

Acupuncture in the rehabilitation of women after breast cancer surgery – a case series

Michele Alem, Maria Salete Costa Gurgel

Michele Alem
physical therapist
acupuncture specialist

Maria Salete Costa
Gurgel
breast surgeon

Department of
Gynecology and
Obstetrics
School of Medicine
Universidade Estadual
de Campinas
UNICAMP, Brazil

Correspondence:
Maria Salete Costa
Gurgel

salete@caism.unicamp.br

Abstract

Objective To evaluate the effect of acupuncture on rehabilitation of motor function, reduction in lymphoedema and improvement in perceived heaviness and tightness in the arms of women who had undergone breast cancer surgery.

Subjects and Methods Twenty nine women who had had mastectomy or segmentectomy with axillary dissection, presenting with lymphoedema and/or a decrease in movement amplitude of the upper limb ipsilateral to surgery were studied. The patients underwent 24 acupuncture sessions once a week from February to December 2004. The movement amplitude of shoulder flexion and abduction and circumferential measurements of the arm, forearm and wrist were evaluated before and after one, three and six months of treatment. Statistical analysis was performed by Friedman's test.

Results Significant improvements in range of movement of shoulder flexion and abduction ($P < 0.001$), degree of lymphoedema ($P = 0.016$), and sense of heaviness and tightening ($P < 0.001$) in the affected limb after six months of therapy were observed. For circumferential measurements of the arm, forearm and wrist, no significant improvement between the different periods of treatment was observed.

Conclusions Acupuncture in rehabilitation after breast cancer surgery was shown to be associated with improvements in movement amplitude of the shoulder, symptoms of heaviness and tightness in the arm, and the degree of lymphoedema. However, controlled trials should be performed to ascertain whether the results were due to the natural history of the complaint or the acupuncture treatment.

Keywords

Breast cancer, lymphoedema, range of movement, acupuncture.

Introduction

Breast cancer has been considered the second most frequent female cancer and is the major cause of death due to cancer among Brazilian women.¹ Advances in medicine have improved recovery following surgery and the survival rate, yet challenges still remain to maintain the patient's quality of life.

A reduction in the amplitude of shoulder movement may occur shortly after surgery, and sometimes may persist for a long time. Furthermore, after total or partial breast surgery with axillary lymph node dissection, lymphoedema can occur in a variable proportion of patients.² Lymphoedema can be complicated by recurrent episodes of cellulitis, and lymphangitis can also occur.³⁻⁵ In various studies, the incidence of lymphoedema has varied widely (6%

to 30%), partly as a result of the differing definitions used, and differing surgical techniques adopted.⁴

The treatment of lymphoedema and limited shoulder range of movement (ROM) may be challenging, especially when women are depressed, anxious or also in pain. Management of lymphoedema has been unsatisfactory in many cases and is a cause of frustration for patients and healthcare professionals alike. It has become a significant goal in patient management.⁶⁻⁸ Complex Decongestive Physiotherapy (CPD) is one of the techniques used. CDP includes a programme with manual lymphatic drainage (MLD), bandaging, exercise and arm care.^{9,10}

Once the condition is present, however, it is hard to eradicate, and palliation needs to be provided

throughout the lifetime of the patient. In most cases, treatment does not result in full functional recovery of the affected limb to pre-surgical condition, and lymphoedema may worsen after interruption of treatment.

One of the most widely used alternative therapies in the West is acupuncture, with its efficacy being confirmed in several conditions.¹¹⁻¹⁶ In a previous study including 24 patients diagnosed with gynaecological malignancies undergoing intrapelvic lymph node dissection, it was observed that acupuncture combined with moxibustion treatment was associated with prevention of lower limb lymphoedema and reduction where it had already occurred.¹⁷ Another study demonstrated that acupuncture alone had a positive effect on pain reduction and limitation of shoulder ROM shortly after breast cancer surgery.¹⁸ However, there are no reports on the use of acupuncture as a therapeutic procedure for pre-existing lymphoedema and limited ROM after breast cancer surgery.

