

## RESEARCH ARTICLE

# The Kuala Lumpur Qigong Trial for Women in the Cancer Survivorship Phase-Efficacy of a Three-Arm RCT to Improve QOL

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## Abstract

**Background:** Qigong is highly favoured among Asian breast cancer survivors for enhancing health. This study examined the hypothesis that quality of life (QoL) in the Qigong group is better than the placebo (aerobic) or usual care group. **Materials and Methods:** A total of 197 participants were randomly assigned to either the 8-week Kuala Lumpur Qigong Trial or control groups in 2010-2011. Measurement taken at baseline and post-intervention included QoL, distress and fatigue. Analysis of covariance (ANCOVA) and Kruskal Wallis were used to examine for differences between groups in the measurements. **Results:** There were 95 consenting participants in this 8week trial. The adherence rates were 63% for Qigong and 65% for the placebo group. The Qigong group showed significant marginal improvement in Quality of life scores compared to placebo (mean difference=7.3 unit;  $p=0.036$ ), compared to usual care (mean difference=6.7 unit;  $p=0.048$ ) on Functional Assessment Cancer Therapy-Breast measure. There were no significant changes between the placebo and usual care groups in fatigue or distress at post intervention (8-week). **Conclusions:** Cancer survivors who participated in the Qigong intervention showed slightly better QOL. Follow up studies are greatly needed to evaluate which subgroups may best benefit from Qigong. With a steep rise of cancer survivors, there is an urgent need to explore and engage more cultural means of physical activity to fight side effects of treatment and for cancer control in developing countries.

**Keywords:** Qigong - quality of life - cancer prevention - cancer survivors - lifestyle

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## Introduction

Breast cancer is the most common cancer diagnosed in women worldwide, with 1.38 million new cancer cases or 23% of all cancer cases diagnosed in 2008 (Ferlay et al., 2008). Its incidence rate is highest in Western Europe, the USA, and Australia, but it is also increasing rapidly in many Eastern European, Asian, Latin American and African countries (Jemal et al., 2010). Earlier detection and treatment advances have resulted in markedly improved breast cancer survival rates in recent decades (Berry et al., 2005). There is an estimated increased by 1.9 million between 2001 and 2007 to a total of 11.7 million survivors in USA alone, and where over the last three decades, cancer have been transformed from a fatal disease to a long-term-disease-free survivorship (CDC, USA 2007). The National Coalition for Cancer Survivorship in 1986 defined cancer survivors to include patients from the time of diagnosis until death, and it includes family members as well. Cancer survivorship refers to the distinct phase a distinct phase in the cancer trajectory between primary treatment and cancer recurrence or end of life (Bell and

Ristovski-Slijepcevic, 2013).

With increasing survival rates, breast cancer is gradually acknowledged as a new form of chronic illness (Loh and Yip, 2006), and like many other chronic diseases, survivors needs to learn to self-manage their health for the remanding period of living. Promotion of healthy lifestyles in breast cancer survivors, and calls for lifestyle redesign for the more sedentary women warrants a full public health attention in order to minimize residual side-effects of treatment and to improve their quality of life (QoL). In addition, this calls for greater efforts to reduce the risk of cancer recurrence and chronic diseases, and improve wellness and survival. Increasing evidence are suggesting that physically active cancer survivors have better QoL compared to sedentary patients (Demark-Wahnefried et al., 2001; ott et al., 2006; IOM, 2007). There is a growing evidence that physical activity have additional positive benefits such as prolonged survival (Schmitz et al., 2010), reduced risk of recurrence (Hayes et al., 2009), reduced breast density (milne et al., 2007), improved physical fitness (ohira et al., 2006) and improvement from fatigue (Valance et al., 2007). Engagement in physical activity in

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moderate intensity physical activity (aerobic, resistance or mixed exercise) for a minimum of 20 minutes, 3 to 5 times per week now forms part of guidelines for cancer survivors, including breast cancer survivors (Hayes et al., 2009). Qigong is a traditional form of Chinese (mind-body) physical activity which is similar, but more ancient in origin, to Tai Chi. It uses slow body movement and mind control (meditative movement), and is commonly practiced by Asian cancer patients (Lam et al., 2009), as it enhances health. A recent systematic review of controlled clinical trials on Qigong in cancer patients identified only 4 RCTs which failed to demonstrate convincing result on the efficacy of Qigong due to the poor methodology and lacked of proceedings details (Lee et al., 2007). Another systemic review by Oh and colleagues (2011) reported encouraging results on medical Qigong in cancer patients. Poor adherence to acceptable standards of trial methodology remained a key limitation in these studies (Oh et al., 2011). Fundamentally, there isn't any study on qigong and the increasing interest amongst cancer survivors in Malaysia. The aim of this RCT study is to evaluate the efficacy of Qigong on the QoL of breast cancer survivors, in comparison to women in the exercise control group and, usual care group.

