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# The Effect of Sugar Free Chewing Gums on Recovery of Bowel Function After Elective Cesarean Delivery

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## **Abstract:**

**Background:** Cesarean delivery as a major abdominal surgery is associated with postoperative changes in central nervous system, leading to decreased bowel motility and postoperative ileus. Gum chewing is non-medicinal therapy option to provide the benefits of early stimulation of the intestinal movement after cesarean delivery. The study aims to investigate the effect of free sugar gum chewing on recovery of bowel function after elective cesarean delivery.

**Methods:** A randomized controlled trial research design was used. Setting: The study was conducted at postnatal ward affiliated to obstetrics and gynecology department at Helwan general Hospital. Sample: A systematic random sample of 177 women delivered by elective caesarean section was divided into two groups study group (n= 88) and control group (n= 89). Tools: Two tools were used for data collection; 1) a structured interviewing schedule to collect data about the women' demographic characteristics, anthropometric measurements, obstetric history and pre/intraoperative indicator 2) post-operative cesarean delivery assessment sheet, it included five items for assessing the post-operative parameters of bowel function

**Results:** There were statistically significant differences  $P < 0.05$  between the gum chewing and control groups regarding post-operative parameters of bowel function. Where the average time of onset of bowel sound, onset of gas passage, onset of defecation, first feeling of hunger, feeding time, length of hospital stay were significantly shorter in the gum chewing group than in the control group.

**Conclusion and recommendation:** Use of chewing gum in the postoperative period after cesarean delivery is a safe, cheap and effective method to stimulate early recovery of bowel function. Chewing gum should be included in postoperative nursing care protocol following cesarean delivery; the curricula of nursing/midwifery education should involve the chewing gum for promotion of bowel function after cesarean delivery.

**Keywords:** *Bowel Function, Cesarean delivery, Gums Chewing.*

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## 1. INTRODUCTION

Cesarean delivery (CD) is a surgical intervention used to reduce maternal and neonatal morbidity and mortality rates. Previously CD was performed in order to decrease maternal and neonatal morbidity and mortality, but over the years it has become an elective procedure serving as an alternative to normal vaginal birth upon the request of the obstetrician or mother. But it is well established in the medical literature that recovery time and complications post CD is complex than vaginal delivery.<sup>[1]</sup> CD as a major abdominal surgery is associated with postoperative changes in central nervous system, leading to decreased bowel motility and postoperative ileus (POI).<sup>[2]</sup> The POI is a predictable delay in gastrointestinal motility that happens after major abdominal surgery.<sup>[3]</sup> Many factors are found to contribute to the cause of POI including anesthesia, narcotic use, surgical stress, and the inhibition of various neurohumoral factors.<sup>[4]</sup> The clinical concerns of POI can be profound. Patients with ileus are delayed ambulation, have pain and discomfort. Ileus also enhances catabolism because of delayed oral intake and poor nutrition. Generally, ileus increases the cost of health care because it longer length of hospital stay and increased risk for hospital infections.<sup>[5]</sup>

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The key to reducing the consequences of POI focuses on a multi-faceted approach to hydration, nutrition, pain treatment, postoperative ambulation as well as pharmacological and nonpharmacological prophylaxis.<sup>[6]</sup>

At the international nurse's day 2012, the International Council of Nurses emphasized that nurses and midwives should use economical, reliable, easy-to-use and beneficial practices in order to minimize the adverse effects of the problems that patients encounter.<sup>[7]</sup> Several approaches and interventions have been tested to prevent or decrease POI, both pharmacological and non-pharmacological. One of these interventions is gum chewing. Favorable outcomes have been shown in previous studies after obstetrical, gynecological, colorectal and liver surgery.<sup>[8,9]</sup>

