Effectiveness of Tai Chi Qi Qong Program for Thai Women with Breast Cancer: A Randomized Control Trial

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Abstract: Despite their increasing cancer survival rate, many women with breast cancer still live with suboptimal health and quality of life. This randomized control trial aimed to determine the effects of the Tai Chi Qi Qong program on self-esteem, fatigue, cortisol, and quality of life in Thai women with breast cancer. The sample included 30 Thai women with breast cancer who, after treatment completion, routinely visited the breast clinic in a university hospital, Bangkok, Thailand. The participants meeting eligibility criteria were randomly assigned into an experimental group and received the program, in addition to usual care, and the control group received only usual care (n = 15 per group). Data were collected at baseline (T_1), 6th week (T_2), and 12th week (T_3) after program implementation. Instruments for data collection were the Rosenberg Self-Esteem Scale, the Fatigue Symptom Inventory, cortisol, and the Functional Assessment of Cancer Therapy-Breast. Repeated measures ANOVA and ANCOVA were used to test the program efficacy.

The results revealed that the experimental group had statistically significant improvement in self-esteem, fatigue, cortical, and quality of life compared with control group between 6th week and 12th week after baseline data was controlled. The findings indicated that the Tai Chi Qi Qong is a beneficial program for Thai woman with breast cancer. Nurses should integrate this program in their practice to promote health and quality of life in Thai women with breast cancer. However, future studies are required including a randomized control trial with a larger sample size.

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Introduction

Breast cancer is one of most common cancers among women worldwide including Thailand. The diagnosis of breast cancer at an early stage through proper screening procedures and wide spread adoption of more effective adjuvant treatment has resulted in the growing number of breast cancersurvivors.[1, 2] In Thailand, the 5-year survival rate for breast cancer

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was approximately 62.7% and breast cancer survivors are now represented as the largest proportion of cancer survivors.[2] Along with this increasing survival rate, some women with breast cancer have still live with suboptimal health and quality of life (QOL).[3-7] QOL is a multi-dimensional construct encompassing psychological functioning, social adjustment, functional ability, and behavioral co-morbidity,[5, 7-8] which is one significant indicator of successful treatment in chronic illnesses, including breast cancer.[3] Therefore, health care providers should have the potential to improve treatment outcomes and minimize complications after treatment completion in order to attain better QOL for women with breast cancer.

Fatigue has been claimed as a major source of variance in QOL of all behavioral co-morbidities in women with breast cancer after treatment completion.[3-5, 8, 10] There is growing evidence to support that this fatigue could persist for months or years after treatment completion,[4, 7, 9-10] and is experienced at the rate of 35-66% at 5-year survival[7] and 20-34% at 10-year survival.[9] Furthermore, fatigue has emerged as the strongest predictor of QOL in the first year after breast cancer diagnosis, explaining around 30-50% of the variability in physical function and overall QOL.[7, 9]

Regarding psychosocial aspects of women with breast cancer, it is estimated that one-third to one-half experience psychosocial distress influencing on psychosocial functioning overtime.[5-6] Consistent with Thai women with breast cancer experiences, a previous study reported that common psychosocial distresses were anxiety (16%) and depression (19%).[11] Predicting factors of psychological distress in Thai women with breast cancer are social support, coping, and symptoms (pain and fatigue).[11] High depression and anxiety in patients in the follow-up period for breast cancer could negatively affect their QOL.[5-7, 11] Hence, improving psychosocial distress in women with breast cancer should focus on stress management and some specific symptoms control (e.g. fatigue and pain).

Another significant psychosocial distress is a decline in self-esteem,[12-15] which women view as affecting their self-worth, self-respect and self-value, and all important aspects affecting QOL.[12] Self-esteem is worsened by breast cancer surgery due to its impact on self-image and sexual life [12-14] and compounded by high levels of fatigue and stress.[12-15] However, self-esteem plays a significant role in the ability of individuals with breast cancer to thrive and go on to live normal lives.[12-14] Self-esteem has also been positively correlated with, and explains most of the variance, in well-being and QOL in individuals with breast cancer.[12-15] Hence, self-esteem needs to also be a targeted intervention outcome to aid individuals with breast cancer to maintain and improve their QOL after treatment completion.

Tai Chi (TC) has been found to be beneficial for people with and without a history of cancer, for stress reduction and increasing self-esteem,[14, 15] reducing anxiety and depression [16-19] and cortisol.[17,18] Additionally, TC has been found to improve cardio-respiratory function and aerobic capacity,[21] immune function,[22-25] muscular strength and flexibility,[25] fatigue [14-16] and several dimensions of QOL.[14, 16, 20, 25] Moreover, TC has been suggested as increasing overall survival in selected populations as well.[20, 25] One of the most widely used type of TC is Tai Chi Qi Qong (TCQQ), a combination of Tai Chi and Qi Qong consisting of short styles of 18-forms TCQQ, and which can improve both physical and psychosocial health and QOL in Thai older persons.[26] However, no research to date has shown whether this TCQQ has an effect on cortisol as a marker of stress, behavioral co-morbidities (fatigue), self-esteem, and QOL of Thai women with breast cancer. This experimental study, therefore, aimed to determine the effectiveness of TCQQ program on self-esteem, fatigue, cortisol, and QOL in women with breast cancer.

