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Research Article

Evaluating the Effectiveness of Acupuncture, Plum Blossom, and Auriculotherapy in Treating Pain and Hot Flashes in Breast cancer Patients: An Observational Retrospective Study

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Abstract

Background: Pain and vasomotor symptoms are the common side effects experienced by breast cancer patients undergoing conventional oncology treatments. Traditional Chinese Medicine might represent a key treatment option for these side effects in a multidisciplinary pathway.

***Aim*:** The present study with a retrospective design was aimed at confirming the effectiveness of acupuncture, plum blossom, and auriculotherapy in reducing hot flashes and the intensity and frequency of pain in women with breast cancer.

Materials and Methods: One hundred and fifteen female patients who were diagnosed with breast cancer and were experiencing hot flashes and/or pain were enrolled at the Fior di Prugna Center, Local Health Unit, Central Tuscany, Florence, in the period between January 2012 and August 2016. All the patients had undergone surgical intervention and/or were continuing to undergo chemotherapy and/or radiotherapy and/or hormonal treatment. Patients were treated with acupuncture according to symptom-based pre-designed protocols, which included plum blossom needles, somatic acupuncture, and auriculotherapy. The Hot Flash Score questionnaire, Present Pain Intensity Scale, and Numeric Pain Intensity Scale were used, at the baseline as well as after the completion of treatment, in order to assess the effectiveness of the acupuncture protocol on the hot flashes and the pain (both at rest and during movements).

Results: All the outcome measures were observed to improve significantly after treatment. No severe side effects were observed after the treatment. The average number of daily hot flashes was reduced from 14.2 (pre-treatment) to 7.52 (post-treatment; $p < 0.001$), which was consistent with the reduction in the mean Hot Flash Score from 2.20 (pre-treatment) to 1.76 (post-treatment). Furthermore, scores for pain at rest and pain during movements were reduced from 2.96 (pre-treatment) to 2.24 (post-treatment; $p < 0.0001$), and from 3.52 (pre-treatment) to 2.59 (post-treatment; $p < 0.0001$), respectively.

Conclusion: The present study confirmed that Traditional Chinese Medicine, acupuncture, in particular, represented a safe and effective approach to reducing pain and the vasomotor symptoms, which was consistent with recent studies in the literature. Therefore, acupuncture may play a key role in supportive cancer care, as women are usually unable to undergo hormone replacement therapy due to the risks associated with it. Further research is necessary to better investigate the causal pathways leading to the effectiveness of acupuncture in cancer patients.

Keywords

Acupuncture; auriculotherapy; pain; hot flashes; breast cancer

1. Introduction

Cancer patients experience multiple physical and psychological symptoms as they undergo oncological treatments. According to the National Cancer Institute (NCI), approximately two-thirds of the post-menopausal women with a history of breast cancer experience hot flashes [1]. Such symptoms may occur after surgery, chemotherapy, or endocrine therapy, and may be difficult to treat. In fact, several treatments available for such symptoms, such as hormone replacement therapy (HRT), should be avoided in the estrogen-sensitive patients, while the pharmacological

agents addressing vasomotor symptoms, such as antidepressants, have been reported to be associated with multiple adverse effects which cause several people to be reluctant toward their assumption [2].

There is growing evidence that suggests that Traditional Chinese Medicine (TCM), acupuncture, in particular, might represent an effective approach to control hot flashes and the intensity and frequency of pain in cancer patients. Indeed, acupuncture constitutes a safe technique with just a few minor side effects. Several studies concerning the effectiveness of acupuncture in treating hot flashes have been published, although with contradicting findings which could be attributed to the methodological differences in control group enrolment. Certain studies have suggested that acupuncture may effectively reduce hot flashes in women with cancer [3–7], while others comparing the effect of acupuncture with sham stimulation reported either no significant differences or just small effect sizes [8–13]. Given such contrasting findings, several authors have, therefore, concluded that there is insufficient evidence to support the effectiveness of acupuncture in treating vasomotor symptoms, and such results should be interpreted cautiously because of the poor quality and small sample sizes included in such studies. However, the advantages of acupuncture, such as safe for use and just a few side effects, might be relevant, particularly for those patients who are not responding to their current pharmacological treatment or are reluctant toward further pharmacological treatments.

