

Effect of Abdominal Massage on Gastrointestinal Function among Enterally Fed Critically Ill Patients

Assist. Prof. Howyda Ahmed Mohamed ⁽¹⁾, Dr. Zeinab Hussein Bakr ⁽²⁾

Dr. Ahmed Mohamed Naguib ⁽³⁾

(1) Assistant Professor of Medical Surgical Nursing - Faculty of Nursing

(2) Lecturer of Medical Surgical Nursing, Faculty of Nursing

(3) Lecturer of Medicine, Faculty of Mdedical- Ain Shams University

Abstract

Background: Critically ill patient need a nursing practice that can enhance getting all benefits of enteralfeeding and improving the gastrointestinal function. Gastrointestinal function was gastric residual volume, abdominal distension, vomiting and constipation. **Aim:** This study aimed to explore the effect of abdominal massage on gastrointestinal function of enteral-feed critical ill patients. **Research Design:** A Quasi experimental design was used. **Setting:** the study was conducted at General Intensive Care Units in El Demerdash Hospital Affiliated from Ain Shams University Hospital. **Subjects:** A purposive sample of 60 Patients who distributed randomly to equal intervention and control groups from the previous mentioned setting. **Results:** there were statically significant difference between the study group and control group subjects regarding Gastric Residual Volume (GRV) was statistically significant in the 3rd, 4th, and 5th days indicating higher GRV among control group. The abdominal circumference between the five days was significantly in the two groups. None of patients in the study group were vomited along the study period (5days) in compared to 5% of control patients without statistical significant differences. **Conclusions:** The abdominal massage was significantly effective in lowering GRV, preventing distension and avoiding vomiting. **Recommendations:** the current study recommended that this practice can be applied as a caring procedure in the daily ICU care program.

Keywords: Abdominal massage, Critical ill patient, Enteral-feeding, Gastrointestinal function,

Introduction

Critically ill patients are characterized by existence of actual or potential lifethreatening health problems which require constant observation, intervention and dependence on the health care providers and advanced technology. One of the key elements in the management of critically ill patients is nutritional support, which is amedical treatment as well as abasic part of the nursing care. Timely and adequate nutritional support play an important role in improving patient's recovery, reducing physiological stress, increasing theimmunity capacity and eliminating malnutrition (El-Feky & Ali, 2020).

Gastrointestinal dysfunction is one of the major problems faced by the intensive care unit (ICU) patients. If patients do not have enough calories intake each day, they may suffer from malnutrition and other problems. In non-drug therapy, abdominal massage is widely used in

patients with gastrointestinal dysfunction as an auxiliary care (Keose & Ayhan, 2018).

Massage is considered one of the most widely practiced complementary therapies. Abdominal massage or stomach massage can be defined as a gentle, non-invasive therapeutic technique that doesn't need a lot of hard work, applied on the stomach and pelvic area to relieve gastrointestinal complications. Stomach massage is not only helpful in relieving stress but alsoimproves oxygen circulation through blood in necessary area and body fluid which ensures the body secret enough enzymes for clearing bowel and prevents constipation (Ogunyewo & Afemikhe, 2020).

Abdominal massage can stimulate parasympathetic activity that enhancing the gastrointestinal function. Abdominal massage accelerates peristalsis by changing intra-abdominal pressure and producing a mechanical and reflexive effect on the intestines, decreasing abdominal distension and

increasing intestinal movements (Narmadha& Priyanka, 2019)

Abdominal massage presents several benefits for critically ill patients who are always in need for careful and continuous observation to avoid or prevent gastrointestinal complications related enteral feeding by increasing stimulation of blood flow to and from the organs, nerves and muscles in the abdominal region, enhancing hormone production and accelerate waste removal. Several studies in Egypt, Turkey, Iran, Germany and others suggested and described using the abdominal massage for patients in ICUs as a complementary therapy for improving gastrointestinal outcomes such as “high gastric residual volume, vomiting, abdominal distension and constipation”, which it has been shown to be effective, non invasive and without any side effects on patients (Fareed&Elsayad, 2017).

