A review on reducing the incidence of postoperative ileus by chewing gum, consuming coffee or warm water post abdominal surgery

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INTRODUCTION

Postoperative ileus, gastric distension, and abdominal distension are the most common occurrence in abdominal surgery 1,2. Postoperative ileus is the occurrence of two periods of nausea and vomiting or more, more than 24 hours of tolerance to the diet, flatus does not appear more than 24 hours, and abdominal distension 3. Postoperative ileus and abdominal distension increase due to prolonged abdominal distension, nausea, vomiting, abdominal pressure, cramps, and pain in the patient, which causes prolonged recovery process 4,5. Protracted postoperative ileus can reduce patient comfort, increase morbidity, mortality, and increase the length of hospital stay, higher maintenance costs, and delayed first food intake and failure of mobilization 6. Several strategies and interventions have been carried out to prevent postoperative ileus both pharmacologically and non-pharmacologically, such as early mobilization and giving mineral water two hours after surgery but these interventions have not been effective in reducing postoperative ileus in abdominal surgery 6,7.

Postoperative ileus reported as 10 to 30% occurring in cases of abdominal surgery, according to previous studies, the incidence is different from one survey to another 7-14. Postoperative ileus in Korea reported to be around 17.4% - 24% is a common complication that occurs after major abdominal surgery 15. Postoperative ileus incidence has happened in post-laparotomy gynecological surgery patients in China 16%. An average of 10% -30% of post abdominal surgery patients have postoperative ileus 17. Postoperative ileus in colorectal surgery was 14%, research conducted in the USA 18. Postoperative gastric patients in Indonesia, approximately 30%-50%, experienced
prolongation of bowel sounds, and flatus 24 to 72 hours. Postoperative ileus problems cannot be resolved four days after surgery reported about 50% of events and will become prolonged postoperative ileus (PPOI) if not resolved for more than five days.

Postoperative ileus can increase due to pain fiber stimulation, excessive sympathetic nerve stimulation, and stress response that is influenced by nitric oxide release, intestinal vasoactive peptide, and P substance. These mechanisms occur because of the reaction of inhibited neurotransmitter in the abdomen manipulated and peritoneal irritation. Postoperative ileus symptoms include abdominal discomfort, nausea, and vomiting, which are the leading causes of delayed enteral diet and patient recovery. The factors affecting are visceral manipulation, inflammatory mediators, anesthetics, and giving opioids to reduce pain. Risk factors that can increase the incidence of postoperative ileus are cigarette users, low body weight, oral antibiotics in pre-surgery, preparation for abdominal repair, and surgery. Patients with postoperative ileus will cause delayed oral food intake, wound healing, decreased immune system, increased septic complications, and hospital stay. It is essential to restore the digestive system function of postoperative patients to normal as soon as possible and prevent postoperative ileus.

The most important part of postoperative patient care that nurses must do is increasing the prevention of postoperative complications. Some studies suggested that the prevention of postoperative complications can reduce complications and problems in postoperative care. Nursing interventions provided to prevent complications of the digestive system include exercise in patients, pain management, early postoperative mobilization, initiation of initial oral intake, and hospital stay. It is essential to restore the digestive system function of postoperative patients to normal as soon as possible and prevent postoperative ileus. Responses of giving warm water to postoperative patients also have positive effects on intestinal motility such as, eliminating gastrointestinal spasm and restoring intestinal peristalsis. Giving a little water to the patient undergoing bile duct surgery during the early postoperative stage is useful in regaining digestive function and preventing oral complications. The next intervention that also provides health benefits is coffee, and research showed that consuming coffee after colectomy surgery is safe and can restore intestinal motility quickly.

Based on the evidence-based on some literature on abdominal postoperative interventions, this systematic review was done to gather evidence that chewing gum, consuming coffee, and warm water can reduce postoperative intestinal ileus. The previous systematic review only discussed the benefits of chewing gum or drinking coffee only, while in this systematic review discussed together with the intervention of chewing gum, drinking coffee, and warm water to reduce post-operative ileus.

METHOD

Search strategy
We used PRISMA statement guidelines in preparing this systematic review. We searched the articles through the Scopus, Sciencedirect, Proquest, and Oxford database, by using the keywords "chewing gum" OR "coffee" OR "warm water" AND "postoperative" (Table 1).

