

## Effectiveness of Chewing Sugar Free Gum on Intestinal Function after Cesarean Section

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**Abstract:** Cesarean delivery is a major abdominal surgery associated with some changes in the autonomic nervous system post-operatively, which lead to decreasing intestinal motility, delay of bowel function and postoperative ileus. Gum chewing is an inexpensive, safe and non-medicinal therapy option to provide the advantages of early stimulation of the intestinal function after cesarean delivery.

**The purpose of the study** was to evaluate the effectiveness of chewing sugar free gum on intestinal function after cesarean section.

**Method:** A quasi-experimental design was utilized.

**Sample:** A purposive sample of 200 primiparous women was taken immediately after cesarean section. **Setting:** The study was carried out at University and Teaching Hospital at Shebin El-Kom.

**Instruments:** A structured interviewing questionnaire, Post-operative intestinal function parameters evaluation form. **The results revealed that** 1) There were highly statistically significant differences between the study and control groups concerning intestinal function parameters and length of hospital stay post-operatively 2) There were highly statistically significant positive correlations between the length of hospital stay and post-operative intestinal function parameters among women in the study group.

**Conclusion:** Chewing sugar free gum is effective, safe, physiologic and inexpensive method in the regaining of intestinal function and shortening the length of hospital stay after cesarean section.

**Recommendation:** Integrating chewing sugar free gum in hospital nursing care protocol for caring primiparous women after cesarean section under spinal anesthesia.

**Keywords:** Cesarean Section (CS), Chewing Gum, Intestinal Function.

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### I. Introduction

Cesarean Delivery (CD) is considered one of the foremost common implemented abdominal surgical procedures all over the world nowadays (Rahimparvar et al., 2018). In addition, Safdari, (2015) stated that cesarean delivery is associated with some changes in the autonomic nervous system post-operatively, which lead to decreasing intestinal motility, delay of bowel function, postoperative ileus and driven problems.

On the other hand, Akhlaghi et al., (2015) stated that postoperative ileus is one of the most commonly complications after abdominal operations. It is described as a transitory stopping in the intestine or the inability to pass the bowel contents and lateness in regaining the regular intestinal function for 3 or 5 days after abdominal surgeries. They added that post-operative ileus causes many problems such as abdominal distention, postoperative pain, increasing the duration of hospital period, increasing the cost of care, inability of the women to initiate breast-feeding and eventually tardiness in recovery.

According to Wajid et al., (2016), sugar- free gum chewing postoperatively acts as a form of sham feeding which hastens digestive recuperation by stimulating nerves in the digestive tract causing the release of gastrointestinal hormones, increasing the production of saliva and secretions from the pancreas and accelerating intestinal movement.

Marwah, Singla and Tinna, (2015) pointed out that gum chewing is a simple, safe, inexpensive, effective and non-pharmacological therapy option to provide the benefits of early stimulation of the intestinal movement after cesarean section.

Also, Cevik and Baser, (2016) reported that the postnatal phase is the time of major physical and psychological transition for the new mother and whole family. Nursing attention takes into account

the psychological and physiological needs of the women during the post-partum period. For preserving nursing care quality, it is essential to help the women through supporting comfort, following vital signs, providing instructions about breast feeding practice and avoiding any associated complications after caesarean surgery.

**Significance of the Study:**

Cesarean section is one of the most commonly obstetrical operations performed all over the world (Vejnović, Costa and Lgnatoy, 2017). In Egypt, the overall rate of caesarean delivery has risen dramatically from 27.6% in 2010 to 52% in 2014 (El-Zanaty and Ann, 2014). The increase in caesarean delivery rates is problematic for several causes. Caesarean delivery has been associated with increasing the women morbidity and mortality rate, unhealthy outcomes of newborns and increasing the health care organizations costs (Karlström, Lindgren and Hildingsson, 2018).

Gastrointestinal dysfunction remains a cause of morbidity and the major factor of length of hospital stay after abdominal operation such as caesarean delivery. The effective and harmless promotion of gastrointestinal function recommencement and prevention of complications after abdominal surgery has begun diffused among medical and nursing staff. Therefore, regaining the bowel movement is an essential aspect which requires due attention (Ge, Chen and Ding, 2017).

Using sugar free gum chewing is one of the non-medicinal nursing interventions and an inexpensive approach which can be used to accelerate gastric secretion, stimulate the stomach, increase peristaltic bowel movements and ultimately enhance return of bowel motility (Hitti, 2016). Consequently, this study was intended to evaluate the effectiveness of chewing sugar free gum on intestinal function after caesarean section in Menoufia governorate.

**Purpose of the Study:**

Purpose of the current study is to evaluate the effectiveness of chewing sugar free gum on intestinal function after caesarean section.

**Hypotheses of the Study**

Hypothesis (I): women who initiate chewing sugar free gum after caesarean section have faster return of intestinal function than those who do not.

Hypothesis (II): women who initiate chewing sugar free gum after caesarean section have shorter length of hospital stay than those who do not.

## **II. Method**

**Research Design:**

A quasi –experimental design (study, control) was utilized in implementing the present study.

**Research Settings:**

The current study was performed at the post-partum unit at two different settings in Menoufia governorate, namely Menoufia University Hospital and Shebin El-Kom Teaching Hospital. These settings were selected because they are governmental hospitals and known to have high flow rate of women from rural and urban areas. Also, they provide many services to the public clients; one of these services is providing the postnatal care for the women with various socioeconomic backgrounds and have increase turnover of puerperal women. Menoufia University Hospital: It was established in 1993. It is a university - affiliated hospital with a primary role in education and is composed of four buildings: three linked (Main building, Emergency hospital and Suzan Mubarak hospital) and one separate building (Oncology building). The flow rate of primiparous women after caesarean section at postpartum unit was 1150 cases / year based on the statistical annual report (2018) of the hospital. Shebin El-Kom Teaching Hospital: It was established in 1962, as a Ministry of Health and Population- affiliated hospital. It provides free and paid services to public clients during pregnancy, labor, postpartum and abortion. In addition, care of gynecological problems and finally family planning services take place at the outpatient clinic. The flow rate of primiparous women after caesarean section at postpartum unit was 1070 cases / year based on the statistical annual report (2018) of the hospital.

