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ROLE OF CHEWING GUM IN MINIMIZING POSTOPERATIVE ILEUS AFTER OPEN ABDOMINAL PROCEDURES – A RANDOMIZED CONTROLLED TRIAL

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Abstract

Background: Sham feeding, such as chewing gum, has been theoretically shown to reduce the incidence and hasten the resolution of postoperative ileus. However, the presence of heterogeneous study populations in existing research has led to inconsistent findings, making it challenging to determine the true effectiveness of sham feeding in managing this condition. This study aims to evaluate the efficacy of postoperative gum chewing in promoting the return of normal bowel function in patients undergoing abdominal surgery.

Material and Methods: A randomized controlled trial was conducted to evaluate the time to first postoperative flatus and defecation. On postoperative day one, the intervention group (n = 8) was given xylitol chewing gum—one piece chewed for 15 minutes, three times daily—until the first passage of flatus and defecation occurred. Both the intervention and control groups (n = 8) received standard postoperative care, including early ambulation. Patients self-reported the time to first flatus.

Results: The intervention group experienced a significantly shorter time to first postoperative flatus and defecation compared to the control group (39.13 ± 15.66 vs. 52.92 ± 21.97 hours for flatus, and 54.55 ± 18.90 vs. 77.98 ± 34.59 hours for defecation, respectively). However, after adjusting for age and duration of surgery, only the time to first flatus remained significantly shorter in the intervention group. Additionally, both groups demonstrated a significant positive correlation between the time to first flatus and time to first defecation.

Conclusion: This study demonstrated that gum chewing has a beneficial effect in reducing the time to first postoperative flatus and defecation. Given its simplicity, low cost, and noninvasive nature, gum chewing may be recommended as an adjunct intervention to facilitate the resolution of postoperative ileus in patients undergoing open abdominal surgeries.

Keywords: Postoperative Ileus**,** Chewing Gum**,** Open Abdominal Surgery**,** Gastrointestinal Recovery

Introduction

Postoperative ileus is a temporary cessation of coordinated bowel activity after surgery, commonly evaluated through the time to first flatus, defecation, and the ability to tolerate oral intake [1]. It is a frequent complication following open abdominal surgeries, typically lasting 4–5 days [2]. The condition arises from disrupted gastrointestinal motility caused by factors such as disordered electrical activity, impaired muscle contractions, and inflammation [3].

Although the exact pathophysiological mechanisms remain uncertain, three primary theories have been proposed: sympathetic nervous system overactivity, activation of inhibitory neural reflexes, and inflammatory responses induced by surgical trauma [3]. One of the most serious complications of prolonged postoperative ileus is septicemia, which is preventable with timely intervention [4]. Jayalal et al. demonstrated the benefit of prophylactic antibiotics in reducing inflammation associated with postoperative complications [5].

Several risk factors contribute to the development of postoperative ileus, including the surgical approach, patient age, comorbidities, and use of opioids for pain control. Minimally invasive techniques like laparoscopy are associated with reduced incidence of ileus and faster recovery of bowel motility [6,7]. Opioid analgesics, though effective for pain, inhibit gut motility by suppressing excitatory neurotransmission to the intestinal smooth muscle [8].

Traditionally, nasogastric decompression has been employed to reduce abdominal distension and facilitate bowel recovery, but studies have shown increased side effects such as nausea and bloating, with minimal benefit in overall recovery, leading to recommendations against its routine use [9]. Early oral intake, when tolerated, is now encouraged to stimulate gastrointestinal activity and shorten hospital stay [3].

Sham feeding through chewing gum is an emerging strategy to enhance gastrointestinal motility postoperatively. The act of chewing stimulates vagal pathways and mimics food intake, promoting gastric secretions and peristalsis [10]. Though several studies support gum chewing as a safe, low-cost intervention that accelerates bowel recovery, others report inconsistent outcomes, likely due to differences in surgical types, anesthetic practices, and postoperative care protocols. Given the safety, accessibility, and affordability of gum chewing, along with its potential to stimulate bowel function through sham feeding mechanisms, it is important to further evaluate its efficacy in a well-defined patient group. This study aims to assess whether chewing gum can significantly reduce the time to first flatus and defecation in patients undergoing open abdominal surgeries.

