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COMPARISON OF OUTCOME OF CHEWING GUM VERSUS WITHOUT CHEWING GUM IN POSTOPERATIVE ILEUS AFTER INTESTINAL SURGERY AT TERTIARY CARE HOSPITAL.

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ABSTRACT:

OBJECTIVE: To associate the outcome of chewing gum in competition with without chewing gum in Postoperative Ileus patients after intestinal surgery. It causes gasses distention, nausea, vomiting, and even pain. After abdominal surgery. **INTRODUCTION:** Postoperative Ileus POI is a well-known problem after surgery of abdomen, causing discomfort and delays in bowel movements¹. Chewing gum has appeared as a fresh & modest modality for declining postoperative ileus & enhance bowel movements². Chewing gum is a cost-effective intervention thought to increase bowel motility by stimulating more secretions and neural signaling to the digestive tract.³ **PLACE AND DURATION OF STUDY:** study was conducted at department of surgery LUMHS hospital at Hyderabad and Jamshoro, for one year starting from the month of January 2023 to the December 2023. **MATERIAL AND METHODS:** A total number of 208 subjects who achieved the criteria for inclusion & admitted in surgical ward LUMHS, Jamshoro were counted in current research after taking informed permission. The subjects were haphazardly assigned in the direction of either in A group chewing gum & B group without gum chewing were asked to record immediate time of feeling bowel sounds, passing flatus or stool, first time of feeling hunger and time of discharge from hospital which was assessed on post 30 minutes of chewing gum after surgery three times in a day. Entirely the composed statistics were moved into the proforma designed at the completion & used by electronic means for investigation determination. **RESULTS:** The mean age of A group was 35.53 ± 13.46 & B group was 40.06 ± 12.62 years. In the gender distribution, A group includes 104 individuals, with 61.5% males and 38.5% females. In contrast, B group has 104 individuals, with 66.3% males and 33.7% females. Comparison of outcomes showed mean $\pm$ SD for first passage of flatus in 57.32 ± 26.48 in A group and 71.09 ± 28.85 in B group, with highly significant P-value 0.0001, first passage of stool was 86.65 ± 37.56 and 102.28 ± 41.64 with $P=0.005$, appearance of the first bowel sound had a mean $\pm$ SD of 39.67 ± 18.04 and 48.07 ± 17.87 , $P=0.001$, first onset of the feeling of hunger 66.98 ± 31.32 and 93.19 ± 38.84 having $P=0.0001$ while the length of hospital stay was 8.24 ± 1.91 in A group and 9.04 ± 2.15 in B group, with $P=0.005$. **CONCLUSION:** This study concluded that patients who chewed gum A group with those who did not B group following intestinal surgery, it was observed that chewing gum appeared to accelerate the recovery of bowel function, promote an earlier return of appetite, and result in shorter hospital stays. This suggests that gum chewing may be a beneficial intervention for reducing the impact of Postoperative Ileus in this patient population.

KEY WORDS: Bowel Sound, Intestinal Surgery, Postoperative Ileus, Chewing Gum, Flatus & Feces, Abdominal Resection, Defecation

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INTRODUCTION

Postoperative Ileus POI refers to reduction in normal motility of the gastrointestinal tract in response to surgical trauma, in absence of mechanical factors. It is an inevitable physiologic response to surgery. It is benign and self-limiting.¹ However, it is possible that it may not recover within the normal time limit and becomes complicated. It is then considered pathologic and prolonged, and is called Postoperative Paralytic Ileus.^{2, 3} Different parts of the intestine take different amount of time to recover from Postoperative Ileus; the small intestine usually takes the shortest duration and recovers between 0-24 hours & the stomach between 24-48 hours & large intestine between 48-72 hours. This view is now being challenged and it is thought that gastric and small intestinal functions recover within a few hours of the surgery, whereas large intestine takes about three days.^{1, 4} The pathogenesis of Postoperative Ileus lies in multiple factors.⁵ These include dysfunction/inhibition of parasympathetic activity and an increase in sympathetic activity causing increased catecholamine secretion, which leads to reduction in

