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THE EFFECT OF HEGU POINTICE MASSAGE ON PAIN RELIEF: A REVIEW ARTICLE

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Abstract

Background and Objective: Due to the major side effects of analgesic drugs, a non-pharmaceutical approach in pain management (which can reduce the need for analgesic drugs) has been attended. Traditional and complementary treatments are effective method in pain management. The Hegu is the most important relief pain point in human body, and its stimulation can be used in the whole body painful conditions. The present research aimed to review the evidence in the field of ice massage on the Hegu point and its effects.

Method: In order to asses documents about the effects of Hegu point ice massage, 14 database in English and Persian language from constitution to June 17, 2015 were investigated.

Results: After searching scientific databases, 192 articles were found. Of this number, 82, 24, and 15 articles were ruled out after filtering titles, reading abstracts, and reading the entire article body, respectively. A total of 60 joint articles were also excluded. In sum, 12 articles met the inclusion criteria for this survey. In the case of one article, only the abstract was read due to unavailability of the full article text.

Conclusion: Considering the numerous advantages of Hegu point ice massage, including its safety and cost-effectiveness, lack of need for special equipment, easy of teaching, easy of application, lack of side effects, and lack of interference with medical treatments, application of this method would be quite useful in pain management.

Keywords: Hegu, Hugo, Huko, LI4, ice massage, cryotherapy

Introduction: Pain is defined as an unpleasant feeling and an emotion experience that is accompanied by potential or actual damages to tissues [1]. Pain can be the result of surgery, trauma, and illness, or a side effect of routine

healthcare services in hospital wards. Inappropriate pain management is a major problem throughout the world [2]. In spite of the recent advancements of pain control interventions, the pain treatments administered for many patients under surgery or with internal diseases are not satisfactory [3]. Research has indicated that 45 to 82% of patients in intensive care units experience different degrees of pain. More than 60% of patients also report post-discharge pains. Research has also revealed that improper pain management costs about 635 US billion dollars, which makes up about 25% of the total medical care costs of the United States. According to the health care organization, that established evidence-based pain management, pain management reduces the cost of each hospitalization by 1500 dollars on average [2].

Untreated pain affects most body systems and may lead to progression of the complications and a prolonged hospitalization and growth of re-hospitalization risks [2]. There are various pharmaceutical and non-pharmaceutical methods for treatment of pain [4], and in spite of availability of new medicine, side effects of narcotics and non-narcotics are still significant [5]. For instance, administration of non-steroid anti-inflammatory drugs for patients undergoing open heart surgery is dangerous due to the related cardiovascular risks [6]. The most common side effects of narcotic sedatives include constipation, nausea, vomiting, itching, and drowsiness. The latter side effect can be problematic in people prone to decreased level of consciousness such as patients in the postoperative phase. Extreme drowsiness can lead to the outbreak of lethal respiratory depression (hypoventilation). Another major side effect of prescribed narcotics is postoperative ileus [6]. Due to the main side effects of analgesic drugs, a non-pharmaceutical approach to pain management (which can reduce the need for analgesics) is given attention [7]. Traditional and complementary treatments are effective for pain treatment [8], and often a combination of analgesics is required for reducing pain effectively [4]. Pain management is consist of all methods for preventing and reducing pain. These measures include pharmaceutical and non-pharmaceutical methods. Sedatives have numerous physical and mental side effects for patients. Sedatives not only lead to addiction and drug dependence, but also result in low blood pressure, weakness of vital sign, drowsiness, nausea, vomiting, and even shock, and impose heavy expenses on the medical treatment system. Non-pharmaceutical interventions are attended by nurses and patients due to their simplicity, effectiveness, and low risk and their lack of dependence on expensive equipment and particular administration time. Moreover, side effects of medicines do not manifest with prescribing non-pharmaceutical analgesics [9]. Non-pharmaceutical sedatives have been attended extremely today. Relaxation methods, music therapy, and massage therapy, and heating/cooling are examples of these methods [10].

Cryotherapy has been used as an effective, low-cost and simple treatment for pain caused by acute sportsinjuries for consecutive decades [11].Cryotherapy involves several specialized techniques for using cold to reduce temperature, metabolism, inflammation, and eventually pain [12]. Cryotherapy reduces pain through excretion of endorphin, inhibit diffusion of harmful materials, inhibit descending of pain in central nervous system, reducing receptor sensitivity, and the gate control theory [11, 12]. In addition, this method increases pain threshold and reduces the sensory and motor nerves conduction velocity [11, 13]. Cold signals are transferred to the spinal cord through A-Delta fibers instead of C fibers. Impulses transmitted through thick fibers (A-Delta fibers), close the pain gate and thus decrease pain. When thick fibers' impulses are stimulated synthetically by ice, the gate closes further (i.e. the gate control theory of pain) [14].