The aim of the present study was to evaluate the effects of acupuncture as a therapeutic technique for the recovery of motor function, lymphoedema and improvement in symptoms of heaviness and tightness in the affected upper limb in women undergoing mastectomy or segmentectomy with axillary dissection following a diagnosis of breast cancer.

Methods

Patients

Women registered with two voluntary institutions that offer assistance to patients with malignancies, living in proximity to Rio Claro and São Carlos, cities in the state of São Paulo, Brazil, were invited to participate in this study. Their oncologic treatment was performed in various clinics and hospitals from this region.

A total of 29 women were recruited to this study from February to December 2004. All had undergone unilateral breast cancer surgery (mastectomy, many of these radical, or segmentectomy) with axillary lymph node dissection) at least six months before entering the study, and eight more than 10 years previously. These women presented with either lymphoedema with a 2cm or greater difference in circumferential measurement (cirtometry) in the affected upper limb in comparison to the contralateral limb, and/or a restriction of 20° or more in flexion

and/or abduction range of movement in relation to the total amplitude of shoulder movement. Patients with tumour recurrence or active disease, vascular abnormalities or bone or joint changes in the upper limb ipsilateral to surgery, or other morbidities that cause alteration in tactile sensation, were excluded from the study.

Each patient underwent weekly acupuncture treatments for a prolonged period of approximately six months, in view of the refractory nature of the symptoms. Most of the women had undergone physical therapy for the condition previously (though women having this within the previous six months were excluded), and further physical therapy including manual drainage was not permitted during the course of acupuncture. The study was approved by the Internal Review Board and the volunteers signed an informed consent form.

Acupuncture techniques

Eleven needles were placed, three in the abdominal region and eight (five in the upper limb and three in the lower limb) in the side of the body contralateral to the mastectomy site to avoid any invasive therapy of the affected limb. The points used were selected according to the theory of Traditional Chinese Medicine (TCM): CV12, CV3, CV2 – to regulate the meridian of systemic vessels, and lead to increased lymphatic circulation and hence a reduction in lymphoedema and lymphatic cysts; LI15, TE14, LU5, TE5, LI4 – for the sense of heaviness, limitation of movement and pain in the upper limbs; ST36, SP9, SP6 – for oedema, gynaecological disturbances, and facilitating blood flow (Figure 1).^{8-11;17-20} The order of puncturing was from the upper limb down, the depth of insertion depended on the point's location, and the patient's age, physical constitution and response to intensity of manual stimulation. Electrical stimulation was not used. Stainless steel needles (0.25mm x 30mm) were used. A total of 24 treatments were performed once a week with a 30 minute needle retention time. No other co-interventions were given. The acupuncture was given by a physical therapist who is an acupuncture specialist.

Evaluations

The evaluation of lymphoedema and measurements of ROM were performed by the same evaluator at the beginning of treatment, and at one, three and six

