

Effect of Proper Enteral Feeding Technique and Abdominal Massage on Selected Gastrointestinal Complications among Stroke Patients

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Abstract

Background: Despite utilization of enteral feeding is an important determinant for stroke patients' recovery, gastrointestinal complications still may occur. The basic goals of nursing care are to prevent complications. Therefore, utilizing techniques such as abdominal massage with proper enteral feeding has been proved to improve various digestive functions. **The aim of the study:** To evaluate the effect of proper enteral feeding technique and abdominal massage on selected gastrointestinal complications among stroke patients. **Research design:** Quasi-experimental research design was utilized. **Subjects:** A purposive sample including (60) adult stroke patients classified equally into two equal groups study and control group (n = 30). **Setting:** Conducted at the Minia University Hospital's Stroke department in the Minia governorate. **Tools:** Four tools were utilized to collect data, the first tool is a structured interview assessment sheet that includes two parts (socio-demographic characteristics and medical data) the second tool includes three parts for assessing selected gastrointestinal complications. The third and fourth tools for abdominal massage and proper enteral feeding techniques. **Results:** The gastric residual volume difference between the study and control group subjects was statistically significant ($P < 0.0001$) on the third-day post-intervention. The difference between the two groups regard to the distension and vomiting occurrence was statistically significant relation on the third day ($P < 0.01$, $P < 0.013$) respectively. **Conclusion:** The study findings concluded that the study group has reduced mean average of gastric residual volume, the distension, and vomiting episodes occurrence than the control group with significance on the third day. **Recommendations:** The in-service educational training program for nurses that emphasizes the purposes and benefits of proper enteral feeding technique and abdominal massage is very important. **Key Words:** Abdominal massage, Enteral feeding, Gastrointestinal complications, Stroke.

Introduction

Stroke is a leading cause of disability worldwide and directly interferes with the morbidity and quality of life of the individual. It is defined as a sudden neurological dysfunction of vascular origin with a rapidly evolving disturbance of cerebral function lasting more than 24 hours (Rabaut et al., 2022) & (Souza et al., 2020).

Globally, 13.7 million strokes occur each year, of them 60% occurs in people under the age of 70 years (Banda et al., 2022). In Egypt, the prevalence of stroke is higher than in many surrounding countries, with a crude prevalence rate of 963/100,000 inhabitants. It accounts for 6.4% of all deaths and is considered the third cause of death in Egypt (Abd El-Gawwad et al., 2022) & (Elsayed et al., 2022).

The European Society of Clinical Nutrition and Metabolism recommends that patients with prolonged severe dysphagia after stroke, whose symptoms are expected to last for more than 7 days, should receive early enteral tube feeding to receive adequate nutrition, fluids, and medication (Li et al., 2022).

Although enteral nutrition is often cited as a safer nutritional therapy than parenteral nutrition, complications still may occur. These complications can be categorized as gastrointestinal, mechanical, or metabolic, which results in poorer quality of life, increased length of stay for patients, wasted medical resources, and an increased workload for nursing staff (Xinbo et al., 2022) & (Li et al., 2022).

The high prevalence of enteral feeding-related gastrointestinal complications includes feeding intolerance of

up to 50%, vomiting of 20%, and high gastric residual volume of 32-39%, which causes the feeding schedule to be interrupted or stopped. The excess GRV lead to interruption of enteral nutrition in 76% of their patients and stopped in 30% of their patients. Moreover, many studies reported that almost two-thirds of patients who developed enteral nutrition complications didn't get their required calories, which lead to a longer hospital stay and a bad prognosis (Abdelhafez & Abd Elnaeem, 2019) & (El-Hafez et al., 2013)

The 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. In non-drug therapy, abdominal massage is widely used in patients with gastrointestinal dysfunction (Mohamed, Bakr, & Naguib, 2021). Abdominal massage is inexpensive, has no side effects, and is widely used as an adjunctive treatment for patients with gastrointestinal dysfunction. Abdominal massage improves blood circulation in the gastrointestinal tract and stimulates gastrointestinal peristalsis (Xinbo et al., 2022).

