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The management of cancer-related fatigue after chemotherapy with acupuncture and acupressure: A randomised controlled trial

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Summary
Background: Cancer-related fatigue after chemotherapy is a difficult symptom to manage in practice and the most disruptive symptom in patients' lives. Acupuncture is a popular complementary therapy among cancer patients and some evidence exists that it could potentially alleviate fatigue by stimulating 'energy' points in the body. Hence, this study was carried out to assess the effects of acupuncture and acupressure in managing cancer-related fatigue and the feasibility of running a randomised trial with these two complementary therapies in preparation for a large trial.
Methods: This study was a randomised controlled trial. Forty-seven patients with cancer who experienced moderate to severe fatigue were randomised either to an acupuncture group ($n = 15$), an acupressure group ($n = 16$) or a sham acupressure group ($n = 16$). The acupuncture group received six 20-min sessions over 2 weeks, while the patients in the two acupressure groups were taught to massage/press the points and did so daily thereafter for 2 weeks on their own. Patients completed the Multidimensional Fatigue Inventory before randomisation, at the end of the 2-week intervention and again about 2 weeks after the end of the intervention.
Results: Significant improvements were found with regards to General fatigue ($P < 0.001$), Physical fatigue ($P = 0.016$), Activity ($p = 0.004$) and Motivation ($P = 0.024$). At the end of the intervention, there was a 36% improvement in fatigue levels in the acupuncture group, while the acupressure group improved by 19% and the sham acupressure by 0.6%. Improvements were observed even 2 weeks after treatments, although they were lower (22%, 15%, 7%, respectively). Acupuncture was a more effective method than acupressure or sham acupressure. Subjects needed a longer treatment period to have more sustained results. The trial was methodologically feasible.

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Conclusion: Acupuncture shows great potential in the management of cancer-related fatigue. As a randomised trial with acupuncture is feasible and preliminary data shows significant improvements, it should be tested further using a large sample and a multicentre design.

Background

Cancer-related fatigue (CRF) is a subjective symptom, the most prevalent side effect after chemotherapy experienced by cancer patients and is reported to be more distressing and disruptive to daily activities than, for example, cancer pain.[1] Our own work has shown, using prospective longitudinal designs, that CRF is a common symptom in patients with cancer, experienced by 73.8—90.5% of patients receiving chemotherapy[2] and 44—80.8% of patients receiving radiotherapy.[3] As many as 40% of cancer patients may experience fatigue even years after they complete treatments.[4,5] In a qualitative assessment of 37 patients experiencing fatigue, the impact of CRF was multidimensional and affected work and role functioning, daily routines, social life, mental abilities, emotional status, and appetite.[6] However, besides describing the symptom itself, research has provided little evidence of how to manage it. Some evidence exists for patient education,[7] where patients who received preparatory knowledge, including sensory information, showed significant reductions in the symptoms of pain and fatigue compared to a control group.[8] Exercise has probably most of the supporting evidence in the management of fatigue.[9] However, most other advise we provide to patients (i.e. rest and sleep, conserving energy and stress reduction) is anecdotal or at preliminary stages of investigation.

Complementary and alternative therapies are popular with cancer patients, and often used to manage side effects from cancer treatments.[10] Some preliminary evidence exists that acupressure (the non-invasive form of acupuncture) was helpful in relieving fatigue in COPD patients attending a pulmonary rehabilitation programme.[11] Furthermore, acupressure and transcutaneous electrical acupoint stimulation was found effective in relieving fatigue, sleep problems and depression in a sample of 106 patients undergoing haemodialysis.[12] However, a strong placebo effect was noted in the study, as the sham acupressure group also improved significantly. Recently, a phase II uncontrolled trial ($n = 37$) of acupuncture in cancer patients at least 3 weeks after chemotherapy, has shown that acupuncture improved fatigue by 31.1%.[13] One cohort received twice a week acupuncture treatment for 4 weeks ($n = 25$) and another once a week for 6 weeks ($n = 12$), and was reported that the difference in the two schedules of treatment was minimal.[13]