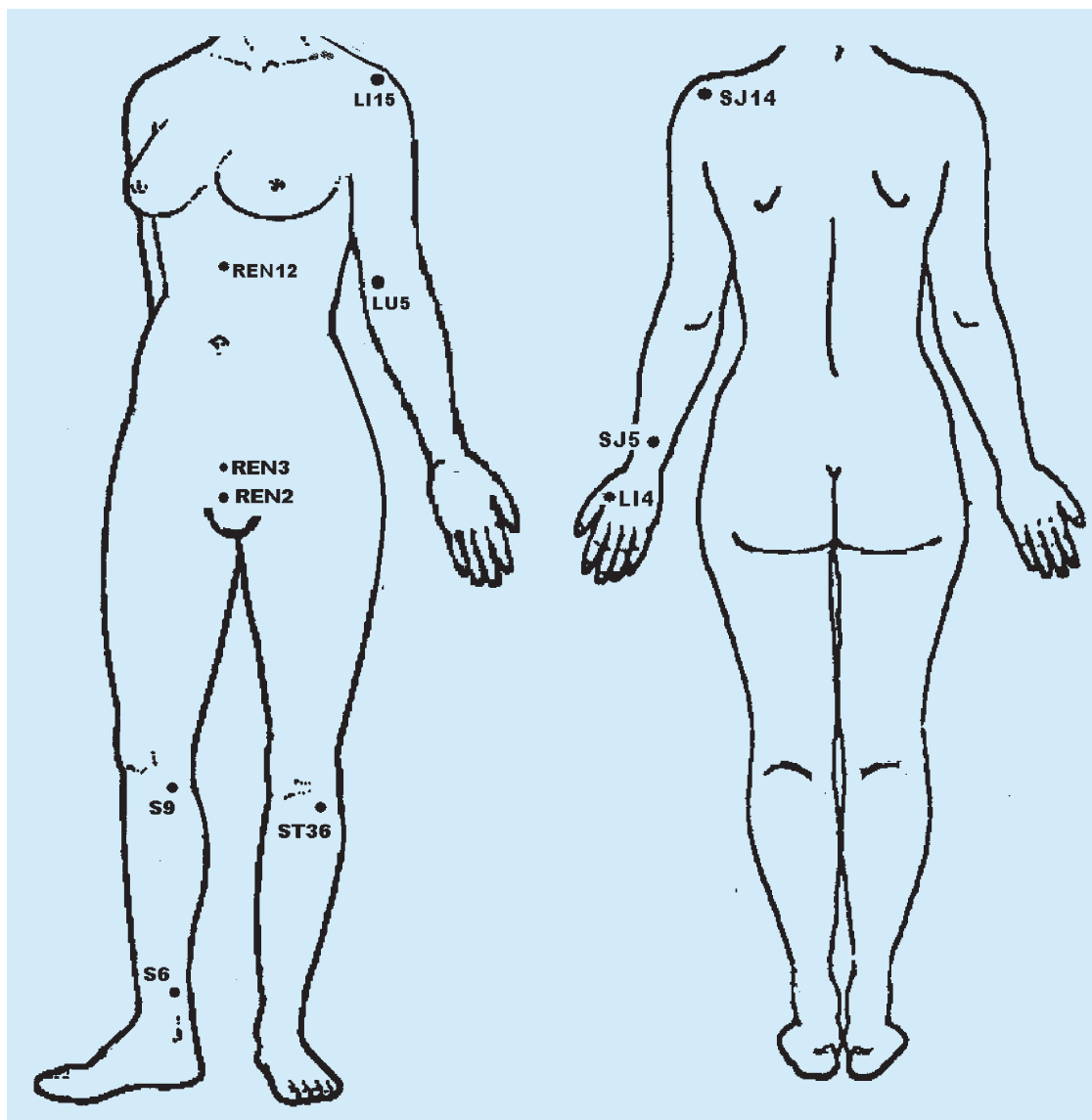


Figure 1 This figure shows a schematic representation of the acupuncture points used in this study: REN = CV; S = SP; SJ = TE.

months after treatment commenced, always prior to the acupuncture session. A flexible metric tape was used to measure upper limb circumference, in centimetres, at three different levels: the olecranon process, the wrist at two levels from the elbow crease (10cm above and 10cm below), and both arms.

The degree of lymphoedema was classified as 1 to 3, according to skin characteristics and limb consistency through palpation and visual inspection.¹⁴ The absence of alterations was classified as 0 (zero).

Shoulder ROM was evaluated by goniometry. Flexion was measured with the patient in the supine position, while abduction was evaluated in the lateral

decubitus, with the segment to be evaluated in the anatomical position and the proximal segment stabilised in such a way as to permit only the desired articular movement. The women were requested to carry out active movements with the greatest amplitude possible, and the angles were registered in degrees. Measurements in the upper limb opposite the surgery were performed only in the pre-treatment period and at the end of treatment. For the evaluation of perceived heaviness and tightness in the arm, a questionnaire with a visual analogue scale (VAS) ranging from 0 (none) to 10 (very) was applied before and after six months of treatment.

Statistical analysis

The data obtained at one, three and six months after treatment were compared with previous measurements by multivariate analysis of variance (MANOVA) for non-parametric repeated measures using Friedman's test. A significance level of $P < 0.05$ was adopted.