Significance Of The Study

Statistics of stroke care unit at Minia University Hospital in the years of (2019 - 2020) revealed that the number of stroke patients admitted were about 190 patients around 52.6% of these patients received enteral feeding and the majority of these patients have enteral feeding related gastrointestinal complications (Hospital Records of Minia University 2019-2020). Worldwide, feeding intolerance

affects more than 60% of patients, and it is one of the main causes of failed nutritional support for patients who require enteral feeding (Mohamed et al., 2021). These complications can lead to an inability to achieve nutritional targets in patients which results in increased length of stay for patients, wasted medical resources, and an increased workload for nursing staff (Hafez & Ali, 2022)&(Zhao et al., 2022). The success of enteral nutrition without complications is of great importance. So, the nurse should utilize their skills for preventing complications, facilitating patient comfort, minimizing the patients' suffering, and helping them return to normal functioning or as close to normal as possible

Aim of the study

The aim of the present study was to evaluate the effect of proper enteral feeding technique and abdominal massage on selected gastrointestinal complications among stroke patients.

Research hypotheses

H1: Adult stroke patients who will receive proper enteral feeding technique and abdominal massage will have a significantly lower mean gastric residual volume as compared to those in the control group who will not.

H2: Adult stroke patients who will receive proper enteral feeding technique and abdominal massage will have a significantly lower incidence of abdominal distension as compared to those in the control group who will not.

H3: Adult stroke patients who will receive proper enteral feeding technique and abdominal massage will have a significantly lower incidence of vomiting episodes as compared to those in the control group who will not.

Subjects and Methods

Research Design:

- The quasi-experimental research design was utilized to fulfill the aim of this study. This design aims to evaluate interventions by causality demonstration between an intervention and an outcome (Maciejewski, 2020).

Setting:

The current study was carried out at the stroke unite at Minia University Hospital.

Study Duration:

The total data collection was collected over a period of nine months starting from July 2021 to March 2022.

Subjects:

A purposive sample of 60 adult patients with stroke on nasogastric tube feeding was assigned in the current study. The first patient was randomly selected for the study group, then another patient was selected for the control group, and so on alternately until the end of the sample. The number of subjects who provide the necessary sample size is calculated by the (Isaac & Michael, 1997) formula, which is computed as ($N = n \times 30/100$), in which

- N = Sample size
- n = Total number of 100 adult patients with stroke on nasogastric tube for feeding at Minia university hospital during the period 2019:2020.
- $N = 100 \times 30 / 100 = 30$ Patient
- Study group 30 patients + 30 patients for control group = 60patients

The researcher divided the sample of the current study into two matched equal groups, with 30 patients for each group. Group I (control group) was exposed to routine hospital care. Group II (study group) was exposed to proper enteral feeding technique and abdominal massage.

Inclusion Criteria: -

- Age (18: 64 years).
- Both sexes (male and female).
- Willing to participate in the study.

Exclusion Criteria the Patients will be excluded if:

- Receive prokinetic medications such as metoclopramide which stimulate digestive tract motility.
- Receive anti-emetic medications.
- Have abdominal malignancy.
- Who have undergone abdominal surgeries and radiotherapy in the past 6 weeks (about 1 and a half months).
- Patient has vomiting accompanied by diarrhea.

Tools of Data Collection

The current study data was collected by four tools to collect pertinent data for this current study prepared by the researcher after literature review (Adam, Mohammed, Abdel-Aziz, Morsy, & AbdElhafez, 2020; El-Feky & Ali, 2020; El-Hafez et al., 2013).

First Tool: Structured Interview Assessment Sheet

It was collected at the first interview and it covers two main parts

- Part one:** Patients' Sociodemographic Characteristics, such as patients' age, gender, education, residence, occupation, etc.
- Part two:** Covers patients' medical data such as past medical history and current medical data such as type of stroke, blood glucose level, blood pressure, etc.

Second Tool: Assessment of Gastrointestinal Complications: Divided into Three Sections:

Section I: -Gastric residual volume (GRV) monitoring: This section was collected (two times) daily before the first abdominal massage and enteral feeding and after one hour from the second massage for patients on three consecutive days. It covered data regarding measuring the baseline of gastric residual volume.

Section II: - Abdominal distention monitoring: -

It covered data regarding assess the baseline of abdominal distention and abdominal circumference. Operationally, "No distension by palpation and percussion" means that the abdomen is soft, moving, and not tense. A distended abdomen means a hard, tender, bloated, and increased abdominal diameter. This section was collected (two times) daily before the first abdominal massage and enteral feeding and after one hour from the second massage for patients on three consecutive days.

