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Effect of Chewing Gum on Post Cesarean Ileus in the North East of Iran: A Randomized Clinical Trial

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ABSTRACT

Background & aim: Cesarean section (CS) accounts for 35% of all surgical operations in Iran. Post cesarean ileus is a complication of CS. There are various pharmaceutical and non-pharmaceutical ways for the treatment of this condition. Given the fact that the non-pharmaceutical approaches are better tolerated and often inexpensive, the present study was conducted to evaluate the effect of chewing gum on post cesarean ileus.

Methods*:* This clinical trial was conducted on 93 patients undergoing CS (i.e., elective or urgent CS) at Sabzevar Mobini Hospital, Savzevar, Iran, between July 2013 and September 2014. The study population was selected using convenience sampling technique and assigned into two groups of chewing gum (n=35) and control (n=58) groups. The subjects in the chewing gum group were encouraged to chew gum at defined intervals. Both groups were evaluated for pain, bowel sounds, first defecations, gas passage, and feeling bowel movements. Data analysis was performed in SPSS software, version 21.

Results: There was no significant difference between the two groups in terms of the auscultation of first bowel sound, first record of gas passing, and first defecation. The logistic regression models showed that chewing gum was significantly associated with reduced post-operative pain while controlling for surgery duration as a confounding factor (OR: 0.79, 95% CI for OR=0.63, 0.99). However, chewing gum showed no significant relationship with bowel sounds, first defecations, gas passage, and feeling bowel movements.

Conclusion: As the findings indicated, the use of chewing gum after CS was ineffective in the reduction of ileus. However, this practice was only capable of mitigating post-operative pain, and therefore can be used as an adjuvant technique for the management of post-operative pain.

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Introduction

Cesarean section is a surgical procedure that is performed in case the maternal and neonatal life is at risk. Although the rate of cesarean section is recommended to be less than 15%, some countries have recorded a much higher rate for this procedure. Iran has a variable prevalence rate of cesarean section in different regions; however, this rate is reported to be 48% in this country (1).

Postoperative gastrointestinal tract dysfunction is common in operated patients, occurring as a result of delay in gastrointestinal movements (2). According to the European Society of Anesthesiology guidelines, adult patients undergoing elective surgery and caesarean section should be encouraged to take

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clear liquids before their surgery. Up to 6 h before surgery, solid foods are prohibited (3). Early oral hydration can be helpful in returning bowel movements and reducing induced ileus (4).

The use of chewing gum is also another inexpensive method in the restoration of bowel movements (5). It seems that chewing can stimulate the gastrointestinal tract hormones and mimic cephalic-vagal reflex. Nonetheless, there is controversy in the findings of the studies assessing the effect of chewing on post-operative ileus (5, 6). Regarding this, the present study was conducted with the aim of evaluating the effect of chewing gum on mitigating ileus in cesarean patients at Sabzevar Mobini Hospital, Sabzevar, Iran, in 2014.

Materials and Methods

This randomized clinical trial (trial registration number: IRCT2015041221710) was conducted on 93 patients undergoing elective or urgent cesarean section at Shahidan Mobini Hospital between July 2013 and September 2014. The participants were randomly divided to the case (n=35) and control (n=58) groups (Figure 1). Sample size was calculated based on the following formula:

$$N=2((Z_{1-\alpha}+Z_{1-\beta})/\sigma_0)^2 \times P \times (1-P)$$

Based on the findings of the previous studies,

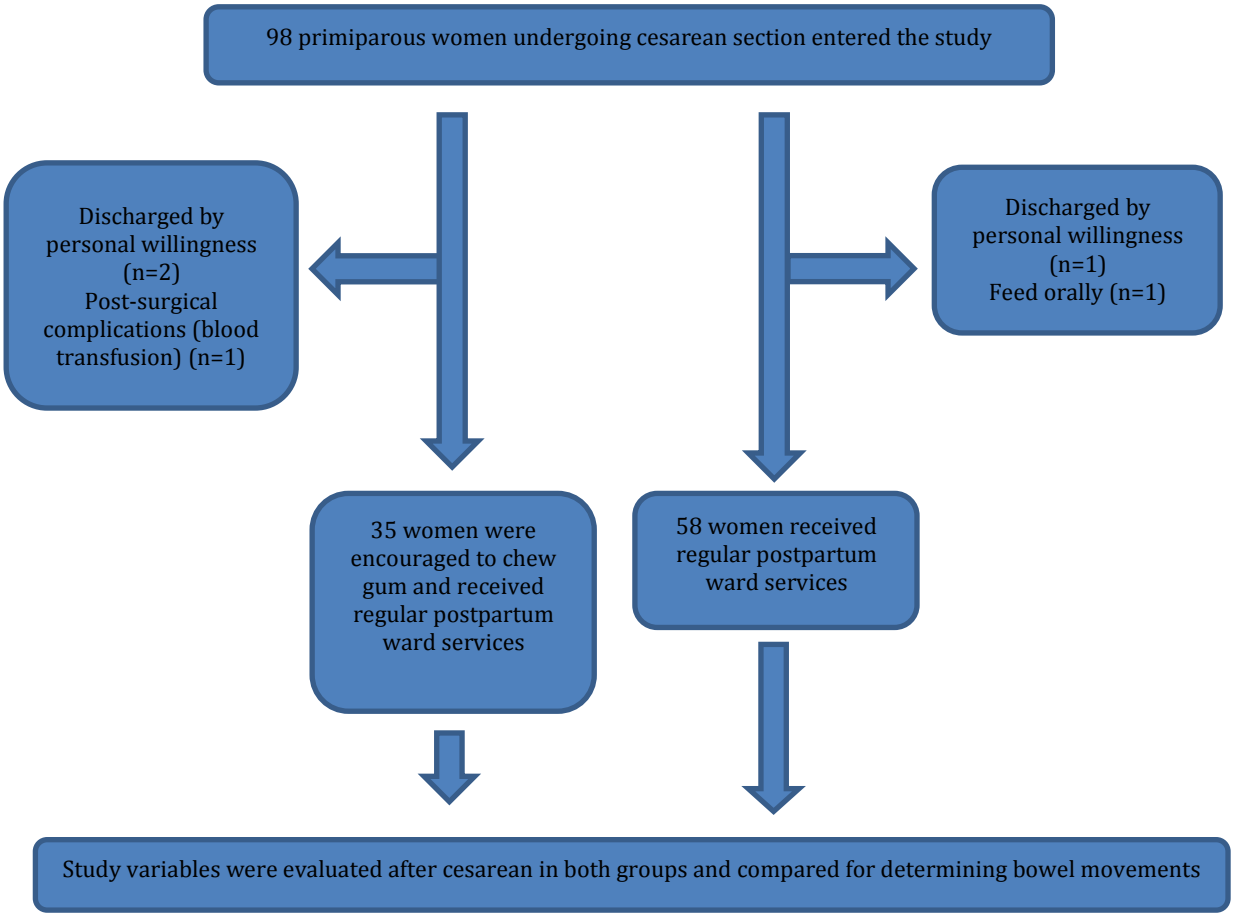


Figure 1. Flowchart of the study design

the mean times to resume bowel sounds were 4.7 and 7.15 h in the intervention and control

groups, respectively. Therefore, considering 95% confidence interval and 95% power, the sample size was calculated as 40 subjects in each group.

The inclusion criteria were: 1) undergoing cesarean section (Pfannenstiel incision or horizontal uterine incision) with general anesthesia, 2) nulliparity, 3) ability to chew gum, 4) no previous history of abdominal surgery, preeclampsia, diabetes, and cardiac diseases, and 5) willingness to participate in the study.

On the other hand, the exclusion criteria included: 1) having operation longer than 90 min, 2) suffering from post-operative complications (e.g., uterine atony) and intra-operative complications (e.g., sever adhesions, blood transfusion, and vesical or intestinal injuries), 3) receiving magnesium sulfate administration, 4) having previous history of any malignancy, inflammatory and obstructive bowel disease, or history of receiving antibiotic therapy for more than 4 days, and 5) undergoing cesarean section with hysterectomy or tubal ligation.

Every eligible patient filled written informed contest. All the operations were carried out between 9 and 11 a.m. The patients in the case group were encouraged to chew gum 1-4 h post-surgery, four times a day for 15 min. The control group took standard regular postpartum workups. All patients were prohibited to consume any drug or feed orally.

