

## ORIGINAL ARTICLE

# Random control trial of hot compresses for women those who used laxatives on severity of constipation and quality of life

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### Abstract

**Aim:** The purpose of this study was to determine the effectiveness of hot compresses for constipation and quality of life (QOL), with a focus on taking laxatives.

**Methods:** Meeting the inclusion criteria were 60 women, who had taken over-the-counter laxatives for constipation. Sixty women were randomly assigned to either the intervention ( $n = 30$ ) or control ( $n = 30$ ) group. The study period was 4 weeks: the first 2 weeks (baseline) without intervention and the last 2 weeks (intervention) with heat stimulus using a commercially available thermic sheet (40°C). Women affixed the sheet to the lumbar area with the Jacoby line in the center immediately after waking and were instructed to remove the sheet after 5 h during the intervention period every day. During the intervention, women recorded their daily defecation and completed the Constipation Assessment Scale (CAS), Constipation QOL 15 (CQ), and 36 Item Short Form Survey.

**Results:** The author excluded incomplete records and study protocol deviations; as a result, a total of 39 subjects (21 hot compresses group, 18 control group) was used for the analysis. Significant improvement was seen in days of defecation and the number of defecations per week for the intervention group. Significant improvement was also seen in physical and psychological subcategory of CQ15. No significant differences were found in the amount of laxatives used.

**Conclusion:** The lumbar application of a 40°C hot compresses in female adults with constipation improved their conditions of defecation and QOL, even though it did not reduce the amount of laxatives.

**Key words:** constipation, defecation, laxatives, nursing care, quality of life.

## INTRODUCTION

Defecation is an important daily activity with important psychological and social significance for humans. Constipation, which is an obstruction of the excretory process, affects 12–19% of the general adult population (Higgins & Johanson, 2004), making it a familiar issue. Constipation is generally divided into acute and chronic conditions. The medical diagnosis of functional constipation is expressed in the Rome III criteria, which is an international system developed to classify functional

gastrointestinal disorders based on clinical symptoms (Longstreth, Thompson, & Chey, 2006). Under the Rome criteria, constipation is listed under “functional bowel disorders” (section C) as “functional constipation” (C3).

Constipation has been reported to affect the quality of life (QOL) of adults, where those with chronic constipation have a lowered psychological state compared with the healthy adults (Glia & Lindberg, 1997). Studies have demonstrated that females with constipation are concerned about the contents of consumed food, choosing clothes that do not call attention to their abdomens, and report difficulties when interacting with others (Lee & Warden, 2011). Several parameters, such as care and necessity of resources, account for the lower health-related QOL compared with the number of defecations or obstructions (Wald &

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Received 27 January 2015; accepted 25 April 2015.

Sigurdsson, 2011). Therefore, it is necessary to assess the effect of constipation on QOL as well as evaluate the improvement in its symptoms.

Both the general population and healthcare professionals recognize over-the-counter (OTC) laxatives for constipation as a general method for managing the symptoms. However, these laxatives can have side-effects such as diarrhea, abdominal pain, nausea, and hypermagnesemia (Hinrichs & Huseboe, 2001). Healthcare professionals are continually seeking treatments that have no side-effects to improve the symptoms of constipation and enable the patient to live a quality life.