Section III: Vomiting Assessment Scale: -

This section is used to assess the frequency and severity of vomiting (Mohammed & Othman, 2018). Its scoring system ranged from zero to four. grade (zero) none, grade (1)-one episode per 24 hours, grade (2) means 2 to 5 episodes per 24 hours, grade (3) means ≥ 6 episodes per 24

hours; IV fluids, or total parenteral nutrition (TPN), indicated, and grade (4) life-threatening consequences. It covered data regarding assess the baseline of vomiting episodes. This section was collected (one time) daily after one hour from the second massage for patients on three consecutive days.

Third Tool: Abdominal Massage Technique:

It was formulated by the researcher after extensive literature review (El-Feky & Ali, 2020; Momenfar, Abdi, Salari, Soroush, & Hemmatpour, 2018; Uysal, 2017) and revised by experts. The massage technique consists of five steps on the abdominal wall. The main steps of massage are (superficial effleurage, vibration, petrissage, friction, and deep circular stroking). The five steps of abdominal massage were performed two times during the day for three consecutive days.

Fourth Tool: Enteral Feeding Administration Check List

It was developed by the researcher after extensive literature review (Patricia A. , 2021) & (Hofland & Grafton, 2020) and includes proper enteral feeding administration steps to provide enteral nutrition support, which is a useful method for providing nutrition for patients with dysphagia following a stroke to enhance their nutritional status and promote their health.

Validity and Reliability:

- To establish validity, the tools were examined by a panel of five experts in the field of medical surgical nursing staff (Minia University).

Pilot study

A pilot study was carried out on 10% (6 patients) of the total sample to test the feasibility, objectivity, and applicability of the data collection tool. Based on the results of the pilot study, no modifications were made by the researcher. Those patients were included in the current study.

Ethical Consideration

Official permission to conduct the study was obtained from the ethical committee of the faculty of nursing (involve six members), the dean of the faculty, Minia university hospital director and the neurological department director. Subjects' participation in this study was voluntary, and they were informed about the study's purpose, procedure, benefits, nature, and follow-up, and they had the right to withdraw at any time without explanation.

Oral and written consent was obtained from subjects, informing them that obtained data would not be included in any further research without a second consent. Confidentiality and anonymity of each subject were ensured through coding of all data and protecting the obtained data.

Field Work:

The actual field work of this study started at the beginning of (July 2021) and had been completed at (March 2022). It was conducted in three phases:

A. Assessment and planning phase:

This phase was carried out through the following steps: developing the tools for data collection after reviewing the related literature. Obtaining experts opinions to ensure tools validity and measurement of reliability. 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:

Data collection from the study group

Firstly, the researcher collected the demographic and medical data from patients (first tool). Secondly, after the researcher was confirmed of the NG tube placement in the stomach, the amount of gastric residual was measured and returned to the stomach. Abdominal distension was examined by palpation and the measurement of abdominal girth was done by using a 150-cm inflexible tape measure to measure abdominal circumference (second tool).

The study group received 15 minutes abdominal massage two times during the day and the interval between the two massages was 2 hours for three consecutive days. First, the researcher put the patient in a supine position, the head-of-bed angle elevated at 30°–45°, straightened the legs, and the researcher stood on the right side of the patient. The researcher carried out the steps of first abdominal massage. This type of massage technique consists of five steps in a clockwise direction over the intestines on the abdominal wall. The first stage of massage starts with effleurage. The second stage of abdominal massage includes vibration. In the third stage, the abdominal skin is elastically deformed by massage. The abdominal skin is picked up and kneaded by the fingers (like kneading dough). The fourth stage involves friction. This technique is done by rubbing the abdomen back and forth. It creates heat, warming up muscles in the abdomen to be treated for deep massage technique, and the last stage contains deep circular stroking on the abdomen

The researcher performed alternating gentle, quick, and striking manipulations such as tapping, cupping, hacking, chopping, and pounding movements all over the abdomen. This technique was usually used as the last technique in the massage session. The spreading oil was used to facilitate the massaging, and then the researcher administered the nasogastric tube feeding for the patients with proper technique.

After 2 hours, the second abdominal massage was performed, and finally, 1 hour after the second massage the gastric residual was measured, abdominal distension, and vomiting episodes were assessed (second tool).