Enteral nutrition(EN) is the preferred route of nutritional support in the critically ill patient. EN helps to maintain peristalsis, improve blood supply, reduces catabolic responses and strengthens the immune system, consequently it may reduce disease severity, diminish complications, decrease intensive care unit length of stay, and favorably impact patients' outcomes (Momenfar,Abdi, Salari, Soroush&Hemmatpour, 2018).

Critical care nurses (CCN) are usually occupied with improving the patient' status and trying to decrease suffering or complications derived from ICU management. Critical care nurses are in charge for the assessment of enteral-fed patients. Most of enteral feeding complications that progress as a result of feeding intolerance can be prevented by nursing care. According to nurse scholars, nutrition is a part of nursing care as well as medical treatment. Nurses perform a significant role starting from the assessment phase of a patient's requirement of feeding, until planning and applying the feeding safely and efficiently. Most of the success in enteral tube feeding depends on the role of CCN in giving the nutrition, continuous monitoring and evaluation the patient (Narmadha& Priyanka, 2019).

The success in enteral nutrition depends on the role responsibility of the critical care

nurses(CCN) in carefully assessing, planning feeding requirement, providing feeding safely and efficiently, monitoring patients' response carefully and preventing enteral feeding related complications through applying alternative measures as abdominal massage. Also intra-abdominal pressure (IAP) monitoring usually is under CCN role through continuous observation and identifying of dynamic changes in the status of critically ill patients (Abdelhafez & AbdElnaem, 2019; El-Feky & Ali, 2020).

Significance of the study:

Improving Gastrointestinal functions still the major problem that facing the critically ill patients' especially enteral-fed one and can increase the suffering (Mohamed., 2016). In the meantime, several studies have focused on the roles of ICU' nurses to perform such intervention (Jamaati et al., 2015). The main focus problem that studied the effectiveness of abdominal massage on patients was constipation. Therefore, this research was carried out trying to help the nurses to find out the solution for all GIT function (GRV, abdominal circumference, Distention and vomiting) by applying the costless, safe and simple strategy which is abdominal massage. Moreover, this study aimed to explore the effect of abdominal massage on gastrointestinal function for enterally feed critical ill patients (Sandoval, Ghamande & Surani, 2017).

Adequate nutritional support is important for the comprehensive management of critically ill patients. In spite of simplicity of administering enteral nutrition through nasogastric tube, it has serious adverse effects such as high gastric residual volume, increase frequency of vomiting and abdominal distension that may indicate feeding intolerance. The most important reasons for unsuccessfully nutritional support among those patients who have gastric feeding are the feeding intolerance that occurs in more than 60% of patients all over the world (Mohammad, 2016).

Many literatures described abdominal massage as the preferred non-pharmacological nursing intervention for managing and preventing enteral feeding related gastrointestinal complications because it has many advantages such as it is easily and

independently applied by nurses and free from side effects. So, this study will be conducted to evaluate the effect of abdominal massage on gastrointestinal function among enterally fed critically ill patients.

Aim of the Study:

This study aimed to evaluate the effect of abdominal massage on gastrointestinal function among enterally fed critically ill patients through the following:

1. Assessment of the patients for gastrointestinal function among enterally fed critically ill patients.
2. Implementing abdominal massage on enterally fed critically ill patients
3. Evaluating the effect of the abdominal massage on gastrointestinal function among enterally fed critically ill patients.

Research Hypothesis:

The current study hypothesizes that:

- Patient in the study group will have better gastrointestinal function than patients in the control group.

Operational definitions:

- **Abdominal massage (Swedish Peristalsis Massage):** It is an intervention that helps to tone and reinforce the muscles located in abdomen and digestive system, in which the abdomen and intestinal areas are massaged (with lavender oil) with various movements and pressure using four basic techniques; stroking, effleurage, kneading, and vibration.
- **Gastrointestinal Function:** means decreased gastric residual volume (GRV), and absence of vomiting, abdominal distension and constipation.

