



EVALUATE THE EFFECTIVENESS OF ABDOMINAL MASSAGE ON GASTRIC RESIDUAL VOLUME AMONG CRITICALLY ILL CLIENTS WITH NASOGASTRIC TUBE FEEDING IN SELECTED HOSPITAL AT NAGERCOIL

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ABSTRACT

Introduction: Enteral nutrition is the preferred nutritional support for critically ill patients. Gastric residual volume (GRV) is used to assess enteral feeding tolerance. Abdominal massage stimulate peristalsis and enhance parasympathetic activity, potentially reducing GRV and improving feeding tolerance. The aim of the present study was evaluate the effectiveness of abdominal massage on gastric residual volume among critically ill clients with nasogastric tube feeding in selected hospital at Nagercoil. **Methodology:** Pre-experimental one group pretest posttest design was adopted. The study was conducted in selected Hospital, Nagercoil. 30 critically ill patients were selected by using Non-probability purposive sampling technique. Self-structured gastric residual volume assessment tool was used to assess the pretest and posttest level of gastric residual volume (GRV). After pretest, the participants were received abdominal massage in the morning for 20 min, and after massage, the gavage was performed, and the gastric volume was increased to 200cc. After 2 h, the second stage of abdominal massage was performed, and finally, 1 h after the second massage, the GRV was examined. The abdominal massage which will be given for 20 minutes, twice a day for 3 consecutive days in order to maintain the normal level of Gastric residual volume among critically ill clients with Nasogastric tube feeding. The data analyzed by using descriptive and inferential statistics. **Results:** The study results revealed that, the mean and standard deviation gastric residual volume scores on the first day were 47.8 ± 14.4 (pretest) and 20.3 ± 2.6 (posttest), with a t value of 9.4; on the second day, 49.9 ± 11.8 and 46.3 ± 14.4 , with a t value of 8.5; and on the third day, 47.4 ± 15.2 and 38.4 ± 11.3 , with a t value of 9.5, respectively. All were statistically significant at $p < 0.05$. A significant association found between demographic and clinical variables such as of educational qualification ($\chi^2 = 11.9$, $p < 0.05$) Reason for Nasogastric tube feeding ($\chi^2 = 7.9$, $p < 0.05$) and Number of feeding per day ($\chi^2 = 8.26$, $p < 0.05$), Rate of interval at each feeding ($\chi^2 = 8.20$, $p < 0.05$). **Conclusion:** The study findings concluded that the intervention was effective in reducing gastric residual volume among the participants, as evidenced by the statistically significant difference between the pretest and posttest scores on all three days. Therefore, the intervention was found to be effective in improving gastric residual volume among patients receiving nasogastric tube feeding.

KEYWORDS : Abdominal Massage, Gastric Residual Volume, Gastric Lavage, Critically Ill Patients & NG Tube Feeding.

INTRODUCTION

Enteral nutrition is the preferred nutritional support for critically ill patients¹, providing essential nutrients through the gastrointestinal tract. It includes oral and transcatheter feeding, with nasogastric tube feeding being a common transcatheter method. It involves inserting a tube through the nose into the gastrointestinal tract to administer water, liquid food, medications, and other nutrients.²

Enteral nutrition is preferred over parenteral nutrition in critically ill patients because it is simpler, has fewer complications, and is more cost-effective. Evidence supports initiating enteral feeding within 48 hours of ICU admission without waiting for bowel sounds or other signs of gastrointestinal function. Current guidelines recommend interrupting enteral nutrition only when necessary for diagnostic or therapeutic procedures.³

According to WHO (2001) stated that 34% of population with short bowel syndrome 26% with cancer and 22% with surgery need nasogastric tube feeding and full tolerance was achieved in 73 of 92 (79.3%). In India, 13.5% of stroke patients receive nasogastric tube feeding.⁴

Gastric residual volume (GRV) is used to assess enteral feeding tolerance and the risk of pulmonary aspiration. Delayed gastric emptying can increase gastric contents, leading to gastroesophageal reflux and aspiration. GRV is commonly assessed every four hours, with higher volumes requiring clinical attention.⁵

An acceptable gastric residual volume (GRV) is 100–200 cc. If the residual volume is more than this, the contents should be returned to the stomach, and feeding should be delayed for 1–2 h. Feeding intolerance is a marker of high GRV, which is a risk factor for aspiration.⁶

More than 50% of ICU patients experience gastric dysmotility and delayed gastric emptying, which may cause inadequate enteral nutrition, nausea, regurgitation, and aspiration, increasing the risk of ventilator-associated pneumonia (VAP). Therefore, monitoring gastric residual volume (GRV) is essential to assess feeding tolerance and prevent complications.

