

Evaluating the Effect of Hot Water Bag Therapy on Constipation in Patients During the Acute Phase of Stroke

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ABSTRACT

Background: Constipation is a common and clinically significant complication in stroke patients, increasing the risk of secondary strokes due to elevated abdominal pressure during straining. Effective management of post-stroke constipation is essential for improving patient outcomes and quality of life. Heat therapy, such as the application of a hot water bag, has been suggested as a potential non-pharmacological intervention to alleviate constipation by enhancing intestinal motility and blood circulation. **Objective:** This study aimed to evaluate the effectiveness of hot water bag therapy in relieving constipation in patients during the acute phase of stroke. **Methods:** A quasi-experimental study was conducted at Imam Al-Hussein Medical City between September 4, 2023, and June 5, 2024. A purposive sample of 58 stroke patients was recruited and divided into two groups: an intervention group (n = 29) and a control group (n = 29). Patients in the intervention group received hot water bag therapy, which involved placing a rubber hot water bag (80°C) with a protective cover on the abdomen four times a day for 30 minutes over a three-day period. The control group received only routine medical care. The study instrument consisted of two parts: (1) socio-demographic and clinical data, and (2) constipation severity assessment using the Wexner Constipation Score. Data were analyzed using descriptive and inferential statistical methods, including independent and paired sample t-tests, with statistical significance set at $p < 0.05$. **Results:** Prior to the intervention, 92.9% of patients in the intervention group had severe constipation. Following hot water bag therapy, 63.3% of patients reported no constipation, while 36.7% experienced only mild constipation. A statistically significant difference was observed between the intervention and control groups post-intervention ($p = 0.000$), indicating the effectiveness of heat therapy in relieving constipation. **Conclusion:** The application of a hot water bag on the abdomen four times daily for 30 minutes over three days significantly reduced constipation severity in stroke patients. These findings support the use of heat therapy as a simple, non-invasive, and effective complementary approach for managing post-stroke constipation. Further research is recommended to explore its long-term benefits and potential mechanisms of action.

Keywords: Stroke, Constipation, Hot Water Bag.

INTRODUCTION

Stroke is one of the main global cause of disability and mortality, representing a significant financial issues on health-care systems and contributing to public health problems [1]. The rate of stroke incidence is continually rising and the age of onset has become younger in recent years due to the increasing of social aging, lifestyle changes, and other factors [2]. Several neurological deficits resulting from strokes include impaired balance, talking, movement, swallowing, voiding, and bowel movement, all of which raise implications for worldwide public health [3]. Patients who have experienced a stroke may experience moderate symptoms like bloating and abdominal pain, or more severe symptoms like intestinal blockage brought on by constipation [4]. Constipation after a stroke that is now receiving a lot less attention, despite its association with longer hospital stays, poor neurological outcomes, the emergence of new complications, and even death [5]. When a stroke originates in the basal ganglia and thalamus constipation is more possible to occur. It is estimated that's about ten percent of patients with stroke may die from constipation after stroke [6]. Constipation is a common symptom of the central nervous system disease and has a severe influence on social functioning and quality of life; however, little is known about the prevalence and causes of constipation in stroke patients [3]. Patients who have constipation need to strain to pass stool, thus increase their chance of having another stroke because the abdominal pressure rises quickly. Prokinetic drugs, osmotic, irritant, and stool softening laxatives are commonly used in the treatment of

constipation, along with dietary or lifestyle changes. Adverse reactions including dehydration, distension in the abdomen, and recurrence upon drug discontinuation are possible side effects of conventional treatment [7]. It's not clear how accurately constipation may occur after stroke. However, bed rest after stroke, inadequate fiber and water consumption, change in dietary and defecation habit may contribute to development of constipation among patient with stroke [8]. In contrast to functional constipation, post-stroke constipation is more likely to result from malfunctioning of the brain-intestinal axis following central nerve injury, as increasing amounts of evidence have demonstrated in recent years [7]. Post-stroke constipation is one of the more prevalent and dangerous consequences following a stroke in clinical practice, occurring between 22.9% and 79% [2]. Long-term fecal accumulation in the colon can break down endotoxin and be reabsorbed by the body, exacerbating harm to various bodily systems, including the central nervous system. The pressure inside the abdominal cavity rises during forced defecation, aggravating brain nerve damage at the lesion site and perhaps causing hypertension and another stroke, which could negatively impact the prognosis of patients [4]. Many non-pharmacological interventions been reports for treatment of constipation, such as massage, electro-acupuncture, and acupuncture [9]. In the clinical setting, retention enemas, irritant/volumetric/permeable/softening/lubricating laxatives, and colon motility medications are frequently used to treat constipation [10]. Constipation can be relieved by non-pharmacological methods