**Sampling:**

A purposive sample of (200) primiparous women was taken from the above-mentioned hospitals immediately after caesarean section at postpartum units. One hundred women were selected from Menoufia University Hospital and another one hundred women from Shebin El-Kom Teaching Hospital. They all fulfilled the inclusion criteria and were enrolled in the current study. The selected women were then randomly assigned immediately after surgery (using simple randomization technique) to two groups (Group1 and Group2). Each one of the 200 women was asked to pick a piece of paper containing odd and even numbers. Those who selected

an odd number was assigned to Group1 and those who selected an even number was assigned to Group2. This technique was used to avoid sample contamination and bias.

**Sample Size Calculation:**

Sample size was based on the past review of the literature that examines the same outcomes and found significant differences, a sample size has been calculated using the following equation (Fisher and Yates, 2014):-

At power 80% and CI 95% the sample size was conducted to be 200 primiparous women with elective cesarean section (100 for each group) participated in the study.

$$n = \frac{z^2 \times \hat{p}(1-\hat{p})}{\epsilon^2}$$

Where

z is the z score

N is population size

$\hat{p}$  is the population proportion

$\epsilon$  is the margin of error

**Instruments:**

**Instrument I: A structured interviewing questionnaire:** It was based on the review of currently related literature and used by the researcher to collect the necessary data about the study participants. It included the following parts: - the first part contained questions related to the socio-demographic characteristics, the second part contained data related to previous obstetric history, the third and fourth part contained data related to previous medical and surgical history, the fifth part contained data related to history of current pregnancy and the final parts contained data related to pre, intra and post-operative characteristics.

**Instrument II: Post-operative intestinal function parameters evaluation form:** This instrument was adopted from (Van Bree et al., 2016). It was especially designed in this study to provide baseline data of the participants regarding bowel function parameters immediately post-cesarean section and within the first 24 hours. It was implemented by using an evaluation form, which illustrated the time of first audible intestinal sound, the time of first passage of flatus and the time of first passage of defecation.

**Validity and reliability**

For validity purposes, the researchers conducted an extensive literature review and developed the questionnaire from the previously used instruments and reviewing pertinent studies. Instrument 1 was designed by the researchers and validated by five experts in the field of maternal and newborn health nursing in the Faculty of Nursing of Menoufia University (for content validity), while instrument II was adopted from the previous studies. The interview questionnaire underwent some modifications according to the panel of judgment regarding the clarity of sentences and appropriateness of content. Test-retest reliability was used to estimate reliability.

**Approval Letters:** An official letter was taken from Faculty of Nursing, Menoufia University Dean and submitted to the directors of the study settings, chairperson of Obstetrics and Gynecology department of University Hospital and Shebin El-Kom Teaching Hospital to carry out the study before starting data collection. An official permission was obtained from the directors of the above-mentioned settings to carry out the study. A full explanation about the rationale of present study was provided to the directors of the study settings.

**Ethical Consideration:**

An approval from the committee of Hearing and Ethics was obtained from Faculty of Nursing - Menoufia University on 14/2/2018 (Appendix C). Approaches to ensuring ethics were considered in the study regarding the confidentiality and informed consent. The researcher introduced herself to the participants of the study and explained the purpose of the study in order to obtain their acceptance to be recruited in the study as well as to gain their cooperation. Confidentiality was achieved by the use of closed sheets with the names of the participating women replaced by numbers. All women were informed that the information they provided during the study would be kept confidential and used only for statistical purposes. They were also informed that the findings would be presented as a group data with no personal participants' information remained.

**Pilot Study:**

A pilot study was implemented to test the applicability of the instruments, the feasibility of the study and to estimate the time needed for data collection. It was performed on 10% of the total participants, which is equal to 20 women. Based on piloting results; the researcher rephrased some questions and sentences, then set the final fieldwork schedule. The 20 women participating in piloting were excluded from the participants of the study.

**Field Work:**

The current study was carried out on three consecutive phases:

• **Preparatory Phase:**

An extensive review related to the study area was done including electronic dissertations, available books, articles and periodicals. A review of literature to formulate knowledge base relevant to the study area was also done. A written permission, from the institutional authority of the two hospitals, was obtained before conducting the study. The researcher resorted to the different data collection instruments, a measuring tape, in addition to seeking managerial arrangement to carry out the study.

• **Implementation Phase:**

- The data were collected over a period of 6 months from the beginning of November (2018) to the end of April (2019) in the postpartum units.
- The researcher carried out the implementation phase according to the following steps:

**The first step:** The researcher went to the postnatal unit in the previous mentioned hospitals three days per week (Saturday, Sunday and Thursday) at different shifts, known to have high flow rate of women with cesarean sections. The researcher screened the women to identify the eligible participants according to the inclusion criteria. All the participants who met the inclusion criteria were included in the study. This protocol was followed until the needed number of both groups was reached.

**The second step:** At the time of initial contact, the researcher greeted the women, introduced herself and explained the purpose of the study in order to obtain their acceptance to participate in this study as well as to gain their cooperation. Each participant was informed that participation in the study is voluntary and she can withdraw at any time. The participants were given an in-depth description on the research approach prior to entering the study.

**The third step:** The selected women who met the inclusion criteria were then randomly assigned immediately after surgery (using simple randomization technique) to two groups (Group1 and Group2).

**The fourth step:** The researcher used questionnaire to assess the effectiveness of chewing sugar free gum on intestinal function after cesarean section. About one to three women were interviewed per day according to the availability of primiparous women who met the inclusion criteria. Each woman was intentionally interviewed individually to collect data. This interview took about 15-20 minutes for each woman. The postnatal women were asked in Arabic language and documented her answer in the instruments utilized.

