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Randomised Controlled Trial

Effect of caffeine on postoperative bowel movement and defecation after cesarean section☆

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ABSTRACT

Introduction: and Importance: Inadequate bowel movement after cesarean section (C-section) can delay the intake of solid diet. Coffee is reported to have beneficial effects on bowel motility after the surgery. This study is designed to evaluate the effects of coffee on bowel movement and defecation following C-section.

Methods: In this randomized clinical trial study, women undergoing elective C-section at the hospital of (XXX) during 2019–2020 were included. Following the surgery, the patients were divided in case (coffee) and control (water) group. At three different interval after the surgery, 111 ml of coffee or water was given to these patients. After the intervention, time of bowel movement, first defecation, body mass index (BMI), age, gestational age, parity and gravidity were recorded and evaluated between the two groups.

Results: Of total 36 patients (18 in study and control group, respectively), the mean age, gravidity, parity, BMI and gestational age was not significantly different, p-value$<$0.05. The mean onset of bowel movements in case group was 14.56 h and control group was 16.83 h and the first defecation after cesarean section in case and control group was 27.78 and 31.67 h, respectively. The two groups were significantly different in both the terms, p-value = 0.042 and p-value = 0.002, respectively.

Conclusion: The postoperative bowel movement and defecation time is shorter with the intake of coffee among patients undergoing C-section.

1. Introduction

Cesarean section (C-section) is one of the most common surgeries in obstetrics and gynecology, which is performed from 58 % in developing countries to 19 % in developed countries [1,2]. Causes of cesarean section include history of previous cesarean section, fetal distress, fetal progression, cephalopelvic disproportion (CPD), and prenatal bleeding [3,4]. Postoperative care following C-section includes proper nutrition and adequate hydration [5]. Nothing by mouth is practiced post-operatively following C-section until the first flatus or bowel movement. A great focus of postoperative diet is to prevent and manage ileus [6,7].

Coffee is a common beverage that is commonly known for its positive neurological and cardiovascular effects [8]. Its beneficial effects in liver diseases, type II diabetes mellitus, Parkinson's disease, constipation, infections and cancer have also been reported [9,10]. Studies have shown that coffee increases bowel motility and improves postoperative gastrointestinal function [11,12]. Nonetheless, intake of coffee is also known for gastroesophageal reflux symptoms [13].

The aim of this study was to evaluate the effects of postoperative coffee intake following C-section on bowel movement and defecation.

2. Methods

This randomized clinical trial was performed to investigate the effect of coffee on bowel movements and postoperative defecation following cesarean section among patients aged 18–35 years, referred to the hospitals of the (XXX) from June 2019 to June 2020. Written consent was obtained from all the patients before the participation in the study and all the queries were answered by resident doctor or gynecologist. Demographic information including age, history of underlying diseases such as diabetes, hypertension, heart disease, smoking history and gestational diseases including gestational diabetes, gestational

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hypertension and previous history of miscarriage were recorded. Patients were also asked regarding any known psychological and genetic disease and family and drug history was obtained, if any. Patients with prolonged surgery (more than 1.5 h), sensitive to caffeine and bupivacaine, unwillingness to participate in study, history of irritable bowel syndrome and idiopathic constipation were excluded from the study.

Patients under American Society of Anesthesiologists (ASA) class I and II underwent elective C-section with spinal anesthesia using 2.5 cc Marcaine at L4-L5 levels. The patients were divided in two groups. Control groups were provided 111 ml of water, three times a day whereas study group received 111 ml of coffee, three time a day (11am, 3pm and 7pm). The patient took the assigned beverages under the supervision of a trained nurse. The coffee was prepared by coffee machine, Nescafé® Alegria® (Gatwick, Sussex, The United Kingdom). In case of non-adherence or intolerability of the intervention, individuals were excluded from the study.

Patients in both groups were matched in terms of age. In the next step, the method of prescribing the drug and the side effects of the drugs for the patient were explained. The patient was monitored by a gynecologist during the treatment period, who also performed caesarean section in the patients. Finally, side effects such as nausea, vomiting, weakness and lethargy, bleeding, mortality were recorded in patients by resident doctor, who was involved in the research. It should be noted that all patients were recommended to walk 5–11 m, 24 h after surgery. The diet was also similar in such that liquid food was given for first 24 h and after 24 h, solid regular food was started. Patients were evaluated for the time of onset of bowel movements and the time of first defecation after cesarean section. Patients were asked to record any discomfort or signs, they would feel or see. The patients were followed up for 48 postoperative hours.

The data was statistically analyzed using software SPSS v22 (IBM, USA). The normality of the data was determined using a one-sample Klomogorov-Smirnov test. Student T test and analysis of variance was used for normal data and if not normal, Kruskal-Wallis and Mann-Whitney tests were used. P-value < 0.05 was considered to be statistically significant.

This study was approved by the Research Ethics Board of (XXX). Researchregistry6907.

The work has been reported in line with the CONSORT criteria [14].

