

# Effects of qigong training on physical and psychosocial well-being of breast-cancer survivors: a systematic review

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## Abstract

**Purpose:** Qigong training has recently become a popular form of supportive care for cancer patients. Many breast cancer patients today use qigong as an alternative method to relieve the symptoms of the disease and its treatment. The aim of this review is to evaluate the effectiveness of qigong training as a form of breast cancer care.

**Methods:** Relevant studies were retrieved from a search of electronic databases and evaluated using the Jadad scale and the Levels of Evidence criteria proposed by the Oxford Centre for Evidence-based Medicine.

**Results:** Eight studies were investigated. Four were randomised controlled trials (RCTs) and the rest were clinical controlled trials. Seven studies investigated the effects of qigong training on physical and psychosocial functioning, and five studies investigated biomedical outcomes. Markers such as quality of life, arterial resistance and shoulder isokinetic muscular strength indicated that qigong significantly improved physical and psychosocial functioning. However, conflicting results were presented for the biomedical effects of qigong, and no significant evidence was provided for its effects on C-reactive protein level, blood-cell count or immune functioning.

**Conclusions:** As the studies reviewed showed several methodological and design limitations, it is still too early to draw conclusions on the contribution of qigong to the rehabilitation care of breast cancer survivors. Future researchers in this area should conduct more rigorously designed studies based on large-scale RCTs.

## Introduction

Breast cancer is the second most commonly diagnosed cancer worldwide, responsible for 11.9% of all cases of cancer [1]. Statistics published by the Hong Kong Cancer Registry in 2013 indicated that breast cancer is the most common type of cancer experienced by women in Hong Kong [2]. Breast cancer is the third leading cause of death from cancer in Hong Kong, responsible for 10.5% of cancer deaths in 2013. However, advancements in breast cancer treatment have significantly improved survival rate. More and more women are surviving breast cancer after treatment; in 2012, there were 6.3 million women alive who had been diagnosed with breast cancer [1]. As the number of breast cancer survivors increases, many strategies have been developed to improve their physical health and quality of life (QOL) during rehabilitation. Qigong training has recently been proposed as an effective method of promoting both the physical health and the psychological health of this population.

Breast cancer survivors are defined as people who have received primary treatment but are not receiving end of life care [3]. Most breast cancer survivors are affected by complications caused by the disease. Reduced QOL has been widely discussed in previous studies [4-7]. Studies have shown that QOL is compromised at every stage of cancer progression and treatment. Breast cancer patients may also suffer from depression and mood changes [4,8,9]. In addition, most breast cancer patients experience sleep disturbance [4,9,10]. They also reported decline in physical activity level [4,7,10]. Breast cancer survivors face the risk of lymphedema after surgery, which affects

their daily physical activities and the sensation in their limbs. Cancer-related fatigue is another complication faced by breast cancer survivors [7,9,10]. The disease itself is also a stressor, which affects patients' immune systems. Breast cancer survivors face a higher risk of infection and tend to experience more prolonged and severe symptoms because their immune functioning is inhibited [11]. In sum, breast cancer has many adverse effects on physical and psychosocial functioning.

Qigong training is a form of traditional Chinese medicine (TCM) [12]. It involves the use of the holistic system to promote health and healing. According to the theories of yin and yang and the five elements, practicing qigong can restore the balance of qi, the body's vital energy. It also facilitates the flow of qi by removing blockages. Breast cancer, like other diseases, may block energy or cause an excess or deficiency of qi. Medical qigong (MQ) for health and healing involves meditation, physical movements and breathing exercises [12]. The use of qigong has recently become more and more common in disease treatment and health promotion. Practising qigong as a mind-body integrative exercise or a TCM intervention can prevent and cure ailments, and

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regular practice can improve health and increase energy levels [13]. Qigong is widely used by breast cancer patients to treat the disease, prevent metastasis, manage other forms of discomfort and reduce menopausal symptoms [14].

