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Positive Effect of Chewing Gum and Early Mobilization on Intestinal Peristalsis



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Abstract

Decreased intestinal peristalsis due to anesthesia before laparotomy surgery can result in inhibition of nerve impulses to the intestinal muscles, paralytic ileus can occur and inhibition of the work of the intestine itself. The purpose of this study was to determine the effect of chewing gum and early mobilization on intestinal peristalsis after laparotomy surgery. The research design used a quasi-experimental. The sampling technique used purposive sampling with 32 respondents divided into 2 groups. The treatment group was given an intervention of chewing gum and early mobilization, while the control group was given an intervention according to standard operating hospital procedures, namely tilting right and left and given 2 spoons of drinking after the patient was fully conscious in the room. The independent variables were chewing gum and early mobilization. The dependent variable was intestinal peristaltic. This study used univariate analysis to determine the characteristics of respondents. The bivariate analysis used paired t test and independent t test. The paired t test in the pre-posttest in the control group was 0.000, while the pre-posttest in the treatment group was 0.000. Independent T test on the post-test of the treatment group with the post-test of the control group of 0.000. There was an effect of chewing gum and early mobilization intervention on intestinal peristalsis in post laparotomy patients. Chewing gum and early mobilization can stimulate hormones in the gastrointestinal system such as gastrin, secretin, gastric inhibitory polypeptide, cholecystokinin, motilin, and enteroglukagon which will increase intestinal peristalsis.

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INTRODUCTION

Intestinal peristalsis is the movement that results from muscle contractions in the digestive tract to push food towards the stomach (Ledari et al., 2016). Surgery is an action that uses invasive procedures (Arif, Fauziyah, et al., 2022). Patients who were given anesthesia prior to laparotomy surgery experienced the effects of anesthesia, namely the inhibition of parasympathetic nerve impulses to the intestinal muscles which caused a decrease in intestinal peristalsis (Sitepu et al., 2021). This decrease in peristalsis, if not treated immediately, risks causing complications that are dangerous for the patient, one of which is paralytic ileus (Mao et al., 2019).

It is recorded that in Indonesia about 35%-50% of post-operative laparotomy patients experience prolonged or delayed bowel sounds and flatus 24-72 hours after surgery and the incidence of post-operative ileus that cannot be resolved four days after laparotomy surgery is around 50% (Kementerian Kesehatan RI, 2020). According to the Dinas Kesehatan (2019), there were 10,503 cases of elective surgery performed during the 2017 period, while in 2018 laparotomy surgery in East Java increased by 11,689 patients. Based on data from dr. Soedomo Hospital Trenggalek recorded that there were laparotomy surgeries in January-October 2021 as many as 423 patients (Rekam Medis RSUD dr Soedomo, 2021).

Patients who will undergo laparotomy surgery will of course be given anesthesia before the laparotomy operation with the aim that when the surgery is performed the patient does not experience pain (Sitepu et al., 2021). General anesthesia can cause complications in postoperative patients such as cardiovascular or circulatory disorders, respiratory disorders, digestive system disorders, impaired liver function and kidney function (Arif, Roosyidah, et al., 2022). The effect of administration of anesthesia is the inhibition of parasympathetic nerve impulses to the intestinal muscles so that the patient's intestinal peristalsis decreases. In general, the patient's intestinal peristalsis returns to normal approximately 24 hours after surgery (Sitepu et al., 2021). Seeing this condition, the patient is advised not to eat and drink until the intestinal peristalsis returns to normal for fear of postoperative ileus that threatens the patient's life (Damayanti & Syara, 2018).

Signs and symptoms of postoperative ileus are abdominal distension, vomiting, abdominal pain, constipation, absent bowel sounds, dilated small

bowel loops with air-fluid boundary (Marhamah, 2021). Abdominal distension in postoperative laparotomy patients occurs 3 days after surgery due to the effects of anesthesia, narcotics and reduced patient activities (Larijani et al., 2016).

Chewing is the process of mechanically grinding food from large particles into small particles using teeth (Hamzah, 2019). Chewing gum can stimulate intestinal motility through the fegal cephalic reflex so that it can increase gastrointestinal hormones consisting of gastrin, secretin, gastric inhibitory polypeptide, cholecystokinin, pancreatic peptide, and enteroglucagon which play a role in the function of movement and regulation of digestive system secretions so that salivary and fluid secretion increases. Gastrin and neurotensin can increase gastrointestinal mortality (Ledari et al., 2016).