3. Results

From the total of 36 patients included in the study (18 in each group), the mean age of the patients was 28.08 ± 3.87 years. Table 1 shows that control and study group were not significantly different in terms of age, body mass index, gravidity, parity and gestational age, p-value >0.05, respectively.

As can be seen in Table 2, the mean onset of bowel movements in case and control group (14.56 vs. 16.83 h) and the first defecation after cesarean section (27.78 vs. 31.67 h) was significantly different, p-value = 0.042 and p-value = 0.002, respectively.

Table 1
Mean and standard deviation of demographic and pregnancy variables in the two groups.

Variable	Group	Number	Mean	Standard-deviation	p-value
Age(year)	Intervention	18	28.72	3.816	0.33
	Control	18	27.44	3.944	
Gestational age (week)	Intervention	18	38.61	0.916	0.518
	Control	18	37.78	0.808	
Gravid	Intervention	18	1.83	0.924	0.264
	Control	18	1.50	0.707	
Parity	Intervention	18	0.78	0.878	0.084
	Control	18	0.33	0.594	
BMI(kg/m^2)	Intervention	18	25.62	1.789	0.987
	Control	18	25.34	1.115	

Table 2
Mean and standard deviation of the onset of bowel movements and excretion in the two groups.

Variable	Group	Number	Mean	Standard-deviation	p-value
onset of bowel movements	Intervention	18	14.56	2.975	0.042
	Control	18	16.83	3.468	
first defecation	Intervention	18	27.78	3.3	0.002
	Control	18	31.67	3.757	

The patients were further analyzed based on the two age groups, 30 and less than 30 years and more than 30 years. The time of first defecation was significantly different among study and control group among patients aged 30 years or less, p-value = 0.006. The first bowel movement was not significantly correlated with the age among the two groups and first defecation was not significantly different in case and control groups among patients aged more than 30 years, p-value = 0.251 (Table 3).

Based on the gestational age of the patients, the case and control groups were significantly different in terms of first defecation among the patients with 38 or less weeks of gestational period, p-value = 0.002. This group did not have significant difference in terms of first bowel movement, p-value = 0.195, respectively. The gestational age of more than 38 weeks was not associated with bowel movement and defecation, p-value = 0.145 and p-value = 0.148, respectively (Table 4).

Based on gravidity, patients were divided in two groups; gravida 1, and gravida 2 or more. Among gravida 1 group, patients in study and control groups had significant difference in terms of first defecation, p-value = 0.008. These patients were not significantly different in terms of first bowel movement, p-value = 0.081. Similarly, among gravida 2 or more groups, the case and control groups were not significantly different in terms of first bowel movement, p-value = 0.43 and first defecation, p-value = 0.253(Table 5).

Patients without previous pregnancy were significantly different in terms of first defecation, p-value = 0.026, however no such correlation was found for first bowel movement, p = 0.146. Previous pregnancy was not correlated with first bowel movement and first defecation in case and control groups, p-value = 0.295 and p-value = 0.053, respectively (Table 6).

BMI 25 and less was significantly correlated with first defecation in case and control group, p-value = 0.008 however was not correlated with first bowel movement, p-value = 0.051. BMI greater than 25 was not significantly correlated with first bowel movement, p-value = 0.612 and p-value = 0.197, respectively (Table 7).

4. Discussion

Our study reported that first bowel movement and first defecation time is significantly reduced (shorter) among women who are given coffee following C-section. Furthermore, patients with gestational age of 38 weeks and shorter, aged 30 years or less, gravida 1, previous pregnancy and BMI 25 kg/m^2 or less presented with significantly shorter time of first defecation.

In an interventional study conducted by Rabieipour et al., 2018, investigating the effect of coffee on bowel movements after surgery, 111 patients were studied and divided into two groups; coffee and controls. Consumption of coffee was 111 ml at 8, 12 and 21 h after surgery and it was found that the time of onset of bowel movements, hearing of bowel sounds and defecation of the first stool was not different between the two groups. However, first flatulence was significantly shorter in the intervention group (6). These findings are not in line with those reported in ours. Differences in the sample size, demographic variables, comorbid conditions and caffeine addiction could have influenced these outcomes [15].

Table 3
Mean and standard deviation of intestinal motility and excretion in the two groups by age.

Variable	Group	Group	Number	Mean	Standard-deviation	p-value
30≥	onset of bowel movements	Intervention	12	15.00	3.015	0.065
		Control	14	3.503	3.503	
	first defecation	Intervention	12	3.143	3.143	0.006
		Control	14	4.122	4.122	
30<	onset of bowel movements	Intervention	6	2.944	2.944	0.651
		Control	4	2.380	2.380	
	first defecation	Intervention	6	3.899	3.899	0.251
		Control	4	1.708	1.708	

Table 4
Mean and standard deviation of intestinal motility and excretion in the two groups based on gestational age.