Data collection from the control group

Firstly, the researcher collected the demographic and medical data from patients (first tool). Secondly, after the researcher confirmed the NG tube placement in the stomach, the amount of gastric residual was measured then this amount was returned to the stomach, abdominal distension were assessed and recorded (second tool) and eventually, the volume of food in the stomach was increased after enteral feeding (the patients were received enteral feeding by hospital staff), and 3 hrs later, the GRV, abdominal distension and vomiting episodes (second tool) were rechecked, assessed, and recorded.

C. Evaluation phase:

- The evaluation phase was emphasizing on determining the effect of proper enteral feeding technique and abdominal massage on selected gastrointestinal complications among stroke patients

- The evaluation phase was start from the first day before and after implementation of abdominal massage till the 3 day of the implementation of the abdominal massage.

III-Administrative design:

An official permission was obtained from the director of stroke care unit at Minia University Hospital affiliated to Minia 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.

IV. 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. 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 statistical tests.

Results

Table (1): Distribution of socio-demographic characteristics among both control and study group subjects. (n= 60).

socio-demographic characteristics	Groups				Test of significance	P – value
	Control (n=30)		Study (n=30)			
	N	%	N	%		
Age / years						
• 30-40	2	6.7%	3	10.0%	Fisher exact = 0.480	0.835 NS
• 41-50	5	16.7%	7	20.0%		
• 51-64	23	76.7%	21	70.0%		
Mean ± SD	56.2 ± 8.2 years		55.4 ± 8.4 years		t=0.386	0.700 NS
Gender						
• Male	16	53.3%	14	46.7%	$\chi^2 = 0.266$	0.609 NS
• Female	14	46.7%	16	53.3%		
Marital status						
• Single	3	10.0%	0	0.0%	Fisher exact = 3.077	0.078 NS
• Married	20	66.7%	24	80.0%		
• Widow	7	23.3%	6	20.0%		
Residence						
• Urban	10	33.3%	11	36.7%	0.073 $\chi^2 =$	0.786 NS
• Rural	20	66.7%	19	63.3%		
Educational level						
• Illiterate	14	46.7%	21	70.0%	Fisher exact = 6.522	0.158 NS
• Read and write elementary	6	20.0%	3	10.0%		
• Secondary	6	20.0%	2	6.7%		
• University	4	13.3%	2	6.7%		
• Pension	0	0.0%	2	6.7%		
Occupation status						
• Housewife	14	46.7%	13	43.3%	Fisher exact = 5.21	0.269 NS
• employee	3	10.0%	1	3.3%		
• Farmer	4	13.3%	8	26.7%		
• Un employee	8	26.7%	4	13.3%		
• pension	1	3.3%	4	13.3%		

NS= not significant

Table (1) shows that the mean average age among the control and study groups was similar constituting (56.2± 8.2 years and 55.4± 8.4 years), respectively. As regards marital status for both groups, the highest percentages among control and study groups were married constituted (66.7%&80.0%) respectively. On the other hand, the table results found that more than two-thirds of both groups (control and study group) lived in rural areas constituted (66.7% & 63.3 %) respectively. According to their educational level about (46.7%&70.0%) of both groups (control and study groups) were illiterate, while around half of them were occupied as housewives. Lastly, there was no significant difference between the study and control groups regarding socio-demographic characteristics.

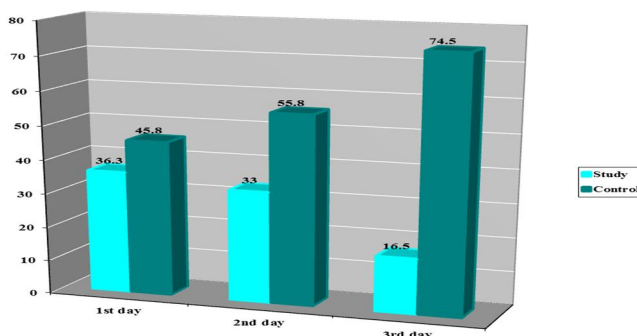


Figure (1) Mean scores for the gastric residual volume three days post-intervention among control and study group subjects.

Figure. 1 presents that there are decrease in the mean average of gastric residual volume constituted (36.3 ± 18.8 , 33.0 ± 19 & 16.5 ± 15) respectively, in three days among the study group after they had received proper enteral feeding and abdominal massage, while there are an increase in the mean average of gastric residual volume constituted (45.8 ± 21 , 55.8 ± 29 & 74.5 ± 29.7) respectively in three days among the control group.