Research on the effectiveness of early mobilization on bowel motility in post-laparotomy patients found that there was a significant difference between the study group and the control group in terms of expulsion of the first flatus with the results of each p-value = 0.032 and p-value = 0.015 (Elhamed et al., 2020). In his research, it was stated that early mobilization can accelerate the return of intestinal peristalsis and reduce abdominal distension after laparotomy surgery by increasing abdominal wall tone and restoring gastrointestinal system function. Patients are advised to walk in an attempt to treat postoperative ileus as well as to reduce cramping and bloating (Elhamed et al., 2020).

Early mobilization is something that needs to be done in recovering the condition of someone who has just undergone abdominal surgery, especially in terms of patient independence (Rahayu & Yunarsih, 2019). Early mobilization is a series of light movements that are carried out after the patient undergoes surgery which starts in bed until he can get out of bed, walk to the bathroom and get out of the bathroom (Rizky et al., 2021). There are several kinds of early mobilization movements to return the range of motion of activities back to normal in postoperative patients, including flexion, extension, hyperextension, supination, pronation, abduction, adduction, and rotation (Rezky et al., 2019).

Based on the data and literature review above, researchers are interested in conducting research on the combination of chewing gum and early mobilization of intestinal peristalsis in post-laparotomy patients. The majority in hospitals only provide early mobilization interventions and it is still

not optimal so it is necessary to look for additional interventions to accelerate the process of increasing intestinal peristalsis. This combination is expected to increase the intervention to provide a better impact. Based on the literature review regarding the length of time chewing gum, researchers are interested in updating the length of time chewing gum so that the quality of chewing remains good and the patient does not feel sick, namely by chewing gum for 5 minutes every 2 hours 3 times after 3 hours postoperatively laparotomy surgery, but scientifically this has not been confirmed and analyzed clearly so it is necessary to prove related to the effect of the combination of these two interventions so that the researchers wish to research with the title "The Effect of Chewing Gum and Early Mobilization of Intestinal Peristalsis Post Laparotomy Surgery at Dr. Hospital. Soedomo Trenggalek"

METHOD

This research used Quasi Experimental research design with pretest-posttest control group design. The sampling technique used purposive sampling with 32 respondents divided into 2 groups. The determination of the respondents was based on inclusion criteria, namely: post-operative laparotomy patients, spinal anaesthesia, age 20-60 years. The independent variables of the study were chewing gum and early mobilization. The dependent variable was intestinal peristalsis. Test Analysis of the data in this research used univariate analysis to determine the characteristics of respondents. The bivariate analysis used paired t test and independent t test to determine the difference in the mean of the 2 unpaired groups.

RESULT

Table 1: Frequency distribution of respondents

	Responden Characteristics	Respondent Group				P Value
		Treatment		Control		
		F	%	F	%	
Age	20-30	3	18.8	2	12.5	0,061
	31-40	1	6.3	3	18.8	
	41-50	6	37.5	4	25.0	
	51-60	6	37.5	7	43.8	
	Amount (n)	16	100.0	16	100.0	
Gender	Male	8	50.0	7	43.8	0,065
	Female	8	50.0	9	56.3	
	Amount (n)	16	100.0	16	100.0	
Profession	Student	3	18.8	2	12.5	0,081
	IRT	2	12.5	4	25.0	
	Entrepreneur	7	43.8	4	25.0	
	PNS	4	25.0	6	37.5	
	Amount (n)	16	100.0	16	100.0	
Laparotomy Indications	Appendicitis	6	37.5	4	25.0	0,083
	Bowel cancer	3	18.8	4	25.0	
	Peritonitis	2	12.5	4	25.0	
	Kolitis Ulseratif	3	18.8	2	12.5	
	Ulkus Peptikum	2	12.5	2	12.5	
	Amount (n)	16	100.0	16	100.0	
BMI	17,0-18,4	1	6.3	2	12.5	0,912
	18,5-25,0	8	50.0	11	68.8	
	25,1-27,0	5	31.3	3	18.8	
	>27,0	2	12.5	0	0,0	
	Amount (n)	16	100.0	16	100.0	

Based on table 1 shows that the characteristics of respondents based on age, respondents with the highest frequency are those aged 51-60 years as many as 13 respondents (40.6%). Demographic data on the age of respondents from both groups showed a homogeneous data variance with p value = 0.061. Characteristics of

respondents by gender, respondents with the most female sex with a total of 17 respondents (53.1%). The demographic data of the sex of the respondents in the two groups showed a homogeneous data variance with a p value of 0.065. Characteristics of work, mostly as many as 11 respondents (34.4%) with self-employed jobs. The demographic data of the respondents' occupations in both groups showed a homogeneous data variance with a p value of 0.081. Characteristics of the indications for laparotomy, the highest number of respondents was appendicitis as many as 10 respondents (31.2%). Demographic data for laparotomy indications for both groups showed homogeneous data variance with p value = 0.083. Characteristics of BMI (Body Mass Index), the most respondents were respondents with a BMI value of 18.5-25.0 as many as 19 respondents (59.4%). BMI demographic data of both groups have homogeneous data variance with p value = 0.912.