Previous studies have demonstrated the potential of qigong to enhance immune functioning [12,14,15]. Another study revealed that qigong training improved cancer patients' immune function, microcirculatory function (indicated by changes in blood viscosity and elasticity) and platelet function, increased their pain threshold and helped them to relax [16]. Positive effects on cancer patients' strength, appetite, risk of diarrhoea, body weight and phagocytic rate (a marker of immune function) by qigong training had been reported [12].

Besides, qigong practice serves as a platform for the patients to enhance the benefits of self-help by encouraging patients to exchange information, share their experiences and support each other [17].

However, although the above studies indicated the advantages of qigong training for cancer patients, some researchers have obtained conflicting findings. A recent study indicated that qigong does not significantly improve QOL [18]. Other researchers have found no significant differences between experimental groups and control groups for certain biochemical outcomes [19,20]. The aim of this review is to determine the effectiveness of qigong training as a form of breast cancer support and care.

## Methods

The review was conducted according to the Preferred Reporting Items of Systematic Reviews and Meta-analyses (PRISMA) guidelines. The following electronic databases were searched in February 2014: MEDLINE, Ovid, The Cumulative Index to Nursing and Allied Health Literature, PsycInfo and Google Scholar. The search terms used were as follows: 'qigong', 'qi gong', 'chi gong', 'breast cancer', 'breast cancer patients', 'breast cancer survivors' and 'breast cancer complications'. A reference list of all of the studies retrieved was searched by hand to identify additional relevant studies.

All clinical controlled trials (CCTs) conducted with breast cancer patients who received individual or group qigong interventions with or without other treatments were included. Studies based on both randomised controlled trials (RCTs) and non-randomised CCTs were considered, due to the limited number of RCTs conducted in this area. Uncontrolled observational studies were excluded. Interventions involving internal qigong were included, whereas studies of external qigong were excluded. The studies considered had either been written in English or translated into English. The primary data obtained from the original sources were reviewed and analysed for every study included.

The measures comprised physical health outcomes, such as symptoms; psychosocial health outcomes, such as QOL; and biomedical outcomes, such as inflammation markers. The strength of the evidence presented in the studies was evaluated using the Levels of Evidence criteria developed by the Oxford Centre for Evidence-based Medicine. Using these criteria, studies are rated from level 1 or grade A (systematic review of RCTs) to level 5 or grade D (expert opinion). The Jadad scale was also used to evaluate the quality and validity of the studies considered. Using the Jadad scale, points are awarded for descriptions of randomisation, descriptions of blinding and descriptions of dropouts, with scores ranging from 0 to 5 (the higher the score, the greater the quality and validity).

## Results

The electronic-database search returned 91 relevant references. Studies that were not related to qigong or cancer, were not based on clinical trials or controlled trials and/or were not published in peer-reviewed journals were excluded. In addition, studies of external qigong or emitted qi, case reports and duplicated publications were excluded.

Eight studies published between 2006 and 2014, comprising four RCTs [19-22] and four CCTs [18,23-25], were identified and reviewed. Seven studies (four RCTs [19-22] and three CCTs [18,23,24]) investigated the effects of qigong on physical and psychosocial functioning, and five studies (four RCTs [19-22] and one CCT [25]) investigated the biomedical effects of qigong on biomedical outcomes. In five studies, both physical/psychosocial and biomedical outcomes were assessed. Tables 1 and 2 present the characteristics of the studies of physical and psychosocial outcomes and biomedical outcomes, respectively.

The studies of physical and psychosocial outcomes covered 234 cancer patients receiving qigong intervention (aged between 11 and 79), 248 cancer patients not receiving an intervention (aged between 12 and 83) and 16 healthy adults. The studies of biomedical outcomes covered 212 cancer patients in qigong groups (aged between 15 and 79) and 224 cancer patients in control groups (aged between 15 and 83). In five studies, the sample comprised solely breast cancer patients; in the remaining studies, patients with various types of cancer were sampled.

The interventions conducted in these studies comprised '18 Forms' Tai Chi (TC) qigong [18,24], MQ [19,21,22], Chan-Chuang qigong [23,25], qigong [20], usual medical care [19,21,22], chemotherapy [23,25] and radiotherapy (RT) [20]. The duration of the qigong interventions ranged from 6 minutes to 6 months.

