Original Article

Thai Buddhism-Based Mindfulness for Pain Management in Thai Outpatients with Cancer: A Pilot Study

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Received: April 27, 2020; Accepted: July 07, 2020; Published: October 15, 2020

ABSTRACT

Objective: This study aimed to evaluate Thai Buddhism-based Mindfulness (TBbM) feasibility based on recruitment and retention rates and to obtain preliminary data regarding changes (effect sizes) in pain severity and other outcomes when comparing control to intervention participants following TBbM use. **Methods:** A randomized controlled trial was conducted in the Outpatient Department at Sawanpracharak Hospital, Thailand, from April 2018 to February 2019. Seventeen participants completed the pretest and posttest. Both groups (control group [*n* = 10] and intervention group [*n* = 7]) received usual care and watched a 25-min educational video about cancer pain. The intervention group participated in a 3-day mindfulness training program at a Buddhist temple and continued practicing at home for 8 weeks. Data were collected at baseline and at 1 and 2 months postintervention. **Results:** One-hundred and thirty-five participants met the eligibility criteria; 112 (82%) declined to participate and 6 of 23 (26%) were lost to follow-up/dropped out. Control and intervention participants had an average age of 44 (± 8.77) and 56 years (± 7.41), respectively. When compared to the control group, the TBbM participants reported no statistically significant improvements in pain or other outcomes. While not statistically significant, the effect size indicated that pain did improve in the TBbM group (Cohen's d = 0.41). **Conclusions:** Given the suboptimal recruitment and retention rates, modification of the intervention is warranted. Further, our findings suggest that the intervention had a moderate effect on pain. To evaluate efficacy, future adequately powered studies are needed to test a more feasible TBbM intervention.

Key words: Cancer, mindfulness, management, pain

Introduction

Globally, cancer is the second leading cause of mortality, accounting for 9.6 million deaths in 2018.[1] Thailand has the fifth highest death rate from cancer in South-East Asia Region countries at 128 men and 83 women per 100,000.[2] Of Thai patients with cancer, 62% experience pain,[3] a major health problem that can be caused by both cancer (93%) and its treatments (21%).[4]

Access this article online

Quick Response Code:

Website: www.apjon.org

DOI: 10.4103/apjon.apjon_43_20

Cite this article as: Ngamkham S, Yang JJ, Smith EL. Thai Buddhism-Based Mindfulness for Pain Management in Thai Outpatients with Cancer: A Pilot Study. Asia Pac J Oncol Nurs 2021;8:58-67.

Cancer pain is a complex, dynamic, subjective experience that is influenced by physiological, sensory, affective, cognitive, and behavioral factors.[5-7] Although pharmacological/analgesic treatment is effective, adverse side effects such as constipation, nausea, and dizziness are common. Nonpharmacological treatment may be another option for patients. Internationally, mindfulness interventions are commonly used by patients with cancer as an effective nonpharmacological treatment for psychological problems including distress,[8-10] anxiety,[11-14] stress,[13,15-19] depression,[9,11,12,14,17,18,20] and improvement of quality of life (QoL).[19,21-23] However, the effect of mindfulness on pain as the primary outcome has not been sufficiently investigated.

Mindfulness is the process of healing the whole person: physical, psychological, and spiritual.[24] Mindfulness, or "paying attention in [a] particular way: To the purpose, in the present moment, non-judgmentally" (p. 4),[25] has three components – intention, attention, and attitude – all of which occur simultaneously from moment to moment as a process.[26] Thai Buddhism-based Mindfulness (TBbM), developed by the Thai monk Luangpor Teean Jittasubho, is the process of cultivating self-awareness by attending to the present act of moving the hand while having continuous awareness and an open mind to perceiving pain, thoughts, and emotions called dynamic meditation.[27] Practitioners – those who engage in TBbM – do not self-judge but simply become aware of how their thoughts, feelings, and behaviors influence their pain experience. Through this practice, individuals transform their thoughts and behaviors into pain-modifying strategies.[28] Since the TBbM intervention is grounded in the Buddhist tradition, it may be well accepted by Thai people living with cancer. TBbM intervention is applicable for patients with cancer who are receiving chemotherapy, radiation therapy, and palliative care because it is a simple and natural way of self-awareness practicing.[27] This study aimed to evaluate TBbM feasibility based on recruitment and retention rates and to obtain preliminary data regarding changes (effect sizes) in pain severity, pain interference, and other outcomes (i.e., anxiety and depression, locus of control, mindfulness, and QoL) when comparing control to intervention participants following TBbM use.

Methods

Design

This two-arm randomized controlled pilot trial [Figure 1] was conducted in the Outpatient Department of Sawanpracharak Hospital, Thailand, from April 2018 to February 2019. Study procedures were approved by the Sawanpracharak Institutional Review Board (Approval No. 12/2561). The ClinicalTrials.gov identifier for this trial is NCT03351010.

Theoretical framework

The Theory of Unpleasant Symptoms[29] was used to guide this research. This theory is scientifically relevant because it outlines the interactions among the physiological (age, gender, cancer type, and stage characteristics), psychological (anxiety and depression), and situational factors (trauma exposure) that influence pain outcomes. Higher pain severity is associated with decreased daily function or more pain interference.[30] Higher pain severity is also associated with maladaptive thinking (cognition) or an external locus of control whereby an individual believes that they have no control over their pain.[31] Conversely, psychological conditions influence pain severity.[8,9,11,13,14] Given the potential mediating effects of psychological, cognitive, and situational variables/influencing factors, and the potential effect of mindfulness mediation to ameliorate these influencing factors, we quantified anxiety, depression, locus of control, and trauma exposure in our target population of Thai patients with cancer-related pain.