Sensory stimulation is used to treat acute and chronic pains worldwide [15]. Acupressure is also based on sensory stimulation and focuses on adjusting internal body energies without the use of herbal or chemical products. Thousands of years ago Chinese scientists discovered a body system, which health and illness (life and death) of humans depends on it. In other words, the life of humans and other living beings depends on certain energies flowing in the body [16]. The Qi energy is described as the vital energy. Qi originates from three different sources: air (air Qi), food (cereal Qi), and inheritance (original Qi). It is believed that the Qi energy flows through the body from deep organs toward the skin surface. This flow travels through pathways called the meridians. The Qi flow manifests through interaction of complementary and contradictory forces which are known as Yin and Yang in traditional Chinese medicine [17].

It is also believed that Yang is associated with activity, power, daylight, and masculinity, whereas Yin is related to peace, flexibility, to be receptive, rain, and femininity. In a health condition, there is a balance between Yin and Yang, while Qi flows harmonically throughout the body. However, poor health conditions are the result of excessiveness, shortage, or inhibition of the Qi energy and the lack of Yin-Yang balance. For example, it is believed that pain is the product of the Qi flow inhibition [17]. Treatment was done by establishment of a balance between these energies through the use of needles and application of pressure to certain parts of fingertips or nails [16]. Certain points and pathways were gradually discovered in the body, which are related to all of the other main body systems (such as the nervous and blood circulation systems) as a collection and significantly affect the function and regulation of activities of body organs. Hence, using one or several points of this collection (which are mostly located on the skin surface) can influence and adjust internal and deep body systems. A total of 1400 points have been

discovered so far for this type of treatment. In the beginning the existence of this system was only a hypothesis and theory, but it is not approved by science [16]. The aforementioned points have been studied using acupuncture by different method of acupuncture and various pattern needles, application of electrical stimulation, laser, heat, and vibration [18]. The Hegu (Huko) point is an acupuncture point associated with the large intestine energy channel, which is called Large Intensive 4 (LI4) and is located on the web between the index finger and the thumb [18]. The Hegu point is the most important pain-relieving of the body and it's stimulation is used in all painful conditions [19]. This point is also used for the treatment of acute and chronic pains in the upper limbs [16]. There are several theories of the pain-relieving mechanism of the Hegu point, some of which include the gate control theory of pain, secretion of endorphin and enkephalin [20], increased secretion of beta-Endorphin, dynorphin, and met-Enkephalin [21]. Numerous studies have been carried out on the analgesic effect of the Hegu point by stimulation methods such as acupuncture, Transcutaneous Electrical Nerve Stimulation (TENS), ice massage, capsicum plaster, acupressure [17, 22-25]. Ice massage has similar analgesic effect to TENS and acupuncture in relieving toothache [26]. In a study aimed to examining the comparative effects of cryotherapy and TENS on backache, the analgesic effect of the two methods were found to be equal, but cryotherapy decrease pain sooner [27]. In another research aimed to examine the effects of cryotherapy and TENS on pressure local pain, the pain threshold in the cryotherapy group increased more than the other group [12]. Results of another investigation also revealed that the induced pain perception at the anterior portion of the knee was lower in the cryotherapy group as compared to the acupuncture group [28]. In another research, the analgesic effect of ice massage was larger than pressure on Hegu point [29]. Finally, in an research, which aimed at examining the effect of magnetic pressure application on Hegu point in decline pain caused by bone marrow aspiration biopsy in cancerous patients, significant difference didn't show in average pain but the number of patients with severe pain decreased [23]. The objective of the present research was to study evidence of the Hegu point ice massage effects to provide a basis for clinical judgments in professional members of healthcare teams and using evidence-based information.

Research Method

To review studies on the analgesic effects of Hegu point ice massage scientific searches were conducted in the following databases from the beginning of their foundation to June 17, 2015: ProQuest, Scopus, ScienceDirect, Cochrane, Ovid, PubMed, CINAHL, and Medline (English databases); and IranMedex, SID, IRANDOC, Magiran,

Medlib, and Noormag (Persian databases). The following keywords were also utilized for searching the aforementioned electronic sources:

- Hegu and (ice massage or cryotherapy)
- Hoku and (ice massage or cryotherapy)
- Hugo and (ice massage or cryotherapy)
- LI4 and (ice massage or cryotherapy)

The list of all articles resulted from the electronic search was also manually searched to find related articles. The researchers investigated all of their files and consulted their colleagues with knowledge of this topic to find more other studies outside of indexed literature. Inclusion criteria include original clinical reports in Persian and English language, which had examined the pain-relieving effects of Hegu point ice massage. To select the articles (Diagram 1), first the title and abstract of articles were filtered with respect to research objectives, and articles which were found to be clearly irrelevant were ruled out. Finally, the full texts of articles potentially have the inclusion criteria were studied. When the information of the titles or abstracts was inadequate or vague, the full article texts were studied. Articles were searched using two separate reviewer and all articles were studied by two researchers. Any discrepancy between the two reviewers was resolved through negotiation, mediation, and consensus.