motility of the gastrointestinal tract. Other factors include increased inflammatory response, undue gut handling, irritation of peritoneum, electrolyte imbalances, and effect of narcotic analgesics used.^{6, 7} It is also thought that the 5 parts of gastrointestinal tract which are manipulated the most during surgery take longer to return back to normal function, but the Ileus extends through intestinal muscles of the parts that were handled during surgery to those that were not handled.¹ Different parameters are used clinically to establish that the Postoperative Ileus is resolving in a patient. It includes, first onset of feeling of hunger after surgery, appearance of earliest bowel sound, first passageway of flatus and first passage of feces. These events at timeline after surgery give a clue to whether the Postoperative Ileus is resolving or not.^{8, 9} Traditionally, Postoperative Ileus in postsurgical patients is dealt by keeping the patient nil per orally, giving intravenous fluids, decompression of the stomach using an NG tube Ryle's tube, and carefully follow-up the patient in hospital facility to check for bowel sound appearance, parameters

described above which show resolution of the Ileus so that the patient can be allowed per orally, mostly after appearance of initial gut sound or passageway of initial flatus. In latest years, the usage of chewing gum has more as a novel treatment option & modest for reducing paralytic ileus. This one turns by increasing bowel movements by neuronal vagal reflex & by growing the manufacture of gut hormones & intestinal movements.^{3, 10} Newly, this was suggested that hexitols presence in the sugar free chewing gums influence by playing a role in the improvement of these all methods are mostly a source of discomfort of the patient practically.^{10, 11} The use of chewing gum for Paralytic Ileus is a simple and cost effective method and has been showing promising results in recent studies that have been conducted. It is thought that gum chewing is a form of 'sham-feeding' or 'false-feeding' and stimulates the gastrointestinal tract through a cephalo-vagal reflex. Chewing gum stimulates the cephalic phase of swallowing which in turn stimulates the vagal nerve in the medulla oblongata. Vagal nerve supplies the parasympathetic nervous system of the gastrointestinal tract, stimulation of which leads to increased appetite.^{12, 13} A study conducted at PIMS, Rotak, India has concluded that when patients were asked to chew gum after undergoing ileostomy closure done for typhoid ileal perforation, the mean time for appearance of bowel sounds was 38.60 ± 18.10 h and 46.52 ± 19.20 h $p = 0.040$, passage of first flatus was 58.48 ± 22.69 h and 73.12 ± 25.63 h, $p = 0.060$, the mean time for the passage of first stool was 84.96 ± 38.288 h and 109.20 ± 37.41 h $p = 0.004$, the mean time of feeling of hunger was 65.84 ± 21.34 h and 92.85 ± 34.73 h $p = 0.004$ and length of hospital stay after surgery mean 8.30 ± 2.91 days and 9.60 ± 4.18 days $p = 0.059$ in the study group and in the control group respectively.¹⁰ 10. Another study conducted in 2017 in India by Kalyanwat AS et al, during study it was revealed that mean time for appearance of bowel sounds

was 51.54 ± 6.33 h and 61.20 ± 8.42 h, the mean time to passage of first flatus was 67.36 ± 5.12 h and 74.64 ± 9.05 h, the passing of stool was 84.96 ± 38.28 and 109.20 ± 37.41 , the mean time of feeling of hunger was 70.72 ± 5.53 h and $80.96 \pm 7.11.83$ h, the patient was discharged early as 104.96 ± 10.45 h and 121.44 ± 20.62 h in the study group versus control group³ The aim of this study is to compare the outcome of chewing gum versus without chewing gum in postoperative ileus among patients after intestinal surgery. By comparing its outcomes in terms of time taken for first onset of feeling of hunger, appearance of first bowel sound, first passage of flatus, first passage of feces and length of hospital stay. Side effects of postoperative ileus POI can be shorten to achieve early recovery of patient. On international level, data is available to compare the use of chewing gum with standardized postoperative care and have shown effective variable results but very less data is available in Pakistan. Role of chewing gum will be beneficial, and will not only help in achieving increased patient satisfaction, it will also minimize the economic burden of our patients in terms of early recovery and early discharge. Results of this study will be valuable contribution in making the decision for its utilization in future for such cases.