Participants

Participants were recruited from the Outpatient Department, Sawanpracharak Hospital, a regional hospital and cancer center under the Ministry of Public Health, Nakhonsawan province, Thailand. Inclusion criteria were as follows: (1) outpatient diagnosed with cancer of any type or stage, (2) 18 years of age or older, (3) worst pain score >4 in the past 7 days, (4) able to read and write the Thai language, (5) Karnofsky Performance Status >70%, and (6) willing to travel to the Buddhist temple. The exclusion criteria were as follows: diagnosis of any psychiatric illness that would prevent the patient from giving informed consent or from participating fully in the study and comorbidities (e.g., arthritis, bone metastasis, deformity, and certain neurologic conditions) that would impair performance of the hand and arm movements of the intervention.

Randomization

Consented participants were randomly assigned to either the intervention or control group using a 1:1 allocation schema and a table of computer-generated sequential random numbers. After patients completed the baseline assessments, the principal investigator (PI; S. Ngamkham) opened the sealed envelope to reveal the group allocation.

Recruitment and assessments

At the Outpatient Department of Sawanpracharak Hospital, nurses recruited patients with cancer who met

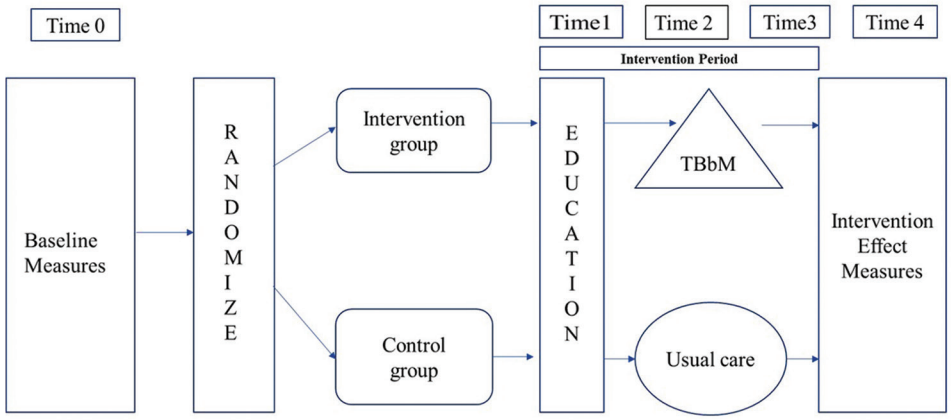

Figure 1: Schematic diagram of Buddhism-based Mindfulness intervention. TBbM: Thai Buddhism-based Mindfulness

the criteria and referred them to the PI, who determined eligibility and explained the study, including its objectives and procedures, to eligible patients. Those who decided to participate in the project provided signed informed consent, after which they were randomly assigned. After baseline assessments were completed, the PI opened the sealed envelope to reveal the group allocation.

Thai Buddhism-based Mindfulness intervention

Both the control and intervention groups received usual care and watched a 25-min cancer pain education video, which was developed by the PI. The video contains information about the definition and causes of cancer pain, pain mechanisms, and pain assessment. After watching the video, all participants were given the opportunity to ask questions of the PI. For example, some participants asked about the pain-relieving effects of herbs. In addition, the intervention group participated in the 8-week self-awareness mindfulness training program created by the Buddhist monk Luangpor Teean Jittasubho. During a 3-day, 2-night stay at Phromburi Temple in Sing Buri province, an expert monk individually trained each participant to perform the 15-position hand movement series [Figure 2], which was then practiced at home for the rest of the 8-week intervention. While practicing the mindfulness hand movements, participants could stand, lie down, or sit in any position on a chair or on the floor. Regardless of position, they were instructed to be aware of every moment. In order to encourage adherence to the TBbM intervention and to provide attention control, the PI made follow-up phone calls to the participants in both the groups every 2 weeks.

Assessment time points and measures

Participants in both the groups were to complete all questionnaires at baseline (Time 0) and at 8-week follow-up (Time 4) and report only their worst pain at 4 weeks (Time 2) [Table 1].

After modification and translation into Thai,[32] the Brief Pain Inventory-Short Form (BPI-SF) was used to measure worst pain (primary outcome variable) and pain interference (secondary outcome variable). The 9-item questionnaire quantifies pain location and intensity (worst, least, average, and current), and items are scored using a numerical rating scale of 0 (no pain) to 10 (pain as bad as one can imagine). The ninth question quantifies how much pain interferes with general activity, mood, walking ability, normal work, relations with others, sleep, and enjoyment of life, using a numerical rating scale of 0 (no interference) to 10 (completely interferes). The total pain interference subscale score is the sum of all interference item scores. Empirical evidence supports satisfactory validity and internal consistency reliability based on high Cronbach's alpha coefficients for pain severity (0.89) items and the pain interference subscale (0.88).[32]

Anxiety and depression, known mediating variables that influence pain severity, were quantified using a Thai-language version of the 14-item Hospital Anxiety and Depression Scale (HADS).[33] HADS contains seven items in each of two subscales that measure anxiety and depression. Items are scored 0–3; subscale scores are computed by summing the scores of the seven individual items. The total score range of each subscale is 0–21, with higher scores indicating more severe symptoms. Internal consistency reliability is adequate, based on subscale Cronbach's alpha coefficients: anxiety (0.85) and depression (0.82).[33] Three HADS cut-point scores reflect levels of symptom severity: nonanxious and nondepressed (0–7 scores), doubtful (8–10 scores), and anxious and depressed (>10).[33]