Encouraged by the above findings, the aim of the study was to examine the effectiveness of acustimulation with two different methods (one invasive and one non-invasive) for the relief of CRF in cancer patients after completing chemotherapy. Specific research questions were:

1. Are acupuncture and acupressure effective treatments for the management of cancer-related fatigue? Are improvements in cancer-related fatigue maintained after the end of treatment?
2. Is minimal stimulation (acupressure) as effective as strong stimulation (acupuncture) in the relevant acupuncture points?
3. Is running a randomised controlled trial design with acupuncture and acupressure feasible?

Methods

Design

A randomised controlled trial using a three-group design was developed. This was a feasibility trial. The reason for including acupressure was that many patients are afraid of needles and may be able to use non-invasive forms of acupuncture if proven effective. Also, adding an acupressure group would help the design of the study by allowing us to use a sham acupressure group, and thus blinding the study, decreasing placebo effects. The sham acupressure group served as the control group. Subjects were randomised to one of the three groups using a computer-generated randomisation table. Subjects who were willing to participate and met inclusion criteria first completed the baseline fatigue scale and after its completion the therapist requested the subject's group allocation from the principal investigator. Hence, neither the patients nor the therapist knew in which group they were assigned until after completion of the baseline data. Although no specific method was used to ensure the treatment allocation could not be changed after subjects had been entered into

the trial other than using intention-to-treat analysis at the end of the study, this did not affect the study as all subjects remained throughout the study in the treatment group they were initially allocated. Randomisation was performed using the Clinstat program (http://www-users.york.ac.uk/~mb55/soft/soft.htm), last accessed 27 January 2006.

Sample and settings

Patients were recruited from an outpatient unit in one cancer centre in the UK. Inclusion criteria for the study were:

Patients with cancer who have completed chemotherapy at least 1 month before.
Adults of either gender.
Patients with a score of five or above on the screening tool for fatigue (single 0—10 item).
Willing to participate in the study and be randomised in one of the three groups.
Anticipated survival more than 3 months.
No schedule to receive chemotherapy, radiotherapy or other cancer treatments during the study period.

Patients were excluded if they had needle phobia; low platelet count (<50,000); suffered from a bleeding disorder (e.g. haemophilia); were pregnant; had lymphoedema at the area of the acupuncture points; haemoglobin levels were less than 9 g/dL and haematocrit less than 30; were on active treatment for anaemia (i.e. EPO or blood transfusions); had a Karnofsky score less than 70 or were receiving steroids to combat fatigue. For this pilot work we aimed at recruiting 50 patients, a conservative estimate of sample size based on an improvement of 30%, as seen in the study by Vickers et al.[13]

Patients were screened for fatigue and if they reported high fatigue levels (>5 on a 0—10 scale), they were randomised to one of three groups, namely the acupuncture, the acupressure and the sham acupressure group. About 20% of the patients approached met inclusion criteria and had a fatigue score $\geq$5.