Table 2: Average Intestinal Peristalsis Before and After Intervention in Control Group

Control Group	N	Mean	Min	Max	Median	p value paired t test
Pre-test	16	5.88	0	9	6.00	0,000
Post-test	16	10.38	6	13	10.50	

Table 2 shows that the results obtained in the control group before the intervention was given, the results of the pre-test mean intestinal peristalsis were 5.88 x/minute with a minimum value of 0, a maximum value of 9 and a median of 6.00 while the post-test results of intestinal peristalsis averaged 10.38 x/minute. with a minimum value of 6, a maximum value of 13, and a median of 10.50. After testing the data analysis using the paired t test (α 0.05) in the control group, the results of $p = 0.000$ were obtained, which means that there was a significant difference between the results of the pre-test and post-test in the control group.

Table 3: Average Intestinal Peristalsis Before and After Intervention in the Treatment Group

Treatment Group	N	Mean	Min	Max	Median	p value paired t test
Pre-test	16	5.44	0	8	6.00	0,000
Post-test	16	16.25	9	20	17.00	

Table 3 shows that in the treatment group before being given the intervention, the results of the pre-test mean intestinal peristalsis were 5.44 x/minute with a minimum value of 0, a maximum value of 8 and a median of 6.00 while the post-test results of the mean intestinal peristalsis were 16.25 x/minute with a minimum value. 9, the maximum value is 20, and the median is 17.00. After testing the data analysis using the paired t test (α 0.05) in the treatment group, the results of $p = 0.000$ were obtained, which means that there was a significant difference between the results of the pre-test and post-test in the treatment group.

Table 4: Differences in the Frequency of Intestinal Peristalsis in the Treatment Group and the Control Group

Variable 1	Variable 2	Mean	P value Independet T test
Intestinal peristalsis pre-test treatment group	Intestinal peristalsis pre-test control group	5.44-5.88	0.556
Intestinal peristalsis post-test treatment group	Intestinal peristalsis post-test control group	16.25-10.38	0.000

Table 4 shows the results of the Independent T test in the pre-test of the treatment group with the pre-test of the control group, $p = 0.556$, which means that there is no significant difference between the results of the pre-test in the treatment group and the control group. While the results of the Independent T test in the post-test of the treatment group and the post-test of the control group, $p = 0.000$, which means that there is an effect of chewing gum and early mobilization intervention on increasing intestinal peristalsis in post-laparotomy patients.

DISCUSSION***Intestinal Peristalsis Before Giving Chewing Gum Intervention and Early***

The results of this study indicate the frequency of peristalsis in the treatment group before being given the intervention, the average intestinal peristalsis was 5.44 x/minute with a minimum value of 0, a maximum value of 8 and a median of 6.00 while in the control group before being given the intervention, the average intestinal peristalsis was 5.88 x/minute with a minimum value 0, the maximum value is 9 and the median is 6.00.

Intestinal peristalsis is the movement that results from muscle contractions in the digestive tract to push food towards the stomach (Ledari et al., 2016). Previous research that discussed the anesthetic process stated that the decrease in intestinal peristalsis was caused by inhalation anesthetic agents given when general anesthesia spread throughout the body resulting in inhibition of parasympathetic nerve impulses to the intestinal muscles so that gastrointestinal motility slowed which was characterized by decreased intestinal peristalsis (Niu et al., 2021). Patients who have undergone laparotomy surgery can experience obstructive ileus if given food intake while the intestinal peristalsis has not recovered (Kiik, 2017).

As research conducted by Andi Herman (2019) which showed the results of research on the emergence of intestinal peristalsis before intervention, the treatment group obtained an average intestinal peristalsis frequency of 11.22 x/minute and in the control group the average intestinal peristalsis was 11.31 x/minute. This shows that there is no significant difference in intestinal peristalsis in the intervention group and the control group before being given the intervention. Likewise with the research conducted by Li Shan et al., (2013) which showed p value = 0.176, which means that there was no significant effect between the treatment group before being given the chewing gum intervention and the control group not being given the chewing gum intervention.