Subjects and Methods:

This study was portrayed under the four main designs as follows:

- I. Technical design.
- II. Operational design.
- III. Administrative design.
- IV. Statistical design.

Technical design:

It included research design, setting, subject and tools for data collection.

Research design:

Quasi-experimental research design was used to conduct this study.

Setting:

The study was conducted in the general Intensive Care Unit at El Demerdash Hospital affiliated from Ain Shams University Hospital, Cairo, Egypt.

Subjects:

- A Purposive sample of 60 critically ill patients who met the inclusion criteria at previously mentioned setting, and divided into two equal groups; study and control group (30 patients for each group).

Sample size was calculated statistically by power analysis considering the total number of critically ill patients admitted to El Demerdash hospital during the year (2019). Based on sample size equation 60 patients participated in the study. The sample size was calculated by adjusting the power of the test to 80% and the confidence interval to 95% with margin of error accepted adjusted to 5% and a known total population of 60 patients considering that:

Type I error (α) = 0.05%

Type II error (B) = 0.20%

With power of test 0.80%

Inclusion criteria:

- Adult patients from both gender >20 years old.
- Patients with newly inserted nasogastric tube for intermittent enteral feeding every 4 hrs.
- Hemodynamically stable.
- Free from intestinal obstruction.
- Didn't have contraindications to abdominal massage such as diarrhea, active bleeding, spinal cord injury or recent abdominal surgery.

Exclusion criteria:

- Patients receiving prokinetic medications as Metoclopramide (Reglan) and Cisapride (Propulsid) to avoid interfering with the massage effects.
- Patients with hepatic impairment, abdominal aortic aneurysm and ascites
- Patients who was receiving radiotherapy or chemotherapy.

Tools for data collection:

There were two tool used in this study

1) **Patients' assessment tool:** This tool was developed by the researcher after reviewing related literature (Fareed & El- Sayad, 2017; Momenfar, Abdi, Salari, Soroush & Hemmatpour, 2018; Narmadha & Priyanka, 2019; El- Feky & Ali, 2020). It included two parts:

Part (I): Demographic data:

It included data such as patient's age, gender, level of education, and occupation.

Part (II): Clinical data:

It included data such as patient's history of GIT problems, reason for ICU admission

2) **Gastrointestinal outcomes assessment tool:**

This tool was adapted from Dehghan, Mehdipoor & Ahmadinejad, (2018); Abdelhafez & AbdElnaeem, (2019) and was modified by the researcher to suite the study aim. This tool was used to assess gastric residual volume, abdominal distension, constipation, vomiting through the following way.

Gastric residual volume:

Both groups were assessed for GRV before each feeding. First, the feeding tube position was confirmed by listening to 20 ml of injecting air with a stethoscope at the epigastric area. Then, aspirate the stomach content slowly until no further content. The aspirated content measured by measuring container and discarded according to the ICU guidelines (Warren, 2016).

Abdominal distension:

Both groups were assessed for distension by palpation and percussion. No distension means that the abdomen is soft, moving and not tense. Distended abdomen means hard, tender, bloating and increase in abdominal diameter. The circumference was measured before the massage (Uysal et al., 2012; El-Feky & Ali, 2020)

Vomiting:

All patients were assessed for developing vomiting or not. According to the ICU guidelines, if the patient vomiting the feeding was interrupted and the tube feeding was connecting to urine bag and opened and the patient was observed if vomiting stopped the patient was re-fed.

Constipation:

All patients were assessed for defecation pattern to determine if the patient developing constipation or not.

Application of Abdominal massage: Put the patient in supine position, straight the legs and stand on rightside. It started in a left to right direction over the intestines on the abdominal wall. The main steps of massage are superficial effleurage, deep circular stroking, petrissage, and vibration (Uysal, 2017).

Operational Design:

It included preparatory phase, content validity and reliability, pilot study and field work.

The preparatory Phase:

It included reviewing of related literature, and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop data collection tools, the educational guidelines content and media.