## Materials and Methods

### *Design and setting*

This RCT was conducted in the University of Malaya Medical Centre (UMMC), a large teaching hospital in Kuala Lumpur, Malaysia, which serves patients from throughout the largely urban Klang Valley (Kuala Lumpur Metropolitan area). Ethical approval was obtained prior to this KL Qigong Trial, from the UMMC Ethical Committee for Research.

### *Subjects*

Patients diagnosed with breast cancer between 2008 and 2011 based were identified from the UMMC breast cancer clinical database. Patients were eligible for inclusion if they were: i) aged between 18 and 65 years; ii) had a primary diagnosis of early stage (I-II) breast cancer; iii) had completed primary cancer treatment with no evidence of metastasis; and iv) were at least one year post-diagnosis. Exclusion criteria were: i) having a medical contraindication to exercise; ii) a major medical condition such as epilepsy, uncontrolled hypertension, a major orthopaedic problem or acute cardiovascular disease (patients diagnosed within last 6 months and are still medically unstable); iii) were currently practicing Qigong or line dancing; or iv) were engaging in more than four hours of vigorous physical activity.

### *Power size calculation*

A priori sample-size was calculated based on previously published RCT on an 8-week exercise intervention in breast cancer patients, whereby, the primary outcome was QoL using the FACT instruments (Oh et al., 2010). Thus, for a medium effect (between-group mean-difference of 13.1 units in the overall FACT-B score at post intervention), and at 80% power and a

significance level of  $p < 0.05$ , this three-arm RCT would need a sample size consisting of at least 38 participants in each group.

### *Recruitment and randomization*

Potentially eligible patients were contacted by telephone, informed of the study and requested to participate. Signed consent was obtained from those who agreed to participate and they were randomised (1:1:1) to one of three arms; the Qigong intervention group, the exercise control group or the usual care group. Block randomisation (block size=six) was performed by one of the researcher. Masking of treatment allocation were conducted, with 'matching' active, placebo and control, using a free online Random Allocation Software (Brady et al., 1997). At the beginning of the trial, the patients were unaware of their allocated treatment and the instructors were unaware of which patients they would be getting. Although we attempt to ensure reduced bias in allocation, blinding is not possible with behavioral study as Qigong as well as line dancing are widely recognized.

### *The KL qigong intervention*

A low-moderate intensity internal Qigong (*Zhi Neng Qigong*) programme (group activity) was employed. Participants were invited to attend weekly face-to-face classes run by a fully qualified Qigong master for 8-weeks. The first 10 minutes of each class was a warming up phase, followed by 70 minutes of main exercise with a 10-minute cool down at the end of the session. Two five-minute breaks were included. *Peng Qi Guan Ding Fa* was taught as the elementary steps to *Zhi Neng Qigong*. It consists of three sequences with three different starting poses. Five sessions were required for the participants to master the stance and steps. On the sixth session, '*San Xin Bing Zhan Zhuang*' was introduced. It has a similar starting and ending sequence to '*Peng Qi Guan Ding Fa*' but has additional movement aimed at improving mental calmness. Minor Qigong movements such as '*Kai He La Qi, Dun Qiang, Chen Qi*' were also included. Participants were encouraged to practice a 30 minute routine at home, twice a week (using the supplementary recording provided on a compact disc) during the 8-week intervention and to record home-practice adherence using a given logbook. Participants were informed at the beginning of the intervention that the program is to enable a redesign of lifestyle towards a more physically active lifestyle by incorporating Qigong into daily living. The program is planned in such a way that the women have consolidated time to learn the steps in a group format, and so that they could integrate into their individual routine lifestyle.

### *The exercise control programme*

A group line-dancing programme with moderate-intensity movements was used as the control intervention. This intervention consisted of four sets of aerobic movements that were taught face-to-face once a week (90-minute sessions for 8 weeks) by an experienced line-dance instructor. Each session began with a 10-minute warm up period; 60-minute dancing sequences and a 10-minute cool down. There were also two intervals of five

minutes during the session. Participants were encouraged to practice a 30 minute routine at home, twice a week (aided by a compact disc recording of music used during the face-to-face session) for the 8-week intervention and to transfer to home practice. A logbook was given to monitor their home practice.

#### Usual care

No change was made to the usual management of participants assigned to this group but they were offered either the Qigong or line dancing programme at the end of the eight week intervention period. Participants in the Qigong and control exercise programmes were also advised to continue with their standard medical care during the intervention period.

