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Effectiveness of gum-chewing on reduction of postoperative ileus among the patient following abdominal surgery at surgical units of tertiary centre, Nepal

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Abstract

Introduction: Postoperative ileus (POI) is a common complication following abdominal surgery, contributing to prolonged hospitalization and increased morbidity. Chewing gum may enhance postoperative gastrointestinal recovery through cephalic-vagal stimulation. This study aimed to evaluate the effectiveness of gum-chewing in reducing the duration of POI after abdominal surgery.

Method: A quasi-experimental study was conducted from 1 Apr 2019 to 30 Mar 2020 at BPKIHS, Dharan, Nepal. Patients undergoing abdominal surgery were allocated to experimental (n=20) or control (n=20) groups by lottery. The experimental group chewed sugarless gum for 30 minutes every 8 hours postoperatively until first flatus, in addition to standard care. The control group received standard care only. Primary outcomes were time to first bowel sound, flatus, and defecation. Data were analysed using SPSS 11.5 with descriptive and inferential statistics (Mann-Whitney U test, Chi-square, Spearman's correlation). A p≤0.05 was considered significant.

Result: Among 40 patients, median time to first bowel sound was 36 h (IQR 24-52.5) in the gum-chewing group versus 51 h (IQR 36-75) in controls (p=0.05). Time to first flatus was 40.75 h (IQR 24-61.75) versus 56.75 h (IQR 46.63-83.5) (p=0.02). Time to first defecation was 60.5 h (IQR 44.25-79) versus 73.5 h (IQR 62.75-102) (p=0.04). No significant difference was found in hospital stay or socio-demographic associations (p>0.05).

Conclusion: Gum-chewing significantly accelerates the return of bowel function after abdominal surgery and is an effective adjunct to postoperative care.

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Introduction

Postoperative ileus (POI) is a common condition which can lead to significant postoperative morbidity and a prolonged length of hospital stay and it is reported to occur in up to 25% of patients.[1] It is an iatrogenic condition that occurs from abdominal surgery and is a transient cessation of coordinated propulsive motility.[2] Gastric motility usually returns to normal within 24-48 hours after surgery.[3] POI is defined as the combination of at least two of the following five signs on or after the fourth postoperative day, with no improvement since surgery: nausea and vomiting, an inability to tolerate solid or semi-liquid diet during the preceding 24 hours, no gas or stool for the preceding 24 hours, abdominal distension, and radiological evidence of ileus.[4] The extent of ileus following abdominal surgery is influenced by the degree of surgical trauma and bowel manipulation. The surgical procedure and use of drugs may alter bowel motility mechanism.[5,6] Delayed postoperative recovery prolongs hospital stay which puts patients at risk of hospital-acquired infections or venous thromboembolism and increases economic burden on patients.[7–9]

Findings suggest that hexitols in sugar-free gum may play a role in resolving ileus through their osmotic effects and might ameliorate POI because these are known to cause gastrointestinal symptoms such as gas, bloating, and abdominal cramps.[10,11] Chewing gum increases gastrointestinal function, concentration of peptide hormone gastrin, and also enhances duodenal alkaline secretion.[12,13]

Gum-chewing has become a commonly applied method to prevent and reduce POI. Sufficient international literature can be found on the effectiveness of gum-chewing on the reduction of postoperative ileus after abdominal surgery, but in the context of Nepal, no single study was found. The use of gum-chewing for such patients could prove to be an asset to additional nursing care concerning the return of bowel movement at the earliest. This study aimed to evaluate the effectiveness of gum-chewing on the reduction of POI among patients following abdominal surgery at surgical units of BPKIHS.

Method

A quasi-experimental research design was used to conduct the study in surgical units I, II, and III of B.P. Koirala Institute of Health Sciences, Dharan, Nepal, from 1 Apr 2019 to 30 Mar 2020. The study was conducted after obtaining ethical clearance from the Institutional Review Committee of BPKIHS (Ref. No. 082/076/077-IRC). Written informed consent was obtained from all participants.