Enteral feeding intolerance is common in critically ill patients and can

lead to inadequate nutritional intake, with only 43–64% meeting their daily caloric requirements. Abdominal massage is a simple, non-invasive nursing intervention that may improve gastrointestinal motility, reduce gastric residual volume (GRV), and enhance feeding tolerance. This technique is believed to stimulate peristalsis and enhance parasympathetic activity, potentially reducing GRV and improving feeding tolerance.⁸

Critical care nurses play an important role in providing safe and effective enteral nutrition and preventing complications in critically ill patients. They assess gastric residual volume (GRV) and monitor vomiting, abdominal distension, and constipation to evaluate feeding tolerance. They also plan nutritional needs and ensure safe feeding practices. Therefore, the present study aimed to evaluate the effectiveness of abdominal massage on gastric residual volume among critically ill patients receiving nasogastric tube feeding in a selected hospital.

Statement of the Problem

“Evaluate The Effectiveness of Abdominal Massage on Gastric Residual Volume among Critically ill Clients with Nasogastric Tube Feeding in Selected Hospital at Nagercoil”.

Objectives

- To assess the pretest and posttest level of gastric residual volume among critically ill clients with Nasogastric tube feeding.
- To evaluate the effectiveness of abdominal massage on gastric residual volume among critically ill clients with Nasogastric tube feeding.
- To find out the association between the pre-test level of gastric residual volume with their selected demographic variables and clinical variables among critically ill clients with Nasogastric tube feeding.

Hypotheses

H₁: There will be a significant mean difference between the pretest and posttest level of gastric residual volume among critically ill clients with Nasogastric tube feeding.

H₂: There will be a significant association between the pretest level of gastric residual volume with their selected demographic variables and clinical variable among critically ill clients with Nasogastric tube feeding.

ASSUMPTIONS

- Increased gastric residual volume (large amount of the fluid left after the feeding) influences clients's ability to tolerate enteral feeding.
- Critically ill clients may have varied amount of gastric residual volume based on their severity of illness.
- Abdominal massage can be reduces the gastric residual volume among critically ill clients with Nasogastric tube feeding

Delimitations: The data collection for the study will be limited to 4 weeks. It is limited to 30 participants and it will be conducted only among critically ill clients with nasogastric tube feeding who were present at the time of data collection.

Research Methodology

Research Approach: Quantitative Evaluative research approach was applied.

Research Design: Pre-experimental one-group pretest posttest design was adopted in this study.

Research Variables

Independent Variable: Abdominal massage

Dependent Variable: Gastric residual volume among critically ill clients with Nasogastric tube feeding.

Setting of the Study: The study was conducted in MuthuNeuro Hospital, Nagercoil.

Study Population

Target Population: Critically ill clients with Nsogastric tube feeding.

Accessible Population: Critically ill clients with NG tube feeding in Muthu Neuro Hospital who are available at the time of the data collection.

Sample: Critically ill clients with NG tube feeding were admitted in Muthu Neuro Hospital, Chunkankadai, Nagercoil and those who fulfilled the inclusion criteria during the period of data collection were included for the study.

Sample Size: The sample size calculated for the current study was 30 critically ill patients with Nasogastric tube feeding. It was calculated by power analysis formula. The study population and standard deviations were referred from previous literature.⁹

$$N = \frac{Z^2 \times N \times Sd^2 p}{(N-1)e^2 + Z^2 \times SD^2 p}$$

N = size of your study population

E² = acceptable error

SD²p = standard deviation of a population

Z² = standard variation at a given confidence level.

$$N = \frac{1.96 \times 34 \times 30.33}{(34-1)0.06 + 1.96 \times 30.33}$$

$$N = \frac{2021.19}{1.98 + 59.44}$$

$$N = \frac{2021.19}{61.42}$$

$$N = \frac{2021.19}{15.77}$$

$$N = 32.9$$

$$N = 32.9$$

$$N = 32.9$$

$$N = 32.9$$

Sampling Technique: Non Probability purposive sampling technique was used for this study.