The 6-item Childhood Traumatic Events Scale (CTES)[34] was used to measure childhood traumatic events (before age 17) as a mediator of worst pain. It has four domains: (1) death of a close family member or friend, (2) parental separation, (3) serious illness, and (4) physical abuse, including sexual assault. Item responses range from 1 (not at

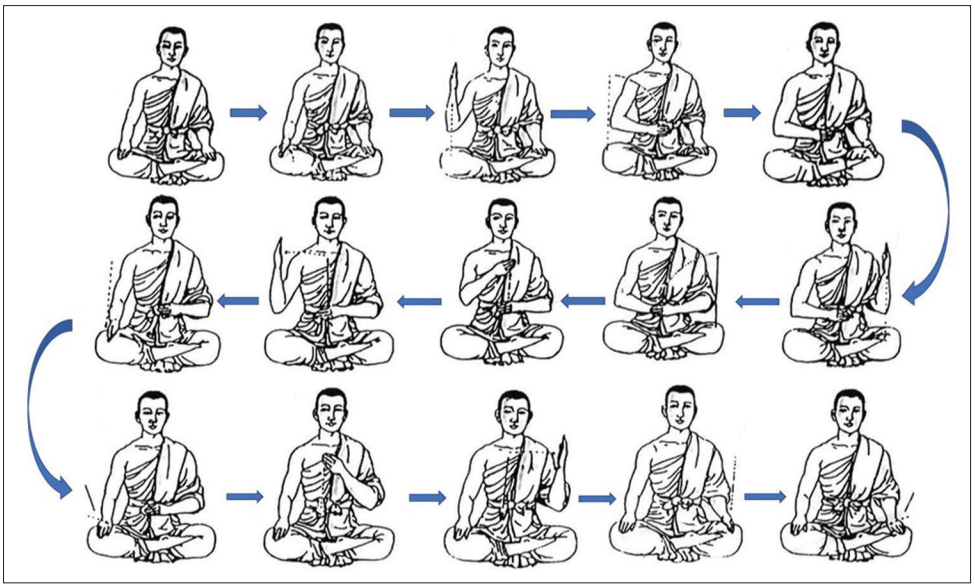

Figure 2: Self-awareness positions

Table 1: Data collection timeline

Data Collection	Time 0	Time 1 2 weeks	Time 2 4 weeks	Time 3 6 weeks	Time 4 8 weeks
Measures					
Demographic questionnaire	X	Intervention starts			
Cancer data form	X				X
Concomitant analgesics form	X		X		X
NRS for worst pain	X		X		X
BPI	X				X
HADS	X				X
CTES	X				X
MAS	X				X
BPCQ	X				X
FACT-G	X				
Phone follow-up			X	X	X

NRS: Numerical Rating Scale; BPI: Brief Pain Inventory; HADS: Hospital Anxiety and Depression Scale; CTES: Childhood Traumatic Events Scale; MAS: Mindfulness Assessment Scale; BPCQ: Beliefs about Pain Control Questionnaire; FACT-G: Functional Assessment of Cancer Therapy-General

all traumatic) to 7 (extremely traumatic). The psychometric properties of the CTES have not been published, but we have significant experience using this instrument and believe that it has acceptable face validity.[34,35] This tool was translated into Thai by the PI and was validated by 5 pain experts who speak both Thai and English (content validity index [CVI] = 0.76). Internal consistency reliability was tested in 42 patients with cancer; the alpha coefficient (α = 0.51) was lower than acceptable established cutoffs.

The Mindfulness Assessment Scale (MAS)[36] was used to investigate self-awareness mindfulness as a secondary outcome; 15 items represent 3 domains (i.e., knowing, intention, and automatic responses). The MAS items quantify mindfulness based on a 1–6 rating scale; higher scores reflect a higher level of mindfulness. Cronbach's alpha coefficients for knowing (0.82), intention (0.67), and automatic response (0.70) suggest moderate internal consistency reliability.[36]

The Beliefs about Pain Control Questionnaire[37,38] contains 13 Likert-scale items within three factors that measure the individual's locus of control: personal (internal factor; 5 items), powerful others (doctor intervention; 4 items), and chance (4 items). Item responses range from 1 (strongly disagree) to 6 (strongly agree). A higher score indicates stronger endorsement of the item. Evidence supports moderate internal consistency reliability based on Cronbach's alpha coefficients (0.68).[38] The PI translated this tool into Thai; 5 pain experts who speak both Thai and English assessed its content validity (CVI = 0.83). Internal consistency reliability of the translated measure was adequate when tested in 42 patients with cancer (α = 0.72).

The 27-item Functional Assessment of Cancer Therapy-General (FACT-G) Version 4-T[39] was used to measure the secondary outcome of QoL in 4 domains of well-being: physical (7 items), social/family (7 items), emotional (6 items), and functional (7 items). Items are scored using a five-point Likert scale of 0 (not at all), 1 (a little bit), 2 (somewhat), 3 (quite a bit), and 4 (very much). The total FACT-G score is obtained by summing the subscale scores; a higher total score indicates better QoL. The Thai language FACT-G has demonstrated good content validity and reliability (α = 0.86) when used with Thai cancer patients.[39]

Miscellaneous measures

The demographic questionnaire collected information about participants' age, gender, religion, education, income, and employment status. The cancer data form was used to collect cancer data (type, stage, and treatment). In addition, qualitative data were collected to evaluate the 25-min video educational program using only an open-ended question. Participants were asked, "What did you think about the educational program?"