Gum chewing is an inexpensive, safe and non-medicinal therapy option to provide the benefits of early stimulation of the intestinal movement after CD.<sup>[10]</sup> It is considered as a kind of sham feeding. Gum chewing improves bowel function by several mechanisms: activation of the cephalic-vagal pathway, which in turn stimulates intestinal motility, stimulation of stomach and duodenal motility, and by increasing plasma concentration of gastrin and pancreatic polypeptides, so increasing saliva secretions and pancreatic juices.<sup>[11,12]</sup>

There is several researches support the use of gum chewing to enhance early recovery of gastrointestinal function. According to Ledari et al., 2013 chewing sugar free gum following CD is accompanied by decrease in the time of the passage of gases, bowel motility, and feeling of hunger, and no complication has been reported in this regard; furthermore, it can be added to post- cesarean section care without any concern on early post-operation feeding as a low-cost, safe and acceptable treatment in early intestinal stimulation to reduce the risk of POI.<sup>[13]</sup>

Postoperative gastrointestinal dysfunction remains a source of morbidity and the foremost factor of length of stay after abdominal operation such as CS. The effective and harmless promotion of the recovery of gastrointestinal function after abdominal surgery and prevention of postoperative complications has begun widespread concern among medical and nursing staff.<sup>[14]</sup>

Nursing staff must take into consideration the physiological and psychological needs of the mother during the post-natal period. For maintaining the quality of the provided nursing care, it is important to help the mother to promote comfort after CD and prevent any related complications. Also they must accurately assess the mother's physiological functioning and provide appropriate and focused nursing care.<sup>[15]</sup>

Nursing intervention is very essential for the women to adapt to postpartum period after CD in the postoperative period and to avoid complications. In this period, using chewing-gum as one of the non-pharmacological interventions and an inexpensive approach that can be used to stimulate the stomach, enhances gastric secretion, increases peristaltic bowel movements and finally hastens regaining of intestinal function can have a significance.<sup>[16]</sup>

### **Significance of the study:**

Cesarean delivery is one of the most common obstetrical surgeries carried out all over the world. The rate of CD has risen dramatically worldwide in the last two decades mostly in middle and high income countries.<sup>[17]</sup> In Egypt, the overall rate of delivery by CS has risen dramatically from 27.6% in 2010 to 52% in 2014.<sup>[18]</sup> The increase in CD rates is problematic for variety of causes. CD has been connected with increased the women morbidity and mortality rate, unhealthy consequences of newborns and increase the cost of health care organizations.<sup>[19]</sup>

### **Aim of the study:**

The current study aims to investigate the effect of free sugar gum chewing on recovery of bowel function after elective CD.

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**Research Hypothesis:**

CD women who chewed sugar free gum regain their bowel functions earlier than those who didn't.

**2. SUBJECTS AND METHODS**

**Research design:** A quasi-experimental research design was utilized to conduct the current study.

**Setting:** The study was conducted at postnatal ward affiliated to obstetrics and gynecology department at Helwan general Hospital.

**Sampling:**

- **Type:** A systematic random sample.
- **Technique:** The subjects recruited in the present study were selected from the prepared CD list, the cases with odd numbers was selected to be included in the study till fulfill the sample size. *The control group* was firstly collected at the first half of period of data collection (1<sup>st</sup> 3months). This was applied to avoid bias during data collection. *The gum chewing group* was collected at the second half of period of data collection (2<sup>nd</sup> 3months).
- **Size:** Sample size was calculated based on the previous year census report of the obstetrics and gynecology department at Helwan general Hospital. The total number of women undergoing CD for the previous last six months was 316 women (Helwan general Hospital statistical center, 2012).<sup>[20]</sup>

Sample size was calculated utilizing the following formula.

$$n = \frac{N}{1 + N(e)^2}$$
$$n = \frac{316}{1 + 316(0.05)^2}$$

Where: n= sample size, N= population, e= margin error (0.05)

A total 177 postpartum women with CS were recruited in the current study. They were randomly allocated into two groups: group (1), the gum chewing group included 88 women; group (2), control group included 89 women.

