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ORIGINAL ARTICLE

Effect of acupressure on constipation in patients with advanced cancer

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Abstract

Purpose Constipation is a common and distressing symptom for patients with advanced cancer. Few reports have focused on the symptoms of constipation in patients with advanced cancer. The aim of this study was to investigate the effect of a short-term acupressure intervention on patients with advanced cancer.

Methods This study used a non-randomized, pre-post study design to assess the effect of acupressure intervention. A total of 30 patients with advanced cancer were recruited from the hospice unit of a medical center in southern Taiwan. In addition to routine care, patients in the intervention group received an 8-min acupressure treatment daily for 3 consecutive days. Three acupoints were used in this study: Zhongwan (CV12), Guanyuan (CV4), and Tianshu (ST25). Analysis of covariance was used to compare the differences in symptoms of constipation between the two groups, adjusted for baseline values. Effect sizes were calculated using partial eta squared (η^2).

Results Significant improvements in symptoms of constipation (partial $\eta^2 = 0.40$, $p < 0.001$ for straining during defecation; partial $\eta^2 = 0.30$, $p = 0.002$ for hard stools; partial $\eta^2 = 0.42$, $p < 0.001$ for sensation of incomplete evacuation; and partial $\eta^2 = 0.29$, $p = 0.002$ for sensation of anorectal obstruction), Bristol stool form scale scores (partial $\eta^2 = 0.40$, $p < 0.001$), comfort levels during defecation (partial $\eta^2 = 0.82$, $p < 0.001$), and colonic motility (partial $\eta^2 = 0.85$, $p < 0.001$) were observed in patients receiving acupressure intervention compared with the controls.

Conclusions Findings from this study indicated that short-term acupressure was effective in alleviating symptoms of constipation among patients with advanced cancer. Further, randomized controlled trials are warranted to confirm the results.

Keywords Advanced cancer · Constipation · Acupressure · Complementary medicine

Introduction

Constipation can be defined as infrequent bowel movements or difficult defecation with or without symptoms such as excessive straining, a sense of incomplete evacuation, hard or lumpy stools, or defecation requiring manual maneuvers to complete [1]. It is a common and distressing symptom for patients with advanced cancer. The prevalence of constipation in these patients is estimated to range from 30–80%, depending on the definition of constipation used [2–4]. Medications (e.g., opioids and antidepressants), poor fluid intake, decreased appetite, and immobility are the main causes of constipation in these patients [5, 6]. Untreated constipation may lead to various distressing symptoms such as abdominal pain, nausea, vomiting, psychological distress, and even life-threatening complications of bowel obstruction and perforation [7].

Although common pharmacological interventions for constipation are effective for short-term symptom relief, their long-term use can be associated with a number of adverse events such as diarrhea and metabolic disturbances [8, 9]. Various non-pharmacological approaches, such as acupuncture [10], auriculotherapy [11], biofeedback [12], moxibustion [13], massage [14], and herbal medicine [15], have been evaluated for the prevention and management of constipation. A meta-analysis of 15 randomized controlled trials, containing 1256 participants, concluded that acupuncture for chronic functional constipation was probably as effective as

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conventional medical therapy in the change of bowel movements and might improve weekly spontaneous bowel movements, quality of life, and relevant symptoms [16].

Contrary to acupuncture, acupressure is a non-invasive and simple intervention that uses finger pressure instead of needles to stimulate specific acupoints of the body along energy meridians defined by traditional Chinese medicine [17]. In traditional Chinese medicine, when relevant acupoints are stimulated, the flow of vital energy "qi" can be improved, which may alter the symptom experience [18]. Several systematic reviews indicated that acupressure shows promise in alleviating symptoms of various health problems such as in allergic disease, nausea, and vomiting in cancer, pain symptoms, sleep disturbances, and cancer-related fatigue [19–23]. A randomized controlled trial on non-oncology patients with constipation showed that perineal self-acupressure could significantly improve quality of life, bowel function, and health and well-being when compared with those receiving standard care [24]. Nevertheless, few reports specifically focusing on the effect of acupressure on constipation in patients with advanced cancer are available in the English literature [25]. Therefore, the aim of this study was to investigate the effect of a short-term acupressure intervention on patients with advanced cancer.