Pain is one of the most common symptoms experienced by cancer patients. Hot flashes may occur after surgery, radiation therapy, chemotherapy, or other diagnostic procedures. Strikingly, 40%–89% of the breast cancer patients have been reported to experience this symptom, raising the requirement of a proper assessment, including intensity measurement [14]. Several studies have reported that research conducted on oncological pain presents major methodological shortcomings [15] and that the administration of acupuncture alone did not lead to a significantly different effect on cancer-related pain compared to that observed with pharmacotherapy [16]. However, several Randomized Controlled Trials (RCTs) have reported that the patients receiving manual acupuncture or electroacupuncture experienced significant relief in pain [17–19]. A recent Cochrane analysis [20] concluded that there is insufficient evidence in favor of recommending acupuncture as a part of standard care for the management of cancer-related pain in adults. However, despite such findings related to standard care treatments, a short course of acupuncture should be considered for patients with intractable pain, which is not adequately treatable otherwise. A recent meta-analysis [21] identified three well-designed RCTs supporting the use of acupuncture in the case of aromatase inhibitor-associated arthralgia (AIAA) and aromatase inhibitor-associated musculoskeletal symptoms (AIMSS). Another article [22] demonstrated that improvements in pain were not significantly different between manual and sham acupuncture. On the other hand, another RCT [23] suggested that true acupuncture, compared to sham acupuncture and a waiting-list control sample, led to a significant reduction in joint pain six weeks after treatment completion in post-menopausal women with early-stage breast cancer and AAIA. It is noteworthy that the evidence-based guidelines of the Society for Integrative Oncology (SIO) on the use of integrative therapies during and after breast cancer treatments, which was published in 2017 [24] and subsequently reviewed and endorsed by the American Society of Clinical Oncology (ASCO) in 2018 [25], state that acupuncture should be considered for treating hot flashes symptoms (Grade C) and for pain control (Grade C).

In this context, it was decided to conduct a retrospective outcome study on the effectiveness of

acupuncture, plum blossom, and auriculotherapy in reducing hot flashes and the intensity and frequency of pain in female breast cancer patients.

2. Aim

The present study, designed as a retrospective study, aimed at confirming the effectiveness of acupuncture, plum blossom, and auriculotherapy in reducing hot flashes and the intensity and frequency of pain in women with breast cancer.

3. Materials and Methods

3.1 Setting

The present study was conducted at the Center of Acupuncture and Chinese Traditional Medicine ‘‘Fior di Prugna’’, Local Health Unit, Central Tuscany, Florence, during the period between January 2012 and August 2016.

The Center is the Tuscan reference center for acupuncture and TCM and is situated at the Public outpatients clinic of Camerata, Florence. The staff at the Center included six licensed medical doctors with at least 3-year training in acupuncture and TCM, two physiotherapists, one nurse, one paramedical operator, and four administrative employees. Every year, approximately 1,200 patients visit the Center, and approximately 14% of them are cancer patients who are interested in reducing the side effects of anticancer therapy. Most of the patients (approximately 60%) are usually referred to the Center by their medical oncologists, while approximately 40% of the patients visit on their own by a word-of-mouth process among the patients.

3.2 Pain

Pain at rest and pain during movements were evaluated by means of Present Pain Intensity (PPI) scale and Numeric Pain Intensity Scale (NRS), both at the baseline (pre-treatment) and after treatment completion. In detail, PPI is a verbal scale ranging from “absence of pain” to “terrible pain” [26], while NRS is a numeric scale with scores ranging from “0” (i.e. no pain) to “10” (i.e. the worst pain ever) [27-29]. Both the tools are self-administered and have been translated and validated in Italian.

3.3 Hot Flashes

The daily occurrence of hot flashes and sudden sweating was evaluated, by means of another self-administered questionnaire that focused on the week prior to the assessment, both at baseline (pre-treatment) and after treatment completion. The daily Hot Flash Score (HFS) was calculated by assigning different numbers to different levels of severity of the symptom: “mild” (1), “moderate” (2), “severe” (3), and “very severe” (4). These numbers were then multiplied by the daily frequency of each type of hot flash, and the four products were finally added together to result in the final Score [30–32].

The patient’s evaluation related to the severity of hot flashes was based on their medical doctor’s indications during the first visit (i.e., duration, physical, and emotional symptoms) [32, Appendix].

In addition, any adverse event associated with the treatment was recorded in a properly prepared form.

3.4 Inclusion Criteria

The inclusion criteria for the present study were as follows: to have undergone surgical intervention and/or to be continuing to undergo chemotherapy and/or radiotherapy and/or hormonal treatment; to be at least 18 years of age; to be suffering from pain or hot flashes (as a prevalent symptom) or both of these symptoms; and to have signed the written informed consent and a privacy-ensuring data protection module.

Most of the patients were not specifically interested in the TCM techniques, and therefore, did not specifically opt for this option. However, since they had been referred to the Center by their Breast Unit conventional Oncologists, they were highly representative of the clinical population of breast cancer patients.