**The researcher also followed these steps:**

- Protocol of chewing sugar free gum was explained to the intervention group.
- The women in the study group (Group1) were instructed to chew one stick of a commercially available sugar free gum (Samarah Foods, Cairo, Egypt) for 30 minutes, which was initiated in first two hours after cesarean section.
- The women continued chewing gum until regaining the intestinal function (flatus or defecation occurred).
- The researcher provided each woman with the required amount of gum sticks.
- The women in the control group (Group2) were not given anything by mouth postoperatively and followed only the postoperative hospital routine care for ambulation.
- The women in both groups were not given oral or rectal bowel stimulants after cesarean section
- The oral intake of clear fluids and soft foods began when flatus had passed and normal intestinal sounds were detected with the progression to a regular diet after passage of first defecation.
- Length of hospital stay was calculated by recording the timing of hospital discharge. The routine hospital stay period (from the onset of surgery until the hospital discharge) ranged between 24-48 hours. Hospital discharge took place when the following criteria were met: stable vital signs, tolerance of the regular diet without nausea or vomiting, return of intestinal movements, ability to ambulate and urinate without assistance and absent - unresolved postoperative complications.

**EvaluationPhase:**

In this phase, the researcher evaluated all the recruited women in the present study for the time of intestinal function parameters immediately post-cesarean section and within the first 24hours by using an evaluation form. This form illustrated (the time of first audible intestinal sound, the time of first passage of flatus and the time of first passage of defecation), in addition to recording the timing of hospital discharge. Each woman in both groups was examined abdominally using a stethoscope to detect the intestinal sound every one hour before and after sugar free gum chewing. She was asked to report immediately about the time of either feeling an intestinal movement (passing flatus or defecation).

**III. Statistical Analysis**

Data were collected, tabulated, statistically analyzed using an IBM personal computer with Statistical Package of Social Sciences (SPSS) version 22 (SPSS, Inc, Chicago, Illinois, USA).

The following statistical devices were used:

- a- Descriptive statistics: in which quantitative data were presented in the form of means ( $\bar{X}$ ), standard deviations (SD), ranges and qualitative data were presented in the form numbers and percentages.
- b- Analytical statistics: was used to find out the possible association between the studied factors and the targeted disease. The used tests of significance included:
  - Chi-square test ( $\chi^2$ ): was used to study the association between the two qualitative variables.
  - Fischer exact test for 2 x 2 tables when expected cell count of more than 25% of cases was less than five and p-value < 0.05 was considered significant.
  - Student t-test: is a test of significance used for the comparison between the two groups having quantitative variables.
  - Pearson’s correlation (r): is a test used to measure the association between quantitative variables.
    - P value of >0.05 was considered statistically non-significant.
    - P value of <0.05 was considered statistically significant.
    - P value of <0.001 was considered statistically highly significant.

**IV. Results**

**Table (1): Socio Demographic Characteristics of the Study Participants (N =200)**

| Variables          |                | Study group (N=100) |      | Control group (N=100) |      | Test of sig.      | P value       |
|--------------------|----------------|---------------------|------|-----------------------|------|-------------------|---------------|
|                    |                | No.                 | %    | No.                   | %    |                   |               |
| Age (years)        | 18 – 24        | 36                  | 36.0 | 33                    | 33.0 | $\chi^2$<br>1.11  | 0.575<br>(NS) |
|                    | 25 – 29        | 45                  | 45.0 | 52                    | 52.0 |                   |               |
|                    | 30 – 35        | 19                  | 19.0 | 15                    | 15.0 |                   |               |
|                    | Range          | 18 – 31             |      | 18 – 32               |      | t-test<br>0.266   | 0.791<br>(NS) |
|                    | Mean $\pm$ SD  | 25.2 $\pm$ 3.74     |      | 25.3 $\pm$ 3.70       |      |                   |               |
| Place of residence | Rural          | 69                  | 69.0 | 61                    | 61.0 | $\chi^2$<br>1.41  | 0.236<br>(NS) |
|                    | Urban          | 31                  | 31.0 | 39                    | 39.0 |                   |               |
| Educational level  | Illiterate     | 7                   | 7.00 | 6                     | 6.00 | $\chi^2$<br>0.254 | 0.968<br>(NS) |
|                    | Read and write | 16                  | 16.0 | 18                    | 18.0 |                   |               |
|                    | Secondary      | 56                  | 56.0 | 54                    | 54.0 |                   |               |
|                    | University     | 21                  | 21.0 | 22                    | 22.0 |                   |               |
| Occupation         | Not working    | 55                  | 55.0 | 66                    | 66.0 | $\chi^2$<br>2.53  | 0.112<br>(NS) |
|                    | Working        | 45                  | 45.0 | 34                    | 34.0 |                   |               |

NS: non-significant

**Table (1)** shows the socio demographic characteristics of the study participants. There were no statistically significant differences between both groups regarding their socio demographic characteristics.

**Table (2): Previous Obstetric, Medical and Surgical History among Study Participants (N =200)**

| Variables                          |               | Study group (N=100) |      | Control group (N=100) |      | Test of sig.     | P value       |
|------------------------------------|---------------|---------------------|------|-----------------------|------|------------------|---------------|
|                                    |               | No.                 | %    | No.                   | %    |                  |               |
| Number of abortions                | None          | 52                  | 52.0 | 61                    | 61.0 | $\chi^2$<br>2.77 | 0.428<br>(NS) |
|                                    | One           | 41                  | 41.0 | 31                    | 31.0 |                  |               |
|                                    | Two           | 5                   | 5.00 | 7                     | 7.00 |                  |               |
|                                    | Three or more | 2                   | 2.00 | 1                     | 1.00 |                  |               |
| Number of dilatation and curettage | None          | 55                  | 55.0 | 66                    | 66.0 | $\chi^2$<br>4.00 | 0.261<br>(NS) |
|                                    | One           | 39                  | 39.0 | 26                    | 26.0 |                  |               |
|                                    | Two           | 4                   | 4.00 | 6                     | 6.00 |                  |               |
|                                    | Three or more | 2                   | 2.00 | 2                     | 2.00 |                  |               |
| Family diseases                    | Yes           | 35                  | 35.0 | 43                    | 43.0 | $\chi^2$         | 0.246         |

|               |                   |      |      |      |      |                  |               |
|---------------|-------------------|------|------|------|------|------------------|---------------|
|               | No                | 65   | 65.0 | 57   | 57.0 | 1.34             | (NS)          |
|               |                   | N=35 |      | N=43 |      |                  |               |
| If yes, it is | *Hypertension     | 16   | 45.7 | 15   | 34.9 | $\chi^2$<br>1.14 | 0.766<br>(NS) |
|               | *Diabetes         | 14   | 40.0 | 22   | 51.2 |                  |               |
|               | *Uterine prolapse | 2    | 5.70 | 2    | 4.70 |                  |               |
|               | *Heart disease    | 3    | 8.60 | 4    | 9.30 |                  |               |

NS: non-significant

**Table (2)** shows the previous obstetric, medical and surgical history among study participants. There were no statistically significant differences between the study and control groups regarding the previous obstetric, medical and surgical history.