It was hypothesized that women who were breast cancer survivors who participated in the TCQQ program would report:

1. Significantly higher self-esteem, lower cortisol, lower fatigue, and higher QOL than women in the control group who received usual care, and

2. Significant improvement of self-esteem, cortisol, fatigue, and QOL at 6th Week and 12th week post-intervention.

Conceptual Framework and Related Literature

The conceptual framework used to guide this study was the Psychoneuroimmunology Model (PNI model). This determines the interactive relationships among psychosocial health (mind), physiological health (neuroendocrine and immune system) and human behavior.[32] This model focuses on how the brain affects the immune cells and how the behaviors can affect the immune system. McCain et al. incorporated Lazarus's transactional model of stress within their PNI model to examine intervention effects in women with breast cancer.[32] This stress process model holds that a variety of coping strategies (including relaxation and social support) used in response to perceived stress serve to psychologically mediate the adaptation outcomes of psychological functioning, QOL, and somatic health.[32] TCQQ includes meditation through simple and deep movements to stimulate both body and mind for relaxation. It was therefore assumed that the PNI model and TCQQ together had the mind and body connection to provide synergic affects for human health.

Treatment completion is a significant period for breast cancer survivors, when they expect to better adapt to more normal life; however, they may still have to face several psychosocial and physical problems that eventually result in reducing QOL. TCQQ, one of the most widely used as a mind-body therapy today, has a potential range of physical, psychosocial, and spiritual synergistic effects if practiced sufficiently. It is a Chinese wisdom exercise that includes meditation and spiritual uplifting through simple but deep movements

stimulating body and mind to induce relaxation. These techniques can encourage a personal sense of control, improve mood, reduce side effects of treatment, increase immunity, and are consistent with a holistic approach to health. Hence, TCQQ program promoting better health and ensuring better QOL following treatment completion in breast cancer survivors is now a focus for clinical outcomes and research. Several previous studies in the US with breast cancer survivors found that TCQQ serves to psychologically mediate the adaptation health outcomes of neuroendocrine-immune reactivity, QOL, and behavioral co-morbidity.[27, 28]

In TCQQ, the exercise intensity of each motion is approximately 3.1 METs (S.D. = 0.9) and the energy expenditure of each set (18-forms) is about 60 Kcal.[29, 30] These findings demonstrate that TCQQ is a low-moderate intensity exercise that can be prescribed as a therapeutic program for women with breast cancer. TCQQ is a safe program that can be tailored to fit with the activity level of each individual. TCQQ consisted of 3 main concepts: slow intentional movements, often coordinated with breathing, and imagery. It aims to strengthen and relax the physical body and mind, enhance the natural flow of what the Chinese call "Qi or Chi", non-translatable words, that describe the interpenetration and connection of phenomenon, or life energy, and improve health, personal development, and self-defense.[27, 28] All potential therapeutic effects are said to occur in eight dimensions: 1) musculoskeletal strength, flexibility and efficiency; 2) breathing; 3) concentration, attention, and mindfulness; 4) imaginary, visualization, and intention; 5) physical touch, massage, and subtle energy; 6) psychosocial interaction; 7) alternative health paradigm, philosophy, and spirituality; and 8) ritual, icons and environmental effects.[27, 28]

Method

Design: A randomized control trial with repeated measures was used in this study.

Ethical Considerations: The study was approved by Siriraj Institutional Review Board (SIRB), Faculty of Medicine, Siriraj Hospital, (Certificate of Approval No. *Si*.494/2011, Protocol number 476/2554: EC3). Each eligible participant was informed about: the purpose of the study; what study involvement entailed; voluntary participation; confidentiality and anonymity issues; the right to refuse to answer any specific question; and the ability to withdraw at any time without repercussion. Those willing to participate were asked to sign a consent form before taking part in the study.

Sample and Setting: This study was conducted during mid-December 2011 to July 2012, at the breast clinic of a university hospital in Bangkok. The sample was recruited from women with breast cancer who came for routine follow-up visits at the clinic. The principal investigator (PI) looked at the medical record for eligible participants meeting the study criteria: 1) first diagnosis with stage 0-IIIb breast