<table>
<thead>
<tr>
<th>Find the database</th>
<th>Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sopus = 32</td>
<td>chewing gum &quot;OR&quot;</td>
</tr>
<tr>
<td>Science Direct = 63</td>
<td>coffee &quot;OR&quot;</td>
</tr>
<tr>
<td>Proquest = 98</td>
<td>warm water &quot;AND&quot;</td>
</tr>
<tr>
<td>Oxford = 22</td>
<td>Postoperative</td>
</tr>
</tbody>
</table>

Study Selection
The articles we chose were the original articles published in the last five years (2015-2019). The articles discuss the intervention of chewing gum or consuming coffee or warm water to reduce postoperative ileus in post abdominal surgery patients. Paper that uses the Randomized Control Trial (RCTs) research method included, and we exclude articles that discuss chewing gum or consuming coffee or warm water combined and or compared with other interventions.

Data extraction
The articles criteria included in this systematic review were (1) articles related to the prevention of postoperative ileus, (2) the patient's criteria were postoperative abdominal patients, (3) the interventions carried out by giving chewing gum, warm water and coffee, (4) The expected research results are the first time bowel noise, flatus, defecation and length of stay (LOS).

RESULTS
The article search results obtained 215 articles consisting of 32 Scopus articles, 63 Science Direct articles, 98 Proquest articles, and 22 Oxford articles. The identification was according to the inclusion and exclusion criteria contained 11 items on the chewing gum intervention, six reports on coffee, and warm water intervention. The remaining 194 items excluded because they were not original articles, in the form of systematic reviews, did not use the RCTs method, in combination with other interventions, and the respondents were not postoperative abdominal patients. The expected results in 17 articles that have identified showed improvement in the first time bowel sounds, flatus, defecation, and LOS.
**Study characteristics**

The article selection process has included in the PRISMA flow diagram presented in figure 1, and sample characteristics, intervention, outcome, and result in the included studies described in table 2. The sampling of selected articles in this systematic review was carried out for five months to 1 year, from January to December 2010-2017 and obtained 200 to 1000 samples, because there was a drop out in the study, the respondents became 20-975 in each group.

The selected articles in this systematic review used the division of intervention and nonintervention group; there were also articles which consisted of 3 groups. Fourteen paper was composed of two groups, including an intervention group and a nonintervention group. The intervention group, and the nonintervention group with standard postoperative interventions. The regular gum-chewing group, and the nicotine gum-chewing group. The coffee-drinking group and the control group. The second articles were the coffee drinking group with caffeine, the decaffeinated coffee drinking group, and the drinking water group, and the third articles were the chewing gum group, the coffee-drinking group, and the warm water-drinking group.