Methodology

This prospective, single-blind, randomized controlled trial was conducted in the surgical ward of Sree Mookambika Institute of Medical Science, Kulasekharam, Kanyakumari, Tamil Nadu, between September and November 2024. Patients aged 18 to 60 years undergoing open abdominal surgeries who were cognitively intact and willing to participate were included. Those unwilling, cognitively impaired, or from the pediatric age group were excluded. Participants in the intervention group received a commercially available mint-flavored, sugar-free xylitol chewing gum (1.2–1.37 g per piece) starting on the first postoperative day. They chewed one piece for 15 minutes, three times daily at 9:00 a.m., 2:00 p.m., and 7:00 p.m., until the first passage of flatus, with gum administered by a resident doctor. Data were analyzed using IBM SPSS Statistics Version 20.0, with significance set at one-tailed $p < .05$. An independent t-test assessed time to first flatus, while the Mann–Whitney U test examined time to first defecation between groups. ANCOVA was performed using age and surgical duration as covariates to control for confounding, based on prior findings. Spearman's rank correlation tested the relationship between time to first flatus and defecation. Homogeneity between groups was verified using independent t-tests and chi-square tests for baseline characteristics. Although randomization ensured comparable groups, potential inference errors were addressed by including known influencing factors as covariates in the analysis to maintain rigor.

RESULTS

[Table 1] shows the demographic characteristics of participants in the intervention (n = 8) and control (n = 8) groups. There were no significant differences between the groups in mean age (p = 0.543), gender (p = 0.750), surgical history (p = 0.550), or type of surgery (p = 0.482). Additionally, mean hemoglobin, albumin, and serum potassium levels were similar between groups. The groups also had comparable surgical duration (p = 0.190) and length of hospital stay (p = 0.340).

Table 1: Demographic Characteristics of Study Participants

Variable	Intervention group (n=8)	Control group (n=8)	P Value
Mean Age (years)	42.88 ± 18.15	33.88 ± 27.01	.543
Gender			.750
Male	5 (62.5%)	6 (75%)	
Female	3 (37.5%)	2 (25%)	
Surgical History (Abdominal)			0.550
No	7 (87.5%)	7 (87.5%)	
Yes	1 (12.5%)	1 (12.5%)	
Mean Hemoglobin (Hb, g/dL)	11.55 ± 1.39	11.60 ± 1.58	0.321
Mean Albumin (g/dL)	3.73 ± 0.32	3.74 ± 0.37	0.246
Mean Serum Potassium (mEq/L)	4.03 ± 0.26	3.88 ± 0.19	0.42
Type of Surgery			0.482
Laparotomy	3 (37.5%)	3 (37.5%)	
Open Appendicectomy	3 (37.5%)	3 (37.5%)	

Cholecystectomy	1 (12.5%)	1 (12.5%)	
Resection and Anastomosis	1 (12.5%)	1 (12.5%)	
Postoperative Information			
Type of Analgesics			0.450
Nonsteroidal Anti-inflammatory	3 (37.5%)	3 (37.5%)	
Strong Opioid	5 (62.5%)	5 (62.5%)	
Surgical Duration (Minutes; M ± SD)	160.33 ± 71.89	185.23 ± 73.51	0.190
Length of Hospital Stay (Days; M ± SD)	7.48 ± 2.31	9.57 ± 10.43	0.340

Table 2: Effects of Time to First Postoperative Flatus and Defecation Between the Intervention and Control Groups (n = 16)

Variable	Median (hours)	Mean (hours)	SD (hours)	T	p	η^2
Time to first postoperative flatus (hours)						
Intervention	38.5	39.13	15.66	2.80	0.004	0.119
Control	52.5	52.92	21.97			
Time to first postoperative defecation (hours)						
Intervention	54.0	54.55	18.90	2.25	0.025	0.034
Control	71.0	77.98	34.59			

[Table 2] presents the effects of time to first postoperative flatus and defecation between the intervention (bubble gum chewer) and control (non-bubble gum chewer) groups (n = 16). The intervention group passed flatus significantly earlier (mean = 39.13 hours) compared to the control group (mean = 52.92 hours), with a significant difference (t= 2.80, p = 0.004) and medium effect size ($\eta^2 = 0.119$). For time to first defecation, the intervention group also experienced defecation earlier (mean = 54.55 hours) than the control group (mean = 77.98 hours), with a significant difference (t = 2.25, p = 0.025) and small effect size ($\eta^2 = 0.034$).