#### Outcome measures

##### Primary Endpoint: FACT B

The primary outcome measure is the QoL score, measured with Functional Assessment of Cancer Therapy-Breast (FACT-B) QoL (Cella et al., 1993). A higher score indicates a better QoL among the participants. The Functional Assessment of Cancer Therapy-Breast (FACT-B) is made up of two components which were the 27-item Functional Assessment of Cancer Therapy-General (FACT-G, scores ranging from 0-108), to measure the multidimensional QoL in the past 7 days, in patients with all types of cancer [21] and the 10 items Breast Cancer Subscale (BCS, scores ranging from 0-36), to measure the breast cancer patients specific symptoms. Thus, the overall FACT-B total score ranges between 0 and 144, the FACT-G total score (0-108), plus the BCS subscale (0-36). Both scales use a 5-point Likert scale, with responses ranging from 0-4, where 0 means 'not at all' and 4 'very much'. FACT-B has been widely used in Asian countries for determining the QoL of breast cancer survivors (Cella et al., 1993; So et al., 2010).

##### Secondary endpoints: DASS and FACIT-F

Secondary outcomes included the measurement of fatigue and negative emotional states. Fatigue, in the previous 7 days, was measured using the 13-item Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) (Yellen et al, 1997). Experience of negative emotional states was measured using the Depression and Anxiety Stress Scale-21 DASS-21 (Antony et al, 1998) which consists of 4-point Likert scales that allow participants to report their negative feelings (depression, anxiety and stress) over the previous seven days.

The KL Qigong trial participants completed the quality of life (FACT-B, as well as the FACIT-F) and distress (DASS-21) measures at baseline, and at the end of the intervention period. Participants in intervention arms were also provided with a logbook to record the dates, nature, duration, and intensity of exercises performed at home during the 8-week trial period. This is to ensure they remember to practice at home.

#### Data analysis

All tests were two-tailed and an alpha level of 0.05 was applied as the criterion for statistical significance.

Data was analyzed using Statistical Package for Social Sciences, version 16 (Daley et al., 2007). Outliers more than 1.5SD, were removed, and missing data were replaced with mean-substitution. Analysis of covariance was used to examine comparative efficacy of Qigong, the mean score of FACT-B, FACIT-F and DASS-21 measures at post intervention, and compared between the groups (Qigong, exercise control and usual care). The baseline covariates (i.e. FACT-B, FACIT-F and DASS) were entered into the Analysis of covariance (ANCOVA) model to adjust for the differences in baseline scores.

## Results

There were 1933 potentially eligible breast cancer Survivors (Figure 1) from the UMMC breast cancer clinical database (2007-2011). Of these, 1182 were excluded for various reasons:-118 (10%) were already physically active, 475 (40.2%) had carcinoma in situ or late stage disease (stage III or IV), 263 (22.3%) were outside the desired age range, 15 (1.3%) had died prior to contact, and a further 311(26.3%) could not be contacted by telephone, despite at least two attempts made at different times of the day. The consented total of 197 was then assigned to the three groups. However, only 95 women finally turn-up and participated in the

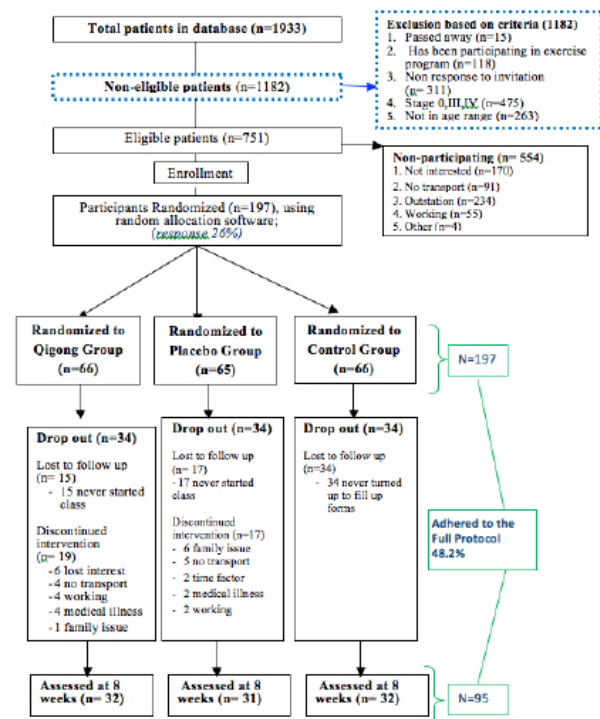


Figure 1. Flow Chart of the KL Qigong Trial

KL Qigong Trial per the protocol set before trial (i.e to comply with the requirement of participation in, at least 6 out of 8 sessions).

#### Demographics

The majority of the participants were Chinese, married, post-menopausal, diagnosed in stage II, one year since diagnosis, working full time, attained at least secondary education and had a household income of less than RM3000 (USD1000 per month). Table 1 and Table 2 show

the baseline demographic data for all patients. There were no statistical significance differences between groups (via Fisher's Exact test), thus they were comparable at the start.