Various outcome measures were used in the studies reviewed. Six studies investigated the effects of qigong on the physical and psychosocial functioning of cancer patients, while seven studies investigated the biomedical outcomes of qigong practised by cancer patients.

The physical and psychosocial markers used in the studies were QOL [18-22], fatigue [20,21], mood [21], depression [20], sleep quality [20], cognitive function [22], symptom-related distress [19,23], psychological distress [23], limb circumference [24], blood flow velocity [24], shoulder mobility and muscle strength [18]. Among the biomedical measures used in the studies were 'inflammatory markers' (C-reactive protein; CRP) [19,21, 22], blood cell count [25] and cortisol rhythm [20].

## Effects of interventions

Five studies (four RCTs [19-22] and one CCT [18]) investigated the effect of qigong on QOL. In four of these studies, the qigong group exhibited a significant improvement in overall QOL compared with the control group [19-22]. In the fifth study, no significant difference in QOL was found between the qigong group and the control group [18]. Overall, the studies provided sound evidence of the positive effects of qigong on the QOL of breast cancer patients. Three studies (two RCTs [20,21] and one CCT [23]) investigated the effects of qigong on the psychological distress, mood and depression of breast cancer patients. In one of the RCT studies [21], the qigong group exhibited a greater reduction in mood disturbance, tension, anxiety, depression, lack of vigour and fatigue than the control group. In the second RCT study [20], qigong was found to reduce the depressive symptoms of

**Table 1.** Summary of randomised and non-randomised controlled trials of physical and psychosocial outcomes of qigong.

Study	Year	Design	Conditions	Sample size (pre-/post-intervention)	Intervention (frequency)	Control	Duration	Outcome measures	Results	Jadad score	Level of evidence
Oh <i>et al.</i> [21]	2010	RCT	Various types of cancer (34% breast-cancer patients)	QG: 79/54 CG: 83/54	MQ programme plus usual medical care (90 min, twice a week)	Usual medical care	10 weeks	Overall QOL (FACT-G) Fatigue (FACT-F) Mood (PMS)	MQ group showed greater improvement in QOL MQ group showed significantly greater reduction in fatigue MQ group showed greater reduction in mood disturbance both overall and in 4 subscales (tension, anxiety, depression, lack of vigour and fatigue). However, no difference in subscales of anger and	3	A (1b)
Oh <i>et al.</i> [19]	2008	RCT	Heterogeneous cancers	QG: 15/8 CG: 15/10	MQ plus usual medical care (90 min, twice a week)	Usual medical care	8 weeks	QOL: EORTC QLQ-C30 Symptoms of side effects of treatment	MQ group exhibited significantly higher global quality of life, cognitive functioning and social functioning, but differences non-significant for physical functioning, role functioning and emotional functioning MQ group showed greater improvement in some symptoms and side-effects of treatment, and greater reduction in inflammation	3	A (1b)
Oh <i>et al.</i> [22]	2012	RCT	Heterogeneous cancer types (Breast cancer 32.4% and 30.2% in MQ and CG respectively)	MQ: 37/23 CG: 44/31	MQ plus usual medical care (90 min, at least once or twice a week)	Usual medical care	10 weeks	CF: EORTC QLQ-C30 CF CF: FACT-Cog QOL: FACT-G	Significant improvement in CF in MQ group in EORTC-CF and all subscales in FACT-Cog Improved sig in QOL in MQ group	3	A (1b)
Chen <i>et al.</i> [20]	2013	RCT	Breast cancer during and after RT	QG: 49/49 CG: 47/46 (death)	Qigong (5 x 40 min per week)	RT	5-6 weeks	Depression: CES-D Fatigue: BFI Sleep: PSQI QOL: FACT-G	Reduced depressive symptoms, in QG group Less fatigue reported for QG Overall QOL better for qigong group No sig diff in sleep disturbance	2	B (2b)
Lee <i>et al.</i> [23]	2006	CCT	Breast cancer treated with chemotherapy	QG: 32 CG: 35	Chan-Chuang qigong therapy plus chemotherapy (15-60 min daily)	Chemotherapy	21 days	Symptom distress (SD): (SDS) Psychological distress (PD): SCL-90-R	Improve symptom distress and apart of psychological distress	0	B (3b)
Fong <i>et al.</i> [18]	2013	CCT	Breast cancer post treatment	TC qigong group: 11 CA-control: 12 Healthy control group: 16	18 Forms TC (3 sessions per week, 1 hour per session)	CA-control: Received mastectomy and completed treatment  Health-control: no specific care	More than 6 months	QOL: FACT-B, version 4 Shoulder mobility Shoulder isokinetic muscular strength	No significant difference between groups Significant difference in shoulder mobility Significantly higher isokinetic peak torque of shoulder rotator muscles in TC training group than control group, with that comparable to healthy individuals	1	B (3a)
Fong <i>et al.</i> [24]	2014	CCT	Breast cancer post-treatment	QG: 11 CG: 12	18 Forms TC internal qigong (once for 6 min)	Rest for 6 min	6 min	Upper-limb circumference Arterial resistance and blood-flow velocity in affected upper limb	Blood-flow resistance decreased, with concomitant increase in blood-flow velocity	1	B (3a)

