Using yoga in breast cancer-related lymphoedema

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The aim of this article is to explore the research findings that can inform the use of yoga for women with breast cancer-related lymphoedema (BCRL). Women with this condition may need lifelong treatment and have to self-manage the affected area. A growing body of research has led to the development of guidelines for the inclusion of exercise as part of self-management. Supervised exercise monitored for its effects, using slow warm ups, cool downs and gradual progression, is known to improve both physical and mental wellbeing. Women are also exploring complementary and alternative therapies, such as yoga, as an adjunct to the mainstream management of lymphoedema. Research has demonstrated positive outcomes from yoga including physical benefits derived from slow breathing and gentle, progressive movement, and psychological benefits from relaxation and meditation. While there is some evidence of the benefit of yoga for lymphoedema of the lower limbs, additional research is required to establish the efficacy and safety of yoga as a viable option in the self-management of BCRL. Subsequent to this, guidelines for practitioners and women can be established.

Key words

Yoga
Breast cancer
Lymphoedema
Alternative medicine

Yoga as a holistic practice may offer another self-management tool for women with breast cancer-related lymphoedema (BCRL), although currently, there is an absence of research in this field. The purpose of this article is to review published research to inform the use of yoga and assist in the development of well-designed trials of yoga as a therapy for BCRL. With this aim, a search for relevant research publications was undertaken.

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Background

BCRL is characterised by swelling of the affected arm and its associated sensations of heaviness, aching, numbness, tightness, pain (Dawes et al, 2008) and fatigue (Armer et al, 2003). Loss of upper body function can be twice as high for those women treated for breast cancer with lymphoedema compared to those without lymphoedema (Hayes et al, 2008). Range of motion and the strength of the affected arm can also be compromised (Johansson et al, 2001), with altered bio-mechanics of the scapulo-humeral joint and thoracic area (Shamley et al, 2009). Fear of making the lymphoedema worse can also reduce physical activity (Lee et al, 2009).

Adverse effects on quality of life for women with BCRL have been reported in both large and small studies (Morgan et al, 2005). A recent descriptive qualitative study exploring women's attitudes to BCRL (n=39) revealed the profound effect lymphoedema has on their quality of life in terms of reduced self-confidence, frustration and negative body image, as well as uncertainty and isolation. To counter this diminished well-being, however, the women reported that they drew on their spiritual beliefs or support from their family and friends (Ridner et al, 2012).

BCRL may require treatment and self-management for life in order to prevent the condition from worsening and to lessen the risk of infections such as cellulitis. Treatment includes complex lymphoedema therapy (CLT) and manual lymphatic drainage (MLD) performed by trained therapists.

Self-management includes daily attention to skin care and self-massage, along with specific exercises including deep breathing, wearing a compression sleeve, arm elevation and knowledge of risk reduction, such as avoiding repetitive actions (Lymphoedema Framework, 2006).

A holistic approach

The need for a holistic approach to BCRL has been advocated by various researchers. A review of qualitative and quantitative studies on quality of life (Morgan et al, 2005) concluded that a multidisciplinary approach based on treating the individual as a whole person is paramount, due mainly to diminished quality of life caused

Table 1

Publications – yoga and lymphoedema

Study	Sample	Design	Outcome
Narahari et al, 2011	Treatment of lymphoedema from filariasis in Kerala India	Report	Positive effects of integrated system using medicine, Ayurveda and yoga therapy, with descriptions of yoga therapy and how the use of this therapy developed with Western medicine
Bose et al, 2011	889 patients (1209 lower limbs) with lower limb lymphoedema from filariasis	Case study of integrated medical treatment with Ayurveda, yoga therapy and herbs for lower limb lymphoedema between 2004–2011. Pre and post test after three months	Reduction in volume of lymphoedema, fewer entry points and fewer acute episodes of infection
Narahari et al, 2007	112 patients (149 lower limbs) with lower limb lymphoedema from filariasis	Case study of integrated medical treatment with Ayurveda, yoga therapy and herbs for lower limb lymphoedema over 194 days	Reduction in circumference measurements for lymphoedema and acute episodes of infection; less use of antibiotics

by the complexity of the physical, psychological and emotional effects of lymphoedema, recovery from cancer and fear of recurrence.