### Quality of life (QoL), distress and fatigue

Table 3 shows the baseline measures of FACT-B, FACIT-F and DASS-21. The mean total of the primary outcome, FACT-B score measured at the end of intervention period was 7.1 units higher (95% CI=0.36-

13.9) in the Qigong group compared to the exercise control group and 6.7 units (95% CI=0.04-13.3) higher than in the usual care group. Qigong participants demonstrated increment in mean score for the five QoL specific sub-components [Physical wellbeing (PWB), Social Well-being (SWB), Functional Well-being (FWB), Emotional Well-being (EWB) and Breast Cancer Subscale (BCS)], compared to non-Qigong participants. However, only the BCS component showed a statistically significant

**Table 1. Baseline Quality of Life, Fatigue and Distress**

| Demographic             |                            | All<br>(n=95)<br>n (%) | Qigong<br>(n=32)<br>n (%) | (line dance)<br>control (n=31)<br>n (%) | Usual care<br>(n=32)<br>n (%) | p-value |
|-------------------------|----------------------------|------------------------|---------------------------|-----------------------------------------|-------------------------------|---------|
| Ethnicity               | Chinese                    | 61 (64.2)              | 19 (59.4)                 | 22 (71.0)                               | 20 (62.5)                     | 0.82    |
|                         | Malay                      | 24 (25.3)              | 10 (31.3)                 | 6 (19.4)                                | 8 (25)                        |         |
|                         | Indian                     | 10 (10.5)              | 3 (3.2)                   | 3 (9.7)                                 | 4 (12.1)                      |         |
| Marital status          | Single                     | 19 (20.0)              | 18.9 (3.5)                | 19.9 (2.75)                             | 18.2 (4.5)                    | 0.73    |
|                         | Married, others            | 76 (80)                | 27 (28.4)                 | 24 (77.4)                               | 25 (78.1)                     |         |
| Menopausal Status       | Pre-menopause              | 31 (32.6)              | 13 (40.6)                 | 8 (25.8)                                | 10 (31.3)                     | -       |
|                         | Post-menopause             | 64 (67.4)              | 19 (59.4)                 | 23 (74.2)                               | 22 (68.8)                     |         |
| Cancer Stage            | Stage I                    | 33 (34.7)              | 11 (34.4)                 | 10 (32.3)                               | 12 (37.5)                     | -       |
|                         | Stage II                   | 62 (65.3)              | 21 (65.6)                 | 21 (67.7)                               | 20 (62.5)                     |         |
| Active treatment        | Surgery only               | 13 (13.7)              | 4 (12.5)                  | 4 (12.9)                                | 5 (15.6)                      | -       |
|                         | Surgery & ChemoTx          | 27 (28.4)              | 10 (31.3)                 | 9 (29.9)                                | 8 (25)                        |         |
|                         | Surgery & RadioTx          | 13 (13.7)              | 5 (15.6)                  | 4 (12.9)                                | 4 (12.5)                      |         |
|                         | Surgery, ChemoTx & RadioTx | 42 (44.2)              | 13 (40.6)                 | 14 (45.2)                               | 15 (46.9)                     |         |
| Years since diagnosis   | 1                          | 14 (14.7)              | 2 (6.3)                   | 4 (12.9)                                | 8 (25.0)                      | -       |
|                         | 2                          | 37 (38.9)              | 15 (46.9)                 | 13 (41.9)                               | 9 (28.1)                      |         |
|                         | 3                          | 24 (25.3)              | 11 (34.4)                 | 9 (29.0)                                | 4 (12.5)                      |         |
|                         | 4-5                        | 20 (21.0)              | 4 (12.5)                  | 5 (16.1)                                | 11 (24.4)                     |         |
| Physical Activity(IPAQ) | Low                        | 58 (61.1)              | 20 (62.5)                 | 18 (58.1)                               | 20 (62.5)                     | -       |
|                         | Moderate                   | 37 (38.9)              | 12 (37.5)                 | 13 (41.9)                               | 12 (37.5)                     |         |
| Employment              | Full time worker           | 34 (35.8)              | 10 (31.3)                 | 12 (38.7)                               | 12 (37.5)                     | 0.54    |
|                         | Unemployment               | 24 (25.3)              | 12 (37.5)                 | 7 (22.6)                                | 5 (15.6)                      |         |
|                         | Part time                  | 8 (8.4)                | 1 (3.1)                   | 3 (9.7)                                 | 4 (12.5)                      |         |
| Educational level       | Full time homemaker        | 29 (30.6)              | 9 (28.1)                  | 9 (29.0)                                | 11 (34.4)                     | 0.18    |
|                         | No formal education        | 2 (2.1)                | 1 (1.1)                   | 0 (0)                                   | 0 (0)                         |         |
|                         | Primary-secondary          | 59 (62.0)              | 15 (15.8)                 | 19 (61.3.7)                             | 10 (31.2)                     |         |
|                         | College                    | 19 (20.0)              | 8 (8.4)                   | 7 (22.6)                                | 16 (50.0)                     |         |
| No. of Child            | University                 | 15 (15.8)              | 8 (8.4)                   | 5 (16.1)                                | 4 (12.5)                      | 0.60    |
|                         | 0                          | 20 (21.1)              | 6 (18.8)                  | 7 (22.6)                                | 7 (21.9)                      |         |
|                         | 1-2                        | 23 (24.2)              | 9 (28.1)                  | 9 (29.0)                                | 5 (15.6)                      |         |
|                         | 3-5                        | 49 (51.5)              | 15 (46.9)                 | 14 (45.2)                               | 20 (62.5)                     |         |
| Financial Status        | >5                         | 3 (3.2)                | 2 (6.3)                   | 1 (3.2)                                 | 0 (0)                         | 0.72    |
|                         | < RM500-3000               | 51 (53.6)              | 13 (10.7)                 | 20 (74.7)                               | 18 (56.3)                     |         |
|                         | RM3001-RM5000              | 27 (28.4)              | 11 (34.4)                 | 8 (25.8)                                | 8 (25.0)                      |         |
|                         | >RM5000                    | 17 (17.9)              | 8 (25.0)                  | 3 (9.7)                                 | 6 (18.8)                      |         |