Statistical analysis

Data were analyzed using the International Business Machines, Statistical Package for Social Sciences for Windows, Version 25.0 software (IBM Corp., Armonk, NY, USA).[40] The percentage of participants who dropped out was used to evaluate recruitment and retention rates (i.e., feasibility). Descriptive statistics (number, percent, mean, range, and standard deviation [SD]) were used to describe sample characteristics and all outcome variables. Differences in sample characteristics between the groups were tested by Chi-square. Wilcoxon signed-rank tests were used to evaluate the efficacy of the TBbM intervention and ANOVA for analysis of pain change over time. All statistical tests were performed at a two-tail 5% level of significance. Cohen's d was calculated to determine effect sizes. For evaluating the video educational program, the qualitative data were analyzed and categorized into participants' understanding and application to their life.

Results

Twenty-three patients were consented, registered, and randomized to either control (n = 11) or intervention group (n = 12). In total, 17 completed the posttest: 10 from the control and 7 from the intervention groups.

Characteristics of participants

Tables 2a and b describe the baseline demographic characteristics. No significant differences were found between the intervention and control groups. The mean age was 44 years (± 8.77) in the control and 56 years (± 7.41) in the intervention groups. Most of the participants were Buddhist and female, with low education and income. They were diagnosed with cancer of various types and stages (I–IV); all were receiving chemotherapy. Patients were using a variety of pain medications such as warm balm cream, acetaminophen, celecoxib, gabapentin, and intravenous morphine.

Table 2a: Sample characteristics at baseline in the 17 patients with cancer

Variables	Control group (n=7)	Intervention group (n=10)	*P*
Age (years)			
Mean±SD	44.00±8.77	56.57±7.41	0.705
Minimum–maximum	26–52	47–67	
Gender, *n* (%)			
Male	1 (10.0)	1 (14.3)	0.787
Female	9 (90.0)	6 (85.7)	
Buddhist	10 (100.0)	7 (100.0)	
Education, *n* (%)			
Elementary	5 (50.0)	3 (42.9)	0.667
High school	2 (20.0)	1 (14.3)	
Bachelor	2 (20.0)	2 (28.6)	
Other	1 (10.0)	1 (14.3)	
Career, *n* (%)			
Farmer	2 (20.0)	2 (28.6)	0.377
Homemaker	1 (10.0)	2 (28.6)	
Business	2 (20.0)	1 (14.3)	
Other	5 (50.0)	2 (28.6)	
Income (baht/monthly), *n* (%)			
<5000	2 (20.0)	3 (42.9)	0.239
5001–10,000	5 (50.0)	1 (14.3)	
10,001–20,000	3 (30.0)	1 (14.3)	
20,001–30,000	-	1 (14.3)	
Relatives diagnosed with cancer, *n* (%)			
Yes	2 (20.0)	3 (42.9)	0.593
No	8 (80.0)	4 (57.1)	
Previous meditation practice, *n* (%)			
Yes	3 (30.0)	5 (71.4)	0.153
No	7 (70.0)	2 (28.6)	

Feasibility

Figure 3 shows the overall flow of participants through the study. Of 135 eligible patients, 112 (82.9%) declined to participate. Reasons for declining included lack of time and/or interest, health problems (e.g., severe pain, drowsiness, and nausea vomiting), family problems, time conflicts due to pending chemotherapy or radiation treatments, and the cost of traveling to the temple.

Of the 23 enrolled participants, 17 (73.9%) completed the postintervention test. All enrolled participants viewed the 25-min cancer pain education video. All participants

Table 2b: Sample characteristics at baseline in the 17 patients with cancer

Variables	Control group ($n=10$)	Intervention group ($n=7$)	*P*
Cancer types, *n* (%)			
Lung	1 (10.0)	1 (14.3)	0.164
Breast	2 (20.0)	-	
Cervix	4 (40.0)	-	
Liver	-	1 (14.3)	
Colon	-	1 (14.3)	
Peritoneal	1 (10.0)	-	
Ovary	1 (10.0)	3 (42.9)	
Stomach	1 (10.0)	-	
Uterus	-	1 (10.0)	
Cancer stage, *n* (%)			
Stage 1	4 (40.0)	2 (28.6)	0.922
Stage 2	2 (20.0)	1 (14.3)	
Stage 3	2 (20.0)	2 (28.6)	
Stage 4	2 (20.0)	2 (28.6)	
Cancer treatment, *n* (%)			
Surgery	3 (30.0)	4 (57.1)	0.787
Radiation	3 (30.0)	1 (14.3)	
Chemotherapy	9 (90.0)	6 (85.7)	
Pain, mean±SD			
Worst pain, 0–10 scale	7.00±2.05	5.57±1.9	0.871
Least pain, 0–10 scale	2.50±1.65	2.57±1.13	0.363
Average pain, 0–10 scale	5.10±1.85	4.00±1.73	0.835
Current pain, 0–10 scale	4.20±2.39	4.71±2.69	0.784
Severe pain, 0–40 scale	18.80±5.94	16.85±6.89	0.682

*$P<0.05$. SD: Standard deviation

described the video as helpful and easy to understand and stated that their new knowledge would help them to better manage their pain. Seven participants (58%) reported that the TBbM intervention helped them feel peaceful, but traveling to the temple was inconvenient.