include increased physical activity, staying hydrated, and eating more fiber-rich foods. Abdominal massage and reflexology can also help. In the therapeutic context, hot packs have also been utilized as a nursing intervention to treat constipation without the need for laxatives. found that in healthy persons with constipation, applying hot packs to the abdominal and lumbar regions increases the frequency of bowel movements and noises [11]. Technology from traditional Chinese medicine has a special and noteworthy impact on preventing and treating constipation symptoms following a stroke. Whether Chinese medicine is taken orally, or acupuncture and moxibustion therapy is used, clinical literature findings show that both treatments effectively cure constipation following a stroke and do not have negative side effects like drug dependence.

Consequently, one approach to investigate the management of post-stroke constipation in clinical practice is to look for a successful treatment from conventional medicines [2]. On the other hand, by causing a somatovisceral response through the activation of somatic nerves via the spinal or supraspinal pathway, heat packs have the potential to boost intestinal motility. Applying heat to trigger warm receptors in the skin may instinctively decrease sympathetic nerves and boost parasympathetic nerve activity in the intestines as a supraspinal and/or spinal reflex. Peristalsis would be improved if such a reflex occurred at the same level of intestinal innervation [11]. Therefore, in

order to offer reliable support for the non-pharmacological intervention for constipation, this study aims to identify the effect of hot water bag on the level of constipation in patients with stroke.

Objectives

To identify the effect of hot water bag on constipation in patient with acute phase of stroke

Methods

Study Design and Participants

A quasi-experimental study was started from September 4th, 2023, to May 16th, 2024. A total of 58 patients with acute stroke who have constipation, and those who agree to participate were enrolled in this study.

Study Setting and Sample

The study was performed at the medical wards of Imam Al-Hussein Medical City in Holy Kerbala, Iraq. The selected sample size was 58 patients with acute stroke who were divided into two groups. There were 28 patients in the control group and 30 in the intervention group. The sample was chosen using a purposive sampling method in which the researchers rely on their own decision when choosing members of the population to participate in this study.