\*Demographic (Completed trial- fulfill the attendance criteria of at least 6/8 session; n=95)

**Table 2. Baseline QoL, Fatigue and Distress**

| Baseline Characteristic   | All (n=95)<br>Mean( SD ) | Qigong (n=32)<br>Mean( SD ) | (line dance) control (n=31)<br>Mean( SD ) | Usual care (n=32)<br>Mean( SD ) | Baseline p-value |
|---------------------------|--------------------------|-----------------------------|-------------------------------------------|---------------------------------|------------------|
| <b>Primary outcome</b>    |                          |                             |                                           |                                 |                  |
| 1.FACT-B                  | 110.8 (15.7)             | 107.2 (16.8)                | 114.4 (12.5)                              | 110 (17.2)                      | 0.20             |
| Physical well being       | 23.7 (3.4)               | 23.4 (4.1)                  | 24.3 (2.90)                               | 23.5 (3.1)                      | 0.54             |
| Social well being         | 22.6 (5.2)               | 22.4 (5.8)                  | 22.5 (4.82)                               | 22.9 (5.1)                      | 0.94             |
| Emotional well being      | 19.0 (3.7)               | 18.9 (3.5)                  | 19.9 (2.75)                               | 18.2 (4.5)                      | 0.17             |
| Functional well being     | 21.9 (5.9)               | 20.4 (6.7)                  | 22.6 (5.39)                               | 22.7 (5.4)                      | 0.22             |
| Breast cancer subscale    | 23.7 (5.4)               | 22.5 (4.8)                  | 23.6 (6.03)                               | 24.9 (5.2)                      | 0.19             |
| <b>Secondary Outcomes</b> |                          |                             |                                           |                                 |                  |
| 1.FACIT-F                 | 40.1 (7.9)               | 39.7 (7.3)                  | 40.4 (7.43)                               | 40.4 (9.3)                      | 0.92             |
| 2.DASS-21                 | 22.2 (20.5)              | 21.8 (17)                   | 25.8 (26.8)                               | 19.0 (16.3)                     | 0.68             |
| Depression                | 5.6 (6.4)                | 6.0 (6.6)                   | 6.5 (7.7)                                 | 4.3 (4.6)                       | 0.76             |
| Anxiety                   | 6.8 (6.7)                | 6.3 (5.6)                   | 7.8 (8.3)                                 | 6.5 (6.1)                       | 0.80             |
| Stress                    | 9.7 (9.1)                | 9.6 (7)                     | 11.5 (12.2)                               | 8.3 (7.1)                       | 0.66             |

\*Note: FACT-B= Functional Assessment Cancer Therapy-Breast; FACIT-F= Functional Assessment Cancer Therapy-Fatigue short ; DASS-21= Depression Anxiety Stress Scale-short form

significant. The results are presented in Table 3 QOL, fatigue, and Distress. With distress (using DASS-21 scale), depression and anxiety scores were lowest in the Qigong group and stress was lowest in the usual care group, but the differences across groups were not statistically significant.