cancer; 2) completion of treatment at least one year before the study; 3) no physical limitation on low to moderate exercise; 4) no diagnoses of mental disorders; 5) having telephone contact number; and 6) ability to read, write, and speak Thai. The PI met the potential participants, after they were first contacted and informed about this research study by the clinic head nurse or staff nurses, to explain the study in more detail and gave them a chance to ask questions. Finally, a total of 30 eligible women consented to participate, and they were randomly assigned into two groups as depicted in Figure 1. The sample size was calculated using an estimation of 12 participants per group rule of thumb the justification for which was based on power analysis.[32] Another 17% (n = 3) was added for attrition, after a previous TCQQ program study in the US survivors of breast cancer resulted in the need for 15 participants in each group.[32]
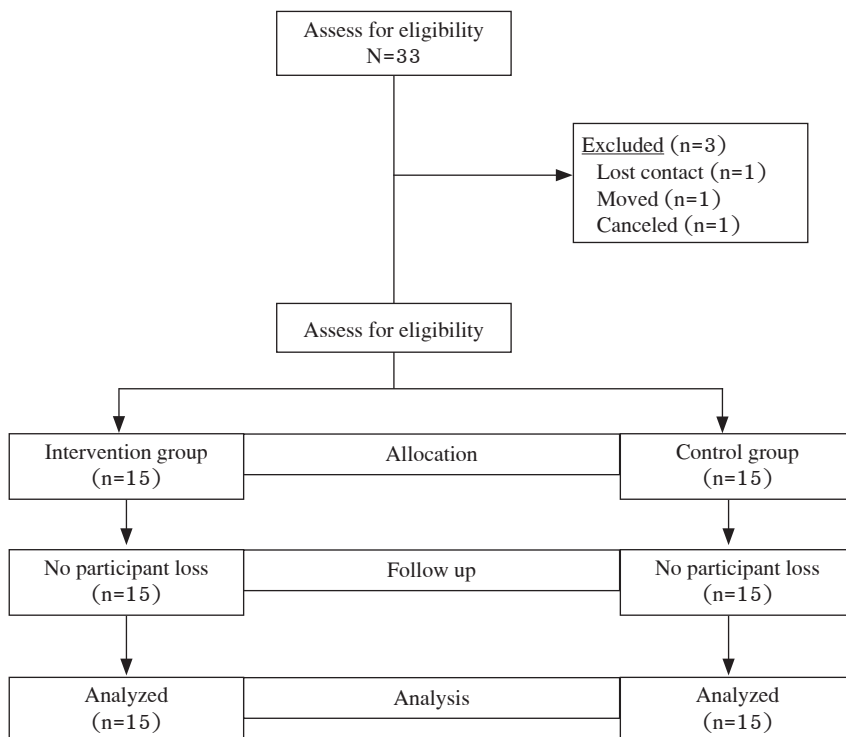
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                    │  Assess for eligibility │
                    │        N=33            │
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                               │              │   Lost contact (n=1)     │
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    ┌───────▼────────┐    Allocation      ┌────────▼───────┐
    │ Intervention   │                    │  Control group │
    │ group (n=15)   │                    │     (n=15)     │
    └───────┬────────┘                    └────────┬───────┘
    ┌───────▼────────┐    Follow up       ┌────────▼───────┐
    │ No participant │                    │ No participant │
    │ loss (n=15)    │                    │ loss (n=15)    │
    └───────┬────────┘                    └────────┬───────┘
    ┌───────▼────────┐    Analysis        ┌────────▼───────┐
    │   Analyzed     │                    │   Analyzed     │
    │    (n=15)      │                    │    (n=15)      │
    └────────────────┘                    └────────────────┘
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Figure 1 Flow Diagram of Participants' Enrollment

Instruments: Two sets of instrument were used: 1) instrument for data collection and 2) TCQQ program as described below.

The Personal Case Record Form (P-CRF) was developed by the researchers, to obtain information about demographic and clinical (treatment) information that were obtained by research assistant (RA). It consisted of age, height, weight, body mass index (BMI), education level, occupation, individual income, marital status, caregiver types, health care payment, accommodation types, exercise preference, history and type, complementary and alternative medicines, caffeine consumption, diagnosis, date of diagnosis, staging of cancer, received treatments, lymph-node status, estrogen receptor (ER) and progesterone receptor (PR), complications, co-morbidity and its treatment, menopausal status, infection history, and vital signs including blood pressure, heart rate, and body temperature.

The Rosenberg Self-esteem Scale (RSE) was originally developed by Rosenberg in 1965[33] and was translated into Thai language version using a back-translation technique in 2001.[34] It is a 10-item scale measuring global self-worth covering both positive (5 items) and negative feelings (5 items) about self-esteem. Examples of items are: "On the whole, I am satisfied with myself (positive feeling)" and "I feel I do not have much to be proud of (negative feeling)." Responses to items are rated on a Likert scale from 0-3 (strongly agree – strongly disagree). Negative item scores are reversed before being summed with the score on positive items. The total score ranges from 0-30. Higher scores indicate higher self-esteem. The Cronbach's alpha reliability of a previous study was at 0.77 and 0.88, respectively.[14, 34] In this study the Cronbach's alpha was at 0.70.

