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Review Article

The Effect of Gum Chewing on Gastrointestinal System Functions in Patients Undergoing Colorectal Surgery: A Systematic Review

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Abstract

In the postoperative period, gas and secretions in the stomach and small and large intestines due to delayed motility of the gastrointestinal system cause abdominal bloating, nausea, vomiting and pain, and this situation negatively affects the comfort level of patients. Chewing gum is among the methods used to prevent ileus after surgery. Chewing gum activates the cephalic vagal reflex and stimulates bowel function in the postoperative period. In this article, the effect of chewing gum in preventing ileus after colorectal surgery and the factors affecting the success rate are reviewed in the light of current literature.

Keywords: Ileus, chewing gum, colorectal surgery, cephalic vagal reflex, postoperative period.

ENTRANCE

Loss of gastrointestinal function (ileus) is a common problem after abdominal surgery (Takagi 2012). Returning gastrointestinal function to normal is an important factor in the speed of postoperative recovery. Gum chewing, also known as a pseudo-feeding method, stimulates intestinal motility after colorectal surgical interventions with a mechanism similar to early feeding, allowing motility to start 20-30 hours earlier on average, preventing vomiting and related aspiration that may occur during early feeding, and preventing the development of complications such as lung problems and/or anastomotic leakage (Gustafsson *et al*., 2013; Marwah *et al*., 2012; Takagi *et al*., 2012). Postoperative chewing gum accelerates intestinal motility by increasing cephalic-vagal reflexes and activating GI hormones, and indirectly helps prevent the development of postoperative ileus (Keenahan, 2014; Fanning and Valea 2011). Delayed gastrointestinal functional recovery prolongs hospitalization by causing abdominal tenderness, abdominal pain, nausea and vomiting, and in severe cases, abdominal compartment syndrome. Chewing gum increases the production of gastric juice and other digestive fluids without the need for the intestines to digest any food. It can help prevent problems experienced by patients who start feeding early after surgery (Riad *et al*., 2019). Chewing gum, which is a relatively new and simple approach to preventing ileus, a difficult complication to manage after surgery, has been reported in many meta-analyses, systematic reviews and clinical studies to stimulate intestinal motility, especially after abdominal surgeries and colorectal surgical interventions where the intestines are manipulated at frequent intervals, thus shortening the time for gas, stool and discharge after surgery and helping to prevent its development (Wallström & Frisman, 2014; Li *et al*., 2013; Ramirez *et al*., 2013; Berghmans *et al*., 2012). In addition to ensuring and maintaining the individual's postoperative evacuation activity, preventing the development of ileus after surgery is an important goal in terms of ensuring comfort and regulating nutrition. In recent years, chewing gum has begun to be used as a form of pseudo-feeding in order to accelerate intestinal motility through both humoral and nerve stimulation after abdominal surgery (Keenahan, 2014; Craciunas 2014). It is emphasized that chewing gum, which is reported to have a positive effect on gas and stool discharge times, can be used especially after colorectal/pelvic surgical interventions, and is an evidence-based, cheap, easily applicable and well-tolerated practice reported in perioperative care guidelines including ERAS protocols (Gustafsson *et al.*, 2013; Nygren *et al.*, 2013). The aim of this study is to determine the effect of chewing gum on gastrointestinal system functions after surgery in patients undergoing colorectal surgery.

MATERIAL METHOD

This systematic review examined 18 studies published between January 15, 2011 and April 15, 2023. The databases were searched using the keywords “Pubmed”, “EBSCO”, “Med-LINE” and “SCOPUS”; “gastrointestinal function”, “chewin gum”, "postoperative recovery", "nursing”. The titles and abstracts of all articles identified through electronic search were examined by the researcher. The full texts of the studies were examined to investigate whether the authors, year, title, abstract, material, method and sample of the studies met the inclusion criteria. Although the number of articles examined in the study was 18, 12 articles that met the inclusion criteria were included in the study.

Research Inclusion Criteria

- It was planned and conducted as a randomized controlled trial on postoperative gastrointestinal function.
- Access to the full text of the study
- The broadcast language is Turkish or English
- It was published between 2011-2023

Research Exclusion Criteria

- Case reports
- Guides
- Retrospective and prospective cohort studies
- Retrospective descriptive studies

Process Steps

- “Pubmed”, “EBSCO”, “Med-LINE” and “SCOPUS” electronic databases were searched with the keywords “Gastrointestinal Function”, “Chewin Gum”, "Postoperative Recovery", "Nursing”.
- A total of 24 studies were reached.
- Studies were listed and reviewed according to the inclusion criteria.
- The 12 articles that met the inclusion criteria were evaluated in terms of limitations and results.