Validity and Reliability

Testing content and face validity of the proposed tools by inspecting the items to determine whether the tools measure what supposed to measure. The stage developed by a jury of 5 experts from different academic categories (professors and assistant professors) of the medical – surgical nursing at the faculty of nursing, Ain Shams University. The experts reviewed the tools for clarity, relevance, comprehensiveness, simplicity and minor modification was done. **Testing reliability** of the proposed tools was done statistically by Crombach alpha test (0.897).

Ethical consideration:

The aim of the research was explained to the participants. Verbal and written consent was obtained from each patient to participate in the study, after clarifying the procedures of the study. Participants were informed about their right to refuse participation and to withdraw at any time without any consequences. Confidentiality of data was ensured.

Pilot Study:

Pilot study carried out for 6 patients who admitted to ICU on enterally feeding and meets the inclusion criteria, in the previous mentioned setting to test clarity, applicability of tools used in this study before performing the actual study.

Based on the result of the pilot study, no modifications were done. The patients who included in the pilot study were included in the study sample.

Field Work:

The actual filed work of this study started at the beginning of (August 2020) and had been completed at the 15 of (February 2021). It was conducted in three phases:

A. Assessment and planning phase:

This phase was carried out through the following steps: Developing tools for data collection after reviewing the related literature. Obtaining experts opinions to ensure tools validity and measurement of reliability. The researcher was receiving a training course by one of the professional physiotherapists to be qualified in applying the correct technique of abdominal massage. An initial assessment was carried out on the first day for all subjects to confirm that they met the inclusion criteria by using the first tool. Patients who met the inclusion criteria were assigned randomly into two groups; the control group and the study group.

B. Implementation phase:

The implementation phase was conducted through the following steps: For both groups; patients' assessment data were obtained and recorded before starting the abdominal massage by using the first tool. Both study and control group was receiving the routine ICU protocol of the intermittent enteral feeding as the type, frequency and amount of formula per day according to ICU protocol the patients receive intermittent enterally feeding it take 300 ml every 3hrs. at 8am, 11 am, 2pm, 5pm, 8pm and 11pm. The study group was receive the abdominal massage twice daily for 15 min

before feeding time to avoid aspiration for five consecutive days at 10,30 am and 4.30 pm.

Abdominal massage was done by the researcher using four basic steps; stroking, effleurage, kneading and vibration. Abdominal distension was examined by palpation and the measurement of abdominal girth was done by using a 150-cm inflexible. Tape measure was used to measure abdominal circumference. It was done before abdominal massage time, GRV was measured before every ryle feeding by aspiration gastric content then measure this amount and take mean for this amount every day are recorded and patient observed for vomiting and defection pattern to determine if patient have constipation or not. The measurement data were recorded in the parameter questionnaire.

C. Evaluation phase:

- The evaluation phase was emphasizing on determining the effect of the implemented abdominal massage on gastrointestinal function among enterally fed critically ill patients.
- The evaluation phase was start from the first day after implementation of abdominal massage till the 5 day of the implementation of the abdominal massage.

Administrative design:

An official permission was obtained from the Director of intensive care unit at El Demerdash Hospital affiliated to Ain Shams University. Meeting and discussions were held between the researchers and nursing administrative personnel to make them aware about the aims and objectives, as well as to get better cooperation during the implementation phase. It was important to have their full support, especially to encourage patients to participate positively in the study.

A statistical design:

Statistical methods for data analysis

All Data were collected, tabulated and subjected to statistical analysis. Statistical analysis is performed by SPSS in general

(version 21), also Microsoft office Excel is used for data handling and graphical presentation. Quantitative variable sare described by the Mean, Standard Deviation (SD) and the Range (Maximum–Minimum).Qualitative Categorical variables are described by proportions and Percentages. Paired sample T test is used for testing Pre –post measurements within the same group. Comparison of the mean changes (Pre-Post) between groups is

performed. Using independent samples T test. For categorical variables Chi squared test is used and Fisher exact test in case of small number per cell. Pearson correlation coefficient is used for quantitative variables. Significance level is considered at $P < 0.05$ (S); while for $P < 0.01$ was considered highly significant (HS). Two Tailed tests are assumed throughout the analysis for all statisticaltests.