In Japan, the hot compresses method is used as a nursing intervention to treat patients with constipation (Nagashima *et al.*, 2011). The heat stimulus to the skin from the hot compresses is reported to promote bowel movements (Nagai, Wada, Kobayashi, & Togawa, 2003) with little physical stress and few side-effects. Lumbar skin temperature is between 33.7°C and 35.3°C (Hishinuma *et al.*, 1997; Webb, 1992) and an increase of 2–4°C is necessary for changes to bowel sounds to occur. The effect of heat stimuli on bowel movements from the lumbar hot compresses begins with the perception of heat by heat receptors on the skin. Heat stimuli from the heat receptors are processed by the sensory area of the brain, resulting in a sensation of warmth. Induction and suppression of bowel movements are controlled by the autonomic nervous system, where activation of the parasympathetic nervous system induces movements, while activation of the sympathetic nervous system suppresses it. It is believed that the sensation of warmth relaxes the body and suppresses or activates the sympathetic and parasympathetic nervous systems, respectively (Nagashima *et al.*, 2006). On the other hand, axon reflex occurs at the site of heat stimulus, which interrupts the stimulus traveling from the sensory neuron receiving the stimulus to the brain, signaling in a retrograde manner to the branching lateral branch (Tsukagoshi, Funakoshi, Goris, & Kishida, 2002). As a result, it affects the blood vessels controlled by the same neuron, dilating the vessels of the skin and muscle (Tsukagoshi *et al.*, 2002). Increased blood flow to the skin or surface muscles is equivalent to a reduction of sympathetic nerve activity (Nagai *et al.*, 2003), which is thought to play a role in the activation of the parasympathetic nervous system and suppression of the sympathetic nervous system. Studies have shown that affixing the aforementioned 40°C thermic sheet on the abdomen for 1 h increases parasympathetic nervous system activ-

ity, leading to an active electrogastrogram and gastrointestinal activity (Nagashima *et al.*, 2006).

However, it is not known whether the hot compresses improve constipation or QOL in female adults taking laxatives. Therefore, the present author investigated the effect of hot compresses on defecation and QOL in female adult with constipation with laxative administration.

## METHODS

### Study design

This study is an intervention assessment study that evaluates the effects of applying an lumbar hot compresses on constipation and QOL in female adult administered OCT laxatives. This is an open, randomized controlled trial divided into control and hot compresses groups.

### Participants

#### *Inclusion criteria*

The participants were female adults between 20 and 30 years of age who were living and working in the region. They took laxatives at least once or more for 2 weeks. They exhibited self-reported symptoms of constipation for over 1 year and scored higher than 5 on the Japanese version of the Constipation Assessment Scale (CAS-J), leading to difficulties during daily living (Fukai, 2006, 2007; Fukai, Sugita, & Tanaka, 1995; Fukai, Tsukahara, & Hitomi, 1995).

This assessment scale, whose reliability and validity have been verified, is a scale for measuring a patient's own awareness of constipation and it uses a 1 week time frame. The CAS has been used to assess clients' constipation in various clinical situations. In addition, however, the CAS has not been used to examine the effect of constipation on QOL, an important area of concern, given the extent to which the symptoms of constipation can also influence daily life.

#### *Exclusion criteria*

Exclusion criteria included: (i) those periodically receiving examinations for constipation from a physician and receiving prescription laxatives; (ii) organic dyschezia or secondary constipation caused by laxatives for unrelated conditions; (iii) pregnant or suspected pregnant subjects, as well as those who were breast-feeding; and (iv) prior dermopathy due to thermic sheets.

## Procedure

The study was conducted between March and November 2012. The participants were 60 female adults living around the capital region of Japan.

The subjects were the facility users or those attending school or employed in the capital region. The author received approval from facility management to conduct the study after explaining the details of the research directly; at the same time, the author displayed posters on an unspecified number of media including bulletin boards and other locations likely frequented by adult females. The author also displayed the poster on social networking sites to encourage recruitment.

The candidates contacted the researcher by phone or email. Consent was obtained after explaining the details of the study, at which point the candidates were asked to answer the CAS questionnaire to determine their eligibility based on the inclusion and exclusion criteria. Once eligibility was confirmed, the participants were asked to sign a written consent form. The candidates were further divided randomly into the control and hot compresses groups by a third party agent. Each participant was notified immediately before the interventional period began.

The author collected the face sheets, evacuation logs, and CAS, Constipation Quality of Life 15 (CQ15), and 36 Item Short Form Survey (SF-36) questionnaires by mail or directly.