This is reflected in The Lymphoedema Framework's consensus document (2006), which advocates the need for education, early identification and holistic treatment of lymphoedema.

What is yoga?

The term 'yoga' derives from the Sanskrit 'yuj' meaning union (Feuerstein, 1975) and is based on Indian philosophical systems developed over thousands of years. Its system of health aims to balance the physical, energetic and mental aspects of the individual, both internally and externally (Saraswati, 1993).

Creating this balance requires integrated yoga practice. A typical yoga session consists of breathing techniques (pranayama), progressive physical exercises that are adapted to the individual (asana), meditation and relaxation. Each of these aspects of yoga incorporates awareness of the body, respiration and mind.

Thus, yoga deals with the 'whole person' and fits into the bio-psychosocial concept of health benefitting the physical, mental and social wellbeing of an individual (Evans et al, 2009). Yoga is increasingly used as a therapy in the healthy and the unwell (Evans et al, 2009), and is supported by professional organisations such as the International Association of Yoga Therapy (IAYT).

There is an absence of published research into the effects of yoga on BCRL. However, yoga therapy has been successfully incorporated into the treatment of secondary lymphoedema of the lower limbs and has also been used for women during and after their treatment for breast cancer without lymphoedema.

A traditional therapy

In the Institute of Applied Dermatology, Kerala, India, yoga therapy is used in conjunction with traditional Indian medicine (Ayurveda), herbal remedies and Western medicine, specifically for the treatment of lower limb lymphoedema caused by filariasis. It was first recommended by Vaqas and Ryan (2003) and has been further developed by Narahari's team (2011) (*Table 1*).

Treatment aims

The aim of this treatment is to provide a self-managed, sustainable and cost-effective way of reducing lymphoedema in rural areas in India. It commences with a two-week treatment in hospital, where the patient and a family member are taught how to perform their treatment on a daily basis when they return home. The therapy consists of:

- Skin treatment
- Yoga
- Indian manual lymphatic drainage (IMLD)
- Elevation
- Compression.

Therapy routine

Eight yoga postures (asana) and five specific breathing techniques (pranayama) are performed before the IMLD and then 10 asana and five pranayama are repeated, along with the application of compression bandaging later in the day. Ayurvedic herbs are also taken.

Table 2

Lymphoedema and breathing

Study	Sample	Design	Outcome
Piller et al, 2006	Experts in lymphoedema	Debate	Variety of opinions on the effect of breathing on lymphatic drainage
Moseley et al, 2005	Intervention (n=38) comparison control (n=24)	Experimental with comparison control	Breathing and arm movement reduced volume of arm lymphoedema, softened fibrous tissue at the chest, and reduced sensations of heaviness and tightness
Vaqas and Ryan, 2003	Practitioners in integrated treatment for lower limb lymphoedema from filariasis in India	Perspective on lymphoedema and its pathophysiology	In-depth description of the effect of breathing and yoga breathing on the lymphatic system
Casley-Smith, 1999	Exercise manual for people with lymphoedema	Outline of lymphoedema treatment with exercise based on MLD and breathing	Daily exercise regimen for self-management

Breathing awareness forms part of the yoga and the massage. Bose and Aggithaya (2011) report that the aim of the slow breathing, which includes breath retention, is to cause pressure changes that will empty the thoracic ducts. The yoga postures also assist the flow of lymph by helping to clear the ducts proximally to distally. Bose and Aggithaya also report that the yoga postures should be performed slowly to ensure complete filling and emptying of the lymphatic collectors.

Finally, the postures end with the limbs being elevated and the yoga concludes in relaxation (Narahari et al, 2011). The session commences and finishes with a chant that lengthens the exhalation to further clear the lymphatic ducts (Piller et al, 2006).

Interpreting positive outcomes

Research conducted on this treatment method using pre- and post-testing over 194 days reported that 112 patients with lower limb lymphoedema (149 lower limbs in total) experienced a decrease in the level of lymphoedema in the affected limb, reduced infection and reduced need for antibiotics (Narahari et al, 2007). Other researchers in the same team have published similar findings with larger numbers over a longer timeframe (Bose et al, 2011).

Yoga postures should be performed slowly to ensure the complete filling and emptying of the lymphatic collectors.