Intervention

The intervention is described following the STRICTA recommendations for reporting acupuncture trials (http://www.stricta.info/stricta.htm). In the acupuncture group, patients had a 20-min acupuncture session needling three points (LI4, SP6 and ST36) bilaterally three times a week for 2 weeks based on the Traditional Chinese Medicine style, although individualisation was not part of the study. These are points traditionally used for 'energy' over the past 2000 years (especially ST36) and were decided after consultation with two acupuncturists.[14] Points were punctured perpendicularly to a depth of 0.5—1 in.[14] bilaterally and were retained for 20 min. Depth of needling depended on the patients' size, sensitivity and state of health. The needles were Hwato needles with guide tubes for single use and their size was 32 gauge/0.25 mm diameter. The location of points was: ST36—below the knee, in the anterior boarder of tibia; SP6—above the tip of the medial malleolus and posterior to the medial border of the tibia; LI4—on the dorsum of the hand between the first and second metacarpal bones. The acupuncturist flicked or rotated the needle (once or twice per session), a standard practice to elicit '*de qi*' and determine the exact point location.[14] There was manual stimulation of the needles, ST36 and SP6 were tonified and even stimulation was applied to LI4. The acupuncturist immediately after the session filled out an audit sheet verifying the treatment given. Conversation during each session was kept to minimal, only to facilitate the treatment. In the acupressure group, the technique used was tonifying, and patients were taught to apply pressure to the same points for 1 min each, daily for 2 weeks. Finally, the sham acupressure group was taught to apply pressure in three points that are not associated with 'energy' in traditional Chinese Medicine (LI12, GB33 and BL61) in the same way as in the acupressure group. The pressure technique was taught in both acupressure groups in an identical manner. Patients in the acupressure groups were told that we are testing the effects of two sets of points, and no one clearly new that one set is a sham technique. No co-interventions were used for any of the treatment groups. The practitioner was trained in acupuncture through a 3-year degree course in a university in the UK, had 1 year of clinical experience post-qualification and previous work experience with cancer patients.

Procedures

The study was reviewed and approved by the South Manchester Research & Ethics Committee and the Ethics Committee of the University of Manchester. Patients were identified during their regular outpatient visit at the outpatient clinic, they were referred by the consultant/nurse clinicians or patients responded to a poster placed in the outpatient area of the hospital. As recruit-

ment was slow, we aided this with an advert to a local newspaper, from where we had a strong response. Some of these patients had received their chemotherapy in other hospitals than the one the study took place. A process of obtaining consent was followed and when the patients agreed to participate, they were screened using a 10-point VAS about fatigue levels (with higher points indicating higher fatigue levels). Consent was obtained by the acupuncturist of the study, after giving detailed information about the study. In addition to the information sheet, patients had the opportunity to see how acupuncture is done through coloured photographs. After randomisation patients in all groups had their first session with the acupuncturist about a week later. One acupuncturist was used for the treatment of all patients. Patients completed the fatigue scale used in the study (see below) three times on their own at home, i.e. before starting the treatment, at the end of the 2-week treatment and 2 weeks after completing treatments. Scales were returned with a pre-paid envelope to the study's principal investigator who was blinded to the treatment the patients were about to receive, and the acupuncturist had no access to these scales. Travel expenses to attend the treatment sessions in the hospital were provided. At the end of the study and for ethical reasons, all alive patients in the sham acupressure group were contacted, presented with the findings of the study and taught how to locate and press the more effective points. Recruitment to the study was open for 9 months, from March to November 2005.

Data collection methods

The fatigue scale used in the study was the Multidimensional Fatigue Inventory (MFI).[15] This scale is well validated and provides information in five areas, namely general fatigue, physical fatigue, reduced activity, reduced motivation, and mental fatigue, consisting of 20 items. A total score of all fatigue items is not recommended, instead the score for general fatigue can be used as an overall indicator of fatigue. Hence, each subscale is interpreted separately, and scores can range from 0 to 20, with higher scores indicating more fatigue. Some items in the scale are in reverse order to minimise the influence of response tendencies. The instrument has been tested with a number of volunteers and patients showing an average Cronbach alpha of 0.84, and good construct and convergent validity.[15] Furthermore, patients in the acupressure and sham acupressure groups completed daily for the 2 weeks of the intervention a log reporting whether they had put pressure in the acupoints prescribed or not. Demographic and clinical data were also obtained from the patients' records.

Data analysis

Data were analysed using descriptive statistics to summarise the data and repeated measures analysis of variance individually for all five areas of fatigue explored through the MFI scale with a focus in between-groups differences and changes over time. Mauchly's test of sphericity showed no evidence that the assumption of sphericity was violated, except in the case of 'reduced activity' subscale ($P = 0.02$). As the above analysis of variance compares the three groups independently of what these groups are, and because there was an ordering in the treatment [sham stimulation, mild stimulation (acupressure) and strong stimulation (acupuncture)], a regression approach (ANCOVA) was further used. In this model, the baseline fatigue score was used as a covariate, and two new fixed factors were created and included in the analysis, an indicator for treatment (scored 1 for acupuncture and acupressure and 2 for sham acupressure) and an indicator for acupuncture (scored 1 for acupuncture and 2 for acupressure or sham acupressure). This covariate analysis was carried out separately for T2 and T3. Ninety-five percent confidence intervals were obtained from *t*-tests between two groups.