## Intervention

The thermal sheet (Megurhythm; Kao, Tokyo, Japan) used for the intervention in this study is constructed from a pyrogenic substance consisting of iron, activated carbon, a salt solution, and pulp that is sandwiched between a non-permeable polyethylene laminate fiber, and a permeable polyethylene or polyester fiber. The heat generated from the oxidation of iron and hydrolysis is transferred to the skin through the permeable fiber. The safety with respect to heat transfer has already been established; it maintains a temperature of 40°C for 5–8 h. In addition, it has been reported that a skin temperature increase of greater than 4°C can be sustained for over 3 h after 30–35 min of direct contact to the skin (Oda *et al.*, 2006).

The study period was 4 weeks: the first 2 weeks (baseline) without intervention and the last 2 weeks (intervention) with intervention with heat stimulus using the sheet. The participants affixed the sheet to the hip area with the Jacoby line (covered around the fourth lumbar vertebra) in the center immediately after waking and

were instructed to remove the sheet after 5 h every day during the intervention period.

## Control groups

The hot compresses method was not applied, and the subjects continued with their daily activities.

## Measurement

The author measured the number of defecations, their characteristics, amount, and number of days and administrations of laxatives to assess the level of constipation with date sheets during the 28 day study period. This sheet was developed by Kato *et al.* (2012): the stool form was indicated using a scale of 1–4, where 1 = watery stool, 2 = mushy stool, 3 = normal stool, and 4 = hard stool; the amount of stool was indicated using a scale of 1–3, where 1 = size of the top of the thumb, 2 = size between 1 and 3, and 3 = size of the fist or larger. Self-reported constipation was measured using the CAS. The CAS was originally developed to assess constipation as a side-effect of morphine use and to provide proper care for patients (McMillan & Williams, 1989). Measurements were made on days 7 and 14 during the non-interventional period, and days 7 and 14 during the interventional period.

Quality of life was measured using the CQ15 and SF-36 version 2 (Medical Outcomes Study). The CQ15 was a standard developed in Japan to measure QOL in patients with constipation (Shinagawa *et al.*, 2002). The standard was developed by taking into account the opinions of a number of physicians and nurses, as well as the Gastrointestinal Symptom Rating Scale (Revicki, Wood, & Wiklund, 1998), a measurement tool for gastrointestinal disorders, and the Hospital Anxiety Depression Scale (Zigmond & Snaith, 1983), a clinical screening method developed to uncover anxiety and depression. The scale is composed of 15 items regarding the psychological and physical functioning of constipation, and has a possible overall index score range 15–60, when used over a 1 week recall period. Questionnaire items are answered using 4 point Likert scale (1 = always, 2 = occasionally, 3 = rarely, 4 = never), and in this study, this scale was used (4 = always, 3 = occasionally, 2 = rarely, 1 = never). Measurements were made on days 7 and 14 during the non-interventional period, and days 7 and 14 during the interventional period.

The SF-36 version 2 is a comprehensive measurement standard for health-related QOL and is comprised of the following eight subordinate concepts: physical function (PF); role physical (RP); body pain (BP); social functioning (SF); general health perceptions (GH); vitality (VT);

role emotional (RE); and mental health (MH). Measurements were made on days 7 and 14 during the non-interventional period, and days 7 and 14 during the interventional period.

### Power calculation

Based on the changes in the CAS score from the preliminary studies, the author calculated the sample size using  $\alpha = 0.05$  and power = 0.80. In a preliminary research with female adults treated with the hot compresses method to 40°C via 5–8 h direct contact, a difference of 2 in the CAS score was determined to be sufficient to improve constipation. The sample size necessary for each group was between 18 and 22, and the author estimated a dropout rate of 20%; therefore, the author aimed to recruit 30 participants per group.

### Date analysis

For the CAS, CQ15, and SF-36, the mean data on the 7th day and 14th day before 2 weeks of intervention and the mean data on the 7th day and 14th day after 2 weeks of intervention were compared.

For the number of defecations, their characteristics, amount, and number of days and administrations of laxatives, and the sums of each result before and after 2 weeks of intervention were averaged for each category. Then, the average values were compared.