The sample size was calculated based on a previous study.[14] Considering a mean difference (d) of 1.84 and a pooled standard deviation (σ) of 2.07, with Zα=1.96 and Zβ=0.84, the calculated sample size was approximately 20 per group. The final sample consisted of 40 patients (20 in the experimental group and 20 in the control group), providing 80% power at a 5% significance level.

Participants were selected using a consecutive sampling technique. Inclusion criteria were patients aged 18-60 years who had undergone elective or emergency abdominal surgery and could follow instructions within 6 hours postoperatively. Exclusion criteria included a history of previous abdominal surgery or radiotherapy, postoperative complications, neuromuscular disorders, and electrolyte imbalances.

Eligible patients were assigned to experimental or control groups using the lottery method. The experimental group received sugarless chewing gum to chew for 30 minutes at 8-hour intervals until the passage of first flatus, in addition to standard postoperative care. The control group received standard postoperative care only.

Data were collected using a structured baseline proforma and assessment record sheet. Collected data were entered and analyzed using SPSS version 11.5. Descriptive statistics (mean, median, IQR, frequency, percentage) were used to summarize socio-demographic and clinical variables. Inferential statistics, including the

chi-square test, Mann-Whitney U test, Kruskal-Wallis test, and Spearman's rank correlation, were applied to examine associations and differences. A p-value ≤0.05 was considered statistically significant.

Result

A total of 40 patients underwent abdominal surgery, 20 in the experimental (gum-chewing) group and 20 in the control group. The socio-demographic and clinical profiles of both groups were comparable at baseline, Table 1. The mean age of participants in the experimental group was 41.05 ± 13.16 years, compared to 43.65 ± 15.25 years in the control group (p=0.37). Both groups were similar in terms of gender distribution, with males comprising 57.5% of the total sample (p=0.75). No significant differences were observed in other baseline characteristics, ensuring homogeneity between groups. The majority of participants, 55%, underwent lower gastrointestinal tract surgery, Table 2. The most common procedure was exploratory laparotomy with appendectomy, performed in 58.3% of the experimental group and 60% of the control group.

Gum-chewing significantly accelerated the return of bowel function compared to standard care alone, Table 3. The median time to first bowel sound was 36 hours (IQR 24-52.5) in the gum-chewing group versus 51 hours (IQR 36-75) in the control group (p=0.05). Similarly, the median time to first flatus was 40.75 hours (IQR 24-61.75) in the experimental group compared to 56.75 hours (IQR 46.63-83.5) in controls (p=0.02). The median time to first defecation was also shorter in the gum-chewing group (60.5 hours, IQR 44.25-79) than in the control group (73.5 hours, IQR 62.75-102; p=0.04). No significant difference was observed in the median length of hospital stay between the gum-chewing group (6 days, IQR 4-7.75) and the control group (4 days, IQR 4-8; p=0.42), Table 3.

A moderately positive correlation was found between the duration of surgery and the time to return of bowel function across both groups, Table 4. Specifically, longer surgical duration was associated with delayed first bowel sound (r=0.64, p=0.003 in experimental group; r=0.60, p=0.005 in control group), first flatus (r=0.57, p=0.009; r=0.55, p=0.012), and first defecation (r=0.62, p=0.003; r=0.66, p=0.001), Table 4.

Table 1. Socio-demographic characteristics of the experimental and control group, n=40

Characteristics	Category	Experimental group n=20 n (%)	Control group n=20 n (%)	p value
Age (in years)	18–30	6 (30)	5 (25)	0.37
	31–40	1 (5)	3 (15)	
	41–50	8 (40)	4 (20)	
	51–60	5 (25)	8 (40)	
Mean ± SD		41.05 ± 13.16	43.65 ± 15.25	
Gender	Male	12 (52.2)	11 (47.8)	0.75
	Female	8 (47.1)	9 (52.9)	

