

Using of Trascutaneous Electrical Nerve Stimulation in Acupuncture Points for Reducing Labor Pain

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Article information	Abstract
<p>Article history: Received: 15 Mar 2011 Accepted: 11 June 2011 Available online: 28 Oct 2012 ZJRMS 2013; 15(2): 32-35</p> <p>Keywords: TENS Acupuncture points labor pain</p> <p>*Corresponding author at: Islamic Azad university, Sari Branch E-mail: azareaghamohamady@iausari.ac.ir</p>	<p>Background: Labor pain is an important factor in increasing mother anxiety. The objective of this study was to assess the efficacy of transcutaneous electrical nerve stimulation (TENS) on specific acupuncture points for reducing labor pain in the first stage of labor.</p> <p>Materials and Methods: In this double-blind clinical trial study, 64 nulliparous healthy women who were selected based on inclusion criteria and were in their active phase of labor's first stage, were randomly divided into 2 equal groups; according to their admittance file numbers and by lottery, the odd numbered patients were assigned to the TENS group and the even numbered to the control group. In either groups two electrodes were put on the Hegu points of both hands and two electrodes were put on the Sanyinjiao points of both feet, after cervix was dilated 4 cm. Pain scores (through visual analogue scale) were studied in both groups. Finally, the collected data were analyzed by independent <i>t</i>-test.</p> <p>Results: The pain intensity was significantly decreased in the TENS group compared to the control group ($p=0.001$). Duration of the labor's first stage in the TENS group (180 min) was significantly shorter than control group (238 min) ($p=0.001$). The number of labor induction with oxytocin were 16 in the TENS group (50%) and 25 in the control group (78.1%) ($p=0.019$).</p> <p>Conclusion: Application of TENS on acupuncture points can be used as a non-medicinal and without complication method for mother and fetus to reduce pain in the first stage of labor.</p> <p>Copyright © 2013 Zahedan University of Medical Sciences. All rights reserved.</p>

Introduction

Severe labor pain can cause long term emotional distress in mother and disrupts her mental health [1, 2]. It also causes oxygen deficiency in fetus which subsequently affects fetal heart rate pattern and decreases neonatal Apgar score; they in turn increase obstetric interventions and their complications [3].

Acupressure and acupuncture were used as the non-medicinal methods to reduce labor pain since long time [4]. The cause of acupressure effectiveness on the labor progress is the stimulation of points that increase the release of labor facilitating hormone. This hormone is normally secreted at small amounts and only improves the delivery process, but its increment in the blood can also have analgesic effect [3].

Skelton et al. found in their study that means pain score in women who were treated with acupressure was low [5]. The results of Ramnero et al. study showed that acupressure can be used as a non-pharmacologic treatment for labor pain to strengthen uterine contractions [6].

The application of TENS (transcutaneous electrical nerve stimulation) for reducing labor pain begins from the late 1970s. Since it is a non-medicinal method with any restrictions, it is one of the best labor pains alleviating

ways [1]. Researchers analyzed the results of 19 previous studies that used TENS for labor pain reduction in 1671 pregnant women, and found that application of this method which is done through electrical stimulation of the skin, besides relieving pain during labor, reduces also the labor duration. This method had not any risk for mother and child [7].

Fox et al. used the combination of TENS and acupressure for back pain and found that the combination of TENS and acupressure had better results than either alone [8]. Dunn et al. studied the TENS effect on acupressure points to induce labor in post-term women and found that the use of TENS on acupuncture points in post-term women increased the intensity and duration of uterine contractions and decreased the cesarean rate and the need for oxytocin, but had no effect on pain intensity [9, 10]. Chao et al. reported in the results of their research that application of TENS on acupuncture points only reduced labor pain but did not affect the duration of the first stage of labor [11]. The review of Aleccander et al. in 1990, which was carried out in Britain to determine the effect of TENS on labor pain, showed that there was not strong evidence to prove the effectiveness of TENS for pain relief during labor [12].

Given the contradictory results, researchers decided to combine the acupuncture and TENS methods and evaluate their pain reducing effect on the first stage of labor, through a clinical double-blind trial. Still many doctors and midwives believe that labor pain is a physiological phenomenon and does not require a relief. Therefore many people refuse the use of any intervention with the pain and embrace the harmful effects of labor pain [12]. No specific method is commonly used in Iran Maternities to relieve labor pain, because of specialist shortage, high costs, and fear of analgesics side effects. Therefore, application of methods that do not require specific expertise, do not use specific medication, and do not have side effects for mother and fetus has a particular significance.