Interventions on these patients carried out in several countries, including Korea, Japan, Turkey, Iran, Australia, Thailand, Taiwan, the Netherlands, the United Kingdom, and the USA. The following inclusion criteria patients over 18 years old, scheduled to be open elective or laparoscopic bowel surgery, fasting for 8 hours preoperative, stable vital signs, no general complications during surgery, no history of diabetes, hypothyroidism, neuromuscular disease, diarrhea, chronic constipation, abdominal irritation syndrome, gastroesophageal reflux and exclusion criteria for swallowing difficulty or risk of choking (post-stroke), risk of aspiration, planned stoma, cognitive impairment, history of analgesic use, electrolyte imbalance, pneumonia or peritonitis, history of abdominal surgery, postoperative complications, dental problems, wearing dentures, not understanding informed consent, patients with acute or chronic cardiovascular disease, liver disease, kidney disease, pregnancy, breastfeeding, patients with sudden surgery, and hypersensitive to coffee.
<table>
<thead>
<tr>
<th>Author</th>
<th>Sample</th>
<th>Intervention</th>
<th>Outcome</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manal Hamet Mahmoud, Safaa Hussein Mohammad</td>
<td>Appendectomy (240)</td>
<td>Chewing gum - Time: 2 hours postoperation, Duration: 15 minutes, Frequency: every 2 hours until flatus</td>
<td>Bowel sound; Feeling hunger; Flatus; Defecation; Length hospital stay.</td>
<td>Shortened digestive function and reduce postoperative ileus symptoms</td>
</tr>
<tr>
<td>Lee H, Cho CW, Yoon S, Suh K, Ryu GH</td>
<td>Liver Transplantation</td>
<td>Chewing gum - Time: postoperative, Duration: 15 minutes, Frequency: 3 times a day</td>
<td>Flatus; Sips water; Diet; Energy intake; Length hospital stay</td>
<td>Postoperative ileus and oral intake do not shorten</td>
</tr>
<tr>
<td>Pilevarzadeh M</td>
<td>Cholecystectomy surgery (40)</td>
<td>Chewing gum - Time: full consciousness postoperative, Duration: 20 minutes, Frequency: 3 times a day until oral intake</td>
<td>Bowel sound; Flatus; Defecation</td>
<td>Time bowel sound, flatus, and defecation reduced</td>
</tr>
<tr>
<td>Lee JT, Hsieh M, Cheng P, Lin J</td>
<td>Caesarean section (120)</td>
<td>Chewing gum - Time: 2 hours postoperation, Duration: 15 minutes</td>
<td>Bowel sounds; Flatus; Defecation</td>
<td>Faster flatus time, shorter defecation time and bowel sound</td>
</tr>
<tr>
<td>E. M. De Leede, N. J. Van Leersum, H. M. Kroon, V Van Weel, J. R. M. Van Der Sijp, B. A. Bonsing</td>
<td>Elective laparotomy or laparoscopic intestinal resection or non-intestinal surgery by laparotomy (2000)</td>
<td>Chewing gum - Time: day of operation, Duration: 30 minutes, Frequency: 3 time until hospital discharge</td>
<td>Length of stay; Intestinal recovery; Complications</td>
<td>Length of stay and intestinal recovery do not shrink, and complications reduced</td>
</tr>
<tr>
<td>C. M. Byrne, A Zahid, J. M. Young, M. J. Solomon, C. J. Young</td>
<td>Elective open or laparoscopic bowel surgery</td>
<td>Chewing gum - Time: postoperation, Duration: 15 minutes, Frequency: 4 times a day until a normal bowel motion</td>
<td>Length of stay; Flatus; Bowel motion; Digestive function return</td>
<td>Digestive function return faster, and analgesic use reduced</td>
</tr>
<tr>
<td>Nathawong E, Sangkomkamhang U, Sangkomkamhang T</td>
<td>Laparotomy for benign gynecologic diseases (112)</td>
<td>Chewing gum - Time: 6 hours postoperatively, Duration: 15 minutes, Frequency: every 4 hours until flatus</td>
<td>Flatus; Liquid tolerate; Diet; Nausea; Vomiting; Anti-emetic requirement</td>
<td>Flatus time, diet and vomiting reduced. Liquid tolerance time, nausea, anti-emetic and length hospital stay are short</td>
</tr>
<tr>
<td>Author</td>
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<tr>
<td>Lambrichts DP V, Boersema GSA, Tas B, Wu Z, Menon AG</td>
<td>Elective oncological colorectal surgery (40)</td>
<td>Chewing gum Time: 2 hours preoperation and half an hour at a time postoperation Frequency: 3 times a day postoperation until defecation and solid food tolerance</td>
<td>Defecation; Solid food toleration; Flatus; Length of stay; Postoperative complications; Postoperative mortality; Postoperative opioid use; Pain score; Nausea; Regurgitations; Vomiting; Chewing gum use; Inflammatory parameters (e.g., CRP, WBC, and IL-6); Blood Pressure; Body temperature Heart Rate; Length of stay; Bowel movement; Flatus; Bowel sounds; Defecation</td>
<td>Defecation, solid food toleration, flatus, length of stay, postoperative complications, inflammatory parameters, and postoperative complications are short</td>
</tr>
<tr>
<td>Atkinson C, Penfold CM, Ness AR</td>
<td>Elective colorectal resection: colorectal neoplasia (invasive cancer or dysplasia), ulcerative colitis or diverticular disease (402)</td>