- **Inclusion Criteria:** Both groups were recruited according to the following criteria: women aged 20 and over, who underwent elective caesarean sections, able to chew gum, free from obstetrical complication as (diabetes and pre-eclampsia) and agreed to participate in the study. While the exclusion criteria includes women who had intestinal problems, had exposed to any intra or postoperative complication and had frequent constipation during pregnancy.

**Tools:** Two tools were used for data collection.

**Tool I: Structured Interviewing Schedule: It consisted of two parts:**

**Part 1:** It included seven items to assess the demographic characteristics and anthropometric measurements of studied women such as (age, residence, educational level, occupation, and weight, height and body mass index).

**Part 2:** It included the obstetrical history of post CD women such (number of gravidity, parity, the gestational age and type of CD) and pre/intra operative indicators such as (fasting time before surgery, duration of surgery and type of anesthesia)

**Tool II: Post-Operative CD Assessment Sheet:**

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It included five items for assessing the post-operative parameters of bowel function such as (the onset of bowel sound, onset of gas passage, onset of defecation, feeling of hunger, feeding time) and the length of hospital stay by hour after CD.

**Tools validity:**

The tools were tested for content validity by a jury of five expertises in the women and obstetrics health nursing.

**Tools Reliability:**

Reliability of tools was tested by using Cronbach's Alpha coefficient test, which revealed that the tool II (postoperative CD assessment sheet) consisted of relatively homogenous items as indicated by high reliability= (0.88).

**Ethical considerations:**

Consideration was paid to comply with ethical principles in all stages of the study. Primarily, permission was received from Faculty of Nursing Ethical Committee, Helwan University to conduct the study. Written informed consents were attained from every woman recruited in the study after clarification of the nature and the aim of the study. Participants also were informed that their information would be confidential and would be used only for research purpose. They were informed about their rights to refuse participation or leave the study at any time.

**Pilot study:**

A pilot study was conducted on 10.0% of the total subjects (17 women) to test clarity of the study tools. It also helped to estimate the time needed for data collection. Participant involved in the pilot study were excluded from the main study sample.

**Field work:**

- Data were collected from the beginning of May 2013 till the end of October 2013.
- The study had been conducted on 177 women undergo CD, who fulfilled the inclusion criteria, general characteristics, obstetrical history and pre/intra operative indicators were collected by using *tool I*.
- Women of the study group were instructed to chew one stick of sugar free gum for 20 minutes, every 2 hours as soon as they are awake from the operation. The researcher provided each woman with required amount of gum sticks, available sugarless gum (Samarah Foods, Cairo, Egypt). The women continued chewing gums until flatus or stool occurred. No gum chewing during sleep period.
- Women of the control group followed only the postoperative hospital routine care.
- The women in both groups were not given anything orally until their bowel sounds became audible according to the hospital common practices. Also were not given oral or rectal bowel stimulants after surgery.
- Both groups were evaluated every hour using the *tool II* (post-operative CD assessment sheet) in terms of bowel sounds, feeling of hunger, passage of gases and defecation. The bowel sounds were evaluated by using stethoscope. Feeling of hunger, passage of gases and defecation times were recorded according to women's notification.

**Statistical analysis:**

Data analysis was performed using The Statistical Package for Social Sciences (SPSS) version 20. The data were explored. Descriptive statistics (frequency, percentage, arithmetic mean and standard deviation) were used to describe characteristics of the studied subjects. Qualitative variables were compared using chi-square and Fisher's Exact tests as the tests of significance, and independent (t) test was used to compare between mean differences of study and control groups. The p-value is the degree of significance. A statistically significant difference was considered at p-value  $\leq 0.05$  and a

highly statistically significant difference was considered at  $p\text{-value} \leq 0.01$ . While the  $p\text{-value} > 0.05$  indicates non-significant results.