Results

Sample characteristics

Forty-seven patients completed the study, with 15 being randomised in the acupuncture arm, 16 in the acupressure arm and 16 in the sham acupressure arm. As can be seen in Table 1, the majority of the participants were females, married, with high school or higher education, and professionals or retired. All participants but one were from white ethnic background. The two most common diagnoses were lymphoma and breast cancer, reflecting also the most common chemotherapy protocols the patients had been treated with. The mean age was 53.4 years (S.D. = 13.1; range = 20—76) (no significant difference across the three groups). The mean initial fatigue score (screening item) was 7.2 (S.D. = 1.1) and the mean Hb level was 12.5 (S.D. = 1). Drop out from the study was acceptable (15%) and comparable across the three arms (Diagram 1). All patients who dropped out were female and their mean age in the acupuncture, acupressure and sham acupressure arm was also comparable (45, 43.5 and 50 years, respectively).

Table 1 Sociodemographic and clinical characteristics of the sample ($n = 47$)

	Acupuncture group, *N* (%)	Acupressure group, *N* (%)	Sham acupressure group, *N* (%)
Gender			
Female	9 (60)	12 (75)	11 (68)
Male	6 (40)	4 (25)	5 (32)
Marital status			
Single	4 (26.7)	1 (6)	3 (18)
Married	9 (60)	11 (69)	12 (76)
Divorced/widowed	2 (13.3)	4 (25)	1 (6)
Education			
Primary school	1 (6.7)	–	–
Secondary school	7 (46.7)	3 (18)	11 (69)
College/university	5 (33.3)	7 (45)	3 (19)
Postgraduate education	2 (13.3)	4 (25)	1 (6)
Missing data		2 (12)	1 (6)
Occupation			
Retired	4 (26.7)	5 (32)	8 (50)
Education/health/business	5 (33.30	6 (38)	4 (25)
Housewives	1 (6.7)	2 (12)	1 (6)
Manual workers	1 (6.7)	1 (6)	1 (6)
Administration	2 (13.3)	–	1 (6)
Unemployed	1 (6.7)	1 (6)	1 (7)
Missing data	1 (6.7)	1 (6)	
Diagnosis			
Lymphoma	8 (53.3)	4 (25)	5 (32)
Breast cancer	4 (26.7)	6 (38)	5 (32)
Gastrointestinal cancers	1 (6.7)	4 (25)	2 (12)
Lung cancer	1 (6.7)	1 (6)	3 (18)
Gynaecological cancers	1 (6.7)	1 (6)	–
Brain tumor	–	–	1 (6)
Chemotherapy received			
Anthracycline-based	3 (20)	5 (32)	5 (32)
CHOP	5 (33.3)	3 (18)	3 (18)
Gemcitabine	1 (6.7)	–	3 (18)
Cisplatin-based	1 (6.7)	5 (32)	–
CVP	1 (6.7)	–	2 (13)
ABVD	1 (6.7)	1 (6)	–
Capecitabine	2 (13.3)	–	–
Other	1 (6.7)	2 (12)	3 (18)

Fatigue scores

The MFI showed high internal consistency across the three assessment points, with Cronbach alpha reliability at T1 being 0.89, at T2 0.94 and at T3 0.92. Using the MFI, fatigue was high at baseline and comparable in all participants (Table 2). Fatigue scores significantly improved in both the acupuncture and acupressure group in four of the five MFI subscales, namely General fatigue ($P < 0.001$); Physical fatigue ($P = 0.016$); Activity ($P = 0.004$), and Motivation ($P = 0.024$) (Table 2). General fatigue showed the largest improvements (Fig. 1), followed by the scores for motivation and reduced activity,