CG: control group; QG: qigong group  
 FACT-B: Functional Assessment of Cancer Therapy – Breast; FACT-G: Functional Assessment of Cancer Therapy – General; FACT-F: Functional Assessment of Cancer Therapy – Fatigue; PMS: Profile of Mood State; EORTC QLQ-C30: European Organisation for Research and Treatment of Cancer Questionnaire; SCL-90-R: Symptom checklist 90 (revised); SDS: McCorkle and Young’s symptom distress scale; CES-D: Centre for Epidemiologic Studies Depression Scale; QLQ-C30 CF: European Organisation for Research and Treatment of Cancer Questionnaire Cognitive Function; FACT-Cog: Functional Assessment of Cancer Therapy – Cognitive Function; PSQI: Pittsburgh Sleep Quality Index; BFI: Brief Fatigue Inventory; PD: psychological distress; SD: symptom-related distress

breast cancer patients, particularly women with elevated levels of depression at the beginning of treatment. Qigong was found to reduce psychological distress in another CCT study, particularly in areas such as ‘hopelessness about the future’ and ‘unwillingness to live’. In sum, these findings indicated that practising qigong plays a significant

role in alleviating the psychological distress, depression and mood disturbances of breast cancer patients.

Two studies (one RCT [19] and one CCT [23]) investigated the effects of qigong on cancer-related symptoms, and in both cases the qigong group exhibited significantly greater improvements than the

**Table 2.** Summary of both randomised and non-randomised controlled trials on biomedical outcomes.

Study	Year	Design	Condition(s)	Sample size (pre-/post-intervention)	Intervention (frequency)	Control	Duration	Outcome measure	Results	Jadad score	Level of evidence
Oh <i>et al.</i> [21]	2010	RCT	Range of cancer types	QG: 79/54 CG: 83/54	MQ programme plus usual medical care (90-min, twice a week)	Usual medical care	10 weeks	Inflammation biomarker (CRP)	Significant differences in inflammation biomarker	3	A (1b)
Oh <i>et al.</i> [19]	2008	RCT	Heterogeneous cancer types	QG: 15/8 CG: 15/10	MQ plus usual medical care (90 min, twice a week)	Usual medical care	8 weeks	CRP	No statistically significant difference between groups	3	A (1b)
Oh <i>et al.</i> [22]	2012	RCT	Heterogeneous cancer types (Breast cancer 32.4% and 30.2% in MQ and CG respectively)	MQ: 37/23 CG: 44/31	MQ plus usual medical care (90 min, at least once or twice a week)	Usual medical care	10 weeks	Inflammation: CRP	Significantly lower CRP	3	A (1b)
Yeh <i>et al.</i> [25]	2006	CCT	Breast cancer treated with chemotherapy	QG: 32 CG: 35	Chan-Chuang qigong therapy plus chemotherapy (15-60 min, daily)	Chemotherapy	21 days	CBC	Significant difference in WBC, plts, Hb (p< 0.001)	0	B (2b)
Chen <i>et al.</i> [20]	2013	RCT	Breast cancer during and after RT	GC: 49/49 CG: 47/46 (death)	Qigong 5 x 40 min per week	RT	5-6 weeks	Cortisol rhythm	No significant difference in cortisol rhythm	2	B (2b)