Efficacy

The TBbM participants reported that there was no statistically significant improvement in pain [Table 3] when compared to the control group. While not statistically significant, the effect was moderate (Cohen's d = 0.41). Regarding change over time [Table 4], there were statistically significant within-group differences in worst pain when comparing baseline to Time 2 and Time 4 scores in both the control ($\chi^2 = 11.002$, $P = 0.004$) and intervention groups ($\chi^2 = 12.333$, $P = 0.002$).

The descriptive results for the secondary outcomes and mediating variables are shown in Tables 5 and 6. When compared to the control group, the TBbM participants showed no statistically significant improvements in any variables, and effect sizes were small (Cohen's d < 0.30). CTES scores revealed no evidence of early childhood trauma for anyone.

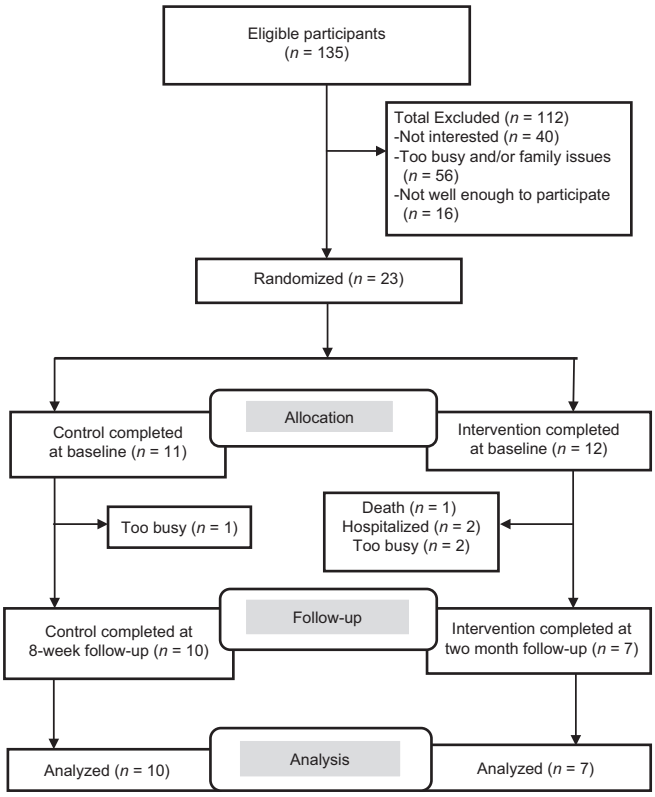

Figure 3: CONSORT flow diagram of patient participation

For the qualitative results, 23 enrolled participants watched the cancer pain education program for 25-min long. All participants reflected that the educational program was particularly useful and easy to understand, thus feeling that they knew how to manage any pain they had.

Discussion

This small pilot study aimed to evaluate TBbM feasibility based on recruitment and retention rates and to obtain preliminary data regarding changes (effect sizes) in pain severity, pain interference, and other variables (anxiety and depression, locus of control, mindfulness, and QoL) when comparing control to TBbM-treated patients.

In alignment with the Theory of Unpleasant Symptoms,[29,41] the TBbM intervention was hypothesized to address psychological and cognitive factors that could mediate changes in worst pain intensity. Because this randomized control trial was not adequately powered to detect mediation effects, an adequately powered study is needed to test the efficacy of the TBbM intervention and identify mediators of pain improvement.

Recruitment feasibility was poor: the intervention itself was not feasible for patients who were sick, undergoing cancer treatment, caring for families, and under financial constraints. Further, those who underwent chemotherapy at the time of recruitment also found it difficult to participate in the study because of time conflicts.

Table 3: Comparisons of mean pain score at baseline and post-intervention in control and intervention groups in the 17 patients with cancer

BPI	Mean ± SD		*Z*	Effect size (Cohen's *d*)
	Baseline	Post-intervention		
Control group (*n*=10)				
Worst pain	7.00±2.05	4.00±3.05	1.906	0.33
Least pain	2.50±1.65	1.90±1.52	0.990	0.17
Average pain	5.10±1.85	3.50±2.01	1.781	0.31
Current pain	4.20±2.39	2.60±2.41	1.333	0.23
Severe pain	18.80±5.94	12.00±8.34	1.780	0.31
Pain interference	30.40±19.07	19.30±19.53	1.784	0.31
Intervention group (*n*=7)				
Worst pain	5.57±1.90	2.29±2.81	2.414	0.41
Least pain	2.57±1.13	0.71±1.11	2.392	0.41
Average pain	4.00±1.73	3.14±2.34	0.813	0.14
Current pain	4.71±2.69	1.43±1.99	2.207	0.38
Severe pain	16.85±6.89	7.57±6.24	2.371	0.41
Pain interference	28.00±17.50	27.00±26.69	0.736	0.13

SD: Standard deviation; BPI: Brief Pain Inventory

Table 4: Change over time of worst pain within group: Control and intervention groups in the 17 patients with cancer

Group	Mean ± SD			χ^2	*P*
	Baseline	Time 2	Time 4		
Control group	7.00±2.05	3.60±2.37	4.00±3.05	11.002	0.004*
Intervention group	5.57±1.90	2.14±2.12	2.29±2.81	12.333	0.002*

*P<0.05. SD: Standard deviation

In terms of retention, the study attrition rate was 26%, suggesting that the current TBbM intervention is not feasible.[42] High illness severity was the main factor influencing participant attrition. Published empirical evidence suggests that a mobile phone mindfulness-based stress reduction intervention for breast cancer survivors was feasible and acceptable.[43] An app/online-based mindfulness intervention has also been well accepted by patients with cancer.[44] Therefore, modification of the intervention to incorporate this technology may address barriers to retention.