Criteria of the Selection for Sample

Inclusion Criteria: Client's who are,

- both gender male and female
- age 25 years to 60 years
- having gastric residual volume >100ml
- with Nasogastric tube feeding over a minimum period of 3 days and above
- willing to participate in the study

Exclusion Criteria: Client's who are not

- underwent abdominal surgery
- not present at the time of data collection
- acutely illness like poisoning
- unconsciousness
- spinal cord injury

Description of Tool

Instruments used for data collection consisted of the following sections,

Part A : Demographic variables

Part B : Clinical variables

Part C : Assessment the level of gastric residual volume

Part A : Demographic Variables

It deals with demographic variables such as Age in year, Gender, Marital status, Educational qualification, Occupation and Dietary pattern.

Part B : Clinical Variables

It deals with clinical variables such as Duration of illness, Previous history of Nasogastric feeding, Reason for Nasogastric tube feeding, Number of feeding per day, Amount of feeding, and Rate of intervals per day.

Part C : Assessment the Level of Gastric Residual Volume

Gastric residual volume was measured by the amount fluid remains in the stomach among critically ill clients. It was developed by researcher by using the self-prepared assessment tool for gastric residual volume.

Table 1 : Scoring Procedure

SCORE/GRADE	Level of gastric residual volume
<100ml	Normal
101ml-150ml	Low risk
151ml-200ml	High risk
>200ml	Very high risk

Intervention

The investigator developed interventional strategy on abdominal massage regarding reduce the gastric residual volume among critically ill clients with Nasogastric tube feeding.

Abdominal massages based on the Swedish massage techniques will be used, and the primary outcome was the change of GRV after abdominal massage. The abdominal massage which will be given for 20 minutes, twice a day for 3 consecutive days in order to maintain the level of Gastric residual volume among Nasogastric tube feeding clients and intervention between the abdominal massage 1 hour after the second massage, the Gastric residual volume level was measured by using GRV scale by the investigator.

Pre Preparation of the Procedure:

- The liquid paraffin is used to facilitate the massaging.
- The patient's position is asleep to the back while undergoing massage.
- The angle between the bed and the patient's head is 30 to 45 degrees, and the client's legs are placed on a pillow. This condition helps to relax the abdominal muscles.

Abdominal massage technique consists of five steps. Which includes;

1. Gliding or Effleurage Technique: Its carried out by making more and long sliding and sweeping strokes with the help of forearms ,fairly slow and smooth strokes to spread the paraffin oil.To achieve abdominal muscle relaxation, this phase for 3seconds.

2. Vibration Massage Technique: Its carried out in the aim of releasing the tension of the patients abdominal muscles.Gradual vibratory actions varying between slow to fast movement that is exerted to shake and vibrate abdominal wall.

3. Petrissage or Kneading Massage Technique: Its performed by squeezing, lifting and rolling the abdominal skin and muscle tissues in a kneading manner to enter deeper tissue with firm pressure to stretch muscles of the abdomen and to establish deep relaxation Kneading helps stimulate nerve endings, eliminates impure substances in the muscles, improving cell repair and enhance blood circulation.

4. Friction Techniques: its done by rubbing back and fourth on the abdominal muscles .this techniques creates heat and makes the muscles of the abdomen warmed up to be treated for deep massage techniques.

5. Tappotment or Stroking Technique: its performed by alternating smooth, fast and striking manipulations include tapping, cupping and pounding movement through out the abdomen. In the massage session this technique is usually used as the last technique.

Testing the Tool

Validity: The tool and teaching content was validated by subject experts.

Reliability: The reliability of the tool was tested by split half method and the 'r' value obtained for gastric residual volume questionnaire was 0.90.