**Table (3): History of Current Pregnancy among Study Participants (N =200)**

| Variables                               |                         | Study group (N=100) |                 | Control group (N=100) |       | Test of sig.      | P value       |
|---|-------------------------|---------------------|-----------------|-----------------------|-------|-------------------|---------------|
|   |                         | No.                 | %               | No.                   | %     |                   |               |
| Gestational age at delivery (weeks)     | 37 weeks                | 19                  | 19.0            | 27                    | 27.0  | $\chi^2$<br>2.92  | 0.404<br>(NS) |
|   | 38 weeks                | 37                  | 37.0            | 29                    | 29.0  |                   |               |
|   | 39 weeks                | 32                  | 32.0            | 35                    | 35.0  |                   |               |
|   | 40 weeks                | 12                  | 12.0            | 9                     | 9.00  |                   |               |
|   | Range                   | 37 – 40             |                 | 37- 40                |       | t-test            | 0.791<br>(NS) |
| Mean $\pm$ SD                           | 38.4 $\pm$ 0.92         |                     | 38.2 $\pm$ 0.96 |                       | 0.824 |                   |               |
| Any complications during this pregnancy | Yes                     | 44                  | 44.0            | 40                    | 40.0  | $\chi^2$<br>0.328 | 0.567<br>(NS) |
|   | No                      | 56                  | 56.0            | 60                    | 60.0  |                   |               |
| Complications                           | - Severe abdominal pain | N=44                |                 | N=40                  |       | $\chi^2$<br>1.58  | 0.663<br>(NS) |
|   | - Vaginal bleeding      | 10                  | 22.7            | 6                     | 15.0  |                   |               |
|   | - Edema of lower limbs  | 3                   | 6.80            | 2                     | 5.00  |                   |               |
|   | - Dyspnea               | 6                   | 13.6            | 4                     | 10.0  |                   |               |
|   |                         | 25                  | 56.8            | 28                    | 70.0  |                   |               |

NS: non-significant

**Table (3)** shows the history of current pregnancy among study participants. There were no statistically significant differences between the study and control groups regarding the history of current pregnancy.

**Table (4): Pre-Operative Data among Study Participants (N=200)**

| Variables                         |                 | Study group (N=100) |                 | Control group (N=100) |       | Test of sig.      | P value       |
|-----------------------------------|-----------------|---------------------|-----------------|-----------------------|-------|-------------------|---------------|
|                                   |                 | No.                 | %               | No.                   | %     |                   |               |
| Frequency of bowel habit per day  | Once            | 61                  | 61.0            | 70                    | 70.0  | $\chi^2$<br>1.79  | 0.180<br>(NS) |
|                                   | Twice           | 39                  | 39.0            | 30                    | 30.0  |                   |               |
| Pre-operative last eating / hours | 6 – 8 hours     | 40                  | 40.0            | 44                    | 44.0  | $\chi^2$<br>0.454 | 0.797<br>(NS) |
|                                   | 9 – 12 hours    | 50                  | 50.0            | 48                    | 48.0  |                   |               |
|                                   | >12hours        | 10                  | 10.0            | 8                     | 8.00  |                   |               |
|                                   | Range           | 6 – 13              |                 | 6 – 13                |       | t-test            | 0.536<br>(NS) |
| Mean $\pm$ SD                     | 9.75 $\pm$ 2.08 |                     | 9.57 $\pm$ 2.02 |                       | 0.620 |                   |               |

NS: non-significant

**Table (4)** shows the pre-operative data among study participants. There were no statistically significant differences between the study and control groups regarding the pre-operative data.

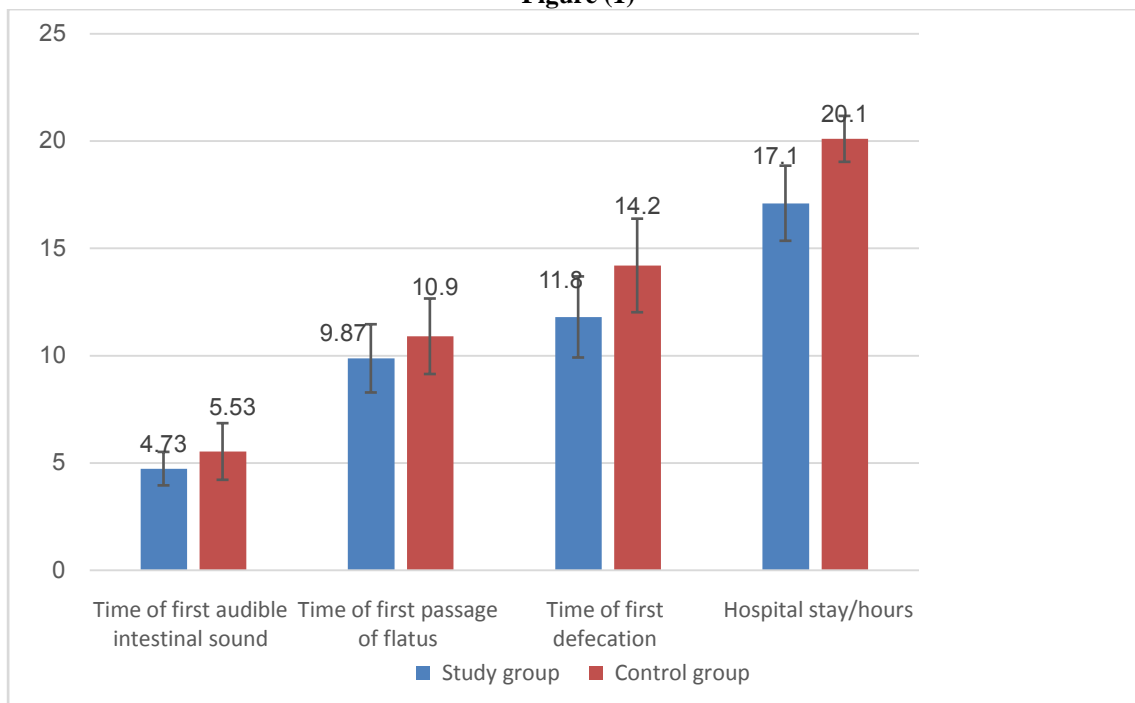
**Table (5): Intra- Operative Data among Study Participants (N=200)**