<td>Chewing gum Time: 1st postoperative morning Duration: 10 minutes, Frequency: 4 times a day for five consecutive days or until discharge (if less than five days)</td>
<td>Intestinal function or length hospital stay cannot return with chewing gum intervention</td>
<td>Paralytic ileus is reduced</td>
</tr>
<tr>
<td>Yildizeli S, Deniz S</td>
<td>Cholecystectomy (40)</td>
<td>Chewing gum Time: after full consciousness Duration: 20 minutes Frequency: each time after until oral intake</td>
<td>Bowel sounds; Flatus; Defecation</td>
<td>Time to first flatus is reduced</td>
</tr>
<tr>
<td>Rabiepoor S, Yas A, Navaei J, Khalikhali HR</td>
<td>Elective cesarean section (100)</td>
<td>Coffee Time: 8, 12 and 20 hours postoperative, Control group; Dosis: 100 cc coffee</td>
<td>Bowel sound; Flatus; Defecation; LOS</td>
<td>Bowel movement and of solid food tolerance decreases with decaffeinated coffee intervention, but flatus does not decrease</td>
</tr>
<tr>
<td>Dulskas A, Klimovskij M, Vitkauskienë M, Samalavicius NE</td>
<td>Elective laparoscopic left-sided colectomy</td>
<td>Coffee Group 1 Time: postoperative morning; Dosis: 100 ml coffee with caffeine 100; Frequency: 8:00 AM, 12:00 PM, and 4:00 PM until a bowel movement Group 2 Time: postoperative morning; Dosis: 100 ml coffee without caffeine; Frequency: 8:00 AM, 12:00 PM, and 4:00 PM Group 3 Time: postoperative morning; Dosis: 100 ml water; Frequency: 8:00 AM, 12:00 PM, and 4:00 PM until bowel movement</td>
<td>Bowel movement (time from postoperative until defecation); Solid food tolerance (no vomiting); Flatus</td>
<td>Bowel movement and of solid food toleration decreases with decaffeinated coffee intervention, but flatus does not decrease</td>
</tr>
<tr>
<td>Author</td>
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<tr>
<td>Goymen A, Simsek Y, Oskaplan SE</td>
<td>Caesarean section (100)</td>
<td>Group 1</td>
<td>Flatus and defecation</td>
<td>Reduced by chewing gum dan coffee intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chewing gum</td>
<td>Time: 2 hours postoperative; Frequency: 4-hour intervals until defaecation</td>
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<tr>
<td></td>
<td></td>
<td>Group 2</td>
<td>Coffee</td>
<td>Time: 2 hours postoperative; Dosis: 100 ml; Frequency: 3 times a day until defaecation</td>
</tr>
<tr>
<td>Hayashi K, Tsuruoda A, Shirashi A, Kusanagi H</td>
<td>LVR (laparoscopic ventral rectopexy) (46)</td>
<td>Group 1</td>
<td>Radiopaque</td>
<td>Bowel movement return faster with coffee intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coffee</td>
<td>Flatus</td>
<td>Defecation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time: 5 hours postoperative</td>
<td>Dosis: 100 ml (50-60 °C)</td>
<td>Frequency: 3 times daily at 9:00 AM, 1:00 PM, and 5:00 PM (1st day postoperative) until defecation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group 2</td>
<td>Water</td>
<td>Time: 5 hours postoperative</td>
</tr>
<tr>
<td>Caliskan N, Bulut H, Konan A.</td>
<td>Laparoscopic cholecystectomy surgeries (60)</td>
<td>Warm water</td>
<td>Nausea/vomiting</td>
<td>Warm water reduces the first time of flatus and has a good effect on the bowel movement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time: 4 hours postoperative</td>
<td>Flatus</td>
<td>Defecation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dosis: 200 ml at 98.6°F (37 °C)</td>
<td>Duration: 15 minutes</td>
<td></td>
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<tr>
<td>Kemal G, Isa Aykut O. M, Ozgu G., Varol G., Mehmet G., Muzaffer S.</td>
<td>Abdominal hysterectomy and bilateral salpingo-oophorectomy (114)</td>
<td>Coffee</td>
<td>Flatus</td>
<td>Intestinal motility and solid diet tolerance are faster with coffee intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time: postoperative morning</td>
<td>Defecation</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Dosis: 100 mL</td>
<td>Bowel movement</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Frequency: 10:00 AM, 3:00 PM, and 7:00 PM</td>
<td>Solid diet tolerance</td>
<td></td>
</tr>
</tbody>
</table>
The result of 11 articles on chewing gum intervention showed the first time bowel noise, flatus, defecation, and LOS faster than standard hospital interventions. First study got the first time bowel sounds in the intervention group (mean = 10.05, SD = 1.44) faster than the control group (mean = 15.22, SD = 2.02), first time flatus in the intervention group (mean = 19.46, SD = 1.87) faster than the control group (mean = 24.43, SD = 1.80), the first defecation in the intervention group (mean = 19.74, SD = 1.84) faster than the control group (mean = 31.03, SD = 8.28), LOS time in the intervention group (mean = 28.81, SD = 12.13) faster than the control group (mean = 35.63, SD = 7.32) 29.