Study parameters

The data collection was accomplished by filling a questionnaire through interviews performed by a research assistant, blinded to the study. Post-operative pain was estimated after 6, 12, 18, and 24 h of the first use of chewing gum in a recumbent position. In addition, pain at the time of leaving bed and discharge was assessed using a Visual Analogous Scale. Hourly intestinal sounds auscultation was performed for both groups until the restoration of the bowel sounds, and the duration between recovery and initiation of bowel sounds was recorded for each patient.

Vital signs were recorded in the ward every 6 h after recovery. Each patient was taught to report the initial gas passing, defecation, and sensation of bowel movement. Other study parameters, including age, occupation, education level, gender, neonatal weight, APGAR score, addiction, number of abortion, usage of supplements during gestation, position of the placenta, and fetus presentation, were also obtained from the subjects during the interview.

The case and control groups were matched for the dosage of analgesics and laxatives, vital signs, pain, gastrointestinal problems, hemoglobin, hematocrit, and white blood cells. The patients were discharged when they could tolerate oral feeding, urinate, walk, and have stable vital signs. The investigated variables entailed vital signs, constipation, timing of ambulation, gas passing, objective and subjective signs of bowel motion (e.g., bowel sounds and sensation of bowel movements), and post-operative pain (i.e., immediately after recovery, 6, 12, 18, and 24 h after recovery, as well as pain severity in bed and during movements out of bed).

Statistical analysis

Data analysis was performed using SPSS software, version 21 (IBM Inc, Chicago, Il). Continuous data were checked for normality using Shapiro-Wilk test. Mean and standard deviation were used for normally distributed data, while median and inter quartile range (IQR) were utilized for non-normally distributed data. The inter-group comparison of the normally distributed data was accomplished using the independent Student's t-test. Furthermore, the Mann-Whitney test was run to compare the non-normally distributed data between the groups.

The categorical data were presented as frequency and percentage. The Fisher's exact test was used to assess the association between categorical variables and study groups. In addition, the assessment of the effect of chewing gum on the severity of pain after surgery and after 6, 12, 18, and 24 h of chewing the first gum was performed by means of the repeated measures analysis of variance (ANOVA) test, while controlling for operation duration as a confounder.

Additionally, the logistic regression models

were run to estimate the relationship between chewing gum and gas passing, initiation of bowel sounds, bowel motion sensation, pain in bed and after leaving bed, constipation, gastrointestinal complications, and post-operative pain, while controlling for operation duration as a confounder. Odds ratio (OR) and 95% confidence interval for OR was calculated. P-value less than 0.05 was considered statistically significant.

Results

Out of the 93 patients enrolled in this study, 5 patients were excluded due to personal unwillingness, post-operative complication, and being fed orally. The remaining patients were randomly divided into the case (35 patients, 37.6%) and control (58 patients, 62.4%) groups. The demographic data of the participants are tabulated in Table 1. Most of the patients were admitted for elective cesarean section (33%).

The mean gestational ages of the case and control groups were 39.22±1.86 and 39.06±1.28 years, respectively. The majority of the fetuses had cephalic presentation. Furthermore, four patients in each group had constipation; therefore, there was no significant difference between the two groups in terms of constipation (P=0.35).

Gastrointestinal problems were present in 49 patients (i.e., 21 and 28 patients in case and control groups, respectively); accordingly, both groups showed no significant difference in this regard (P=0.19). The initiation of bowel movements and other study parameters were evaluated in both groups (Table 2). Good level of satisfaction was recorded in 30 (85.7%) patients, who had received gum, and in 45 (77.6%) patients in the control group (P=0.35).

Table 1. Demographic characteristics of the case and control groups

Variable		Gum n=35	Control n=58	P-value
Age (year)		24.87±4.54	24.81±4.74	0.95
Duration of education (year)		12.76±31.23	12.59±3.65	0.81
APGAR score		8.84±0.59	8.83±1.15	0.94
Birth weight (g)		3215.05±460.27	3236.17±632.99	0.86
Surgery duration		30.84±5.59	32.14±7.83	0.33
Occupation	Non-governmental	30 (85.7%)	44 (75.9%)	0.39 ‡
	Governmental	4 (11.4%)	8 (13.8%)	
	Student	1 (2/9%)	6 (10.3%)	
Prenatal care requirement		33 (94.3%)	54 (93.1%)	0.73 ‡

 Mean and standard deviation were used to describe continuous variables and the independent Student's t-test was used for comparison.