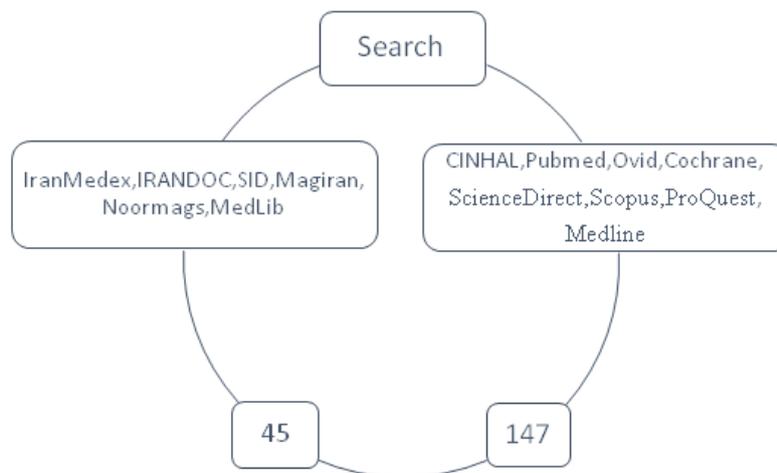


Figure 1.

Research Results

After searching the databases, 192 articles were found, 82, 24, and 15 articles were ruled out through title filtering, reading abstracts and reading articles full text, respectively. Finally, a total of 60 common articles were excluded. Four articles were found through manual searches in the list of references from electronic searches, but only one of

the four (reference no. 37) had the inclusion criteria for this research. Of the remaining 12 articles, one article was only studied based on its abstract due to unavailability of its full text [30] Figure 1.

In this research, was tried to assess the previous studies by considering different aspects of pain relief by Hegu point ice massage.

A) Hegu Point ice Massage and the effect on intensity of labor pain

The findings from the review studies about the effect of Hegu point ice massage on pain intensity are presented in the following.

Enjezab et al, (2007) conducted a clinical trial on 62 singleton pregnant women to examine the effect of Hegu point ice massage on the reduction of labor pain. The average pregnancy age was 39.33 ± 1.21 , and the samples were selected using the convenience non-random sampling method. Mothers were divided randomly into the 30-member experiment and control groups. In the experiment group, Hegu point ice massage was carried out on an area on the mothers' palms between their index fingers and thumbs as hegu point for 30 minute during each uterine contraction, which would stop at the end of each contraction. In the control group, the area was touched without pressure for 30 minutes in beginning of each uterine contraction. Pain was measured by VAS-pain (Visual Analogue Scale for Pain) before and following the intervention. In the experiment group, 0.71 unit decrease was observed in pain, while, 2.10 unit growth was observed in the control group ($p < 0.001$). Dilatation and effacement increased significantly in both groups ($p < 0.001$), but the difference between the two groups in terms of dilatation ($p = 0.387$) and effacement ($p = 0.393$) was insignificant [31] Supplementary table 1.

Kamali et al,(2014) conducted a clinical trial on 60 primigravid with singleton pregnancy, who aged 20 to 35 years, to study the effect of Hegu point massage on intensity of labor pain. The samples were randomly divided into the 30-member experiment and control groups. The mean age of the experiment and control group participants was 24.75 and 24.94 years, respectively. In the experiment group, Hegu point ice massage was carried out on the inner side of the palm on an area between the thumb and index finger for 60 minutes (30 minutes for right hand and 30 minutes for left hand) with application of mild pressure in each uterine contraction. The control group also only received routine care. Intensity of pain was measured by VAS-pain scale before and after intervention in each hand. There was no significant difference between the pre-intervention mean intensity of pain in the experiment (6.21 ± 1.08) and control (5.98 ± 1.68) groups. In the experiment group, the mean intensity of pain after the right and left hand massages was 4.5 ± 1.23 units and 3.09 ± 1.78 units, respectively. In control group, the mean intensity of pain was 6.78 ± 0.66 units

after 60 minutes. Following the intervention, intensity of pain in the experiment group decreased significantly as compared to the control group ($p < 0.0001$). Results of that research also indicated that the left hand massage is more effective than the right hand massage in reducing pain ($p < 0.001$) [32]Supplementary table 1.

Waters and Raisler, (2003) carried out a clinical trial to examine the decrease in labor pain following Hegu point ice massage. The participants included 49 women, who aged between 16 and 38 years. The sample size had not been previously determined, and sampling was aimed to achieve the maximum number of samples within one year. Hegu point ice massage was performed on the palm between the index finger and the thumb for 20 minutes during 3 to 4 uterine contractions. Level of pain was measured with VAS-pain, before, during, and 40 minutes (or less) after the right and left hands massage. McGillPain Questionnaire was employed 24 hours following the labors to measure the participants' memory of pain before and during the ice massage. The pre-intervention pain level was 61.53. Results revealed a decrease in post-massage pain. The mean level of pain following the right and left hand massages was 49.60 mm and 33.31 mm, respectively. Twenty four hours after the labor, a significant difference was observed between the pain score before and during massages. As a result, the mean score of pain from McGill's Pain Questionnaire was 3.27 and 2.22 before and after the massage, respectively. Twenty four hours after labor, verbal expression of pain shifted from "irritating" (score 3) prior to the massage to "unpleasant" (score 2) following the massage [33]Supplementary table 1.