#### Follow-up study (12 month after baseline)

The participants from the Qigong (n=32) and exercise control (n=31) groups were followed up at 12 months post-intervention. Only 37% (23/63) participants responded [Qigong (n=14) and exercise control (n=9)] Table 4a and 4b reports the mean and SD of the quality of life, fatigue

**Table 3. Primary and Secondary Outcomes at Post-Intervention of the 8-Week Program**

| Outcome Measure        | Intervention |               | Mean Difference (95% confidence Interval) |
|------------------------|--------------|---------------|-------------------------------------------|
| [Primary Endpoint]     |              |               |                                           |
| FACT-B                 | Qigong       | vs Line dance | 6.67 (0.03 to 13.3)                       |
|                        | Qigong       | vs Usual Care | 7.13 (0.35 to 13.9)                       |
|                        | Line dance   | vs Usual Care | -0.46 (-7.15 to 6.23)                     |
| Physical well being    | Qigong       | vs Line dance | -0.70 (-2.34 to 0.94)                     |
|                        | Qigong       | vs Usual Care | 0.34 (-1.29 to 1.97)                      |
|                        | Line dance   | vs Usual Care | 1.04 (-0.37 to 2.37)                      |
| Social well being      | Qigong       | vs Line dance | 1.85 (-1.43 to 5.12)                      |
|                        | Qigong       | vs Usual Care | 3.08 (-.16 to 6.32)                       |
|                        | Line dance   | vs Usual Care | 1.24 (-2.03 to 4.51)                      |
| Emotional well being   | Qigong       | vs Line dance | 0.31 (-1.86 to 2.48)                      |
|                        | Qigong       | vs Usual Care | 0.01 (-2.01 to 2.28)                      |
|                        | Line dance   | vs Usual Care | -0.18 (-2.37 to 2.02)                     |
| Functional well being  | Qigong       | vs Line dance | 1.12 (-1.34 to 3.57)                      |
|                        | Qigong       | vs Usual Care | 0.77 (-1.66 to 3.19)                      |
|                        | Line dance   | vs Usual Care | 1.90 (-.21 to 4.02)                       |
| Breast cancer subscale | Qigong       | vs Line dance | 3.03 (0.86 to 5.21)                       |
|                        | Qigong       | vs Usual Care | 2.01 (-3.20 to 1.17)                      |
|                        | Line dance   | vs Usual Care | -1.02 (-3.02 to 1.28)                     |
| [Secondary Endpoint]   |              |               |                                           |
| Fatigue (FACIT-F)      | Qigong       | vs Line dance | 0.74 (-2.62 to 4.11)                      |
|                        | Qigong       | vs Usual Care | 2.15 (-1.19 to 5.49)                      |
|                        | Line dance   | vs Usual Care | 1.40 (-1.96 to 4.67)                      |

| Distress (DASS 21) | Intervention     | Mean Rank | p-value |
|--------------------|------------------|-----------|---------|
| Depression         | Qigong           | 45.23     | 0.49    |
|                    | Exercise Control | 46.08     |         |
|                    | Usual care       | 52.63     |         |
| Anxiety            | Qigong           | 47.73     | 0.81    |
|                    | Exercise Control | 45.90     |         |
|                    | Usual care       | 50.30     |         |
| Stress             | Qigong           | 43.53     | 0.13    |
|                    | Exercise Control | 44.48     |         |
|                    | Usual care       | 55.88     |         |

\*FACT-B= Functional Assessment of Cancer Therapy-Breast; FACIT-F= Functional Assessment of Cancer Therapy-Fatigue Short; Line dance =(Exercise Control); DASS-21= Depression Anxiety Stress Scale-21

**Table 4a. Active Engagement Sustained from Baseline Till 12 Months Post-Intervention**

| Characteristics               | All (n=23) |      | Qigong (n=14) |      | Exercise Control (n=9) |      |
|-------------------------------|------------|------|---------------|------|------------------------|------|
|                               | n          | %    | n             | %    | n                      | %    |
| Active PA engagement (months) |            |      |               |      |                        |      |
| 0                             | 11         | 47.8 | 9             | 64.3 | 2                      | 22.2 |
| 1-3                           | 5          | 21.7 | 4             | 28.6 | 1                      | 11.1 |
| 4-6                           | 4          | 17.4 | 0             | 0    | 4                      | 44.4 |
| 12                            | 3          | 13.0 | 1             | 7.1  | 2                      | 22.2 |

improvement of 3.0 units (95% CI=0.9-5.2), in contrast to the exercise control group. The Social wellbeing component showed a significant improvement of 3.1 units (95% CI=-1.4 to 5.1) in the Qigong group when compared to the usual care group.