Variable	Group	Group	Number	Mean	Standard-deviation	p-value
38 weeks≥	onset of bowel movements	Intervention	9	14.56	3.206	0.195
		Control	8	16.62	3.068	
	first defecation	Intervention	9	27.67	2.345	0.002
		Control	8	32.88	3.441	
38week<	onset of bowel movements	Intervention	9	14.56	2.920	0.145
		Control	10	17.00	3.916	
	first defecation	Intervention	9	27.89	4.197	0.148
		Control	10	30.70	3.889	

Table 5
Mean and standard deviation of intestinal motility and excretion in individuals of the two groups based on the number of pregnancies.

Variable	Group	Group	Number	Mean	Standard-deviation	p-value
1	onset of bowel movements	Intervention	8	14.75	3.012	0.081
		Control	11	17.55	3.387	
	first defecation	Intervention	8	27.75	3.370	0.008
		Control	11	33.00	3.975	
2 ≤	onset of bowel movements	Intervention	10	14.40	3.098	0.43
		Control	7	15.71	3.546	
	first defecation	Intervention	10	27.80	3.425	0.253
		Control	7	29.57	2.299	

Table 6
Mean and standard deviation of intestinal motility and excretion in individuals of the two groups based on the history of labor.

Variable	Group	Group	Number	Mean	Standard-deviation	p-value
Yes	onset of bowel movements	Intervention	8	14.75	3.012	0.146
		Control	13	17.00	3.464	
	first defecation	Intervention	8	27.75	3.370	0.026
		Control	13	33.08	4.291	
No	onset of bowel movements	Intervention	10	14.40	3.098	0.295
		Control	5	16.40	3.847	
	first defecation	Intervention	10	27.80	3.425	0.053
		Control	5	20.60	1.673	

Table 7
Mean and standard deviation of intestinal motility and excretion in individuals of the two groups based on BMI.

Variable	Group	Group	Number	Mean	Standard-deviation	p-value
25≥	onset of bowel movements	Intervention	11	13.55	2.911	0.051
		Control	9	16.78	3.993	
	first defecation	Intervention	11	26.73	3.165	0.008
		Control	9	31.78	4.438	
25<	onset of bowel movements	Intervention	7	16.14	2.478	0.612
		Control	9	16.89	3.100	
	first defecation	Intervention	7	29.43	2.992	0.197
		Control	9	31.56	3.206	

In a review study by Eamudomkarn et al., it was reported that coffee consumption as a beverage in the postoperative phase causes earlier bowel movements and shorter duration of first flatulence [16].

In an intervention study conducted by Güngördük et al. [17] to investigate the effect of coffee compared to water on bowel function after surgery, it was found that the time available until the first bowel movement, tolerance of solid food, time of first defecation and time of first flatus was significantly shorter in coffee group. Kruse et al. also

reported that intake of coffee postoperatively is associated with a shorter time of first bowel movement and first defecation (9). Dulskas, Klimovskij [18] also concluded that caffeinated coffee intake following laparoscopic colectomy reduced the time of first bowel movement whereas tolerance of solid food was shorter in decaffeinated coffee group. The time of first flatus and hospital duration was not significantly different in the two groups. Our study did not evaluate the effects of decaffeinated coffee and parameters like flatulence and ileus were not evaluated in the study. A recent systematic review and meta-analysis by Gkegkes, Minis [19] showed that postoperative intake of coffee shortens the duration of first bowel movement, first flatus and tolerance of solid diet. The study concluded that coffee improves gastrointestinal motility without any postoperative complications.

Our findings are based on small sample size and postoperative parameters like vitals and adverse effects of spinal anesthesia were not evaluated in our study. Further studies are therefore required in this field that include these parameters and evaluate the effects of different doses of caffeine.

5. Conclusion

The findings of this study showed that the mean onset of bowel movements and the first defecation after cesarean section in the intervention group (coffee) was significantly lower than the control group, which had a significant effect among patients under 31 years of age with a history of pregnancy, gestational age less than 38 weeks and BMI less than 25. Therefore, considering the importance of early onset of gastrointestinal movements in people undergoing cesarean section, coffee is a safe and inexpensive method among cesarean section patients. The favorable effects may be more based on demographic and maternity-related parameters. Therefore, studies with a larger sample size are required in this area.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Conflict of interest

The authors deny any conflict of interest in any terms or by any means during the study.

Sources of funding

N/A.

Ethical approval

This study was approved by the Research Ethics Board of Tehran Islamic Azad University of Medical Sciences, Tehran, Iran (IR.IAU.TMU.REC.1399.323).

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Consent for publication

Written informed consent was obtained from the patient for publication of this research and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Availability of data and materials

All relevant data and materials are provided with in manuscript.

Ethical approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Contributors' statement page

Dr. Mahnaz Narimani Zamanabadi and Dr.Mohamad Aryafar: conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript.

Dr. Farshid Gholami and Dr.Reza Alizadeh: Designed the data collection instruments, collected data, carried out the initial analyses, and reviewed and revised the manuscript.

Dr. Seyed Ahmad Seyed mehdi: Coordinated and supervised data collection, and critically reviewed the manuscript for important intellectual content.

Consent

Not applicable.

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Declaration of competing interest

All authors must disclose any financial and personal relationships with other people or organisations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding.

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