MATERAIAL AND METHOD:

This prospective, randomized, comparative trial was undertaken at department of surgery Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad. Total number of 208 patients admitted through outpatient who fulfilled the inclusion criteria were included in the study after taking informed consent. The patients were randomly assigned to either in A group chewing gum and B group without chewing gum were asked to record immediate time of feeling bowl sounds, passing flatus or stool, first time of feeling hunger and time of discharge from hospital which was assessed on post 30 minutes of

chewing gum after surgery three times in a day. All the collected data were entered into the proforma attached at the end and used electronically for research purpose.

RESULTS:

In this randomized controlled trial, the total of 208 patients 104 in each group as A group chewing gum and B group without chewing gum were included to compare the outcome of chewing gum versus without chewing gum in Postoperative Ileus POI after intestinal surgery in patients presenting in tertiary care hospital and the results were analyzed as: The mean $\pm$ SD of age in A group was 35.53 ± 13.46 with C.I 32.91--- 38.15 and B group was 40.06 ± 12.62 with C.I 37.60---42.51 years, as shown in TABLE 1. The mean $\pm$ SD of body mass index in A group and B group was 27.85 ± 4.43 and 27.38 ± 3.99 with C.I 26.99---28.71 and 26.60--- 28.15 kg/m², respectively as shown in TABLE 1. In the gender distribution across groups, A group comprises 104 individuals, with 61.5% being male 64 males and 38.5% being female 40 females. In contrast, B group consists of 104 individuals, with 66.3% being male 69 males and 33.7% being female 35 females, as shown in TABLE 1. The distribution based on residence status reveals that in group A, 76 individuals 73.1% were from urban areas, while 28 individuals 26.9% were from rural areas. In B group, 70 individuals 67.3% were 46 urban residents, while 34 individuals 32.7% resided in rural regions as shown in TABLE 1. In terms of socioeconomic status, 25 individuals 24.0% had a family monthly income $\leq 20,000$ PKR, 49 individuals 47.1% fell within the income range of 21,000 to 50,000 PKR, and 30 individuals 28.8% reported incomes

exceeding 50,000 PKR in group A. On the other hand, B group showed a distinct socioeconomic composition, with 23 individuals 22.1% reporting incomes $\leq 20,000$ PKR, 48 individuals 46.2% having incomes between 21,000 and 50,000 PKR, and 33 individuals 31.7% documenting incomes exceeding 50,000 PKR as shown in TABLE 1. The analysis of smoking status revealed that out of the total individuals, 45 43.3% were identified as smokers in A group while the remaining 59 56.7% were categorized as non-smokers. Similarly, in B group, 38 individuals 36.5% were smokers, and 66 individuals 63.5% were categorized as non-smokers based on their smoking status, shown in TABLE 1. The mean $\pm$ SD for first passage of flatus were noted as 57.32 ± 26.48 and 71.09 ± 28.85 in A group and B group while having a highly significant P-value i.e., $P=0.0001$ as shown in TABLE 2. The mean $\pm$ SD for first passage of stool were noted as 86.65 ± 37.56 and 102.28 ± 41.64 in A group and B group while having a significant 47 P-value i.e., $P=0.005$ as shown in TABLE 2. The mean $\pm$ SD for appearance of first bowel sound were noted as 39.67 ± 18.04 and 48.07 ± 17.87 in A group and B group while having a significant P-value i.e., $P=0.001$ as shown in TABLE 2. The mean $\pm$ SD for first onset of feeling of hunger were noted as 66.98 ± 31.32 and 93.19 ± 38.84 in A group and B group while having a highly significant P-value i.e., $P=0.0001$ as shown in TABLE 2. The mean $\pm$ SD for length of hospital stay were noted as 8.24 ± 1.91 and 9.04 ± 2.15 in A group and B group while having a highly significant P-value i.e., $P=0.005$ as shown in TABLE 2.