Secondary Outcomes include the fatigue (FACIT-F) and distress (DASS 21) measures. At post intervention, the fatigue scores showed favorable improvement on the Qigong group, but the differences across groups was not

**Table 4b. Primary Outcome Measure at follow up (12 months post intervention)**

|                        | Post 12 months (T2) |        | Mean difference (T2-T0) |        |            |                  | Mann-Whitney U Test (p-value) |
|------------------------|---------------------|--------|-------------------------|--------|------------|------------------|-------------------------------|
|                        | Qigong (n=14)       |        | Exercise control (n=9)  |        | Qigong     | Exercise control |                               |
|                        | Mean (SD)           | Median | Mean (SD)               | Median | Mean (SD)  | Mean (SD)        |                               |
| FACT-B                 | 111.4 (25.4)        | 115.8  | 117.2 (12.5)            | 116.0  | 2.8 (15.1) | -0.7 (9.9)       | 0.85                          |
| Physical well being    | 23.1 (6.0)          | 24.5   | 26.0 (2.5)              | 26.0   | 0.9 (5.5)  | 3.7 (5.9)        | 0.27                          |
| Social well being      | 20.9 (9.3)          | 25.8   | 24.3 (4.0)              | 26.0   | -2.1 (8.3) | 1.1 (5.4)        | 0.54                          |
| Emotional well being   | 20.2 (3.4)          | 20.5   | 19.8 (2.5)              | 20.0   | 1.6 (2.8)  | -0.1 (3.4)       | 0.56                          |
| Functional well being  | 22.9 (6.0)          | 25.0   | 24.8 (4.3)              | 27.0   | 0.8 (4.0)  | 1.6 (4.5)        | 0.34                          |
| Breast cancer subscale | 24.1 (7.0)          | 25.0   | 22.3 (7.0)              | 26.0   | 1.5 (4.5)  | -0.1 (5.1)       | 0.60                          |

\*A bigger mean difference in total score, social, emotional and breast cancer subscales for QiGong

and distress scores with some improvement in mean scores but with no significant changes on the QOL scores.

## Discussion

This study found a positive trend of improved QoL in the 8 weeks Qigong group for breast cancer survivors' (as measured with breast specific FACT-B). These findings are similar to Oh et al's (2010) studies that involved 162 cancer patients. When comparing the breast cancer-specific subscale, a significant mean difference of 3.0 and 2.0 was observed in the exercise control and usual care group when comparing to the mean in Qigong group. These findings were consistent with past literatures (Milne et al., 2008). The results suggest Qigong may have beneficial effect in QOL possibly via movement as therapy which helps in ameliorating cancer symptoms such as swelling of arm, and reduced weight and lowered distress contributing to better QOL. This preliminary evidence of efficacy of Qigong for the quality of life of breast cancer survivors, and which warrants a larger RCT follow up.

A significant improvement in QoL was found at eight-week post-QiGong intervention, but not in the exercise-control group, or in the usual-care group. Our findings concurred with studies whereby participant's QoL remained unchanged after undergoing physical activity intervention over a period of time (Segal et al., 2001; Kim et al., 2008). In this trial, line dancing was used as exercise-control group to control for the social-effect of group. We found that, despite anecdotal evidence and observations of more fun and laughter in this group, the effect did not culminate to a significant improvement of their QoL, which may suggest that even the positive social-effect is not large enough to generate a significant effect on their QoL. This observation adds strength to the finding that the social-group effect, alone, do not lead to a better QoL, than the impact found in Qigong. We have also minimized possible bias whereby the participants were assigned to the respective group without any knowledge of the group assignment, and as such this step eliminates the rationale that a psychological-effect may overrides the real physical activity effect. Additionally, the tester was not involved in the group intervention and stayed neutral throughout the trial.

Another finding is there was no statistical significant change in the level of fatigues demonstrated across the groups. Some studies had found that fatigue may persist even years after active treatment (Meeske et al., 2007; Kim et al., 2008). In this study, the baseline fatigue scores were relatively higher compared to studies that used the same outcome measure. (Danhauer, 2009; Oh, 2010). Two reasons are postulated for this observation. Firstly, the ceiling-effect in fatigue (measured with FACIT-F scale), may possibly have confounded the result, leading to an insignificant change in fatigue levels. Secondly, some of the participants may have adjusted to symptoms of fatigue since their mean-year post-diagnosis was 2.6 years. A larger sample size may be required to demonstrate a clearer significant effect of Qigong on fatigue.

In terms of distress, both activity groups recorded no significant changes in depression, anxiety or stress.

Studies showed that the most depressed survivors were difficult to be recruited into trial as they preferred to stay at home (Danhauer, 2009). Hence, participants that were recruited might have less distress at the baseline state. The low power due to high attrition rate may be a likely factor for the non-statistically significant changes observed (Pallant 2010).

