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Effectiveness Of Abdominal Massage In Reducing Constipation Among Patients With Diabetes Mellitus: A Quasi-Experimental Study

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Abstract
Background*: Constipation is one of the most common gastrointestinal complications experienced by patients with Diabetes Mellitus (DM), primarily due to diabetic autonomic neuropathy, which impairs intestinal motility. Persistent constipation negatively affects patients' comfort, quality of life, and overall disease management. Abdominal massage has emerged as a simple, safe, and non-pharmacological nursing intervention that may improve bowel function by stimulating intestinal peristalsis.*
Objective*: To determine the effectiveness of abdominal massage in reducing constipation among patients with Diabetes Mellitus at dr. Zainoel Abidin Regional General Hospital, Banda Aceh.*
Methods*: A quasi-experimental study with a pretest-posttest control group design was conducted involving 70 participants selected using purposive sampling. Participants were alternately allocated into an intervention group (n = 35) and a control group (n = 35). The intervention group received abdominal massage for 15 minutes once daily for three consecutive days, while the control group received routine nursing care. Constipation severity was assessed using the Constipation Scoring System (CSS). Data were analyzed using the Wilcoxon Signed Rank Test and Mann-Whitney U Test with a significance level of $p < 0.05$.*
Results*: The mean constipation score in the intervention group significantly decreased from* ***16.83 ± 1.150*** *before intervention to* ***9.91 ± 1.173*** *after intervention ($p < 0.001$). In contrast, the control group showed no significant change, with scores decreasing slightly from* ***16.89 ± 1.157*** *to* ***16.71 ± 1.126*** *($p = 0.317$). No significant difference was found between groups at baseline ($p = 0.818$), whereas a significant difference was observed after the intervention ($p < 0.001$).*
Conclusion*: Abdominal massage is an effective non-pharmacological nursing intervention for reducing constipation in patients with Diabetes Mellitus. Incorporating abdominal massage into routine nursing care may improve bowel function and provide a practical complementary strategy for constipation management.*
Keywords: *abdominal massage; constipation; Diabetes Mellitus; nursing intervention; self-management.*

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I. Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It has become one of the leading global public health challenges because of its rapidly increasing prevalence and the substantial burden of chronic complications. According to the International Diabetes Federation (IDF), approximately 537 million adults aged 20–79 years were living with diabetes in 2021, and this number is projected to increase to 643 million by 2030 and 783 million by 2045.[1] Indonesia is among the countries with the highest number of people living with diabetes, with an estimated 19.5 million cases in 2021, which are expected to increase substantially by 2045[2].

Diabetes mellitus is associated with various microvascular, macrovascular, and gastrointestinal complications. Among these, constipation is one of the most common gastrointestinal manifestations but is frequently underrecognized in clinical practice. Constipation is characterized by infrequent bowel movements, hard stools, excessive straining during defecation, and a sensation of incomplete evacuation[3]. In patients with DM, constipation is primarily associated with diabetic autonomic neuropathy, which impairs enteric nervous system function, decreases intestinal motility, prolongs colonic transit time, and disrupts normal bowel function[4]. Gastrointestinal manifestations, including constipation, have been reported in approximately 20–60% of patients with Diabetes Mellitus, depending on the study population and diagnostic criteria used[5].

Persistent constipation has considerable physical and psychological consequences. Patients commonly experience abdominal discomfort, bloating, reduced appetite, impaired daily functioning, and reduced quality of life. If left untreated, constipation may lead to hemorrhoids, anal fissures, fecal impaction, and bowel obstruction[6]. Therefore, effective constipation management should be considered an essential component of comprehensive diabetes care[7].

The management of constipation includes pharmacological and non-pharmacological approaches. Pharmacological therapy, particularly laxatives, is widely used to relieve constipation symptoms; however, long-term use may result in adverse effects such as electrolyte imbalance, laxative dependence, and reduced bowel function[8]. Consequently, non-pharmacological interventions that are safe, cost-effective, and easy to implement have gained increasing attention in nursing practice[9].