TABLE # 1

DESCRIPTIVE STATISTICS OF AGE n=208					
AGE years		No	MEAN	$\pm$SD	95% C. I
Groups	Group A	104	35.53	13.46	32.91-38.15
	B group	104	40.06	12.62	37.61-42.51
DESCRIPTIVE STATISTICS OF BODY MASS INDEX n=208					

BMI kg/m2	No	MEAN	±SD	95% C. I
Group A	104	27.85	4.43	26.99-28.71
B group	104	27.87	3.99	26.60-28.15
DISTRIBUTION OF GENDER n=208				
GENDER				
GROUPS	No	Male	Female	
Group A	104	64	40	
		61.50%	38.50%	
B group	104	69	35	
		66.30%	33.70%	
DISTRIBUTION OF RESIDENTIAL STATUS n=208				
RESIDENTIAL STATUS				
GROUPS	No	URBAN	RURAL	
Group A	104	76	28	
		73.1%	26.9%	
B group	104	70	34	
		60.30%	32.70%	
DISTRIBUTION OF SOCIOECONOMIC STATUS n=208				
SOCIOECONOMIC STATUS				
GROUPS	No	≤20000	21000-50000	>50000
Group A	104	25	49	30
		24.00%	47.10%	28.80%
B group	104	23.00%	48	33
		22.10%	46.20%	31,70%
DISTRIBUTION OF SMOKING STATUS n=208				
SMOKING STATUS				
GROUPS	No	NON-SMOKER	SMOKER	
Group A	104	45	59	
		43.30%	56.70%	
B group	104	38	66	
		36.50%	63.50%	

TABLE # 2

COMPARISON FOR FIRST PASSAGE OF FLATUS BETWEEN GROUPS n=208					
FIRST PASSAGE OF FLATUS					
GROUPS	MEAN	±SD	95% C. I	P-VALUE	
	A group 104	57.32	26.489	52.18-62.58	
B group 104	71.09	28.853	65.48-76.71	0.0001	
COMPARISON FOR FIRST PASSAGE OF STOOL BETWEEN GROUPS					
GROUPS	FIRST PASSAGE OF STOOL				
	No	MEAN	±SD	95% C. I	P-VALUE
A group	104	86.65	37.560	79.35 -93.96	

					0.005
B group	104	102.28	41.649	94.19 - 110.39	
COMPARISON FOR APPEARANCE OF FIRST BOWEL SOUND BETWEEN GROUPS n=208					
GROUPS	APPEARANCE OF FIRST BOWEL SOUND				
	No	MEAN	±SD	95% C. I	P-VALUE
Group A	104	39.67	18.044	36.16 - 43.18	0.001
B group	104	48.07	17.874	44.60 - 51.55	
COMPARISON FOR FIRST ONSET OF FEELING OF HUNGER BETWEEN GROUPS n=208					
GROUPS	FIRST ONSET OF FEELING OF HUNGER				
Group A	No	MEAN	±SD	95% C. I	P-VALUE
	104	66.98	31.326	60.89 - 73.07	
B group	104	93.19	38.842	85.64 - 100.75	0.0001
COMPARISON FOR LENGTH OF HOSPITAL STAY BETWEEN GROUPS n=208					
GROUPS	LENGTH OF HOSPITAL STAY				
	No	MEAN	±SD	P-VALUE	
Group A	104	8.24	1.918	0.005	
B group	104	9.04	2.155		