### 3. Results

**Table (1) Distribution of the studied women according to their sociodemographic characteristics (n= 177).**

Variables	Gum chewing group n= 88		Control group n= 89		X <sup>2</sup> / FET	P value
	No	%	No	%		
<b>Age</b>						
- 20- <30	64	72.7	71	79.8	1.461	>0.05
- 30- <40	20	22.7	16	18.0		
- ≥41	4	4.6	2	2.2		
Mean ± SD	28.67±4.65		27.77±4.54		t= 1.426	>0.05
<b>Educational level</b>						
- Read and write	4	4.6	4	4.5	0.901	>0.05
- Primary education	13	14.7	16	18.0		
- Secondary education	57	64.8	52	58.4		
- University education	14	15.9	17	19.1		
<b>Occupation</b>						
- Working	57	64.8	63	70.8	0.729	>0.05
- Housewife	31	35.2	26	29.2		
<b>Residence</b>						
- Urban	65	73.9	61	68.5	0.608	>0.05
- Rural	23	26.1	28	31.5		

X<sup>2</sup>: Chi-Square test

FET: Fisher's Exact Test

t: Independent t test

**Table (1)** Represents socio demographic characteristics of the studied women. It was clear that 72.7% and 79.8% of both gum chewing and control groups respectively aged 20 to <30 years, with a mean age 28.67±4.65 and 27.77±4.54 years for gum chewing and control groups respectively. Furthermore, 64.8% and 58.4% of both groups respectively had secondary education. In addition, 64.8% of gum chewing group and 70.8% of control group were working. Finally, 73.9% of the gum chewing group and 68.5% of control group were rural areas residence. There were no statistically significant differences  $p > 0.05$  between gum chewing and control groups regarding their sociodemographic characteristics.

**Table (2) Distribution of the studied women according to their obstetrics history (n= 177).**

Variables	Gum chewing group n= 88		Control group n= 89		Significance test	P value
	No	%	No	%		
<b>Gravidity</b>						
- Primigravida	23	26.1	24	27.0	$X^2= 6.423$	>0.05
- Gravida (2)	22	25.0	24	27.0		
- Gravida (3)	27	30.7	23	25.8		
- Gravida (4)+	16	18.2	18	20.2		
Mean $\pm$ SD	2.45 $\pm$ 1.15		2.52 $\pm$ 1.32		t= 0.394	>0.05
<b>Parity</b>						
- Para (1)	23	26.1	24	27.0	$X^2= 0.442$	>0.05
- Para (2)	39	44.3	41	46.0		
- Para (3) +	26	29.6	24	27.0		
Mean $\pm$ SD	2.15 $\pm$ 0.95		2.13 $\pm$ 0.96		t= 0.168	>0.05
<b>Type of CD</b>						
- Primary	34	38.6	40	44.9	$X^2= 1.209$	>0.05
- Repeated	54	61.4	49	55.1		
<b>Gestational age (week)</b>	38.26 $\pm$ 1.05		38.41 $\pm$ 1.02		t= 0.989	>0.05