Data analysis was performed using the SPSS version 19.0 J for Windows (SPSS, Chicago, IL, USA). The author calculated the descriptive statistics for each variable and arranged the basic data. The author assessed the differences in constipation and QOL between the control and hot compresses groups using an independent two group Student's *t*-test or the Mann–Whitney *U*-test. Statistical significance was set to  $P < 0.05$ .

### Ethical considerations

All participants were informed (written and orally) of the study objectives, methods, and protection of personal information, in addition to the fact that study participation was voluntary and that they could withdraw from the study at any time without penalty. The division into the control and hot compresses groups was random, and the author distributed thermic sheets to those in the control group. This study was approved by the ethical review boards at the St. Luke's College of Nursing Ethics Committee.

## RESULTS

The author selected a total of 60 adult females who fit the inclusion criteria. The women were further divided

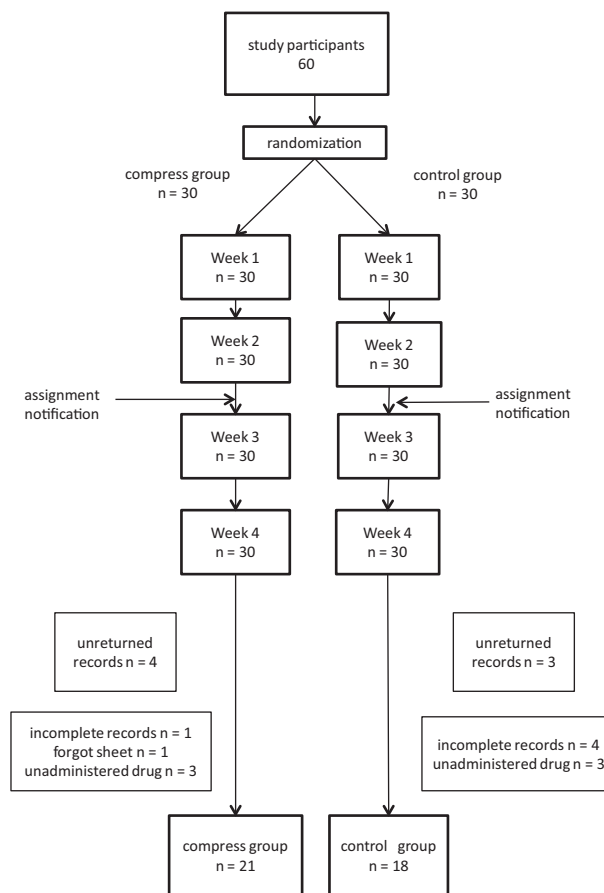


Figure 1 Recruitment and exclusion of participants.

randomly into control and hot compresses groups. Nine subjects (15% dropout rate) in the intervention group did not return their records after the study. The author also excluded incomplete records and study protocol deviations (forgetting the thermic sheet or not using laxatives during the non-interventional period). As a result, a total of 39 subjects (21 hot compresses group, 18 control group) was used for the analysis (Fig. 1).

### Patient characteristics

No significant difference was observed between the hot compresses and control groups, with regard to age, duration of constipation, and CAS at the time of recruitment (Table 1).

The CAS score decreased significantly in the hot compresses group during the interventional period ( $P = 0.01$ ), while the days of defecation ( $P = 0.040$ ) and number of defecations ( $P = 0.017$ ) were signifi-

**Table 1** Comparison of characteristics in the compresses and control groups

	Average value (SD)		<i>t</i>	d.f.	<i>P</i>	95% CI	
	Compress group	Control group				Lower limit	Upper limit
Age	28.19 (6.88)	28.72 (6.22)	−0.251	37	0.803	−4.82	3.76
Period of constipation per year	9.71 (7.28)	9.91 (9.25)	−0.074	37	0.941	−5.56	5.17
Recruitment CAS	8.24 (1.55)	8.50 (1.89)	−0.477	37	0.636	−1.38	0.85

\**P* < 0.05 independent two group Student's *t*-test. N = 39 (compress group = 21; control group = 18). CI, confidence interval; d.f., degrees of freedom; SD, standard deviation.

