Chewing gum: post-operative effect on women's recovery and bowel motility following gynecologic-abdominal surgery

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Abstract

Background: Ileus commonly happens post abdominal surgery and is associated with complication and may delay recovery. The study is hypothesized that chewing gum decreases postoperative ileus by improving early recovery of gastrointestinal function. **Aim:** The study aims to investigate the effect of chewing gum on the postoperative recovery of gastrointestinal function after gynecological and abdominal surgery. **Methods;** ***Design:*** A quasi-experimental research design. ***Setting***: the study was conducted at the general surgery department, and gynecological department at the university hospital in El Fayoum city. ***Subjects:*** a purposive sample of 60 postoperative women. ***Tools:*** Data collection tool consists of structured interviewing schedule, post-operative assessment sheet, and patient satisfaction of using gum. ***Results*** there was significant difference between two groups according to patient's performance after surgery, also there was significant difference between two groups as regarding vomiting time, abdominal distention and amount of oral fluid intake. **Conclusion:** the study conclude that chewing gum is an accessible, effortless, safe, harmless, cheap, and effective method in declining ileus and accelerating gastrointestinal recovery after gynecological and abdominal surgery. **Recommendations:** Chewing sugar-free gum should be added in the protocol of nursing care after gynecological and abdominal surgery in the surgery units.

Keywords: Bowel motility, chewing gum, gynecological and abdominal surgery and post-operative ileus

Introduction

After the majority of abdominal surgeries, the activity of the gas-trointestinal tract is inhibited and this causes abdominal distention, a buildup of gas, nausea and vomiting. Extended and large abdominal surgery leads to more harshness of this disruption ***(Rafati et al., 2014).***

Paralytic ileus is a critical disruption arising following abdominal surgery and is defined as the delayed regain of the synchronized intestinal motility. This disturbance makes the progress delayed and increases the hospital days of stay ***(Jakkaew and Charoenkwan, 2013).***

Apart from the fiscal concerns, the patient's lack of comfort and other problems such as the hospital-acquired infections are major concerns ***(Ge et al., 2015).***

Postoperative ileus occurs due to the drop of intestinal movement and the reduction of the activity of the parasympathetic nervous system ***(Nimarta et al., 2013).*** Ileus occurs in cases of opioid and drug interaction and abdominal operations, especially in surgeries with extreme manipulation, and transiently contributes to impeding peristalsis (bowel movement); the related mechanism is possibly dysfunction in the parasympathetic system (inhibitory neurons) activity ***(Ge et al., 2015).***

Postoperative ileus increases to be a cause of morbidity and the primary reason for the extended hospital days of stay post abdominal surgery such as an appendectomy. The useful and safe encouragement of the improvement of gastrointestinal function post abdominal operation and avoidance of postoperative problems have initiated a prevalent apprehension between medical and nursing staff ***(Pilevarzadeh, 2016).*** Ileus resolution is

habitually defined by the passage of flatus (gas) or feces or both. These are signs that intestinal function is being restored to normal, and the end points of postoperative ileus are usually measured ***(Lim et al., 2013).***

Postoperative ileus occurs in approximately 50% of patients who undergo major abdominal surgery. Chewing gum can increase the bowel motility as it directly activates the cephalic vagal reflex, which in turn activates intestinal myoelectric motion, and indirectly stimulates the secretion of gastrointestinal hormones that increase the release of saliva and pancreatic juice. This reaction leads to likewise humeral and nervous activation of bowel motility ***(Murray and Mckinne, 2014).***

Many theories have been proposed for chewing as a type of sham feeding that enhances the plasma concentration of gastrin, neuro-tensin, pancreatic polypeptide, and duodenal alkaline secretion ***(Ibrahim and Mohamady, 2013).*** The mechanism of improved revival from postoperative gastrointestinal dysfunction with the assistance of chewing gum is thought to be the cephalic-vagal-stimulation of digestion, which enhances the capability of neural and humoral factors that operate on different portions of the gastrointestinal tract ***(Mansour et al., 2016).*** Chewing gum proceeds by stimulating intestinal motility coupled with bowel motility that causes early return of bowel sounds, a passage of flatus, and arrival of appetite ***(Rafati et al., 2014).***