| Variables                             |                                 | Study group (N=100) |                 | Control group (N=100) |       | Test of sig.     | P value       |
|---------------------------------------|---------------------------------|---------------------|-----------------|-----------------------|-------|------------------|---------------|
|                                       |                                 | No.                 | %               | No.                   | %     |                  |               |
| Duration of surgery / minutes         | 30 – 40 min                     | 68                  | 68.0            | 60                    | 60.0  | $\chi^2$<br>1.38 | 0.239<br>(NS) |
|                                       | 41 – 60 min                     | 32                  | 32.0            | 40                    | 40.0  |                  |               |
|                                       | Range                           | 30 – 45             |                 | 30 – 45               |       | t-test           | 0.336<br>(NS) |
| Mean $\pm$ SD                         | 36.9 $\pm$ 4.77                 |                     | 37.5 $\pm$ 4.61 |                       | 0.964 |                  |               |
| Indications of cesarean section       | -On maternal request            | 20                  | 20.0            | 15                    | 15.0  | $\chi^2$<br>1.32 | 0.516<br>(NS) |
|                                       | -Cephalo-pelvic disproportion   | 8                   | 8.00            | 6                     | 6.00  |                  |               |
|                                       | -Mal-presentation / malposition | 72                  | 72.0            | 79                    | 79.0  |                  |               |
| Application of intra peritoneal drain | Yes                             | 1                   | 1.00            | 2                     | 2.00  | FE=<br>0.338     | 0.561<br>(NS) |
|                                       | No                              | 99                  | 99.0            | 98                    | 98.0  |                  |               |

NS: non-significant FE: Fisher exact test

**Table (5)** reveals the intra-operative data among study participants. There were no statistically significant differences between the study and control groups regarding the duration of surgery, indications of cesarean section and application of intra peritoneal drain.

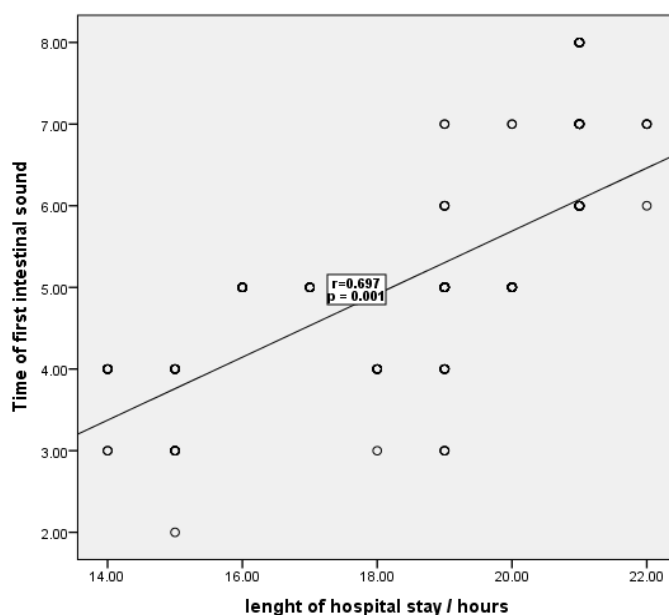
**Figure (1)**



**Mean Differences of Post-Operative Parameters of Intestinal Function and Mean Length of Hospital Stay among Study Participants**

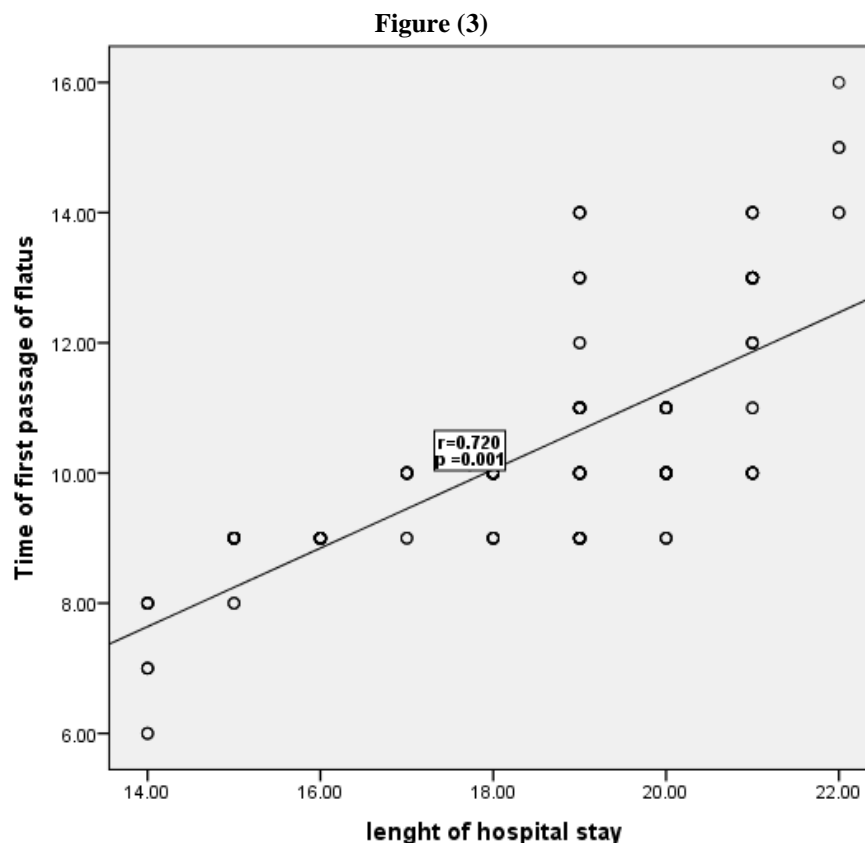
**Figure (1)** shows the mean differences of post-operative parameters of intestinal function and the mean length of hospital stay among study participants. There were highly statistically significant differences between the study and control groups regarding the time of first audible intestinal sound, the time of first passage of flatus, the time of first passage of defecation and the length of hospital stay respectively ( $P = 0.001$ ).

