

✧ RESEARCH PAPER ✧

A self-directed home yoga programme for women with breast cancer during chemotherapy: A feasibility study

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Accepted for publication 8 November 2015

Komatsu H, Yagasaki K, Yamauchi H, Yamauchi T, Takebayashi T. *International Journal of Nursing Practice* 2016; 22: 258–266

A self-directed home yoga programme for women with breast cancer during chemotherapy: A feasibility study

Recent studies suggest yoga as a promising approach for improving the cognitive function of cancer survivors. We studied whether a self-directed home yoga programme was feasible for patients with breast cancer who were undergoing chemotherapy. Participants' preferences for the type of yoga course and the clinical effects of the programme were also assessed.

In this study, 18 women (mean age, 43.9 years) were enrolled (44.7% recruitment rate). Of the participants, 63.6% had stage II cancer and 71.4% received adjuvant chemotherapy. Favourable retention (86%), adherence (94.4%) and acceptability (96.5%) rates were determined. Most (94.4%) of the women practiced the home programme more than twice a week on average. The participants preferred to gradually increase the intensity of the exercises.

We only observed improvements in the cognitive aspects of fatigue. No serious adverse events were encountered during the programme. This self-directed home yoga programme was safe and feasible for patients with breast cancer undergoing chemotherapy.

Key words: breast cancer, chemotherapy, cognition, quality of life, yoga.

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INTRODUCTION

Cancer-related cognitive impairment (CRCI) is common among cancer patients receiving chemotherapy. Despite its wide variation between studies, the prevalence of CRCI among cancer patients is estimated to be up to 30% prior to treatment, up to 75% during treatment and up to 35% after treatment according to a recent review.¹ Although it is often referred to as 'chemo-brain' or 'chemo-fog', CRCI occurs even before chemotherapy, and the underlying mechanism is not well understood.² Further research is needed, including oxidative stress and DNA repair mechanisms in relation to cognition.¹

Cancer-related cognitive impairment negatively affects the quality of life (QOL) of cancer patients,^{3,4} but recent studies suggest that exercise positively affects cognitive function of individuals with cancer.⁵⁻⁷ Yoga, encompassing gentle physical activity, breathing practices and meditation, has been shown to be a promising approach for improving the cognitive function of breast cancer survivors.⁶ A meta-analysis of yoga interventions in cancer patients revealed strong beneficial effects on anxiety and distress; moderate effects on fatigue, general QOL, and emotional and social functioning; a mild effect on functional well-being and no significant effect on physical function and sleep disturbances.⁸ In a recent randomized clinical trial, breast cancer survivors (stages 0-IIIa), who were assigned to receive a 12-week twice-weekly Hatha yoga intervention, had fewer cognitive problems than a control group at the 3-month follow up.⁶ Galantino⁷ also suggested that yoga might affect cognition during and after chemotherapy.

Although most of the existing studies on yoga are limited to breast cancer survivors and few studies have been performed on yoga during chemotherapy, patients undergoing chemotherapy might benefit from yoga programmes. Physical activity typically declines over the course of cancer treatment.⁹ Fatigue, a common experience among patients with breast cancer, has also been identified as a barrier to participation in physical activity, including yoga.¹⁰⁻¹² Furthermore, evidence suggests that cancer patients experience less cognitive decline if they perform yoga.⁶

We developed a self-directed home yoga programme for patients with cognitive complaints during chemotherapy. As participant preference for physical activity programmes is important in designing intervention strategies to increase the adoption and adherence to regular physical activity,^{13,14} the programme is characterized by a combination of yoga courses that are based on the patients' preferences and are practiced at home using a digital versatile disc (DVD).

The primary objective of our study was to test the feasibility of this self-directed home yoga programme for patients with breast cancer who are undergoing chemotherapy by measuring recruitment, retention and acceptability rates. The secondary objective was to study the frequency at which the patients practiced the yoga programme and their preferences regarding the components of the programme. Changes in cognitive function and QOL were also measured.

METHODS

Study design

A prospective feasibility study was conducted in a general hospital with 500 beds in Tokyo, Japan. Ethical approval was obtained from the internal review boards of the Faculty of Nursing and Medical Care, Keio University (No. 215) and St. Luke's International Hospital (13-R166).

