



Effect of Electroacupoint in treatment of Pain during first stage of labor

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ABSTRACT

Aims: To investigate the effect of TENS on acupoints for reducing pain during first stage of labor .

Study design: Experimental.

Place and Duration of study: Department of Obstetrics, Kafrelsheikh General Hospital-Kafrelsheikh, between November 2013 to January 2014.

Methodology: Thirty pregnant women (age range 20-30 years) were selected randomly, they would be delivered normally and divided into 2 equal groups (A&B). Women in group (A) were treated by TENS on acupuncture points (Sanyinjiao & Hegu points) of right side of the body during first stage of labour, women in group (B) were treated by placebo TENS on the same acupuncture points. The changes in arterial blood's PH, oxygen and carbon dioxide were measured as an indication of pain relief before and after treatment program.

Results: Women in both groups (A&B) showed highly significant changes in arterial blood's PH, PO₂ and PCO₂ (P=.001) between before and after the treatment program. Comparing the mean values of arterial blood's PH, PO₂ and PCO₂ between both groups (A&B), there was no significant difference (P=.40) at the beginning of the study, while there was highly statistical significant difference (P= .001) at the end of the treatment program.

Conclusion: TENS on acupuncture points is effective in relieving labour pain.

Keywords: TENS; acupuncture points; labor pain; first stage of labor.

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1. INTRODUCTION

Labour is the physiologic process by which a fetus is expelled from the uterus to the outside world. This process is characterized by an increase in myometrial activity or, more precisely, a switch in the pattern of myometrial contractility from irregular contractions (long-lasting, low frequency activity) to regular contractions (high-intensity, high-frequency activity) resulting in effacement and dilatation of the uterine cervix [1]. First stage of labour begins with regular uterine contractions and ends with complete cervical dilatation at 10 cm [2]. During this stage of labour, pain located in the region of the uterus and its adnexae as a result of (a) dilatation of the cervix and lower uterine segment, (b) traction and pressure of the adnexae and parietal peritoneum and the structure they envelop, (c) pressure and stretching of the bladder, urethra, rectum, and other pain-sensitive structures in the pelvis, (d) pressure on one or more roots of the lumbo sacral plexus and (e) reflex skeletal muscle spasms. Several hypotheses suggested that pain intensity is related to fetal position, ischemia of the uterus, myometrial blood flow, inflammatory processes of the uterine muscles, psychological aspects and probably contractions of the uterus under isometric conditions [3]. Labour pain may cause anxiety and exhaustion to laboured mothers and can cause a negative influence on the progress of labour process [4]. The anxiety and pain of labour frequently results in hyperventilation [5]. Hyperventilation results from deep, rapid breathing which causes too little carbon dioxide and too much oxygen in the blood, thereby affecting the body's acid base balance and increasing the alkalinity of the mother's blood [6]. Fetal hypoxia and acidaemia can result from maternal hypocapnia by pulmonary hyperventilation [7]. Labour pain management studies have focused on use of drugs that affect sensory awareness of pain, which may have the additional effect of impeding women's active participation in giving birth [8]. Modern medicine is continuously searching for a way of relieving pain during labour and delivery and eliminating any possible side effects to mother and neonate, conventional method of pain relief during labour and delivery including analgesics, sedatives drugs, epidural injections, and local blocks, all varying degrees of potential risks to mother and neonates [9]. However, despite continued advances in obstetric analgesia and anesthesia, there is still a vogue for 'natural' childbirth, using alternative therapies, there is scant scientific evidence for these techniques, but enthusiasm and satisfaction levels are high amongst their advocates and users [10]. There is a long history of attempts to alleviate the pain of childbirth, particularly in Asian and Middle Eastern civilizations, some of these techniques might be considered primitive by today's standards, for example, chanting rituals, religious incantations and even the infliction of physical pain as a form of distraction, intoxicating substances such as opium, cannabis and alcohol have also been used, although the use of alcohol and cannabis during childbirth would provoke outrage now, opioids are considered completely acceptable, and are widely used [11]. TENS for pain relief during labor works by a combination of the central and peripheral actions to release much more endogenous opioid peptides [10]. TENS is a non-invasive and safe method for nerve stimulation intended to reduce pain, either acute or chronic [12]. It doesn't interfere with obstetrical practice [13].

The purpose of this study: to investigate the effect of TENS on acupuncture points for pain relief during first stage of labour.

2. MATERIALS AND METHODS

A total of 30 pregnant women were selected randomly from department of obstetrics from Kafrelsheikh general Hospital in Kafrelsheikh, Egypt. They would be delivered normally, divided into 2 equal groups (A&B). Women in group (A) were treated by TENS on acupuncture points during labour; women in group (B) were treated by placebo TENS on the same acupuncture points. Their age was ranged from 20 to 30 years. Number of parity 2-3. Their body mass index was less than 30 kg/m². None of them had been taken any medication or analgesia for pain relief during labour. Women with maternal cutaneous lesions on the application sites (such as wound scars, urticaria or insect bites), pacemaker or hypertension were excluded from this study. The design of this study was experimental. Informed consent form had been signed from each woman before participating in the study. The study was done from November 2013 to January 2014. We measured the changes in PH, oxygen and carbon dioxide levels in the arterial blood (Gem Premier 5300, USA) as indication of pain relief before and after treatment for each woman. Women in group (A) were treated by TENS (Medsana, China) on acupuncture points (Sanyinjiao & Hegu points) of right side of the body during first stage of labour, the active electrode of TENS was positive electrode and placed on acupuncture points while inactive electrode was negative electrode and placed 5cm proximal to active electrode, the duration of treatment was 30 minutes, at frequency of 100 Hz with a burst frequency of 2 Hz, pulse width 150 μ s, and intensity according to patients tolerance; women in group (B) were treated by placebo TENS on the same acupuncture points (Sanyinjiao & Hegu points) of right side of the body, for 30 minutes.