3.5 Statistical Analysis

Statistical assessment of the results was performed using t-test applied to matched-pair samples, in association with a two-tailed significance test for continuous variables (Hot flash scores), and by using Wilcoxon's test applied to the matched-pair samples, in association with a two-tailed significance test for ordinal variables (PPI scale).

4. Therapeutic Protocol

All patients received information regarding the acupuncture protocols and were asked to sign a written informed consent.

In the first 60 min of the visit, patients' medical history was analyzed, followed by physical examination along with pulse and tongue evaluation. Subsequently, acupuncture sessions consisting of 20 min of needle insertion and 5 min of plum blossom treatment, were conducted following the pre-specified protocol (i.e. one acupuncture session per week, for 9 weeks).

The Fior di Prugna Center team developed the protocols after reaching a consensus-based on the international scientific literature and the TCM classical textbooks [33–37]. The basic treatment protocol was the same for all women, while the tailored treatment protocol was designed according to individual energetic diagnosis, based on the theory of Yin and Yang, the Law of Five Phases, and the most prevalent syndromes during menopause [37].

As far as patients suffering from hot flashes were concerned, the acupuncture protocol included bilateral stimulation of the following points by means of sterile 0.25 × 0.25 mm needles: GV23 (*shàng xīng*), BL2 (*cuán zhú*), CV22 (*tiān tǔ*), LI11 (*qǔ chí*), LI4 (*hé gǔ*), GV20 (*bâi huì*), CV4 (*guān yuán*), SP6 (*sān yīn jiāo*), SP10 (*xuè hâi*), ST37 (s*hàng jù xǔ*), and LR3 (*tài chōng*). In case of the prevalence of specific sub-symptoms, the medical acupuncturist added certain specific predefined points (i.e., BL23 -*shèn shǔ*- in case of lack of energy and HT3 -*shào hâi*- in case of hot flashes during the night).

As far as the patients suffering from pain were concerned, somatopuncture and auriculotherapy were performed. According to the TCM principles, cancer patients usually exhibit a void of Qi and blood disharmony due to Yin stagnation, which is typical of the disease itself and is in turn caused

by a Yin deficiency due to a Jing void. Stagnation produces heat, which may damage the body fluids including blood, and consume the Qi, creating a vicious circle. Therefore, the protocol included certain specific acupoints for treating the heat and to tonify blood. In detail, the acupuncture protocol for pain included stimulation of the following points: LR3 (*tài chōng*), GB34 (*yáng líng quán*), LI4 (*hé gǔ*), BL43 (*gāo huāng*), ST36 (*zú sān lǐ*), and CV6 (*qì hâi*), in addition to local *ashi* and *xi* points located on the specific Channels associated with the painful area(s). As for the treatment of hot flashes, it was then possible to add a few points in order to provide a tailored treatment in accordance with the patient's individual energetic diagnosis. Needles were inserted to a depth that resulted in the achievement of the proper *deqi* sensation. Finally, the auriculotherapy protocol was performed, which included stimulation of certain specific points in the ear corresponding to the painful body area(s), in addition to the general points (i.e., *Shen Men, Thalamus, Myorelaxant*, *and Antidepressant*). In auriculotherapy, the press needles (max. 5/7 points) were left *in situ* for a week.

The patients suffering from both the symptoms underwent a treatment protocol targeting their most invalidating symptoms. Furthermore, the plum blossom needle treatment was performed for both the symptoms, by stimulating the dorsal C7–T5 region (*huatojaiji*) and the medial and lateral branches of the Bladder Channel in the shoulder blades area.

Any treatment-related adverse effect was recorded in a properly prepared form.

A modified protocol for hot flashes and pain was applied to the group of patients who were experiencing both of these symptoms.

5. Results

5.1 Patients and Questionnaires

In the study period, 135 women fulfilled the inclusion criteria of the present study, while only 126 were accepted to complete the questionnaires and to participate in the study. Among these 126 women, 11 women did not complete the treatment protocol and/or the questionnaires **(Figure 1)**. Therefore, a total of 115 women underwent the complete TCM treatment, and their 128 completed questionnaires (concerning their prevalent symptom) were analyzed. Among the participants, 67 patients suffered from hot flashes and 61 patients suffered from pain; 13 women were suffering from both the symptoms and therefore, completed all the questionnaires). In the complete study sample, 112 patients were Italian, 3 were from other countries, and they all were living in Tuscany.