This collective research is important as it not only shows the benefits of yoga therapy as part of a holistic medical treatment for lymphoedema, but also as part of a cost-effective method of self-care. However, while the results of the research are encouraging, it is uncertain which of the multiple treatments are responsible for the beneficial effects on lymphoedema.

Beneficial results gained from research into the effects of yoga on women during and after breast cancer may have transferrable outcomes. Randomised controlled trials (RCTs), based on integrated yoga practices during breast cancer treatment, have resulted in:

- An improvement in quality of life (Chandwani et al, 2010)
- Reduction in anxiety and depression (Rao et al, 2009)
- Reduction in fatigue (Danhauer et al, 2009).

Reduction in physical constraints

A non-randomised yoga (n=18) versus exercise control (n=20) trial over eight bi-weekly 75-minute sessions researched the effect of yoga on body image and physical constraints caused by breast cancer (van Puymbroeck et al, 2011). Compared with the control group, the yoga group showed significant quantitative improvements in reducing physical constraints, as well as improving spinal flexibility and grip strength, while the control group improved their abdominal and lower body strength. Qualitatively, the yoga group felt more

Table 3

Lymphoedema and complementary alternative medicine

Study	Sample	Design	Outcome
Narahari et al, 2011	638 lymphoedema patients and 381 vitiligo patients treated with the integrated medical and traditional system in Kerala, India	Education report	Effective integrated system of medicine incorporating dermatology, Ayurveda, yoga therapy and herbs, with description of yoga techniques used
Finnane et al, 2011	247 women with lymphoedema from breast or gynaecological cancer	Cross-sectional survey with questionnaire on effectiveness of CAM and mainstream medicine over previous 12 months	95 questionnaires analysed. Over half used CAM, including yoga and meditation, and considered CAM effective
Girgis et al, 2011	266 women with lymphoedema from breast cancer >2cm at one point	Cross-sectional survey with questionnaire on unfulfilled needs of women with lymphoedema from breast cancer treatment	237 questionnaires analysed. Outcome was that women wanted more information on mainstream and alternative treatments, better informed medical staff and financial assistance for treatment
Bernas and Witte, 2004	Editors *Lymphology*	Editorial	CAM needs well-designed trials to support its effectiveness

Table 4

Lymphoedema and relaxation

Study	Sample	Design	Outcome
McClure et al, 2010	32 women with BCRL. Intervention (n=16) Control (n=16)	Randomised controlled trial. Gentle exercise based on visual imagery and relaxation for three months, with home-practice component	Improved bio-impedance levels, arm flexibility, quality of life and mood at three months

positive regarding body image, physical constraints and physical fitness and felt a reduction in pain. A limitation of this qualitative research was that the exercise control were not interviewed (Van Puymbroeck et al, 2011).

Effect on immunity

Improvement in immunity has also been reported in studies on yoga for women with breast cancer. A trial with a focus on mindfulness and yoga indicated a decrease in cortisol due to stress reduction (Carlson et al, 2007).

Another RCT, looking at the period from surgery through to radiotherapy and chemotherapy, found an increase in natural killer (NK) cells in the yoga group (n=16) compared to the control group (n=21) (Rao et al, 2007). Improvement in immunity may reduce the number of infections experienced by women with BCRL.

Discussion

As there is variation in yoga styles, length of intervention, trial design, measuring tools and statistical analysis, comparison between studies is difficult. However, they do point towards benefits in quality of life and physical parameters that support yoga for women with BCRL, such as:

- Improved immunity
- Less fatigue
- Fewer physical constraints

- More flexibility for women during and after breast cancer treatment.

Regardless of these possible benefits, it is still unknown how lymphoedema is affected by the yoga. Well-designed trials must take place, therefore, before any real recommendation concerning yoga in BCRL can be made.

Nervous system

Other relevant research that may be applied to BCRL is the effect of yoga on the nervous system. Research into a yoga technique that involves performing a short series of yoga postures, followed by an equal amount of rest, has shown how the nervous system is able to alternate from sympathetic to para-sympathetic activation (Telles et al, 2000).