WBC: white blood cells; plts: platelets; Hb: haemoglobin

control group. In the CCT study, qigong was found to attenuate distress caused by symptoms such as pain, numbness, heartburn and dizziness during chemotherapy. In the RCT study, the intervention group reported an increased appetite and reduced nausea, pain, insomnia, constipation and diarrhoea. Another two RCT studies investigated the effects of qigong on patients’ fatigue [20,21]. In both cases, fatigue was significantly reduced in the qigong group, compared with the control group. Practising qigong relieved the participants’ cancer-related fatigue, which is a common complication encountered by breast cancer patients during and after treatment.

In an RCT study of the effects of qigong on sleep disturbance, no significant difference between the qigong group and the control group was observed [20]. However, as only one study in this area was identified during the database search, insufficient evidence is available on the effects of qigong on the sleep patterns of breast cancer patients. Further studies should be conducted in this area. One RCT study [22] investigated the effects of qigong exercise on cognitive function. Compared with the control group, the qigong group exhibited significant improvements in self-reported cognitive function, perceived cognitive impairment, perceived cognitive ability and the adverse influence of perceived cognitive impairments on QOL. However, only one study in this area was identified. Further studies should be conducted to determine the effects of qigong on the cognitive functioning of breast cancer patients.

One CCT was conducted to investigate the effects of qigong on arterial resistance and blood flow velocity [24]. The qigong group exhibited a significance decrease in arterial resistance, resulting in a significant increase in blood-flow velocity. One CCT investigated the effects of practising qigong on shoulder mobility and shoulder isokinetic muscular strength [18]. There was no significant difference in shoulder mobility between the qigong group and the control group. However, shoulder isokinetic muscular strength differed significantly between the qigong group and a healthy-adult group. One CCT was conducted to investigate the effects of practising qigong on limb circumference [24]. Significant differences were observed in the circumference of the

affected upper arm, elbow, forearm and wrist after the intervention. Although significant findings were obtained for blood flow velocity and shoulder isokinetic muscular strength, the limited number of studies in this area may have led to bias in the results. Therefore, further RCT studies are recommended to provide more evidence of the effects of qigong on blood-flow velocity and shoulder isokinetic muscular strength.

Three RCT studies investigated the effects of practising qigong on a primary biomarker of inflammation: serum CRP [19,21,22]. In one study, no significant difference in CRP level was found between the qigong group and the control group. However, the results of the other two RCTs indicated that inflammation had been significantly reduced in the qigong group compared with the control group [19]. Collectively, these results suggested that qigong has positive effects on the CRP of breast cancer patients.

One RCT study investigated the effects of qigong on cortisol rhythm, whose elevation causes the down-regulation of immune response and is thus associated with lower survival rates among breast cancer patients [26]. No significant difference was observed between the qigong group and the control group [20]. One RCT study investigated the effects of practising qigong on blood-cell count, as breast cancer patients undergoing chemotherapy may experience side-effects such as leucopenia, neutropenia, granulocytopenia, thrombocytopenia and anaemia. Significant differences in the proportions of white blood cells, platelets and haemoglobin were observed between the qigong group and a control group over a 3-week intervention [25]. However, due to the limited number of studies in this area, more research should be conducted to conclusively determine the effects of qigong on the immune function of breast cancer patients.

**Favourable effects**

One RCT study investigated the effects of practising qigong on the fatigue experienced by breast cancer survivors [21]. Qigong was found to significantly reduce the fatigue of patients in the qigong group

relative to those in the control group.

Three studies (two RCTs [5,21] and one CCT [23]) investigated the effects of practising qigong on the mood and depression of breast cancer patients. In each case, mood swings and depression were significantly reduced in the qigong group compared with the control group.