In a clinical trial, **Kaviani et al**, (2011) investigated the effect ofhegu point acupressure and ice massage on intensity of pain, anxiety level, and duration of labor in 165 pregnant women, who were selected by convenience sampling method. The participants were randomly divided into three 55-member groups by draw. In acupressure group, during uterine contractions in 3-4 cm dilatation, a pressure equal to 3 kg was applied by the thumb on Hegu point in palm, somewhere between their right index finger and thumb. Meanwhile, a pressure equal to 3.5 kg was also applied by the researcher on Hegu point in palm, somewhere between their left index finger and thumb. In the Hegu point ice massage group, the right and left hands of parturient were massaged with ice each for half an hour. In the control group, the Hegu points on the right and left hands of participants were only touched. To measure anxiety levels in the three groups, Spielberger's situational anxiety test was carried out before and one hour after the intervention. Pain was also measured by VAS-pain scale. The mean anxiety level in the acupressure and ice massage groups subsided significantly following the intervention, but an increase in mean level of anxiety was displayed in control group ($p \leq 0.001$). The mean intensity of labor pain before and immediately after intervention decreased in the acupressure and

ice massage groups but it increased in the control group ($p \leq 0.001$). The decrease in pain was higher in the ice massage group. The pre-intervention mean intensity of pain was 7.51 (SD=1.32) and 7.04 (SD=7.04) in the acupressure and ice massage groups, respectively. However, the pre-intervention mean intensity of pain in the control group was 7.31 with a standard deviation of 1.31. Immediately after intervention, the mean level of pain in the acupressure, ice massage, and control groups was 4.62 (SD=1.37), 2.93 (SD=1.05), and 7.64 (SD=2.21), respectively. The mean durations of the first and second stages of labor were statistically significant in all groups ($p \leq 0.001$). Durations of the first and second stages of labor in the acupressure and ice massage groups were shorter than the control group, while the ice massage group experienced more decrease in duration of these stages [29]Supplementary table 1.

In a single-blind clinical trial, **Safdari et al**, (2009) studied the effect of Hegu point ice massage on intensity of labor pain in primigravid women. The convenience sampling method was used for sampling, and mothers were randomly divided into two 30-member groups. The average age of mothers in the experiment and control groups was 22.3 ± 2.7 years and 22.9 ± 2.8 years, respectively. In the experiment group, ice massage was applied for 20 minutes on Hegu point in palm of participants somewhere between the thumb and index finger. Prior to the intervention, the level of pain was measured with VAS-pain. Hegu point massaging was carried out in 4, 6, 8, and 10-cm dilatations of the cervix. Hence, in the aforementioned dilatations, massages were performed within 3 to 4 contractions for 20 minutes and stopped at the end of contractions. In the control group, the Hegu point was only touched with a sand bag with a weight equal to an ice bag through the same procedure. Intensities of post-intervention pain in each of the mentioned dilatations were measured in both groups and were compared. Following the intervention, intensity of pain in the experiment group (6.67 ± 0.67) subsided significantly as compared to the control group (7.93 ± 0.62) ($p < 0.001$). Results also revealed that the first active phase of labor was shorter in the experiment group (353.46 ± 67.6 min) than the control group (401.5 ± 96.59 min) ($p < 0.05$). In the 10-cm dilatation, no significant difference was observed between the mean intensities of pain in two groups ($p > 0.05$) [24]Supplementary table 1.

Afzali et al, (2010) studied the effect of Hegu point ice massage on intensity of labor pain in a clinical trial. they selected 60 pregnant women aged between 18 and 40 years using the convenience sampling method and the random allocation technique. The participants were divided into two 30-group members. The Hegu point in this study was on the dorsal side of hands, on the most prominent point of the thumb adductor muscle (when the thumb completely sticks to the index finger). Levels of pre-intervention pain in the experiment and control groups were measured with

VAS-pain and were recorded. In the ice massage group, Hegu point was massaged in the 4-8 cm dilatations and during uterine contractions using an ice marble with a diameter of 2 cm, which was moved in circles by applying mild pressure for 2 minutes. Then massage would be paused for 15 seconds. The massage conducted for 10 minutes totally. In control group, an glass marble was placed on Hegu point similar to the experiment group but without application of any pressure and massage. Labor pain was measured immediately, half an hour and one hour after intervention. In the ice massage group, a significant difference was observed between pain intensity before (7.47), immediately after (5.74), half an hour after (5.9), and one hour (6.77) after the intervention ($p < 0.001$). Even one hour after intervention, the level of pain did not reach the pre-intervention level. In the control group, a significant difference was observed between intensity of pain before (7.47) and immediately after (6.33) intervention ($p < 0.001$). In other words, intensity of pain half an hour after intervention (7.1) was equal to intensity of pain before intervention (7.47), whereas this value one hour after intervention (7.6) was larger than the pre-intervention value. Research results indicated that the maximum effect of ice massage is observed half an hour following the intervention, and to preserve the analgesic effect of ice massage, it should be repeated every half an hour or another method should be employed [34]Supplementary table 1.