This practice may be useful for people with BCRL as it avoids over-activation of the sympathetic nervous system, creates adequate rest periods between a series of postures and allows time for the lymph vessels to empty, as recommended by the yoga therapy guidelines in Kerala (Bose and Aggithaya, 2011). A breathing technique known as alternate nostril breathing (nadi shodan) balances the autonomic nervous system (Saraswati, 1993) and has been used in the previously mentioned yoga therapy in India to prepare the body for relaxation.

This research may have transferrable outcomes but, as it is not for women with BCRL, it is vital that guidelines from existing research into the effect of exercise on BCRL be followed.

Exercise and BCRL

For those women at risk of or having BCRL, the aim of exercise is to improve overall health and fitness, daily function and quality of life without causing or exacerbating lymphoedema. Exercise research has focused on post-operative physiotherapy and resistance training, as well as other exercise types at a later stage.

The findings from the various post-operative trials using physiotherapy or resistance training can be summarised by the findings of a recent literature review of four of these RCTs. The review concluded that range of motion and strength training do not cause or exacerbate existing lymphoedema and may, in fact, reduce its occurrence (Cavanaugh, 2011).

Further to this, a recent systematic review (Kwan et al, 2011) concluded that lymphoedema is not made worse by the systematic progression of exercise. Reviewing studies of exercise for people with lymphoedema and those at risk of lymphoedema, including resistance exercise (seven studies), aerobic and resistance exercise (seven studies) and other exercise modalities (five studies), the authors reported that resistance exercise is likely to be effective and that aerobic and resistance exercise appears safe but needs longer and more rigorous trials. In spite of broadly positive results, other exercise modalities require further investigation.

Progressive exercise of the upper body for strength and mobility, as well as whole body aerobic training with rest periods, can be adopted by women with breast cancer-related lymphoedema.

Resistance training included upper body and lower body exercises (free weights, machines, resistance bands, dragon boat racing), aerobic training included an average of 60–70% aerobic capacity (treadmill, cycling, elliptical and walking interventions), and upper body mobility exercises included specific exercises or stretching. All studies included gradual progression of exercise intensity and adequate rest periods. The degree of monitoring varied.

In the largest exercise intervention to date — the PAL trial — 141 women with secondary arm lymphoedema were randomised to a control or intervention group in a year-long study examining the potential benefits of resistance training and its effect on lymphoedema (Schmitz et al, 2009). While strength improved, there was no increase in lymphoedema and the incidence of lymphoedema exacerbations, and arm and hand symptoms, decreased. The researchers concluded that supervised resistance training, with adequate warm-up and cool-down sessions, adequate rest and gradual progression of intensity, does not have an adverse effect on lymphoedema. A further positive outcome of this trial was the significant improvement in body image experienced by the participants (Speck et al, 2010).

These studies provide evidence that progressive exercise of the upper body for strength and mobility, as well as whole body aerobic training with rest periods, can be adopted by women with BCRL. This has implications for the types of movement that can be incorporated into yoga programmes.

Gentle exercise, breathing and relaxation

Further to the previously mentioned exercise trials, the use of breathing and gentle exercise has been used as a therapeutic self-management tool for BCRL (*Table 2*).

Casley-Smith (1999) developed gentle isotonic exercises that followed the principles of MLD to systematically clear the proximal to distal lymph nodes. These exercises commenced and finished with relaxation and slow breathing, preferably with elevation of the affected arm. During the exercises, specific breathing (exhalation by compressing the abdominal muscles) was used to clear the thoracic ducts to allow space for the lymph to flow. When applied to individual self-management of lymphoedema, physiotherapy groups (Bracha and Tamar, 2010), and aquatic exercise (Tidhar et al, 2010), these principles have improved quality of life without increasing lymphoedema levels.

In contrast, a debate on the actual effect of deep breathing and gentle movement showed varying points of view in relation to lymphoedema (Piller et al, 2006). While participants generally agreed that movement is beneficial, there was no consensus on the effect of deep breathing, with those against it arguing that the

physiology of the human body did not support it, while those that argued for it agreed with Casley-Smith (1999) that it could empty the thoracic ducts.

A trial specifically testing the effect of deep breathing using a tai-chi style exercise had positive results (Moseley et al, 2005). A four-week trial of 24 women saw a twice-daily, 10-minute arm exercise performed, which involved deep breathing, compared with a control group. The authors hypothesised that deep breathing and gentle movement would create pressure changes, systematically emptying the thoracic ducts and improving lymphatic drainage from the affected limb.