Results

A total of 29 women, ranging in age from 43 to 92 years (average of 61.9 ± 11.6 years), were invited to the Women's Institution of Cancer Combat of São Carlos and to the Carmen Prudente Institution of Cancer Combat of Rio Claro. All had undergone unilateral surgical treatment due to breast cancer for a mean time of 86.1 ± 81.6 months previously. Radiotherapy was performed in 27 women (96%)

and adjuvant chemotherapy in 19 (68%). Twenty eight women (97%) presented some degree of limited ROM and 23 (79%) presented some degree of lymphoedema (Table 1).

Restriction of ROM of shoulder abduction and flexion improved significantly with treatment. In the third month, there was an improvement in abduction ($P = 0.0021$) and in the sixth month flexion improved ($P < 0.001$), achieving normal values at the end of treatment (Table 2). There was no relationship between the type of surgery, whether chemotherapy was performed or not, or the time since surgery and limited ROM in the different treatment periods. A significant improvement in the sense of heaviness and tightness in the affected upper limb was also observed from before to after six months of treatment (Table 3). Regarding the rating of lymphoedema, a significant improvement in degree of the condition was observed ($P = 0.016$) after six months of treatment ($P = 0.017$) (Table 4). However, no improvement in the difference of circumference values in the arm, forearm and wrist was observed with treatment.

The mean circumference difference between the upper limbs was higher among patients whose surgery had been performed more than five years prior to the study. This difference was already present before the beginning of treatment ($P = 0.004$), remained the same in evaluations performed after one month ($P = 0.025$), three months ($P = 0.039$) and was close to significance level at the end of the sixth month ($P = 0.057$). No relationship between the type of surgery, use of chemotherapy and lymphoedema was observed at different treatment periods.

Table 1 Baseline characteristics of the sample (n=29)

	n	%
Age (years)		
≤50	5	17
51–60	10	35
61–70	9	31
>70	5	17
Surgery type		
Mastectomy	19	65
Segmentectomy	10	35
Other anticancer treatment		
Radiotherapy	27	96
Chemotherapy	19	68
Degree of lymphoedema		
0 (absent)	6	21
1	10	35
2	5	17
3	8	27

Table 2 Deficit in amplitude of range of movement in the affected upper limb (n = 25)

Movement	Mean deficit (degrees)	Standard deviation	Median	P
Flexion				
before*	50.8	29.1	44	<0.0001
1 month	43.3	26.6	40	
3 months	35.4	23.3	30	
6 months*	16.9	21.2	10	
Abduction				
before**	60.5	30.1	50	<0.0001
1 month	44.7	28.3	40	
3 months**	36.3	25.2	30	
6 months	18.6	22.2	10	

Friedman's test: * $P < 0.0001$; ** $P = 0.0021$

One patient had no limitation of ROM and was excluded from the analysis. Three patients were excluded due to absence of data in one of the evaluations.

Table 3 Ratings (VAS scores) of perceived heaviness and tightening in the upper limb ipsilateral to mastectomy (n = 26)

Sense	Mean	Standard Deviation	Median	P*
Heaviness				
before	5.5	2.9	5	0.0001
6 months	2.1	2.3	1	
Tightening				
before	3.7	3.4	5	<0.0001
6 months	0.4	1.1	0	

* Friedman's test
Three cases were excluded due to lack of data in one of the treatment periods.

Table 4 Circumference difference between upper limbs, and rating of the degree of lymphoedema (n=20)

	Mean	Standard deviation	Median	P
Arm				
before	3.9	2.4	3.7	0.2608
1 month	3.7	2.4	3.2	
3 months	3.2	2.6	2.7	
6 months	2.7	2.4	2.2	
Forearm				
before	5.2	4.0	4	0.9634
1 month	4.9	4.0	3.7	
3 months	4.8	3.9	3.5	
6 months	4.7	3.6	4	
Wrist				
before	2.6	2.7	1.5	0.5978
1 month	2.5	2.9	1.7	
3 months	2	2.6	1	
6 months	2.1	2.6	1	
Degree of lymphoedema (scale 0 to 3)				
before	1.9	0.9	2	0.0159
1 month	1.8	0.9	2	
3 months	1.4	0.7	1	
6 months*	1.1	0.8	1	

Friedman's test, significant change between baseline and six months.
Nine patients had no lymphoedema and were excluded from the analysis.