In a random clinical trial, **Ozturk Can and Saruhan**, (2015) studied the effect of Hegu point ice massage on intensity of labor and postpartum pain. They studied 150 women with an average age of 23.86 ± 4.38 years, who were randomly divided into three 50-member groups. The study was carried out in the active labor phase and 17.57 ± 6.52 (on average) hours following the labor. In the ice massage group, the Hegu point on the palm somewhere between the index finger and thumb was massaged with an ice balloon for an average duration of 31.04 ± 11.19 minutes within 4 contractions after the 4 cm cervix dilatation. The massage would be stopped at the end of each contraction. Pressure was applied for 30.38 ± 7.72 minutes (on average) on Hegu point in the silicon group by a silicon balloon. The control group also received routine care without prescription of sedatives. The level of pain before and after intervention was measured with VAS-pain in the acupuncture, ice massage and control groups. In the second phase, before discharging mothers of the three groups and after delivering babies to them, the levels of pain were re-measured using McGill's Pain Questionnaire and VAS-pain scale. The ice massage group experienced the lowest level of pain during the active labor phase. In addition, 100%, 98%, and 94% of mothers in the control, silicon, and ice massage groups felt postpartum pain, respectively. Pain scores from McGill's Pain Questionnaire were 38.02 ± 11.55 , 37.97 ± 8.73 , and 35.50 ± 12.58 in the control, silicon, and ice massage groups, respectively. Twenty four hours following labor no

significant difference was observed between pain intensity values obtained with McGill's Pain Questionnaire and VAS-pain scale for the three groups ($p>0.05$). A significant difference was found between results of items 14 and 19 of the McGill's Pain Questionnaire, which questioned miscellaneous dimension and perception of pain ($p<0.05$). In item 14 of McGill Pain Questionnaire, most mothers in the control (34.2%) and ice (52.2%) groups described the pain to be cruel, whereas most mothers in the silicon group (41.9%) described it to be punishing. Description of pain decreased in the silicon group. In item 19 of McGill Pain questionnaire, most mothers in the ice massage (79.4%) and silicon (64.5%) groups described pain to be cool. This description was 44.2% in the control group. Research results indicated that the ice massage group felt more comfortable than other groups following labor. Although there was no significant difference between groups in terms of duration of labor, in the ice massage group labor (4.88 ± 2.47 hours) was shorter than other groups [35]Supplementary table 1.

HajjAmini et al, (2012) compared the effects of ice massage and acupressure on decreasing labor pain. In a quasi-experimental clinical trial, 90 pregnant women with an average age of 27.82 ± 6.20 years were divided into three 30-member groups randomly (ice massage, acupressure, and control groups). In ice massage group, the Hegu point was massaged with ice for 10 minutes (2 minute massages and 15 second break). In the acupressure group, the Hegu point was massage for 10 minutes (2 minute pressure/massages, and 15 second break) with a glass ball. In the control group, a glass ball was placed on the Hegu point without any pressure or massaging. The levels of pain were measured with VAS-pain immediately, half an hour, and one hour after the interventions in the three groups. In the ice massage and acupressure groups, pre-intervention intensity of pain was significantly different than the pain intensity measured immediately and half an hour after intervention ($p<0.001$). In ice massage group, the mean intensity of pain before, immediately, half an hour, and an hour after intervention were 7.47 ± 1.94 , 5.73 ± 1.74 , 5.90 ± 1.84 , and 6.77 ± 1.97 , respectively. In the acupressure group, intensity of pain before, immediately, half an hour, and an hour after intervention was 7.73 ± 1.41 , 6.70 ± 1.44 , 6.87 ± 1.45 , and 7.73 ± 1.50 , respectively. In control group, the difference was significant between pre- and immediately after intervention ($p<0.001$). Moreover, in control group, intensity of pain before, immediately, half an hour, and an hour after intervention was 7.17 ± 1.66 , 6.33 ± 1.72 , 7.10 ± 1.64 , and 7.60 ± 1.56 , respectively. In none of the groups the intensity of pain before intervention showed significant difference than intensity of pain one hour after intervention. In the ice massage group, intensity of pain one hour after intervention was lower than the pre-intervention, whereas in the acupressure group, intensity of pain one hour after intervention was equivalent to the pre-intervention level. In control group, the intensity of pain one

hour after intervention was higher than the pre-intervention level. Therefore, ice massage has a more significant effect on decreasing labor pain. The analgesic effect of ice massage and pressure remain for 30 minutes after intervention, and the end of this period these methods should be repeated [36]Supplementary table 1.