Materials and Methods

The present study is a double-blind clinical trial. In this study, 32 samples were selected for each group, with a 95% confidence and 80% statistical power and with designation of 1.2 for difference. Thirty-two persons of the TENS in acupuncture points group and 32 persons of the control group were studied.

Inclusion criteria included all nulliparous healthy women of 20-34 years old, singleton, term (37-41 weeks), in active phase and with 4-5 cm dilatation, without epidural analgesia, vertex presentation, and no previous experience of TENS or acupressure application. Exclusion criteria included the presence of wound and scar or inflammation in the TENS electrodes contact sites, having a pacemaker, any poor pregnancy outcomes, or any chronic disease of the mother. Sixty-nine nulliparous healthy woman who delivered in Razi Hospital of Ghaemshahr from 23 October 2009 until 05 January 2010 were enrolled in the study; 34 people in the TENS group and 35 in the control group. Three of them due to emergency cesarean section, one due to breech presentation and one due to posterior occiput presentation were excluded from the study. Finally, 64 persons (32 in the TENS group and 32 in the control group) were studied.

After explaining the research objectives and taking the consent form from the studied samples, they were randomly divided into two groups. The samples were selected based on inclusion criteria and were randomly enrolled in two groups of 32 people; according to their admittance file numbers and by lottery, the odd numbered patients were assigned to TENS group and the even numbered to control group.

A two-channel portable TENS device that worked with battery and had two pairs of electrodes was used in this study. In both groups, two electrodes were put on the Hugo points of both hands (between thumb and index finger at junction point of the first and second metacarpal bone) and two electrodes were put on the Sanyinjiao points of both feet (4 fingers of the same person above medial malleolus), after cervix was dilated 4 cm.

These four electrodes were lubricated with gel and were fixed by elastic bandage. According to physiotherapy consultant recommendation, the device was set on continuous current, 100 Hz frequency and 250 micrometer wavelength and was alternately turned on and off for 20 minutes [11]. The device was turned on and off by someone else. When turned on it beeped. The voltage was increased for the case individuals but not for the control group. Neither the studied samples who had not previous history and familiarity with TENS, nor the researcher were aware of in which treatment group they were (double-blind).

Mother demographic information and the extent of cervical dilatation were recorded at the time of the intervention. The first stage pain assessment was performed at intervention onset, at dilatation of 6-7 cm, and at dilatation of 9-10 cm by the researcher. Also, the duration of labor's first stage was measured with a digital watch and the need to strengthen the delivery was evaluated in both groups. If the number of contractions per ten minutes was less than 3, induction of the labor contractions with oxytocin was considered. The questionnaires of satisfaction from TENS were filled after 24 hours after delivery. To assess and measure the intensity of pain, the McGill linear scale was explained by the researcher to the mother and then was marked by mothers in both groups. According to Apgar table, the Apgar score at 1 and 5 minute and the weight of the newborn immediately after birth were recorded. Finally, the collected data were analyzed by independent *t*-test, using SPSS-13 software. $p < 0.05$ was considered significant.

Table 1. Demographic status of nulliparous women of two study groups

	Experimental group Mean±SD	Control group Mean±SD	<i>p</i> -Value
Age (year)	28.4±2.19	27.6±2.1	0.157
BMI	26.5±1.3	26.3±1.3	0.319
Gestational age(wk)	39.0±0.9	39.1±0.6	0.429
Cervical dilatation(cm)	4.3±0.4	4.2±0.4	0.273

Table 2. Outcome of pregnancy in nulliparous women referred to Razi Hospital in TENS and control groups

	Experimental group	Control group	<i>p</i> -Value
Pain score at 4 cm dilation	8(1-10)	8(1-10)	1.00
Pain score at 6-7 cm dilation	7.5(3-9)	8.3(4-10)	0.059
Pain score at 10 cm dilation	8.1(3-10)	9.8(3-10)	0.0001
Start of the intervention period (Mean±SD)	180.9±25	238.2±30.7	0.0001
Induction with oxytocin (%)	16(50%)	25(78.1%)	0.019
First minute Apgar score (Range)	8.9(7-9)	8.9(8-9)	0.703
Five-minute Apgar score (Range)	9.9(9-10)	9.9(9-10)	1.00
Birth weight (Mean±SD)	3301±470	3285±353	0.881