Data Analysis

The content of the 12 articles evaluated in this study;

- The time it takes for patients' gastrointestinal functions to return to normal after surgery
- Effect of prolonged postoperative fasting on GI motility
- Is there a relationship between the duration of postoperative fasting and the return of GI motility?
- Is there a difference in GI functions during and after surgery between patients who were fasted for a long time after surgery and those who were given any beverages?
- Is there a difference in GI functions and complications (nausea, vomiting, aspiration) between patients who were given water, carbohydrate drinks, and gum after surgery and those who had oral restrictions?
- Whether the amount of fluids given after surgery, as well as their content, has an effect on GI motility and complications
- It has been investigated whether it is necessary to fast for a long period before surgery to prevent complications (nausea, vomiting, aspiration pneumonia, etc.) during and after surgery and to ensure patient comfort.

FINDINGS

Postoperative pain, nausea, ileus, increased cardiac load, and respiratory dysfunction increase morbidity rates after cesarean section (Yenigul *et al*., 2020). Delay in mobilization and early enteral feeding may lead to postoperative complications such as prolonged hospital stay (Yenigul *et al*., 2020). Medical (reducing the amount of systemic inflammation, using gastrointestinal prokinetic agents to increase intestinal motility, nonsteroidal anti-inflammatory drugs (NSAIDs) and laxatives to reduce opioid use) and nursing practices (restricting nasogastric tube application, applying abdominal massage, informing the patient about the surgical process, as well as interventions such as early initiation of feeding, early postoperative hydration, and chewing gum) aimed at ensuring that bowel movements return in a short time gastrointestinal complications are reduced (Lee *et al*., 2016). There are theories about the early start of bowel movements. One of these theories is fake food eating. Chewing is an event that starts voluntarily and continues as a reflex. The contact of food with the mucosal cells in the digestive tract or chemical irritation of the mucosa activates the enteric nervous system, and the mucosal glands are stimulated. Stretching of the intestine causes neural reflexes that stimulate secretion. Touch, chemical stimulation or stretching increases bowel movements, and movement increases secretion (Altraigey *et al*., 2020). For this reason, activation of bowel movements is achieved by chewing gum at certain intervals in the postoperative period. Gastrointestinal complications are common after abdominal surgeries. In clinics, different practices such as early oral intake, early mobilization, early fluid intake and chewing gum are used to prevent gastrointestinal complications. Different studies have been conducted to determine the effect of gum chewing on intestinal peristalsis (Table 1).

The effect of chewing gum can be seen as pseudofeeding, which activates the cephalovagal tract and enables faster recovery of gastrointestinal system function after colorectal surgery (Li *et al*., 2016). Many researchers have suggested Enhanced Recovery after Surgery (ERAS) in the perioperative period because ERAS increases postoperative intestinal motility with some rehabilitation approaches, such as removing nasogastric tubes as soon as possible after surgery, early feeding, and early walking (Wijk *et al*., 2014). However, in clinical practice, since many patients cannot tolerate

diet immediately after abdominal surgery, few doctors encourage patients to eat early after surgery. As a result, chewing gum, which can be seen as pseudofeeding, seems to be a better alternative. Chewing gum can effectively trigger gastrointestinal hormone release and increase intestinal motility without feeding. In addition, patients readily accept this treatment method after abdominal surgery (Liu *et al*., 2017).

Table 1: Some Studies Examining the Effect of Gum Chewing After Abdominal Surgeries

The person who implemented the study	Study draft	Number of samples (study group/control group/anesthesia type)	Use duration	Intestines over effect	First Gas (study group/control group)
Takagi (2012)	Randomized controlled study	23/21 (general anesthesia)	From the operation 2 hour later 3 times a day for 1 hour	Gastrointestinal early onset of function provided.	3.09 days / 3.86 days
Marwah S., Singlan S. And Tinna P. (2012)	Randomized controlled study	50/50 (general anesthesia)	Post-op 6 hours later 3 times a day for 1 hour	Gastrointestinal early onset of function provided.	17 hours/24 hours
Ramirez J *et al*., (2013)	Randomized controlled study	150/150 (unspecified)	From the operation 2 hour later discharge to what happened 4 times a day for 10-15 minutes until	Gastrointestinal early onset of function provided.	12 hours/24 hours
Li, S., Liu, Y., Peng, Q., Xie, L., Wag, J., Qin, X. (2013)	Meta Analysis	1736/17 RCT (General Anesthesia)	Post-op 8 hours later 1 day 30 min	Gastrointestinal early onset of function provided.	18 hours/32 hours
Wronsky S. (2014)	Randomized controlled study	58/62 (general anesthesia)	Post-op 8 hours later 2 days 45 min	Gastrointestinal early onset of function provided.	19 hours/32 hours
Berghmans, TMP, Hulsewe, KWE, Buurman, WA, Luyer, MDP (2012).	Randomized controlled study	120 (general anesthesia)	Post-op 4 hours later 1 day 1 hour	Gastrointestinal early onset of function provided.	11 hours
Craciunas L, Sajid Ms, Ahmed As. 2014.	Randomized controlled study	728/734 (general anesthesia)	Post-op 6 hours later 3 times a day for 30-60 minutes	Gastrointestinal early onset of function provided.	17 hours/36 hours
Riad, NA, Masry, SE, Elwan, WM, & Khalil, AK (2019)	Randomized controlled study	75/75 (not specified)	Post-op 4 hours later 1 day 30 min	Gastrointestinal early onset of function provided.	23 hours/41 hours
Yenigul *et al*., (2019)	Randomized controlled study	75/75 (spinal anesthesia)	At the 3rd, 5th and 7th hours after the operation 30 minutes	Gastrointestinal early onset of function provided.	11.73 hours/14.10 hours
Altrailey *et al*., (2020)	Randomized controlled study	372 people, 3 separate groups (gum chewing, hospital protocol, control/anesthesia type not specified)	2 hours after the operation, 30 minutes every 2 hours for 8 hours (except at night)	Gastrointestinal early onset of function provided.	18 hours / 29.9 hours
Lee (2016)	Randomized controlled study	120 people in 3 separate groups	From Operation2 hour later 1 hour Search with 15 every minute (09:00 20:00 hours between)	Gastrointestinal early onset of function provided.	16.6 hours/ 17.5 hours/ 24.3 hours
Kamala *et al*., (2015)	Randomized controlled study	54/44 (general and regional anesthesia)	30 6 times a day min along	Gastrointestinal early onset of function provided.	7 hours/9 hours