Ysmael et al, (2012) carried out a clinical trial to examine the decrease in labor pain in pregnant women. The samples included thirty 20 to 30-years-old primigravid with cephalic fetuses in active phase of labor. Women with cervix dilatation of more than 8 cm were excluded from samples. Intensity of pain prior Hegu point ice massage and after it was measured by VAS-pain. Ice massage was performed on the Hegu point in left and right hands for 15 minutes during uterine contractions, and intensity of pain was measured after massaging each hand. Intensity of pain before the right hand massage and after the intervention was 70.733 mm and 49.867 mm (with a discrepancy of 18.934), respectively. In addition, intensity of pain before the left hand massage and after it was 72.167 mm and 53.233 mm (with a discrepancy of 20.866), respectively. Research results revealed that ice massage effectively reduces pain in the active labor phase. Results also suggested that pain decreased equally following the right and left hand massage [37]Supplementary table 1.

B) Hegu Point Massage and Its Effect on Toothache Relief

Melzack et al, (1980) investigated the effect of hegu point ice massage on toothache relief. In a clinical trial, 22 men and 18 women aged 18 or higher were randomly selected and divided into the experiment and control groups. The experiment and control groups were each divided into two subcategories. Members of control group no. 1 received massages and were told the area was massaged to prepare for subsequent pain treatments. In other words, the patients were unaware of the possible pain-relieving effect of massages. Members of control group no. 2 received touch massages as well as clear explanations about pain treatment, but they remained unaware of the dry massage. In other words, the patients were not told that they were receiving different massages to experiment group on acupressure points to investigate its pain-relieving effect.

One experiment group, control group no. 1, were as experiment group no. 1, and the other experiment group formed the experiment group no. 2 along with control group no. 2. Afterwards, McGill's pain questionnaire was provided to patients to measure intensity of pain. Prior to treatment, intensities of pain were equal in all groups. In the experiment group, ice cube was wrapped in wet gauzes and were placed gently on the skin around the Hegu point on the side with toothache to massage the area. The patients were asked to report their feelings during the Hegu point massage. Massaging would be stopped after the patients felt numb on the massaged area or after 7 minutes (either one that

occurred sooner). Intensity of pain was re-measured following the massage. The control group also received touch massage without ice on the Hegu point using a piece of wood wrapped in gauze. Duration of massaging in the control group was similar to the ice massage group. In the experiment group no. 1, the present pain intensity (PPI: 57.9%) and the pain rating index (PRI: 59.1%) in the ice massage group decreased. In addition, in the experiment group no. 1, the PPI (23.9%) and PRI (32%) values decreased in the touch massage group.

In the experiment group no. 2, the PPI (79.3%) and PRI (74.5%) values of the ice massage group showed a decline. Also in the experiment group no. 2, the PPI (1.2%) and PRI (20.4%) of the touch massage group decreased. Research results revealed that Hegu point ice massage effectively reduces toothache. According to the pain rating index (PRI), 60 to 90% of patients in the ice massage group reported more than 50% of decrease in pain ($p < 0.05$). The comparison between the two control groups also indicated that clear explanation about touch massage does not cause a considerable post-intervention decrease as compared to touch massage without explanation. No significant statistically difference was also observed between the two control groups [26]

Supplementary Table 2.

C) Hegu Point ice Massage and Its Effect on Intensity of Vein puncture Pain

Rostami et al, (2014) conducted a single-blind randomized clinical trial to examine the effect of Hegu point ice massage on intensity of vein puncture pain in children aged 6 to 12 years. Sampling was carried out using the convenience sampling method, and a total of 86 children with major thalassemia aged between 6 and 12 years were classified into the experiment and control groups using random blocks. The average age of the intervention and control groups was 9.49 ± 2.1 years and 9.88 ± 2.3 years, respectively. Information was collected using the social-demographic information questionnaire and the Face, Legs, Activity, Cry, Consolability scale (FLACC scale). The latter scale was completed in two stages before and during pediatric vein puncture. About 5 minutes before insertion of needle, the Hegu point between the thumb and index finger of the punctured hand was massaged by an ice marble with a diameter of 2 cm, which was wrapped in a single-layer wet gauze and was put in a plastic glove. The massages were performed gently in circles and by application of average pressure. The maximum duration of pressure and massage was one minute and massage would be stopped after 10 seconds. This intervention lasted for 5 minutes. Afterwards, the scores of pain during the first successful vein puncture were observed and recorded by the researcher, who was blind to the group type. No intervention took place in the control group. The two groups were equal in terms of gender, age, and duration of illness. The comparison between intensities of vein puncture pain in the two groups (experiment group: 0.65 ± 0.75 ; control group: 3.81 ± 1.84) showed a significant statistical difference ($p = 0.001$). Research results showed that the Hegu point massage can reduce intensity of pain during vein puncture in children with thalassemia [38]

Supplementary Table 2. In a clinical trial, **Nasiri et al**, (2013) studied the effect of Hegu point ice massage during arteriovenous fistula (AVF) puncture in patients under hemodialysis. A total of 90 hemodialysis patients with AVF were randomly selected and were classified into one experiment and two control groups based on a random table. The experiment group members received Hegu point ice massages. The control group no. 1 received wrist massages,

while the control group no. 2 received Hegu point massages. On the first day of no intervention, the intensity of pain during puncturing the fistula was measured using VAS-pain the three groups. On the second day, 10 minutes following the intervention, intensity of pain was re-measured in the three groups. A statistically significant difference was observed between the levels of pain in the three groups following the intervention ($p=0.001$). Research findings revealed that Hegu point ice massage is an effective pain relief method for reducing the pain of AVF puncture in hemodialysis patients and lacks side effects [30]

Supplementary Table 2.