Methods

Study design and participants

This pragmatic study [26] used a non-randomized, pre-post study design to compare the effect of acupressure intervention on patients with advanced cancer. Inpatients from the hospice unit of a medical center in southern Taiwan were recruited into this study from June 1, 2015, to December 1, 2017. The inclusion criteria for the study were (1) age of 20 years or older, (2) principal diagnosis of advanced cancer, (3) able to communicate; (4) diagnosis of constipation by the hospice medical team, (5) treated with laxatives for at least 1 week but still had symptoms of constipation, and (6) consent to participate in the study. The exclusion criteria included (1) delirium, (2) intestinal obstruction, (3) had abdominal abscess or tumor, (4) active gastrointestinal bleeding, and (5) thrombocytopenia (platelet count < 50,000/μL).

The study protocol was approved by the institutional review board of the study site (No. 104-1033B). All patients gave written consent after receiving an oral explanation of the objectives and procedures of the study.

Intervention and control

Patients in the intervention group received acupressure treatment at 2 pm once daily for 3 consecutive days. Patients were treated in supine position, and one of the investigators (C-W H) applied firm pressure (3 to 5 kg of pressure) with the fingertips in a circular motion at a speed of two circles per second for a duration of 2 min per acupoint. A 1–2-s rest was applied after each five to ten circles. The complete process lasted for 8 min. A weighing scale was used for comprehending the correct amount of finger pressure necessary for the acupressure treatment. The three acupoints used in this study were Zhongwan (CV12), Guanyuan (CV4), and Tianshu (ST25). CV12 is located on the midline, 4 cun superior to the umbilicus. CV4 is located on the midline, 3 cun inferior to the umbilicus. ST25 is located on the upper abdomen, 2 cun lateral to the center of the umbilicus [27].

Patients in the control group received routine medical care. At the beginning of the study, all participants were asked to maintain their usual food and water intake as well as the use of stool softeners throughout the duration of the study.

Measurements

The basic characteristics, medication use, and laxative use of the patients were ascertained at the baseline. Symptoms of constipation, Bristol stool form scale scores, and comfort levels during defecation were assessed at the baseline and the end of the study. Colonic motility was assessed at the baseline, day 1, day 2, and the end of the study.

Symptoms of constipation were measured using a previously published instrument with five items [28]. Each item is rated on a four-point Likert scale that ranges from "severe symptom" (4 points) to "no symptom" (1 point). A higher score indicates more severe symptom. The instrument was reviewed by an expert panel consisted of a geriatric specialist, nurse practitioner, head nurse, and senior nurse. A content validity index (CVI) of over 90% was obtained, indicating the instrument has good content validity.

The Bristol stool form scale was used to classify the form of feces into seven categories: (1) separate hard lumps, like nuts (hard to pass); (2) sausage-shaped, but lumpy; (3) like a sausage but with cracks on its surface; (4) like a sausage or snake, smooth and soft; (5) soft blobs with clear cut edges; (6) fluffy pieces with ragged edges, a mushy stool; and (7) watery, no solid pieces, entirely liquid. Type 1 and type 2 indicate constipation and types 3 and 4 are considered as ideal stools [29].

The comfort level during defecation was estimated using a 10-cm visual analogue scale with anchor points of 0 (no discomfort) and 10 (maximum discomfort). Therefore, a higher score indicates a higher level of discomfort during defecation.

The frequency of colonic motility in times per minute was measured by auscultation of the lower right

Table 1 Basic and clinical characteristics of patients with advanced cancer at baseline

Variable	*n* (%)			*p* value
	Total $N = 30$	Acupressure $n = 15$	Control $n = 15$	
Sex				0.439
Male	20 (66.7)	9 (60.0)	11 (73.3)	
Female	10 (33.3)	6 (40.0)	4 (26.7)	
Age group (years)				> 0.999
30–49	4 (13.3)	2 (13.3)	2 (13.3)	
50–69	14 (46.7)	7 (46.7)	7 (46.7)	
70–89	12 (40.0)	6 (40.0)	6 (40.0)	
Educational level				0.797
Elementary school and below	7 (23.3)	4 (26.7)	3 (20.0)	
Junior high school	8 (26.7)	3 (20.0)	5 (33.3)	
Senior high school and above	15 (50.0)	8 (53.3)	7 (46.7)	
Marital status				> 0.999
Being married	14 (46.7)	7 (46.7)	7 (46.7)	
Other	16 (53.3)	8 (53.3)	8 (53.3)	
Main caregiver				0.544
Spouse	10 (33.3)	4 (26.7)	6 (40.0)	
Child	7 (23.3)	5 (33.3)	2 (13.3)	
Nurse	7 (23.3)	4 (26.7)	3 (20.0)	
Other	6 (20.0)	2 (13.3)	4 (26.7)	
Activity level				> 0.999
Normal	7 (23.3)	3 (20.0)	4 (26.7)	
Wheelchair-bound	8 (26.7)	4 (26.7)	4 (26.7)	
Bedridden	15 (50.0)	8 (53.3)	7 (46.7)	
Medication use				
Calcium channel blockers	6 (20.0)	2 (13.3)	4 (26.7)	0.651
Diuretics	12 (40.0)	7 (46.7)	5 (33.3)	0.456
Narcotic analgesics	29 (96.7)	15 (100)	14 (93.3)	> 0.999
Anti-Parkinsonian drugs	1 (3.3)	0 (0)	1 (6.7)	> 0.999
Aluminum antacids	5 (16.7)	1 (6.7)	4 (26.7)	0.330
β-blockers	8 (26.7)	4 (26.7)	4 (26.7)	> 0.999