Pilot Study: After obtaining permission from selected hospital, the pilot study was conducted with 6 samples by means of purposive

sampling technique. Written informed consent obtained from participants. Pretest level of Gastric residual volume was assessed by using Gastric residual volume assessment tool. Each day after pretest, the researcher demonstrated abdominal massage for about 20 min twice a day for three days, and the interval between two massages will be 2 h. Each day, before the intervention and 1 hour after the second massage, the GRV was measured and investigated. There is no suggestion and modification done during pilot study. The investigator decided to proceed the major study.

Data Collection Procedure

The data collection was carried out for 4 weeks. The formal written permission was obtained from MuthuNeuro hospital, Nagercoil. A sample of 30 critically ill clients with Nasogastric tube were selected using the Non purposive sampling technique based on inclusion and exclusion criteria. The purposes of the study and their right to participate or withdraw from the study were explained to the clients for obtaining the written informed consent. Abdominal massage protocol step by step (5 steps) were prepared by investigator. The protocol content validity was obtained from nursing experts.

Baseline data on demographic variables and clinical variables were collected using interview technique and other dependent variable level of gastric residual volume was checked by assessment of gastric residual volume scoring by maintaining privacy. Ethical principles was adhered too throughout the study. First, using a special 50 ml gavage syringe, 5 cc of air was quickly injected into the stomach, and using a stethoscope, the voice in the stomach was heard, and after confirmation of the insertion of the Nasogastric tube placement in the stomach, the lavage was performed, and the amount of gastric residual will be measured and recorded, then this amount of lavaged food was returned to the stomach. In the next stage, study group was received abdominal massage in the morning for 20 min, and after massage, the gavage was performed, and the gastric volume was increased to 200cc. After 2 h, the second stage of abdominal massage was performed, and finally, 1 h after the second massage, the GRV was examined. The abdominal massage which will be given for 20 minutes, twice a day for 3 consecutive days in order to maintain the normal level of Gastric residual volume among critically ill clients with Nasogastric tube feeding.

Plans for Data Analysis: The collected data were analyzed by descriptive and inferential statistics.

Ethical Consideration: Ethical clearance for the study was given by the institutional ethical committee. Written permission from concerned authority and informed consent obtained from the care givers. Subjects anonymity and confidentiality of the data was maintained scientific objectivity of the study was maintained with honesty and impartiality.

RESULTS

The study had 30 critically ill patients with Nasogastric tube feeding. The demographic data is shown in (Table -3). Out of 30 participants, 14 (46.67%) of them belonged to 41-50 years and 20 (66.7%) were male. Regarding Association, there was a significant association between the selected demographic and clinical variable of Educational qualifications ($\chi^2 = 23.20$, $p < 0.05$), with the level of gastric residual volume level. Hence H_0 is retained for only the variable of Educational qualifications. It showed in Table -3.

Regarding clinical variables, majority 53.3% of them were having 1-3 weeks duration of illness and 43.3% of them have previous history of NG tube feeding. In relation to association, there was significant association found between gastric residual volume and clinical variables such as Reason for Nasogastric tube feeding ($\chi^2 = 7.9$, $p < 0.05$) and Number of feeding per day ($\chi^2 = 8.26$, $p < 0.05$), Rate of interval at each feeding ($\chi^2 = 8.20$, $p < 0.05$). It showed in Table 4.

Table 3: Frequency and Percentage Distribution of Demographic Variables and Association Between Pretest Level of Gastric Residual Volume and Demographic Variables Among Critically Ill Clients with Nasogastric Tube Feeding n=30

S. No	Demographic variables	Level of gastric residual volume				χ^2 Value	Table Value (df)
		Low risk		High risk			
		F	%	f	%		