The Fatigue Symptom Inventory (FSI) was originally developed in 1998[35] and translated into Thai using the back-translation technique in 2006.[36] It is a 14-item self-report measure designed to assess severity, frequency, and daily pattern of fatigue including its perceived interference with QOL. Severity is measured on separate 11-point scales (0 = Not at all fatigued; 10 = As fatigued as I can be) that assess most, least, and average fatigue in the past week and current fatigue. Frequency is measured as the number of days in the past week (0-7) that fatigue was felt and the extent of each day on average that fatigue was felt (0 = None on the day; 10 = The entire day). Perceived interference is measured on separate 11-point scales (0 = No interference; 10 = Extreme interference). These assess the degree to which fatigue in the past week was judged to interfere with general level of activity, ability to bath and dress, normal work activity, ability to concentrate, relations with others, enjoyment of life, and mood. These interference ratings can be summed to obtain a total perceived interference score. The final item provides qualitative information about possible diurnal variation in the daily experience of fatigue. An item example is: "Rate your level of fatigue on and the day you felt most fatigued during the past week (severity). For instrument scoring, each item on the FSI is scored on an individual scale (severity, frequency, and interference). The total possible score of 14 items ranges from 0-131, with a higher score indicating higher fatigue. The reliability of FSI in a previous study was 0.96 [36] and in this study was 0.95, respectively.

The Functional Assessment of Cancer Therapy-Breast (FACT-B) Version 4 was developed in 1993.[37] It is a self-report measure designed to assess QOL both general and breast cancer-specific dimensions. The tool was translated into Thai with a back translation-technique in 2001 and permission for its use was received for this study.[38] The FACT-B scales are designed for patient self-administration, but can also be administered in interview format. It consists of a 27-item general QOL scale (FACT-G) with 4 well-being subscales: Physical Well-Being: (PWB) 7 items, Social Well-Being: (SWB) 7 items, Emotional Well-Being: (EWB) 6 items, Functional Well-Being: (FWB) 7 items, and a 9-item breast

cancer-specific scale (BCS). Possible responses to each item range 0-4 (0 = Not at all to 4 = Very much). A higher score indicates higher QOL. Item examples are: "I have nausea (PWB);" "I feel close to my friends (SWB);" "I feel sad (EWB);" "I am sleeping well (FWB);" "I feel sexually attractive (BCS)".[37] A higher FACT-B score indicate the better QOL. Reliability of the total FACT-B scales in previous study ranged 0.84 to 0.86.[38] The Cronbach's alpha in this study was 0.89.

Cortisol: The effects of stress on immunity have tentatively been related to the increased release of cortisol. It is the biological marker of stress as well as stress hormone that has previously been used in studies.[18, 19] It is routinely used as a biomarker of psychological stress and related mental or physical disease, although the psychological mechanisms which trigger the Hypothalamus-Pituitary-Axis (HPA). Urine Free Cortisol (UFC) is considered a suitable noninvasive alternative to blood collection for the assessment of cortisol level with high correlations between unbound free cortisol levels in serum, urine, and salivary during the circadian cycle and under different dynamic tests.[18, 19] All participants were supervised by a research assistant for 24-hour UFC collection at home and provided with necessary equipment to collect urine and later take to the clinic. In sum, all UFC specimens were collected accurately and completely. For this study, the solid phase radioimmunoassay technique (RIA) was used to examine urinary cortisol level in a quality assurance laboratory of the university hospital.

Intervention Program: The TCQQ Program was developed by the researchers, based on TC literature and research and was validated by 3 experts, a psychologist, a physical therapy instructor, and an advanced practice nurse (APN) in medical-surgical nursing. The program was conducted by the PI who was certified in TCQQ practice and had previous experience leading sessions. This Program has two parts: a set of TCQQ sessions (60 minute/session) and weekly telephone calls. Each 60-minute TCQQ session is divided into three phases: 1) warm-up (extend muscle for 5 minutes), 2) exercise (18-form TCQQ practicing for 45-50 minutes), and cool-down (decreasing exercise to normal for 5-10 minutes). The 18-form TCQQ was grouped into 3 sets (6-form/set) aiming to assist participants' memory. The participants practiced the 18-forms at the 4th week of the program. A weekly follow-up telephone call was done by the PI to monitor and motivate participants in the experiment group practicing TCQQ and for the control group doing regular exercise. In particular, this telephone call helped participants to identify and resolve any program problems. They were also instructed to maintain their current level of physical activity outside of the program.

There was a telephone question guide of 8 items: exercise frequency, place, timing, exercise partner, skill and performance, some side effects, and barriers/problems. Self-report data were used to assess compliance with instructions by a TCQQ daily diary. The study outcomes at all three measurement time points were collected by a research assistant who was a 3-year experienced nurse working in chronic illness areas including cancer. She received training from the PI in how to accurately administer all instruments.