Supplementary table 1

Summary of Hegu point ice massage studies for reducing labor pain

Reference	Study design	Experiment group	Control group	Key measurement	results
<i>Enjezab B, etal 2007[31]</i>	<i>clinical trial singleton labor phase women. available sample divided into two group randomly</i>	<i>hegu point ice massage throughout uterine contraction, in 30 minute.</i>	<i>hegu point touch, without acupressure throughout uterine contraction, in 30 minute.</i>	<i>VAS-pain</i>	<i>significant reduce labor pain in Experiment group.</i>
<i>Kamali s, etal 2014 [32]</i>	<i>clinical trial In nulliparous, singleton labor phase Women. available sampels divided into two group randomly.</i>	<i>hegu point ice massage,during uterine contraction, in 60 minute (30minute right hand And 30 minute left hand) pain measurement before and afterice massage in each hand.</i>	<i>Routine care</i>	<i>VAS-Pain</i>	<i>Significant reduce labor pain in experiment group. significant reduce in severity of pain afte Left hand massage.</i>

Waters LB, etal 2003[33]	Non-Randomized clinical trial available labor phase women Gestational age between 37-41 weeks.	A one group(49 pregnant women), pre test, post test design was chosen. hegu point ice massage during Uterine contraction, in 20 minute On right and 20 minute on left hand served as post test1. Post test 2 was administered Within 24 hours after delivery for measuring memory of pain Before, during and after ice massage.	Intensity of pain before ice massage served as the control (pre test)	VAS-pain (pre test-post test1) McGill pain questionnaire (post test 2)	significant pain reduction after ice massage. Left hand provided less pain in majority of participant. detectable difference in pain score Before and after ice massage was indicated.
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Supplementary Table1. continued

Reference	Study design	Experiment group	Control group	Key measurement	Results
Kaviani M, etal 2011[29]	clinical trial, In nulliparous, labor phase Women. 165 available sampels divided into three group randomly.	Group 1: hegu point acupressure in cervical dilatation of 3-4 cm in 30 minute in right and left hand (55 sample). Anxiety level was asses. Group2: hegu point ice massage on right and left hand for 30	Touch of hegu point in right and left hand for 30 minute (55 sample). Anxiety level was asses	VAS-pain Spielberge r questionnaire (anxiety measurement)	Significant decrease in pain immediately after intervention in ice and acupressure group and more in ice massage group. Anxiety level and the length of first and second stage of labor were significantly reduced.

		minute. (55 sample) Anxiety level was asses in two group.			
Safdari Df, etal 2009 [24]	Single blind, clinical trial, In nulliparous, labor phase Women. 60 available sampels divided into 2 group randomly (30 sample in each group)	Hegu point Ice massage in right hand in 20 minute, in cervical dilataion 4, 6, 8, 10 cm.	Touch of hegu point for 20 minute.	VAS-pain	Significant decrease in pain severity in ice massage group, in cervical dilatation 4, 6, 8. Active phase of labor was shorter than control group.
Afzali M, etal 2010 [34]	clinical trial, In labor phase Women. 60 available sampels divided into 2 group randomly (30 sample in each group).	Hegu point Ice massage with ice ball in cervical dilataion 4-8 cm in 10 minute. 2 minute massage and 15 second stop.	Ice ball inserted on hegu point without massage and acupressure	VAS-pain Pain measured immediately, half and one hour after intervention in two group.	Significant difference between before and half and one hour after intervention in experiment group. Significant difference between before and immediately after intervention in control group.The most analgesic effect of this method in experiment group is half an hour after intervention.

Supplementary Table1: continued

Reference	Study design	Example group	Control group	Key measurement	results
Can H O, etal 2015 [35]	Randomized control trial in 150 labor phase women, divided into 3 group.(50 samples in each group). Study was done in active phase of labor. And 24 hours after delivery.	Group1: acupressure was applied by silicon balloon on hegu point for about 30 minute. Group2: hegu point ice massage in 30 minute was done	Control group: Routine care	VAS-Pain: active phase of labor and 24 hours after delivery. McGill questionnaire: 24 hours after delivery	The mothers in the ice application group had the lowest mean VAS score. It was determined that ice massage applied to LI4 during the active phase of labor did not lead to any statistical differences in mothers in the first 24 hours postpartum in terms of the characteristics of the pain with MPQ and Vas.In ice massage group mothers felt more comfortable than other group following labor
Hajiamini Z, etal 2012 [36]	<i>clinical trial, in labor phase Women. 90 available sampels divided into three group randomly</i>	Group1: acupressure was applied by glass ball on hegu point for about 10 minute (2 minute massage, 15 second stop). Group 2: hegu point	Glass ball was placed on hegu point without acupressure and massage	VAS-Pain immediately, half and one hour after intervention in three group.	Significant difference in mean pain intensity, before and after intervention in ice massage and acupressure group. Ice massage have more effective in reducing pain during labour. Acupressure and ice massage should be repeated after 30 minute.

		ice massage was done in 10 minute, such as acupressure interval.			
Ysmael FT, etal [37] 2012	Clinical trial in primigravid women in active phase labor.	One group, 30 sample Ice massage on hegu point in right and left hand in 15 minute.	Severity of pain before ice massage was considered as control	VAS-Pain	Significant decrease in labor pain after ice massage. This effect is equal in right and left hand.