Women with vasomotor symptoms (n = 67) were in the age range of 34–78 years (median age = 52.5 years). Among these, 33 women had cancer in the right breast, 32 women had cancer in the left breast, one woman had cancer at both sides, and one other woman had cancer of the breast and other organs. The treatments these women patients were receiving were hormone therapy (44), chemotherapy (5), radiotherapy (2), and a combination of therapies (8), while no treatment data were obtained for 8 women patients.

Women with pain (n = 61) were in the age range of 38–78 years (median age = 59). Among these, 31 women had cancer in the left breast, 25 women had cancer in the right breast, 3 women had cancer at both sides, and 2 women had cancer of the breast and other organs. The treatments, these women were receiving, were endocrine therapy (40), hormone therapy (7), radiotherapy (1), and a combination of anticancer therapies (9), while for 4 women, no treatment data was

obtained.

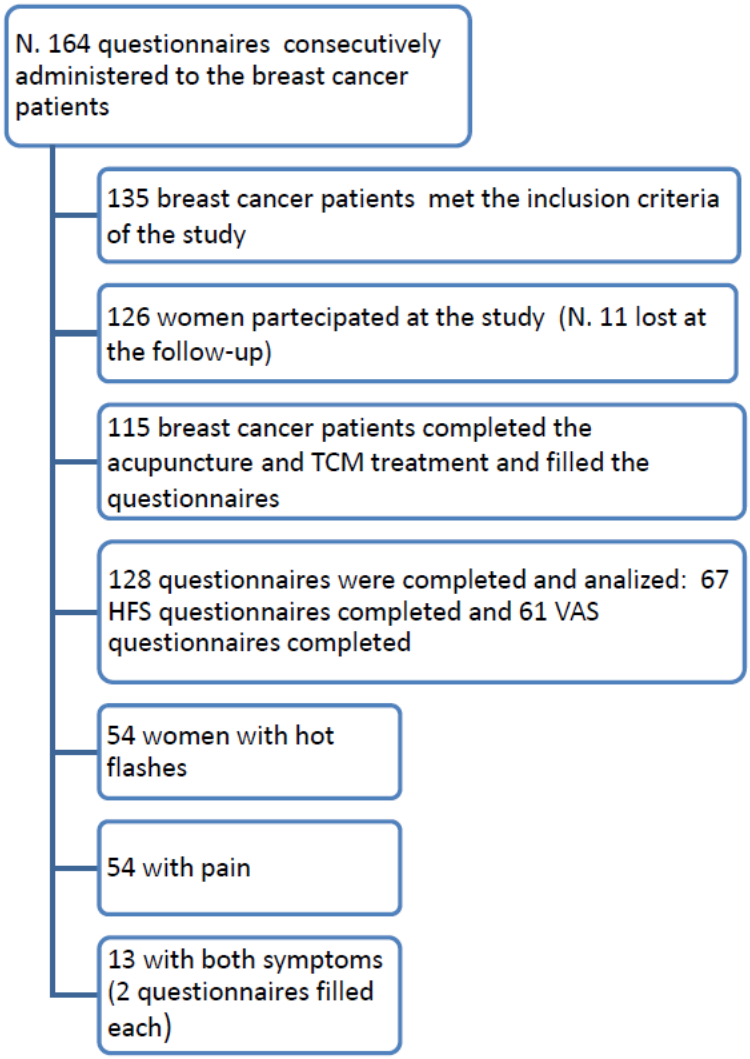

Figure 1 Schematic diagram of the method applied.

5.2 Hot Flashes Treatment

Table 1 lists the mean pre-treatment and post-treatment daily frequency and intensity of hot flashes in the 67 patients who underwent the specific acupuncture protocol. Intriguingly, the average number of daily hot flashes was observed to have reduced from 14.2 (pre-treatment) to 7.52 (post-treatment) ($p < 0.001$).

Table 1 Frequency and intensity of mean daily hot flashes.

Hot flashes	*Mild*	*Moderate*	*Severe*	*Very severe*	*Total*
Pre-treatment	3.1	5.7	4.4	1.0	14.2
Post-treatment	2.5	3.2	1.7	0.2	7.5

Table 2 lists the main outcomes related to acupuncture and plum blossom treatments. It was noteworthy that 64.2% of the patients suffering from hot flashes felt significantly better after the completion of treatment.

Table 2 Acupuncture and plum blossom treatment-related outcomes for the patients suffering from hot flashes.

Acupuncture and plum blossom treatment-related outcomes	**No. of patients**	**%**
1–Remission of Symptoms	2	3.0
2–Amelioration of Symptoms	41	61.2
3–No changes	13	19.4
4–Worsening of Symptoms	11	16.4
Total	67	100

Figure 2 depicts the mean pre-treatment and post-treatment HFS scores. The mean scores were observed to be reduced from 2.20 (pre-treatment) to 1.76 (post-treatment).