Participants

Breast cancer patients were recruited at the chemotherapy clinic of St. Luke's International Hospital, Tokyo, Japan, from July to September 2014. The patient eligibility criteria for the study were: (1) undergoing chemotherapy as an initial therapy; (2) experiencing more than one of the typical symptoms of cognitive impairment associated with chemotherapy, including memory loss and difficulty remembering; (3) women aged 20 years or older; and (4) able to complete questionnaires in Japanese. The exclusion criteria were: (1) severe cognitive impairment (e.g. dementia); (2) receiving treatment for a psychiatric disorder from mental health professionals; (3) receiving treatment for symptoms of metastatic cancer; and (4) reported current yoga practice or prior yoga practice for more than 3 months.

Study procedures

This was a convenience sample with sample size for this feasibility study based on estimates of the recruitment rate in a single facility where trained nurses and physicians were available for a safe yoga intervention. Sociodemographic (age, marital, educational and job status), clinical (disease stage and chemotherapy regimen) and baseline outcome (cognitive function, fatigue, QOL and psychological distress) data were obtained from consenting women through a self-reported questionnaire. After participating in a 30 min orientation and a 90 min group yoga class led by an instructor in a hospital exercise room, the participants practiced a 4-week yoga programme commencing the

following day by using a DVD at home. The follow-up assessment was performed during a clinic visit or by mail, 4 weeks after the commencement of the home yoga programme.

Intervention

The objective of the intervention programme was to improve cognitive function by physical and mental activation achieved through yoga, including physical practice, breathing exercises and meditation. We provided information material on the yoga programme (in booklet format), an instructor-guided group yoga class during the orientation, a self-directed home yoga programme on a DVD and yoga logs.

The yoga protocol consisted of mild-level positioning and mild-level or moderate-level posture exercises in consideration of the physical condition of the breast cancer patients and the side effects of chemotherapy. The yoga protocol was agreed with a yoga instructor with 15 years of experience who had been involved in yoga for vulnerable elderly people, breast surgery and oncology patients, and researchers. Three courses of the home yoga programme were provided, each course lasting 15 min (Table 1). The participants chose either one course or combined multiple courses to practice yoga based on their physical condition and preferences. The participants kept yoga logs (detailing the date of practice, the specific yoga course and the practice time), and whether they underwent chemotherapy on the practice day or not, their physical conditions and comments (yoga logs).

Table 1 Self-directed home yoga programme

Hatha yoga

The participant practices one yoga session by choosing one or combine multiple courses from the following:

1. Warming-up course (15 min)
Stretch, isometric exercises focusing on the shoulders, neck, arms and legs, and deep breathing
2. Low-intensity course with mainly sedentary poses (15 min)
Vayu muktyasana, Ashwa, sanchalansana, child pose, Supta, matyendrasana and Savasana
3. High-intensity course with mainly standing poses (15 min)
Cat and cow, diagonal stretch, Adho Mukha Svanasana, child pose, Virabhadrasana I, Pada Hasthasana and Savasana

Outcome measures

Feasibility

We defined recruitment rate as the number of consenting women divided by the number of eligible women who were approached to participate in the study. We defined retention rate as the number of recruited participants who completed the pre-intervention and postintervention questionnaires. Adherence was assessed by using the self-reported number of completed home yoga sessions for 4 weeks. If the participant practiced yoga once daily, it was counted as one yoga session, irrespective of the type of course. Furthermore, the participants' course preferences were assessed according to their choices recorded in their yoga logs. The acceptability rate of the yoga programme was assessed after programme completion through an eight-item evaluation form, where participants rated the clarity of the programme's objectives, how easy it was easy to understand, their interest in the programme, its usefulness, their satisfaction with the programme and their wish to continue the yoga programme on a 4-point Likert scale. Safety was assessed based on the participants' reports of any unfavourable changes limiting their daily lives.