$X^2$ : Chi-Square test

t: Independent t test

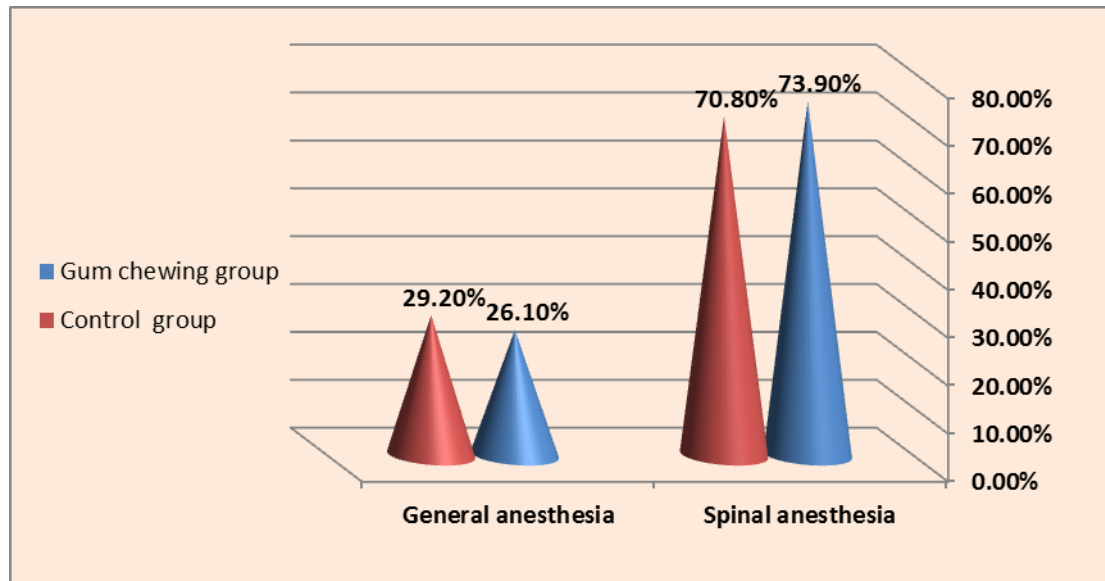
**Table (2)** illustrates the obstetrics history of the studied women. It was found that 26.1% and 27.0% of the gum chewing and control groups respectively were primigravida. The average numbers of births of the studied women in gum chewing and control groups were respectively 2.15 $\pm$ 0.95 and 2.13 $\pm$ 0.96. Regarding to the type of CD, 61.4% of the gum chewing group and 55.1% of control group had a repeated CD. In addition to the mean gestational age in the gum chewing and control groups were 38.26 $\pm$ 1.05 and 38.41 $\pm$ 1.02 weeks respectively. There were no statistically significant differences  $p > 0.05$  between gum chewing and control groups in the term of gravidity, parity, type of CD and gestational age.

**Table (3): Mean differences of anthropometric measurements and pre/intraoperative indicators among the studied groups (n= 177).**

Variables	Gum chewing group n= 88	Control group n= 89	t test	P value
	Mean $\pm$ SD	Mean $\pm$ SD		
- Weight (kg)	73.37 $\pm$ 11.71	74.02 $\pm$ 9.03	0.412	>0.05
- Height (cm)	161.63 $\pm$ 3.37	162.02 $\pm$ 3.49	0.748	>0.05
- Body mass index(kg/m <sup>2</sup> )	28.02 $\pm$ 4.06	28.17 $\pm$ 3.13	0.273	>0.05
- Fasting time before surgery (hour)	6.29 $\pm$ 1.13	6.25 $\pm$ 1.21	0.552	>0.05
- Duration of surgery(min)	57.10 $\pm$ 11.78	55.28 $\pm$ 9.48	1.133	>0.05

t: Independent t test

**Table (3)** displays that there were no statistically significant differences  $P > 0.05$  between the gum chewing and control groups regarding anthropometric measurements and pre/intra operative indicators; weight, height, body mass index, fasting time before surgery and duration of surgery.