**Table 2** Comparison of defecation conditions between groups

	Compress group		Control group		<i>t</i>	d.f.	<i>P</i>	95% CI	
	Average value	SD	Average value	SD				Lower limit	Upper limit
CAS (before)	7.05	1.44	6.17	1.93	1.63	37	0.112	−0.21	1.98
CAS (after)	5.55	2.01	7.33	2.07	−2.73	37	0.010*	−3.11	−0.46
CAS (difference)	−1.50	1.96	1.17	1.42	−4.78	37	0.000*	−3.80	−1.54
Defecation (before)	1.90	0.43	1.95	0.37	−0.35	37	0.729	−0.31	0.22
Volume (after)	2.10	0.58	1.84	0.47	1.52	37	0.138	−0.09	0.61
Volume (difference)	0.20	0.65	−0.11	0.52	1.60	37	0.118	−0.08	0.69
Defecation (before)	2.09	0.65	2.01	0.51	0.36	37	0.725	−0.32	0.45
Characteristics (after)	2.28	0.59	1.96	0.54	1.73	37	0.092	−0.05	0.68
Characteristics (difference)	0.19	0.66	−0.06	0.61	1.21	37	0.235	−0.17	0.66

\**P* < 0.05 independent two group Student's *t*-test. N = 39 (compress group = 21; control group = 18). CAS, Constipation Assessment Scale; CI, confidence interval; d.f., degrees of freedom; SD, standard deviation.

**Table 3** Comparison of defecation conditions between groups

	Median value (lowest/highest value)		Average rank		<i>U</i>	<i>P</i>
	Compress group	Control group	Compress group	Control group		
No. of days with defecation						
Before	3.5 (1.5/7.0)	3.5 (2.0/6.5)	20.88	18.97	170.5	0.606
After	4.5 (2.0/7.0)	3.25 (1.0/7.0)	23.45	15.97	116.5	0.040*
Difference	0.50 (−1.0/2.0)	−0.50 (−2.5/1.5)	20.88	18.97	115.5	0.037*
No. of defecations						
Before	5.0 (2.0/12.5)	4.75 (2.0/14.0)	21.12	18.69	165.5	0.512
After	6.5 (3.0/15.0)	4.25 (1.5/13.0)	23.98	15.36	105.5	0.017*
Difference	1.0 (−2.0/4.0)	−0.75 (−3.0/3.5)	21.12	18.69	76.5	0.001*

\**P* < 0.05 Mann–Whitney *U*-test. N = 39 (compress group = 21; control group = 18).

cantly higher. Significant differences were not observed in the amount of defecations or the characteristics of defecations (Tables 2,3).

The total scores of CQ15 did not differ significantly between the hot compresses and control groups.

However, a significant reduction (*P* = 0.002) of difference between the non-interventional and interventional periods was observed in the hot compresses group. The physical subcategory of CQ15 did not change between the two groups; however, it was significantly decreased



**Table 4** Comparison of CQ15 between groups

	Compress group		Control group		<i>t</i>	d.f.	<i>P</i>	95% CI	
	Average value	SD	Average value	SD				Lower limit	Upper limit
CQ15									
Before	38.26	6.04	34.64	6.70	1.77	37	0.084	−0.52	7.75
After	33.42	7.77	35.72	6.91	−0.97	37	0.088	−7.11	2.51
Difference	−4.84	5.69	1.08	4.99	−3.42	37	0.002*	−9.42	−2.41
CQ15 physical subcategory									
Before	24.64	3.29	22.56	4.14	1.75	37	0.175	−0.33	4.50
After	21.86	4.59	23.56	3.91	−1.23	37	0.339	−4.49	1.09
Difference	−2.79	3.73	1.00	3.33	−3.31	37	0.002*	−6.10	−1.47
CQ15 psychological subcategory									
Before	13.62	3.37	12.08	3.56	1.38	37	0.226	−0.72	3.78
After	11.57	3.99	12.44	4.37	−0.66	37	0.516	−3.59	1.83
Difference	−2.05	2.52	0.36	2.63	−2.92	37	0.006*	−4.09	−0.74

\**P* < 0.05 independent two-group *t*-test. *n* = 39 (compress group = 21; control group = 18). CI, confidence interval; CQ15, Constipation Quality of Life 15; d.f., degrees of freedom; SD, standard deviation.

