Original Research

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A STUDY TO DETERMINE THE EFFECTIVENESS OF GUM CHEWING (NON-SUGARED) IN REDUCING POST-OPERATIVE ILEUS IN CASES OF PERFORATION PERITONITIS (PRIMARY CLOSURE)

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ABSTRACT

Background: Perforation peritonitis is one of the most prevalent and challenging surgical emergencies in India, often leading to significant postoperative complications. One such complication, as a way to stimulate gastrointestinal motility and potentially reduce the duration of postoperative ileus (POI), is characterized by a delayed return of bowel function. POI leads to prolonged recovery times, increased healthcare costs, and patient discomfort. Gum chewing, a simple and inexpensive method of "sham feeding," has been suggested in reducing POI following surgery.

Objective: To determine the effectiveness of gum chewing (non-sugared) in reducing post operative ileus in cases of perforation peritonitis undergoing primary closure.

Material and methods: This study was conducted prospectively in the Department of General Surgery, Government Medical College & Rajindra Hospital, Patiala. Data for this prospective study was sourced from postoperative patients who underwent surgery for perforation peritonitis with primary closure at Government Medical College & Rajindra Hospital, Patiala, during the period of study from 1st August 2023 to 31 July 2024. Total 60 cases were enrolled. Group A (n=30) received non-sugared gum to chew thrice daily after recovery from anaesthesia until passage of first flatus. Group B (n=30) received standard postoperative care. Outcomes accessed included appearance of bowel sounds, time to first flatus, defecation time, time to acceptance of first enteral liquid diet, and duration of hospital stay.

Results: Bowel sounds returned earlier (37.43 ± 8.43 vs. 58.76 ± 9.43 hours, $p < 0.0001$), Mean time to first flatus was 47.43 ± 7.36 hours in Group A versus 61.53 ± 6.96 hours in Group B ($p < 0.0001$)., and defecation occurred sooner (90.87 ± 3.42 vs. 110.30 ± 22.17 hours, $p < 0.0001$). Patients in Group A tolerated enteral liquid diet earlier and had a significantly shorter hospital stay (8.83 ± 2.03 vs. 11.30 ± 1.51 days, $p < 0.0001$). The mean age in group A was 42.87±7.36 years (range 19-75) and mean age in group B was 41.13±16.80 years (range 20- 80).

Conclusion: While both groups had similar age and gender distributions, postoperative patients who were given chewing gum (non- sugared) demonstrated a faster recovery trajectory across several key indicators, including time to pass flatus, defecation, resumption of normal dietary intake and had less hospital stay. Additionally, postoperative patients on chewing gum (non- sugared) experienced a shorter hospital stay and an earlier return of bowel function. Suggesting that the approach used in chewing gum group may be more effective in promoting quicker recovery following surgery, highlighting its potential benefits for patient management in similar clinical settings.

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INTRODUCTION

Perforation peritonitis is among the most frequent surgical emergencies, presenting as acute abdomen and is a major cause of mortality and morbidity therefore need prompt diagnosis and treatment. The most acknowledged protocol for treatment of patients with perforation peritonitis is resuscitation of the patient, antimicrobial therapy, intensive care and surgical procedure to remove the source of contamination as soon as possible.

Surgical intervention of choice is exploratory laparotomy that permits primary repair along with infection control [1]. Other procedures can be resection and anastomosis or repair with ileostomy/colostomy [2].

Despite improvements in perioperative care and surgical techniques, postoperative complications remain common. Among these, postoperative ileus (POI)- characterized by an inability to tolerate oral intake resulting from the disruption of the coordinated propulsive motor activities of the gastrointestinal tract with manipulation of gastrointestinal tract after surgeries, in the absence of any mechanical obstruction- represents a major obstacle to recovery.[3]

Gastrointestinal motility is regulated by a complex interaction among the central and enteric nervous systems, along with various hormonal and local factors that directly influence intestinal smooth muscle function. Disruptions in any of these pathways, often resulting from surgical trauma or manipulation of the bowel, can ultimately precipitate POI.

[4] Gum chewing is a type of sham feeding which refers to promoting gastrointestinal peristalsis by viewing, smelling, chewing, and tasting without ingesting food into the gastrointestinal tract. It stimulates intestinal motility via the cephalic vagal reflex and promotes the secretion of GI hormones involved in bowel movements. [5]

Although gum chewing has shown benefit in elective colorectal and gynaecological surgeries, its role in emergency settings like perforation peritonitis, where patients are critically ill and bowel handling is extensive,

has not been well studied [6]. This study was designed to evaluate whether postoperative gum chewing could reduce the duration of POI in patients undergoing primary closure for perforation peritonitis.

