

Effectiveness of Abdominal Massage on Reducing Constipation in Patients with Diabetes Mellitus

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Abstract

Introduction: Constipation is a common gastrointestinal complication in patients with diabetes mellitus and may reduce quality of life. Abdominal massage is a safe non-pharmacological nursing intervention that may improve bowel motility. **Objective:** This study evaluated the effectiveness of abdominal massage in reducing constipation among hospitalized patients with diabetes mellitus. **Method:** A quasi-experimental pretest-posttest control group design was used. Seventy participants were selected through purposive sampling and assigned to intervention and control groups of 35 each. The intervention group received a 15-minute abdominal massage once daily for three consecutive days, while the control group received routine care. Constipation severity was measured using the Constipation Scoring System. Data were analyzed using Wilcoxon signed-rank and Mann-Whitney tests. **Result and Discussion:** Baseline constipation scores did not differ significantly between groups. After intervention, the median score in the intervention group decreased from 17.00 to 10.00, whereas the control group remained at 17.00. The posttest difference between groups was significant. The improvement may reflect stimulation of parasympathetic activity, the gastrocolic reflex, and colonic motility. **Conclusions:** Abdominal massage effectively reduced constipation severity and may be integrated into routine nursing care and discharge planning.

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Introduction

As a chronic, complex, and systemic disease, diabetes mellitus (DM) is characterized by chronic hyperglycemia resulting from metabolic disorders due to insulin failure. Uncontrolled and persistent hyperglycemia leads to long-term metabolic dysfunction and requires multifactorial management to prevent serious systemic complications (American Diabetes Association Professional Practice Committee, 2024). Recent global estimates also demonstrate a substantial and increasing burden of diabetes across regions (GBD 2021 Diabetes Collaborators, 2023). Globally, the International Diabetes Federation (2021) estimated that 537 million adults were living with diabetes mellitus. Indonesia ranks fifth highest worldwide, with 19.5 million diagnosed cases, and this number is projected to increase to 28.6 million by 2045. At the local level, the Aceh Provincial Health Office reported 189,464 diabetes mellitus cases, with Banda Aceh alone contributing 7,486 cases (Dinas Kesehatan Provinsi Aceh, 2023). These figures underscore the importance of addressing diabetes and its secondary complications that can compromise patients' quality of life.

Chronic constipation is an important lower gastrointestinal problem in patients with diabetes mellitus, and anorectal dysfunction and lower gastrointestinal symptoms have been documented in this population (Reszczyńska & Kempieński, 2021). Chronic constipation is also reported among patients with type 2 diabetes, although its prevalence and associated factors vary across clinical settings (Abdu Seid et al., 2023). Diabetes-related constipation may be associated with several mechanisms, including prolonged hyperglycemia, altered gastrointestinal motility, and possible involvement of diabetic autonomic neuropathy. Autonomic dysfunction affecting the enteric nervous system may interfere with neuromuscular transmission and reduce colonic motor activity. However, autonomic neuropathy should not be considered the sole or direct cause because constipation in patients with diabetes is generally multifactorial (Kornum et al., 2025). These physiological changes may contribute to prolonged fecal transit time and slow-transit constipation, a syndrome characterized by impaired colonic propulsion (Vlismas et al., 2024).

Constipation occurring during hospitalization should also be distinguished from constipation associated with diabetes itself. Hospital-related factors may include reduced physical activity, changes in dietary and fluid intake, limited privacy, dependence on healthcare workers, unfamiliar toileting environments, and delayed responses to the urge to defecate. In addition, medications administered during treatment may contribute to constipation by reducing gastrointestinal motility or altering fluid balance. Therefore, constipation in hospitalized patients with diabetes may result from the combined influence of metabolic conditions, hospitalization-related circumstances, and medication use.

While pharmacological treatments such as laxatives are commonly used, concerns about long-term structural damage from stimulant laxatives should be interpreted cautiously. A recent critical review found that available evidence does not clearly establish permanent colonic damage or an increased colorectal cancer risk from long-term stimulant laxative use (Whorwell et al., 2024). Therefore, non-pharmacological strategies can be considered as complementary approaches when clinically appropriate. Abdominal massage has been described as a non-invasive intervention involving manual stimulation of the abdominal wall and has been investigated for effects on gastrointestinal motility and constipation symptoms (Wang et al., 2022). Systematic-review evidence suggests that abdominal massage can improve constipation-related outcomes in adults (Huang et

al., 2025), and randomized trial evidence has also examined its effects on constipation and quality of life in older adults (Xie et al., 2024).