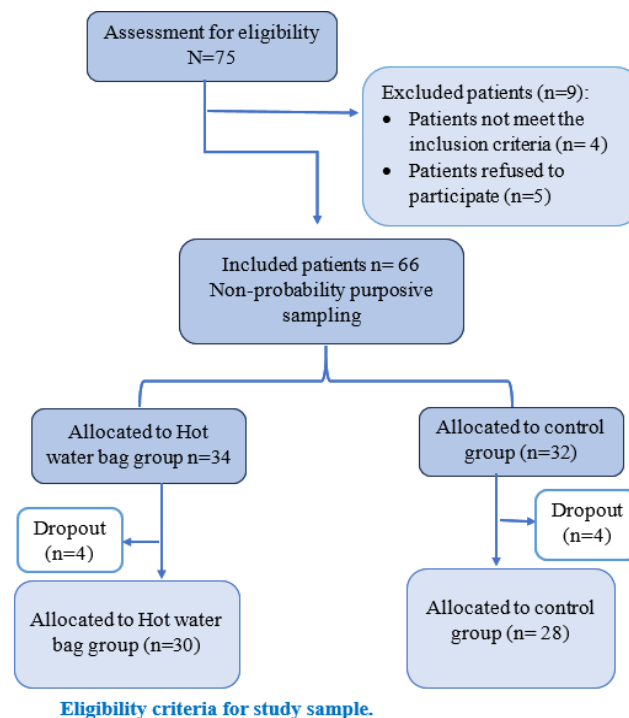


FIGURE 1: Eligibility Criteria for Study Sample

Study Instruments

The data were collected using the instrument consists of three parts: First part: Socio-demographic features and clinical data that include ages, genders, marital status, educational level, occupation, chronic diseases, type of stroke, location of stroke, period after stroke, and recurrence of stroke. The second part was used to assess the level of constipation by using Wexner constipation questionnaire, this scale was developed by Agachan, et al., [12] is from the Department of Colorectal Surgery, Cleveland Clinic Florida, Fort Lauderdale, Florida. This scale has seven option like how often opening bowel, painful or

difficult to open bowel, feeling not completely empty bowels when go to the toilet, unsuccessful attempts to empty bowel have in 24 hours, feeling pain in abdomen, time to take open bowels, need assistance to open bowel. The third part is constipation assessment scale, this scale design by Isenring, et al., [13], Department of Nutrition and Dietetics, Flinders University, Australia, this scale consists from eight options, each question have from (1-3), one (no problem), two (mild constipation), three (sever problem).

The content and face validity of the study instrument were determined by a panel of seventeen experts, and its reliability was

determined through a pilot study by using Cronbach's alpha of Wexner constipation questionnaire is 0.854 and Cronbach's alpha of constipation assessment scale is 0.823.

Intervention Protocol

The interventional protocol was established by the researcher after reviewing scientific literature and previous studies, as well as the researcher's experience. This interventional regimen is intended to offer instructions on how to improve bowel movement and treatment of constipation for patients with stroke. Therefore, this interventional protocol includes using hot water bag. All patients were given an explanation about the procedure. Participants were separated fairly into two groups: [intervention group (G1 n=30)] and [control group (G2; n=28)]. The intervention group instructed to apply hot water bag to improve gastrointestinal motility, a rubber water bag with a fluffy cover filled with hot tap water [80°C] are placed on the abdomen, four times a day, for 30 minutes each time for three days' duration. The researcher followed up with the patients two times a day to remind them to perform the intervention and to instruct them about the protocol. The follow-up method was performed through the phone by creating communication groups on social media sites (WhatsApp) and by communicating with patients through telephone (SIM-card).

During this follow-up, the researcher monitored the patient's adherence and responses to the intervention. Patients in the control group just received the conventional care provided to all patients. The levels of constipation were measured for all patients in the intervention and control groups before the intervention and immediately after the completion of the intervention; all participants continued to receive their conventional stroke care. The data collection process was carried out from January 17th to March 16th, 2024.

Statistical Analysis

The IBM statistical package for social sciences version 26 was used to examine the data. The Shapiro-Wilk test was employed to determine whether the data were normal, and it revealed that the data had a normal distribution.

A descriptive statistical procedure, e.g., frequency, percentage, and mean of score, was used to summarize the study result, and an inferential analysis procedure, e.g., paired sample t-tests were used for within-group comparisons, independent sample t-test were used for between-group comparisons, and Chi square test were used to investigate the difference among groups. A p-value of <0.05 was determined to be statistically significant.

Table 1: Distribution of Patients in Two Groups According to their Socio-Demographic Characteristics:

Socio-Demographic Characteristics		Groups				X ² P-Value
		Hot Water Bag		Control		
		F	%	F	%	
Age Groups	40-59	8	26.7	5	17.9	0.39
	60-80	19	63.3	19	67.9	
	More than 80	3	10.0	4	14.3	
Gender	MS ± SD	66.6±12.0		70.4±11.6		0.54
	Male	24	80.0	9	32.1	
	Female	6	20.0	19	67.9	
Marital Status	Married	24	80.0	25	89.3	0.33
	Widow/Widower	6	20.0	3	10.7	
	No Reads and write	17	56.7	17	60.7	
Educational Level	Reads and write	7	23.3	7	25.0	0.66
	Primary school	3	10.0	2	7.1	
	Middle school	1	3.3	1	3.6	
	Diploma	2	6.7	0	0	
	Bachelor's and above	0	0	1	3.6	
Occupation	Gainer	14	46.7	15	53.6	0.31
	Retired	2	6.7	5	17.9	
	Housewife	14	46.7	8	28.6	

f= frequencies; %=Percentages; X²: chi square test; NS=non-significant.