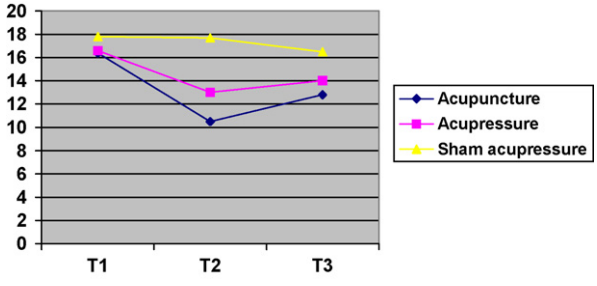

Figure 1 General fatigue scores in the three groups across time.

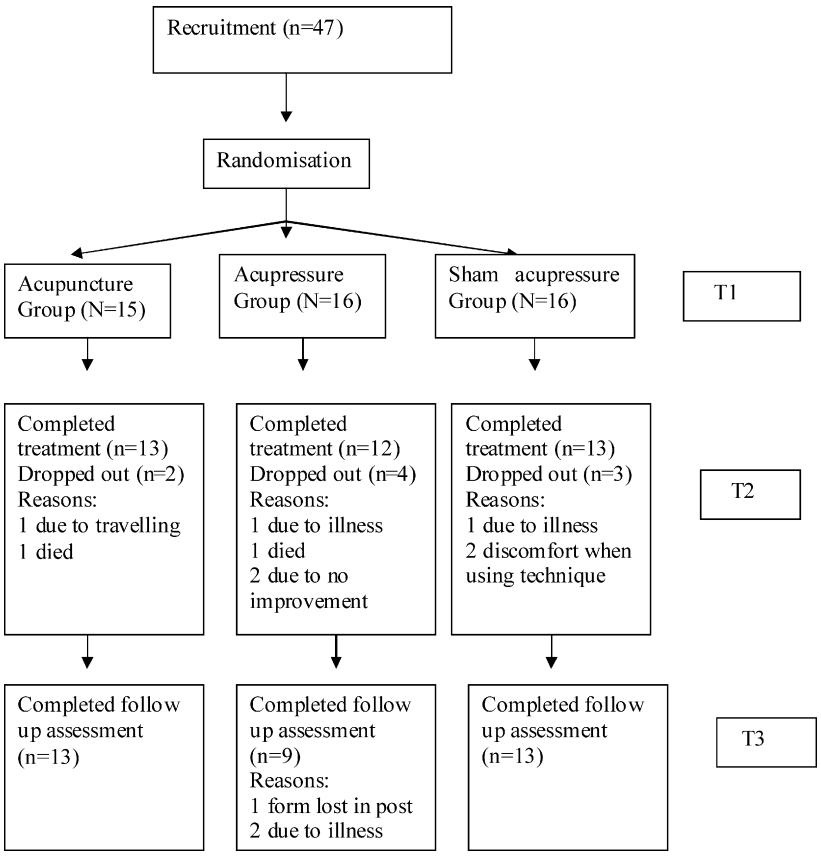

Diagram 1 Trial profile: recruitment and randomization.

and physical fatigue. Using the general fatigue subscale, a measure of an overall indication of fatigue, improvements were highest in the acupuncture group immediately post-treatment sessions (36%), followed by acupressure (19%), while the sham acupressure group did not improve at all. Improvements were maintained about 2 weeks after the end of all sessions, although they were not as impressive