Following abdominal surgeries, the reduction of gastrointestinal system motility and the alteration of dietary habits may cause progress of ileus symptoms, such as nausea, vomiting, abdominal distension, and hiccup, which leads to severe pain for the patient/ individual after operation ***(Li et al., 2013; Forrester et al., 2014).*** Postoperative ileus is the most major post abdominal surgery crisis that extends the interval of hospital stay, causes pain and distension, hinders oral feeding, causes respiratory troubles, and increases hospital expenses ***(Ho et al., 2014).***

Consequently, resumption of the intestinal function is an essential feature that necessitates appropriate awareness ***(Keenahan, 2014).*** Chewing gum can augment bowel movements and decrease the temporary phase of paralysis ***(Su'aBulPollock et al., 2015).*** Using chewing gum as one of the non-pharmacological interferences and an economical method that can be used to activate the stomach improves gastric secretion, enhances peristaltic bowel movements, and finally accelerates retrieval of intestinal function ***(Craciunas et al., 2014).***

Although working with the patient undergoing gynecological-abdominal operation is the duty of the nurse to avert the postoperative ileus, there are many non-pharmacological treatments, such as early enteral nutrition, early mobilization, and psychological preoperative training, and among them, the utilization of chewing gum has appeared as a latest, effortless, willingly obtainable, and inexpensive modality for lessening postoperative ileus ***(Ho et al., 2014).*** This intervention has been revealed to be successful in the postoperative time of abdominal-gynecological surgery. Moreover, the outcome of such a topic in our Egyptian context is necessary ***(Ngowe et al., 2010).***

Significant of the study:

Postoperative ileus occurs in approximately 50% of patients who undergo major abdominal surgery **(Senagore AJ, 2007)**. Chewing gum is hypothesized to decrease postoperative ileus by encouraging early recovery of gastrointestinal function Chewing gum tricks the body into thinking it is eating, causing the digestive system to start functioning again. Given that greatest people have preceding experience of chewing gum, the intervention is mostly well tolerated by individuals. Chewing gum as an intervention is also low-cost and easy to implement.

Aim of the Study

The study aims to investigate the effect of chewing gum on the postoperative recovery and gastro-intestinal function after adnominal and gynecologic-abdominal surgery.

Subjects and methods

1.1. Research Design

Quasi experimental design.

1.2. Setting

The study was conducted at the general surgery department, and gynecological department at the university hospital in El Fayoum city.

1.3. Subjects:

1.3.1. *Type:* a purposive sample of postoperative women who met the criteria for inclusion in this study.

1.3.2. *Size:* 60 post-operative women at gynecological and surgical department at Fayoum university hospital.

1.3.3. *Inclusion criteria*

- Age ≥18years
- Satisfactory consciousness.
- Cooperativeness toward chewing gum.
- Underwent abdominal or gynecological-abdominal surgery.

1.3.4. *Exclusion criteria*

- No teeth or defective or incomplete chewing movement
- Need of long term fasting and having received total parenteral nutrition.
- Pyloric obstruction.
- Remnant or recurrence of gastric cancer.
- Palliative surgery for advanced gastric cancer.

1.4. Tools of Data Collection

To attain the aim of this study, the following two tools were utilized for data collection.

1.4.1. Tool I: Structured interviewing schedule; consisted of 3 parts: prepared by the researcher after reviewing of the current literature.

Part 1: it included the following six items to assess personal characteristics of the studied participant: age, educational level, occupation, residence, family income. And crowding

Part 2: it involved items to assess health history of studied participants such as past health history as diabetes, hypertension and heart disease.

Part 3: information about present operation as type of operation, time of operation, blood transfusion, previous surgery, and occurrence of complication.