We explored efficacy by comparing baseline to postintervention change in pain outcomes between the control and intervention groups. Our findings suggest that pain severity decreased in both the groups over time. However, since no statistically significant differences were found between the intervention and control groups, we cannot conclude that the TBbM intervention was better than education alone to improve pain outcomes. Since worst pain decreased significantly for both the groups when comparing baseline, Time 2, and Time 4, the cancer pain educational program may have been a factor. Evidence indicates that education can be effective in reducing pain severity;[45] hence, study participants' pain may have improved in both the groups after the pain education program due to subsequent shifts to an internal locus of control – beliefs that one can control their own pain – and knowledge of specific strategies for doing so.

Our findings contradict the results reported by Johannsen *et al.*[46,47] and Johns *et al.*[20] suggesting that mindfulness interventions do improve pain intensity. One possible explanation for this discrepancy is that these prior studies were adequately powered to detect an effect. In addition, our findings suggest that the TBbM intervention had a moderate effect on pain but a small effect on anxiety and depression, mindfulness, locus of control, and QoL variables. Another possible explanation is that practicing the TBbM intervention at the temple for 3 days and two nights may increase patients' anxiety, particularly in women, due to perceptions within Thai culture. Thai women cannot touch and send something directly to monks. Thus, female patients believed that staying at temple was exceedingly difficult to eat, take a bath, sleep, and live. These results, obtained from our small pilot study, provide preliminary evidence supporting the need for an adequately powered study to test the effectiveness of a modified TBbM intervention that can be easily administered to sick patients.

Limitations

The study sample was small, homogeneous, and not representative of the general Thai population. The low recruitment rate (17% of eligible patients) suggests that selection bias likely compromised the study's internal validity. Although all monks in the temple are experts in self-awareness mindfulness, participants were trained by different monks, which may have compromised intervention fidelity. Furthermore, the study was underpowered to detect statistically significant changes in the outcome variables, and data regarding analgesic use and dosage – an important, potentially confounding variable – were not collected. Finally, study participants and the PI were not blinded to the intervention assignment, and significant bias could have occurred given that the PI was also the interventionist.

Clinical implementation

Our results suggest that TBbM as currently designed is not a feasible intervention for Thai patients with cancer and should be modified and retested. However, given that participants found the cancer pain educational video and face-to-face discussions with the PI very useful and informative, health-care professionals can encourage self-management behaviors by providing pain-specific educational to patients/families.

Table 5: Comparison between mean score of secondary outcomes at baseline and post-intervention in the control group and intervention group in the 17 patients with cancer

Variables	Mean ± SD		*Z*	Effect size (Cohen's *d*)
	Baseline	Post-intervention		
Control group (*n*=10)				
MAS				
Knowing (0–25)	19.00±5.83	19.60±5.15	0.360	0.06
Intention (0–25)	17.10±2.47	17.20±3.55	0.154	0.03
Automatics (0–25)	14.10±3.14	12.90±2.23	0.986	0.17
FACT–G				
Physical well-being (0–28)	11.40±3.84	10.20±5.03	0.205	0.04
Social/family well-being (0–28)	20.30±4.29	19.90±3.81	0.597	0.10
Emotional well-being (0–24)	6.30±3.06	8.00±3.33	1.407	0.24
Functional well-being (0–28)	19.30±4.19	18.70±4.40	0.461	0.08
Intervention group (*n*=7)				
MAS				
Knowing (0–25)	18.85±3.44	20.86±2.97	1.552	0.27
Intention (0–25)	17.00±4.00	18.00±2.24	0.736	0.13
Automatics (0–25)	12.86±4.41	14.29±4.07	0.677	0.12
FACT-G				
Physical well-being (0–28)	10.14±4.88	11.42±8.81	0.169	0.03
Social/family well-being (0–28)	19.71±4.23	23.00±1.53	0.954	0.16
Emotional well-being (0–24)	7.42±4.03	8.42±5.71	1.069	0.18
Functional well-being (0–28)	19.57±4.23	18.43±6.16	0.341	0.06

SD: Standard deviation; MAS: Mindfulness Assessment Scale; FACT-G: Functional Assessment of Cancer Therapy-General

Table 6: Comparison between mean score of mediating variables at baseline and post-intervention in the control group and intervention group in the 17 patients with cancer

Variables	Mean ± SD		*Z*	Effect size (Cohen's *d*)
	Baseline	Post-intervention		
Control group (*n*=10)				
HADS				
Anxiety (0–21)	4.70±3.20	5.40±1.78	0.494	0.08
Depression (0–21)	4.60±1.95	5.40±2.01	0.060	0.01
BPCQ				
Internal factor (0–30)	20.60±4.03	21.10±3.81	0.357	0.06
Power of doctors (0–24)	15.80±4.54	14.10±6.24	1.128	0.19
Chance events (0–24)	17.80±2.35	19.20±2.86	1.228	0.21
Intervention group (*n*=7)				
HADS				
Anxiety (0–21)	7.14±4.74	6.71±5.82	0.527	0.09
Depression (0–21)	6.85±2.03	8.00±5.29	0.426	0.07
BPCQ				
Internal factor (0–30)	20.42±8.26	21.71±6.34	0.595	0.10
Power of doctors (0–24)	15.28±4.79	17.00±3.74	1.160	0.20
Chance events (0–24)	18.14±2.48	19.14±1.95	0.938	0.16

SD: Standard deviation; BPCQ: Beliefs about Pain Control Questionnaire; HADS: Hospital Anxiety and Depression Scale

Conclusions

Given the suboptimal recruitment and retention rates, the intervention should be modified. Our findings suggest that the intervention had a moderate effect on pain. However, to test the efficacy of a more feasible TBbM intervention, future adequately powered studies that also control for mediating factors and analgesic use are needed.