Two studies (one RCT [19] and one CCT [23]) investigated the effects of practising qigong on cancer-related symptoms and the distress caused by these symptoms. The results of both studies indicated significant improvements in the qigong group compared with the control group.

Two RCT studies investigated the effects of practising qigong on cognitive functioning [19,22]. Both revealed significant improvements in the qigong group compared with the control group.

One RCT study investigated the influence of practising qigong on blood-cell components, such as the adverse effects of chemotherapy on blood-cell count. Breast cancer patients receiving chemotherapy may experience side effects such as leucopenia, neutropenia, granulocytopenia, thrombocytopenia and anaemia. Significant differences in white blood cells ( $f = 115.76$ ,  $p < 0.001$ ), platelets ( $f = 25.29$ ,  $p < 0.001$ ) and haemoglobin ( $f = 15.39$ ,  $p < 0.001$ ) were observed between the qigong group and the control group over the 3-week intervention [25].

One CCT was conducted to investigate the effects of qigong training on limb circumference. Significant differences were observed after the intervention in the circumference of the patients' affected upper arms, elbows, forearms and wrists. This study also investigated the influence of practising qigong on arterial resistance and blood-flow velocity. Arterial resistance was found to significantly decrease, resulting in a significant increase in blood-flow velocity, in the qigong group [24].

One CCT was performed to investigate shoulder isokinetic muscular strength, which was found to differ significantly between a group of patients practising qigong and a healthy-adult group [18].

### Negative findings

Although the studies above indicated that qigong has several positive effects, some conflicting findings were obtained for markers such as sleep quality, inflammation marker, immune function and shoulder isokinetic muscular strength.

One RCT study investigated the effects of qigong exercise on sleep disturbance, and the results indicated that sleep quality did not differ significantly between the qigong group and the control group [20].

Three RCT studies were conducted to examine the effects of practising qigong on a primary biomarker of inflammation: serum CRP level. The findings of two of these studies indicated that CRP level did not differ significantly between the qigong group and the control group. In the third study, however, qigong was found to significantly reduce inflammation [19,21,22].

One RCT study investigated the effects of qigong training on immune function [20], with particular reference to cortisol rhythm, whose elevation down-regulates immune response and is thus associated with lower survival rates among breast cancer patients [26]. The results indicated that cortisol rhythm did not differ significantly between the qigong group and the control group.

One CCT was conducted to determine the effects of practising qigong on shoulder mobility and shoulder isokinetic muscular

strength. No significant difference in shoulder mobility was observed between the qigong group and the control group [18].

### Discussion

In this review, the extent to which qigong training improves physical, psychosocial and biomedical outcomes was comprehensively examined. To date, the contribution of qigong exercise to the supportive care of breast cancer survivors has received little attention in the literature. Only a few researchers have focused on breast cancer survivors, and even fewer have explored the effects of qigong on the cancer-related complications experienced by breast cancer survivors [18-25]. Eight studies, comprising four RCTs and four CCTs, were reviewed. Qigong was found to have various effects on two types of health outcomes: physical and psychosocial and biomedical.

The results of all four RCTs reviewed indicated that practising qigong has favourable effects on QOL [19-22]. Overall QOL improved significantly in the qigong groups compared with the control groups. In one CCT, however, QOL was not found to improve significantly in the qigong group [18].

QOL was the most frequently examined physical/psychosocial outcome, followed by symptom-related distress and fatigue. The effects of qigong on psychological distress, depression, mood, sleep disturbance and cognitive functioning were also measured. As the outcome measures used in the studies were diverse, it was difficult to draw conclusions on the contribution of qigong to the physical and psychosocial care of breast cancer survivors. With the exception of sleep disturbance, the above measures all indicated that qigong had favourable effects; however, due to the limited number of studies in this area and the small sample sizes used, more evidence is needed to conclusively determine the role of qigong in supporting the physical and psychosocial functioning of breast cancer survivors.