$$X^2 = 0.209$$

$$p \text{ value} = >0.05$$

**Fig. (1):** Distribution of the studied groups according to the type of anesthesia(n= 177).

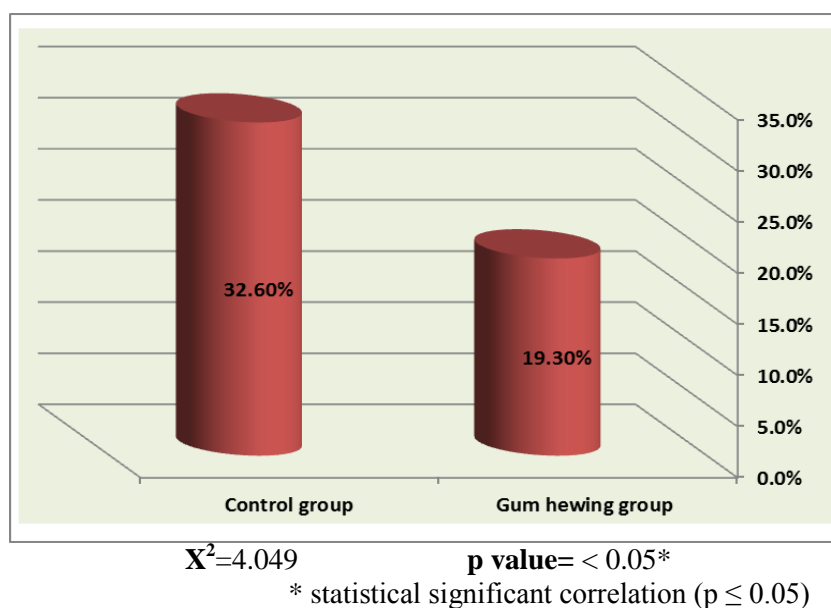
**Fig. (1)** Portrays that, 73.9% of gum chewing group as well as 70.8% of control group were undergoing spinal anesthesia.

**Table (4):** Mean differences of post-operative parameters of bowel function among the studied groups. (n= 177)

Variables	Gum chewing group n= 88	control group n= 89	t test	P value
	Mean ± SD	Mean ± SD		
- Onset of bowel sound (hours)	5.53±1.40	7.03±1.17	3.172	<0.05*
- Onset of gas passage (hours)	15.80±4.07	19.06±3.43	2.375	<0.05*
- Onset of defecation (hours)	24.40±3.69	27.53±3.97	2.233	<0.05*
- Feeling of hunger (hours)	8.20±1.11	10.13±1.92	2.806	<0.05*
- Feeding time (hours)	8.33±1.11	9.46±1.12	2.773	<0.05*
- Length of hospital stay (hours)	22.53±2.77	25.60±4.43	2.270	<0.05*

\* statistical significant correlation ( $p \leq 0.05$ )

**Table (3)** demonstrates that, there were statistically significant differences  $P < 0.05$  between the gum chewing and control groups regarding post-operative parameters of bowel function. Where the average time of post-operative parameters of bowel function were significantly shorter in the gum chewing group than in the control group. The onset of bowel sound was 5.53±1.40 and 7.03±1.17 hours respectively, the onset of gas passage was 15.80±4.07 and 19.06±3.43 hours respectively, the onset of defecation was 24.40±3.69 and 27.53±3.97 hours respectively, the first feeling of hunger was 8.20±1.11 and 10.13±1.92 hours respectively, the feeding time was 8.33±1.11 and 9.46±1.12 hours respectively and the length of hospital stay was 22.53±2.77 and 25.60±4.43 hours between both groups respectively.



**Fig. (2): Distribution of the studied groups according to their complain of abdominal distension after surgery (n= 177).**

**Fig. (2)** Illustrates that, there was statistically significant differences  $P < 0.05$  between the gum chewing and control groups regarding their complain of abdominal distension after surgery where it's incidence was 19.3% of gum chewing group and 32.6% of control group.

**Table (5): Correlation coefficient between the length of hospital stay and post-operative bowel parameters among the studied groups.**

Variables	Length of hospital stay	
	$r$	$P$
- Onset of bowel sound	0.283	$> 0.05$
- Onset of gas passage	0.508	$< 0.01^{**}$
- Onset of defecation	0.555	$< 0.01^{**}$
- Feeling of hunger	0.362	$< 0.05^*$
- Feeding time	0.355	$< 0.05^*$

- $^{**}$ A highly statistical significant correlation ( $p \leq 0.01$ )
- $^*$  statistical significant correlation ( $p \leq 0.05$ )

**Table (5)** clarifies that, there were a positive highly statistically significant correlations  $P < 0.01$  between the onset of gas passage, onset of defecation and the length of hospital stay. Moreover, a positive statistically significant correlations  $P < 0.05$  between the feeling of hunger, feeding time and the length of hospital stay. On the other hand, there was no statistically significant correlation  $P > 0.05$  between the onset of bowel sound and the length of hospital stay.