‡ Frequency and percentage were used to describe categorical variables and the Fisher's exact test was used to assess the relationship between these variables and chewing gum.

Table 2. Comparison of study outcomes after operation between the study groups

Variable	Gum	Control	P-value
Admission duration (days)	2.03±0.16	2.03±0.17	0.89
Initiation of bowel sounds (min)	192.79±51.64	194.83±81.07	0.88
Gas passing (min)	1120.18±405.83	1202.55±416.05	0.33
Bowel movement sensation (min)	447.50 (493.70)	745.00 (962.5)	0.14
Defecation (min)	1387.92±343.79	1394.86±330.336	0.92
Initiation of ambulation (min)	646.26±152.12	658.87±210.57	0.75
Pain wile in bed (min)	7.22±2.49	7.61±2.04	0.41
Post operation pain (min)	7.18±2.25	8.12±1.85	0.03*

 Mean and standard deviation were used to describe all continuous variables and independent t-test was used for comparison, except for bowel movement sensation where median and interquartile range and the Mann-Whitney test were used for comparison.

* Significant difference between groups at α=0.05

Table 3. Relationship between chewing gum and outcome measures while controlling for operation duration and age

Variable	Wald	P-value	OR	95% CI for OR	
				Lower	Upper
Initiation of bowel sounds	0.05	0.82	1.00	0.99	1.01
Gas passing	0.21	0.65	1.00	0.99	1.00
Bowel movement sensation	2.68	0.09	1.00	0.99	1.00
Defecation	0.85	0.36	0.99	0.99	1.00
Initiation of ambulation	0.001	0.97	1.00	0.99	1.00
Satisfaction	2.04	0.15	0.40	0.11	1.40
Pain in bed	0.12	0.73	1.04	0.84	1.28
Post operation pain	3.92	0.04*	0.79	0.63	0.99
Constipation	0.05	0.82	1.19	0.25	5.72
Gastrointestinal complaints	0.30	0.58	1.30	0.50	3.35
Duration of admission	0.01	0.93	0.88	0.05	17.09

* Significant relationship

Table 4. Repeated measures ANOVA for vital signs and pain severity during the study duration

Variable	Gum				Control				Within group P-value	Between group P-value
	6th hour	12th hour	18th hour	24th hour	6th hour	12th hour	18th hour	24th hour		
Pain	4.34±2.63	3.38±2.21	5.22±2.35	4.75±2.57	4.31±2.23	3.60±2.22	5.90±2.66	5.14±2.20	0.34	0.60
Pulse rate (/min)	84.74±3.06	85.03±2.19	84.58±1.79	113.42±	85.10±3.21	84.30±3.92	84.56±2.38	83.59±3.25	0.61	0.37
Respiratory rate (/min)	19.92±0.49	19.84±0.72[a]	20.00±0.00	20.00±0.00	20.31±2.18	20.12±0.52[a]	20.03±0.25	20.00±0.36	0.30	0.02*
Blood pressure (mmHg)	106.58±9.87	105.90±10.63	103.39±9.72	103.39±9.72	109.35±9.89	107.44±8.58	106.49±8.73	101.87±14.57	0.25	0.62
Temperature (˚C)	36.99±0.08	37.09±0.18	37.05±0.18	37.05±0.15	37.03±0.10	37.08±0.18	37.05±0.25	37.05±0.20	0.56	0.62

* Significant difference at α=0.05

[a] P=0.03,

Logistic regression models revealed that chewing gum was significantly associated with reduced post-operative pain (OR: 0.79, 95% CI for OR=0.63, 0.99), while controlling for surgery duration as a confounding variable (Table 3).

The repeated measures ANOVA with age, occupation, education, and the length of surgery as confounding factors only showed a significant difference in respiratory rate between the groups at the 12th h of assessment (Table 4). The changes in the evaluated study parameters during the study after controlling for confounders are depicted in Figure 2.