Discussion

Acupuncture treatment was associated with improvement in most of the parameters evaluated. All patients presented a significant improvement in ROM, progressing from a significant limitation of shoulder abduction and flexion movements to values considered normal (ie with no meaningful limitation in range of movement). This parameter seems to be independent of external factors such as type of surgery, chemotherapy, in addition to showing a faster and more efficient response to acupuncture treatment. In some cases, a major improvement was observed, since values close to those of the contralateral limb were achieved. Some women reached maximum amplitude of joint movement. It is worth mentioning that improvement in ROM was

also observed in the upper limb opposite to the mastectomy, and some patients achieved maximum ROM values both in abduction and flexion movements. In this context, acupuncture to a particular area has produced both local and distant effects, according to traditional terminology.¹²⁻²²

Another study demonstrated that acupuncture was effective in the treatment of patients with pain and limited ROM, when given within 14 days of breast cancer surgery with node axillary dissection.¹⁸ In that study, however, additional acupuncture meridian points were used according to health conditions of the patients before and after surgery. However, the use of individualised points could be considered a potential confounding factor in the outcome of the study. So, in the present study, we

chose to puncture the same meridian points at every treatment session in all subjects.

Improvement in ROM could be observed even in cases where the reduction in lymphoedema was insignificant. Some patients reported feeling their arms lighter, as if the 'tape that was fastening their arms had loosened'. These results positively influenced the wellbeing of the patients, permitting them to return to some of their daily life activities and reducing their feeling of incapacity. Moreover, improvement in ROM and ease of arm movement with time could positively influence the lymphatic drainage via the pump action of the muscles.

For many women, the arm swelling and limitation of movement are a constant reminder of their cancer. A 2cm or greater difference in circumferential measurements and a 20° or more restriction of shoulder movements are the most important indicators of several physical complaints. Daily living activities are impaired and women undergoing mastectomy or segmentectomy with axillary lymphadenectomy due to breast cancer are faced with psychological challenges.²³ Furthermore, these women experienced feelings of incapacity, weakness and difficulties in engaging in normal daily activities.^{23;24}

Although improvement in circumference was not observed in any of the three points analysed, a significant improvement in the degree of lymphoedema was confirmed through a decrease in consistency, skin alteration and better limb movement.

In a study conducted with patients undergoing intrapelvic lymph node dissection due to gynaecological malignant tumours, acupuncture combined with moxibustion treatment was associated with a preventive effect on lower limb lymphoedema and reduction of oedema that had already occurred.¹⁷ However, sessions were performed five times a week during the hospitalisation period and twice a week after discharge from hospital. In pre-existing lymphoedema, four months or more were required for perceived improvement. However, it was a descriptive study with a limited number of cases and where the evaluation of the degree of lymphoedema regression was limited to subjective parameters.¹⁷

It is important to emphasise that the aim of this study was to evaluate the effectiveness of acupuncture alone for the treatment of lymphoedema and

limitation of ROM, and not acupuncture combined with other TCM techniques. Thus, the use of moxibustion and/or other alternative therapies was excluded. According to some authors, acupuncture influences the activity of certain body functions and thus has systemic effects.^{13;14;25}

A fact that may limit interpretation of the results was the lack of information about previous treatments, including use of radiotherapy, and the time lymphoedema initially appeared. The reason for this was lack of access to patient records, since medical care had been provided in institutions that were not associated with voluntary services. In addition, most patients had difficulty in recalling this information accurately. Thus, the small reduction in limb circumference may be partly explained because lymphoedema is a difficult and complex problem often associated with fibrosis. Although some patients could not adequately recall or report the time lymphoedema appeared, it could be inferred that many had experienced this condition for a long time. Of 23 patients with lymphoedema, 17 (74%) had undergone surgery more than five years before entering the study. Of these 17 patients, eight (47%) had undergone surgery more than 10 years before the study. In this context, time since surgery seemed to correlate negatively with reductions in forearm circumference measurements during the course of treatment. Persistent swelling and protein stagnation may lead to fibrosis, promoting recurrent episodes of cellulitis and lymphangitis, leading to valvular failure, causing greater stasis.⁵⁻⁷

In greatly advanced degrees of lymphoedema (Stage 3), reactions similar to those reported with conventional treatment (manual lymphatic drainage) could be observed, ie the most affected areas became softened with subsequent reduction in measurements. Moreover, during the treatment period, patients did not develop phlebitis, including those with pre-existing phlebitis, some cases having required hospitalisation.