Table (1) indicates that most of patients in the hot water bag and control groups were within age group (60-80) years old and accounted 63.3%, 67.9% respectively. 80% of patients in the hot water bag group is male and 67.3% in the control group is female.

Regarding the marital status, the majority of the patients in the hot water bag and control groups were married and accounted (80.0%),

(89.0%) in the hot water bag and control groups respectively. In concern to the education level 56.7% in the hot water bag group and 60.7% in control group have no read and write.

This table also exposed that are 46.7%, and 53.6% of patients enrolled in the hot water bag and control groups were gainer respectively.

Table 2(a): Distribution of Patients in Two Groups According to their Clinical Data

Variables		Groups			
		Hot Water Bag		Control	
		F	%	F	%
Previous Stroke	Yes	13	43.3	9	32.1
	No	17	56.7	19	67.9
Type of Stroke	Ischemia	26	86.7	25	89.3
	Hemorrhage	4	13.3	3	10.7
Location of Stroke	Left side	16	53.3	12	42.9
	Right side	14	46.7	12	42.9
	Both	0	0	4	14.3
	Not found	14	46.7	9	32.1
Number of Previous Stroke	1-2	12	40.0	14	50.0
	More than 2	4	13.3	5	17.9

Table 2(b): Distribution of patients in two groups according to their clinical data:

Variables			Groups			
			Hot Water Bag		Control	
			F	%	F	%
Defecation Before Stroke	Daily		23	76.7	19	67.9
	Every 1-2 days		7	23.3	9	32.1
Method of Defecation	Diapers		30	100	27	96.4
	Oriental toilet		0	0	0	0
	Western toilet		0	0	1	3.6
Mobility	Need assistance with movement		20	66.7	13	46.4
	Don't Movement		4	13.3	14	50.0
	Wheelchair		6	20	1	3.6
Nutritional Intake	Dysphagia		20	66	10	35.7
	Need assist to eat		2	6.7	9	32.1
	IV fluid		1	3.3	1	3.6
Current Medication	NG tube		7	23.3	8	28.6
	Calcium channel blockers		2	6.7	12	42.9
	Calcium supplements		0	0	4	14.3
	Diuretics		0	0	1	3.6
	Laxative		0	0	4	14.3
	Laxative and calcium channel blockers		27	90	7	25.0
	Tricyclic antidepressants		1	3.3	0	0

f= frequencies; %=Percentages; p= p-value χ^2 : chi square Test; NS=non-significant.

Table 2 indicates that are more than one-half (56.7%) and (67.9%) of patients in hot water bag and control group don't have previous stroke, 86.7%, and 89.3% of patients in the hot water bag and control groups respectively are have ischemic stroke. With regard to the location of stroke 53.3 %,42.9% of patient in the hot water bag and control groups have left side stroke. Concerning to the number of previous strokes, 40%, and 50% of patients in the hot water bag and control groups respectively have exposed one-two time previously to stroke. According to defecation before stroke 76.7%, and 67.9% of

patient in hot water bag and control groups have daily bowel movement. 100% and 96.3% of patient in the hot water bag and control groups used dipper method of defecation. Concerning to mobility status, 66.7% and 46.4% of patient in the hot water bag and control group are need assistance to movement. According to the nutritional status 66% and 35.7% of patient in the hot water bag and control groups have dysphagia, and 90% of patient in the hot water bag group used laxative and calcium channel blocker while 42.9% of patient in the control group used calcium channel blocker only.