Cognitive function

The Japanese version of the Cognitive Failures Questionnaire (CFQ) was used to measure cognitive function. The CFQ, developed by Broadbent *et al.*, comprises 25 items derived from three areas of slips and errors, namely, perception slips, memory slips and slips in motor functioning.¹⁵ Respondents are asked questions such as 'Do you fail to notice signposts on the road?' or 'Do you read something and find you haven't been thinking about it and must read it again?' Each question is scored on a 5-point Likert scale. The total score on the CFQ ranges from 0 to 100, and higher scores indicate a higher level of self-reported cognitive impairment. Sumitani translated the CFQ into Japanese,¹⁶ and we obtained permission for its use. Bilingual breast surgeons and oncologists analysed its content validity.

Fatigue scale

The Cancer Fatigue Scale (CFS), developed by Okuyama *et al.*, is a 15-item self-rating scale designed to assess the multidimensional nature of fatigue in individuals with cancer.¹⁷ This scale consists of three subscales (physical, affective and cognitive aspects of fatigue), and each item is rated on a scale from 1 (not at all) to 5 (very much). Total

fatigue is calculated as the sum of the subscale scores, and higher total scores indicate more severe fatigue. The reliability and validity of this scale have been well established.^{18,19} We obtained the permission to use the CFS from the National Cancer Center Hospital East.

Psychological distress

The Japanese version of a self-reported Hospital Anxiety and Depression scale (HAD) was used to assess psychological distress. The HAD, developed by Zigmond and Snaith, has two subscales (anxiety and depression) that are rated on a scale from 0 (not at all) to 3 (very much), with higher scores indicating higher levels of anxiety and depression.²⁰ The HAD was translated into Japanese by Kitamura,²¹ and its reliability and validity were established by Hatta.²²

Quality of life

Quality of life was measured by using the Japanese version of the Functional Assessment of Cancer Therapy-Breast (FACT-B). FACT-B, developed by Cella,²³ is a 36-item self-reported questionnaire consisting of the following five subscales: physical (seven items), family/social (seven items), emotional (six items), functional well-being (seven items) and breast cancer (nine items). A 5-point Likert scale ranging from 0 (not at all) to 4 (very much) is used,^{23,24} and higher scores indicate a higher QOL. The Japanese version of FACT-B was translated by Shimozuma,²⁵ who also established its reliability and validity.²⁶ We obtained permission to use the FACT-B from FACIT.org (Functional Assessment of Chronic Illness Therapy).

Statistical analysis

Descriptive statistics were tabulated for participant characteristics, study outcomes and feasibility measures. Pre-intervention and postintervention data were compared by using the Wilcoxon signed-ranked test, with statistical significance set at $P < 0.05$. Results were analysed using SPSS version 17 (SPSS Japan Inc).

RESULTS

Recruitment

Forty patients with cognitive complaints were recruited during a 3-month screening period. Of these, two were ineligible due to symptoms caused by metastatic cancer. Of the remaining 38 patients, 17 (44.7%) consented to participate in the study (Fig. 1).