Table 3: Effects of Time to First Postsurgical Flatus and Defecation Between the Intervention and Control Groups (n = 16) after adjusting for age and surgical duration

Variable/Covariance	Intervention	Control	Mean	SE	F	P	Partial η^2
Time to first postoperative flatus (hours)	39.07	52.98	7.64	3.53	6.00	0.027	.100
Age	-	-	1.19	0.280	-	-	-

Operation duration	-	-	0.42	0.522	-	-	-
Time to first postoperative defecation (hours)	62.74	79.79	3.34	6.55	2.60	0.120	.040
Age	-	-	0.86	0.357	-	-	-
Operation duration	-	-	3.21	0.079	-	-	-

[Table 3] shows the effects of time to first postoperative flatus and defecation between the intervention (bubble gum chewer) and control (non-bubble gum chewer) groups (n = 16), adjusting for age and operation duration. The intervention group passed flatus significantly earlier (mean = 39.07 hours) than the control group (mean = 52.98 hours), with a significant F-value of 6.00 (p = 0.027) and moderate effect size ($\eta^2 = 0.100$). For time to first defecation, the intervention group (mean = 62.74 hours) also passed stool earlier than the control group (mean = 79.79 hours), but the difference was not statistically significant (F = 2.60, p = 0.120, $\eta^2 = 0.040$).

DISCUSSION

The key findings of this study indicate that gum chewing following abdominal surgery significantly shortened the time to first postoperative flatus and defecation compared to those who did not receive the intervention. Patients in the intervention group experienced their first flatus and defecation approximately 13.91 and 17.05 hours earlier, respectively, than those in the control group. A single-sample t-test revealed that the average time to first flatus in the intervention group was significantly shorter compared to that in a previous study (p = .014), whereas the time to first defecation did not show a statistically significant difference (p = .751). These outcomes are consistent with existing research, which supports the notion that gum chewing after open abdominal procedures accelerates bowel recovery, specifically the passage of flatus and defecation [11,12]. Studies reporting no significant benefits often included patients who underwent both laparoscopic and open surgeries [13,14]. Since laparoscopic surgery involves less tissue trauma and shorter anesthesia duration, it typically results in flatus occurring around 29 hours earlier than in open surgery patients [15].

A notable finding in this study is that even after adjusting for variables such as patient age and surgery duration, gum chewing continued to show a statistically significant effect on reducing time to first flatus. Fesharakizadeh et al. [16] previously demonstrated that longer colorectal surgery duration was predictive of a delayed return of bowel activity. This suggests that prolonged procedures may hinder early flatus, but gum chewing could potentially offset this delay. On the other hand, the impact of gum chewing on defecation time was less clear, indicating that factors like age and operation time may play a larger role in bowel function restoration. Although both groups had similar surgical durations, the control group's mean surgery time was about 25 minutes longer, which supports the idea that extended surgery and anesthesia exposure may heighten the risk of postoperative ileus [17,18]. This underscores the need for effective strategies to restore bowel function post-surgery.

Additionally, it is possible that gum chewing stimulates the desire to eat by mimicking the act of food intake, which may, in turn, enhance appetite and support the patient's overall recovery process. Finally, consistent with prior research showing no major impact of gum chewing on hospital length of stay [16,25,26], this study found that patients who chewed gum were discharged

an average of 2.09 days earlier than those in the control group. Gum chewing thus appears to be a safe, inexpensive, and practical intervention for postoperative ileus, especially for patients who are mentally alert and physically capable of chewing.

Limitations: Postoperative physical activity and chewing speed were not standardized or quantitatively monitored. The small daily intake of xylitol may have influenced gastrointestinal function. Age and individual digestive capacity could have affected bowel recovery outcomes.

CONCLUSION

The findings of this study support the beneficial effects of gum chewing in enhancing recovery from postoperative ileus following abdominal surgeries. Gum chewing significantly reduced the time to first flatus and defecation, and earlier passage of flatus was associated with quicker defecation. These results add to the clinical understanding of bowel function recovery and reinforce the role of noninvasive interventions, such as sham feeding, in managing postoperative ileus in middle-aged and older patients after open abdominal surgeries.

Clinically, gum chewing was well accepted due to its non-invasive nature. Increased saliva production during chewing improved oral comfort, and no serious complications or adverse events were observed. Patients in the intervention group also had a shorter hospital stay compared to controls. Overall, the study supports gum chewing as a safe, cost-effective, and practical approach that merits broader clinical use.

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