#### 4. Discussion



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Nurses should be assess gastrointestinal function after CD by auscultating for bowel movements until normal peristaltic movement is noted in all abdominal quadrants. lack of movement in the bowel that happens after cesarean birth, so the nurses must be aware of the signs, which include absent or delayed bowel sounds, abdominal distention and failure to pass gases or stool.<sup>[21]</sup>

The present study finding revealed that no significant differences were found among the gum chewing and the control groups in terms of age, educational level, occupation and residence. As well as there were no statistically significant differences between both groups concerning their obstetrics history, anthropometric measurements and pre/intraoperative indicators. These findings mean that the two groups under study are homogenous and comparable. These findings were in accordance with **Shang et al., 2010**<sup>[4]</sup> who had studied "gum chewing slightly enhances early recovery from POI after CD", reported that the gum chewing and control groups were comparable in age, height, weight, weeks of gestation, type of anesthesia and duration of surgery. Also, **Ledari et al., 2013**<sup>[13]</sup> who had studied "chewing sugar-free gum reduces ileus after CD in nulliparous women" documented that no significant difference between the control and sugarless gum chewing groups regarding demographic characteristics, duration of surgery, BMI, fasting time before the surgery, number of pregnancies and types of CD. *Moreover*, **Rashad and ALYousef, 2013**<sup>[10]</sup> who had studied "the effect of sugarless gum chewing on intestinal movement after CD " stated that no significant difference in terms of the age, level of education, occupation, gravidity, parity, duration of pregnancy and anthropometric measurements between the intervention and control groups.

Concerning the post-operative parameters of bowel function, the current study findings pointed out that, there were statistically significant differences  $P < 0.05$  between the gum chewing and control groups regarding post-operative parameters of bowel function. Where the average time of the onset of bowel sound, the onset of gas passage, the onset of defecation, the first feeling of hunger, the feeding time and the length of hospital stay were significantly lower in the gum chewing group than in the control group. These findings suggest beneficial actions of gum chewing on enhance bowel function recovery following CD. According to the relevant literatures gum chewing is advocated for prevention of POI because it acts as sham feeding, possibly stimulating bowel and gastric motility through repetitive stimulation of the cephalic-vagal complex.<sup>[22]</sup>

These present study findings are in line with the findings of at least other six studies. *First*, **Abd- El-Maeboud et al., 2009**<sup>[23]</sup> who had conducted their study in Egypt to evaluate the efficacy and safety of gum chewing on the recovery of bowel motility after CD. They had reported a statistically significant differences between the study and control groups regarding the mean postoperative time interval to first hearing of bowel sounds  $10.9 \pm 2.7$  versus  $15.6 \pm 3.7$  hours, passage of flatus  $17.9 \pm 4.6$  versus  $24.4 \pm 7.1$  hours, onset of defecation  $21.1 \pm 4.7$  versus  $30 \pm 8.2$  hours and the length of hospital stay  $40.8 \pm 10.6$  versus  $50.5 \pm 8.9$  hours. *Second*, **Kafali et al., 2010**<sup>[24]</sup> who had studied "the influence of gum chewing on postoperative bowel activity after CD" stated that bowel sounds and the first passage of flatus postoperatively appeared in a significantly shorter duration of time in the gum-chewing group as well as the total length of hospital stay was shorter in the gum-chewing group than in the control group. *Third*, **Dehcheshmeh et al., 2011**<sup>[25]</sup> who had studied "the effect of chewing sugar free gum after elective CD on return of bowel function in primiparous women", reported that the mean postoperative time interval to first hearing of normal bowel sounds, the first passage of flatus, first defecation and the staying period in the hospital were significantly lower in the gum-chewing group compared with control group. *Fourth*, **Takagi et al., 2012**<sup>[26]</sup> who had studied "gum chewing enhances early recovery of bowel function following transperitoneal abdominal aortic surgery" reported that, the chewing of gum postoperatively was associated with a significant reduction in time to first flatus, the time to oral intake and the length of hospital stay. *Fifth*, **Husslein et al., 2013**<sup>[27]</sup> who had investigated the effect of Postoperative gum chewing after gynecologic laparoscopic surgery, found a significantly shorter interval between surgery and passage of first flatus in the gum chewing group compared with the control group. *sixth* **Ertas et al., 2013**<sup>[12]</sup> who had studied "influence of gum chewing on postoperative bowel activity after complete staging surgery for gynecological malignancies", found a significant differences in the time to first intestinal movement, passage of first flatus and feces, time to tolerate diet and the length of hospital stay between the gum chewing and control groups.