Abdominal massage is a simple, non-invasive nursing intervention designed to stimulate intestinal motility by applying rhythmic massage along the anatomical pathway of the colon. This technique enhances parasympathetic nervous system activity, promotes intestinal peristalsis, facilitates colonic transit, and improves bowel evacuation[10]. Previous studies have demonstrated that abdominal massage significantly improves bowel movement frequency, stool consistency, and constipation severity among patients with chronic constipation[11–13]. Moreover, abdominal massage is inexpensive, easy to perform, and can be taught to patients and caregivers, making it an effective strategy for long-term constipation self-management[14].

The application of abdominal massage is consistent with the Roy Adaptation Model, which emphasizes adaptive responses to physiological changes through effective coping mechanisms. By improving bowel function and encouraging patient participation in self-care, abdominal massage may enhance physiological adaptation while promoting patient independence in managing chronic symptoms[15–16].

Although the effectiveness of abdominal massage has been reported in several patient populations, evidence focusing specifically on patients with Diabetes Mellitus remains limited, particularly in Indonesia. Furthermore, abdominal massage has not been routinely incorporated into nursing care for constipation management at dr. Zainoel Abidin Regional General Hospital, Banda Aceh. Therefore, generating local evidence is essential to support the implementation of this intervention as an evidence-based nursing practice.

Therefore, this study aimed to determine the effectiveness of abdominal massage in reducing constipation among patients with Diabetes Mellitus at dr. Zainoel Abidin Regional General Hospital, Banda Aceh.

II. Materials And Methods

Using a quasi-experimental strategy based on a pretest-posttest control group design, this study conducted quantitative research. Study participants were diabetic patients at dr. Zainoel Abidin Regional General Hospital in Banda Aceh, Indonesia, and their goal was to find out whether abdominal massage helped alleviate constipation. From March to May of 2025, the research was carried out. There were 70 participants in the study, and they included both male and female patients with a diagnosis of diabetes mellitus.

Study Design:

This study adopted a quantitative research approach with a quasi-experimental pretest–posttest control group design to determine the effectiveness of abdominal massage in reducing constipation among patients with Diabetes Mellitus. Participants were allocated into an intervention group and a control group without randomization. The intervention group received abdominal massage in addition to routine nursing care, whereas the control group received routine nursing care alone. Constipation severity was measured before and after the intervention using a validated assessment instrument. The pretest–posttest design allowed the researchers to evaluate changes in constipation scores within each group and to compare the outcomes between groups, providing evidence regarding the effectiveness of abdominal massage as a complementary nursing intervention.

Study Location:

This study was conducted in the inpatient units of dr. Zainoel Abidin Regional General Hospital, Banda Aceh, Indonesia. Data collection was carried out through direct visits to the inpatient wards, where eligible participants were recruited, the abdominal massage intervention was administered to the intervention group, and outcome assessments were performed before and after the intervention.

Study Duration:

The study was carried out over a three-month period, from March to May 2026. The research activities included participant recruitment, eligibility screening, baseline data collection, implementation of the abdominal massage intervention for the intervention group, post-intervention assessments, and completion of data collection. All study procedures were conducted according to the predefined research protocol to maintain consistency and reliability of the collected data.

Sample size:

The study included a total of 70 patients with Diabetes Mellitus who met the eligibility criteria. Participants were divided into two groups, comprising 35 patients in the intervention group and 35 patients in the control group. This sample size allowed for the comparison of constipation outcomes between participants who received abdominal massage in addition to standard nursing care and those who received standard nursing care alone.

Sample size calculation:

A total of 70 eligible patients were included in this study using purposive sampling during the study period. The sample consisted of 35 participants in the intervention group and 35 participants in the control group. The sample size was determined based on the number of patients who met the inclusion and exclusion criteria during the data collection period.