Supplementary Table 2

Summary of hegu point ice massage studies for reducing dental and vein puncture pain

References	Study design	Experiment group	Control group	Key measurement	Results
Melzack et al 1980 [39]	Randomized control trial 40 dental pain patient divided in control (1,2)and experiment group (1,2) randomly	Ice massage on hegu point in 7 minute or area numbness occurred. Clear explanation about pain treatment	Dry massage with wooden ball on hegu point Group 1: didn't receive clear explanation Group 2: received clear explanation	McGill pain Questionnaire	significant decreases in pain produced by ice massage compared to tactile massage. No significant statistically difference was observed between the two control groups.
Rostami et al. 2014 [38]	single-blind randomized clinical trial	hegu point ice massage in 5 minute before	No intervention	FLACC scale	Hegu point massage can reduce intensity

	68 available thalassemia children divided into 2 group randomly (33 sample in each group).	vein puncture			of pain during vein puncture in children with thalassemia significantly.
Nasiri et al. 2013 [30]	Randomized control trial 90 hemodialysis patients with AVF were classified into one experiment and two control groups randomly.	Ice massage on hegu point in 10 minute	Control 1: wrist massage in 10 minute Control 2: hegu point massage in 10 minute	VAS-Pain	Hegu point ice massage is an effective pain relief method for reducing the pain of AVF puncture in hemodialysis patients significantly.

Discussion

Different types of Hegu point stimulation are utilized to treat acute and chronic pain [16]. ice massage is a kind of these stimulations, which involves short application of extreme cold and has similar pain-relieving effects to TENS and acupuncture [26]. Studies suggest that the effect of ice massage is more considerable than acupressure and sometimes TENS [26, 29, 39, and 40]. In articles were reviewed, ice massage was applied for 10 to 30 minutes to stimulate the Hegu point on the palm of hand during uterine contractions.

It is noteworthy, the exact site of hegu point is on the dorsal side of hand, between index and thumb finger, on peak point of the thumb adductor muscle (when the thumb completely sticks to the index finger). Due to thin and irritable skin of this place, ice massage was applied on palm side of hand with more thick and resistant skin to cold and friction [33]. In all articles, ice massage reduced pain more effectively than acupressure and placebo administration. The increase in dilatation and effacement and the decrease in the active labor phase were observed in all of the

intervention and placebo groups [24, 29, 31]. Ice massage is not effective for pain relief in 10 cm cervix dilatation, and pain decrease of this method would be maximum to 8 cm dilatation [24].

The comparison between the right and left hand results revealed that Hegu point ice massage on the left hand reduces pain more than the right hand [32, 33]. Only one article examined the effects of ice massage and Hegu point acupressure on decreased anxiety and indicated that ice and pressure were effective in reducing anxiety an hour after intervention but ice massage was more effective [29].

Placement of ice without any pressure and massage on the Hegu point can reduce pain only immediately after intervention, and its effect is even smaller than pressure. Ice massage with average pressure reduces pain up to half an hour following intervention, and at the end of this time the massage should be repeated. The Hegu point acupressure also reduces pain up to half an hour following intervention, but ice massage is more effective. Hence, one hour after intervention, pain did not reach its pre-intervention level in the ice massage group, whereas in the acupressure group, it reached the pre-intervention level and In placebo group, the level of pain was higher one hour following the intervention. Hence, the ice massage group displayed more decrease in pain [34, 36]. Ice massage does not effective to pain relief 24 hours following labor, but mothers in this group felt more comfortable [35].

Hegu point ice massage reduced dental pain by over 50% in 60 to 90% of patients [26]. It also reduced fistula puncture pain in dialysis patients and vein puncture pain in patients with major thalassemia [30, 38].

Conclusion

Considering the numerous advantages of Hegu point ice massage (including its safety and cost-effectiveness, lack of need for special equipment, easy of teaching, easy of application, lack of side effects, and lack of interference with medical treatments), further research should be conducted on this method to use this method for relieving pain based on more evidence. This study was also associated with limitations. Our search was only limited to a few databases, thus we might have lost articles that were not indexed in those databases. Moreover, searches were only carried out in Persian and English languages, which could prevent access to all information about the effects of Hegu point ice massage. In spite of these constraints, this research was conducted as a comprehensive study, because the references were reviewed based on searches in several expansive databases in English and Persian languages.

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