Procedures: Participants were randomly assigned to either the program group or control group. Randomization was achieved by a ballot with group assignment concealed from participants until baseline assessments were completed. Baseline data were obtained including P-CRF, RSE, FSI, cortisol, and FACT-B within Day1 (T_1) by a research assistant who was blinded as to whether a participant was in the intervention or in control group. Data were again collected at 6th week (T_2) and 12th week (T_3). During the program (Table 1), participants in the experiment group performed TCQQ group exercise for 60 minutes three times per week. The sessions were led by the PI a private room in the breast clinic. The participants were motivated and monitored via weekly telephone to practice independent 30-minute TCQQ

exercise at home three times per week. The control group also received advice from the PI and a take-home manual leaflet on Day 1. They were also motivated via a weekly telephone call to have a

30-minute regular exercise independently at home three times per week. In order to stay in the study the experiment group had to practice at least 4 times weekly to learn all the 18-form TCQQ.[19, 20]

Table 1 Schedule and content of TCQQ Program for experiment and control group.

Week	Experimental Group	Control Group	Notes
1st	– Establishing relationship and trust – Introduction among group members – Brief discussion about TCQQ as an approach to mind and body program	– Establishing relationship and trust – Introduction among group members – Usual care: advise and take home leaflet	
	1st Data collection (baseline: RSE, FSI, cortisol, QOL)		
1st	– Practice TCQQ (60 minutes) : 1st – 6th form	– Practice as advised in usual care	A weekly telephone call to monitor both groups to adhere with their practice guideline
2nd	– Practice TCQQ (60 minutes) : 7th – 12th form – Review practice TCQQ : 1st – 6th form – Practice all TCQQ : 1st – 12th form		
3rd	– Practice TCQQ (60 minutes) : 13th – 18th form – Review practice TCQQ : 1st – 12th form – All practice TCQQ : 1st – 18th form		
4th–6th	– Practice all TCQQ: 1st – 18th form (completely form) (60 minutes)		
	2nd Data collection (RSE, FSI, cortisol, QOL)		
7th–12th	– Practice TCQQ (60 minutes) : 1st – 18th form – Group Termination and any necessary review	– Practice as advised in usual care – Group Termination and any necessary review	A weekly telephone call to monitor both groups to adhere with their practice guideline
	3rd Data collection (RSE, FSI, cortisol, QOL)		
	Program Termination		

Data analysis: Descriptive statistics were used to describe participant characteristics, disease and treatment information, and all outcome scales. At baseline, differences between two groups were tested by independent samples *t*-tests and *chi*-square test with no statistically significance. Basic assumptions of repeated-measures analysis of variance (RM-ANOVA) and repeated-measures analysis of covariance (RM-ANCOVA) were had been previously checked. After controlling for the covariate (baseline score: T_1),

data on RSE, FSI, cortisol, and QOL were analyzed to examine change over time, differences between group, and time variables.

Results

Thirty Thai women with breast cancer participated in this study. At baseline, there were no significant differences between the two groups in terms of participant demographics, clinical characteristics, and four main outcomes of the study sample (Table 2-3).

Table 2 Differences between two groups for stage, surgery, axillary node dissection status, chemotherapy, radiation therapy, hormonal therapy, complications after treatment, age, and body mass index at baseline (T_1)

Characteristics	Control (n = 15)	Experiment (n = 15)	Total	χ^2	*p*
	n	n			
Stage				4.61	.20
0 (Insitu)	2	0	2		
1	5	7	12		
2	8	6	14		
3	0	2	2		
Surgery				.00	1.00
– Modified Radical Mastectomy	9	9	18		
– Total Mastectomy with Axillary Node Dissection	1	1	2		
– Total Mastectomy with Sentinel Lymph Node Biopsy	5	5	10		
Axillary Node Dissection				.00	1.00
No	5	5	10		
Yes	10	10	20		
Chemotherapy				.18	.66
No	4	3	7		
Yes	11	12	23		
Radiation Therapy				.13	.71
No	6	7	13		
Yes	9	8	17		
Hormonal Therapy				.00	1.00
No	6	6	12		
Yes	9	9	18		
Complications after treatment				.83	.36
No	13	11	24		
Yes	2	4	6		
– Numbness	1	1		2.16	.53
– Wound pain	1	1			
– Arm edema	0	2			
Age(years)				1.00	.50
≤ 60	6	7	13		
> 60	9	8	17		
Body Mass Index (kg/m²)				1.00	.50
≤ 25	7	8	15		
> 25	8	7	15		

Table 3 Differences between two groups for RSE, FSI, Cortisol, and QOL at baseline (T_1)

Characteristics (Total score)	Control (n = 15) Mean(SD)	Experiment (n = 15) Mean(SD)	*t*-test	*p*
RSE (10–40)	20.47(2.56)	18.73(2.60)	−1.83	.07
FSI (0–131) [a]	36.40(28.18)	33.67(28.60)	−.26	.79
Cortisol (0–150) [b]	148.71(68.02)	125.42(90.06)	−.79	.43
QOL (0–144) (FACT–B)	108.34(14.15)	104.27(18.78)	.67	.50