Despite its proven benefits, preliminary observations at the Regional General Hospital (RSUD) dr. Zainoel Abidin Banda Aceh revealed that independent nursing self-management protocols for constipation are not yet fully established or integrated into routine discharge planning. Healthcare providers are often overstretched, leaving patients to self-medicate their bowel issues. Based on this clinical phenomenon, there is a vital need to empirically evaluate this intervention within the local hospital setting. The aim of this study is to identify and analyze the effectiveness of abdominal massage in reducing constipation among patients with diabetes mellitus at RSUD dr. Zainoel Abidin Banda Aceh.

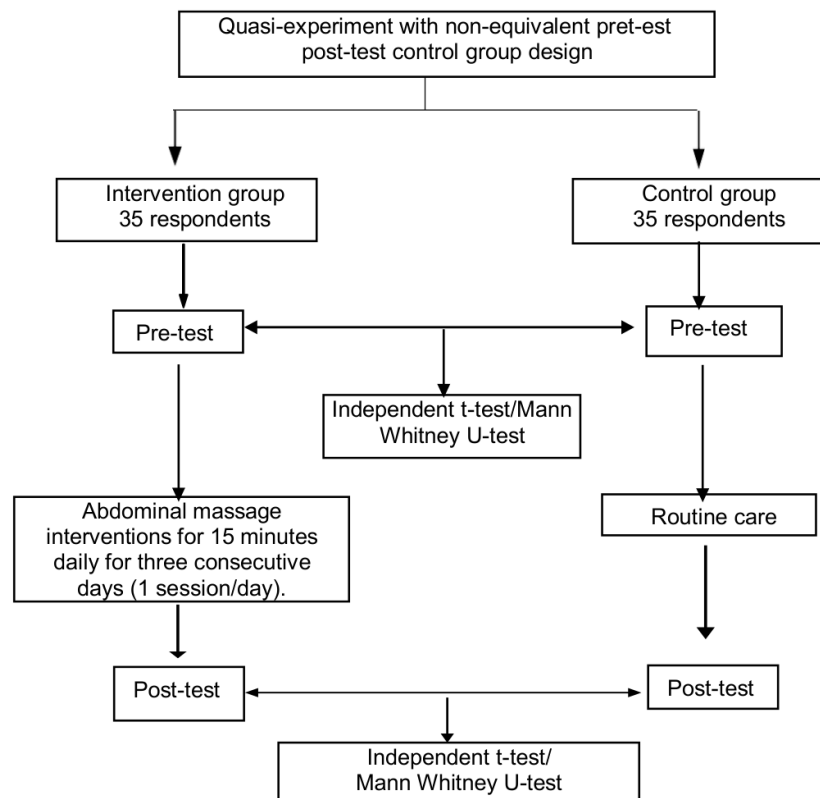
Methods

Design, population and sample

A quasi-experimental using a pretest-posttest control group design was employed in this study. The intervention and control groups were screened for identification of constipation related to diabetes mellitus. The intervention group consisted of hospitalized diabetes mellitus patients who received abdominal massage, while the control group received routine hospital care (standard education and conventional medical management). The intervention group received abdominal massage administered for 15 minutes per session daily for three consecutive days. Each session involved manual, sequential pressure on the abdominal wall to stimulate the parasympathetic nervous system, trigger the gastrocolic reflex, and improve colonic motility. The abdominal massage protocol was performed by the researcher and assisted by trained nursing professionals at the inpatient wards. The intervention used olive oil as a lubricating medium to maximize mechanical stimulation and enhance comfort compared to water-based alternatives. The pretest was conducted before the first session, and the posttest was administered immediately after the completion of the three-day session for both groups. The severity of constipation in both tests was measured using the Constipation Scoring System (CSS) instrument.

The population of this study comprised all hospitalized patients diagnosed with diabetes mellitus who experienced constipation at RSUD dr. Zainoel Abidin Banda Aceh. The total number of samples involved 70 respondents, calculated to provide adequate statistical power, and was divided equally into two groups: 35 respondents in the intervention group and 35 respondents in the control group. The sampling technique used was purposive sampling based on strict criteria. The inclusion criteria consisted of: 1) patients diagnosed with diabetes mellitus experiencing constipation (indicated by baseline CSS screening), 2) being hospitalized at RSUD dr. Zainoel Abidin Banda Aceh, 3) being able to communicate verbally, and 4) consenting to participate in the study. Meanwhile, the exclusion criteria were based on absolute contraindications for abdominal massage, which included: 1) patients with a history of colorectal cancer, gastric cancer, or intestinal obstruction, 2) patients with active gastrointestinal tract inflammation or intestinal bleeding, 3) patients with severe back pain, 4) patients who had undergone abdominal surgery within the last six months, and 5) patients with current pregnancy status. The flowchart of the study is showed in Scheme 1 below.