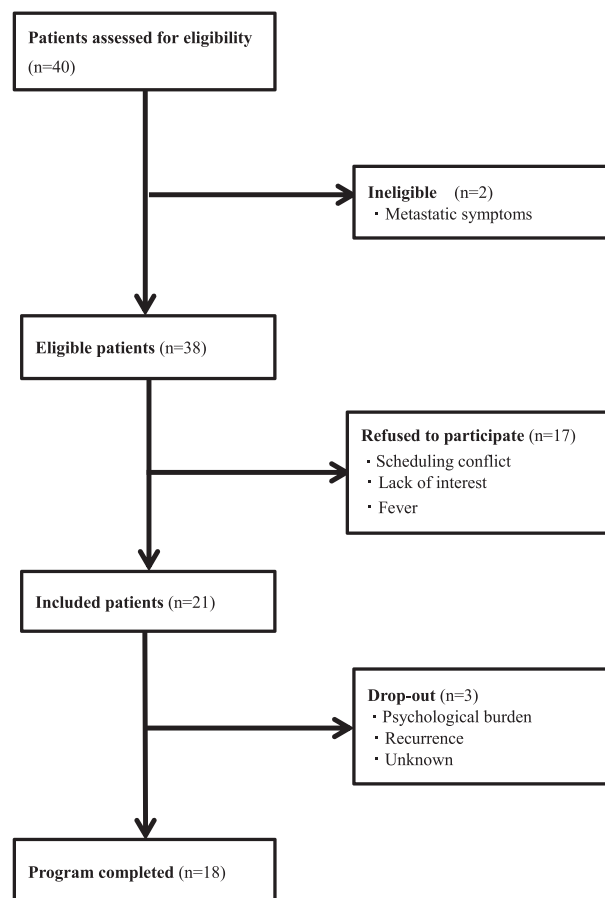


Figure 1. Flow diagram for the self-directed home yoga programme study.

Participant characteristics

The study participants' pre-intervention demographic and clinical characteristics are summarized in Table 2. The women were aged 33–58 years (mean age, 43.9 years). Nearly 90% were married; all had at least a high school education, and about half of the participants had a full-time job or half-time job. Two-thirds (63.6%) of the participants had stage II cancer, and 71.4% received adjuvant chemotherapy (mostly an anthracycline regimen (90.5%)).

Feasibility and safety

During the yoga programme, three participants withdrew owing to psychological burden related to bilateral breast cancer, recurrence and unknown reasons (retention rate, 86%). One, four, four, five and four participants practiced the self-directed home session once (5.6%), twice (22.2%), three times (22.2%), four times (27.8%) and more than five times (22.3%) on average, respectively. Most

Table 2 Participant characteristics, *n* = 21

Age (years)		
Mean, SD	43.9	6.5
	<i>n</i>	%
30–39	7	33.3
40–49	10	47.6
50–59	4	19
Gender		
Female	21	100
Marital status		
Married	18	85.7
Divorce	1	4.8
Unmarried	2	9.5
Educational status		
High school	2	9.5
Junior college/technical school	10	47.6
University or higher	9	42.9
Job status		
Full-time	8	38.1
Part-time	3	14.3
Housewife	10	47.6
Disease stage at diagnosis		
0	2	9.1
I	2	9.1
II	14	63.6
III	3	13.6
Unclassified	1	4.5
Chemotherapy course		
Adjuvant	15	71.4
Neo-adjuvant	6	28.6
Neo-adjuvant or adjuvant chemotherapy		
Anthracycline and taxane	16	76.2
Other anthracycline-based	3	14.3
Other taxane-based	2	9.5

(94.4%) of the participants practiced the self-directed home programme more than twice a week on average.

The participants reported the reasons why they did not practice the yoga programme in their yoga logs. Although we only had limited data on these reasons because of missing data, the side effects of chemotherapy were commonly cited. Reasons for not practicing the yoga programme included physical distress (e.g. nausea, lack of appetite, diarrhoea, constipation, joint or muscle pain, fever and fatigue/drowsiness). No adverse effects of the yoga programme were reported.

All of the women completed and returned the evaluation form (Table 3) and reported either 'agree' or 'strongly

agree' for all the survey items. The acceptability rate of the programme was 96.5%.

The participants preferred to gradually increase the intensity of the exercises (Table 4). The warm-up course was always chosen by the participants at the beginning of an exercise session (100%), and more participants combined warm-up and low-intensity courses (38.9%) or all three courses (27.8%) rather than the warm-up and high-intensity courses (5.6%).

Clinical effects

Improvement was only observed for the cognitive aspects of fatigue; no changes were observed for cognitive function, fatigue (physical, mental and overall), anxiety or depression and QOL (Table 5).

DISCUSSION

This is the first study to investigate the feasibility of a self-directed home yoga programme for patients with cognitive complaints during chemotherapy. With a fair recruitment (44.7%), and favourable retention (86%), adherence (94.4%) and acceptability rates (96.5%), the results suggest that participating in this self-directed home yoga programme is feasible and safe for breast cancer patients with cognitive complaints during chemotherapy.

