal peristalsis is often expressed by patients with a feeling of mild abdominal cramping, audible gas movement, and the onset of hunger. The slowing of motility of the gastrointestinal system and changes in nutritional patterns can lead to the onset of symptoms such as nausea, vomiting, abdominal distension, and hiccups, which can cause serious distress to the postoperative patient. In addition, these conditions can prolong the duration of hospitalization and increase costs. In this regard, laparotomy postoperative patients must receive interventions to stimulate bowel motility early (22, 24).

Intestinal peristalsis is a movement resulting from muscle contractions in the digestive tract to push food towards the stomach (25). Intestinal peristalsis of post-abdominal surgery patients is said to return to normal if the patient can feel mild cramps in the abdomen, has flatus, and feels hungry (22). Efforts to improve gastrointestinal function after laparotomy surgery are still a hot topic for health researchers. Doctors generally prohibit early peroral feeding in post-cesarean section patients to avoid the risk of intestinal

fistula, rebleeding, and aspiration. This is a fallacy; on the contrary, many recent studies support that early peroral feeding can stimulate intestinal motility and shorten the length of stay. However, the problem is that most postoperative patients are unable to tolerate early feeding (26).

Early oral hydration, ambulation, and chewing gum are being developed to enhance gastrointestinal motility during postoperative recovery. Simulated eating with gum stimulates the cephalic-vagal response and hormone production to speed gastrointestinal function recovery. The patient's intestinal peristalsis must be restored quickly, including by autonomous nursing treatments (27). One of the nurse self-interventions that can be done to accelerate the return of intestinal peristalsis is by chewing gum. Systematic review and meta-analysis research conducted ten studies in the last ten years (2007 - 2017) showed that chewing gum activity affects the recovery time of gastrointestinal function (26). Chewing gum is an intervention that is believed to provide results in stimulate the small intestine to return to normal work after surgery. Chewing gum is a process similar to eating, where there is a mass in the mouth, and there is a chewing process that causes the occurrence of vagal cholinergic mechanisms (28). The vagal cholinergic (parasympathetic) mechanism stimulates the gastrointestinal tract, which is the same as the process of eating orally, but in theory, this process less often causes a vomiting

response in patients and prevents aspiration "(29). Chewing gum has a positive impact on accelerating the recovery of intestinal peristalsis in post-abdominal surgery patients. So that chewing gum therapy is expected to be applied as an intervention to improve the recovery of intestinal peristalsis in post-abdominal patients (30).

The average intestinal peristalsis frequency before the intervention was 5.44 x/min with a minimum value of 0, a maximum value of 8, and a median of 6, while after the intervention it was 16.27 x/min with a minimum value of 17, a maximum value of 21, and a median of 17. Before and after eating gum, intestinal peristalsis averages vary. Previous research showed that intestinal peristalsis appeared faster in the group that chewed gum at 1 hour 3, while in the control group, intestinal peristalsis appeared at 1 hour 5. From the results of the research, it can be concluded that there is an effect of chewing gum on the acceleration of intestinal peristalsis (11).

Age, fluid consumption, psychological variables, operation anesthetic, and physical activity might affect intestinal peristalsis recovery. Intestinal peristalsis may increase in 17-35-year-old postoperative patients. This is because in this age range, the body has a higher ability to adjust to restore intestinal peristalsis after surgery. Conversely, in patients aged 60 years or elderly age, the frequency of intestinal peristalsis reaches its lowest level,

so that there is a decrease in physiological function, especially after undergoing surgery (31). In this study, the nursing intervention of chewing gum proved to be effective in increasing intestinal peristalsis and accelerating the time to first flatus. This intervention works synergistically by stimulating the parasympathetic nerves towards the intestinal muscles, producing waves of intestinal motility (18). Increased parasympathetic nerve activity leads to the release of acetylcholine, which enhances the conduction of ascitatory waves along the intestinal wall, thereby improving intestinal motility and accelerating the occurrence of flatus (32).

The more quickly intestinal peristalsis recovers after undergoing surgery, the more beneficial it will be for the patient's recovery process. The recovery of intestinal peristalsis indicates that the patient can begin oral intake. Eating more quickly means that nutritional needs can be met immediately, which supports the healing of incision wounds and physical recovery after surgery. This can also reduce the length of hospital stay, making care more cost-effective, and lowering the risk of nosocomial infections that may be acquired in the hospital environment (33).

However, in the application of chewing gum therapy, the obstacle encountered is that the subject must be fully conscious, or in a cognitively intact condition, in order to be able to chew the gum safely (21). Chewing gum is easy to implement and can

increase comfort and accelerate the recovery of the patient's intestinal peristalsis. Hospitals are expected to consider this therapy in decision-making in service units by developing standard operating procedures (SOPs) to implement combination therapy with chewing gum in post-laparotomy patients. This suggests that early mobilization exercises help speed up intestinal peristalsis by contracting and relaxing muscles (31).

## **CONCLUSION AND RECOMMENDATION**

The management of intestinal peristalsis recovery carried out by nurses in the nursing unit involves monitoring and assessing intestinal peristalsis every 4 to 8 hours. Postoperative patients with normal intestinal peristalsis will be immediately given nutritional intake to replace cells lost during surgery. Chewing gum has been shown to improve intestinal peristalsis after laparotomy. Nurses need to provide chewing gum interventions after 4 hours postoperatively to stimulate intestinal peristalsis in patients post laparotomy.

A limitation of this study is that sugar-free chewing gum contains sugar alcohol (sorbitol), which can cause digestive problems such as bloating or diarrhoea if consumed in excess. However there is no reported about the possible effects of the ingredients of these gums. In this study was sugar free chewing gum safe and tolerated by all patients. In conducting this study, the obstacle encountered was that the duration

of the operation controlled by the researcher was relatively long, ranging from 40 to 90 minutes. In future studies, in addition to measuring intestinal peristalsis, consideration may also be given to measuring additional variables such as length of hospitalization, incidence of post-operative ileus, and the patient's comfort.

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