Table 2 Fatigue scores over time in the three groups

Fatigue dimension	Group	T1, mean (S.D.)	T2, mean (S.D.)	T3, mean (S.D.)	*F* (d.f. = 2)	*P*
General fatigue	Acupuncture	16.4 (2.4)	10.5 (3.0)	12.8 (3.2)	10.11	<0.001
	Acupressure	16.6 (2.7)	13.4 (3.0)	14 (2.4)		
	Sham acupressure	17.8 (2.5)	17.7 (2.6)	16.9 (3.0)		
Physical fatigue	Acupuncture	16.4 (2.7)	12.7 (4.0)	13.4 (4.1)	4.73	0.016
	Acupressure	16.2 (2.9)	14.9 (3.5)	14.5 (3.2)		
	Sham acupressure	17.4 (2.3)	18 (2.9)	17 (2.6)		
Activity	Acupuncture	14.5 (3.8)	10.5 (4.8)	12 (4.4)	6.56	0.004
	Acupressure	14.8 (3.5)	11.6 (4.5)	12.4 (3.7)		
	Sham acupressure	17.7 (2.2)	17 (2.5)	16.4 (3.1)		
Motivation	Acupuncture	13 (3.6)	9.4 (3.8)	9.2 (4.3)	4.26	0.024
	Acupressure	9.7 (4.2)	8.1 (4.0)	8.5 (3.2)		
	Sham acupressure	13.7 (2.9)	12.8 (2.9)	13.1 (3.7)		
Mental fatigue	Acupuncture	14.6 (4.6)	10.2 (4.8)	11.8 (5.1)	0.010	0.99
	Acupressure	13 (3.9)	11.9 (4.4)	11.2 (4.5)		
	Sham acupressure	13.4 (5.1)	12.45 (5.1)	11.1 (5.4)		

T1: baseline data; T2: end of 2-week treatment; T3: 2 weeks after end of treatment.

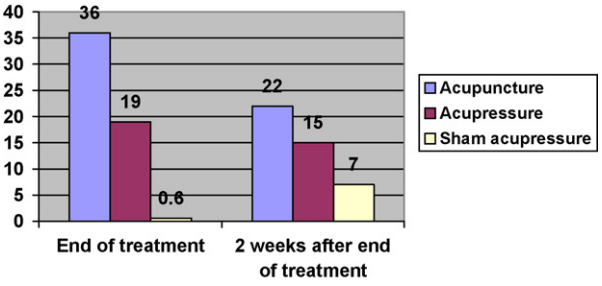

Figure 2 Percent improvement of general fatigue over time in the three groups compared to baseline scores.

as after the end of treatment (Fig. 2). The power of the analysis for the above four subscales was adequate, ranging from 0.69 to 0.97 ($\eta^2 = 0.23—0.40$). Mental fatigue showed similar improvement in all three groups ($P > 0.05$), although this analysis was underpowered.

Through the regression analysis (ANCOVA) it was shown that the indicator of active treatment (acupuncture or acupressure) significantly influenced the results for General fatigue at T2 (end of treatment) compared to sham acupressure ($F = 5.69$; d.f. = 1, 33; $P = 0.023$). Acupuncture was found to be significantly more effective than acupressure or sham acupressure ($F = 7.37$; d.f. = 1, 33; $P = 0.01$). Results for the indicator of treatment or indicator for acupuncture were not significant for General fatigue at T3. For Physical Fatigue at T2, results were not significant in relation to the indicator of treatment, although acupuncture was associated with significant improvements ($F = 4.70$; d.f. = 1, 33; $P = 0.037$). Results for the indicator of treatment or indicator for acupuncture were not significant for Physical fatigue at T3. For Activity at T2, results were significant for the indicator of treatment ($F = 4.44$; d.f. = 1, 33; $P = 0.043$) but not for acupuncture. Results for the indicator of treatment or indicator for acupuncture were not significant for Activity at T3. For Motivation at T2 and T3 the results were not significant in relation to the indicator of treatment and the indicator for acupuncture. For Mental Fatigue, although the results for the indicator of treatment were not significant, they were significant for the indicator of acupuncture ($F = 4.98$; d.f. = 1, 33; $P = 0.032$). Results for the indicator of treatment or indicator for acupuncture were not significant, however, for Mental Fatigue at T3. Ninety-five percent confidence intervals of the difference for the above variables are shown in Table 3.