MATERIAL AND METHODS

Study Design: This was a prospective, hospital-based, randomized comparative study conducted in the Department of General Surgery, Government Medical College & Rajindra Hospital, Patiala, Punjab, from August 2023–July 2024 (12 months).

Participants: A total of 60 patients (>18 years) who underwent abdominal surgery for perforation peritonitis with primary closure were enrolled.

- **Inclusion criteria:** Patients over 18 years of age undergoing major abdominal surgery, willing to give written informed consent and no infection other than peritonitis present at the time of surgery.
- **Exclusion criteria:** Patients requiring resection-anastomosis or ileostomy, those who could not undergo randomization due to cognitive impairments like dementia or encephalopathy, high aspiration risk, pregnancy and with objective evidence of severe sepsis or multiple organ dysfunction.

Randomization: Patients were randomized into two groups (n=30 each) using sealed opaque envelopes prepared by departmental member unrelated to present study.

- **Group A**: Chewed non-sugared gum thrice daily for 2 hours each session, starting after full recovery from anaesthesia, until the passage of first flatus**.**
- **Group B:** Received standard postoperative management.

Methodology: All the patients selected for this study were assessed through detailed history and physical examination**.** They were adequately investigated for diagnosis and were subjected to exploratory laparotomy after resuscitation and antimicrobial therapy in which single layer primary closure of the perforation was done.

Data Collection: A performa was employed to gather and record information and all patients were evaluated daily with regards to appearance of bowel sounds, time to pass first flatus, acceptance of first enteral liquid diet, defection time and duration of hospital stay.

Ethical Approval: Ethical clearance was obtained from the institutional ethics committee and written informed consent was taken from all patients.

Results: The two groups were comparable with respect to age (mean 42.87 ± 7.36 years in Group A vs. 41.13 ± 16.80 years in Group B, $p = 0.60$) and gender distribution (male predominance in both groups).

Key postoperative outcomes are summarized below:

Parameter	Group A		Group B		*p* value
Appearance of bowel sounds (hours)	37.43 ± 8.43		58.76 ± 9.43		<0.0001

Time to first flatus (hours)	47.43 ± 7.36		61.53 ± 6.96		<0.0001
Time to first enteral liquid diet (hours)	71.20±7.09		81.87±7.18		<0.0001
Time to first defecation (hours)	90.87 ± 3.42		110.30 ± 22.17		<0.0001
Duration of hospital stay (days)	8.83 ± 2.03		11.30 ± 1.51		<0.0001

DISCUSSION

Postoperative ileus (POI) is a transient impairment of gastrointestinal motility following abdominal surgery, caused by non-mechanical factors that prevent adequate oral intake. POI frequently occurs in surgeries involving extensive intestinal manipulation. In recent years, gum chewing has emerged as a novel, non-pharmacological approach to mitigating POI. This practice, known as sham feeding, stimulates bowel recovery post-surgery. The mechanism behind its effectiveness includes stimulation of intestinal motility through cephalic vagal reflexes, enhancement of gastrointestinal hormone production related to bowel motility, and parasympathetic activation, which counteracts inhibitory sympathetic signals. Given its simplicity, low cost, and lack of adverse effects, gum chewing presents a promising strategy for enhancing postoperative recovery in patients at risk of ileus. Further studies are warranted to establish standardized protocols and assess its broader clinical impact.

The present study was conducted with the objective to determine the effectiveness of gum chewing(non-sugared) in shortening the duration of post-operative ileus in cases of perforation peritonitis (primary closure). The parameters like time to pass first flatus, defection time, duration of hospital stay, bowel sounds and acceptance of first enteral liquid diet were also noted.

This study examined 60 patients, of which 18 (30%) were females and 42 (70%) were males. The results showed that there was no significant difference in gender ratios of Group A and Group B; Group A included 23.33% females and 76.67% males, compared with Group B, which had 39 female representation of 36.67%, and males accounting for 63.33%. Males are affected more than females in both groups. This may be due to later presentation by males in hospital, alcohol intake, smoking, drug abuse and NSAIDS use. The statistical analysis reveals a chi-square value of 1.2698 and a p-value of 0.2598, indicating that the variations observed are not statistically significant, consistent with previous studies by Dousti M et al (2021)[7] and Bhatti S et al (2021)[8].

The mean age in Group A was 42.87 ± 7.36 years (range: 19–75), while in Group B it was 41.13 ± 16.80 years (range: 20–80). The largest proportion of participants in both groups fell within the 21–40 years age range. This indicates that younger patients are more likely to be affected due to dietary habits and higher incidence of alcohol intake, smoking and drug abuse in young patients leading to higher rates of appendicitis, duodenal perforation and other related conditions. As observed, there was no significant difference in the mean age between Group A (the intervention group) and Group B (the control group), p= 0.6053. The results of this study align with those reported by Varma KC et al. (2022)[9], which reported study group's mean age was 38.12 + 14.41 years, while the control groups were 38.08 + 14.07 years (p 0.13) and Dousti M et al (2021)[7] reported that the mean age of patients was 31.04 ± 14.08 in control group and 28.57 ± 13.39 in study group, respectively (P > 0.05). Bhatti S et al (2021)[8] found that mean patient age in chewing gum group was 26.12 (± 7.1) years and in no chewing gum group was 28.80 (± 10.5) years.