The second study found the results of the first time flatus in the intervention group (69.0 (66.1-82.9) hours) faster than the control group (72.0 (57.6-77.2) hours), the LOS time in the intervention group (21 (15-37) days) more quickly than the control group (26 (16-42) days) 30. The third study found that the first flatus time in the intervention group (21.05 ± 12.8 hours) was faster than the control group (40.8 ± 15.9 hours), the first time defecation in the intervention group (38.1 ± 29.8 hours) was faster than the control group (58.25 ± 18.6 hours). The first time bowel noise in the intervention group (4 ± 0.02 hours) was faster than the control group (1.9 ± 1.2 hours) 31.

The fourth study found that the first time bowel noise in the intervention group of chewing xylitol gum (6.9 ± 1.7 hours) faster than the intervention group of chewing regular gum (8.0 ± 1.6 hours) more quickly than the control group (12.8 ± 2.5 hours). The first time flatus in the intervention group of chewing xylitol gum (16.6 ± 2.9 hours) faster than the intervention group of chewing regular gum (17.5 ± 2.6 hours) more quickly than the control group (24.3 ± 4.5 hours), the first time defecation in the intervention group of chewing Xylitol gum (42.2 ± 5.6 hours) was faster than the intervention group of chewing regular gum (42.4 ± 6.2 hours) faster than the control group (43.4 ± 6.9 hours) 32.

The fifth study found the first time flatus in the intervention group (23 (14-45) hours faster than the control group (24 (13-48) hours), the first time defecation in the intervention group (52 (29-79) hours) faster than the control group (60 (25-88) hours). The LOS in the intervention group (7 (5-10) days) was the same as the control group (7 (5-10) hours) 33. The sixth study got the results of the first time flatus in the intervention group (42.0 (2.9) hours) was faster than the control group (58.0 (8.2) hours), LOS in the intervention group (5.8 days) was faster than the control group (6.1 days) 34.

The seventh study got the results of the first time flatus in the intervention group (20.3 ± 8.4 hours) faster than the control group (27.3 ± 7.9 hours), LOS in the intervention group (6.1 ± 0.3 hours) more quickly than the control group (6.1 ± 0.4 hours) 35. The eighth study found the first time flatus in the intervention group of chewing nicotine gum (1.00 [1.00-1.00] hours) faster than the intervention group of chewing regular gum (1.00 [1.00-22.25] hours), the first time defecation of intervention group of chewing nicotine gum (3.00 [1.75-4.00] hours) faster than the intervention group of chewing regular gum (3.00 [1.75-5.00] hours), LOS in the intervention group of chewing nicotine gum (4.50 [4.00-6.00] days) faster than the intervention group of chewing regular gum (5.50 [4.00-8.50] days) 36.

The ninth study found that the first time bowel noise in the intervention group (2 (1-3) hours) was the same as the standard intervention group (2 (1-3) hours), the first time flatus in the intervention group (2 (2-3) hour) is the same as the standard intervention group (2 (1-3) hours). LOS in the intervention group (2 (1-3) hours) was faster than the standard intervention group (3 (1-4) hours) 37. The tenth study got the results of the first time flatus in the intervention group chewing gum (42.33 ± 1.42 hours) faster than the control group (49.20 ± 1.42 hours), the results of the first time defecation in the intervention group chewing gum (68.07 ± 2.36 hours) faster than the control group (78.37 ± 1.62 hours) 37.

The eleventh study got the result of the first time flatus in the intervention group (51.07 ± 19.63 hours) faster than the control group (87.83 ± 25.89 hours). The first time defecation in the intervention group (73.33 ± 30.29 hours) were faster than the control group (137.20 ± 44.05 hours), and LOS in the intervention group (7.63 ± 1.47 faster than the control group (9.47 ± 2.67 hours) 38.