In this study, the two groups of respondents carried out a matching process. This is summarized in the inclusion and exclusion criteria in the previous chapter, namely: post-operative laparotomy patients (appendicitis, intestinal obstruction, chronic intestinal inflammation, colectomy, colostomy, ileostomy, bowel cancer, peritonitis, small bowel resection), post-operative laparotomy patients with spinal type. anesthesia, patients aged 20-60 years, patients with albumin levels more than 3.5 g/dl, did not experience bleeding, the patient did not experience decreased

consciousness, and the patient did not experience severe pain after laparotomy surgery. It can be concluded that the treatment group and control group can be compared based on the inclusion and exclusion criteria.

Intestinal Peristalsis After Giving Chewing Gum Intervention and Early Mobilization

The results of this study showed the frequency of intestinal peristalsis after chewing gum and early mobilization in the treatment group was 16 people with an average intestinal peristalsis of 16.25 x/minute with a minimum value of 9, a maximum value of 20, and a median of 17.00 while in the control group there were 16 people. After being given conventional intervention according to the SOP at the hospital, the average intestinal peristalsis was 10.38 x/minute with a minimum value of 6, a maximum value of 13, and a median of 10.50. This indicates that the frequency of intestinal peristalsis in the intervention group was higher than the control group. As research conducted by Bhatti et al., (2021) that chewing gum and early mobilization have an effect on intestinal peristalsis of postoperative patients with the result of a significant reduction in the duration of postoperative ileus in hospital. It was found that the mean appearance of bowel sounds in the intervention group was 22.8 x/minute with a standard deviation of 1.125 and in the control group it was 13.9 x/minute with a standard deviation of 0.228.

This is in line with research conducted by Elhamed et al., (2020) regarding the effectiveness of early mobilization and chewing gum in patients after laparotomy surgery. each p value = 0.032 and p value = 0.015. In his research stated that early mobilization and chewing gum can accelerate the return of intestinal peristalsis and reduce abdominal distension after laparotomy surgery by increasing abdominal wall tone and restoring gastrointestinal system function.

In contrast to the research conducted by Li Shan et al., (2013) showed statistical test results with p value = 0.075, which means that there is no significant effect between the treatment groups given the chewing gum intervention and the control group which was not given the chewing gum intervention.

The intervention of chewing gum containing xylitol in addition to stimulating the recovery of intestinal peristalsis, the xylitol content in it will increase the effectiveness of chewing gum therapy because this gum has a laxative effect so that it will increase intestinal peristaltic activity which will accelerate the recovery of the gastrointestinal system

compared to the control group who did not. treated with chewing gum.

In the treatment group there was a difference in the mean of intestinal peristalsis in the post-test results compared to the control group. This is because recovery in the control group only depends on the body's response slowly returning to normal as the effects of the anesthetic decrease. Recovery in the control group without chewing gum will appear randomly and slowly starting from the emergence of nerve impulses until there is movement in the intestines which will later help the emergence of bowel sounds.

Effect of Chewing Gum and Early Mobilization on Intestinal Peristalsis

Test data analysis using the paired t test (α 0.05) in the pre-test control group with the post-test control group obtained $p = 0.000$, which means that there is a significant difference between the results of the pre-test and post-test in the control group. While the results of the paired t test (α 0.05) in the pre-test of the treatment group and the post-test of the treatment group obtained the same results, namely $p = 0.000$, which means that there is a significant difference between the results of the pre-test and post-test in the treatment group.

The results of the Independent T test in the pre-test of the treatment group with the pre-test of the control group obtained p value = 0.556, which means that there is no significant difference in the results of the pre-test between the treatment group and the control group. While the results of the Independent T test in the post-test of the treatment group and the post-test of the control group, the results obtained a significance value of 0.000 (<0.05), which means that there is a significant difference between the post-test results of the treatment group and the control group so that H_a is accepted and it was concluded that in the treatment group there was an effect of chewing gum and early mobilization on intestinal peristalsis after laparotomy surgery.

This study is the same as the research conducted by Andi Herman (2019) on the effect of nursing interventions chewing gum and early mobilization on increasing intestinal peristalsis and flatus at the Kendari city hospital in 2019 which obtained research results with an average pre-test score. 11.25 x/minute and a post-test score of 19.08 x/minute in the intervention group while in the control group the pre-test score obtained an average of 11.31 x/minute and

the post-test 14.22 x/minute. There was a difference between the average frequency of intestinal peristalsis after the intervention group and the control group and there was an effect of chewing gum and early mobilization on postoperative intestinal peristalsis (p value 0.000; $\alpha=0.05$).