Table 3: Comparison Significant of Constipation in Two Group Between Pre-Test and Post-Test Period

Groups	Test	MS	SD	T-Value	Df	P- Value	Sig.
Control Group	Pre-Test	2.45	0.41	1.76	27	0.08	NS
	Post-Test	2.37	0.45				
Hot Water Group	Pre-Test	2.67	0.30	45.4	29	0.000	S
	Post-Test	0.38	0.20				

MS=Mean of Score; SD= Standard Deviation; df= Degree of freedom; NS=non-significant (p-value>0.05); S=Significant (p-value≤0.05).

Table (3) exposed a non-significant difference in the constipation between the first and second assessment of the control group at p-value =0.08. While there is a statistically significant difference in the constipation between the first and second assessment at p-value

=0.000 for the hot water bag group. Therefore, not implementing the intervention protocol significantly increases the constipation level. Conversely, implementing the intervention protocol were significantly reducing the constipation level in patients with stroke.

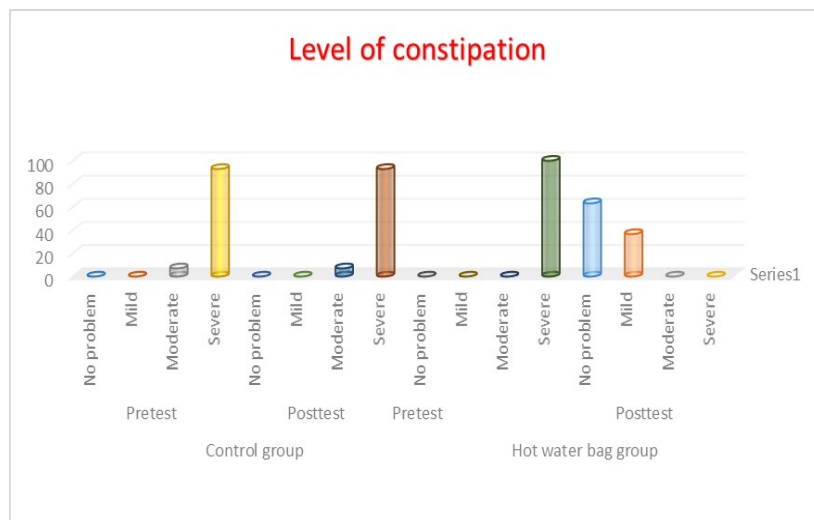
**Figure 2:** Comparison the Statistical Result of Severity of Constipation for the Control and Hot Water Bag Groups at Pre-Test and Post-Test Period.

Figure (1) exposes the percentage of constipation severity in the control, and hot water bag groups. It is evident that the hot water bag

has an effective effect on improving the bowel movement when compared to control group.

Table 4: Differences between the Effectiveness of Hot Water Bag on Constipation with Patient's Socio-Demographic and Clinical Data

Variables	Comparative Patterns	Df	F-Value	P-Value	Sig.
Age	Between Groups	5	.852	0.527	NS
	Within Groups	24			
Marital Status	Between Groups	5	.517	0.761	NS
	Within Groups	24			
Educational Level	Between Groups	5	1.196	0.341	NS
	Within Groups	24			
Occupation	Between Groups	5	.271	0.925	NS
	Within Groups	24			
Location Of Stroke	Between Groups	5	1.253	0.316	NS
	Within Groups	24			
Number Of Previous Stroke	Between Groups	5	0.282	0.918	NS
	Within Groups	24			
Motility Status	Between Groups	5	1.033	0.421	NS
	Within Groups	24			
Nutritional Status	Between Groups	5	1.746	0.162	NS
	Within Groups	24			
Current Medication	Between Groups	5	3.727	0.012	S
	Within Groups	24			

df=Degree of freedom; *NS*=Non significant (*p*-value>0.05); *S*=Significant (*p*-value<0.05).

Table (4) shows a non-significant statistical association was found between the effectiveness of hot water bag on constipation with patient's age, marital status, education level, occupation, location of stroke, number of previous strokes, motility status, nutritional status at *p*-value >0.05. While a significant difference was found between

current medication and the effectiveness of hot water bag at *p*-value <0.05. Table (5) show a non-significant statistical association between the effectiveness of hot water bag on the constipation level with patient's gender, previous stroke, type of stroke, defecation before stroke, method of defecation at *p*-value >0.05.