Looking at each participant's scores over time, among those using acupuncture 11 improved (maximum improvement 77%), one was stable (0—5% improvement) and 1 increased the fatigue scores. Among those using acupressure 10 improved (maximum improvement of 40%), 2 were stable, and none increased the fatigue scores. Finally, among the sham acupressure participants 2 improved, 7 were stable and 4 increased their fatigue levels.

The daily log was completed by all patients in the two acupressure groups, and there were only between 1 and 4 days (out of the 14) that were not completed by 4 subjects. There were also two patients with lymphoedema of the left arm who did not have acupuncture in the affected arm, although looking at the individual scores, both patients showed high improvements in their fatigue scores.

Side effects from treatments

About 90 sessions of acupuncture were given. Side effects from the acupuncture included spot bleeding in two cases, bruise in one point in 1 patient, one patient feeling discomfort in one point (SP6), and one patient feeling nauseous after the end of the session. One patient felt nervous about needles, but still continued with all treatments. In the acupressure groups, the only complained was bruising from pressure in one patient and pain in the points after pressure.

Unsolicited comments

Patients made a number of positive comments on their questionnaires, reporting noticing improve-

Table 3 Ninety-five percent confidence intervals of the difference in the fatigue variables among the three treatment groups at T2

	95% CI: acupuncture and acupressure groups	95% CI: acupuncture and sham acupressure groups	95% CI: acupressure and sham acupressure groups
General fatigue	−5.24 to −0.35	−9.19 to −3.89	−6.39 to −1.11
Physical fatigue	−4.87 to 1.25	−7.72 to −2.06	−5.61 to −0.56
Activity	−4.47 to 3.04	−9.32 to −2.77	−8.37 to −2.29
Motivation	−2.15 to 3.96	−6.25 to −0.24	−7.13 to −1.17
Mental fatigue	−4.82 to 2.78	−5.94 to 2.23	−4.80 to 3.13

ments in their breathing (two lung cancer patients), their low back pain or pain in the arm, and improvements in their sleep quality. Patients also mentioned they walked further distances after the acupuncture sessions, felt more alert and managed to do things such as ironing which they were avoiding before due to tiredness.

Discussion

The results of this pilot study showed that acupuncture produces clinically meaningful improvements in the fatigue levels of chronically fatigued patients after chemotherapy. To our knowledge, this is the first randomized trial testing the effects of acupuncture in cancer-related fatigue, and the mean improvement in general fatigue after a course of six sessions was 36%. This level of improvement is slightly higher that that reported by Vickers et al.[13] in their uncontrolled study of 37 patients (mean improvement of 31.1%), which may be attributed to the different points used in these two studies or the frequency of the sessions. The latter phase II study did demonstrate that acupuncture is worthy of further investigation, and our trial confirmed that improvements are sustained when using a randomized trial design.

Improvements in relation to acupressure in the same points were also shown, although their magnitude was considerably lower than that seen in the acupuncture patients. The mean improvement was 19%, slightly above the minimum clinically meaningful improvement as discussed in the paper by Vickers et al.[13] Nevertheless, albeit its modest improvement, it could potentially be an alternative self-help intervention for fatigued cancer patients, especially those with needle-phobia, those who cannot travel to receive acupuncture or those who have no access to an acupuncturist. This is an easy method to teach, there are no costs involved and our study patients found it pleasant and useful. Nevertheless, as shown from the ANCOVA results, acupuncture showed significantly higher improvements compared to acupressure, hence strong stimulation of the relevant meridian points was associated with more improvement in fatigue.

We did not have an obvious placebo effect in our results, as the patients in the sham acupressure group (who were told that they are using a different combination of points than the other acupressure group) did not improve at all. However, a placebo effect, especially in the acupuncture group, cannot be ruled out, as they received more attention by the therapist and a more active form of treatment. Sham acupressure was found to be an appropriate blinding method for the patients, avoiding the problems with superficial or minimal needling techniques, hypothesising that any real but unknown effect with this (sham) group would have been low. The use of non-invasive sham needles (Streitberger needles) may have been a more appropriate blinding technique, although sham acupuncture is still an unresolved methodological issue in acupuncture clinical trials.