abdomen with a stethoscope. The procedure was carried out at baseline, on days 1, 2, and 3, at approximately the same time of the day for all patients (2 pm). A mean frequency was also calculated by averaging the recordings on days 1, 2, and 3.

Statistical analysis

The basic and clinical characteristics of the patients were expressed at frequencies and percentages. The differences between the acupressure and control groups were compared using the chi-square test or Fisher's exact test, as appropriate. Analysis of covariance was used to examine the differences on symptoms of constipation, Bristol stool form scale scores, comfort levels during defecation, and colonic motility between the acupressure and control groups, adjusted for their respective baseline levels. In addition, effect sizes for the adjusted mean differences between the acupressure and control groups were calculated with partial η^2. All analyses were performed by using the IBM SPSS Statistics package version 24.0 (SPSS Inc., Chicago, IL, USA).

Results

During the recruitment period, 34 patients were eligible for the study. Three of them declined to participate, and one patient was unable to complete the study due to deteriorated health conditions. No adverse events associated with acupressure were noted. No significant differences were observed in basic and clinical characteristics of patients with advanced cancer between the

Table 2 Laxatives used in patients with advanced cancer

Laxative	*n* (%)			*p* value
	Total $N = 30$	Acupressure $n = 15$	Control $n = 15$	
Sennoside	23 (76.7)	9 (60.0)	14 (93.3)	0.080
Magnesium oxide	1 (3.3)	1 (6.7)	0 (0)	> 0.999
Primperan (metoclopramide)	8 (26.7)	4 (26.7)	4 (26.7)	> 0.999
Lactulose	23 (76.7)	12 (80.0)	11 (73.3)	> 0.999
Dulcolax (bisacodyl)	4 (13.3)	2 (13.3)	2 (13.3)	> 0.999
Dulcolax suppositories	14 (46.7)	10 (66.7)	4 (26.7)	0.028
Glycerin enema	1 (3.3)	0 (0)	1 (6.7)	> 0.999

acupressure and control groups at the baseline (Table 1). Overall, sennoside and lactulose were the most commonly used laxatives. The use of laxatives was not significantly different between the two groups except that of Dulcolax suppositories, which was significantly more common in the acupressure group ($p = 0.028$) (Table 2).

Results of analysis of covariance indicated that significant improvements in symptoms of constipation (partial $\eta^2 = 0.40$, $p < 0.001$ for straining during defecation; partial $\eta^2 = 0.30$, $p = 0.002$ for hard stools; partial $\eta^2 = 0.42$, $p < 0.001$ for sensation of incomplete evacuation; and partial $\eta^2 = 0.29$, $p = 0.002$ for sensation of anorectal obstruction), Bristol stool form scale scores (partial $\eta^2 = 0.40$, $p < 0.001$), comfort levels during defecation (partial $\eta^2 = 0.82$, $p < 0.001$), and colonic motility (partial $\eta^2 = 0.85$, $p < 0.001$) were observed among patients receiving acupressure intervention compared with the controls (Table 3).