1.4.2. Tool II: Post-Operative Assessment Sheet: It for assessing the postoperative parameters of intestinal function, including time of first intestinal sound, time of first passage of flatus, time of first feeling of hunger, time of first defecation, and the time of hospital stay by hour, as well as occurrence of postoperative ileus and related symptoms among studied participants such as abdominal distension, nausea, and vomiting.

1.4.3. Tool III: patient satisfaction of using gum.

1.5. Validity and Reliability:

Content validity of the questionnaire was ensured through three experts in obstetrics and gynecological nursing, medical surgical nursing. Modification to the tools was made according to experts' judgment on the clarity of sentences, appropriateness of the content, the sequence of items, and accuracy of scoring and recording of items. The tool's accuracy was based on Cronbâch ALPHA. The Cronbach's alpha for the reliability was 0.86 for tool II and III.

1.6. Pilot study:

Applicability of the research tools was checked through a pilot study conducted on 10% of women (excluded from the study sample) to ensure the tool's consistency and comprehensibility.

1.7. Administrative & Ethical Considerations:

Before conducting the study, official permission was obtained from the director of Fayoum University Hospitals. Consent was obtained from each woman recruited in the study. Participants' were told that all their data were highly confidential. Anonymity was also maintained by assigning a code number to each person instead of names to protect their privacy. Only the researchers and the participants had data available.

1.8. Field work:

The study was carried out from April 2018 to July 2018. A written informed consent was obtained from the participants who fulfilled the inclusion criteria, and they were given a justification on the aim of the study before participation. Protocol of chewing gum was explained to each woman in the intervention group. Gum chewing was started 2 hours after surgery and continued every 2 hours for 15 minutes in duration excluding throughout sleeping until passing flatus. Each participant in both groups (study and control) was assessed abdominally using a stethoscope to identify the intestinal sound every 1 hour and was asked to report immediately the time of either feeling an intestinal movement, passing flatus or stool, first time of feeling hunger, first time of passing flatus, and defecation time and document the time of hospital discharge. The collected data were coded, analyzed, and then the results were compared between the two groups.

1.9. Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0**.** **(**Armonk, NY: IBM Corp**)** Qualitative data were described using number and percent. Significance of the obtained results was judged at the 5% level.

3.9.1 Quantitative data were described using range (minimum and maximum), mean and standard deviation.

3.9.2 The used tests were:

Chi-square test: for categorical variables, to compare between different groups.

Fisher's Exact or Monte Carlo correction: Correction for chi-square when more than 20% of the cells have expected count less than 5

Student t-test**:** For normally distributed quantitative variables, to compare between two studied groups.

2. Results:

Table (1): revealed that was no significance difference between the two groups as regarding socio-demographic characteristics.

Table (2): showed that there was no significant difference between two groups as regarding medical history.

Table (3): showed that there was no significant difference between two groups regarding current operation data.

Table (4) & (5): illustrated that there was significant difference between two groups as regarding vomiting time, abdominal distention and amount of oral fluid intake.

Table (6): illustrated that all study group stayed 1-2 days in hospital ,more than half of the study sample (56.7) chewing gum immediately after surgery ,80% of them chewing gum three times per day, 56.% of study sample chewing gum 46- 60 minutes.

Table (7) and figure (1): showed that all study sample satisfied when chewing gum.

Table (1): Comparison between the two studied groups according to socio-demographic characteristics