Subjects & selection methode:

Participants were recruited using a purposive sampling technique based on predefined inclusion and exclusion criteria. Eligible patients who met the study criteria during the data collection period were consecutively enrolled and alternately assigned to either the intervention group or the control group until each group consisted of 35 participants.

Constipation severity was assessed using the **Constipation Scoring System (CSS)**, a validated instrument consisting of eight items that evaluate the frequency of bowel movements, difficulty during defecation, sensation of incomplete evacuation, abdominal pain, time required for defecation, need for assistance, unsuccessful evacuation attempts, and duration of constipation. The total CSS score ranges from 0 to 30, with higher scores indicating greater constipation severity.

Inclusion criteria:

1. Patients diagnosed with Diabetes Mellitus
2. Patients experiencing constipation based on CSS
3. Patients aged ≥ 18 years
4. Patients who were conscious and cooperative
5. Patients who agreed to participate and signed informed consent.

Exclusion criteria:

1. Patients with intestinal obstruction
2. Patients with history of abdominal surgery
3. Patients with severe abdominal pain
4. Patients with unstable medical conditions that contraindicate abdominal massage.

Procedure methodology

The study commenced after obtaining ethical approval from the Health Research Ethics Committee and administrative permission from dr. Zainoel Abidin Regional General Hospital, Banda Aceh. Eligible patients with Diabetes Mellitus who met the inclusion and exclusion criteria were recruited using a purposive sampling technique during the study period. Participants were enrolled consecutively and alternately assigned to either the intervention group or the control group (intervention–control–intervention–control) until each group consisted of 35 participants.

Before data collection, the researchers explained the study objectives, procedures, potential benefits, risks, and participants' rights. Written informed consent was obtained from all participants. Baseline demographic characteristics, including age, sex, educational level, and duration of Diabetes Mellitus, were collected using a structured questionnaire. Constipation severity was assessed before the intervention using the Constipation Scoring System (CSS).

Participants in the intervention group received abdominal massage once daily for three consecutive days. Each session lasted approximately 15 minutes and was performed according to a standardized operating procedure using four massage techniques: stroking, effleurage, palmar kneading, and vibration, following the anatomical direction of the colon. Extra-virgin olive oil was used as the massage medium to facilitate the procedure and enhance patient comfort. Participants in the control group received routine nursing care without abdominal massage.

On the third day, constipation severity was reassessed in both groups using the Constipation Scoring System (CSS). The pretest and posttest scores were subsequently analyzed to determine the effectiveness of abdominal massage in reducing constipation among patients with Diabetes Mellitus.

Statistical analysis

Data were checked for completeness and accuracy before being entered into the Statistical Package for the Social Sciences (SPSS) software for analysis. Descriptive statistics were used to summarize participants' demographic characteristics and constipation scores. Continuous variables are presented as means and standard deviations (SD), whereas categorical variables are presented as frequencies and percentages.

Because the data were not normally distributed, non-parametric statistical tests were performed. The Wilcoxon Signed-Rank Test was used to compare pretest and posttest constipation scores within the intervention and control groups. Differences in constipation scores between the intervention and control groups were analyzed using the Mann–Whitney U Test. All statistical tests were two-tailed, and a p-value of < 0.05 was considered statistically significant.

III. Results

In this study, age, sex, education level, and other pertinent clinical data were included as respondent demographics. A thorough overview of the respondent characteristics was obtained from the demographic data through the use of statistical tools such as percentage distribution, mean, and standard deviation. Table 1 displays the results.

According to Table 1, the average age of the participants was 51.92 years. There were 47 female responses (67.1% of the total) and 23 male responders (32.9% of the total). Of the total responders, 50 (71.4%) had finished senior high school, 16 (22.9%) had earned a diploma or degree, and 4 (5.7%) had just completed elementary school.