Note: RSE = Rosenberg Self–esteem; FSI = Fatigue Symptom Inventory; QOL = Quality of Life; FACT–B = Functional Assessment of Cancer Therapy – Breast; a. 0 = No fatigue, 36 = Mild fatigue, 65 = Moderate fatigue, 85 = Severe fatigue, and 110+ = Excessive fatigue; b. Normal UFC level = 0 – 150 μg/day

The effectiveness of TCQQ program

All main outcomes changing over time after program implementation were found in only in the experimental group (Table 4). There were significant differences on RSE score (between T_2 –T_3 and T_1 –T_3) and on FSI score (between T_1 – T_2 and T_1 – T_3). Also, significant differences between T_1 – T_3 were found on cortisol and QOL. However, data showed no significant differences on these study outcomes between the two groups. After controlling the mean scores of RSE, FSI, cortisol, and QOL at T_1 as covariate, the results showed significant differences between the two groups (Table 5).In addition, the analysis of effect size of program on main outcomes at three months after program implementation was calculated. The results revealed that effect size was large for self–esteem (1.29), medium for fatigue (0.80), cortisol (0.75) and QOL (0.68), respectively.

Table 4 Comparison of mean scores across time for RSE, FSI, Cortisol, and QOL

Outcomes Group		Baseline (T_1)	Wk.6 (T_2)	Wk.12 (T_3)	F^o	*p*
RSE						
Control	M	20.47	20.73	20.33	.221	.803 [NS]
(n = 15)	SD	2.56	1.75	2.74		
Experiment	M	18.73	19.60 [b]	23.87 [c]	17.41	.000*
(n = 15)	SD	2.60	2.55	3.54		
FSI						
Control	M	36.40	28.80	27.20	1.68	.203 [NS]
(n = 15)	SD	28.18	26.97	19.68		
Experiment	M	33.67 [a]	17.33	11.27 [c]	10.33	.002*
(n = 15)	SD	28.60	16.45	9.09		
Cortisol						
Control	M	148.71	155.61	131.75	.99	.383 [NS]
(n = 15)	SD	68.02	73.49	77.22		

Table 4 Comparison of mean scores across time for RSE, FSI, Cortisol, and QOL (continued)

Outcomes Group		Time of measurement			F^o	p
		Baseline (T_1)	Wk.6 (T_2)	Wk.12 (T_3)		
Experiment	M	125.42	89.31	73.08^c	7.73	.002*
(n = 15)	SD	90.06	65.13	49.49		
QOL (FACT-B)						
Control	M	108.34	108.77	109.53	.07	.928 ^{NS}
(n = 15)	SD	14.15	10.05	10.57		
Experiment	M	104.27	109.93	116.72^c	6.64	.004*
(n = 15)	SD	18.78	15.79	14.02		

Note: RSE = Rosenberg Self-esteem; FSI = Fatigue Symptom Inventory; QOL = Quality of Life; FACT-B = Functional Assessment of Cancer Therapy – Breast; * = Statistic significance ($p < 0.05$); NS = No significance ($\rho > 0.05$);

^{o} = One-way repeated measure ANOVA

^{a} = Statistical significance between T1 and T2;

^{b}= Statistical significance between T2 and T3;

^{c} = Statistical significance between T3 and T1

Table 5 Analyses of Covariance of RSE, FSI, Cortisol, and QOL

Source of Variance	SS	df	MS	F^c	p
RSE					
Groups	46.130	1	46.130	5.566	0.026*
Error	223.778	27	8.288		
FSI					
Groups	2753.817	1	2753.817	8.374	0.007*
Error	8879.436	27	8879.436		
Cortisol					
Groups	36494.454	1	36494.454	9.291	0.005*
Error	106053.683	27	106053.683		
QOL (FACT-B)					
Groups	562.035	1	562.035	4.302	0.048*
Error	3527.682	27	3527.682		

Note: RSE = Rosenberg Self-esteem; FSI = Fatigue Symptom Inventory; QOL = Quality of Life; FACT-B = Functional Assessment of Cancer Therapy – Breast; c = Two-way repeated measure ANCOVA; * = Statistical significance ($p < 0.05$)

Discussion

Based on this study's findings, all research hypotheses were supported in that TCQQ had positive effects on all four study outcomes which included self-esteem, fatigue, cortisol, and QOL. The TCQQ Program could induce the mind-body interpenetration based on incorporating and uniting principles of slow intentional movements, often coordinated with breathing, and meditation. One main concept of TCQQ was concentration that can be directed to one's own body as well as to the external environment. A typical TC phrase that exemplifies this principle is: "Cleanse your mind and concentrate on the slowness and evenness of your movements".[27, 28] Using self-study or self-evaluation through a series of specific TCQQ forms and personal concentration, attention, mindfulness, and intention were internally developed in the participants. From these principles, self-evaluation of Thai women with breast cancer improved, and they were better able to see and evaluate themselves as they thought others could others see and evaluate them.