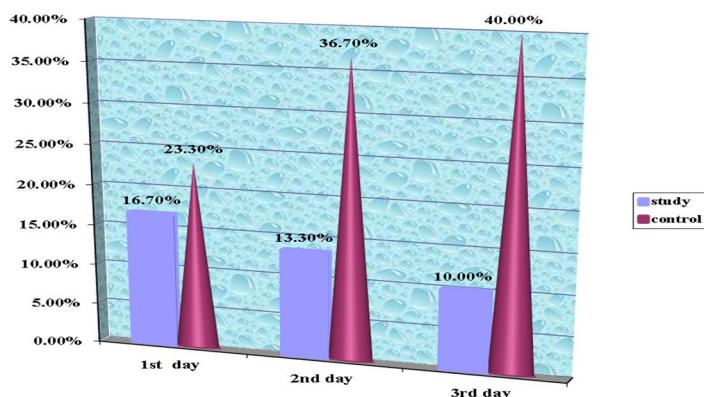


Figure (2) Percentage distribution for the presence of abdominal distension three days post-intervention among study and control subjects

It shows that there is a decline in percentage distribution of abdominal distention among the study group after they receive proper enteral feeding and abdominal massage during three days constituted (16.7%, 13.3% & 10.0%) respectively, while there is an increase in the percentage distribution of abdominal distention among the control group during three days constituted (23.3%, 36.7% & 40.0%) respectively

Table (2) Percentage distribution of the vomiting episodes post-intervention during three days among both control & study groups (n= 60)

Occurrence of vomiting episodes	1 st day				2 nd day				3 rd day			
	Control (n=30)		Study (n=30)		Control (n=30)		Study (n=30)		Control (n=30)		Study (n=30)	
	N	%	N	%	N	%	N	%	N	%	N	%
No vomiting	20	83.3%	26	86.7%	24	80.0%	27	90.0%	22	73.3%	29	96.7%
Grade I	0	16.7%	4	13.3%	6	20.0%	3	0.0%	6	20.0%	0	0.0%
Grade II	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	6.7%	1	3.3%
Test of significance	Fisher's Exact = .113 P - value = .000				Fisher's Exact = .113 P - value = .000				Fisher's Exact = .113 P - value = .000 *			

Table (2) reveals that, according to vomiting scale there are an increase in the percentage of occurrence of vomiting episodes constituted (16.7%, 20.0% & 26.7%) respectively, in three days among the control group, while a decline in the percentage of occurrence of vomiting episodes constituted (13.3%, 10.0% & 3.3%) respectively, in three days among the study group after they had received proper enteral feeding and abdominal massage.

There was a statistically significant difference among both study and control groups regarding their occurrence of vomiting episodes post-intervention on the 3rd day only

Table (3) Correlations between socio-demographic data and selected gastrointestinal complications (GRV, abdominal distention, occurrence of vomiting episodes, and presence of constipation) post-intervention on 3rd day among control and study groups

sociodemographic data		gastric residual volume		abdominal distension		presence of constipation		occurrence of vomiting episodes	
		Control	Study	Control	Study	Control	Study	Control	Study
age	r	.498*	.252	.283	.250	.042	.309	.071	.057
	p	.005	.178	.129	.182	.827	.096	.709	.763
gender	r	.130	.104	.082	.134	.250	.134	.075	.199
	p	.493	.585	.667	.481	.183	.481	.695	.293
residence	r	.012	.007	.000	.023	.189	.069	.040	.141
	p	.949	.972	1.000	.904	.317	.716	.836	.456
Marital status	r	.047	.221	.029	.111	.244	.167	.098	.093
	p	.803	.240	.880	.559	.193	.379	.605	.626
Education	r	.203	.006	.062	.098	.122	.134	.051	.105
	p	.282	.975	.744	.605	.521	.480	.789	.582
occupation	r	.200	.011	.030	.038	.137	0.429	.082	.063
	p	.289	.954	.876	.844	.472	.018	.668	.741