Lymphoedema may be influenced by other factors such as the weather (treatment beginning in the summer and ending in the winter and vice-versa), activities performed, and even falls that patients may have had during the treatment period. The pathophysiology of lymphoedema is multifactorial. Factors that might contribute to the formation of lymphoedema and the nature of its interaction have yet to be fully elucidated.⁵

Concerning the sense of heaviness and tightness in the arm, a significant improvement was observed, corroborating a reduction in the degree of lymphoedema. It may also be related to improvement in ROM. In some cases, the patients reported significant improvement as early as the first acupuncture session.

This study arose from the need to find more effective alternatives that are acceptable to patients. Conventional treatment with manual lymphatic drainage requires at least three sessions a week lasting approximately 90 minutes and the continuous use of bandages that impair daily activities.

It is possible that our protocol with weekly sessions with a 30 minute needle insertion time may have been sufficient for the improvement in ROM, and the sense of heaviness and tightness in the arm, but insufficient to influence the reduction in the degree of lymphoedema. Alternative protocols with an increased number of sessions (eg twice per week), or using auricular treatment with steel balls or indwelling needles should be considered. In this way, treatment could be sustained for the entire week until the next session, extending and strengthening the effects already achieved.

Another point to be considered is that there are no previous reports of studies that used acupuncture in the treatment of pre-existing lymphoedema following mastectomy. Thus, the selection of acupuncture meridians in our study was based on the principles of TCM, and a different approach could influence the results, for example the addition of some combined points.

In this study, acupuncture was performed in the contralateral limb and in distal points in relation to the affected limb, which may not be the most effective technique. We were careful to avoid needling the affected upper limb, which is contraindicated in Western medicine. However, in Eastern medicine there are no reports of this contraindication. Since needles used in acupuncture have no cutting edge, unlike those used for blood collection or applying injections, it might be possible to formulate a protocol using acupuncture of the affected limb.

A strength of this study was strict patient compliance to treatment, which presumably demonstrates that the effects were appreciated by the patients. However, any protocol with a higher number of weekly sessions or longer

follow up time might lead to difficulties in treatment adherence.

In conclusion, the acupuncture seems to be a useful therapeutic technique for improving the amplitude of movement, degree of lymphoedema, and the sense of heaviness and tightness in the affected upper limb of patients with breast cancer. However, RCTs should be performed to ascertain whether the changes observed were due to the natural history of the complaint or the acupuncture treatment.

Acknowledgments

We wish to thank the Women's Institution of Cancer Combat of São Carlos and the Carmen Prudente Institution of Cancer Combat of Rio Claro for making this study possible.

We would also like to thank Carlos Magno for his helpful guidance on the selection of acupuncture points.

Conflict of interest

No conflict of interest has been declared by the authors.