DISCUSSION

Postoperative Ileus POI is a common complication after intestinal surgery, characterized by the transient impairment of normal gastrointestinal motility.¹⁴ Various interventions have been explored to manage and prevent POI, including the use of chewing gum as a potential modality. The presence and duration of ileus can also be influenced by the anatomical location of gut resection.¹⁵ The time for restoration of motility is the longest after colorectal surgery. Chewing gum is a non-invasive, cost-effective intervention that has been proposed to stimulate the gastrointestinal system, potentially reducing the duration and severity of POI.¹⁶ The act of chewing gum is believed to promote the secretion of saliva and gastric juices, which, in turn, can stimulate bowel motility. Chewing gum is easy to administer, well-tolerated by patients, and may have additional benefits, such as relieving thirst and dry mouth.¹⁷ The use of chewing gum as an adjunct in managing POI remains an area

of ongoing research and debate. While some studies have shown positive effects in reducing the duration of POI and postoperative hospital stays, others have failed to demonstrate a clear benefit.¹⁸ It is important to consider that the effectiveness of chewing gum may vary depending on the specific patient population and surgical procedures. 100 Several studies have investigated the impact of chewing gum on POI, offering insights into its efficacy and benefits. It's essential to compare findings from different studies to assess the overall consensus on its effectiveness.¹⁹ The study by McCormick JT et al,²⁰ reported that patients who chewed gum postoperatively had a significantly shorter duration of POI compared to the control group no chewing gum. The results indicated a reduction in the average length of hospital stay for patients in the chewing gum group, emphasizing the potential benefits of this simple intervention. In contrast, the study by Johnson et al,²¹ found no significant difference in the duration of POI between patients who chewed gum and those who

did not. The authors suggested that while chewing gum might be well-tolerated by patients, its impact on POI might vary depending on patient-specific factors and the type of surgery. The study by Ertas IE et al,²² reported that chewing gum was associated with a reduced incidence of prolonged POI, particularly in patients undergoing specific types of intestinal surgery. The authors suggested that chewing gum might be more beneficial for certain patient populations. These varying results from different studies underscore the complexity of the relationship between chewing gum and POI. Factors such as the type of surgery, patient characteristics, 101 and the timing of gum administration may contribute to the observed differences.²² The findings of our study are comparable with multiple studies conducted worldwide. In our study the mean $\pm$ SD of age in A group chewing gum was 35.53 ± 13.46 and B group without chewing gum was 40.06 ± 12.62 years. In the study by Marwah S et al, the study participants displayed a wide age range, from 10 to 75 years. Specifically, in the group of patients who used chewing gum, the mean age was 36.90 years with a standard deviation of 15.97, while in the group of patients who did not use chewing gum, the mean age was 39.94 years with a standard deviation of 15.75¹⁰ A study by Bhatti S et al,¹⁵ noted that in A group chewing gum, the mean age of the patients was 26.12 years with a standard deviation of 7.1, while in B group no chewing gum, the mean age was 28.80 years with a standard deviation of 10.5. In the gender distribution across groups, A group comprises 104 individuals, with 61.5% being male 64 males and 38.5% being female 40 females. In contrast, B group consists of 104 individuals, with 66.3% being male 69 males and 33.7% being female 35 females. A study by Marwah S, et al 64% were males and 36% were females reported in those patients who used chewing gum while 72% were males and 36% were females in patients who did