**Figure (2)**



**Correlation between the Length of Hospital Stay and the Time of First Audible Intestinal Sound Post-Operatively among Women in the Study Group.**

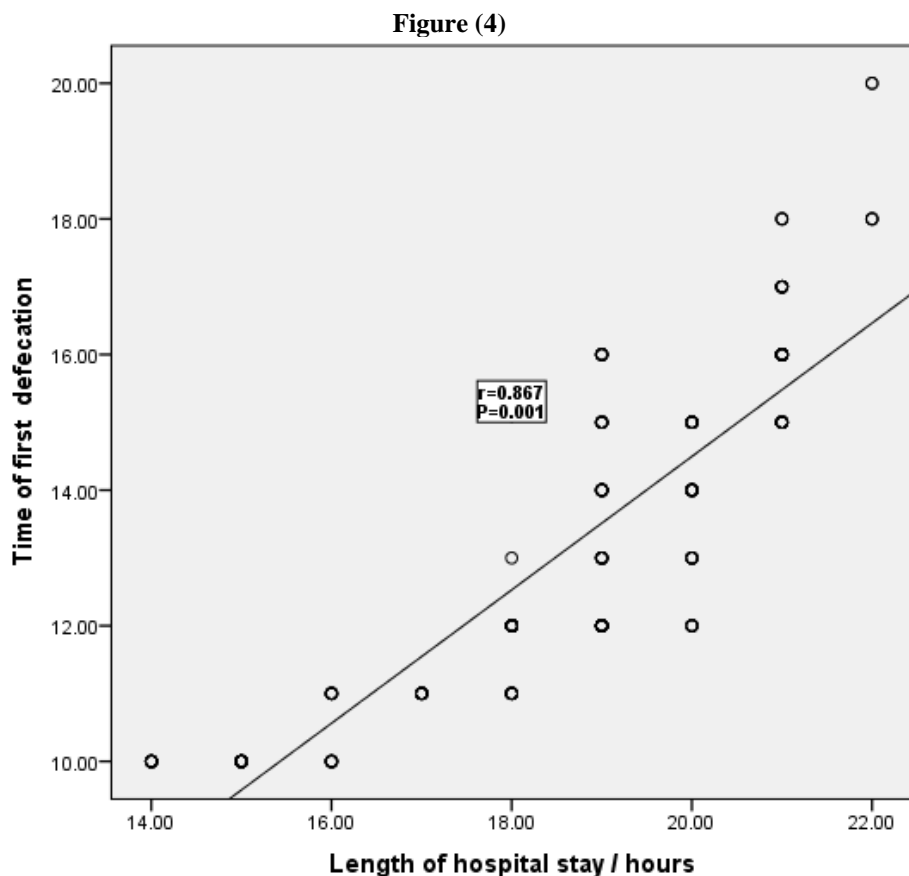
**Figure (2)** shows the correlation between the length of hospital stay and the time of first audible intestinal sound post-operatively among women in the study group. This figure shows that there was a highly statistically significant positive correlation between the length of hospital stay and the time of first audible intestinal sound ( $r= 0.697$ ,  $p = 0.001$ ).



**Correlation between the Length of Hospital Stay and the Time of First Passage of Flatus Post-Operatively among Women in the Study Group.**

**Figure (3)** shows the correlation between the length of hospital stay and the time of first passage of flatus post-operatively among women in the study group. This figure shows that there was a highly statistically significant positive correlation between the length of hospital stay and the time of first passage of flatus ( $r= 0.720$ ,  $p = 0.001$ ).





**Correlation between the Length of Hospital Stay and the Time of First Passage of Defecation Post-Operatively among Women in the Study Group.**

**Figure (4)** shows the correlation between the length of hospital stay and the time of first passage of defecation post-operatively among women in the study group. This figure shows that there was a highly statistically significant positive correlation between the length of hospital stay and the time of first passage of defecation ( $r = 0.867$ ,  $p = 0.001$ ).

## V. Discussion

Murray and Mckinne., (2014) revealed that nurses should evaluate the bowel function after caesarean section by the frequent auscultation of intestinal movement until normal peristaltic movement is noted in all abdominal quadrants. The nurses must be alert about the signs which include missing or deferred bowel sounds, failure to pass gases or stool and abdominal distention.

Findings are discussed in the following sequences: 1- General findings of socio-demographic characteristics. 2- Post-operative intestinal function parameters and the length of hospital stay among study participants. 3-Correlation between the length of hospital stay and post-operative intestinal function parameters among women in the study group.

### Socio-demographic characteristics:

The findings of the current study documented that there were no statistically significant differences between both groups regarding their socio demographic characteristics (age, place of residence, educational level and occupation). Also, there were no statistically significant differences between both groups concerning their obstetrics variables and pre/intraoperative data.

These findings mean that the two groups under study were homogenous and comparable. These factors might interfere with treatment modality suggested. Therefore, the matching criteria helped in preventing these possibilities and the final results of this study were not influenced by these factors.

These findings were in agreement with Shang et al., (2015) who investigated their studies about "The effect of chewing-gum after cesarean section on regaining the bowel function" in Singapore. Their findings revealed that the study and control groups were comparable in age, duration of surgery, last eating before surgery and weeks of gestation. In addition, Ledari et al., (2016) investigated their studies about "The effect of

chewing sugar-free gum on reducing ileus after cesarean delivery" in Rohtak, India on one hundred nulliparous women. Their findings revealed that no significant differences existed between the study and control groups pertaining the socio demographic characteristics, duration of surgery, fasting time before surgery, the number of miscarriages and dilatation & curettage. Rashad and Yousef, (2014) also implemented their studies in Kingdom of Saudi Arabia concerning "Effect of sugar free gum chewing on intestinal movement post cesarean delivery". Their findings revealed that there were no statistically significant differences in terms of age, educational level, occupation, duration of pregnancy and duration of surgery between the study and control groups. As well, these findings were compatible with Abd-El-Aleem et al, (2014) who conducted their studies about "The efficacy and safety of gum chewing on the recovery of bowel motility after caesarean delivery" on 200 women in Egypt. Their findings revealed that there were no statistically significant differences in the general characteristics between the study and control groups.