Results:

Table (1): Comparison between patients in the control and the study group regarding their demographic characteristics.

Patients' characteristics	Study Group N=30		Control Group N=30		Test	P value
	No	%	No	%		
Age/years						
< 40	10	33.3%	12	40.0%	$\chi^2=0.14$	0.7307
40 – 60	11	36.7%	12	40.0%		
Above 60	9	30.0%	6	20.0%		
Mean \pm SD	43.55 \pm 12.14		46.35 \pm 12.78		t = 0.30	0.8624
Gender						
Male	15	50.0%	20	66.7 %	$\chi^2=1.67$	0.1845
Female	15	50.0%	10	33.3%		
Education						
Illiterate	5	16.7%	3	10.0%	$\chi^2=0.91$	0.7220
Read and write	8	26.7%	6	20.0%		
Secondary	10	33.3%	13	43.3%		
Higher	7	23.3%	8	26.7%		
Residence						
Rural	7	23.3%	5	16.7%	$\chi^2=0.48$	0.4902
Urban	23	76.6%	25	83.3%		
Marital status						
Widow & divorced	6	20.0%	7	23.3%	$\chi^2=0.10$	0.6357
Married	24	80.0%	23	76.6%		

Regarding characteristics of patients in the control and study group, table (1) show that, the mean age of control group was **46.35 \pm 12.78**, while, the mean age of the study group was **43.55 \pm 12.14**. Regarding gender, 66.7 % of patients of control group and 50.0 % of patients of the study group were males. As regards educational level, 10.0% only of the control group and 16.7% of the study group were illiterate. In relation to residence, 83.3% and 76.6% of patients in the control and study group resided in urban areas respectively. Regarding marital status, 76.6%ofthe control group and80.0% of the study group were married.

Table (2): Comparison between patients in the study and control groups according to their admission clinical data

Items	Groups				X ²	P value
	Study (n=30)		Control (n=30)			
	No.	%	No.	%		
Reason of admission to ICU						
Postoperative care	20	66.67	18	60.00	1.247	0.534
Neurological disorders	6	20.00	3	10.00	3.360	0.067
Infectious disorders	0	0.00	2	6.67	1.156	0.150
Gastrointestinal disorders	1	3.33	0	0.00	1.017	0.313
Endocrine/metabolic disorders	3	10.00	7	23.33	3.158	0.072
Presence of GIT problems						
Yes	10	33.33	12	40.00	=1.67	0.1845
No	20	66.67	18	60.00		
GIT problems experienced						
Constipation	6	60.00	10	83.33	3.565	0.078
Diarrhea	4	40.00	2	16.67	2.412	0.063

P>0.05 not significant *P<0.05 Significant ** P<0.001 highly significant

Table (2) illustrate that, regarding patient diagnosis during admission, the results revealed that, 66.67% of study group and 60% of control group have post-operative care, also 20% of study group and 10% of control group have neurological disorder. While, regarding presence of GIT problems there were 33.33% of study group and 40% of the control group have GIT problems and 60% of them in study group and 83.33% of control group have constipation as GIT problems. In addition, there was no statistically significant difference between two groups regarding patient clinical data.

Table (3): Gastrointestinal function regarding residual volume among study and control group.

Gastric Residual volume	Study Group	Control Group	T Test	P value
	(Mean+ SD)	(Mean+ SD)		
1 st day	0±0	0±0	----	-----
2 nd day	4.54±3.2	7.77±14.6	4.256	0.079
3 rd day	19.37±5.05	61.43±8.42	26.754	<0.001**
4 th day	22.2±5.89	74.07±14.08	29.44	<0.001**
5 th day	26.1±6.22	86.97±22.45	31.564	<0.001**

Table (3) show that, mean of gastric residual volume is higher among control group than the study group from the second day to the fifth day with a highly statically significant differences between them regarding gastric residual volume in 3rd, 4th and 5th day, while there was no statically significant relation in day 1 and 2.

Table (4): Gastrointestinal function regarding Abdominal Circumference among study and control group.

