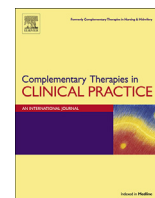




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# The effect of acupressure on pain, anxiety, and the physiological indexes of patients with cancer undergoing bone marrow biopsy



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## ABSTRACT

**Objectives:** This study aimed to determine the effect of acupressure on pain intensity, anxiety, and physiological indexes of patients with cancer undergoing bone marrow biopsy and aspiration.

**Methods:** The study was designed as a randomized, double-blinded, controlled trial.

Ninety samples was selected using the convenience sampling method, then for allocation groups random block sampling was used (30 for each group). The three groups were similar by age and gender. LI4 and HT7 (Shen Men) acupressure points were examined for the intervention. Sham pressure was used in the placebo group while no intervention was applied in the control group.

**Results:** The results showed that the lowest average anxiety score ( $1.5 \pm 0.5$ ;  $P = 0.01$ ) and the lowest average pain score ( $4.9 \pm 0.8$ ) after the intervention were related to the acupressure method ( $P = 0.001$ ).

**Conclusion:** Cost effectiveness and short-term simple education make acupressure method useful in clinical settings for different illnesses.

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## 1. Introduction

Cancer is a global problem that causes 552,200 deaths yearly [1]. In 2015, there were 17.5 million cancer cases worldwide [2]. Patients with cancer undergo painful procedures such as lumbar puncture (LP) or bone marrow biopsy and aspiration (BMBA) during their treatment process, which not only cause pain and anxiety but may also affect the quality of life, treatment duration, or further examinations [3]. Moreover, the side effects may lead to tachycardia or hypertension [4].

Numerous studies have shown that the highest level of pain in patients with cancer undergoing different kinds of intensive diagnostic or evaluation procedures was related to BMBA, lumbar puncture, and insertion of a central venous catheter (CVC) [5,6]. Moderate to unbearable pain was reported by 50%–70% of patients who had undergone BMBA [7]. Prescription of a combination of

analgesics, sublingual fentanyl, benzodiazepine, or nitrous oxide/oxygen are treatment options for reducing pain and anxiety in a patient [8].

However, pharmacotherapy is not very effective [9]. It also has different side effects such as respiratory depression, nausea, and vomiting. The patient's situation needs to be accurately monitored, which is time-consuming for the nursing staff [10]. Bao (2011) explained that local anaesthesia as a standard procedure was effective in relieving the pain due to the needle entering the body but it is not able to relieve the pain due to bone marrow aspiration [7].

Another common problem of patients with cancer before and after painful procedures is anxiety, which can influence the quality of life [7]. Anxiety increases sympathetic responses and changes some vital signs, which may lead to tachycardia and hypertension [11]. Therefore, studying non-medical methods for relieving pain, decreasing anxiety, and controlling vital signs is necessary [12]. The use of complementary and alternative medicine is now emphasized [13].

Acupuncture, acupressure, homeopathy, energy healing, and yoga are among the complementary and alternative therapies/practices used by patients with cancer [14]. Acupressure has been

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getting more attention recently [15]. Simplicity, effectiveness, and safety are the strengths of this method [16]. Appropriate points are pressed using the hand, foot, or a special device in some cases [17]. It is a method which can control pain and anxiety [13].

There are reports that the acupressure method can have rapid and average effects on relieving pain, reducing anxiety, and controlling vital signs, although more studies with accurate findings are needed to support this statement [12]. In a study by Bao and his colleagues. (2011), application of magnetic acupressure to the LI4 point relieved pain significantly in a group of patients suffering from severe pain [7].

One theory suggest that acupressure reduces anxiety by reducing 5-hydroxytryptamine and adrenocorticotrophic hormone concentrations in nerves and adjusting the concentrations of neurotransmitters [13]. Beikmoradi et al. (2015) concluded that acupressure was significantly effective in reducing patients' anxiety after the intervention [13]. Studying the use of acupressure among nurses can help improve the quality of nursing care and reduce the side-effects of the invasive methods [12]. The increasing prevalence rate of cancer and limited number of studies on acupressure led us to conduct a research and explore the effectiveness of acupressure on pain, anxiety, and physiological indexes in patients with cancer undergoing BMBA.