(*P* = 0.002) in the hot compresses group. A similar pattern was observed for the psychological subcategory of CQ15 (*P* = 0.006) (Table 4).

In terms of the state of general health, MH of the SF-36 was significantly lower in the hot compresses group than in the control group during both the non-interventional (*P* = 0.04) and interventional (*P* = 0.05) periods; however, no differences were observed when comparing both periods between the two groups. PF (*P* = 0.028) and RP (*P* = 0.032) did not differ between the two groups during the non-interventional and interventional periods; however, the difference was significantly larger in the hot compresses group during the non-interventional and interventional periods (Tables 5,6).

### Conditions for laxative use

Although no significant difference in the number of laxatives-administrated days was detected between the hot compresses and control groups, a significant reduction was observed in both the hot compresses (*P* = 0.008) and control (*P* = 0.041) groups when comparing the non-interventional and interventional periods. A similar pattern was observed for the hot compresses (*P* = 0.008) and control (*P* = 0.039) groups with respect to the number of uses of laxatives (Tables 7,8).

## DISCUSSION

The author demonstrated that applying a 40°C hot compresses to the lumbar region significantly improved the

CAS, the number of days of defecation, number of defecations, and physical and psychological side of QOL in adult females administrated laxatives between 20 and 30 years of age.

At first, the author considered the effect of the hot compresses method on constipation. The result of this study demonstrated that applying a 40°C hot compresses to the lumbar region improved severity of constipation in female adult women taking laxatives. A previous study have shown that the application of a 40°C hot compresses to the lumbar promoted defecation; however, the study was conducted in a mixed population of patients with and without laxatives. Additionally, differences with respect to the presence of laxatives, and the status and characteristics of constipation were not reported. The number of participants treated with the 40°C hot compresses was 28, of which 12 (42.9%) were administrated laxatives in the report by Hishinuma, Yamazaki, and Igaki (2010); however, comparisons of the compresses method in the presence and absence of laxatives was not conducted. A similar study by Hosono, Horioka, Hisamitsu, and Igaki (2010) of 23 elderly, bedridden patients receiving a number of laxatives during the non-interventional period, did not explore the effect of the hot compresses method on constipation with or without laxatives. In other words, research to date has not considered the effect of laxative administration on the effectiveness of the hot compresses method. This suggests that the induction of defecation seen in these studies could be due to its effect on those administrated laxatives. In this study, participants

**Table 5** Comparison of SF-36 between groups

	Compress group		Control group		<i>t</i>	d.f.	<i>P</i>	95% CI	
	Average value	SD	Average value	SD				Lower limit	Upper limit
BP									
Before	76.66	14.95	84.68	14.87	−1.67	37	0.100	−17.73	1.69
After	75.62	17.41	74.33	22.62	0.20	37	0.840	−11.71	14.29
Difference	−1.05	19.18	−10.35	20.84	1.45	37	0.155	−3.68	22.29
GH									
Before	62.45	14.39	61.17	19.23	0.24	37	0.810	−9.64	12.21
After	61.36	15.78	60.81	20.36	0.10	37	0.920	−11.18	12.29
Difference	−1.10	9.71	−0.36	6.77	−0.27	37	0.789	−6.26	4.79
VT									
Before	44.51	15.47	51.76	21.20	−1.23	37	0.230	−19.17	4.69
After	48.08	20.50	51.59	22.38	−0.51	37	0.620	−17.55	10.54
Difference	3.57	17.24	−0.17	13.15	0.75	37	0.458	−6.35	13.82
MH									
Before	58.57	17.92	70.42	17.30	−2.09	37	0.040*	−23.32	−0.37
After	60.24	17.69	71.11	16.27	−1.98	37	0.050*	−21.97	0.23
Difference	1.67	17.95	0.69	13.03	0.19	37	0.850	−9.36	11.31

\**P* < 0.05 independent two group Student's *t*-test. N = 39 (compress group = 21; control group = 18). BP, body pain; CI, confidence interval; d.f., degrees of freedom; GH, general health; MH, mental health; SD, standard deviation; VT, vitality.