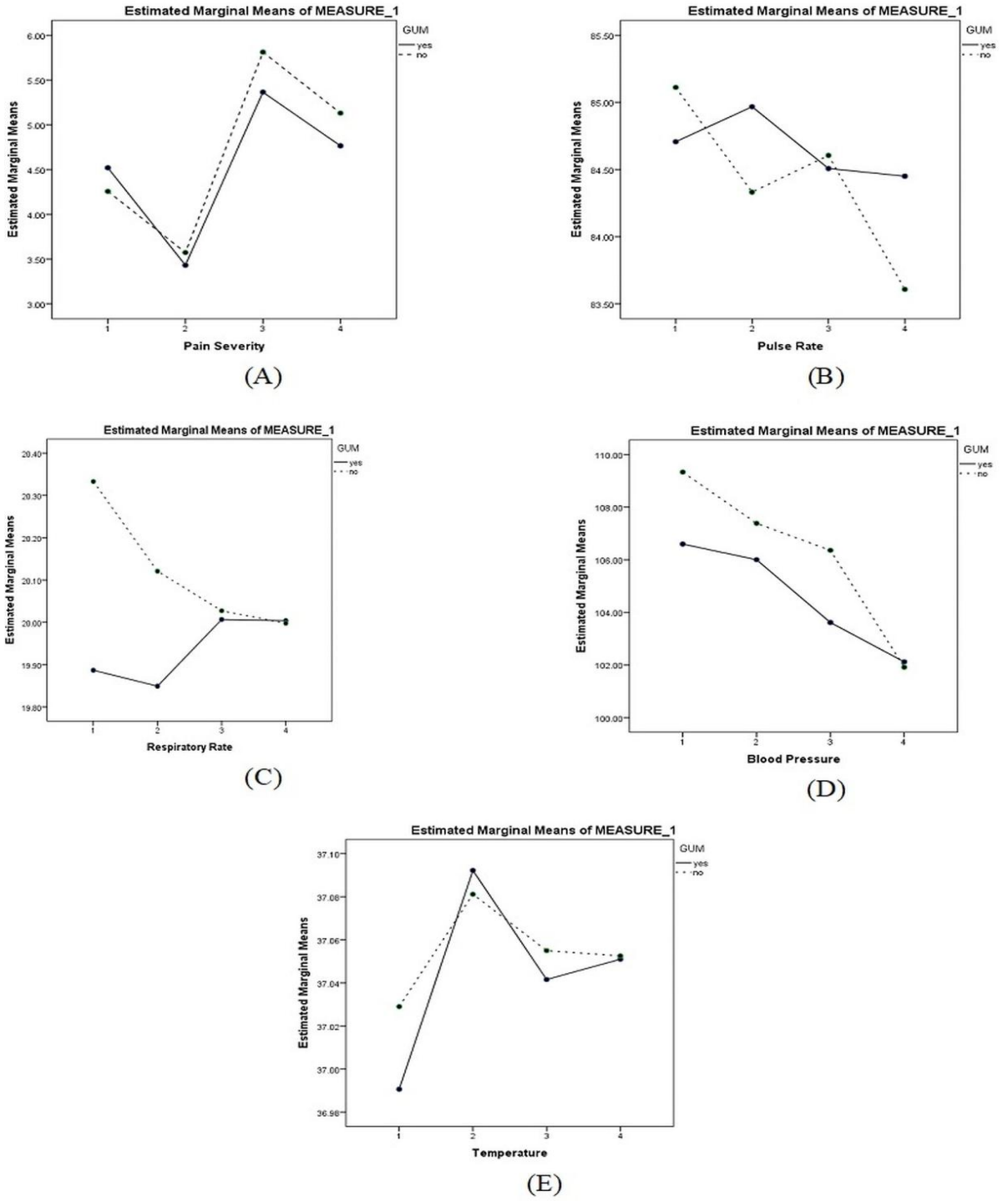
Discussion

Based on our study protocol, we evaluated different variables in our study population, such as constipation, gas passing, objective and subjective signs of bowel motion, and pain after surgery. However, only post-operative pain was significantly affected by chewing gum. The results revealed no significant relationship between chewing gum and resumption of normal bowel movements.

The pathogenesis of failure in the restoration of bowel movements is multifactorial, including intestinal manipulation during surgery, anesthetic drugs, and narcotics administration, which can interfere with parasympathetic nervous system function (7, 8). There is no universal treatment for this gastrointestinal problem; however, the insertion of nasogastric tube, local anesthesia, parenteral nutrition, and other invasive methods were also studied (8).