Socio-demographic characteristics	Study (n = 30)		Control (n = 30)		Test of Sig.	p
Age (years)						
Min. – Max.	20.0 – 35.0		20.0 – 35.0		t=	0.795
Mean ± SD.	27.13 ± 4.25		27.40 ± 3.63		0.262	
Education degree	**No.**	**%**	**No.**	**%**		
Primary	9	30 0	6	20 0		
Secondary	10	33 3	14	46 7	χ^2=	0 518
University	11	36 7	10	33 3	1 314	
Occupation						
House wife	12	40.0	19	63.3		
Governmental work	5	16.7	3	10.0		^{MC}p=
Private work	7	23.3	3	10.0	3.722	0.303
No work	6	20.0	5	16.7		
Residence						
Rural	15	50 0	12	40 0	χ^2=	0 436
Urban	15	50 0	18	60 0	0 606	
Family income						
Not enough	14	46 7	18	60 0	χ^2=	0 301
Enough	16	53 3	12	40 0	1 071	
Crowding index						
Min. – Max.	1.0 – 2.50		0.67 – 2.50		t=	0.349
Mean ± SD.	1.43 ± 0.37		1.53 ± 0.43		0.945	

Table (2): Comparison between the two studied groups according to medical health history

Second :Health History	Study (n = 30)		Control (n = 30)		χ^2	p
	No.	%	No.	%		
Do you suffer from any chronic diseases?						
Yes	**14**	**46.7**	**20**	**66.7**	2.443	0.118
No	16	53.3	10	33.3		
If yes: what is it?						
DM	5	35.7	3	15.0	1.964	^{FE}p=0.228
Hypertension	8	57.1	10	50.0	0.169	^{FE}p=0.681
Gestational Diabetes	1	7.1	4	20.0	1.085	^{FE}p=0.379
Heart	1	7.1	0	0.0	1.472	^{FE}p=0.412
Kidney	0	0.0	0	0.0	–	–
Liver	1	7.1	0	0.0	1.472	^{FE}p=0.412
Anemia	3	21.4	7	35.0	0.731	^{FE}p=0.467
Thyroid	0	0.0	2	10.0	1.488	^{FE}p=0.501
Depression	0	0.0	0	0.0	–	–
Have you ever had surgery?						
Yes	**18**	**60.0**	**23**	**76.7**	1.926	0.165
No	12	40.0	7	23.3		
If yes, what kind of surgery?*						
Previous caesarean delivery	14	77.8	15	65.2		
Appendectomy	3	16.7	4	17.4		
Cholecystectomy	0	0.0	2	8.7	1.722	^{MC}p=0.782
Previous caesarean delivery & Appendectomy	1	5.6	2	8.8		

Table (3): Comparison between the two studied groups according to current operation data

Third: Current operation data	Study (n = 30)		Control (n = 30)		Test of Sig.	p
Operation time in minutes						
Min – Max	30.0 – 40.0		30.0 – 50.0		t=	0.783
Mean ± SD	34.0 ± 3.81		33.67 ± 5.40		0.276	
Blood transfusion during the operation	**No.**	**%**	**No.**	**%**		
No	4	13.3	5	16.7	χ^2=	^{MC}p=
500	26	86.7	21	70.0	4.387	0.129
1000	0	0.0	4	13.3		
Did any complications occur for the operation?						
Yes	2	6.7	7	23.3	χ^2=	^{FE}p=
No	28	93.3	23	76.7	3.268	0.145
Type of complication						
Drop in blood pressure	2	100.0	4	57.1	χ^2=1.286	^{FE}p=0.500
Persistent vomiting	0	0.0	3	42.9	χ^2=1.286	^{FE}p=0.500
Severe dizziness	0	0.0	2	28.6	χ^2=0.735	^{FE}p=1.000
Nausea	0	0.0	1	14.3	χ^2= 0.321	^{FE}p=1.000

Table (4): Comparison between the two studied groups according to women's observations: Follow up after surgery