Pearson's Chi-Square Test (p > 0.05)

Table 2. Types of abdominal surgery of experimental and control group, n=40

Types of abdominal surgery	Operative procedure	Experimental gr (n=20), n (%)	Control gr (n=20), n(%)
Upper gastrointestinal surgery	Gastrectomy	1 (50)	2 (50)
	Ex lap GOPR	1 (50)	2 (50)
Lower gastrointestinal surgery	Extended rt. hemi-colectomy	2 (16.7)	3 (30)
	Ex lap with appendectomy	7 (58.3)	6 (60)
	Sigmoidectomy	2 (16.7)	0 (0)
	Ex lap with peritoneal lavage	1 (8.3)	1 (8.3)
Hepatopancreatobiliary surg	Extended cholecystectomy	4 (66.7)	5 (83.3)
	Extended cholecystectomy with CBD exploration	2 (33.3)	1 (16.7)

Ex Lap = Exploratory laparotomy; GOPR = Graham's omental patch repair; CBD = Common bile duct

Table 3. Duration of postoperative ileus between experimental and control group, n=40

Variable	Experimental group n=20 Q_2 (Q_1–Q_3)	Mean rank	Control group n=20 Q_2 (Q_1–Q_3)	Mean rank	Test score	p value
Time to presence of first bowel sound (h)	36 (24–52.5)	16.90	51 (36–75)	24.10	128.00	0.05*
Time to passage of first flatus (hours)	40.75 (24–61.75)	16.18	56.75 (46.63–83.5)	24.83	113.50	0.02*
Time to passage of first defecation (h)	60.5 (44.25–79)	16.80	73.5 (62.75–102)	24.20	126.00	0.04*
Length of hospital stay (day)	6 (4–7.75)	21.08	4 (4–8)	19.93	188.5	0.42

*Mann Whitney U test; * = Test is significant at 0.05 level; Q_1: First quartile; Q_2: Median; Q_3: Third quartile*

Table 4: Correlation between postoperative ileus and duration of surgery among two groups, n=40

Variables	Experimental group n=20		Control group n=20	
	r value	p value	r value	p value
Time to presence of first bowel sound	0.64**	0.003	0.60**	0.005
Time to passage of first flatus	0.57**	0.009	0.55*	0.012
Time to passage of first defecation	0.62**	0.003	0.66**	0.001

*r = Spearman's Rank Correlation Coefficient; ** = Correlation is significant at the 0.01 level; * = Correlation is significant at the 0.05 level*

Discussion

This study demonstrated that gum-chewing significantly reduced the duration of postoperative ileus following abdominal surgery. Patients who chewed gum experienced earlier return of bowel sounds, earlier passage of flatus, and earlier defecation compared to those who received standard care alone.

Postoperative ileus commonly occurs after abdominal surgery, particularly following bowel manipulation, and may result in nausea, vomiting, and anorexia.[15] It poses a significant burden for patients, healthcare workers, and the healthcare system. The findings of this study indicate that gum-chewing shortened the duration of postoperative ileus compared to the control group receiving standard care alone.

The mean age of participants was 41.05±13.16 years in the experimental group and 43.65±15.25 years in the control group. There was homogeneous distribution of age between groups with a non-significant p-value of 0.37, which is supported by a study where the mean age of the intervention group was 56.6±13.9 years and control group 56.2±15.7 years, showing no significant difference between groups regarding age.[16] This finding is consistent with a study conducted in New Delhi, India where the highest frequency of participants in both groups was in the age group of 40-49 years, with 6(40.0%) in the experimental group and 7(46.7%) in the control group.[17]

Gender distribution in the present study comprised 23(57.5%) males and 17(42.5%) females. This finding is supported by studies reporting 55% male participants[14] and 57.5% male participation.[18] Another study reported a majority of female participants in both experimental and control groups, with 11(73.3%) and 13(86.7%) respectively.[5] Similar findings were observed in a study with 56.23% male participants in both groups.[19]