The current study demonstrated further improvement in postoperative management for women after cesarean delivery.

#### **Post-operative intestinal function parameters and the length of hospital stay:**

Regarding the indicators of bowel function post-operatively, the current study results documented that the means of bowel function indicators were highly statistically significant and had a lower average time in the study group than the control group ( $P = 0.001$ ).

These findings were in accordance with numerous relevant studies. Following are some of these studies:

Takagi et al., (2016) investigated their studies in Japan about "Effects of gum chewing on early recurrence of intestinal function following cesarean section surgery". Their findings revealed that gum chewing after surgery had a significant shorter time to first bowel sound, flatus, defecation, the time to oral intake and the length of hospital period. Kafali et al., (2015) investigated their studies about "Influence of gum chewing on post-operative bowel activity after cesarean delivery" in Turkey on one hundred fifty women. Their findings revealed that the first hearing of intestinal sound, the first passage of flatus and defecation appeared postoperatively have a significantly lower duration of time in the study group. Also, the duration of hospital stay was lower in the study group compared to the control group.

Abd- El-Aleem et al., (2014) revealed in their studies mentioned before that there were statistically significant differences between the study and the control groups concerning the mean time to the first hearing of bowel sound postoperatively where it was ( $10.9 \pm 2.7$  versus  $15.6 \pm 3.7$  hours), the passage of flatus was ( $17.9 \pm 4.6$  versus  $24.4 \pm 7.1$  hours), the onset of defecation was ( $21.1 \pm 4.7$  versus  $30 \pm 8.2$  hours) and the duration of hospital stay was ( $40.8 \pm 10.6$  versus  $50.5 \pm 8.9$  hours). Dehcheshmeh et al., (2015) performed their studies in Brazil on 120 primiparous women concerning "Benefits of chewing sugar free gum after elective cesarean section on the resumption of intestinal function". Their findings revealed that the mean postoperative time to the first hearing of intestinal sound, the first passage of flatus, the first passage of defecation and the duration of hospital stay were lower significantly in the study group than the control group.

Ertas et al., (2015) conducted their studies in Turkey regarding "A randomized controlled trial of sugar free gum chewing to prevent and treat post-operative ileus". Their findings revealed that there were statistically significant differences in the time of the first bowel sound, the first passage of flatus, defecation and the length of hospital stay between both groups. Husslein et al., (2017) implemented their studies about "Does postoperative gum chewing stimulate bowel activity after cesarean section" in Germany. Their findings revealed that there was a significantly lower interval between the operation and the first gas passage in the study group than the control group.

Kelley et al., (2016) investigated their studies in California about "The impact of chewing gum on early recovery from POI after cesarean surgery". Their findings revealed that the mean time of the first bowel movement was  $63.2 \pm 5.4$  h and  $89.4 \pm 2.4$  h in the study and the control groups respectively.

These findings emphasized the physiological and beneficial actions of chewing sugar free gum for improving bowel function, hastening hospital discharge and supporting women comfort following cesarean section. This is due to the stimulation of gastric secretion that contributes to stimulating and softening the process of feeding. According to relevant literature, gum chewing is advocated for the prevention of postoperative ileus because it acts as sham feeding, probably stimulating bowel and gastric movement via repetitive stimulation of the cephalic-vagal complex (Hocevar et al., 2015).

Furthermore, these findings were in line with Roberto et al., (2015) who implemented their studies on primiparous women in Italy regarding "Impact of chewing gum after elective cesarean delivery on return of bowel movement". Their findings revealed that the bowel indicators were significantly lower in the intervention group compared with the control group. The time of the first bowel sounds was ( $6.5 \pm 1.5$  versus  $12.5 \pm 2.5$  hours) respectively, the first gas passage was ( $12.2 \pm 2.0$  versus  $22.4 \pm 4.1$ ) hours, the first sensation of intestinal motility was ( $7.4 \pm 1.7$  versus  $15.7 \pm 3.4$  hours) and the defecation was ( $15.5 \pm 2.5$  versus  $23.4 \pm 4.8$  hours).

As well, Ledari et al., (2016) concluded in their studies mentioned before that intestinal function indicators were statistically significant lower in the intervention group compared with the control group. Likewise, Zhu et al., (2014) investigated their studies in Taiwan concerning "The gum chewing effects on bowel motility after post-operative cesarean section". Their findings revealed that women in the study group had a significant shorter interval for intestinal function parameters than the control group regarding the time of the first hearing intestinal sounds, the time of the first gas passage, the time of the first defecation passage as well as for the period of hospital stay.

Louis, (2016) also revealed that "Using of gum chewing after cesarean surgery had a stimulatory effect on the recovery of intestinal motility" in Belgium. Their findings showed that the mean time of intestinal movement and flatus were decreased more significantly in the women that took sugar free gum than the women in the control group. Such agreement is established between the current study results and Rashad & Yousef, (2014) results. Their agreement focused on the fact that the women who chewed sugar free gum had a shorter mean bowel function parameters than the control group.

-The agreement between the results of the current study and the previous studies might be related to the similarity of the type, duration of the operation, the use of regional anesthesia, minimal bowel manipulation, low rate of peritonitis and the benefits of gum chewing specifically rapid return of intestinal movement.

On the contrary; the current study findings were inconsistent with Huang & He., (2015) and Shang et al., (2015) who revealed different results. The first implemented "A met-analysis study about usefulness of chewing-gum on restoration of intestinal function after cesarean section" in China. Their findings revealed that there were no statistically significant differences concerning the time of first bowel sound, the time of first passage of flatus, defecation and the duration of hospital stay between both groups. The latter investigated "The effect of chewing-gum after cesarean section on regaining the bowel function" in Singapore. Their findings revealed that there were no statistically significant differences regarding the parameters of intestinal function and the length of hospital stay among study participants.