Compared with the control group, there was a slight but significant decrease in lymphoedema levels and significant subjective improvement in sensations of heaviness and perception of limb size. There was also a significant reduction of chest tissue density in the intervention group, perhaps caused by the gentle movement of the exercise softening the adhesions and fibrosis of the tissue.

Another small RCT used a daily therapy that combined slow and gentle movement with deep breathing, imagery and music to promote a relaxed state. The five-week study included a bi-weekly, hour-long group and a 17-minute session of practice at home, followed by three months of further home practice (McClure et al, 2010).

The authors hypothesised that the sequencing of movement with breathing would promote lymph flow and thoracic emptying, while at the same time reducing stress and negative mood, leading to improved immune function in what they described as a 'circle of healing'. It was hoped that symptoms of lymphoedema would also decrease.

At the completion of the trial, the intervention group (n=10) showed a significant reduction in swelling and weight loss, and an increased range of motion (flexion, abduction, external rotation), mood and quality of life, compared with the control group (n=11).

The aforementioned trials support the notion that exercise, breathing and relaxation may offer another self-management tool for people with lymphoedema. Although these trials are small, exercise, breathing and relaxation do have elements similar to yoga therapy and, in fact, various researchers have suggested research into the effects of yoga on BCRL is warranted (Moseley, 2005; Schmitz, 2009). However, the pathophysiology of breathing on the lymphatic system needs further investigation.

Complementary and alternative medicine

As well as exercise, the use of CAM is emerging as a popular addition to mainstream treatment for women with BCRL (*Table 3*).

The aim of this treatment is to provide a self-managed, sustainable and cost-effective way of reducing lymphoedema to rural areas in India.

An Australian study investigated the use of CAM as treatment for lymphoedema after breast or gynaecological cancer (Finnane et al, 2011). This cross-sectional study focused on the use of CAM over the previous 12 months. Using a self-administered questionnaire, half the respondents (n=95) reported using 27 different types of CAM, as well as their mainstream treatment. The most common types were:

- A chi machine
- Vitamin E supplements
- Yoga and meditation.

Respondents rated the effectiveness of CAM as similar to that of mainstream therapies. The authors recommended further research into the relationship between mainstream and CAM therapy for lymphoedema. Another Australian study reported on the unfulfilled needs of 237 women with BCRL. A major finding was that participants wanted to know more about both conventional and alternative treatment for lymphoedema (Girgis et al, 2011).

The previously described combination of Western medicine with CAM that exists in India for the treatment of lymphoedema from filariasis reflects how effective such an integration of treatment can be. Lymphoedema researchers have recommended that well-designed trials of CAM for lymphoedema should be established (Bernas et al, 2004).

Yoga as an integrated system for BCRL

It would appear that an integrated yoga programme may be particularly suited to the holistic self-management requirements of lymphoedema. However, research is required before conclusive recommendations can be made for lymphoedema treatment. Any recommendations must also take into account factors such as exercise guidelines, to optimise the benefit to be gained from yoga intervention. Recommendations for principles to be followed in a yoga session for stage 1 lymphoedema, based on the above research guidelines, focus on breathing, posture, meditation and deep relaxation.

Breathing

Breathing is an important aspect of yoga and lymphoedema management. Slow and deep breathing (the full yoga breath), with breath retention, will create pressure changes that empty the lymphatic system into the venous system at the thoracic ducts and clear the lymphatic pathways, both before the postures begin and again when they are completed (Vaqas et al, 2003).

The use of a prolonged exhalation with a chant following a deep inspiration, as used to commence and finish a yoga session, may enhance the emptying of the lymphatic system (Piller et al, 2006). Specific movements, with compression of the abdominal area on the exhalation, can also be used to empty the thoracic ducts (Casley-Smith, 1999; Narahari et al, 2011).

The long, slow breath may also improve the elasticity of the secondary inhalation muscles, the pectoralis minor,

major and serratus anterior, which can be impaired from surgery and radiation during breast cancer treatment.

Pranayama, such as alternate nostril breathing, balances the sympathetic and para-sympathetic nervous systems and is regarded as a good preparation for meditation, which can be performed after the physical postures as part of the slow cool down phase of the session (Saraswati, 1993; Narahari et al, 2011).