1	Age in year a. 25-30 b. 31-40 c. 41-50 d. 51-60	3 5 14 4	10 16.7 46.6 13.3	0 2 0 2	0 6.7 0 6.7	6.10 (NS)	7.8 df=3
2	Gender a. Male b. Female	17 9	56.7 30	3 1	10 3.3	0.14 (NS)	3.8 df=1
3	Marital status a. Married b. Single c. Widower d. Separated	20 1 4 1	66.7 3.3 13.3 3.3	2 0 1 1	6.7 0 3.3 3.3	3.09 (NS)	7.8 df=3
4	Educational qualification a. No formal education b. Primary c. Secondary d. Higher secondary e. Diploma f. Graduate	7 6 1 9 2 1	23.3 20 3.3 30 6.7 3.3	0 0 1 1 1 1	0 0 3.3 3.3 3.3 3.3	11.9* (S)	11.0 df=5
5	Occupation a. Government b. Private employee c. Self employee d. Unemployed	1 9 6 10	3.3 30 20 33.3	0 0 1 3	0 0 3.4 10	2.61 (NS)	7.8 df=3
6	Dietary pattern a. Vegetarian b. Mixed diet	2 24	6.7 80	0 4	0 13.3	0.32 (NS)	3.8 df=1

* $p < 0.05$, s= Significant, NS= Not Significant and df= degree of freedom

Table 4: Frequency and Percentage Distribution of Clinical Variables and Association Between Pretest Level of Gastric Residual Volume and Clinical Variables Among Critically Ill Clients with Nasogastric Tube Feeding n=30

S. No	Clinical Variables	Level of gastric residual volume				χ^2 Value	Table Value (df)
		Low risk		High risk			
		F	%	f	%		
1	Duration of illness a. <1 week b. 1-3 weeks c. >3 weeks	2 14 10	6.7 46.7 33.3	1 2 1	3.3 6.7 3.3	1.21 (NS)	5.9 df=2
2	Previous history of Nasogastric tube feeding a. Yes b. No	11 15	36.7 50	2 2	6.7 6.7	0.08 (NS)	3.8 df=1
3	Reason for Nasogastric tube feeding a. Trauma b. Unconsciousness c. Neurological disorders d. Other disorders	2 4 14 6	6.7 13.3 46.7 20	0 3 1 0	0 10 3.3 0	7.9* (NS)	7.8 df=3
4	Numbers of feeding per day a. 2-4 times b. 5-7 times c. 8-10 times d. >10 times	1 13 11 1	3.3 43.3 36.7 3.3	2 1 1 0	6.7 3.3 3.3 0	8.26* (NS)	7.8 df=3
5	Amount of feeding a. <100 ml b. 100-150 ml c. 151-200 ml d. >200 ml	2 14 4 6	6.7 46.7 13.3 20	0 2 2 0	0 6.7 6.7 0	3.31 (NS)	7.8 df=3
6	Rate of interval at each feeding a. 2-3 hours b. 4-5 hours c. >5 hours	13 12 1	43.3 40 3.3	1 1 2	6.6 10 3.3	8.20* (S)	5.9 df=2

* $p < 0.05$, s= Significant, NS= Not Significant and df= degree of freedom

In response to the Level of gastric residual volume among critically ill clients, on the first day during pretest, majority 86.7% were under low risk (101-150ml) whereas in the post test all 100% were under low risk

(101-150ml). On the 2nd day the during pretest all 100% were under low risk (101-150ml), where as in Posttest 93.3% low risk (101-150ml). On the 3rd day during pretest 93.3% were under low risk (101-150ml) whereas during posttest 40% were under low risk (101-150ml) 60% were under normal (<100ml). It showed in Table 5.

Table 5 : Frequency and Percentage Distribution Level of Gastric Residual Volume Before and After Abdominal Massage Among Critically Ill Clients with Nasogastric Tube Feeding n=30

S. No	Level of gastric residual volume	Day 1				Day 2				Day3			
		Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Normal (<100ml)	0	0	0	0	0	0	2	6.7	2	6.7	18	60
2	Low risk (101-150ml)	26	86.7	30	100	30	100	28	93.3	28	93.3	12	40
3	High risk (151-200ml)	4	13.3	0	0	0	0	0	0	0	0	0	0
4	Very high risk (>200ml)	0	0	0	0	0	0	0	0	0	0	0	0

The mean and standard deviation of gastric residual volume on the first day was 47.8 ± 14.4 (pretest) and 20.3 ± 2.6 (posttest), with a *t* value of 9.4. On the second day, it was 49.9 ± 11.8 and 46.3 ± 14.4 , with a *t* value of 3.5. On the third day, it was 47.4 ± 15.2 and 38.4 ± 11.3 , with a *t* value of 9.5. All findings were statistically significant at $p < 0.05$. It showed that, the abdominal massage was very effective to reducing gastric residual volume among critically ill clients with Nasogastric tube feeding. It showed in Table 6.