Reference list

1. Brasil - Ministério da Saúde. Instituto Nacional de Câncer. Programa Nacional do Câncer do Colo de Útero e de Mama – Viva Mulher [on line]. http://www.inca.gov.br/inca/conteudo_view.asp?id=140 [accessed 24 September 2005].
2. Stanton AW, Svensson WE, Mellor RH, Peters AM, Levick JR, Mortimer PS. Differences in lymph drainage between swollen and non-swollen regions in arms with breast-cancer-related lymphoedema. *Clin Sci (Lond)* 2001;101(2): 131-40.
3. Rockson SG. Precipitating factors in lymphedema: myths and realities. *Cancer* 1998;83(12 Suppl Am):2814-6.
4. Petrek JA, Heelan MC. Incidence of breast carcinoma-related lymphedema. *Cancer* 1998;83(12 Suppl Am):2776-81.
5. Petrek JA, Pressman PI, Smith RA. Lymphedema: current issues in research and management. *CA Cancer J Clin* 2000;50(5):292-307.
6. Földi M. Lymphology today. *Angiology* 1983;34(2):84-90.
7. Földi E, Földi M, Weissleder H. Conservative treatment of lymphoedema of the limbs. *Angiology* 1985;36(3):171-80.
8. Ko DSC, Lerner R, Klose G, Cosimi AB. Effective treatment of lymphedema of the extremities. *Arch Surg* 1998; 133(4):452-8.
9. Brennan MJ, Miller LT. Overview of treatment options and review of current role and use of compression garments, intermittent pumps, and exercise in the management of lymphedema. *Cancer* 1998;83(12 Suppl Am):2821-7.
10. McKenzie DC, Kalda AL. Effect of upper extremity exercise on secondary lymphedema in breast cancer patients – a pilot study. *J Clin Oncol*, 2003;21(3):463-6.
11. Shang C. The past, present and future of meridian system research. *Clin Acup Oriental Med* 2000;1(2):115-24.

12. Scognamillo-Szabo MVR, Bechara GH. Acupuntura: Bases Científicas e Aplicações - Revisão Bibliográfica. [Portuguese] *Rev Ciência Rural, Santa Maria* 2001; 31(6):1091-1099.
13. Embid A: Acupuntura-Moxibustion-Electroacupuntura-Laser: síntesis de trabajos mundiales sobre la acción de la acupuntura-moxibustion em las reacciones inmunológicas. In: Embid, A. *Estimular las Defensas de Otra Forma: tratamiento de los síndromes de inmunodeficiencia*. [Spanish] Madrid: Medicinas Complementarias; 1992.
14. Tukmacki, E. Treatment of hot flushes in breast cancer patients with acupuncture. *Acupunct Med* 2000;18(1):22-27.
15. Liang, QM, editor. *Chinese Acupuncture and Moxibustion*. Edinburgh; Churchill Livingstone: 1993.
16. Hickey M, Saunders CM, Stuckey BG. Management of menopausal symptoms in patients with breast cancer: an evidence-based approach. *Lancet Oncol* 2005;6(9): 687-95.
17. Kanakura Y, Niwa K, Kometani K, Nakazawa K, Yamaguchi Y, Ishikawa H, et al. Effectiveness of acupuncture and moxibustion treatment for lymphedema following intrapelvic lymph node dissection: a preliminary report. *Am J Chin Med* 2002;30(1):37-43.
18. He JP, Friedrich M, Ertan AK, Muller K, Schmidt W. Pain-relief and movement improvement by acupuncture after ablation and axillary lymphadenectomy in patients with mammary cancer. *Clin Exp Obst Gynecol* 1999;26(2): 81-4.
19. Van Nghi Nguyen. *Patogenia y Patología Energéticas em Medicina China: Tratamiento por Acupuntura y Masajes*. [Spanish] Madrid: Editorial Cabal; 1981.
20. Chen Jing. *Anatomical Atlas of Chinese Acupuncture Points*. Jinan, China: Shandong Science and Technology Press; 1982.
21. International Society of Lymphology. *The Diagnosis and Treatment of Peripheral Lymphedema* (Consensus Document of the International Society of Lymphology.) <http://www.isl.com> [accessed 4 October 2005].
22. Langevin HM, Yandow JÁ. Relationship of acupuncture points meridians to connective tissue planes. *Anat Rec* 2002;296(6):257-265.
23. Voogd AC, Ververs JM, Vingerhoets AJ, Roumen RM, Coebergh JW, Crommelin MA. Lymphoedema and reduced shoulder function as indicators of quality of life after axillary lymph node dissection for invasive breast cancer. *Brit J Surg* 2003;90(1):76-81.
24. Woods M, Tobin M, Mortimer P. The psychosocial morbidity of breast cancer patients with lymphoedema. *Cancer Nurs* 1995;18(6):467-71.
25. Guimarães CM, Pinge MCM, Yamamura Y, Mello LE. Effects of acupuncture on behavioral cardiovascular and hormonal responses in restraint-stressed Wistar rats. *Braz J Med Biol Res* 1997;30(12):1445-50.