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Research Paper

Comparing the effects of acupressure at LI4 and BL32 points on intramuscular injection pain

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Abstract

Introduction: The effectiveness of some acupressure techniques in relieving the acute pain of intramuscular injection pain has been assessed in previous studies. However, the effects of acupressure at LI4 point have still remained unknown. The aim of this study was to compare the effects of acupressure at LI4 and BL32 points on intramuscular injection pain.

Methods: This after-only interventional study was made on 90 women were who referred to the injection unit of the Central Emergency Department, Kashan, Iran, in 2015 for receiving an intramuscular injection of penicillin. The women were randomly allocated to three 30-person groups, namely control, LI4 acupressure, and BL32 acupressure groups. After intramuscular injection of penicillin, the level of intramuscular injection pain of all women was assessed by using a 0–10 visual analog scale. Data were analyzed through doing the Kruskal–Wallis, the Chi-square, and the Fisher's exact tests, and Spearman correlation coefficient.

Results: The means of pain intensity in the control, LI4 acupressure, and BL32 acupressure groups were 2.76 ± 1.75, 2.33 ± 1.80, and 1.76 ± 2.45, respectively. In other words, the mean pain intensity in the control group was significantly higher than the LI4 and BL32 acupressure groups by 0.43 and 1.0 points, respectively ($p = 0.011$). Except for educational status, intramuscular injection pain was not significantly correlated with the participants' other demographic characteristics as well as injection time.

Conclusion: Acupressure can significantly relieve intramuscular injection pain. This simple, cost-effective, and easily applicable therapy can be used in all healthcare settings for relieving intramuscular injection pain.

Keywords: Intramuscular injection; Pain; Acupressure; LI4 point; BL32 point

1. Introduction

Intramuscular injection (IMI) is among the most common routes for delivering medications to the body. The World Health Organization estimated that 16 billion injections are administered annually throughout the world [1], among them about twelve billion are IMIs [2]. About 96% of IMIs are performed to administer antibiotics, vitamins, and analgesics [3]. The number of annual IMIs has been reported to be 0.9–8.5 per person [4].

IMI is a painful procedure the pain of which can cause patients intense fear and disrupt the process of treatment. Farhadi and Esmailzadeh used a visual analog scale (VAS) and found that the pain intensity of the IMI of penicillin benzathin was as high as 7.4–10, denoting that the IMI of this medication is extremely painful [5]. Thus, physicians and nurses have developed different strategies to alleviate IMI pain [6], including cold compress [7], massage [8], and acupressure [3,9].

Abbreviations: IMI, intramuscular injection; VAS, visual analog scale.

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Acupressure is the application of pressure to specific areas of the body for therapeutic purposes including for the relief of pain [3]. Although acupressure points are the same as acupuncture points (acupoints), needle insertion is not used in acupressure [10]. Thus, acupressure is less likely to have any of the potential complications which have been associated with acupuncture such as fainting, infection, bleeding, and hepatitis [11]. Acupressure can be used alone or in combination with other therapies for managing illnesses without causing any kind of complications [12]. The exact mechanism of acupressure is unknown [13]. Some scholars reported that it may redress the balance in a vital force or energy called *qi* in the body [14].

There are different acupoints throughout the body, the stimulation of which can relieve pain and anxiety [13,14]. The results of previous studies showed that acupressure at BL31 (shàngliáo) and BL32 (cìliáo) can relieve IMI pain [3,9]. However, both these points are located in the sacral area and locating and pressing it may cause feeling of shame for patients. Thus, using more easily accessible acupoints may improve patients' acceptance of acupressure.

Another acupoint is LI4 or Hégu which is the most important acupoint for pain relief [15,16]. The point is located on the dorsum of the hand on the most prominent spot of the adductor muscle of the thumb when this finger is brought close to the index finger [15,17]. This point can be easily stimulated by gentle pressure, needle, or cold compress [15]. Different studies showed that the stimulation of this point can alleviate different types of bodily pain, including labor pain [15,18], toothache [19], and pain caused by removal of chest drain tube [20]. However, no study has yet investigated the effectiveness of pressing the LI4 and the BL32 points on IMI pain. The results of our unpublished pilot study revealed that stimulation of the LI4 point can relieve IMI pain. Two questions raised here are, "Is acupressure at LI4 effective in relieving IMI pain?" and "Is there any difference between the pain-relieving effects of acupressure at LI4 and BL32?" The present study sought to answer these questions. The aim of the study was to compare the effects of acupressure at LI4 and BL32 points on IMI pain.

2. Methods

2.1. Study design and participants

This after-only interventional study was made on women who referred to the outpatient injection unit of the Central Emergency Department (CED), Kashan, Iran, in 2015 for receiving an IMI of penicillin. The CED is a medical emergency department in the central part of the Kashan city. This department has two injection units that perform intramuscular and intravenous injections, one for outpatient males and the other for female clients. This department and all its units are active 24 h a day, seven days a week. The eligibility criteria were an age of 18–60, no experience of recent trauma or road accident, full consciousness at the time of acupressure and injection, no history of acute myocardial infarction or mental illness, and no skin lesion, edema, or fracture at the injection site or acupoints.

The sample size was determined based on the results of a previous study which reported that the means of pain intensity in a BL31 acupressure and a control group were 3.0 ± 2.0 and 5.0 ± 2.0, respectively [3]. Accordingly, with an alpha of 0.01 and a power of 0.80, the necessary sample for each group of the present study was determined to be 24 women. In order to improve the credibility of the findings, we recruited 30 women to each group – 90 in total. Sample size was calculated by using the following formula, $n = ((z_{1-\alpha/2} + z_{1-\beta/2})^2 \times (\alpha_1^2 + \alpha_2^2))/(\mu_1 - \mu_2)^2$.

2.2. The group allocation method

After calculating the sample size and before sampling, a random sampling plan was generated by using the SPSS software. Accordingly, numbers 1–90 were entered into the software and then, the 'random numbers' command from the 'compute' menu as well as the 'function group box' command from the 'transform' menu were used to allocate 90 hypothetical samples to three groups. After that, a coin was tossed to allocate these three groups to the three interventions of the study. Thereafter, the first author used the generated list of the numbers and groups to randomly allocate each eligible woman to either the LI4 acupressure, the BL32 acupressure, or the control groups.

2.3. Data collection instruments

The data collection instrument was a datasheet in which the results of measuring the participants' weight, age, literacy level, and IMI time were documented. Besides, a VAS was used for pain assessment. The scale consisted of a horizontal line which had been divided into points from 0 to 10. The point 0 and 10 stood for no pain and the severest pain perceived by the respondent, respectively.

2.4. The procedure

We identified and recruited women at the study center who were going to receive penicillin G procaine 800,000 IU (Pen®, made by *Jaber ibn Hayyan* Pharmaceutical *Company*, Tehran, *Iran*) through an IMI. All injections were performed by the same female nurse into the upper exterior quarter of the dorsogluteal muscle based on the World Health Organization recommended technique for IMIs. For each injection, the skin of the area was initially disinfected by using an alcohol prep pad. Then, the skin was pulled to one side, the needle was inserted, and the suspension of penicillin was injected at a rate of one milliliter per two second. The volume of penicillin suspension was three milliliters. Disposable five-milliliter syringe with a 22 gauge needle was used for all patients.

Study intervention was implemented by a therapist (the first author) who had already received the necessary training about acupressure at LI4 and BL32 from an acupressure specialist (i.e. a medical doctor who passed special courses on traditional Chinese medicine and acupressure at the Traditional Medicine University of Armenia and China and is officially licensed for