**Table 6** Comparison of SF-36 between groups

	Median value (lowest/highest value)		Average rank		<i>U</i>	<i>P</i>
	Compress group	Control group	Compress group	Control group		
PF						
Before	95.0 (72.5/100.0)	97.5 (70.0/100.0)	16.79	23.75	121.5	0.057
After	95.0 (67.5/100.0)	98.75 (57.5/100.0)	18.88	21.31	165.5	0.512
Difference	2.5 (−10.0/15.0)	0.0 (−17.5/2.5)	23.71	15.67	111.0	0.028*
RP						
Before	87.5 (40.65/100.0)	100.0 (65.65/100.0)	16.9	23.61	124.0	0.069
After	96.9 (62.55/100.0)	96.88 (43.8/100.0)	19.45	20.64	177.5	0.749
Difference	0.0 (−37.45/28.10)	0.0 (−46.85/12.45)	23.60	15.81	113.5	0.032*
SF						
Before	81.25 (50.0/100.0)	93.75 (56.25/100.0)	17.74	22.64	141.5	0.183
After	93.75 (25.0/100.0)	93.75 (50.0/100.0)	20.0	20.00	189.0	1.000
Difference	0.0 (−37.5/25.0)	0.0 (−37.5/25.0)	21.95	17.72	148.0	0.257
RE						
Before	91.65 (41.7/100.0)	91.7 (75.0/100.0)	18.0	22.33	147.0	0.245
After	91.7 (20.8/100.0)	91.7 (54.2/100.0)	20.07	19.92	187.5	0.967
Difference	0.0 (−45.9/45.85)	0.0 (−41.70/20.85)	21.00	18.83	168.0	0.568

\**P* < 0.05 Mann–Whitney *U*-test. N = 39 (compress group = 21; control group = 18). PF, physical function; RE, role emotional; RP, role physical; SF, social function; SF-36, 36-Item Short Form Survey.

were limited to those taking laxatives; therefore, this shows new results of the hot compresses method on constipation. However, given the above, it became clear that there was a necessity to consider the effect of

laxative administration on the effectiveness of the hot compresses method.

Next, the author considered the effect of the hot compresses method on QOL. In this investigation, the

**Table 7** Comparison of number of days and drug use on laxatives between groups

	Median value (lowest/highest value)		Average rank		<i>U</i>	<i>P</i>
	Compress group	Control group	Compress group	Control group		
No. of days of laxatives						
Before	3.0 (1.0/14.0)	2.0 (1.0/14.0)	22.10	17.56	145.0	0.223
After	3.0 (0.0/14.0)	2.0 (0.0/12.0)	20.48	19.44	179.0	0.308
Difference	−0.5 (−2.0/1.0)	−0.5 (−2.0/2.0)	20.43	19.50	180.0	0.813
No. of laxative administrations						
Before	3.0 (1.0/84.0)	2.0 (0.0/41.0)	21.74	17.97	152.5	0.791
After	4.0 (0.0/82)	2.0 (0.0/16.0)	20.38	19.56	181.0	0.835
Difference	1.5 (−17.5/7.5)	1.0 (−15.0/4.0)	21.00	18.83	168.0	0.568

\**P* < 0.05 Mann–Whitney *U*-test. *N* = 39 (compress group = 21; control group = 18).