ARGUMENT

The start of gastrointestinal function in the postoperative period is clinically important. Because the patient may develop pain, nausea, vomiting, respiratory dysfunction and paralytic ileus (Kamalak *et al*., 2015). Since intestinal functions do not start in the early postoperative period, patients may have difficulty in passing gas and stool. One of the interventions applied to stimulate intestinal functions in the postoperative period is early feeding or chewing gum (Keenahan, 2014;

Craciunas 2014). Chewing gum stimulates intestinal motility by imitating food intake (Gustafsson *et al*., 2013; Nygren *et al*., 2013). Studies have shown that chewing gum after abdominal surgery accelerates the time for passing gas and stool.

The effect of chewing gum can be seen as pseudofeeding, which activates the cephalovagal tract and enables faster recovery of gastrointestinal system function after colorectal surgery (Li *et al*., 2016; Ho *et al*., 2014). Many researchers have proposed Enhanced Recovery After Surgery (ERAS) in the perioperative period because ERAS increases postoperative intestinal motility with some rehabilitation approaches, such as removing nasogastric tubes as soon as possible after surgery, early feeding, and early walking (Gustafsson *et al*., 2012; Wijk *et al*., 2014). However, in clinical practice, since many patients cannot tolerate diet immediately after abdominal surgery, few physicians encourage patients to eat early after surgery. Consequently, chewing gum, which can be seen as pseudofeeding, seems to be a better alternative. Chewing gum can effectively trigger gastrointestinal hormone release and increase intestinal motility without feeding (Xu *et al*., 2018).

Additionally, oral stimulation and chewing may stimulate the vagus nerve, which plays a role in promoting peristalsis. Finally, none of the current theories adequately explain the effect of chewing/chewing gum on reducing postoperative inflammation in the gut, which may lead to a lower incidence of postoperative infections. Previous studies have shown that the physiological changes associated with gum chewing support normal gastrointestinal function and subsequent postoperative/anesthetic recovery (van den Heijkant *et al*., 2015; Yang *et al*., 2018). Gum chewing itself appears to elicit paradoxical physiological responses. For example, one study showed that chewing unpleasant gum during a stressful experience stimulated the sympathetic nervous system, which was reflected in increased heart rate in subjects (Walker *et al*., 2016). Conversely, another study demonstrated a parasympathetic response to gum chewing, leading to increased peristalsis and gastrin secretion (Ohta *et al*., 2017). Although findings are inconsistent, postoperative gum chewing has been most frequently investigated in the literature in the context of recovery from surgical procedures such as colorectal cancer resection (Liu *et al*., 2017; Yang *et al*., 2018), cesarean section (Altraigey *et al*., 2020; Lee *et al*., 2018), and bladder cystectomy (Choi *et al*., 2011). Some studies have demonstrated that gum chewing after colorectal resection reduces the initial postoperative gas and defecation time (Liu *et al*., 2017; van den Heijkant *et al*., 2015) and reduces the risk of postoperative ileus (Liu *et al*., 2017).

Clinically, the noninvasive nature of the gum chewing intervention achieved a high acceptance rate among participants. Saliva secretion increases during gum chewing, which moisturizes the oral mucosa and throat and improves comfort (Hsu *et al*., 2022)

CONCLUSION

In conclusion, evidence-based nursing practice enables nurses to look critically and determine whether practices are based on research evidence, clinical knowledge, or traditional understanding. In patients undergoing colorectal surgery, chewing gum after surgery has been found to help with early gas and stool release. In addition, patients readily accept this treatment method after abdominal surgery. As a result of this review, it has been recommended that chewing gum should be routinely applied in clinics because it has no side effects and is therefore a useful, safe, inexpensive, and easily applicable method for transitioning to early feeding after surgery.

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