Q	B) Women's observations: Follow up after surgery	Study (n = 30)		Control (n = 30)		χ^2	p
		No.	%	No.	%		
1	**Hours to removal of bladder catheter**						
	<12	1	3.3	3	10.0		^{MC}p=
	12–24	21	70.0	17	56.7	1.589	0.461
	>24	8	26.7	10	33.3		
2	**Hours to removal of drains**						
	1 day	17	56.7	11	36.7		
	2 days	7	23.3	12	40.0	2.678	0.262
	3 days or more	6	20.0	7	23.3		
3	**Parenteral fluid volume (liters)**						
	No	0	0.0	0	0.0		
	500	0	0.0	0	0.0	0.000	^{FE}p=
	1000	3	10.0	3	10.0		1.000
	1500	27	90.0	27	90.0		
4	**IV fluids duration (hours)**						
	10 or less	0	0.0	1	3.3		^{MC}p=
	11 – 20	26	86.7	19	63.3	4.507	0.074
	>20	4	13.3	10	33.3		
5	**Vomiting (times)**						
	No	18	60.0	7	23.3		
	1 – 2	6	20.0	15	50.0	8.983*	0.011*
	3 or more	6	20.0	8	26.7		
6	**Abdominal Distension**						
	Yes	0	0.0	17	56.7	23.721*	<0.001*
	No	30	100.0	13	43.3		
7	**Post-operative Ileus**						
	Yes	6	20.0	5	16.7	0.111	0.739
	No	24	80.0	25	83.3		
8	**Hours to oral fluids**						
	10 or less	25	83.3	17	56.7		^{MC}p=
	11 – 20	3	10.0	5	16.7	5.504	0.054
	>20	2	6.7	8	26.7		
9	**Amount of oral fluids**						
	< 100	22	73.3	30	100.0		
	100 –200	8	26.7	0	0.0	9.231*	^{FE}p=
	>200	0	0.0	0	0.0		0.005*

Table (5): Comparison between the two studied groups according to follow up after surgery "continue"

Q	B) Follow up after surgery	Study (n = 30)		Control (n = 30)		χ^2	p
		No.	%	No.	%		
10	**Hours to regular diet**						
	<12	0	0.0	2	6.7	8.870*	MCp= 0.006*
	12–24	9	30.0	1	3.3		
	>24	21	70.0	27	90.0		
11	**Hours to sit**						
	<3	25	83.3	23	76.7	8.649*	MCp= 0.009*
	3 – 4	5	16.7	1	3.3		
	>4	0	0.0	6	20.0		
12	**Hours to ambulate**						
	<6	20	66.7	26	86.7	10.983*	MCp= 0.002*
	6–12	10	33.3	1	3.3		
	>12	0	0.0	3	10.0		
13	**Minutes out of bed**						
	None	0	0.0	5	16.7	17.326*	MCp <0.001*
	10 or less	17	56.7	4	13.3		
	11–20	0	0.0	4	13.3		
	>20	13	43.3	17	56.7		
18	**Method of bowel function assessment**						
	Listening of Bowel sound	29	96.7	25	83.3	2.963	FEp=0.195
	Pass flatus	29	96.7	25	83.3	2.963	FEp=0.195
	Pass stool	28	93.3	25	83.3	1.456	FEp=0.424
	First min after sewing gum						
	No bowel sound	29	96.7	25	83.3	2.963	FEp=0.195
	Exist	1	3.3	5	16.7		
	After 5 min						
	No bowel sound	29	96.7	25	83.3	2.963	FEp=0.195
	Exist	1	3.3	5	16.7		
19	**Symptoms and signs of gastrointestinal disturbance within the first 72 hours after surgery**						
	Nausea	3	10.0	24	80.0	29.697*	<0.001*
	Vomiting	3	10.0	25	83.3	32.411*	<0.001*
	Vomiting(times)						
	No	26	86.7	6	20.0	28.265*	<0.001*
	1 – 2	4	13.3	13	43.3		
	3 or more	0	0.0	11	36.7		
	Need anti-emetics	4	13.3	25	83.3	29.433*	<0.001*
	Abnormal cramping	3	10.0	27	90.0	38.400*	<0.001*
	Abnormal distension	4	13.3	26	86.7	32.267*	<0.001*

Table (6): Distribution of the studied patient according to women's observations follow up after surgery in study group (n = 30)