Abdominal distention (palpitation)	Study Group		Control Group		X ²	P value
	No	%	No	%		
1 st day (distended)	0	0.0	0	0.0	----	---
2 nd day (distended)	0	0.0	2	6.67	1.156	0.150
3 rd day (distended)	2	6.67	11	36.67	6.73	0.012
4 th day (distended)	2	6.67	16	53.33	12.07	0.0002
5 th day (distended)	1	3.33	18	60.00	15.43	<0.001

Table (4) show that, number of patients have abdominal distension is higher among control group than the study group from the second day to the fifth day with a highly statically significant differences between them regarding abdominal distension in 4th and 5th day, and there was statically significant relation between them regarding abdominal distension in 3rd day while there was no statically significant relation in day 1 and 2.

Table (5): Gastrointestinal function regarding Abdominal Circumference among study and control group.

Abdominal Circumference(CM)	Study Group	Control Group	T Test	P value
	(Mean+ SD)	(Mean+ SD)		
1 st day	80.17±7.87	93.43±7.8	2.313	<0.001**
2 nd day	82.22±7.79	95.5±7.73	2.324	<0.001**
3 rd day	81.25±7.83	96.98±7.58	2.335	<0.001**
4 th day	81.3±7.76	94.62±7.65	2.377	<0.001**
5 th day	80.23±7.85	95.23±7.6	2.561	<0.001**

Table (5) show that, mean of abdominal circumference is higher among control group than the study group from the first day to the fifth day with a highly statically significant differences between them regarding abdominal circumference in all 5 days.

Table (6): Gastrointestinal function regarding Vomiting among study and control group

Vomiting	Study Group		Control Group		X ²	P value
	No	%	No	%		
1 st day	0	0.0	0	0.0	----	---
2 nd day	0	0.0	0	0.0	---	---
3 rd day	0	0.0	0	0.0	---	---
4 th day	0	0.0	3	10.00	1.179	0.076
5 th day	0	0.0	2	6.67	1.156	0.150

Table (6) show that, none of patients in the study group suffered from vomiting, while only 10,00% and 6.67% of patients in the control group suffered vomiting. Also there were no statically significant differences between study and control group regarding vomiting in all 5 days.

Table (7): Gastrointestinal function regarding Constipation among study and control group.

Constipation	Study Group		Control Group		X ²	P value
	No	%	No	%		
1 st day	6	20.00	10	33.33	3.564	0.078
2 nd day	8	26.67	12	40.00	3.743	0.084
3 rd day	5	16.67	15	50.00	6.435	0.003
4 th day	5	16.67	14	46.67	6.134	0.008
5 th day	4	13.33	16	53.33	10.345	0.001

Table (7) show that, number of patients have constipation in the control group is higher than number of patient in the study group from the first day to the fifth day with a highly statically significant differences between study and control group regarding constipation in 4th and 5th day, and there were statically significant differences between study and control group regarding gastric residual volume in 3rd day while there were no statically significant differences in day 1 and 2.

Table (8): Comparison between day one and day five regarding gastrointestinal function among study and control group.

Items	Study group		Control group	
Gastric residual volume				
Day 1	0±0		0±0	
Day 5	26.1±6.22		86.97±22.45	
	Test: 12.372 P value: 0.001		Test: 24.744 P value: 0.001	
Abdominal circumference				
Day 1	80.17±7.87		93.43±7.8	
Day 5	80.23±7.85		95.23±7.6	
	Test: 1.313 P value: 0.067		Test: 1.643 P value: 0.165	
Abdominal Distension				
Day 1 (distended)	0	0.0	0	0.0
Day 5 (distended)	1	3.33	18	60.00
	Test: 1.017 P value: 0.313		Test: 5.454 P value: 0.001	
Vomiting	No	%		
Day 1	0	0.0	0	0.0
Day 5	0	0.0	2	6.67
	Test: ----- P value: -----		Test: 1.32 P value: 1.54	
Constipation	No	%		
Day 1	6	20.00	10	33.33
Day 5	4	13.33	16	53.33
	Test: 2.29 P value: 0.297		Test: 3.2 P value: 0.043	

Table (8) show that, this table show comparison between day 1 and day 5 regarding study and control group, there was better outcome in study group than control group regarding to gastric residual volume, abdominal distension, abdominal circumference and constipation. There were highly statically significant differences between day 1 and day 5 in study and control group regarding gastric residual volume, and abdominal distension in control group. There were statically significant differences between day 1 and day 5 regarding constipation in control group. While there were no statically significant differences between day 1 and day 5 regarding abdominal circumference and vomiting in study and control group.