Tabel no 1: Characteristics of Respondents (n = 70)

Characteristics	Intervention (n=35)	Control (n=35)	Total
Age (Mean ± SD)	51.97 ± 9.57	51.86 ± 8.49	51.92 ± 9.03
Male	10 (28.6%)	13 (37.1%)	23 (32.9%)
Female	25 (71.4%)	22 (62.9%)	47 (67.1%)
Elementary	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%)

According to Table 1, the average age of the participants was 51.92 years. Of the total number of responders, 47 were female (67.1% of the total), while 32.9% were male. Fifty people, or 71.4% of the total, had graduated from high school. It appears from these results that the two groups of respondents had similar baseline characteristics.

Table no 2: Constipation Scores Before and After Intervention

Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)
Intervention	16.83 ± 1.150	9.91 ± 1.173
Control	16.89 ± 1.157	16.71 ± 1.126

The average constipation score in the group that received abdominal massage reduced from 16.83 ± 1.150 before the intervention to 9.91 ± 1.173 thereafter, as shown in Table 2. A little decrease from 16.89 ± 1.157 to 16.71 ± 1.126 was seen in the control group. These findings suggest that abdominal massage contributed to a greater reduction in constipation severity compared with standard nursing care.

Table no 3: Wilcoxon Signed Rank Test

Group	Z	p-value
Intervention	-5.553	0.000
Control	-1.000	0.317

Table 3 shows that the intervention group's constipation scores were significantly different between the pretest and posttest ($Z = -5.553$; $p = 0.000$) according to the Wilcoxon Signed Rank Test. $Z = -1.000$; $p = 0.317$) indicates that the control group did not vary significantly. These results indicate that abdominal massage significantly reduced constipation severity among patients with Diabetes Mellitus.

Table no 4: Mann-Whitney U Test

Group	Z	p-value
Intervention	-0.230	0.818
Control	-7.257	<0.001

According to Table 4, the control and intervention groups had similar baseline circumstances for constipation ratings (p = 0.818), suggesting that there was no significant difference between the two groups prior to treatment. Nevertheless, following the intervention, a notable disparity was noted between the two groups (Z = -7.257; p 0.001). The results show that diabetic individuals who massaged their abdomens saw a decrease in constipation.

IV. Discussion

This study provides evidence that abdominal massage is an effective complementary nursing intervention for reducing constipation among patients with Diabetes Mellitus. Although no statistically significant difference in baseline constipation severity was observed between the intervention and control groups before treatment (p = 0.818), participants who received abdominal massage experienced a significant reduction in constipation severity after three consecutive days of intervention. In contrast, constipation scores in the control group remained relatively unchanged. These findings indicate that the observed improvement was attributable to the abdominal massage intervention rather than to routine nursing care alone.

The effectiveness of abdominal massage observed in this study is consistent with previous research demonstrating its beneficial effects on bowel elimination and constipation management. Systematic reviews and randomized controlled trials have reported that abdominal massage significantly increases bowel movement frequency, improves stool consistency, shortens colonic transit time, and reduces constipation severity across various patient populations, including hospitalized adults, older adults, and patients with chronic constipation[11–14]. Furthermore, studies conducted in Indonesia have similarly reported that abdominal massage effectively improves bowel elimination and reduces constipation severity, supporting its application as an evidence-based complementary nursing intervention in clinical practice[17–19].

Several physiological mechanisms may explain these findings. Abdominal massage performed according to the anatomical pathway of the colon provides gentle mechanical stimulation that activates the parasympathetic nervous system, enhances intestinal peristalsis, improves gastrointestinal blood circulation, and accelerates colonic transit. These physiological responses facilitate stool movement toward the rectum, thereby promoting more effective bowel evacuation and reducing constipation symptoms[10,20,22]. In addition, massage therapy has been shown to improve autonomic nervous system activity, which may further contribute to restoring gastrointestinal motility in patients with impaired bowel function[10].