not use 102 chewing gum.¹⁰ A study by Bhatti S et al, there were 25 males 50% and 25 females 50% in A group chewing gum. In B group no chewing gum, there were 29 males 58% and 21 females 42%. In current study, comparison showed mean $\pm$ standard deviations for various postoperative indicators such as first passage of flatus, the mean $\pm$ SD was 57.32 ± 26.48 in A group and 71.09 ± 28.85 in B group, with a highly significant P-value of 0.0001. In terms of the first passage of stool, the mean $\pm$ SD was 86.65 ± 37.56 in A group and 102.28 ± 41.64 in B group, with a significant P-value of 0.005. The appearance of the first bowel sound had a mean $\pm$ SD of 39.67 ± 18.04 in A group and 48.07 ± 17.87 in B group, with a significant P-value of 0.001. Regarding the first onset of the feeling of hunger, the mean $\pm$ SD was 66.98 ± 31.32 in A group and 93.19 ± 38.84 in B group, with a highly significant P-value of 0.0001. Lastly, the length of hospital stay had a mean $\pm$ SD of 8.24 ± 1.91 in A group and 9.04 ± 2.15 in B group, with a highly significant P-value of 0.005. A study by Bhatti S et al,²³ reported mean time to pass flatus to be 18.36 ± 8.43 hours, in the chewing group group A, whereas in the no chewing gum group B group, it was 41.16 ± 6.14 hours p value with a pvalue of 0.004. Moreover, the use of chewing gum as an intervention to manage POI after intestinal surgery is a subject of active research.²³ While some studies suggest potential benefits, the efficacy of chewing gum remains inconclusive and may vary based on patient-specific factors and surgical procedures. The decision to implement chewing gum as part of a POI management strategy should be made on a case-by-case basis, taking into consideration the overall clinical context and individual patient needs.²⁴ Additional exploration & more, controlled trials are required to provide more definitive evidence regarding the 104 effectiveness of this simple and non-invasive

intervention in mitigating the impact of POI after intestinal surgery.²⁵

CONCLUSION

The conclusion of this study is that patients who chewed gum group A with those who did not B group following intestinal surgery, it was observed that chewing gum appeared to accelerate the recovery of bowel function, promote an earlier return of appetite, and result in shorter hospital stays. This suggests that gum chewing may be a beneficial intervention for reducing the impact of Postoperative Ileus in this patient population.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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AUTHORS' CONTRIBUTIONS:

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

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REFERENCES

1. JC Kalff, S Wehner, B Litkouhi. Postoperative ileus. Waltham, MA. Accessed on October 14, 2015, 2017
2. Nimarta, Neena VS, Gupta R. Effectiveness of chewing gum on bowel motility among the patients who have undergone abdominal surgery. Nurs Midwifery Res J 2013; 93:108-18.
3. Kalyanwat AS, Jakhar M, Jain S. Postoperative ileus: a study on the role of chewing gum to reduce its duration. Saudi Surg J. 2018;6 3:85-8.
4. Carroll J, Alavi K. Pathogenesis and management of postoperative ileus. Clin Colon Rectal Surg. 2009;221:47-50.
5. Kumar A, Kumari R, Kumar S, Raj P. Effect of chewing gum on bowel motility in post operative patients following abdominal surgery: a clinical outcome based study. Int Surg J. 2018;58:2808-12.
6. Duangchan C, Toskulkao T, Danaldutsadeekul S, Iramaneerat C. Effect of gum chewing on bowel motility in patients with colorectal cancer after open colectomy: a randomized controlled trial. Siriraj Med J. 2016;683135-41.
7. Ledari FM, Barat S, Delavar MA. Chewing gums has stimulatory effects on bowel function in patients undergoing cesarean section: a randomized controlled trial. Bosn J Basic Med Sci 2012; 12 4:265-68.
8. Li S, Liu Y, Peng Q, Xie L, Wang J, Qin X. Chewing gum reduces postoperative ileus following abdominal surgery: a meta-analysis of 17 randomized controlled trials. J Gastroenterol Hepatol. 2013;287:1122-32.
9. Wajid R, Huma G, Mobusher I. Role of chewing gum on early recovery of females after Caesarean section. Ann King Edw Med Univ. 2015;214:280-4.
10. Marwah S, Singla S, Tinna P. Role of gum chewing on the duration of postoperative ileus following ileostomy closure done for typhoid ileal perforation: a prospective randomized trial. Saudi J Gastroenterol. 2012;182:111-7.
11. Abdollahi AA, Yazdi K, Behnampour N, Niazi M. Effect of gum-chewing on the movement of intestines after abdominal resection and length of