*Correlation is significant at the 0.05 level

**Correlation is significant at the 0.01 level

Table (3) illustrates that there is no statistically significant correlation between all socio-demographic characteristics for study and control groups and their assessment of gastric residual volume, abdominal distention, constipation, and occurrence of vomiting episodes on the third-day post-intervention except as regard assessment of gastric residual volume and age had a positive correlation among a control group

Discussion

Regarding to demographic characteristics of patients in the control and study group, table (1) shows that the mean average age among the study and control groups was similar, constituting (56.2± 8.2 years and 55.4± 8.4 years), respectively. From the researcher's point of view this is related to the risk of stroke increasing with age among Egyptian populations because the risk of atherosclerosis and hypertension increase with age and it is consider the main risk factor for stroke in Egypt. This result was in agreement with (Ding et al., 2022) who illustrated that, globally, there was an increase in ischemic stroke incidence with increasing age, especially in women 50 to 69 years of age or older. In the same line (Osama et al., 2019) who conclude that the main risk factor for CVS in Egypt was hypertension. Also, these findings are congruent with a study done by (Essmat et al., 2021) who mentioned that the incidence of stroke increases with age and that risk factors for stroke include older age, hyperlipidemia, DM, and hypertension.

Regarding residence the present study illustrated that more than two-thirds of patients were from a rural areas in both groups. This finding was in concordance with (Morsy et al., 2013) who approximately had the same findings. Being from rural areas (from the researcher's point of view) interferes with access to health care facilities and leads to a lack of awareness of CVS warning signs except in urban city at Minia government.

Another rationale was that the rural patients had specific personal characteristics as well as economic factors such as low income that resulted in their income not covering their treatment. In this regard, (Feigin et al., 2022) revealed that lower income and wealth are associated with a high incidence of CVS. This finding raises questions regarding the availability and utilization of preventive, screening, and diagnostic services in rural areas.

Regarding occupation nearly half of the current studied groups were occupied as housewives, which reflects their rural residence. This result is supported by (Mohammed & El-Sayed, 2022). **In terms of educational level, the current study revealed that** more than two-thirds of the studied groups were illiterate. This finding was agreed upon by several researches by (Morsy et al., 2013), (Farrag et al., 2018), and (Osama et al., 2019). From the researcher's point of view, patients with low income and low education tend to have more advanced diseases. Egyptian rural culture in the past does not allow individuals to attend or complete their educational level leading to a lack of awareness of warning signs and risk factors of stroke.

Regarding to gastric residual volume, the patients in the study group showed lower mean GRV in 2nd and 3rd day after they had received proper enteral feeding technique and abdominal massage as compared to the control group (whose gastric residual volume increased significantly). This may be attributed to the exposure to 15 min of abdominal massage twice per day for three days, and keen of researcher to give by himself proper enteral feeding to study group subjects which can improve stomach function and increase the speed of gastric emptying.

This result was in agreement with (Ogunyewo & Afemikhe, 2020) who explained that the abdominal massage can play an important role in reducing the GRV, and it is through the stimulation mechanism of the peristaltic movements, intra-abdominal pressure changes, and mechanical and reflexive effects on the intestines, it shortens

the food transition time in the intestines, increases intestinal movements, and facilitates food flow through the digestive tract

In the same line study by (Momenfar et al., 2018) who showed that the abdominal massage can reduce the gastric residual volume in patients who received enteral feeding. Therefore, it is suggested that this method can be considered a caring method in the daily care program for these patients.

In this regard, a study by (Kahraman & Ozdemir, 2015) and (Thomas et al., 2019) to assess the effectiveness of abdominal massage on gastric residual showed that the GRV on the last day compared to the first day had a significant reduction, while there was an increase in GRV in the control group.

In addition, several studies in Egypt, Turkey, Iran, Germany, and others suggested and described using the abdominal massage for patients who receive enteral feeding as a complementary therapy for improving gastrointestinal outcomes such as lowering incidence of "high gastric residual volume, vomiting, abdominal distension and constipation", which it has been shown to be effective, noninvasive and without any side effects on patients (Fareed & El-Sayad, 2017) & Mohamed et al., 2021).

Regarding effect of proper enteral feeding on gastric residual volume among stroke patient who received enteral feeding the study done by (Shabaan et al., 2021), showed that application of enteral feeding protocol in recent stroke patients early at onset resulted in rapid improvement of decreased incidence of gastrointestinal complications include gastric residual volume.