Table 5: Association between the Effectiveness of the Hot Water Bag on Constipation with Patient's Gender and Previous Stroke, Type of Stroke, Defecation Before Stroke and Method of Defecation

Variables	Classes	F	MS	SD	Df.	P-Value	Sig.
Gender	Male	14	1.5	0.50	5	0.884	NS
	Female	16					
Previous Stroke	Yes	12	1.6	0.49	5	0.681	NS
	No	18					
Type of Stroke	Ischemia	26	1.13	0.34	5	0.826	NS
	Hemorrhagic	4					
Defecation Before Stroke	Daily	26	1.13	0.34	5	0.544	NS
	1-2 days	4					
Method of Defecation	West toilet	29	1.06	0.36	5	0.530	NS
	Diapers	1					

MS=Mean of Score; *SD*= Standard Deviation; *df*= Degree of freedom; *NS*=non-significant (*p*-value>0.05).

Discussion

In this quasi-experimental study, the intervention group have been instructed to apply hot water bag to improves gastrointestinal motility, a rubber water bag with a fluffy cover filled with hot tap water [80°C] are placed on the abdomen, four time a day, for 30 minutes each time for three days' duration, while they are not used for the control group. As shown in table (2), our findings indicate that more than one-half (56.7%) and (67.9%) of patients in hot water bag and control group don't have previous stroke, 86.7%, and 89.3% of patients in the hot water bag and control groups respectively have ischemic stroke. With regard to the location of stroke 53.3 %,42.9% of patient in the hot water bag and control groups have left side stroke. Ibrahim and Athbi [14] reported that the 53.3% of the patient in the control group experienced hemorrhagic strokes, compared to 63.3% of the experimental group, and right lobe of the brain impacted 63.3% of the experimental group and the control group roughly 50%. Concerning to the number of previous stroke, 40%, and 50% of patients in the hot water bag and control groups respectively have exposed one-two time to stroke previously. According to defecation before stroke 76.7%, and

67.9% of patient in hot water bag and control groups have daily bowel movement. 100% and 96.3% of patient in the hot water bag and control groups used dipper method of defecation. Concerning to mobility status, as shown in table (2) the result exposed that 66.7% and 46.4% of patient in the hot water bag and control group are need assistance to movement. According to the nutritional status 66% and 35.7% of patient in the hot water bag and control groups have dysphagia, and 90% of patient in the hot water bag group used laxative and calcium channel blocker while 42.9% of patient in the control group used calcium channel blocker only. Deshmukh and Dixit [15] found that out of 40 stroke patients, 27.5% suffered from hemorrhages and 72.5% of patient had ischemic strokes. Table (3) reveled the mean constipation score was 2.45 during the pretest and 2.37 during the post-test time of the control group, this table exposed a non-significant difference in the constipation between the first and second assessment of the control group at *p*-value =0.08. Conversely, the mean constipation score for patient in the intervention group was 2.67 for constipation prior to the implementation of the intervention, and 0.38 for the same group following the implementation of the interventions, it is exposed a statistical significant difference in the constipation