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Scheme 1. Flowchart of the study

Instrument

Data collection used a measuring instrument, namely the Constipation Scoring System (CSS) questionnaire to assess and identify the severity level of constipation. The CSS instrument consists of 8 assessment items, including evaluation of stool frequency, difficulty of painful evacuation, completeness of evacuation, abdominal pain, duration of defecation time, assistance/laxative types needed, number of failed evacuation attempts, and history of constipation duration. The final score ranges from 0 (normal) to 30 (severe constipation).

Data Analysis

Data analysis included univariate analysis presented in frequency, percentage, mean, median, interquartile range (IQR), and mean rank. The data normality assumption was tested using the Shapiro-Wilk test to determine the appropriate statistical analysis. Because the data were not normally distributed, non-parametric statistical analysis was used, namely the Wilcoxon Signed Rank test to analyze within-group (pretest-posttest) differences and the Mann-Whitney U-test to evaluate differences between the intervention and control groups.

Ethical Considerations

All study procedures adhered to applicable research ethics principles and were approved by the Ethics Committee of Universitas Syiah Kuala and the Ethics Committee of dr. Zainoel Abidin Hospital. All respondents were provided with clear study information during the screening process, and they gave written informed consent by signing the respondent consent sheets prior to participating in the study.

Result and Discussion

1. Result

In this study, the non-parametric Wilcoxon Signed Rank and Mann-Whitney U-tests were utilized because the data normality assumptions were not met based on the Shapiro-Wilk test results. The statistical analysis results are systematically presented in Tables 1 to 5. Table 1 shows the demographic characteristics of the respondents across both groups, involving a total sample size of 70 individuals divided equally into 35 respondents for the intervention group and 35 respondents for the control group. The baseline homogeneity analysis presented in Table 2 demonstrated that there was no significant difference in the initial constipation scores between the intervention and control groups prior to the abdominal massage intervention ($p > 0.05$). The pretest average constipation score for the intervention group was 16.83 [Median = 17.00; IQR = 2.00], while the control group showed a baseline average score of 16.89 [Median = 17.00; IQR = 2.00].

Following the three-day intervention period, Table 3 and Table 4 show the within-group pretest-posttest score changes. The intervention group experienced a highly significant reduction in constipation severity, with the posttest score dropping sharply to an average of 9.91 [Median = 10.00; IQR = 2.00] ($p = 0.000$). Conversely, the control group did not demonstrate clinically meaningful changes, moving slightly from 16.89 to 16.71 ($p = 0.014$). Finally, Table 5 illustrates that there was a statistically significant difference in the posttest constipation scores between the intervention and control groups ($p < 0.001$), proving the definitive efficacy of abdominal massage. As presented in Table 1, the mean age of respondents in the control group was 51.86 ± 8.49 years, whereas the mean age in the intervention group was 51.97 ± 9.57 years. Overall, the average age of the participants ranged from 51.67 to 51.97 years. When broken down by gender, females accounted for the majority in both groups, comprising 71.4% of the intervention group and 62.9% of the control group. In terms of education level, a high school diploma or its equivalent was the most common qualification, held by 71.4% of respondents in both the intervention and control groups. Regarding occupational status, the majority of the respondents were self-employed, representing 42.9% of the intervention group and 37.1% of the control group.

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Table 1
Sociodemographic and Clinical Characteristic Data of Respondents

Respondent Characteristic	Min	Max	Intervention (n=35)		Control (n=35)		Total (n=70)	
			f	%	f	%	f	%
Age (Mean ± SD)	34	71	51.97 ± 9.57		51.86 ± 8.49		51.67 ± 9.09	
Gender								
Male			10	28.6	13	37.1	23	29
Female			25	71.4	22	62.9	47	67.1
Highest Level of Education								
Elementary School			2	5.7	2	5.7	4	5.7
High School			25	71.4	25	71.4	50	71.4
Diploma/University			8	22.9	8	22.9	16	22.9
Occupation								
Retired Civil Servant			10	28.6	11	31.4	21	30.0
Self-Employed			15	42.9	13	37.1	28	40.0
Other			10	(28.6)	11	(31.4)	21	(30.0)