It was interesting to see that all dimensions of fatigue improved, except in the case of mental fatigue. Looking further at the correlations between the initial score of fatigue and the MFI subscales (not reported here), there was absence of any correlation between the former and the mental fatigue scores across all three points. One explanation may be that the statements used to describe mental fatigue (i.e. forgetfulness) may have not been associated with what patients perceived as fatigue. Due to the small sample size, a Type II error is possible. However, the more likely explanation may be that acupuncture produces more measurable physical changes after needling the points used in the current study, either through serotonin pathways,[16] through the release of endogenous steroids or mediating endogenous opioids,[17] or another biological pathway yet to be identified. Nevertheless, a significant effect between acupuncture and mental fatigue were observed in the regression analysis. Furthermore, the only patient in the acupuncture group who had an increase in fatigue was a patient suffering also from hypothyroidism. As thyroid dysfunction and fatigue are related, an exclusion criterion in future studies should be patients with hypothyroidism.

The regression analysis also showed that at T3, there were no significant effects from the active treatments. The improvement at this time of assessment was, however, clinically significant, at least in the acupuncture group. What these results possibly imply is that patients were under-treated and six sessions over 2 weeks, although sufficient to improve fatigue immediately, were not sufficient to sustain this benefit for long. Hence, a future study should consider more treatments over a longer period of time in order to sustain improvements longer. Teaching patients to carry out maintenance acupuncture after the prescribed duration of treatment by a therapist may lead to greater improvements over a much longer period of time.

This pilot study also showed that a large rigorous randomized trial of acupuncture is feasible, with acceptable drop out rates and with the integrity of a study protocol being maintained. Patients were also eager to participate. The only initial difficulty

we experienced was in recruiting patients with initial fatigue scores of >5 (on a 0—10 scale), i.e. those with moderately high to severe fatigue; many patients who approached us with complaints of fatigue had a score less than 5, and hence were not included in the study. However, an advert in the local paper significantly increased the numbers of patients recruited for the study almost overnight. It may be that moderately to severely fatigued patients respond better to such interventions, on which assumption we based our decision to exclude a large number of less fatigued patients. It will be of interest in future studies to explore whether less fatigued patients with cancer respond equally well to acupuncture as patients with more severe fatigue.

The concept of randomization was acceptable to patients, and no one who was assigned to one group expressed a strong preference for another of the study's groups. The only problem we had before randomization in accruing patients was traveling, and several patients who met inclusion criteria decided at the end not to take part in the study, as traveling to hospital to receive the intervention was problematic, either as they lived far away from the cancer centre or were too fatigued to travel. This problem was also communicated to us by several patients who received acupuncture, although only 1 (6.6%) dropped out because of travel difficulties. Travel was also identified as an obstacle to accrual by Vickers et al.[13] Furthermore, visiting the hospital three times a week for 2 weeks was also tiring for our patients. As there is little difference in improvement between treatment of once per week for 6 weeks, twice a week for 4 weeks[13] or three times for 2 weeks, decreasing the frequency of visits and extending the duration of the treatment is a more appropriate intervention plan for fatigued patients.

The MFI was a comprehensive tool and, unlike other scales that give only an overall single score, it allowed us to explore different dimensions of fatigue. Patients clearly understood the questions and there was no missing data in any questionnaire. Also, the scale's reliability was high. However, as depression and difficulties with sleeping are closely linked with fatigue,[18—20] it would be appropriate in future studies to additionally measure at least these two important covariates of fatigue.

Conclusion

Our results support the use of acupuncture (and to a lesser extent acupressure) in the management of fatigue in patients with cancer after chemotherapy. However, despite finding significant results with this relative small sample size, they should be treated as preliminary as no formal power calculations were carried out, an imbalance in pre-randomisation covariates may be likely, there could be selection bias as well as an inflated type I error rate.[21] A multicentre large randomized trial is warranted.

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