In relation to abdominal distention the current study revealed that the majority (ninety percent) of study group have not abdominal distention while, around half of patients in control group have abdominal distention on third day with a highly statically significant differences.

From the researcher's point of view and in agreement with (Dehghan et al., 2020) who explained that the abdominal massage can reduce pressure in the abdominal cavity, and effectively relieve abdominal distension. In addition, abdominal massage can stimulate the skin's sensitivity to touch and pressure receptors that produce sympathetic stimulation to promote gastrin secretion, facilitate gastric peristalsis, and reduce abdominal distention.

This result was in accordance with a systematic review and meta-analysis by (Xinbo et al., 2022) who approved that the incidence of abdominal distension in the abdominal massage group was lower than in the control group, and the difference in the incidence of abdominal distension between the two groups was statistically significant.

This result also had been agreed with another study by (Wang et al., 2019) who founded that abdominal massage can reduce the incidence of gastric residue, abdominal distension, gastric retention, and vomiting in ICU patients and proves that the abdominal massage is effective.

Regarding effect of proper enteral feeding on abdominal distension among stroke patients who received enteral feeding the study done by (Shabaan et al., 2021) and (Mohammed & Othman, 2018) showed that application of enteral feeding protocol in recent stroke patients early at onset resulted in rapid improvement of decreased

incidence of gastrointestinal complications include abdominal distention.

In the same line (El-Hafez et al., 2013) who concluded that the intermittent enteral feeding schedule applied on the study group subjects had lower development of gastrointestinal complications (diarrhea, vomiting, constipation, and abdominal distention) than the control group ones.

Regarding occurrence of vomiting the incidence of vomiting is a serious complication associated with enteral feeding, especially for comatose patients, which increases the risk of aspiration, pneumonia, and even suffocation. The current study revealed that more than one quarter of control group have vomiting episodes while the percentage among study group who received abdominal massage and enteral feeding with proper technique was declined (three percent) on the 3rd day with statistical difference.

From the researcher's point of view, this may be due to the abdominal massage technique speeding up food emptying, thereby reducing the amount of gastric residue and reducing the incidence of gastric retention. As a result, it reduces the likelihood of vomiting.

The present study findings are compatible with (Xinbo et al., 2022) who stated that, abdominal massage can stimulate the vagus nerve and increase intestinal motility, which prevents delayed gastric emptying. It also has a mechanical reflex effect on the intestines, which can increase peristalsis and promote gastric emptying, further preventing vomiting. Therefore, abdominal massage reduces GRV and, at the same time, reduces the incidence of vomiting.

In harmony, (Ge, 2013), (Lyu, 2014) and (Zhou et al., 2016) showed that the incidence of vomiting in the abdominal massage group was lower than that in the control group, and the difference between the two groups was statistically significant.

On the other hand, this finding is unsupported by (Ogunyewo & Afemikhe, 2020) who conclude that abdominal massage decreased GRV and distension while it increased the frequency of defecations, and had no effect on vomiting in enterally fed patients. Also, the abdominal massage was observed to have no side effects.

The present study illustrated that there is a strong positive correlation between the amount of gastric residual volume and the mean average age among control groups on the third day. From the viewpoint of the researcher, and in consistent with (Fekri et al., 2021) this may be due to the younger patients of the control group in this study have improved digestion than older age patients this result is consistent with the scientific fact of increased patient's age, causes gastric blood flow to decrease and mucosal defences to weaken, the reduced total volume of gastric secretions, reduced digestion, and delayed gastric emptying, thereby increasing gastric residual volume. While the study group who received proper enteral feeding and abdominal massage having improving digestion and have less gastric residual volume. So on the basis of the findings of our study applying proper enteral feeding along with the implement of abdominal massage technique is effective in preventing gastrointestinal dysfunctions among elderly and adult patients.

Conclusion

The study findings concluded that the proper enteral feeding technique and abdominal massage decreased selected gastrointestinal complications in the study group. The

majority of the study group has reduced mean gastric residual volume, the occurrence of distention and of vomiting episodes than the control group with significance on the third day.

Recommendations

Based on the findings of the present study the researcher suggested that:

- The in-service educational training program for nurses that illustrates the purposes and benefits of proper enteral feeding technique and abdominal massage is very important.
- Incorporate abdominal massage as a routine care for stroke patients who receiving enteral feeding.

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