Discussion

Findings from this study indicated that a short-term intervention of acupressure was effective in alleviating symptoms of constipation among patients with advanced cancer. Significant improvements were observed in both subjective symptoms and objective measures of constipation. For subjective measurement, four symptoms of constipation and comfort levels during defecation were significantly improved with a moderate to large effect size. Significant improvements in objective measurement of constipation based on Bristol stool form scale scores

Table 3 Analysis of covariance of symptoms of constipation, Bristol stool scale, comfort level during defecation, and colonic movement in patients with advanced cancer

Variable	Adjusted mean[a]		Adjusted mean difference	Partial η^2	*p* value
	Acupressure	Control			
Symptom of constipation					
Straining during defecation	1.59	2.82	− 1.23 (− 1.83, − 0.63)	0.40	< 0.001
Hard stools	2.00	3.13	− 1.14 (− 1.82, − 0.45)	0.30	0.002
Sensation of incomplete evacuation	1.42	2.91	− 1.49 (− 2.18, − 0.80)	0.42	< 0.001
Sensation of anorectal obstruction	1.36	2.70	− 1.34 (− 2.16, − 0.52)	0.29	0.002
Bristol stool form scale[b]	3.85	1.81	2.04 (1.05, 3.03)	0.40	< 0.001
Comfort level during defecation	1.98	8.82	− 6.85 (− 8.12, − 5.57)	0.82	< 0.001
Colonic motility (time/min) (day 1)	4.93	2.14	2.80 (1.59, 4.00)	0.46	< 0.001
Colonic motility (time/min) (day 2)	5.42	2.45	2.96 (1.92, 4.00)	0.56	< 0.001
Colonic motility (time/min) (day 3)	9.27	2.66	6.61 (5.57, 7.64)	0.86	< 0.001
Colonic motility (time/min) (average)	6.50	2.46	4.04 (3.37, 4.72)	0.85	< 0.001

[a] Least-square mean adjusted for baseline value. A higher score indicates more severe symptoms of constipation

[b] Bristol stool form scale: 1: separate hard lumps, like nuts (hard to pass); 2: sausage-shaped, but lumpy; 3: like a sausage but with cracks on its surface; 4: like a sausage or snake, smooth and soft; 5: soft blobs with clear cut edges; 6: fluffy pieces with ragged edges, a mushy stool; and 7: watery, no solid pieces, entirely liquid

and colonic motility were also observed with a moderate to large effect size.

Chronic constipation is a common gastrointestinal complaint in cancer patients and can add an extra burden to patients who already have to cope with debilitating pain and other treatment-induced symptoms [30]. Acupressure is an accessible, non-invasive, and economical procedure and might be used as a non-pharmacological approach in the management of constipation [31]. In addition, the acupressure treatment used in this study is easy to learn and can be self-administered in some patients. Nevertheless, patients in a hospice setting may find self-treatment to be difficult and may require a staff or family member to perform the procedure. A meta-analysis of 15 randomized controlled trials on chronic functional constipation found that acupuncture was probably as effective as conventional medical therapy in the change of bowel movements. It might be the same as conventional medical therapy and could be better than sham acupuncture for improving colonic transit activity [16]. Another systematic review of three randomized controlled trials on moxibustion for treating constipation concluded that there was insufficient evidence to support its effectiveness [32]. However, no systematic review of acupressure is yet available in English to date. One systematic review published in Chinese identified seven studies. The review concluded that acupressure appeared to be effective in increasing the urge to defecate and in reducing abdominal distention. Nevertheless, the authors also pointed out that the strength of evidence was limited by the low methodological quality and incomplete reporting of study design [33]. Given acupressure is based on the same fundamental principle of acupoint stimulation as acupuncture, and that some people are not comfortable with acupuncture needles, additional studies on the effect of acupressure on constipation are warranted. Furthermore, the exact mechanisms involved in the effect of acupressure on constipation are still unclear. Studies on acupuncture suggested that the enhancement of contractility in the distal colon and colonic motility through the vagal and parasympathetic system could be possible pathways [34, 35].

The results of this study should be interpreted in light of its limitations. First, this study was based on a relatively small sample size of patients with advanced cancer from a single center. Second, the lack of random assignment could lead to uneven distribution of potentially confounding variables between groups. Nevertheless, the basic and clinical characteristics between the two groups at baseline were comparable. Moreover, pragmatic research setting is by definition inclusive of non-randomized methodologies, reflecting the "real-life" clinical setting in which non-conventional treatments such as acupressure are taking place. Finally, in the absence of blinding using a sham intervention, such as the use of non-acupoints, the possibility of a placebo effect could not be ruled out. While patients should be blinded whenever possible, it is not considered appropriate in studies using a pragmatic methodology [36]. Further randomized controlled trials with sham acupressure are warranted to confirm the results.

In conclusion, findings from this study indicated that a 3-day acupressure intervention was effective in alleviating both subjective symptoms and objective measures of constipation among patients with advanced cancer. Acupressure should be further investigated as a non-invasive approach to manage constipation among patients with advanced cancer.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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