## 2. Trial design

This research was a randomized double-blinded clinical trial in which the patients were not aware about the grouping orders. The acupressure and BMBA operators were blinded to baseline pain and anxiety scores. The questionnaires were seen only by an independent data collector. The proposal is registered in the Iranian Registry of Clinical Trials with the registration number of "IRCT 2016080229159N1".

## 3. Participants

The participants included cancer patients who were undergoing BMBA and who were referred to oncology wards or oncology doctors' offices in the western regions of Mazandaran province. The sample was selected using the convenience sampling method, then for allocation groups random block sampling was used. The three groups were similar by age and gender.

## 4. Sample size

Estimates of variability for the three key outcomes (pain, anxiety, and physiological indexes) were obtained from a pilot study and power calculation ( $\alpha = 0.05$ ;  $(1 - \beta) = 0.90$ ; effect size = 0.84). Therefore, 30 participants were required for each group.

## 5. Inclusion criteria

The inclusion criteria were as follows: a pathology test result confirming the cancer, being fully aware, 18–65 years of age, no intake of anxiolytic and analgesic medications 12 h before the BMBA, no surface limitation like wounds or angiocath at the point of acupressure, platelet levels greater than 100000 mg/dl, new to the whole procedure, no visual impairment, and no previous knowledge about acupressure.

## 6. Interventions

The intervention was performed by a researcher who was a certified acupressure practitioner. Different points have been used in previous studies [18–20] including EX-HN3 (Extral), HT7 (Shen

Men), and LI4 [12].

The researcher selected the LI4 or Hegu point located at the middle of the bisector of the angle between the first and second metacarpal (Fig. 1) and the HT7 point on the lateral wrist located radial towards the tendon of the flexor carpi ulnaris (Fig. 2) by reviewing different studies [21,22] and by soliciting advice from an expert. The LI4 point is located where the energy flow is closer to the skin and thus, is incited by chilling out, pressure or a needle much easier.

The pressure points were pressed for 2 min [23] symmetrically immediately after the start and the end of the biopsy. Fingers were pressed gently on the point and pressure was increased gradually until there was a sensation of soreness. All the patients were placed in the same position and 5 mg of lidocaine was injected locally. The same doctor performed the BMBA for all patients.

For the placebo group, a point at 1.5 cm distance from the main points (LI4 and HT7) was selected. These points are called ineffective or sham pressure points. No intervention was performed in the control group; only routine procedures like blood pressure measurement, pulse, and breathing controls were performed.

Ninety patients participated in this study. Thirty patients were randomized to receive acupressure at LI4, and 30 to receive acupressure at HT7. Another 30 patients were randomized to the sham acupressure group. The remaining 30 patients were randomized to the control group (Fig. 3).

Three patients were excluded from analysis because they did not meet the eligibility criteria for this study. They had platelet counts less than 100,000 mg/dl and an obstacle on the pressure points. One of the patients experienced severe bleeding and severe dyspnoea during the bone marrow aspiration, which caused his exit from the probing process. None of the patients withdrew during the intervention.

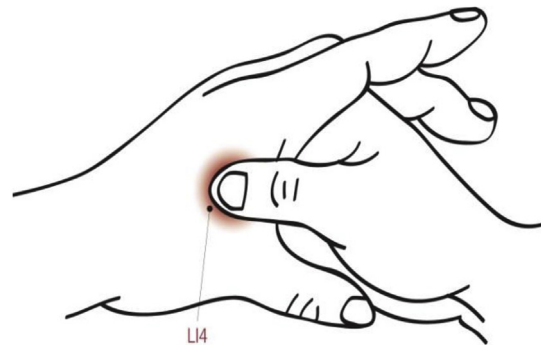


Fig. 1. The LI 4 point is located between the first and second metacarpal bones.<sup>11</sup>

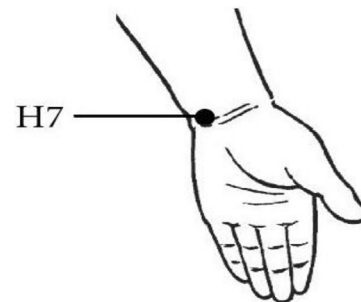


Fig. 2. The Shen Men is located on the transverse crease of the wrist in the articular region between the pisiform bone ulna in the depression on the radial side of the tendon of the flexor carpi ulnaris muscle.

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