between the first and second assessment at $p\text{-value} = 0.000$ for the hot water bag group. Therefore, not implementing the intervention protocol significantly increases the constipation level. Conversely, implementing the intervention protocol were significantly reducing the constipation level in patients with stroke. In a study conducted in March 2018 at the girls' dormitory of a private university in Bandung West Java, Indonesia, a purposive sampling was used to choose the sample. At the time of the study, 25 individuals had experienced recurring constipation for at least three months and had not gone to the bathroom in the previous three days. For three days in a row, the patients received 500 cc of warm water before breakfast each day. The results of the study showed that the first day of treatment was 68% ($p=0.000$) successful when warm water therapy was taken before breakfast, 88% ($p=0.000$) successful on the second day, and 84% ($p=0.000$) effective on the third. Following a three-day trial, 96% of the people successfully defecated at least once over the trial's three days ($p=0.000$), with 60% of them doing so every day ($p=0.000$) [16]. On other hand, in a study comprised of 86 elderly individuals (control group: 44, experimental group: 42) suffered from constipation. For a period of two weeks, the experimental group's Chun-Chu (ST25) and Kwan-Won (CV4) areas were subjected to 40 minutes of mugwort heat therapy every day, which included stimulation of ST25 and CV4. The nurse was qualified in eastern medicine nursing. The control group continued to lead their regular lives, eating a diet high in fiber and staying hydrated. The number of defecations per week, the complexity of the process, the strength of the stool, and the discomfort associated with constipation were outcome variables. Constipation discomfort, stool strength, and the number of defecations were all significantly improved in the experimental group. Defecation difficulties declined in the experimental group during the intervention, however the decline was not statistically significant [17]. The results of our study exposed the benefits of performing hot water bag for patients with acute stroke. As shown in figure (1), most patients (92.9%) in the control group had severe constipation levels in the pre-test and post-test, respectively. Conversely, 100% of patients in the intervention group had a severe constipation level in the pre-test, while in the post-test period, 63.3%, and 36.9% of patients in the intervention group had no constipation, mild constipation, respectively. In randomized controlled trial, 121 women were randomized to the control ($n = 62$) or hot water pack ($n = 59$) group. The use of an abdominal hot water pack significantly reduced the mean time to passing first flatus (25.2 ± 3.6 ; $P < 0.0001$), mean time to first bowel movements (28.4 ± 4.0 ; $P < 0.0001$), mean time to first defecation (33.4 ± 4.9 ; $P < 0.0001$), and mean time to tolerating solid diet (2.1 ± 0.6 ; $P < 0.0001$) compared to the control group. The postoperative ileus incidence was significantly lower in the hot water pack group (3.4%) than the control group (16.1%) ($P = 0.01$) [18]. In a randomized controlled trial that was conducted by Çalışkan et al., [19] to determine the effect of giving warm water orally for patients who had undergone laparoscopic cholecystectomy during the early postoperative phase on the onset of their first flatus. It is concluding that warm water consumption in the fourth postoperative hour was found to have a positive effect on bowel motions. Table 5 demonstrates

that, at a $p\text{-value} > 0.05$, there is no statistically significant correlation between the effectiveness of a hot water bag on the degree of constipation and the patient's clinical data, including the location of stroke, number of previous strokes, mobility status, and nutrition status. Although there was a significant correlation ($p\text{-value} < 0.05$) between the effectiveness of a hot water bag on the degree of constipation and the medicine taken currently. In a study that was done between March and November 2012, 60 female adults in Japan were enrolled, the study period was 4 weeks: intervention with heat stimulus. No significant difference was observed between the hot compresses and control groups, with regard to age, and duration of constipation at the time of recruitment [20].

Study limitations:

The main limitation of the present study was that the patients administered hot water bag at home; thus, they might not have followed the intervention closely because of physical or psychological issues. Other limitation is patient number and many patients refused to participate in study; additional study is recommended to assess the long-term impacts of hot water bag on constipation after stroke.

Conclusion:

Application of hot water bag after stroke for 30 minutes/ four sessions a day for 3 days would significantly decrease the constipation level and increase bowel movement. Nursing implications: patients with stroke complain of many complications related to bowel movement one of them constipation. Thus, the nurse must act to provide holistic care for patients with stroke by enabling them to perform normal bowel habit and decrease level of constipation as much as possible, thereby enhancing their functional abilities and decreasing the risk of fecal impaction. In order to provide a realistic nursing role for such patients and to potentially increase the standard of nursing care, it is crucial to incorporate hot water bag into routine hospital care. Hot water bag can be given to stroke patients to reduce their constipation level, which will afterwards improve their functional capacities.

Acknowledgments

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Ethical Considerations

An ethical authorization was achieved from the Ethical Committee at the College of Nursing/University of Kerbala (code: UOK.CON.23.017) on November, 15th, 2023. Moreover, the study was recorded in the Iranian Registry of Clinical Trials (code: IRCT20240204060895N2). Each patient who took part in this study provided their informed consent, and it is presumed that they have the right to withdraw at any moment.

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