Chewing this gum can stimulate intestinal motility through the feagal cephalic reflex so that it can increase gastrointestinal hormones consisting of gastrin, secretin, gastric inhibitory polypeptide (GIP), cholecystokinin (CCP), motilin, pancreatic peptide (PP), and enteroglucagon which are all plays a role in regulating the function of movement and secretion of the digestive system so that salivary secretion increases as well as pancreatic, gastrin, and neurotensin which can increase gastrointestinal mortality (Ledari et al., 2016) . Chewing gum can stimulate the abdomen and secretions of gastric and intestinal which will cause the person's desire to eat and drink so as to increase the patient's intestinal peristalsis so as to speed up the recovery process of postoperative ileus.

This is in accordance with research conducted by Grace. Regarding chewing gum on intestinal peristalsis in post operative appendectomy patients, the results of statistical tests with p value = 0.000 were found. According to him, chewing gum can increase intestinal motility which directly activates the cephalic vegal reflex and stimulates the secretion of gastrointestinal hormones indirectly so that it produces saliva and pancreatic juice so that this reaction can encourage nerves and hormones to increase intestinal motility. The mechanism of action of early mobilization in increasing intestinal peristalsis is by stimulating the parasympathetic nerves to the intestinal muscles which results in a wave of intestinal motility, with the increase in the work of the parasympathetic nerves resulting in the release of acetyl choline so that there will be an increase in the conduction of acitive waves along the intestinal wall which can increase motility and increase intestinal peristalsis (Damayanti & Syara, 2018).

Patients who receive early mobilization interventions after surgery, the abdominal and pelvic muscles will return to normal as before so that their abdominal muscles become strong and can accelerate healing, besides that early mobilization movements can trigger contraction and relaxation of smooth muscle fibers so that they can stimulate intestinal peristalsis to return to normal (Rismawati, 2015).

This is in accordance with research conducted by Elhamed et al., (2020) regarding the effectiveness of early mobilization on intestinal motility in post-laparotomy patients who were carried out in a hospital in Egypt, the results of the statistical test value were p value = 0.015 which means that there is a significant difference between the treatment group and the control group in terms of intestinal motility of post-laparotomy.

In this study, apart from chewing xylitol gum, an intervention for early mobilization of the lower extremities was also given. This was given because the respondent to be studied was given spinal anesthesia which would cause organ function from the stomach to the bottom to be disturbed. Early lower extremity mobilization exercises include hip movements, knee movements, toe movements, and ankle movements. The results of the study indicate that in the treatment group there is a higher increase in intestinal peristalsis, this indicates that early mobilization exercises can accelerate the return of intestinal peristalsis by triggering contraction and relaxation of the muscles so that they can stimulate intestinal peristalsis to return to normal.

Many studies have used early mobilization interventions to accelerate the recovery of postoperative intestinal peristalsis. In contrast to early mobilization, the use of chewing gum is still very rarely done. Whereas based on the latest theory and review, it was found that the use of chewing gum can help speed up the process of returning to the function of the gastrointestinal system and can prevent complications of postoperative ileus. Chewing gum is like fake feeding, where the food is chewed but does not enter the stomach, it can stimulate appetite which can trigger the release of gastrointestinal hormones such as gastrin, neurotensin, and pancreatic polypeptides so that intestinal motility is restored due to the effects of giving anesthesia.

CONCLUSION

There is a combination effect of chewing gum and early mobilization interventions on increasing intestinal peristalsis in post-laparotomy patients at the Dr. Soedomo Trenggalek. Chewing gum can increase gastrointestinal hormones consisting of gastrin, secretin, gastric inhibitory polypeptide (GIP), cholecystokinin (CCP), motilin, pancreatic peptide (PP), and enteroglucagon which increase gastrointestinal mortality. Meanwhile, early mobilization will stimulate an increase in the work of the parasympathetic nerves and release acetylcholine resulting in an increase in conduction of ascitatory

waves along the intestinal wall which will increase intestinal motility and peristalsis.

SUGGESTION

Future research is expected to be able to develop research by adding other interventions in the form of giving warm compresses related to the acceleration of the return of intestinal peristalsis after laparotomy surgery due to the effect of anesthesia.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. Other funders than the authors had no role in the data collection, data analysis, and also in the writing of the manuscript.

AUTHOR CONTRIBUTIONS

DBP, research concept, research data tabulation, writing a draft manuscript and analysis; TA, wrote and revised the manuscript with support from the other author, team coordination. TCS, performed the statistical analysis and interpreted the data; MDC, verified the method and design of this study. All the authors agreed to the arrangement of authors in this study. We have read and approved the final version of the manuscript. we agreed to be accountable for all aspects of the work.

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