In terms of design, whilst most studies are limited to having just an experimental and control group (Cambell et al., 2005; Oh et al., 2010), this trial utilised a three-arm RCT design which allows comparison to another form of physical activity to control the effect of participating in a social group. Thus, our study outcome may better reflect the effectiveness of a physical activity intervention after minimizing the possible social-group effect, a strong confounding effect on benefit of physical activity. Other confounding factors that have been taken into consideration included i) ensuring a focus specific population in cancer stage (early), cancer type (breast cancer) and ii) exclusion of physically-active participant.

A prospectively longer follow-up study is also essential to explore whether the short-term benefits can persist to produce effective health behavior changes. It is also important to note that the exercise control (i.e. Line-Dance) is not well researched for improving survivor's QoL. However it is a form that was perceived relevant for adjusting for the social-group effect in such group activities. Given the variety of options of physical activity, future studies can compare the different types of Qigong, or other physical activity such as group aerobic or resistance exercise that has accumulated some evidences. It will also be beneficial to explore Qigong practice and mind-body exercise such as yoga to add knowledge to the growing evidence of engaging physical activity among breast cancer survivors. Also, a more homogenous group (for example BMI status, age status, gender-status) may provide more accurate findings on efficacy of Qigong amongst subgroups in cancer survivors. In summary, more studies into women survivors are needed. The relatively short timeline is another limitation in this trial. Although eight weeks intervention period was sufficient to detect significant changes (Daley et al., 2007), many RCTs reported were conducted from 10 weeks to 6 months (Courneya, 2003; Mutrie et al., 2007; Loh et al., 2011). Given a longer time and a follow-up program post intervention, a greater increment in physical and psychological aspect may be expected as positive long term health impact on long term participation in physical activity intervention has been reported (Segal et al., 2001; Cadmus et al., 2009).

With power size, since most cancer trial recorded recruitment as a key barrier, any future studies should proactively consider adopting multiple recruitment strategies to counter attrition rate, since there are multiple barriers to physical activity (Loh, Chew, Lee 2011a; Loh Chew, Lee, 2011b). Strategies for higher uptakes and lower attrition rate will resulted in a better sample size.

The preliminary data of this study suggested that Qigong tested here is relatively safe and has preliminary beneficial outcome which can be promoted by healthcare professionals, such as the occupational therapists, to

engage survivors in meaningful lifestyle redesign to optimize QiGong's activity-enhancing qualities for survivors' overall well-being. All form of cultural activity to engage the survivors should be pursued since the protective effects of physical activity on cancer risk reductions has been reported as up to 20-30% (Kruk and Czerniak, 2013). In addition, this study outcome provides preliminary evidence to occupational therapists to enable survivors to self-manage their physical health and a more balanced daily-life activity engagement. However, survivors must be reminded so that they do not think that Qigong is all that they need to do to improve physical QoL.

The subjects were first contacted via telephone and were informed about the study for their informed-consent. There were 554 eligible participants who were unable to participate due to various reasons such as- residing far away from the trial location (n=234), transportation issue (n=91), work commitments (n=55), and lack of interest/will (n=170). Although a final total of 197 patients were recruited and randomized into the three groups, only 131 patients provided baseline data and started the study. Based on the strict (but reasonable) criteria that subjects must attend at least 6 out of 8 sessions, only 95 participants completed the trial, giving a response rates of 48 percent (95/197).

There has been enormous media attention and funding provided for breast cancer disease which is highly prevalent in women worldwide. Unfortunately, even with this attention, medical care for women with breast cancer continues to focus narrowly on detections of recurrence, without consideration of many other aspects that affects functioning. Despite rising evidence that physical activity can lower risk of breast cancer recurrence, most women with breast cancer (n=368) only changed their diet after diagnosis, but did nothing about their level of physical activities (Yaw, et al 2014). More studies on the medical and non-medical tasks are warranted for the wellbeing of women.

In conclusion, this study found a significant positive association on Qigong and the Quality of life of cancer survivors over usual care, when controlling for group social effect. In view of this finding, and more importantly, due to the increasing popularity of Qigong amongst Asian survivors, couple with the difficulty to engage survivors in an active lifestyle, we therefore would recommend the practice of their preferred Qigong to be encouraged as a possible, potent means of physical activity strategy. The public health message must be simple and clear for two reasons. Firstly, to engage survivors in choosing to stay active over sedentary activities, and secondly, a drive towards the slogan, 'stay active for life' that help towards cancer control. This study has implications for more research to examine how best to engage survivors, and to maintain the effects of QiGong (Asian cancer survivors' preferred activity) over the longer survivorship period, and to identify what component of the Qigong program are effective (best time to start the program, type of Qigong movement, length of program etc) for lifestyle redesign to prevent recurrence. there is an urgent need to explore and engage more cultural means of physical activity to fight side effects of treatment and for cancer control in

developing countries. With longer survivorship, public health campaign and health intervention to improve the physical health of survivors is timely and warranted.

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