We propose several plausible explanations why a high adherence rate was achieved. The home-based nature of the intervention might have allowed the women to practice the yoga sessions at the times that were most convenient to them.²⁷ Because the participants were allowed to choose or combine courses, the programme was flexible and could be tailored to their physical conditions and personal preferences, which has been recommended in a previous study.²⁸ In addition, their participation in the instructor-guided programme during the orientation made it easier for the women to practice yoga at home.

Although most of the participants responded favourably to the programme, five women (27.8%) reported difficulty incorporating the yoga programme into their daily lives. As many women with breast cancer are performing housework and taking care of their families as homemakers and mothers, being too busy and lacking time are often reported as barriers to home-based exercises.²⁹ Slocum-Gori³⁰ suggested the importance of family involvement in the development of a therapeutic environment for cancer patients to practice yoga. These points should be considered in the promotion of the self-directed home yoga programme.

Table 3 Acceptability of the yoga programme ($n = 18$)[†]

	Strongly disagree <i>n</i> (%)	Disagree <i>n</i> (%)	Agree <i>n</i> (%)	Strongly agree <i>n</i> (%)
1) Was the objective of the yoga programme clear?	0 (0)	0 (0)	7 (38.9)	11 (61.1)
2) Did you easily understand the programme?	0 (0)	0 (0)	6 (33.3)	12 (66.7)
3) Did you easily understand the tips in the yoga exercises?	0 (0)	0 (0)	8 (44.4)	10 (55.6)
4) Was it easy to incorporate the yoga practice in your daily life?	0 (0)	5 (27.8)	11 (61.1)	2 (11.1)
5) Were you interested in this programme?	0 (0)	0 (0)	2 (11.1)	16 (88.9)
6) Was this programme useful for your daily life?	0 (0)	0 (0)	5 (27.8)	13 (72.2)
7) Were you satisfied with this programme?	0 (0)	0 (0)	6 (33.3)	12 (66.7)
8) Do you wish to continue the yoga programme?	0 (0)	0 (0)	5 (27.8)	13 (72.2)

[†]*n* (%).

Table 4 Participant course preference

Course	<i>n</i>	%
1. Warm-up course only	5	27.8
2. Warm-up + low-intensity course	7	38.9
3. Warm-up + low-intensity + high-intensity course	5	27.8
4. Warm-up + high-intensity course	1	5.6

In this study, participants preferred exercises with stable sedentary postures plus breathing and stretching exercises to those with standing postures. They also preferred a gradual increase in exercise intensity. As these participants practiced yoga during the course of chemotherapy, individual differences in the severity of treatment side effects, including fatigue and nausea/vomiting, and cognitive impairment might have affected their preferences for these combination patterns. Ray *et al.*³¹ suggested that sick people need to choose specific yoga practices for themselves. Our yoga programme is practical because the patients can choose and combine components of yoga practices based on their preferences in consideration of their physical and psychological conditions.

Lymphoedema and pain in the affected upper extremity were anticipated as potential adverse effects of the programme. One patient experienced mild muscle soreness that was relieved within a few days. None of the patients developed lymphoedema. Study findings were aligned with research showing that yoga might contribute to desired outcomes. Perceived cognitive complaints might be minimized by increasing physical activity and mindfulness. Breathing exercises and meditation help to focus attention to the present moment.⁶ Fatigue might be reduced through stretching

and by improving muscular strength.³² Fostering physical activity enhances body awareness and stress management, which can reduce cancer-related symptoms and improve overall well-being and QOL.⁷

Cognitive complaints did not differ significantly before and after the intervention in the present study. Similarly, cognitive scale scores did not significantly improve immediately after the intervention in the breast cancer survivors in a previous study. However, they did improve significantly at the 3-month follow up when compared with a control group.⁶ As this was a feasibility study, the clinical effects of the yoga programme should be examined in future studies, which should investigate both short and long-term effects of the yoga programme on cognitive function.

Among the three CFS subscales (physical fatigue, affective fatigue and cognitive fatigue), only cognitive fatigue significantly improved after the intervention. Cognitive fatigue includes forgetfulness, errors while speaking and carelessness.¹⁷ Fatigue is a potential confounding variable for CRCI.³³ Future studies should assess the association between cognitive impairment and cognitive fatigue.