**Coffee and warm water**

There were six articles on coffee and mild water intervention. First, the first study found that the first time bowel noise in the coffee intervention group (5.84 ± 1.41 hours) was faster than the warm water intervention group (6.16 ± 1.33 hours). The first time flatus in the coffee intervention group (17.28 ± 4.44 hours) faster than the warm water intervention group (22.54 ± 5.09 hours), the first time defecation in the coffee intervention group (37.22 ± 16.31 hours) was faster than the warm water intervention group (36.82 ± 16.35 hours) 39.

The second study found that the first time bowel noise in the decaffeinated coffee intervention group (3.00 ± 1.50 hours) was faster than the caffeine coffee intervention group (3.75 ± 1.53) shorter than the drinking water group (4.14 ± 1.15). The time first flatus in the decaffeinated coffee group (1.47 hours) was faster than the caffeine coffee group (1.57 hours) faster than the drinking water group (1.77 hours). The LOS in the caffeinated coffee intervention group (6.0 days) was faster than the decaffeinated coffee intervention group (6.6) faster than the drinking water group (7.0 days) 40.

**Outcome**

**Chewing gum**

The result of 11 articles on chewing gum intervention showed the first time bowel noise, flatus, defecation, and LOS faster than standard hospital interventions. First study got the first time bowel sounds in the intervention group (mean = 10.05, SD = 1.44) faster than the control group (mean = 15.22, SD = 2.02), first time flatus in the intervention group (mean = 19.46, SD = 1.87) faster than the control group (mean = 24.43, SD = 1.80), the first defecation in the intervention group (mean = 19.74, SD = 1.84) faster than the control group (mean = 31.03, SD = 8.28), LOS time in the intervention group (mean = 28.81, SD = 12.13) faster than the control group (mean = 35.63, SD = 7.32) 29.
Third research got the first time result of intestinal noise in the chewing gum intervention group (300 (150-500)) faster than the coffee intervention group (320 (205-590)) more quickly than the warm water intervention group (385 (280-580)) more rapidly than the control group (405 (188-680)s), the first time flatus in the intervention group chewing gum (360 (200-600)) more quickly than the coffee intervention group (420 (300-650)) faster than the warm water intervention group (490 (345-705)) more rapidly than the control group (600 (380-903)), the first time defecation in the intervention group of chewing gum (802 (710-930)) longer than the intervention group of coffee (776 (502-960)), longer than the warm water intervention group (737 (490-910)) and faster than the control group (980 (804-1010)) 41.

The fourth study found that the first time bowel noise in the intervention group (35.6 ± 5.4) was faster than the control group (47.5 ± 11.7), the first time flatus in the intervention group (29.7 ± 4.9) was faster than the control group (41.6 ± 10.9). The first time defecation in the intervention group (42.0 ± 6.8) was faster than the control group (59.8 ± 14.6), and LOS in the intervention group (6.1 ± 1.1) was faster than the control group (7.4 ± 2.3) 38. The fifth study got the results of the first time flatus in the coffee intervention group (55.1 (19.1,114.0)) was faster than the water intervention group (69.7 (20.7,141.6)), the first time defecation in the coffee intervention group (9.3 (0.5,47.1) ) was faster than the warmer intervention group (12.6 (1.1,46.1)) 42.

An article about the intervention of consuming warm water in an study got the result of the first time flatus in the intervention group (11.0 ± 4.2 hours) faster than the control group (18.6 ± 6.0 hours), the first time defecation in the intervention group (35.4 ± 12.5 hours) was faster than the control group (38.1 ± 12.7 hours) and LOS in the intervention group (24.4 ± 7.6 hours) was faster than the control group (23.8 ± 4.8 hours) 22.

DISCUSSION

This systematic review was compiled based on the identification of 19 articles with RCTs method about the effect of chewing gum intervention, consuming coffee, and warm water to decrease the incidence of postoperative ileus in postoperative abdominal patients. Postoperative ileus is a postoperative abdominal complication characterized by prolonged bowel sounds, flatus, defecation, and causes LOS. Postoperative ileus is a cessation of intestinal motility in a coordinated and temporary manner after surgery to prevent the removal of the bowel of tolerance of oral diet contents 43. Some degree of postoperative ileus is not pathological response but a physiological and reasonable response to abdominal surgery according to some opinions in general 5. Typical values for determining between pathological postoperative ileus there is still no significant opinion.