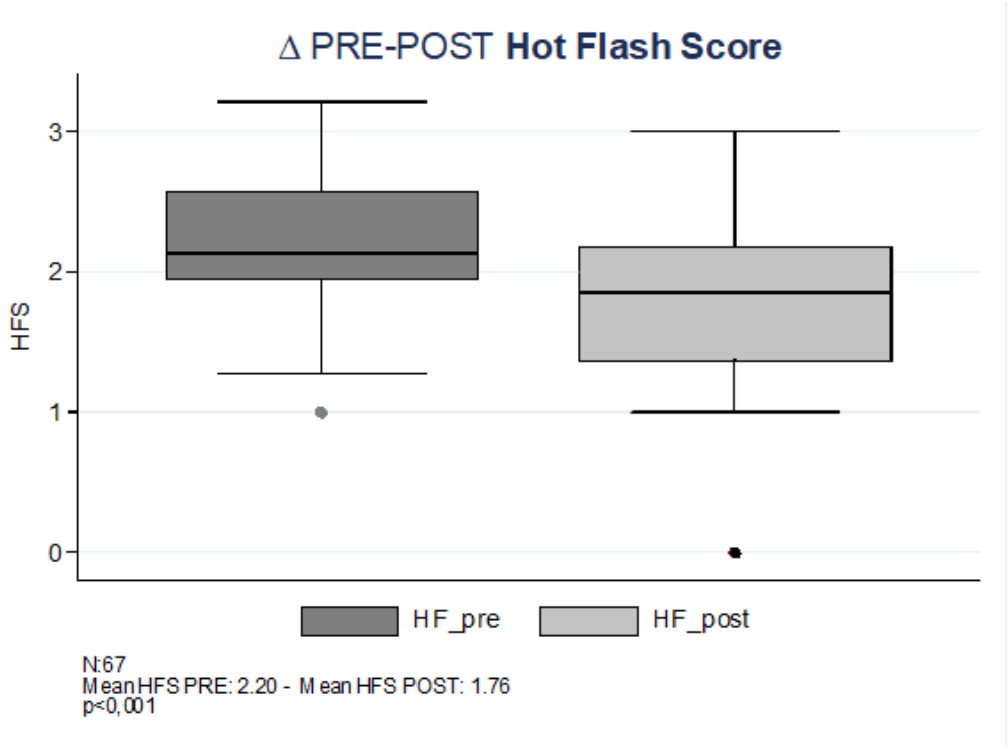

Figure 2 Mean HFS scores at pre- and post-treatment evaluations.

Furthermore, the effects of acupuncture and auriculotherapy treatments on the frequency and intensity of hot flashes, as measured using HFS, were evaluated by comparing the patients who began their endocrine therapy at pre-menopausal age with those who began their therapy when

they were already in menopause. The women whose iatrogenic menopause was induced by the endocrine therapy exhibited slightly higher, although not statistically significant, improvements in comparison to the women who were already in menopause.

5.3 Pain

In regard to the pain treatment protocol, acupuncture was observed to significantly reduce pain, both at rest and during movements. Firstly, the PPI scores suggested that pain at rest was reduced from 2.96 (pre-treatment) to 2.24 (post-treatment) ($p < 0.0001$). Figure 3 presents the distribution of the subjects according to their pre-treatment and post-treatment scores, with the relative *p-values*.

It is noteworthy that a significant improvement in the clinical symptoms was observed, although the shape of the subjects' statistical distribution did not change substantially, as is clearly visible in Table 3.

Table 3 PPI pre- and post-treatment pain at rest evaluation.

PPI at rest–PRE treatment N. patients (%)	**PPI at rest–POST treatment N. patients (%)**				
	Absent	**Mild**	**Moderate**	**Strong**	**Excruciating**
Absent n. 2 (3.3%)	2	0	0	0	0
Mild n.14 (23%)	1	8	5	0	0
Moderate n.31 (50.8%)	7	13	9	2	0
Strong n.12 (19.7%)	0	7	5	0	0
Excruciating n.2 (3.3%)	0	0	2	0	0
TOTAL POST	10 (16.4%)	28 (45.9%)	2 (34.4%)	2 (3.3%)	0