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These findings are also supported by several systematic reviews and meta-analysis studies have also documented significant reduction in time to first flatus, bowel movement and the length of hospital stay in the gum chewing group. **Noble et al., 2009<sup>[28]</sup>**; **Fitzgerald and Ahmed<sup>[29]</sup>, 2009**; **Hocevar et al., 2010<sup>[22]</sup>**; **Li et al., 2013<sup>[30]</sup>**

On the other hand both **Cavuşoğlu et al., 2009<sup>[31]</sup>** and **Jakkaew & Charoenkwan, 2013<sup>[14]</sup>** had reported different results. Where *the former*, who had investigated "the effect of gum chewing on POI after intestinal resection in children", stated that gum chewing was not associated with a significantly earlier return of intestinal function compared to routine postoperative management. *The Latter*, had investigated "the effects of gum chewing on recovery of bowel function following CD", found a significant differences between the study and control groups in the time of first flatus only and didn't find any significant difference in other parameters of bowel function recovery and ileus related complications between the groups.

This discrepancy between the current study results and those of the latter two studies may be attributed to the minor differences of the duration and frequency of gum chewing among the studies. In the current study, the participants were asked to start chewing gum for 20 minutes, every 2 hours as soon as they are awake and return from the operating theater. While in the contradicting studies, the participants were encouraged to chew gum for 30 min four times a day; morning, noon, evening, and before bed time. As it seems logical to recommend that increasing the frequency and duration of gum chewing times would have more prominent effect on stimulation of bowel function. In addition to the shorter duration of surgery with short duration of anesthesia and fewer intervention with the intestines, and peritoneal irritation compared in the CD surgery with intestinal resection surgeries.

The correlations between the length of hospital stay and post-operative bowel parameters among the studied groups after CD were investigated in the current study. Accordingly, there was a positive highly statistically significant correlation  $P < 0.01$  between the onset of gas passage, onset of defecation and the length of hospital stay. In other words, the woman who had earlier gas passage and defecation therefore could be discharged earlier from hospital.

In this regard **Cinar, 2005<sup>[32]</sup>** had evaluated "the effects of early ambulation on functions of intestine in patients who had been operated on abdomen" demonstrated a significant positive correlation between the time of flatulence and defecation and the time of hospital discharge among their study participants.

### **Conclusion**

Based on the overall findings of the current study, it can be concluded that the use of chewing gum in the postoperative period after CD is a safe, cheap and effective method to stimulate early recovery of bowel function and reduce the postoperative ileus.

### **Recommendations**

- Chewing gum should be included in postoperative nursing care protocol following CD
- The curricula of nursing/midwifery education should involve the chewing gum for promotion of bowel function after CD.
- Implementing health education classes for pregnant women regarding the benefits of free sugar gum chewing following CD.
- Further study also recommended: Evaluating the effect of chewing gum on POI in open gynecologic surgery using a larger sample and different geographical areas in Egypt.

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