- hospital stay. *Int J Hosp Res.* 2013; 23:127-32.
12. Ajuzieogu OV, Amucheazi A, Ezike HA, Achi J, Abam DS. The efficacy of chewing gum on postoperative ileus following cesarean section in Enugu, South East Nigeria: a randomized controlled clinical trial. *Niger J Clin Pract.* 2014;176:739-42.
 13. Abd-El-Maeboud KH, Ibrahim MI, Shalaby DA, Fikry MF. Gum chewing stimulates early return of bowel motility after caesarean section. *BJOG.* 2009;11610:1334-9.
 14. Doyle-Munoz J, Forrester DA, McTigue T, D'Andrea S, Natale-Ryan A. The efficacy of gum chewing in reducing postoperative ileus. *J Wound Ostomy Continence Nurs.* 2014; 413:227-32.
 15. Bhatti S , Malik_Y J, Changazi S H, Rahman U A Role of chewing gum in reducing postoperative ileus after reversal of ileostomy: a randomized controlled trial. *World J Surg.* 2021;454:1066-70.
 16. Asao T, Kuwano H, Nakamura JI, Morinaga N, Hirayama I, Ide M. Gum chewing enhances early recovery from postoperative ileus after laparoscopic colectomy. *J Am Coll Surgeons.* 2002;1951:30-2.
 17. Quah HM, Samad A, Neathey AJ, Hay DJ, Maw A. Does gum chewing reduce postoperative ileus following open colectomy for left-sided colon and rectal cancer?—a prospective randomized controlled trial. *Colorectal Dis.* 2006;81:64-70.
 18. De Castro SM, Van den Esschert JW, Van Heek NT, Dalhuisen S, Koelemay MJ, Busch OR, et al. A systematic review of the efficacy of gum chewing for the amelioration of postoperative ileus. *Digest Surg.* 2008;251:39-45. 111
 19. Fitzgerald JE, Ahmed I. Systematic review and meta-analysis of chewing-gum therapy in the reduction of postoperative paralytic ileus following gastrointestinal surgery. *World J Surg.* 2009;3312:2557-66.
 20. McCormick JT, Garvin R, Caushaj P, Simmang C, Gregorcyk S, Huber P, et al. The effects of gum-chewing on bowel function and hospital stay after laparoscopic vs open colectomy: a multi-institution prospective randomized trial. *J Am Coll Surgeons.* 2005; 2013:S66-7.
 21. Johnson MD, Walsh R. Current therapies to shorten postoperative ileus. *Cleveland Clin J Med.* 2009;7611:641-8.
 22. Ertas IE, Gungorduk K, Ozdemir A, Solmaz U, Dogan A, Yildirim Y. Influence of gum chewing on postoperative bowel activity after complete staging surgery for gynecological malignancies: a randomized controlled trial. *Gynecologic Oncol.* 2013; 1311:118-22.
 23. Kouba EJ, Wallen EM, Pruthi RS. Gum chewing stimulates bowel motility in patients undergoing radical cystectomy with urinary diversion. *Urology.* 2007;706:1053-6.
 24. Crainic C, Erickson K, Gardner J, Haberman S, Patten P, Thomas P, et al. Comparison of methods to facilitate postoperative bowel function. *Med surg Nurs.* 2009;184 235-8.
 25. Matros E, Rocha F, Zinner M, Wang J, Ashley S, Breen E, et al. Does gum chewing ameliorate postoperative ileus? Results of a prospective, randomized, placebo- controlled trial. *J Am Coll Surgeons.* 2006;2025:773-8.