Table 6: Mean, Standard Deviation and “t” value of Pretest and Posttest Level of Gastric Residual Volume Among Samples. n=30

Day	Level of gastric residual volume	Mean	Standard deviation	't' value	Table value
1	Pretest	47.8	14.4	9.4*	2.0
	Post test	20.3	2.6	(S)	
2	Pretest	49.9	8.3	8.5*	2.0
	Post test	46.3	14.4	(S)	
3	Pretest	47.4	15.2	9.5*	2.0
	Post test	38.4	11.3	(S)	

*Significant at $p < 0.05$ Level

DISCUSSION

The study comprised 30 critically ill patients. On Day 1, 86.7% were at low risk in the pre-test, increasing to 100% in the post-test. On Day 2, 100% were at low risk in the pre-test and 93.3% in the post-test. On Day 3, 93.3% were at low risk in the pre-test, while 40% were low risk and 60% were normal in the post-test.

This finding were supported by Narmadha et al. al., (2019) to assess the effectiveness of Abdominal Massage on Gastric Residual Volume among critically ill patients with Nasogastric tube Feeding. The study results revealed that, during Pre-Test 01 (3.3%) of them were in normal level, 18 (59.4%) of them were in low risk, 09 (29.7%) of them were in high risk and 02 (6.6%) of them in very high risk. Where as in Posttest 27 (90%) of them were in normal level, 2 (6.6%) of them were in low risk, 01 (3.3%) of them were in high risk and none of them were in very high risk.¹⁰

The present study shows that, the mean and standard deviation of gastric residual volume on the first day was 47.8 ± 14.4 (pretest) and 20.3 ± 2.6 (posttest), with a *t* value of 9.4. On the second day, it was 49.9 ± 11.8 and 46.3 ± 14.4 , with a *t* value of 3.5. On the third day, it was 47.4 ± 15.2 and 38.4 ± 11.3 , with a *t* value of 9.5. All findings were statistically significant at $p < 0.05$. It showed that, the abdominal massage was very effective to reducing gastric residual volume among critically ill clients with Nasogastric tube feeding.

The study findings were supported by Narmada et al., (2019) conducted a pre experimental study to assess the effectiveness of Abdominal Massage on Gastric Residual Volume among critically ill patients with Nasogastric tube feeding in SMVMCH, Puducherry. The study results revealed that, the pretest mean and standard deviation scores for day 1, 2 & 3 we're 2.93, 5.28, 2.53, 5.75 & 2.46, 6.09, respectively. The posttest mean and standard deviation scores for day 1, 2 & 3 we're 2.61, 5.64, 2.03, 5.98 & 1.09, 6.81, respectively. The calculated *t* values for day 1, 2 & 3 were 9.8, 12.7, & 4.5 which were

statistically significant at $p = 0.001$.¹⁰

The present study found that, there was a significant association between the gastric residual volume level and selected background variables such as Educational qualifications, Reason for Nasogastric tube feeding and Number of feeding per day and Rate of interval at each feeding at p value < 0.05 .

A similar study was conducted by Thomas et al., (2019), A comparative study to assess the effectiveness of abdominal massage on gastric residual volume among patients with intermittent Nasogastric tube feeding in a selected hospital, Bangalore. The study results revealed that, there was a statistical significant association noted between gastric residual volume and drugs (proton pump inhibitors) at p value < 0.001 .¹¹

The study was limited to critically ill clients in the MuthuNeuro Hospital at Nagercoil, Study results may not generalizable to all age group and the sample size is limited to 30 samples only. Recommendation for future studies were A phenomenological study to assess the complications of Naso gastric tube feeding among critically ill clients, a similar study in two groups experimental and control group and in two settings and a comparative study with two intervention.

CONCLUSION

The following conclusion was drawn from the study .The study proved that thus abdominal massage is an effective intervention on reducing gastric residual volume among critically ill clients with Nasogastric tube feeding.

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