In addition, the current study findings were incompatible with Mason et al., (2015) who performed their studies in England on thirty-eight women to assess "Does gum chewing prevent of ileus post cesarean section". Their findings revealed that there were no statistically significant differences between the study and the control groups regarding bowel function indicators and length of hospital stay.

Morris et al., (2014) also investigated their studies on one hundred women in London about "The effect of gum chewing on the recovery of gastrointestinal movement for women who underwent cesarean section surgery". Their findings revealed that chewing gum was safe but did not improve the gastrointestinal function. As well, Zaghiyan et al., (2014) conducted their studies in San Diego about "Influence of sugared chewing gum on gastrointestinal function after cesarean section. Their findings revealed that sugared chewing gum had no effect on women undergoing cesarean section.

-The difference between the results of the present study and the previous studies might be due to the surgical conditions and sampling, the use of general anesthesia and the lack of necessary statistical power to give conclusion with respect to hospital stay.

Furthermore, both Caoğlu ve Şet al., (2015) & Jakkaew and Charoenkwan, (2016) revealed different findings. The first study, investigated in Turkey regarding "The impact of gum chewing after cesarean delivery on the prevention of ileus". Their findings revealed that gum chewing was not associated with a significantly earlier regaining of intestinal movement compared to routine postoperative management. The latter study, investigated in Thailand about "The influence of chewing gum on resolution of ileus following cesarean section". Their findings revealed that there was a significant difference between the study and the control groups in the time of first passage of flatus only. There were no any significant difference in the recovery of other intestinal function indicators and ileus- related complications between both groups.

- The contradiction between the present study findings and those of the previous two studies might be related to the simple differences of the duration and the frequency of chewing gum in the research studies. In the present study, the women were instructed to chew sugar free gum for 30 minutes, every two hours as soon as they were awake and returned from the operating room. In the dissenting studies, the women were asked to initiate chewing gum for 20 min three times a day (morning, noon and evening). Consequently, increasing the duration and the frequency of gum chewing times had more notable effects on the stimulation of intestinal function and the prevention of post-operative ileus.

#### **Correlation between the length of hospital stay and post-operative intestinal function parameters:**

The correlations between the length of hospital stay and post-operative intestinal function parameters among women in the study group were analyzed in the current study. The findings revealed that there were highly statistically significant positive correlations between the length of hospital stay and the time of the first audible intestinal sound, the first passage of flatus, the first passage of defecation respectively ( $P = 0.001$ ). This means that the women who had an earlier hearing of intestinal sound, earlier passage of flatus and defecation

could be discharged from the hospital early.

These findings were congruent with Cinar, (2015) who investigated their study in Afyon about "Advantages of gum chewing on the functions of intestine in the patients who had been operated on abdomen". Their findings found that there were statistically significant positive correlations between the time of gas passage, the time of defecation and the time of hospital discharge among participants in the study group. In addition, Delavar et al., (2014) mentioned in their studies performed in India that gum chewing stimulates early regaining of bowel movement and lowers the duration of hospital stay.

Daquan and Dong., (2015) also found in their studies investigated in China that the early beginning of gum chewing by 2 hours after cesarean delivery was associated with the early regaining of intestinal function and the early hospital discharge than those who initiated after 6-8 hours after surgery. Terzioglu et al., (2013) also investigated their studies in Turkey about "The effect of multimodal interventions (chewing gum, early oral hydration and early mobilization) on the intestinal motility following cesarean section". Their findings revealed that the study group had an earlier parameters of bowel function and a lower duration of hospital stay than other groups.

Correspondingly, Sahin, (2015) was contradicted with the results of research study investigated in Turkey about "The effect of multimodal interventions (chewing gum, early oral hydration and early mobilization) on the intestinal motility following cesarean section. Their findings revealed that the hospital discharge times was not affected by the intervention as the women who chewed gum were discharged in  $56.22 \pm 2.70$  hr. and the women in other groups were discharged in  $54.99 \pm 2.59$  on average.

The current study aimed to evaluate the effectiveness of chewing sugar free gum on intestinal function after cesarean section. This goal was achieved via the current study findings, which revealed that the study group had an earlier regaining of intestinal function parameters and a shorter length of hospital stay than the control group.

Consequently, the first and the second study hypotheses were achieved and accepted "women who initiate chewing sugar free gum after cesarean section have faster return of intestinal function and shorter length of hospital stay than those who do not".

## **VI. Conclusions**

**Based on the present study findings that evaluated the effectiveness of chewing sugar free gum on intestinal function after cesarean section, it can be concluded that:**

- Chewing sugar free gum in the postoperative period was safe, effective, inexpensive, acceptable, well-tolerated and non-pharmacological therapy. It can be implemented without an increase in adverse outcomes in women undergoing cesarean section under spinal anesthesia.
- Chewing sugar free gum had a positive effect on the intestinal function parameters post-operatively in terms of a more rapid regaining of intestinal function with a shorter time to hear bowel sounds, passage of flatus and defecation in study group than control group. This supported the first study hypothesis.
- Chewing sugar free gum had a positive effect on the length of hospital stay post-operatively in terms of the shorter length of hospital stay in study group than control group. This supported the second study hypothesis.

## **VII. Recommendations**

**In the light of the current study findings, the following can be recommended.**

- ✓ Integrating chewing sugar free gum in hospital nursing care protocol for caring primiparous women after cesarean section under spinal anesthesia to have faster return of intestinal function and shorter length of hospital stay.
- ✓ Implementing effective health education sessions and counseling for pregnant women concerning the benefits of chewing sugar free gum after cesarean delivery.

### **Suggestions for further studies**

- ✓ Further studies should be conducted to examine the effectiveness of chewing sugar free gum on the intestinal function after cesarean section for all women under spinal and general anesthesia.
- ✓ Further studies are needed to focus on the post-operative management of women who have had cesarean delivery with new steps and trials for more positive maternal outcomes.
- ✓ Further studies should be implemented to evaluate the effectiveness of chewing sugar free gum on the postoperative ileus in open gynecologic surgery using a larger sample and different geographical areas in Egypt.

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