Acknowledgments

The authors would like to express special thanks and gratitude to Dr. Kathleen Potempa, who gave her the opportunity to train in the Fogarty International Training Program for Strengthening Non-Communicable Disease Research and Training Capacity, co-funded by the National Institute of Nursing Research.

Financial support and sponsorship

This study was financially supported by the Fogarty International Center and National Institute of Nursing Research (Grant No. 1D43TW009883).

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. Cancer. World Health Organization; 2018. https://www.who.int/health-topics/cancer#tab=tab_1. [Last accessed on 2018 Nov 24].
2. World Health Organization. Cancer Situation in SEAR Countries. World Health Organization; 2018. http://origin.searo.who.int/thailand/news/cancer-sear/en/. [Last accessed on 2018 Nov 24].
3. Nagaviroj K, Jaturapatporn D. Cancer pain-progress and ongoing issues in Thailand. Pain Res Manag 2009;14:361-2.
4. Caraceni A, Portenoy RK. An international survey of cancer pain characteristics and syndromes. IASP Task Force on Cancer Pain. International Association for the Study of Pain. Pain 1999;82:263-74.
5. Ahles TA, Martin JB. Cancer pain: A multidimensional perspective. Hosp J 1992;8:25-48.
6. McGuire DB. Comprehensive and multidimensional assessment and measurement of pain. J Pain Symptom Manage 1992;7:312-9.
7. Pidgeon T, Johnson CE, Currow D, Yates P, Banfield M, Lester L, *et al*. A survey of patients' experience of pain and other symptoms while receiving care from palliative care services. BMJ Support Palliat Care 2016;6:315-22.
8. Fish JA, Ettridge K, Sharplin GR, Hancock B, Knott VE. Mindfulness-based cancer stress management: Impact of a mindfulness-based programme on psychological distress and quality of life. Eur J Cancer Care (Engl) 2014;23:413-21.
9. Würtzen H, Dalton SO, Christensen J, Andersen KK, Elsass P, Flyger HL, *et al*. Effect of mindfulness-based stress reduction on somatic symptoms, distress, mindfulness and spiritual wellbeing in women with breast cancer: Results of a randomized controlled trial. Acta Oncol 2015;54:712-9.
10. Zeidan F, Gordon NS, Merchant J, Goolkasian P. The effects of brief mindfulness meditation training on experimentally induced pain. J Pain 2010;11:199-209.
11. Ando M, Morita T, Akechi T, Ito S, Tanaka M, Ifuku Y, *et al*. The efficacy of mindfulness-based meditation therapy on anxiety, depression, and spirituality in Japanese patients with cancer. J Palliat Med 2009;12:1091-4.
12. Dobos G, Overhamm T, Büssing A, Ostermann T, Langhorst J, Kümmel S, *et al*. Integrating mindfulness in supportive cancer care: A cohort study on a mindfulness-based day care clinic for cancer survivors. Support Care Cancer 2015;23:2945-55.
13. Gotink RA, Chu P, Busschbach JJ, Benson H, Fricchione GL, Hunink MG. Standardised mindfulness-based interventions in healthcare: An overview of systematic reviews and meta-analyses of RCTs. PLoS One 2015;10:e0124344.
14. Zhang J, Xu R, Wang B, Wang J. Effects of mindfulness-based therapy for patients with breast cancer: A systematic review and meta-analysis. Complement Ther Med 2016;26:1-10.
15. Carlson LE. Mindfulness-based interventions for physical conditions: A narrative review evaluating levels of evidence. ISRN Psychiatry 2012;14:1-21.
16. Dowd H, Hogan MJ, McGuire BE, Davis MC, Sarma KM, Fish RA, *et al*. Comparison of an online mindfulness-based cognitive therapy intervention with online Pain Management Psychoeducation: A Randomized Controlled Study. Clin J Pain 2015;31:517-27.
17. Carmody J, Reed G, Kristeller J, Merriam P. Mindfulness, spirituality, and health-related symptoms. J Psychosom Res 2008;64:393-403.
18. Lengacher CA, Reich RR, Paterson CL, Ramesar S, Park JY, Alinat C, *et al*. Examination of broad symptom improvement resulting from mindfulness-based stress reduction in breast cancer survivors: A randomized controlled trial. J Clin Oncol 2016;34:2827-34.
19. Mackenzie MJ, Carlson LE, Ekkekakis P, Paskevich DM, Culos-Reed SN. Affect and mindfulness as predictors of change in mood disturbance, stress symptoms, and quality of life in a community-based yoga program for cancer survivors. Evid Based Complement Alternat Med 2014;2013:1-13.
20. Johns SA, Brown LF, Beck-Coon K, Talib TL, Monahan PO, Giesler RB, *et al*. Randomized controlled pilot trial of mindfulness-based stress reduction compared to psychoeducational support for persistently fatigued breast and colorectal cancer survivors. Support Care Cancer 2016;24:4085-96.
21. Osborn RL, Demoncada AC, Feuerstein M. Psychosocial interventions for depression, anxiety, and quality of life in cancer survivors: Meta-analyses. Int J Psychiatry Med 2006;36:13-34.
22. Poulin PA, Romanow HC, Rahbari N, Small R, Smyth CE, Hatchard T, *et al*. The relationship between mindfulness, pain intensity, pain catastrophizing, depression, and quality of life among cancer survivors living with chronic neuropathic pain. Support Care Cancer 2016;24:4167-75.
23. Reich RR, Lengacher CA, Alinat CB, Kip KE, Paterson C, Ramesar S, *et al*. Mindfulness-Based Stress Reduction in Post-treatment Breast Cancer Patients: Immediate and Sustained Effects Across Multiple Symptom Clusters. J Pain Symptom Manage 2017;53:85-95.
24. Ott MJ. Mindfulness meditation: A path of transformation; healing. J Psychosoc Nurs Ment Health Serv 2004;42:22-9.
25. Kabat-Zinn J. Wherever you go, there you are: Mindfulness Meditation in Everyday life. 1st ed. New York: The United States of America; 1994.
26. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. J Clin Psychol 2006;62:373-86.
27. Jittasubho T. A Manual of Self-Awareness. Bangkok, Thailand: Laugpor Teean Jittasubho (Pann Itapew) Foundation; 1994.
28. Harrington N, Pickles C. Mindfulness and cognitive behavioral therapy: Are they compatible concepts? J Cognitive Psychother 2009;23:315-23.
29. Lenz ER, Pugh LC, Milligan RA, Gift A, Suppe F. The middle-range theory of unpleasant symptoms: An update. ANS Adv Nurs Sci 1997;19:14-27.
30. Cho SF, Rau KM, Shao YY, Yen CJ, Wu MF, Chen JS, *et al*. Patients with head and neck cancer may need more intensive pain management to maintain daily functioning: A multi-center study. Support Care Cancer 2019;27:1663-72.
31. Musich S, Wang SS, Slindee L, Kraemer S, Yeh CS. The association of pain locus of control with pain outcomes among older adults. Geriatr Nurs 2019;S0197-4572(19)30173-9.
32. Chaudakshetrin P. Validation of the Thai Version of brief