Previously, the patients were withheld from the oral consumption of food and liquids till the returning of the bowel sounds. However, nowadays, early oral feeding is believed to be capable of inducing bowel movements (9, 10). Nonetheless, there is controversy over the findings of these studies (11).

Chewing gum is a noninvasive and inexpensive way of stimulating relaxation by inducing the vagal reflex and increasing intestinal hormones (6). As a result, gastrin and



(A) Pain severity, (B) Pulse rate, (C) Respiratory rate, (D) Blood pressure, (E) Temperature

Figure 2. Changes in pain severity and vital signs during the study procedure after controlling for age, occupation, education, and length of surgery

neurotensin concentration and duodenal alkaline secretion would increase, which in turn leads to the incidence of gastric, duodenal, and colon (12). There are a number of recently published review studies investigating the effect of chewing gum and post-operative pain (13).

The latest meta-analysis and systematic reviews have demonstrated that chewing gum hastens the intestinal function after cesarean section (13). However, it was concluded that larger clinical trials and high-quality studies are warranted in order to estimate the role of chewing gum in postpartum ileus (13).

The main reasons for performing different systematic reviews could be the various limitations of different studies. The first limitation is the surgical approach and duration of the surgery. Each kind of surgery will have its own unique effect on intestinal tract, and therefore the recovery may be may have different courses in different patients. Another possible reason for facing various studies examining this issue is the lack of a unique post-operative and nursery care after cesarean section. This fact demonstrates that the study outcome is patient- and hospital-dependent.

Different study designs can be highlighted in many studies. As an example, Deshpande et al. who evaluated the effect of sugar free gum on post cesarean ileus, chose 8-hour intervals between chewing (14). They reported that chewing gum would accelerate post cesarean bowel mobility. In another study demonstrating the effectiveness of chewing gum after cesarean section, the chewing interval was the same as the time used in our study; however, their patients received spinal anesthesia (15).

In the present study, the patients undergoing cesarean section under general anesthesia were selected due to the fact that most of the surgeries implemented in the hospital under investigation were performed under general anesthesia. There are also similar studies suggesting the effect of epidural anesthesia on ileus mitigation (16-19).

Some other studies have tested shorter intervals of chewing and concluded meaningful results regarding the reduction of post cesarean ileus (20). In our study, the use of chewing gum for 15 min was not suitable for some mothers. Moreover, the patients stopped chewing gum at sleeping time, when gastrointestinal hormones peak is at its lowest level.

Therefore, the subjects were asked to start chewing gum at 12 p.m., resulting in the accomplishment of chewing the next gums at 6 p.m., 12 a.m., and 6 a.m. to leave the sleeping time and hormonal peak uninterrupted. Likewise, Abdollahi et al. reported the same time duration for the initiation of bowel sounds. However, it cannot be concluded that chewing gum may help enhance intestine movements and result in earlier hospital discharge (8).

It was suggested that artificial sweeteners in gums, such as sorbitol and hexitols, can induce such side effects as bloating and abdominal cramps (21). Nonetheless, in this study, all patients tolerated gums, and there was no report of bloating, nausea, vomiting, or abdominal cramp.

One of the limitations of the present study can be ascribed to the relatively small sample size. This was due to the fact that the randomization of the two groups of patients with the same clinical features resulted in the exclusion of a number of patients. It is recommend to conduct further studies using a larger population. Another prominent limitation was the reliance of the results on the patient's response to some of the parameters, such as pain severity questions.

Conclusion

As the findings of this study revealed, chewing gum after cesarean section did not relieve bloating and only decreased post-operative pain. Therefore, it is suggested to use chewing gum as an additive method to other treatment options in order to reduce the abdominal discomfort.

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Conflicts of interest

None declared.