Discussion

Massage therapy began as a sacred system of natural healing. Nutrition is one of the essential components of life. Every individual requires nutrition for healthy living. However, for some individuals, nutritional intake becomes compromised while some benefit from oral supplements, others require active nutritional support. In the hospital setting depending on the disease condition, patients may need to maintain their nutritional intake through altered routes like enteral tube feeds and parenteral. Critically ill patient can have issues that can lead to restriction in oral feeding. In such cases, an option is nasogastric feeding. Nutritional support in intensive care units (ICUs) is an integral part of patient care. It is an important factor in health maintenance and disease recovery, particularly in critically ill patients (Narmadha & Priyanka, 2019).

Regarding to demographic characteristics of patients in the control and study group, table (1) show that, the mean age of study group was 43.55 ± 12.14 , while, the mean age of the control group was 46.35 ± 12.78 . This result was in agreement with Dehghan, Mehdipoor, & Ahmadinejad, (2018). whose study title "Does abdominal massage improve gastrointestinal functions of intensive care patients with an endotracheal tube?" who found that the mean age in the study group was 42.97 ± 23.08 and mean age in the control group was 40.94 ± 19.44 in the control group. While, this was not in agreement with Momenfar, Abdi, Salari, Soroush, & Hemmatpour, (2018). Whose study title was "Studying the effect of abdominal massage on the gastric residual volume in patients hospitalized in intensive care units" who found that the mean age was 60.76 ± 17.38 in the study group and 58.66 ± 14.75 in the control group.

Regarding gender, half of patients of study group and more than two third of patients of the control group were males. This result was not in agreement with Etinkaya, Ovayolu; Ovayolu (2020): whose study title was 'The Effect of Abdominal Massage on Enteral Complications in Geriatric Patients' who found that two third of intervention group and more than half of control group were female.

As regards educational level, only less than one fifth of the study group and minority of the control group were illiterate. This result was in agreement with Warren (2016) whose study title was "Abdominal massage may decrease gastric residual volumes and abdominal circumference in critically ill patients" who found that one third of intervention group and more than half of control group were illiterate.

Regarding marital status, majority of the study group and more than three quarter of the control group were married. This was in agreement with Zhou, Yang, Yuan, & He. (2016), whose study title was "Effect of abdominal massage on recovery of gastrointestinal function in patients with severe cranio-cerebral injury with indwelling nasointestinal tube" who found that two third of intervention group and half of control group were married.

Regarding patient diagnosis during admission, the results revealed that, two third in study group and less than two third in control group had post-operative care, also one fifth in study group and minority in control group have neurological disorder. This result was in agreement with Tao (2017) whose study title was "Effect of abdominal massage on vomiting in patients with enteral nutritional crisis" who found that, more than half in study group and two third in control group have post-operative care.

Regarding presence of GIT problems there were more than one third in study group and two fifth of the control group had GIT problems and less than two third of them in study group and majority of control group had constipation as GIT problems. In addition, there was no statistically significant difference between two groups regarding patient clinical data. This result was in agreement with Etinkaya, Ovayolu; Ovayolu (2020): whose study title 'The Effect of Abdominal Massage on Enteral Complications in Geriatric Patients' who found that one fifth of intervention group and two fifth of control group have GIT problems also found that majority of the study group and all of the control group have constipation.