Serum CRP was the most frequently examined biomedical outcome; cortisol rhythm, complete blood count (CBC), limb circumference, arterial resistance and blood-flow velocity, shoulder mobility and shoulder isokinetic muscular strength were also measured. Again, the outcome measures examined in the studies were diverse, making it difficult to draw conclusions on the effectiveness of qigong exercise in improving the biomedical care of breast cancer survivors. Qigong was found to have favourable effects on blood-cell components, limb circumference, arterial resistance and blood flow velocity and shoulder isokinetic muscular strength; however, due to the limited number of studies conducted in these areas and the small sample sizes used, more evidence is needed to determine the contribution of qigong to the supportive care of breast cancer survivors.

In contrast with previous reviews, only certain types of intervention were included. External-qigong interventions were accepted, but studies of internal qigong training were excluded. We focused on RCTs and CCTs with breast cancer survivors as the target population, excluding patients with other types of cancer from the review.

The studies reviewed had certain limitations. Three had no drop-out cases [19-22], and reasons for withdrawal were stated clearly in one of the studies with drop-outs [25]. In the four RCTs, the method of randomisation was clearly described, and all of the studies provided details of drop-outs and withdrawals. Per-protocol analysis rather than intention to treat analysis was used in all of the studies. Therefore, the method of analysis may have led to attrition bias.

In addition, the participants undertaking qigong were exposed to

different qigong styles. As the form of qigong intervention was not standardised, it was difficult to compare the results of the studies. The intervention types comprised 18 Forms TC qigong, MQ, Chan-Chuang qigong and qigong. These differences in training style limited comparison of the effects of the qigong interventions. Training style was not examined in the studies, and no objective method is yet available to evaluate the effects of different styles of qigong. In future studies, the intensity of qigong exercise could be converted to metabolic equivalents to provide a standardised measure.

As the duration of training varied considerably, from 6 minutes to 6 months, this also requires further attention. A more objective and scientific method of measuring the effects of interventions with different durations should be implemented in further studies of the effects of qigong on breast cancer survivors.

The very nature of the qigong interventions created methodological limitations. For example, it was impossible to blind the participants to the interventions implemented. In most cases, the qigong group were given qigong training while the control group received usual medical care. No matched interventions were provided for the control groups, which may have led to performance bias and the placebo effect. In other words, the effects of the interventions may have been influenced by the participants' expectations of qigong training.

In addition, only the short-term effects of qigong training were examined in the studies reviewed; the long-term effects of qigong exercise on breast cancer survivors have not yet been examined.

Overall, the quality of most of the studies reviewed was fair. Only three studies were ranked as 'A' for their level of evidence; the remaining five studies were ranked as 'B'. The Jadad scores for the RCTs ranged from 2 to 3. Therefore, researchers are advised to conduct higher-quality studies in the future.

The strengths of this systematic review lie in the collection of studies from various databases and the inclusion of both RCTs and CCTs. The risk of bias in the studies reviewed was evaluated by assessing the studies' results and validity. A range of outcome measures were included in the review to obtain a comprehensive picture of the contribution of qigong to the care of breast cancer survivors. We also adopted several guidelines and checklists, such as the PRISMA checklist, the Consolidated Standards of Reporting Trials checklist, the Levels of Evidence criteria proposed by the Oxford Centre for Evidence-based Medicine and the Jadad scale, to objectively assess the validity and quality of the studies reviewed. However, the review has several potential limitations. Due to the limited number of RCTs identified and the heterogeneity of the outcome measures, it was impossible to perform a meta-analysis. In addition, the literature review may be incomplete.

## Conclusion

In conclusion, as of the limited number of RCTs conducted to date on the efficacy and effectiveness of qigong training in improving the health outcomes of breast cancer survivors, and the methodological and design limitations of the studies reviewed, it is still too early to draw definitive conclusions on the contribution of qigong to the rehabilitation care of breast cancer survivors. As qigong is currently practised worldwide by patients with various types of cancer, further studies of the effects of qigong exercises on breast cancer survivors, based on well-designed large-scale RCTs, should be conducted.

## Conflicts of interest

The authors declare that they have no conflicts of interest with respect to the authorship or publication of this paper.

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