Results

No difference was observed in age, BMI, gestational age, and cervical dilatation at the time of study onset in both groups (Table 1). There was no difference in mean pain scores between two groups at intervention onset as well as at dilatation of 6-7 cm, but at dilatation of 9-10 cm the mean pain score was significantly lower in the TENS group compared to the control group. The duration of labor's first stage from the beginning of the active phase in the TENS group was significantly shorter than the control group and the need to induce the labor with oxytocin in the TENS group was significantly smaller than the control group. No differences were seen between 1 and 5 minute Apgar scores and the weight of newborns in both groups (Table 2).

Discussion

In the present study, there was no difference in mean pain scores between two groups at intervention onset as well as at dilatation of 6-7 cm, but at dilatation of 9-10 cm the mean pain score was significantly lower in the TENS group compared to the control group. The study of Chao et al. showed that the use of TENS on acupuncture points during delivery effectively reduces the pain of the first stage of labor. They explained in their studies that the TENS device operates through gate control mechanism and increases the secretion of endorphins and enkephalins in the CNS to relief the pain [10].

The review of Aleccander et al. which was carried out in Britain to determine the effect of TENS on labor pain, showed that there was not strong evidence to prove the effectiveness of TENS for pain relief during labor [11]. The results of Aleccander et al. are not consistent with the results of this study, probably because they had put the TENS on lumbar nerves and not on acupuncture points.

The study of Ramnero et al. showed that the pain score and the duration of labor's first stage did not differ in the TENS on acupuncture points group and the control group, and that vacuum delivery rate was significantly higher in the TENS group. The results of this study are not consistent with the results of Ramnero et al. probably because in the TENS group the mean weight of newborns was higher and the mean height of mothers was lower than the present study [6]. Short women have smaller pelvis and passing of a large embryo from a small pelvis may prolong labor and cause more pain [10]. The findings of this study showed that both groups had significant differences in terms of the mean duration of labor's first stage; the mean duration of labor's first stage was 180.9 ± 25 minutes for the TENS group, and 238.2 ± 30 minutes for the control group, also the need to induce the delivery by oxytocin in the TENS group, was significantly smaller than the control group. Kaplan et al. studied the role of transcutaneous electrical nerve stimulation on reducing the duration of the first and second stages of active phase and concluded that TENS reduces the duration of the first

and second stages of labor and reduces the need for oxytocin. These results are consistent with the results of the present research [13]. The results of Lee et al. study confirm the effect of acupressure on shortening of labor's first stage duration [3].

Park et al. suggested that acupressure increases the intensity of uterine contractions without affecting the delivery period [14]. In the study of Park et al. the total duration of the first and second stage of labor was calculated while in the present study only the duration of the first stage of labor was considered, and probably that is why the results of their study are not consistent with the results of the present study.

Skilnand et al. research showed that pressure on the Sanyinjiao point lowered the need to oxytocin in comparison to the control group. Skilnand et al. attributed this effect of acupressure on Sanyinjiao point to the release of $F_2\alpha$ prostaglandin and β -endorphins and softening and dilatation of the cervix [15]. Dunn et al. studied the effect of TENS on acupressure points in order to induce labor in post-term women and found that the use of TENS on acupuncture points in post-term women increased the intensity and duration of uterine contractions and decreased the need for oxytocin; also it reduced the cesarean section rate in post-term women [9].

The results of this study showed that the use of TENS on acupuncture points does not affect neonatal outcomes and the Apgar score of newborn at 1 and 5 minutes. Several studies in this area confirm this issue and so far any neonatal complications were reported in accordance with the application of this method [3, 7, 16].

This double-blind clinical trial has shown that the duration and the pain level in the first stage of labor and the need to induce labor with oxytocin were significantly low in the TENS on acupuncture points group than the control group. Since acupuncture needs the use of numerous needles and demands a trained staff, the TENS application on acupuncture points in addition to the combination of TENS and acupuncture can be easily trained and used.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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