Physical postures

Gentle non-straining postures should be used with a focus on awareness of the body, breath and mind. Postures should be chosen to promote the clearing of lymph nodes from proximal to distal, following the principles of MLD (Casley-Smith, 1999; Narahari et al, 2011).

The tensing of muscles on the pause after the inhalation and the release on the exhalation, will create further pressure changes to enable the flow of lymph (Moseley et al, 2005). As the flow is slow, so are the postures, allowing the lymph collectors to fill and empty (Bose et al, 2011). After the repetition of each series of postures, a rest should follow, activating the para-sympathetic nervous system before the next series of postures, which may help with the emptying of the lymph vessels (Telles et al, 2000).

Movement of the spine and arms, alongside the long slow breath, gently stretches and compresses the tissue across the chest and upper back. As in the tai-chi trial above, this may result in the softening of fibrous tissue caused by radiation, surgery and lymphoedema and encourage vascular and lymphatic flow (Moseley et al, 2005).

Postures should cover the full range of shoulder and thoracic spine movement, focusing on stability to improve the biomechanics of the shoulder girdle, thoracic spine and neck muscles, which may be impaired from both breast cancer treatment and lymphoedema (Shamley et al, 2009).

Static postures can be built up to and gradually lengthened over time, following the guidelines advocated by Schmitz (2009). For example, standing 'held' postures, including balances, will improve core stability and strength as well as improving symmetry, which can be compromised by BCRL. Weight bearing on the arms can also be introduced slowly and progressively over time.

The postures will follow principles of appropriate warm up and cool down as recommended by lymphoedema exercise guidelines.

Mindfulness practices for breast cancer survivors have been shown to reduce stress and improve mood, quality of life and immunity.

Other issues that need attention are maintaining a steady temperature in the room, the use of compression sleeves, education about the effect of pressure from brassieres and women's other health needs. The style of yoga known as 'hot' yoga, which is performed in a heated room, is contraindicated as heat will add to lymphatic load (Lymphoedema Framework, 2006).

Meditation

Mindfulness exercises, such as witnessing a sound or sensations in the body, can be used to improve awareness of the present moment. Mindfulness exercises for breast cancer survivors have been shown to reduce stress and improve mood, quality of life and immunity (Carlson et al, 2007).

Meditation by guided visual imagery will enhance the relaxation response and so decrease sympathetic activation towards the end of the session (Saraswati, 1993).

Deep relaxation with elevation of the affected arm

Relaxation exercises using arm elevation will facilitate lymphatic drainage and cool the body down by increasing the parasympathetic nervous system response (Vaqas and Ryan, 2003). These exercises have been used in various trials for women with lymphoedema (Casley-Smith, 1999; McClure et al, 2010; Narahari et al, 2011) (*Table 4*).

Key points

- There is currently an absence of research into the effects of yoga on BCRL.
- Yoga therapy as part of a holistic treatment for lower limb lymphoedema has had beneficial results in India.
- Research into yoga for women with breast cancer may have transferrable outcomes in parameters of physical mobility and quality of life.
- Guidelines from exercise research for BCRL can be incorporated into well-designed yoga trials.
- Women are using CAM, including yoga and meditation, in their self-management of BCRL.

Conclusion

The use of yoga with slow breathing, gentle and progressive physical postures, meditation and relaxation, following guidelines for exercise and risk reduction, will not exacerbate lymphoedema. Furthermore, it may improve overall physical movement as well as the stability and function of the shoulder girdle and thoracic spine. The movements may be beneficial in softening fibrous tissue across the chest and upper back. Research into the use of yoga in breast cancer demonstrates improvements in quality of life.

As women who practise yoga may have had lymphoedema for varying lengths of time, and undergone various breast cancer treatments, it is clear that yoga teachers need to understand both secondary lymphoedema and the different effects of breast cancer treatment over time.

Women with lymphoedema are already attending yoga classes, so it is essential that well-designed research into the effects of yoga on BCRL is implemented, resulting in appropriate and safe guidelines being developed for yoga teachers. As there is an absence of published research into the effect of yoga on BCRL, there is a need for well-designed trials into its effects. JL

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