References

1. Azami-Aghdash S, Ghojazadeh M, Dehdilani N, Mohammadi M. Prevalence and causes of cesarean section in Iran: systematic review and meta-analysis. Iranian Journal of Public Health. 2014; 43(5):545-555.
2. Smith I, Kranke P, Murat I, Smith A, O'Sullivan G, Søreide E, et al. Perioperative fasting in adults and children: guidelines from the European Society of Anaesthe-siology. European Journal of Anaesthe-siology. 2011; 28(8):556-569.
3. Kammen BF, Levine MS, Rubesin SE, Laufer I. Adynamic ileus after Caesarean section mimicking intestinal obstruction: findings on abdominal radiographs. The British Journal of Radiology. 2000; 73(873):951-955.
4. Tadayon P, Mohammadian F. Early versus late liquid diet consumption after the elective cesarean sections. Journal of Zanjan University of Medical Sciences & Health Services. 2003; 11:19-23.
5. Quah HM, Samad A, Neathey AJ, Hay DJ, Maw A. Does gum chewing reduce postoperative ileus following open colectomy for left-sided colon and rectal cancer?-a prospective randomized controlled trial. Colorectal Disease. 2006; 8(1): 64-70.
6. Vega CH. Gum chewing may speed recovery from postoperative ileus. Archives of Surgery. 2006; 141(2):174-176.
7. Abd-El-Maeboud KH, Ibrahim MI, Shalaby DA, Fikry MF. Gum chewing stimulates early return of bowel motility after caesarean section. BJOG: An International Journal of Obstetrics & Gynaecology. 2009; 116(10): 1334-1339.
8. Abdollahi AA, Yazdi KH, Behnampour N, Niazi M. Effect of gum-chewing on the movement of intestines after abdominal resection and length of hospital stay. International Journal of Hospital Research. 2013; 2(3):127-132.
9. Polland KE, Higgins F, Orchardson R. Salivary flow rate and pH during prolonged gum chewing in humans. Journal of Oral Rehabilitation. 2003; 30(9):861-865.
10. Weinstein L, Dyne PL, Duerbeck NB. The PROEF diet: a new postoperative regimen for oral early feeding. American Journal of Obstetrics and Gynecology. 1993; 168(1): 128-131.
11. Burrows WR, Gingo AJ, Rose SM, Zwick SI, Kosty DL, Durker LJ, et al. Safety and efficacy of early postoperative solid food consumption after cesarean section. The Journal of Reproductive Medicine. 1995; 40(6):463-467.
12. Watters JM, Kirkpatrick SM, Norris SB, Shamji FM, Wells GA. Immediate postoperative enteral feeding results in impaired respiratory mechanics and decreased mobility. Annals of Surgery. 1997; 226(3):369-377.
13. Wen Z, Shen M, Wu C, Ding J, Mei B. Chewing gum for intestinal function recovery after caesarean section: a systematic review and meta-analysis. BMC Pregnancy and Childbirth. 2017; 17(1):105.
14. Deshpande H, Madkar C, Kale N, Sable U, Bobe A. The study of effect of sugar free chewing gum on peristalsis activity in postcaesarean patients. Paripex-Indian Journal of Research. 2017; 6(3):4-6.
15. Kovavisarach E, Atthakorn M. Early versus delayed oral feeding after cesarean delivery. International Journal of Gynecology & Obstetrics. 2005; 90(1):31-34.
16. Scheinin B, Asantila R, Orko R. The effect of bupivacaine and morphine on pain and bowel function after colonic surgery. Acta Anaesthesiologica Scandinavica. 1987; 31(2): 161-164.
17. Ahn H, Bronge A, Johansson K, Ygge H, Lindhagen J. Effect of continuous postoperative epidural analgesia on intestinal motility. British Journal of Surgery. 1988; 75(12):1176-1178.
18. Liu SS, Carpenter RL, Mackey DC, Thirlby RC, Rupp SM, Shine TS, et al. Effects of perioperative analgesic technique on rate of recovery after colon surgery. Anesthesiology. 1995; 83(4):757-765.
19. Wattwi M, Thoren T, Hennerdal S, Garvill JE. Epidural analgesia with bupivacaine reduces postoperative paralytic ileus after hysterectomy. Anesthesia and Analgesia. 1989; 68(3):353-358.
20. Mansour SE, Elnegeri MA, Ibrahim AA. Chewing gum after cesarean section: it's effect on regaining intestinal function. IOSR Journal of Nursing and Health Science (IOSR-JNHS). 2016; 5(6):75-83.
21. Tandeter H. Hypothesis: hexitols in chewing gum may play a role in reducing postoperative ileus. Medical Hypotheses. 2009; 72(1): 39-40.