The analysis of the mean time of appearance of bowel sounds in group A was 37.43±8.43 hours (range 24-71) and in group B was 58.76±9.43 hours (range 30-74). Our results indicated a significant statistical difference between groups (p< 0.0001). This signifies that in experimental group first bowel sound was recorded significantly earlier as compared to control group. This finding suggests that in experimental group there is early return of bowel movement because of cephalovagal reflex causing parasympathetic stimulation and increasing gastric, duodenal, pancreatic secretions associated with GI motility. Similar results were noted by Kumar A et al (2018)[10], Dousti M et al (2021)[7] and Muwel S et al (2024)[11] that mean time for the appearance of bowel sounds in experimental group is significantly less.

The mean time to pass first flatus (hours)in group A was 47.43±7.36 hours (range 36-62) and in group B was 61.53±6.96 hours (range 48-72). Statistical evaluation indicated a notable difference between the groups (p< 0.0001) suggesting that the mean time for first flatus in study group is significantly less than that of the control group. This is due to the early return of gut motility in study group as compared to control group because of cephalovagal reflex causing parasympathetic stimulation and increased bowel movements. This finding aligns with Dousti M et al (2021)[7] and Muwel S et al (2024) [11] who noted that mean time is significantly shorter in the chewing gum group than the no chewing gum group.

The time for acceptance of first enteral liquid diet in group A was 71.20±7.09 hours (range 54-92) and for group B was 81.87±7.18 hours (range 60-92). The results indicated a significant statistical difference between groups (p< 0.0001). This suggests that there is early acceptance of first enteral liquid diet in study group in comparison to control group because sham

feeding decreases the length of postoperative ileus thus decreasing the nausea, vomiting and distention associated with it leading to better acceptance of first diet. Early acceptance of first diet decreases the likelihood of malnutrition and there promotes better wound healing. This also reduces the need of costly total parenteral nutrition, plus lower the expenses related to placement of central venous catheters. Study by Topcu SY et al. (2016)[12] and Muwel S et al (2024)[11] also statistically found that there is earlier initiation of feeding and early sensation of hunger in gum chewing group as compared to control group.

The mean defecation time in group A was 90.87±3.42hours (range 84-101) and for group B was 110.30±22.17 hours (range 82-150). Our analysis indicated a significant statistical difference between groups ($p< 0.0001$). Participants in study group had markedly early bowel movement i.e., shorten defection time as compared to control group. Cephalic stimulation in study group as a result of sham feeding caused increased gastrointestinal secretions which are associated with gut motility thus reducing defection time in study group. Kumar A et al (2018)[10] and Shilpa H et al (2019)[13] also reported that the time to the appearance of first stool was significantly earlier and defecation time markedly shortened by gum chewing.

In the present study the mean duration of hospital stay in group A was 8.83±2.03 days (range 6-12) and for group B was 11.30±1.51 days (range 8 14). The analysis conducted showed that the mean hospital stay of interventional group was significantly less than that of control group ($p< 0.0001$). These findings suggest that patients in the experimental group experienced earlier discharge than those in the control group. Chewing gum significantly reduced postoperative ileus in the experimental group, promoting earlier bowel movements, faster recovery, and quicker mobilization. These factors collectively shortened the duration of illness and reduced the overall length of hospital stay, resulting in earlier discharge. Similar results were noted by Varma KC et al. (2022)[9], Bhatti S et al (2021)[8] and Muwel S et al (2024)[11] that the experimental group had an earlier discharge and a shorter hospital stay compared to the control group, with the difference being statistically significant.

Limitations: The sample size was modest and the study was conducted at a single centre. Larger multicentre trials would provide stronger evidence.

CONCLUSION

In this study, comparisons between the groups revealed significant differences in postoperative recovery outcomes. While both groups had similar age and gender distributions, postoperative patients who were given chewing gum (non- sugared) demonstrated a faster recovery trajectory across several key indicators, including time to pass flatus, defecation, resumption of normal dietary intake and had less hospital stay. Additionally, postoperative patients on chewing gum (non- sugared) experienced a shorter hospital stay and an earlier return of bowel function. These results suggest that the approach used in chewing gum group may be more effective in promoting quicker recovery following surgery, highlighting its potential benefits for patient management in similar clinical settings. In addition, studies that involve multicentric patient enrolment would enhance the applicability of the findings to broader populations.

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