Regarding types of surgery, more than half of the participants, 22(55%), had undergone lower gastrointestinal tract surgery. Among these, 7(58.3%) in the experimental group and 6(60%) in the control group underwent exploratory laparotomy with appendectomy. This finding

was supported by a study where all 41 patients had undergone appendectomy,[20] whereas it contradicted another study where 56 of 117(47.9%) participants had undergone right-sided colectomy.[21]

The median time to presence of first bowel sound after surgery was 36 hours (range 24-52.5 hours) in the experimental group and 51 hours (range 36-75 hours) in the control group. The median time to passage of first flatus was 40.75 hours (range 24-61.75 hours) in the experimental group and 56.75 hours (range 46.63-83.5 hours) in the control group. The median time to passage of first defecation was 60.5 hours (range 44.25-79 hours) in the experimental group and 73.5 hours (range 62.75-102 hours) in the control group. These findings are consistent with other similar studies.

A study conducted in New Delhi supported these findings, reporting that 10(66.7%) of participants in the experimental group experienced return of bowel sounds at 24 hours, compared to only 8(53.3%) in the control group at 32 hours.[17] Furthermore, that study revealed that 10(66.7%) participants passed first flatus at 24 hours after abdominal surgery, whereas in the control group, 9(60%) passed first flatus at 32 hours.[17] Similarly, another study demonstrated statistically significant differences between groups in mean duration to gas passing, defecation, and first bowel sound.[7] The first gas passing occurred at 21.05±12.8 hours and 40.8±15.9 hours postoperatively in intervention and control groups respectively. First defecation occurred at 38.1±29.8 hours and 58.25±18.6 hours postoperatively in intervention and control groups respectively. First bowel sounds were heard at 4±1.02 hours and 4.9±1.3 hours postoperatively in intervention and control groups respectively. All three differences were statistically significant.[7]

However, some studies contradict the present findings. A study reported no difference in time to first flatus (72 [66.1-82.9] hours vs 69.0 [57.6-77.2] hours, p=0.422).[22] Another study also contradicted current findings by reporting no difference in time to flatus (24 hours in control group versus 23 hours in chewing gum group, p=0.873) and time to defecation (60 versus 52 hours respectively, p=0.562).[18] These discrepancies may be attributed to differences in surgical procedures, patient populations, or postoperative care protocols across studies.

The limitations of this study include a relatively small sample size (n=40), which may limit the statistical power and generalizability of the results. The quasi-experimental design, while pragmatic, does not provide the same level of evidence as a fully randomized comparative trial and may be susceptible to selection bias. The study was conducted in a single tertiary center in Nepal, which may restrict generalizability to different patient populations, practices, or protocols. Finally, the follow-up period was limited to the immediate postoperative hospital stay, and longer-term outcomes or patient-reported measures were not assessed.

Despite these limitations, the findings of this study suggest that gum-chewing is a simple, cost-effective, and non-invasive adjunct to postoperative care that can accelerate gastrointestinal recovery. While it did not shorten hospital stay in this cohort, its benefits for patient comfort and early GI recovery support its inclusion as a routine adjunct in postoperative nursing care. Further research with larger, multicenter randomized trials in the Nepalese context is recommended to confirm these findings and evaluate the impact on hospital stay and healthcare costs.

Conclusion

This study demonstrates that gum-chewing is an effective, low-cost, and non-invasive intervention to reduce the duration of postoperative ileus following abdominal surgery. While no significant reduction in hospital stay was observed, the clinical benefits of earlier bowel function recovery support the integration of gum-chewing into standard postoperative care.

Author contribution

Concept design: SG, PP, RSM, LA, LBG, EB; Literature search: SG, LBG, EB; Data collection: SG,PP, RSM, LA; Data analysis: SG, LBG, PP, RSM, EB; Draft manuscript: SG, LBG, EB; Final manuscript: SG, PP, RSM, LA and accountability: All

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Conflict of interest

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Supplementary material

Data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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