The duration of pathological postoperative ileus varies from 1-7 days, according to the researchers 17. The results of physiological studies explained that gastric motility returned at 24-48 hours, small intestinal motility at 12-24 hours, and colonic motility at 3-5 days 45. Postoperative ileus requires appropriate action in overcoming problems arising from its pathological effects. The cooperation of all health workers is needed to achieve optimal digestion recovery and reduce the length of stay. Appropriate planning and communication are also required to develop as evidence-based standard operational procedure than is followed and carried out; there have been several interventions designed to reduce the number and timing of postoperative ileus lately 44.

Nineteen articles have identified in this systematic review that proved that the intervention of chewing gum, coffee, and consuming warm water could speed up the first time bowel sounds, flatus, defecation, and shortening LOS in postoperative abdominal patients. Chewing gum, coffee, and consuming warm water interventions are safe, inexpensive, secure. Without side effects, so they can be recommended as additional interventions on standard operational procedures in postoperative abdominal patients. The clinical characteristics of ileus are abdominal distension, inability to expel flatus, defecation, and defecation pain. These conditions can inhibit recovery, increase the LOS, and higher cost of care 37. Sham feeding with gum is a safe, inexpensive, and convenient method to reduce postoperative abdominal ileus surgery 19.

Chewing gum and coffee consumption are comfortable, safe, and tolerable methods and reported to increase postoperative gastrointestinal motility 46. Chewing gum can increase intestinal motility by directly activating vagal cephalic reflexes that activate bowel myoelectric motion and stimulates the secretion of gastrointestinal hormones indirectly so that saliva and pancreatic fluid are produced; these reactions can encourage hormones and nerves to activate intestinal motility 29.

The intervention of consuming warm water in postoperative patients also has a positive effect on intestinal motility such as, eliminating gastrointestinal spasm and restoring intestinal peristalsis 42. When heat-sensitive receptors in the hypotalamus stimulated, the effector’s system emits a signal which causes peripheral vasodilation and perspiration. Medulla oblongata, as the vasomotor center of the brain stem, regulates changes in the shape of blood vessels, vasodilation of blood vessels is influenced by anterior hypothalamic. As a result of vasodilatation of blood vessels will increase the blood flow of splanchnic (blood vessels of the gastrointestinal system).

The increased blood flow will carry the hormones that have been released by endocrine gland cells such as gastrin and motilin in the blood to circulated. These hormones will
have an excitatory effect along the intestinal wall and smooth muscle, causing intestinal motility.\textsuperscript{47} At the same time, coffee is a beverage that is known globally and has positive effects on health, including the cardiovascular system and central nervous system, as well as increasing feelings of comfort. According to Cohn, coffee has a good influence on the peristaltic and intestinal motility index when taken by adults.\textsuperscript{39,48-50}

Intervention procedure of chewing gum (sugar-free gum) was given 2 hours before surgery and or 2-6 hours after surgery for 15-30 minutes, giving frequency every 2-4 hours once a day until flatus and defecation appear or up to 5 days (if the patient comes home before five days). The intervention procedure for consuming warm water was given 4 hours after surgery for 15 minutes as much as 200 ml with a temperature of 37°C, the frequency of providing water was every 4 hours until bowel sounds, flatus or defecation appears. The coffee intervention procedure was given six hours 1 days after surgery, as much as 100 ml of decaffeinated coffee, the frequency of giving coffee was every 2-4 hours until bowel sounds, flatus or defecation appear.

The weaknesses in this systematic review were first: respondents who included in all cases of abdominal and non-intestinal abdominal surgery have not homogenized in any of the cases. Second, there was only one article about consuming warm water after surgery, so it cannot strengthen evidence of warm water in reducing postoperative abdominal ileus. Third, not all items included outcomes of first-time bowel noise, flatus, defecation, and overall length of stay.

CONCLUSIONS AND RECOMMENDATION

Postoperative abdominal ileus characterized by abdominal distension, prolonged bowel sounds, flatus, and defecation can be reduced by chewing gum intervention, consuming warm water, and coffee. The invasion of chewing gum, drinking coffee, and warm water enhances the recovery of digestive function by accelerating the first time bowel sounds, flatus, defecation, and the Length of Stay of postoperative abdominal patients. The intervention is safe, comfortable, secure, and no side effects, so it can be recommended as a standard operational intervention procedure in postoperative gastric patients.

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