TCQQ practice enhanced self-esteem as resourceful cognitive functioning (more concentration and intention with problem solving and coping selection), and the participants' stress could be also adjusted (stress neutralization).[27, 28] Self-esteem is a self-worth evaluation that involves several processes including reflected appraisals, social comparisons, and self-attributions.[14, 15, 27, 28] Thai survivors of breast cancer with high self-esteem believe in their abilities and strengths, and this has been linked to better adjustment and less helplessness. Our results were congruent with two previous studies in that practicing sufficient TCQQ improved self-esteem in women with breast and other cancers [14, 15]

Additionally in congruence with our findings, two previous studies also supported that TCQQ practicing can reduce cortisol.[18, 19] Possible explanations are that TCQQ practice can reduce psychosocial stress stimulus in the way as the effects of stress management and relaxation techniques.[14, 15, 27, 28] While practicing TCQQ the practitioner experiences peaceful movement, relaxation and mindfulness-raising. Therefore, stress stimulus will decreasingly stimulate the HPA-axis. As a result, cortisol level after practicing TCQQ can be decreased. In sum, reduction of cortisol after such practicing by Thai women with breast cancer could be explained by the two main communicating centers for brain-body interaction, the hypothalamus working with the pituitary gland in the HPA.

It is possible that TCQQ may have a potential synergic effect on both the physiological and psychological tracts of fatigue development.[14-16] TCQQ practicing would reduce stress stimulus affecting the HPA as relaxation technique and alteration in pro-inflammatory cytokine then decreases the response.[23, 24] Meantime, higher individual aerobic capacity and physical strength by TCQQ would be benefit adaptation of energy sources; as a result, individual fatigue would be then reduced.[14-16] This is consistent with two previous studies which supported that TCQQ practice can improve fatigue symptoms. [14-16] Based on the PNI model, fatigue can be developed by two processes: physiological and psychological tracts; and consistently, fatigue in women with breast cancer can be caused by the cancer itself, treatment, and psychological distress.[31] Moreover, women with breast cancer live with a maladaptive state of energy sources such as low nutrition, sedentary life-style, and stressful minds, and they then experience worse fatigue.[31]

In addition, our results also indicated significant decreasing of the mean FSI scores in the experimental group between 1st week and 6th week, compared with the 1st week and 12th week (Table5). Possible explanations of these results could be about the amount of exercise and duration of the program. Firstly, the Program had 18-forms which might be difficult to remember in one time for the participants who were mostly older people. It was then divided into 6-forms per week for easier training and memory. As a result, the participants had to train at least 4 week to meet all of 18-forms. The amount of exercise might be not sufficient until after

the 4th week of practice, as shown statistically significant differences were found at the 6th week, and 12th week (Table 5). This is consistent with the findings from a meta-analysis study of TCQQ effects, where it was recommended that exercises and their duration should be practiced for at least 30 minutes, with a minimum of 3 times per week, and 12 weeks continuously.[21] Secondly, the participants in experimental group had more experiences and skills of practice in later sessions (5th -12th week), and they then might be feel better and accurately practicing TCQQ than in earlier times. Lastly, a possible explanation of this situation may be that the participants in both groups received regular telephone support once a week by the PI to monitor and to encourage them to practice exercise 3 times a week (control) and to practice TCQQ 3 times a week (experiment). Regarding the decreasing of fatigue, this may was developed in both groups by increasing physical activity, doing exercise regularly, and psychological relaxation; however, stronger effects were found in the experimental group.

The results revealed higher self-esteem, lower fatigue, lower cortisol, and higher QOL significantly occurred after TCQQ implementation. This could be due to the PNI model in the TCQQ practicing, since meditation and relaxation can reduce stress stimuli into the HPA, resulting in lower cortisol.[18-19, 31] In addition, higher self-esteem, better psychosocial resources and lower fatigue are supportive of increased QOL.[16-17] Finally, enhanced health resources may synergistically work to improve QOL when TCQQ is practiced enough.[14-17, 23]

In conclusion, the findings obtained from this study support the PNI model in explaining the positive effects of TCQQ Program on self-esteem, cortisol, fatigue, and QOL in the context of women with breast cancer at least one year after treatment cessation. The TCQQ program may be a beneficial intervention which could be used for improving health, and reducing some side-effects of cancer treatment in Thai women with breast cancer, as previously mentioned in literature.

Limitations

A limitation of this study is the small sample size which reduces generalizability of findings. In addition, this hospital-based TCQQ Program was conducted in only one university hospital with fully-equipped resources. Findings therefore should be used with caution.

Nursing Implications and Recommendations

The study findings have implications for nursing practice and future research. The effectiveness of the TCQQ program on positive health outcomes and QOL suggests that TCQQ may be an efficacious intervention for improving QOL and some other health outcomes in Thai women with breast cancer after treatment completion. These findings are helpful for this particular group to promote their health and QOL. A targeted home-based and community-based program involving nurses could be considered for the future after further research, for Thai women living with breast cancer. Further, active collaboration and closely facilitation between hospital and home, or between women with breast cancer, health care personnel, and family should be promoted. For instance, encouraging TCQQ group exercise in the community in which women with breast cancer can join would help enhance their health in long-term.