Based on Table 2, the statistical analysis using the Mann-Whitney U test prior to the intervention (pretest) yielded a p-value of 0.818 ($p > 0.05$). This significance level, being greater than 0.05, proves that there was no significant difference in baseline constipation scores between the intervention and control groups at the beginning of the study. Descriptively, the initial distribution of constipation scores was identical across both groups, with the intervention group presenting a Median = 17.00 (IQR = 2.00) and the control group similarly exhibiting a Median = 17.00 (IQR = 2.00). These inferential test results demonstrate that both sample groups were highly comparable and homogenous before the treatment, thereby establishing a valid baseline to evaluate the subsequent efficacy of the abdominal massage intervention.

Table 2
Differences in Constipation Scores of Diabetes Mellitus Patients Between the Control and Intervention Groups Prior to the Abdominal Massage Intervention

Group	n	Mean ± SD	Median (IQR)	p
Intervention	35	16.83 ± 1.150	17.00 (2.00)	0.818
Control	35	16.89 ± 1.157	17.00 (2.00)	

Based on Table 3, the inferential analysis using the Mann-Whitney U test post-intervention yielded a p-value < 0.001 ($p < 0.05$). This proves that there was a highly significant difference in constipation scores between the intervention and control groups following the implementation of the abdominal massage intervention. Descriptively, a substantial decrease in constipation scores was observed in the intervention group [Median = 10.00; IQR = 2.00] compared to the control group [Median = 17.00; IQR = 1.00]. This drastic reduction demonstrates that the abdominal massage intervention is significantly effective in reducing the severity of constipation in patients with diabetes mellitus.

Effectiveness of Abdominal Massage on Reducing Constipation in Patients with Diabetes Mellitus**Table 3**

Differences in Constipation Scores of Diabetes Mellitus Patients Between the Control and Intervention Groups Following the Abdominal Massage Intervention

Group	n	Mean $\pm$ SD	Median + IQR	p
Intervention	35	16.83 $\pm$ 1.150	10.00 (2.00)	<0.001
Control	35	9.91 $\pm$ 1.173	17.00 (1.00)	

Based on Table 4, the statistical analysis using the Wilcoxon Signed Rank test for the intervention group yielded a Z-value of -5.162 with a p-value of 0.000 ($p < 0.05$). This significance level proves that there was a highly significant decrease in constipation scores after the implementation of the abdominal massage intervention in patients with diabetes mellitus. Descriptively, the clinical reduction of constipation symptoms was remarkably drastic, shifting from an initial baseline (Pretest) of Median = 17.00 (IQR = 2.00) in the constipation category down to a Median = 10.00 (IQR = 2.00) in the non-constipation category at the final measurement (Posttest). The efficacy of this intervention is further substantiated by an exceptionally large effect size of $r = 0.975$, indicating that abdominal massage provides a very substantial clinical contribution to alleviating constipation.

Table 4

Differences in Constipation Scores of Diabetes Mellitus Patients Within the Intervention Group Before and After the Abdominal Massage Intervention

Measurement Time	n	Mean $\pm$ SD	Median (IQR)	z	p	Effect Size (r)
Pre Test	35	16.89 $\pm$ 1.157	17.00 (2.00)	-5.162	0.000	0.975
Post Test	35	16.71 $\pm$ 1.126	10.00 (2.00)			

Based on Table 5, the statistical analysis using the Wilcoxon Signed Rank test for the control group yielded a Z-value of -2.449 with a p-value of 0.014 ($p < 0.05$). This significance level indicates that there was a statistically significant difference in constipation scores before and after the monitoring period in diabetes mellitus patients who only received routine hospital standard care. Descriptively, the distribution shifted from an initial baseline (Pretest) of Median = 17.00 (IQR = 2.00) to a final measurement (Posttest) of Median = 17.00 (IQR = 1.00). Although this change is statistically significant ($p = 0.014$), clinically, the reduction is extremely minimal and does not indicate any meaningful improvement in constipation symptoms. This is further supported by a medium effect size of $r = 0.414$, confirming that the change in the control group is categorized within the moderate effect range.