Regarding to gastric residual volume, mean of gastric residual volume is higher among control group than the study group from the second day to the fifth day with a highly statically significant differences between them regarding gastric residual volume in 3rd, 4th and 5th day, while there was no statically significant relation in day 1 and 2. This result was in agreement with **Thomas, Krishna, Das, (2019)** the study title was "A study to assess the effectiveness of abdominal massage on gastric residual volume among patients with intermittent naso-gastric tube feeding in a selected hospital, Bangalore" who found that there was statistically significant change in gastric residual volume after the application of abdominal massage.

In relation to abdominal distension, number of patients have abdominal distension is higher among control group than the study group from the second day to the fifth day with a highly statically significant differences between them regarding abdominal distension in 4th and 5th day, and there was statically significant relation between them regarding abdominal distension in 3rd day while there was no statically significant relation in day 1 and 2. This may be due to abdominal massage improve peristalsis and make defecation better so it lead to decrease abdominal distension. This result was in accordance with **Wang, (2015)**, who examined the effects of 15-min gentle abdominal massage was administered bi-daily for 3 days showed decrease abdominal distension significantly.

Regarding to abdominal circumference, mean of abdominal circumference is higher among control group than the study group from the first day to the fifth day with a highly statically significant differences between them regarding abdominal circumference in all 5 days. This may be related to the abdominal massage was decrease abdominal distension so the abdominal circumference not changed in study group rather than in control group. This result was in agreement with **Dehghan, Mehdiipoor & Ahmadinejad, (2018)** who found that who applied 15-minute abdominal massage twice a day for three days found a significant difference in the abdominal circumference between the intervention and control groups.

In addition to vomiting, none of patients in the study group suffered from vomiting, while minority of patients in the control group suffered vomiting. Also there were with a no statically significant differences between study and control group regarding vomiting in all 5 days. This is may be referring to the massage was effective on preventing occurrence of vomiting along the study period (5 days) and the massage timing before feeding which enhance gastric empty. This result was in disagreement with, **Momenfar (2018)**, who reported that the incidence of vomiting ranged from 12% to 50 %.

Regarding to constipation, number of patients have constipation in the control group is higher than number of patient in the study group from the first day to the fifth day with a highly statically significant differences between study and control group regarding constipation in 4th and 5th day, and there were statically significant differences between study and control group regarding gastric residual volume in 3rd day while there were no statically significant differences in day 1 and 2. This may be due to abdominal massage improve defecation pattern in study group rather than control group. This result was in agreement with **Etinkaya, Ovayolu; Ovayolu (2020)** who found that one fifth of intervention group and two fifth of control group have GIT problems also found that majority of the study group and all of the control group have constipation.

Regarding to comparison of gastrointestinal function the result of the present study showed that, there was better outcome in study group than control group regarding to gastric residual volume, abdominal distension, abdominal circumference and constipation. there were highly statically significant differences between day 1 and day 5 in study and control group regarding gastric residual volume, and abdominal distension in control group. There were statically significant differences between day 1 and day 5 regarding constipation in control group. In addition, while there were no statically significant differences between day 1 and day 5 regarding abdominal circumference and vomiting in study and control group. This may be due to abdominal massage improve abdominal peristalsis and it help in improving food absorption and defecation pattern so it lead to decrease gastric residual volume, abdominal circumference, abdominal distension

and improve defecation pattern so decrease constipation.

This result was in agreement with **Etinkaya ,Ovayolu; Ovayolu (2020)** who found that GRV decreased significantly in the intervention group and increased significantly in the control group. The frequency of defecation significantly increased in study group. It was found that there was no positive effect of abdominal massage on vomiting. Also, this result was in accordance with **Wang, 2015**, who examined the effects of 15-min gentle abdominal massage was administered bi-daily for 3 days showed decrease abdominal distension, abdominal circumference, and gastric residual volume significantly.

Conclusion:

According to the findings, increasing evidence supports the effect of abdominal massage on lowering GRV, preventing distension and avoiding vomiting and lowering constipation with a statistical significant support.

Recommendation

- Apply abdominal massage practice a caring procedure in the daily ICU care program.
- Educational program for nurses to improve their knowledge and practice regarding abdominal massage application.
- Application of complementary medicine for different disease.

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