In further studies, the TCQQ Program, with a larger sample size, should be tested at active treatment periods in various times, for instance, after diagnosis, surgery, chemotherapy, radiation, and also at different time points of survival. In addition, more preferable and effective TCQQ forms should be tested in further study in order to design a tailored-TCQQ program to fit Thai women with breast cancer.

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ประสิทธิผลของโปรแกรมการบริหารกาย–จิตแบบไทชี่จี้กงในสตรีไทยโรคมะเร็งเต้านม:การทดลองแบบสุ่มและมีกลุ่มควบคุม

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บทคัดย่อ: แม้ในปัจจุบันมีผู้รอดชีวิตจากโรคมะเร็งเพิ่มขึ้น แต่สตรีรอดชีวิตมะเร็งเต้านมจำนวนมากยังคงมีภาวะสุขภาพและคุณภาพชีวิตไม่ดี การวิจัยเชิงทดลองแบบสุ่มและมีกลุ่มควบคุมชนิดวัดซ้ำนี้ มีวัตถุประสงค์เพื่อศึกษาผลของโปรแกรมการบริหารกาย-จิตแบบไทชี่จี้กง ต่อการรับรู้คุณค่าในตนเอง อาการเหนื่อยล้า ระดับคอร์ติซอล และคุณภาพชีวิต ในสตรีไทยโรคมะเร็งเต้านม โดยกลุ่มตัวอย่างในการศึกษาคือ สตรีไทยโรคมะเร็งเต้านมที่มาตรวจตามแพทย์นัดในระยะหลังการรักษาเสร็จสิ้นแล้วอย่างน้อย 1 ปี ณ คลินิกเต้านม โรงพยาบาลมหาวิทยาลัยแห่งหนึ่งในกรุงเทพมหานคร กลุ่มตัวอย่างจำนวน 30 ราย โดยคัดเลือกตามเกณฑ์ที่กำหนดแล้วสุ่มเข้ากลุ่มด้วยวิธีจับสลาก โดยแบ่งออกเป็น 2 กลุ่มๆละ 15 คนเท่ากัน คือกลุ่มที่ได้รับโปรแกรมการบริหารกาย-จิตแบบไทชี่จี้กงร่วมกับการพยาบาลตามปกติ และกลุ่มที่ได้รับการพยาบาลตามปกติอย่างเดียว เครื่องมือในการวิจัยประกอบด้วย แบบประเมินการรับรู้คุณค่าในตนเอง แบบประเมินอาการเหนื่อยล้าระดับคอร์ติซอล และแบบประเมินคุณภาพชีวิต โดยเก็บรวบรวมข้อมูลใน 3 ระยะคือ ก่อนดำเนินโปรแกรมสัปดาห์ที่ 6 และสัปดาห์ที่ 12 หลังดำเนินโปรแกรม วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา การทดสอบความแตกต่างระหว่างกลุ่มด้วยการทดสอบความแปรปรวนร่วมแบบมีตัวแปรควบคุม และความแปรปรวนร่วมแบบวัดซ้ำ

ผลการศึกษาพบว่าหลังจากใช้คะแนนตัวแปรตามก่อนดำเนินโปรแกรมเป็นตัวแปรควบคุม สตรีไทยมะเร็งเต้านมกลุ่มที่เข้าร่วมโปรแกรมการบริหารกาย-จิตแบบไทชี่จี้กงมีการรับรู้คุณค่าในตนเอง อาการเหนื่อยล้า ระดับคอร์ติซอล และคุณภาพชีวิตแตกต่างจากกลุ่มที่ได้รับการพยาบาลตามปกติอย่างมีนัยสำคัญทางสถิติ เมื่อเปรียบเทียบสัปดาห์ที่ 6 และสัปดาห์ที่ 12 หลังดำเนินโปรแกรม ผลการศึกษานี้แสดงถึงประสิทธิผลของโปรแกรมการบริหารกาย-จิตแบบไทชี่จี้กงต่อการรับรู้คุณค่าในตนเอง อาการเหนื่อยล้า ระดับคอร์ติซอล และคุณภาพชีวิตในสตรีไทยโรคมะเร็งเต้านม พยาบาลควรสนับสนุนการนำโปรแกรมการบริหารกาย-จิตแบบไทชี่จี้กงนี้ไปประยุกต์ใช้ในการปฏิบัติพยาบาล เพื่อส่งเสริมสุขภาวะและคุณภาพชีวิตที่ดีในสตรีไทยโรคมะเร็งเต้านม อย่างไรก็ตามควรมีการศึกษาเชิงทดลองในกลุ่มตัวอย่างที่มีขนาดใหญ่ขึ้นในการศึกษาครั้งต่อไป

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