Constipation is particularly common among patients with Diabetes Mellitus because chronic hyperglycemia contributes to diabetic autonomic neuropathy, resulting in impaired enteric nervous system function and delayed gastrointestinal motility[4,5,21]. Damage to autonomic nerve fibers decreases intestinal peristalsis, prolongs colonic transit time, and increases water absorption from fecal material, leading to hard stools and difficulty during defecation. Consequently, constipation represents one of the most prevalent gastrointestinal complications experienced by patients with Diabetes Mellitus. By mechanically stimulating intestinal activity and promoting physiological bowel movements, abdominal massage may partially compensate for impaired gastrointestinal motility associated with diabetic autonomic neuropathy[20,22].

The findings of this study also support the Roy Adaptation Model, which conceptualizes constipation as a maladaptive physiological response to chronic illness. Within this framework, Diabetes Mellitus acts as the focal stimulus affecting gastrointestinal function, whereas inadequate dietary fiber intake, insufficient fluid consumption, limited physical activity, prolonged disease duration, and hospitalization represent contextual stimuli that further contribute to constipation. Through abdominal massage, patients receive a positive adaptive stimulus that promotes physiological adaptation by improving bowel elimination and restoring gastrointestinal function.[1516] Consequently, abdominal massage not only addresses constipation symptoms but also supports patients in achieving better adaptation to chronic illness through enhanced self-care and physiological regulation.

The present findings have important implications for nursing practice. As an independent nursing intervention, abdominal massage is inexpensive, non-invasive, safe, and easy to implement without requiring sophisticated equipment. Compared with prolonged laxative therapy, abdominal massage is not associated with medication-related adverse effects and may reduce dependence on pharmacological treatment[14,25]. Furthermore, the technique can be taught to patients and family caregivers, allowing constipation management to continue after hospital discharge and promoting patient self-management. These characteristics make abdominal massage a practical intervention that can be integrated into evidence-based nursing care for patients with Diabetes Mellitus experiencing constipation[19,23].

Overall, the findings of this study strengthen the growing body of evidence supporting abdominal massage as an effective complementary intervention for constipation management. Incorporating abdominal massage into routine nursing care may improve bowel function, increase patient comfort, reduce constipation-related complications, and contribute to better quality of life among patients with Diabetes Mellitus. Future multicenter studies with larger sample sizes and longer follow-up periods are recommended to further confirm the long-term effectiveness of this intervention and its applicability across different clinical settings.

V. Conclusion

This study demonstrated that abdominal massage is an effective non-pharmacological nursing intervention for reducing constipation among patients with Diabetes Mellitus. Patients who received abdominal massage for 15 minutes once daily over three consecutive days showed a significant reduction in constipation severity compared with those who received routine nursing care alone. These findings suggest that abdominal massage can be incorporated into routine nursing practice as a safe, simple, cost-effective, and complementary intervention to improve bowel function and alleviate constipation in patients with Diabetes Mellitus.

Study Limitations: This study has several limitations. First, the intervention was administered over a relatively short period of three consecutive days, which may not fully reflect the long-term effectiveness of abdominal massage. Second, the study was conducted at a single tertiary hospital, which may limit the generalizability of the findings to other healthcare settings. Third, potential confounding factors, such as dietary fiber intake, fluid consumption, physical activity, and medication use, were not fully controlled and may have influenced constipation outcomes.

Recommendations: Future studies should investigate the long-term effects of abdominal massage using larger sample sizes and multicenter study designs to improve the generalizability of the findings. Further research is also recommended to evaluate the combined effects of abdominal massage with other non-pharmacological interventions, including dietary modification, increased fluid intake, regular physical activity, and bowel habit training. In clinical practice, nurses are encouraged to integrate abdominal massage into evidence-based nursing care as an independent intervention for patients with Diabetes Mellitus experiencing constipation.

Conflict of Interest: The authors declare that there are no conflicts of interest related to this study.

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