Implications

The results of the present study suggest that a yoga programme with low-intensity components can be used safely, and hence be recommended by nurses, for patients with cognitive complaints during chemotherapy. As yoga poses and practices are numerous and varied, nurses need to understand this diversity and recommend matching of courses to the specific needs of the individuals when they work with patients who seek to practice yoga.³⁴ It is also important to consider the patients' individual backgrounds and any

Table 5 Pre-yoga and postyoga intervention $n = 18$

Outcome	Baseline Median (min, max)	Follow up Median (min, max)	<i>P</i> -value [†]
Fatigue [‡]			
Physical aspect of fatigue	9 (3, 26)	9.5 (0, 22)	0.45
Affective aspect of fatigue	8 (2, 11)	8 (4, 11)	0.42
Cognitive aspect of fatigue	11 (3, 16)	8 (3, 11)	0.01
Total scale of fatigue	28.5 (10, 52)	27 (7, 39)	0.13
Quality of life [§]			
Physical well-being	18 (5, 26)	18 (10, 27)	0.20
Social well-being	22.5 (10.5, 28)	19.9 (11, 28)	0.16
Emotional well-being	15 (9, 24)	17 (9, 23)	0.57
Functional well-being	18 (9, 24)	16.5 (10, 23)	0.79
Breast cancer subscale	17.5 (9, 27)	18 (10, 29)	0.58
Total score	90 (59.5, 124.3)	90.5 (51, 125.5)	0.81
Psychological distress [¶]			
Depression	7 (1, 13)	5.5 (0, 12)	0.41
Anxiety	7 (0, 15)	5 (0, 12)	0.10
Cognitive function ^{††}	34.5 (21, 59)	33 (21, 55)	0.21

[†]Wilcoxon single-rank test. [‡]Cancer Fatigue Scale. [§]Functional Assessment of Cancer Therapy-Breast. [¶]Hospital Anxiety and Depression Scale.

^{††}Cognitive Failures Questionnaire.

treatment side effects they might experience. Breast cancer patients with cognitive complaints might have difficulties finding a suitable yoga programme after the commencement of chemotherapy. Therefore, nurses and other health-care providers should inform patients of the risk of cognitive impairment associated with chemotherapy and suggest that they participate in the self-directed home yoga programme before starting chemotherapy. The provision of programme materials (including a DVD and booklets) and participation in an instructor-guided group class during the orientation make it easier for patients to practice the yoga programme at home.

Limitations

The present study makes new contributions to the feasibility of a home-based yoga programme for breast cancer patients during chemotherapy; however, it is essential to acknowledge that this study has limitations. First, most of the outcome measures (including cognitive impairment) relied on the patients' self-reports, potentially resulting in over-reporting and under-reporting biases. Also, the reliability of the CFQ has not been established yet. Objective

measurements will be required in further studies. Second, the pre-intervention and postintervention study design has inherent bias, as have all non-randomized studies; however, this design is suitable for a feasibility study. Third, the study was conducted in only one institution; therefore, institutional bias might limit the generalisability of the results. In addition, the patients were all Japanese, which might also limit the generalisability of our results to populations of different cultural backgrounds.

CONCLUSIONS

This study demonstrated that a self-directed home yoga programme can be safe and feasible for breast cancer patients with cognitive complaints during chemotherapy. This programme was rated as useful, interesting and satisfactory by the patients, with high retention rates. Improvement was observed for cognitive fatigue but not for cognitive function. Nurses and other health clinicians should collaborate with yoga practitioners to take this work forward, and the data provided by the present study will be useful for designing future yoga interventions for breast cancer patients undergoing chemotherapy.

ACKNOWLEDGEMENTS

We are grateful to Miho Matsumoto, the yoga instructor. We also appreciate the assistance of the staff of St. Luke's MediLocus and the nursing staff of the Oncology Center of St. Luke's International Hospital. This project was supported by the Health Labour Sciences Research Grant ITAKUHI (2014) and the Mitsubishi Foundation (2012).

Trial Registration: UMIN Clinical Trials Registry (UMIN-CTR), Japan, UMIN000017202.

CONFLICT OF INTEREST DISCLOSURES

None declared.

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