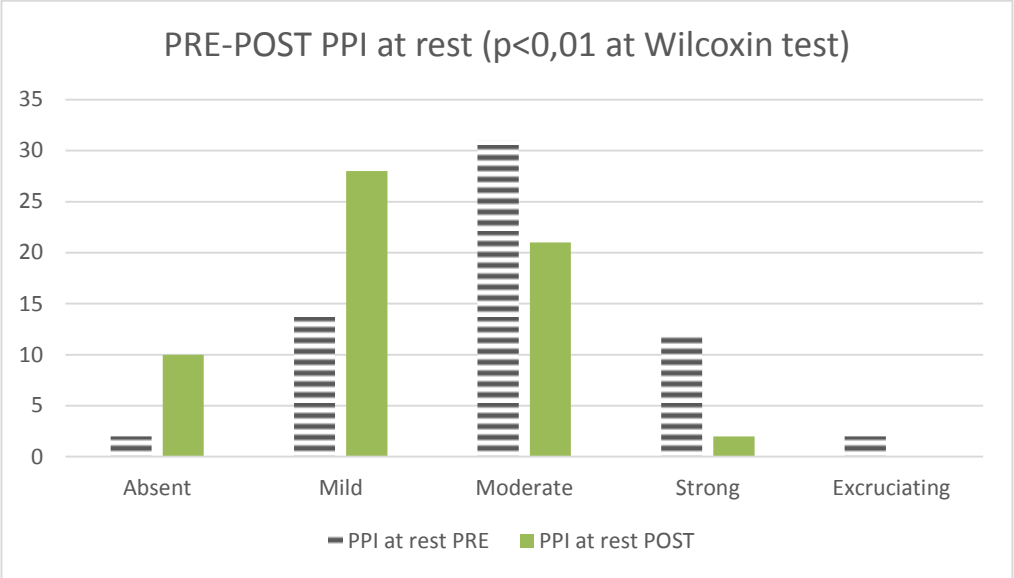

Figure 3 Mean PPI at rest scores (pre- and post-treatment).

In regard to the pain during movements, the analysis of the PPI scores revealed that the pain was reduced significantly during the movements as well, as the scores dropped from 3.52 (pre-treatment) to 2.59 (post-treatment) ($p < 0.0001$).

Pain intensity, measured using the PPI, was observed to have decreased by at least one point in 68.9% of the patients during movements and in 57.4% of the patients at rest. Furthermore, pain intensity was observed to have decreased by at least two points in 26.2% of the patients, both during movements and at rest.

Table 4 Mean PPI during movements: pre- and post-treatment scores.

PPI during movements PRE-treatment. No. of patients (%)	**PPI during movements POST-treatment N. patients (%)**				
	Absent	**Mild**	**Moderate**	**Strong**	**Excruciating**
PPI Absent 2 (3.3%)	2	0	0	0	0
PPI Mild 4 (6.6%)	1	1	2	0	0
PPI Moderate 17 (27.9%)	0	9	8	0	0
PPI Strong 36 (59%)	0	14	16	6	0
PPI Excruciating 2 (3.3%)	0	1	1	0	0
Total 61 (100%)	3 (4.9%)	25 (41%)	27 (44.3%)	6 (9.8%)	0

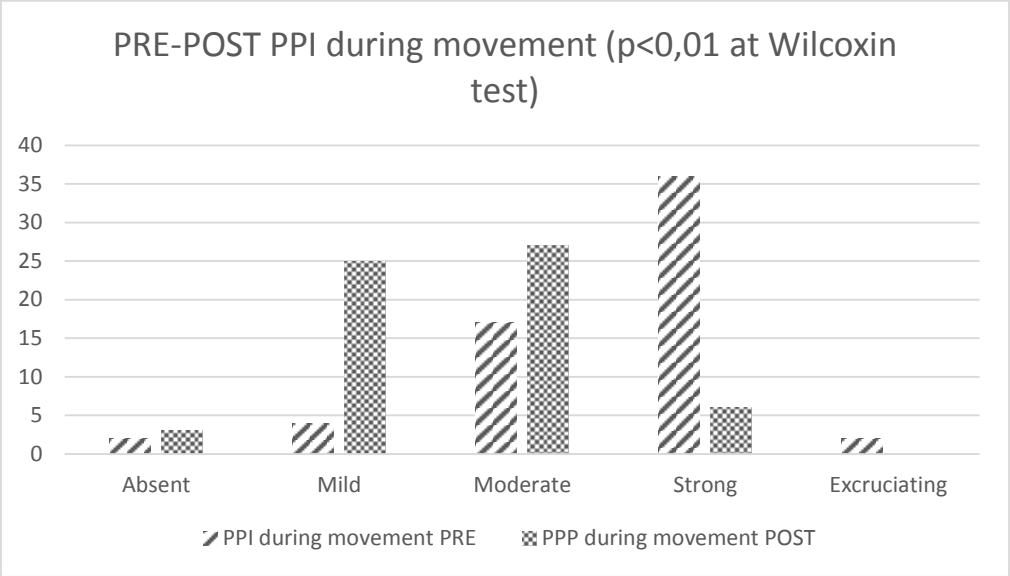

Figure 4 Mean PPI during movement scores (pre- and post-treatment).