pain inventory (BPI-T) in cancer patients. J Med Assoc Thai 2009;92:34-40.
33. Nilchaikovit T, Lotrakul M, Phisansuthideth U. Development of Thai version of hospital anxiety and depression scale in cancer patients. J Psychiatric Assoc Thailand 1996;41:18-30.
34. Pennebaker JW, Susman JR. Disclosure of traumas and psychosomatic processes. Soc Sci Med 1988;26:327-32.
35. Scheller-Gilkey G, Moynes K, Cooper I, Kant C, Miller AH. Early life stress and PTSD symptoms in patients with comorbid schizophrenia and substance abuse. Schizophr Res 2004;69:167-74.
36. Silpakit O. The Invention of the mindfulness assessment scale. J Ment Health Thailand 2015;23:72-90.
37. Czerw A, Religioni U, Deptała A, Fronczak A. Application of the BPCQ questionnaire to assess pain management in selected types of cancer. Ann Agric Environ Med 2016;23:677-82.
38. Skevington SM. A standardised scale to measure beliefs about controlling pain (BPCQ): A preliminary study. Psychol Health 1990;4:221-32.
39. Glangkarn S, Promasatayaprot V, Porock D, Edgley A. Measuring quality of life in thai women with breast cancer. Asian Pac J Cancer Prev 2011;12:637-44.
40. IBM Crop. SPSS Statistics for Windows [Computer Program]. Ver. 22.0. NY: IBM Crop; 2013.
41. Ngamkham S, Holden JE, Smith EL. A Systematic Review: Mindfulness Intervention for Cancer-Related Pain. Asia Pac J Oncol Nurs 2019;6:161-9.
42. Dumville JC, Torgerson DJ, Hewitt CE. Reporting attrition in randomised controlled trials. BMJ 2006;332:969-71.
43. Lengacher CA, Reich RR, Ramesar S, Alinat CB, Moscoso M, Cousin L, *et al*. Feasibility of the mobile mindfulness-based stress reduction for breast cancer (mMBSR (BC)) program for symptom improvement among breast cancer survivors. Psychooncology 2018;27:524-31.
44. Kubo A, Altschuler A, Kurtovich E, Hendlish S, Laurent CA, Kolevska T, *et al*. A pilot mobile-based mindfulness intervention for cancer patients and their informal caregivers. Mindfulness (N Y) 2018;9:1885-94.
45. Roth RS, Geisser ME. Educational achievement and chronic pain disability: Mediating role of pain-related cognitions. Clin J Pain 2002;18:286-96.
46. Johannsen M, O'Connor M, O'Toole MS, Jensen AB, Højris I, Zachariae R. Efficacy of mindfulness-based cognitive therapy on late post-treatment pain in women treated for primary breast cancer: A randomized controlled trial. J Clin Oncol 2016;34:3390-9.
47. Johannsen M, O'Toole MS, O'Connor M, Jensen AB, Zachariae R. Clinical and psychological moderators of the effect of mindfulness-based cognitive therapy on persistent pain in women treated for primary breast cancer - explorative analyses from a randomized controlled trial. Acta Oncol 2017;56:321-8.