Q		No.	%
14	**Time hours to initiation of gum chewing:**		
	Immediately after surgery	17	56.7
	Two to five hours after surgery	12	40.0
	Six or more hours after surgery	0	0.0
	After anesthesia recovery	0	0.0
	Anytime in first day	1	3.3
15	**How many times chewing gum per day (24)**		
	1	0	0.0
	2	4	13.3
	3	24	80.0
	4	2	6.7
16	**Minutes of chewing gum**		
	15 or less		
	16 – 30	2	6.7
	31 –45	11	36.7
	46– 60	17	56.7
	>60	0	0.0
17	**Length of stay**		
	1 – 2 days	30	100.0
	3 – 4 days	0	0.0
	>4 days	0	0.0
20	**Sid effect of using gum**		
	No	18	60.0
	Jaw muscle fatigue or pain	12	40.0
	Diarrhea	0	0.0
	Headaches	0	0.0

Table (7): Distribution of the studied cases according to patient satisfaction of using gum in study group (n = 30)

Patient satisfaction of using gum	No.	%
Are you satisfied?		
Not Satisfied	0	0.0
Satisfied	30	100.0
If satisfied how you would rate your satisfaction when using gum or chewing gum?		
5	1	3.3
6	13	43.3
7	2	6.7
8	13	43.3
9	1	3.3
10	0	0.0

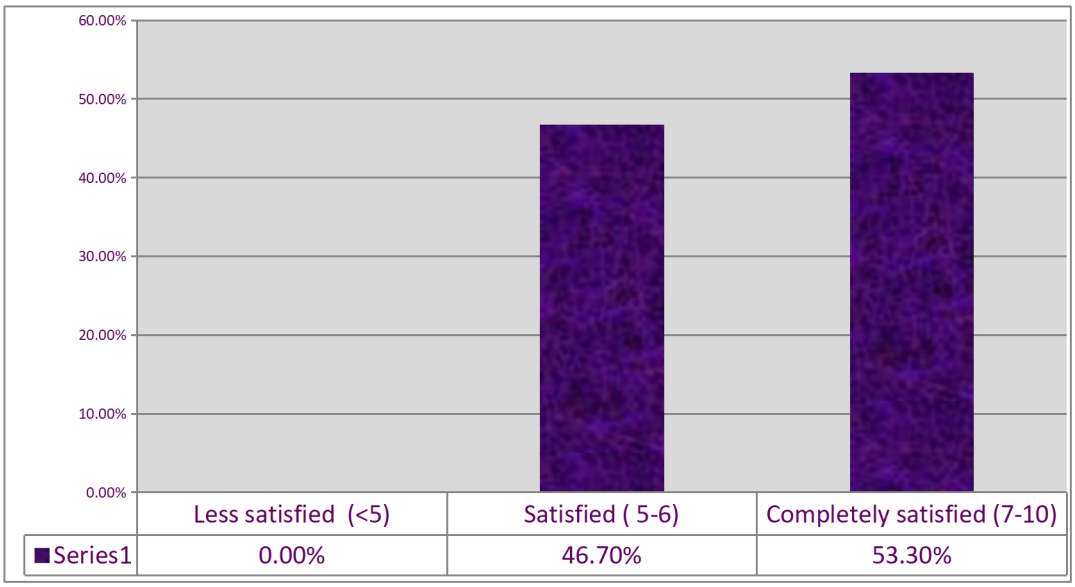

Figure (1): women's satisfaction of using gum

Discussion:

The important complication of abdominal surgical procedures is postoperative eileus (Colonicstasis), which results in patient discomfort, prolonged length of hospital stays, and increased cost of treatment. The exact mechanism that produces postoperative ileus is unknown, but possible origins include gastrointestinal inflammatory response, stimulation of them esenteric plexus, anesthesia, and use of opioid analgesics ***(Husslein et al., 2013).***

Results of this study demonstrate that there are no significant statistical differences between the chewing gum group and the control group regarding their personal characteristics, such as age, sex, educational level, residence, and occupation, these findings mean that the intervention group and the control group are homogenous and comparable. This study finding are congruent with the results of previous studies that found no significant discrepancy between the control and sugar-free gum chewing groups in terms of demographic characteristics ***(Ledar et al., 2012).***