As far as the NRS scores are concerned, the mean pain intensity score was observed to have significantly reduced both at rest, from 5.25 (pre-treatment) to 3.40 (post-treatment) ($p < 0.0001$), and during movements, from 6.59 (pre-treatment) to 4.15 (post-treatment) ($p < 0.0001$).

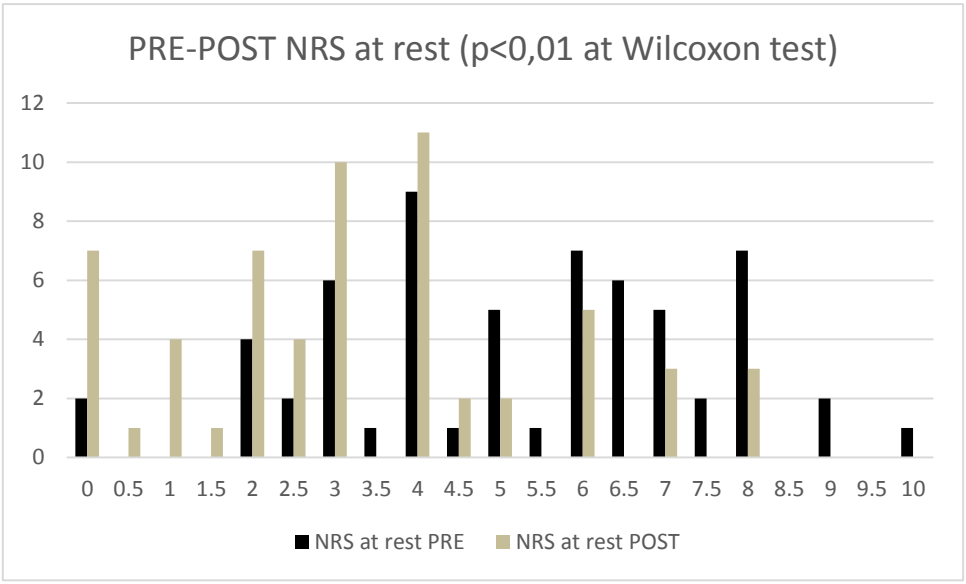

Figure 5 Mean NRS scores for pain at rest (pre- and post-treatment).

The mean value of pain intensity in NRS was observed to have reduced both at rest (from 5.25 to 3.40; $p < 0.0001$) and during movements (from 6.59 to 4.15; $p < 0.0001$).

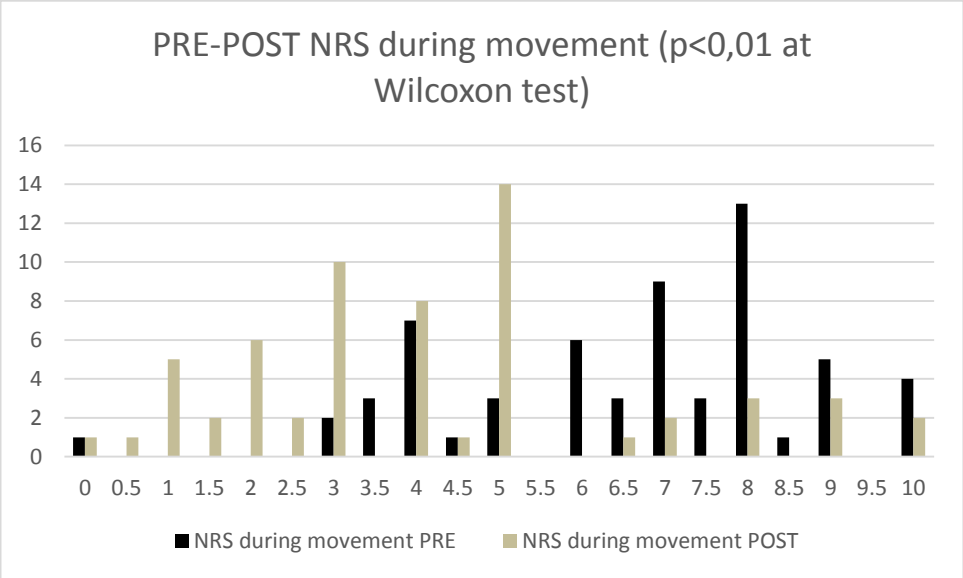

Figure 6 Mean NRS scores for pain during movements (pre- and post-treatment).