**Table 8** Comparison of laxative administrations and number of days on laxatives between groups

		Rank	<i>N</i>	Average rank	<i>Z</i>	<i>P</i>
No. of days of laxatives						
Compress group	Total number of post-intervention days < total number of pre-intervention days		13	8.12	−2.63	0.008*
	Total number of post-intervention days > total number of pre-intervention days		2	7.25		
	Total number of post-intervention days = total number of pre-intervention days		6			
Control group	Total number of post-intervention days < total number of pre-intervention days		12	9.92	−2.04	0.041*
	Total number of post-intervention days > total number of pre-intervention days		5	6.80		
	Total number of post-intervention days = total number of pre-intervention days		1			
No. of laxative administrations						
Compress group	Total number of post-intervention < total number of pre-intervention		14	8.50	−2.67	0.008*
	Total number of post-intervention > total number of pre-intervention		2	8.50		
	Total number of post-intervention = total number of pre-intervention		5			
Control group	Total number of post-intervention < total number of pre-intervention		12	9.96	−2.06	0.039
	Total number of post-intervention > total number of pre-intervention		5	6.70		
	Total number of post-intervention = total number of pre-intervention		1			

\**P* < 0.05 Wilcoxon signed rank. *N* = 39 (compress group = 21; control group = 18).

author demonstrated an improvement in the physical and psychological subcategory of CQ15 after the hot compresses intervention, and further improvement of PF and RP of the SF-36. The psychological subcategory of

CQ15 measures the effects on social life, including the workplace and school, as well as hobbies and interpersonal activities. Self-reported symptoms of constipation as well as the number of days of defecation and number



of defecations improved significantly. In addition, CQ15 was higher and QOL was lower during the pre-interventional period, suggesting a larger improvement in QOL with respect to constipation. This led to improvement of both the physical and psychological effects, reducing the effect of constipation on social activities. PF and RP of the SF-36 also improved significantly. PF and RP are criteria related to physical activity levels such as climbing stairs and active time at work. Given that the subjects of the author's study were healthy adult females, these QOL scores might have started high, and the suitability of the results may be low. Therefore, an appropriate measurement tool must be used depending on the situation.

Finally, the author discussed whether the hot compresses method was able to reduce the administration of laxatives. Although the self-reported conditions and characteristics of constipation improved, a significant reduction of laxative use was not observed. In contrast, intragroup comparison revealed a significant reduction in laxative use in both the compresses and control groups. Together, these results suggest that laxative use decreased because of factors other than the degree of constipation.

The self-monitoring through daily defecation records conducted by both groups might have had an effect on the reduction of the number of days of laxative use and number of laxative use in both the compresses and control groups. Self-monitoring increases awareness of the factors affecting healthy activities through self-observations (Wadden *et al.*, 2005), and is effective for the promotion of such activities. Although there have not been any studies regarding self-monitoring in patients with constipation, the effectiveness of recording and measurements through self-monitoring have been reported for diabetes (Pickup, Freeman, & Sutton, 2011). The reduction of laxative use seen in the present study may be attributed to the awareness that the participants gained through self-monitoring.

## LIMITATIONS

The interventional hot compresses method used in this study could not be conducted blinded; therefore, it is possible that the Hawthorne effect influenced the results. Moreover, the type of laxatives, use conditions, or type of constipation was not monitored, and the effect of the compresses method may differ depending on these conditions. Further research is necessary to differentiate its effects.

## CONCLUSION

The lumbar application of 40°C hot compresses in female adults with constipation improved their conditions of defecation and QOL, even though it did not reduce laxative use amounts. In addition to investigating the effect of the hot compresses method on constipation and QOL, it will be necessary to investigate the reasons for laxative use and non-constipation factors leading to laxative use in the future.

## ACKNOWLEDGMENTS

The author acknowledges the subjects who participated in this study. The author would like to thank Professor Michiko Hishinuma, the late Haruo Yanai, Kazuhiro Nakayama of St. Luke's International University and Makiko Nozawa of Nihonbashi Lady's Clinic for their support of this study. This study was supported by the Yamaji Fumiko Nursing Research Fund.

## DISCLOSURE

The author has no conflicting interest in this study.

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