The result of the present study illustrated that there was significant difference between two groups as regarding vomiting time, abdominal distention and amount of oral fluid intake. Some studies contradict the findings of this study. One study reported that there was no benefit to sugared chewing gum in comparison with no gum in patients undergoing major colorectal surgery managed with early feeding regarding postoperative pain, nausea, or appetite ***(Jamilian, 2016).***

Also, two previous studies found no effect of sugared chewing gum for patient with colorectal surgery compared to no gum chewing in their study conducted for the effect of sugared chewing gum on the return of gastrointestinal function after major surgery ***(Wan et al., 2014).*** The negative results are possibly due to their practice of early enteral feeding, which may already fasten the postoperative recovery of gastrointestinal function. Also, the pathophysiology of postoperative ileus may be different for various operative techniques and anatomical portions of the gastrointestinal tract ***(Atkinson et al., 2016).***

The present finding revealed that there was significant difference between the two groups regarding follow up after surgery. Some studies agree with the findings of this study. One study reported that there was a significant statistical reduction in the occurrence of post-operative ileus and related symptoms such as nausea, vomiting, and distention favoring the chewing gum group than the other one. In this respect, a previous study pointed out that chewing gum

improves recovery after open appendectomy by reducing postoperative ileus among appendectomy patients ***(Kobayashi et al., 2015).***

These results are in line with many studies that conducted meta-analysis for the relation between chewing gum and postoperative ileus and demonstrated a significant effect suggesting that chewing gum following abdominal surgery offers benefits in reducing the time of post-operative ileus ***(Lim et al., 2013).*** Also, one study noted that gum chewing reduced postoperative ileus and inflammation among colorectal surgery patients ***(Shum et al., 2016).***

The present study illustrated that all study group stayed 1-2 days in hospital ,more than half of the study sample chewing gum immediately after surgery, most of them chewing gum three times per day, and more than half of study sample chewing gum 46-60 minutes. These results were in accordance with Van Den Heijkant (2015) who reported that duration of hospital stay was shorter in the intervention group compared to the control group; and the first intestinal sounds were heard earlier in the intervention group than in the control group ***(Van Den Heijkant et al., 2015).***

In contrast to the results of this study, in a study carried out to evaluate the effect of chewing sugared gum in combination with early enteral feeding on the recovery of gastrointestinal (GI) function after major colorectal surgery, it was demonstrated that there was no significant difference in time to tolerating a low-residue diet, time to flatus, time to bowel movement, length of postoperative hospital stay, and postoperative complications ***(Jamilian, 2016).*** The discrepancy may be due to two main factors. The first factor is the starting of early enteral feeding, which activates the gastrointestinal motility. The second factor is the use of sugared gum in their study, which differs in its effect from sugarless gum. Also, chewing gum composition; sugar-free gum uses sugar substitutes (e.g., sorbitol and xylitol). These sugar surrogates can improve gut function by causing a non-stimulant laxative effect. This represents another factor, which may influence gut motility in the gum-chewing group of patients ***(Ge et al., 2015).***

Conclusions

Supported by the overall findings of this study, we conclude that chewing gum is an accessible, effortless, safe, harmless, cheap, and effective method in declining ileus and accelerating gastrointestinal recovery after gynecological and abdominal surgery.

Recommendations

Based on the findings of this study, the following recommendations are suggested:

[1]. Chewing sugar-free gum should be added in the protocol of nursing care after gynecological and abdominal surgery in the surgery units.

[2]. Involvement of chewing gum after gynecological and abdominal surgery into nursing curriculum.

[3]. Conducting a further study for evaluating the effect of chewing gum on postoperative ileus among gynecological and abdominal surgery patients using a larger sample and different geographical areas in Egypt.

[4]. Carry out health education programs to gynecological abdominal surgery patients about the effect of chewing gum post-surgery.

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