The findings of the present study regarding the patient subgroup (N = 13) suffering from both the symptoms did not differ from those obtained for the pain subgroup (PPI at rest: pre-treatment = 3.07, post-treatment = 2.38; NRS at rest: pre-treatment = 5.3, post-treatment = 3,92; PPI during movements: pre-treatment = 3.38, post-treatment = 2.53; NRS during movements: pre-treatment = 6.84, post-treatment = 5.7) or from those obtained for the hot flashes subgroup (hot flashes occurrence: pre-treatment = 12.84, post-treatment = 6.84; mean score: pre-treatment = 3.20, post-treatment = 1.70).

Finally, the patients were divided into two groups according to their age, one with patients aged <59 years and the other with patients aged >59 years (because 59 was both the mean age and the median age of the patients). There were no statistically significant differences between the two groups in the efficacy of the treatment of pain when measured using either PPI or NSR. There was only a tendency for better results observed in the "at rest" evaluations in the group of patients aged <59 years, and a tendency for greater improvement observed in the "during movements" evaluation in the patients aged >59 years. However, both of these observations were not statistically significant.

6. Adverse Effects

No relevant adverse effects were reported. The only adverse effects recorded during the whole study period were sporadic episodes of little pain and bruising at the points of needle insertion, which did not result in any serious consequences. Such features confirmed what had been previously reported in the literature.

7. Bias

First of all, the present study was a single-arm, retrospective, and observational study, conducted without using a control group. A limitation of the present study was the absence of a long-term follow-up, which did not allow comprehending the duration of the treatment-related benefits.

Another bias of the present study could be the sampling method used in the study.

8. Discussion

The present study was aimed at confirming the effectiveness of acupuncture, plum blossom, and auriculotherapy in reducing hot flashes and the intensity and frequency of pain in women with breast cancer, as already suggested by several observational and RCT studies available in the literature. The vast majority of patients were not specifically interested in TCM, nor did they specifically opt for it. However, since they were all referred to the Center by the medical oncologists of their Breast Units, they were highly representative of the clinical population of breast cancer patients.

The collected data exhibited a significant decrease in the frequency of hot flashes intensity, as measured by the HFS, as well as a decrease in the pain intensity, as represented by the mean NRS and PPI scores, both at rest and during movements. In regard to the vasomotor symptoms, the present study registered a significant difference in the HFS scores, together with a reduction in the number of daily hot flashes (greater than 47% after treatment completion). The treatment also led to significant improvements in the pain at rest and during movements, with the pain intensity decreasing by a factor of greater than 35% in terms of the NRS scores, both at rest and during movements. In addition, the adverse effects recorded during the study period were not relevant, confirming the findings of the previous studies available in the literature.

Although several contradicting findings have been reported in the literature, there has been increasing evidence regarding the feasibility of acupuncture for the control of hot flashes and pain in this clinical population. As previously stated (*ibidem*), the small sample size and the absence of a proper control group might limit the possibility of generalization of the findings of the present study, especially when performing a comparison with those reported in the RCTs in the literature. Nevertheless, the findings of the present study are promising and stimulate further research. Further studies (especially RCTs) are necessary to better investigate the causal pathways leading to the effectiveness of acupuncture in cancer patients. In particular, large, double-blind RCTs with a long-term follow-up (ranging from 3 to six months according to the reports in the literature) would be required for establishing the durability of the treatment-related benefits.

9. Conclusions

The preliminary findings of the present study, which was an observational study, suggested the effectiveness and safety of acupuncture, as measured through validated questionnaires. The data from the present study, together with the data available from previous research work in this area, warrant future RCTs with larger sample sizes (e.g., acupuncture vs. placebo, or other types of interventions) and with a long-term follow-up, in order to clarify the role of this approach in the management of hot flashes and pain in the clinical population of breast cancer patients.

Competing Interests

No competing interests exist**.**

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Author Contribution

Cortesi EB. and Monechi MV. drafted the manuscript and contributed to analysis and critical interpretation and bibliographic research; Baccetti S. conceived the survey, supervised its distribution among patients and analyzed the results; Cucca B. registered the data of the questionnaires, drafted the tables and co-ordinated the authors; Di Stefano M., Rossi E. and Martella F. participated in the critical revision of the data; Conti T., Traversi A., Terranova F., Barberousse SY., Montelatici R., Sabatini F., Vuono C., Bini C. widely contributed to data collection. All the authors participated in the final revision of the article.

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