Although a statistical difference was found before and after the observation period within the control group, the actual changes in the score distribution were relatively negligible compared to the intervention group. This minor adjustment was only reflected in the reduction of the Interquartile Range (IQR) from 2.00 to 1.00, while the Median remained static at 17.00. These results demonstrate that the changes in the control group are clinically insignificant compared to the drastic and meaningful clinical reduction observed in the group receiving the abdominal massage intervention

Table 5

Differences in Constipation Scores of Diabetes Mellitus Patients Within the Control Group Before and After the Abdominal Massage Intervention Period

Measurement Time	n	Mean $\pm$ SD	Median (IQR)	z	p	Effect Size (r)
Pre Test	35	9.91 $\pm$ 1.173	17.00 (2.00)	-2.449	0.014	0.414
Post Test	35	16.71 $\pm$ 1.126	17.00 (1.00)			

2. Discussion

The primary objective of this study was to evaluate the clinical effectiveness of abdominal massage in reducing constipation among hospitalized patients with diabetes mellitus. The baseline analysis prior to the treatment demonstrated that the intervention and control groups were statistically homogenous, presenting identical median constipation scores, which validated the subsequent inferential comparison. Following the three-day intervention period, the results revealed a highly significant, drastic reduction in constipation scores within the intervention group, shifting the patients' status from a severe constipation category to a non-constipation state. Conversely, the control group exhibited no clinically meaningful improvement, reinforcing the conclusion that abdominal massage serves as a powerful, effective non-pharmacological modality to alleviate constipation in the diabetic population.

The marked clinical improvement in the intervention group may be understood through the combined mechanical and neurophysiological effects of abdominal massage on gastrointestinal function. In diabetes mellitus, constipation can occur as part of diabetic gastroenteropathy, a pan-alimentary complication involving altered motility and neural regulation rather than a single isolated mechanism (Kornum et al., 2025). Slow-transit constipation is characterized by impaired colonic propulsion and may reflect abnormalities in enteric neuromuscular function and colonic motor activity (Vlismas et al., 2024). Abdominal massage provides external mechanical stimulation along the abdominal wall and has been proposed to influence bowel motility, parasympathetic activity, and defecation-related symptoms (Wang et al., 2022). The reduction in constipation scores observed in the present study is consistent with broader evidence that abdominal massage can improve constipation-related outcomes in adults (Huang et al., 2025).

Furthermore, the findings can be interpreted within the Roy Adaptation Model, which views individuals as adaptive systems responding to focal, contextual, and residual stimuli through four adaptive modes (Roy, 2009). For hospitalized patients with diabetes, constipation-related discomfort and the hospital environment may function as stimuli that challenge the physiological-physical mode. In this context, abdominal massage can be conceptualized as a nursing intervention intended to support a more adaptive physiological response by reducing bowel-related discomfort and improving elimination. The interdependence mode also emphasizes the role of supportive relationships; therefore, nurse and family involvement in education and self-management may support continued adaptation after hospitalization (Roy, 2009). However, the present study did not directly measure coping processes, family support, motivation, or other Roy Adaptation Model constructs, so this interpretation should be considered conceptual rather than a direct test of the model.

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Interestingly, the statistical analysis showed that the control group also experienced a statistically significant, yet clinically negligible, change in posttest scores ($p = 0.014$). This minor variance was reflected only in a reduction of the interquartile range (IQR) from 2.00 to 1.00, while the median remained 17.00. This small shift may relate to routine hospital care, which can include dietary, fluid, activity, and other conservative measures recommended in constipation management (Perkumpulan Gastroenterologi Indonesia, 2023). Nevertheless, constipation in diabetes is multifactorial and may involve gastrointestinal dysmotility and neural dysfunction (Kornum et al., 2025). Compared with the control group, the substantially larger reduction in the intervention group supports a clinically meaningful benefit of abdominal massage in this study.

Conclusion

Abdominal massage using olive oil was associated with a significant reduction in constipation severity in hospitalized patients with diabetes mellitus. The intervention may support bowel motility through mechanical stimulation and neurophysiological mechanisms, although colonic transit time and autonomic activity were not directly measured in this study. There was no significant difference in baseline Constipation Scoring System (CSS) scores between groups, indicating a comparable pretest condition. After the three-day intervention, the median CSS score in the intervention group decreased from 17.00 to 10.00, while the control group remained at a median of 17.00.

Patients with diabetes mellitus who experience constipation may consider abdominal massage as part of self-management and discharge planning when there are no contraindications and when it is appropriate within their clinical care. As a non-invasive approach, abdominal massage provides a non-pharmacological option that can complement conventional constipation management rather than being framed as a method that prevents established long-term laxative harm. The findings of this study support abdominal massage as a practical intervention for reducing constipation severity and improving bowel-related comfort in hospitalized patients with diabetes mellitus.

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