The collected data was statistically analyzed by using Wilcoxon matched pairs test and descriptive statistics: mean, standard deviation and percentage. Statistical significance level of 0.05 would be used within this study.

3. RESULTS

All data had been collected and statistically analyzed and presented under the following headings;

3.1 Physical characteristics of the patients:

In this study, 30 pregnant women would be delivered normally, divided into 2 equal groups (A&B). Group (A): 15 women were included in this group; the mean age and BMI were (25.87 \pm 2.69) years and (26.78 \pm 1.49) Kg/m². Group (B): 15 women were included in this group; the mean age and BMI were (24.80 \pm 2.01) years and (26.73 \pm 1.45) Kg/m². There was no significant difference (P= .38 and .10) between both groups (A&B) regarding their ages and BMI respectively (Table 1).



Table 1. Mean ± SD values of women's age and BMI in both groups (A&B).

	Age (yrs)		BMI(Kg/m ²)	
	Group A	Group B	Group A	Group B
Mean ± SD	25.87±2.69	24.80±2.01	26.78±1.49	26.73±1.45
P-value	0.38		0.10	
Significance	NS		NS	

*SD: standard deviation, P: probability, NS: non-significant.

3.2 Biochemical analysis of maternal arterial blood gases:

Group (A): There were a highly significant differences in arterial blood's PH (P=.001) between mean values of arterial blood's PH before (7.40±0.02) and after (7.38±0.02) the treatment program .

There were a highly significant differences in arterial blood's PO₂ (P=.001) between mean values of arterial blood's PO₂ before (110.47±9.28)mm.Hg and after (96.67±8.82) mm.Hg the treatment program .

There were a highly significant differences in arterial blood's PCO₂ (P=.001) between mean values of arterial blood's PCO₂ before (40.10±3.47) mm.Hg and after (41.93±3.67) mm.Hg the treatment program .

Group (B): There were a highly significant differences in arterial blood's PH (P=.001) between mean values of arterial blood's PH before (7.39±0.02) and after (7.44±0.02) the treatment program .

There were a highly significant differences in arterial blood's PO₂ (P=.001) between mean values of arterial blood's PO₂ before (109.60±9.40) mm.Hg and after (126±7.01) mm.Hg the treatment program .

There were a highly significant differences in arterial blood's PCO₂ (P=.001) between mean values of arterial blood's PCO₂ before (40.80±3.87) mm.Hg and after (37.27±3.47) mm.Hg the treatment program .

When comparing the mean values of arterial blood's PH,PO₂ and PCO₂ between both groups (A&B), there was no significant difference (P=.40) at the beginning of the study. While there was a highly statistical significant difference (P=.001) at the end of the treatment program(Table 2).

Table 2. Mean± SD values of arterial blood,s PH, PO₂ and PCO₂ at pre and post treatment program for both groups (A&B).

	Pretreatment						Post treatment					
	Group A			Group B			Group A			Group B		
	PH	PO ₂	PCo ₂	PH	PO ₂	PCo ₂	PH	PO ₂	PCo ₂	PH	PO ₂	PCo ₂
Mean ± SD	7.40±0.02	110.47±9.28	40.10±3.47	7.39±0.02	109.60±9.40	40.80±3.87	7.38±0.02	96.67±8.82	41.93±3.67	7.44±0.02	126±7.01	37.27±3.47
P-value	0.40						0.001					
Significance	NS						HS					

*SD: standard deviation, P: probability, HS: highly significant, NS: non significant

4- DISCUSSION

Labour has been described as one of the most intense forms of pain that can be experienced, and represents both a physiological and psychological challenge for women [14].The most important factors causing labour pain are dilatation of the cervix and contractions of the uterus. Individual pain perception depends on the intensity and duration of the contractions, the speed with which the cervix dilates, the physical condition of the woman as well as a complexity of emotional factors such as previous experiences, present expectations, and cultural factors [15].During strong first stage contractions of the uterine muscle both respiratory rate and depth increase in response to increased oxygen requirement. Some decrease in arterial PCO₂ tension appears to be normal, but in severe cases of over breathing the women experiences numbness and tingling of the lips and extremities due to the blood becoming relatively alkalotic, leading to calcium ionization which affects nerve conductivity [16]. Different opioid peptides have been released in central nervous system by TENS application. enkephalins and β-endorphins were released with TENS application of 2 Hz while, dynorphin was released in the spinal cord with 100-Hz ,a combination of both frequencies allows synergistic interaction among the three endogenous opioid peptides and provides a powerful analgesic effect [17].Since there is no objective method of



measuring labour pain. The intensity of pain depends upon several factors, most important being the emotional stability of the women. The anxiety and pain of labour frequently results in hyperventilation. This study found that arterial blood gases (ABG) indicated statistically significant decrease in pain perception in TENS group compared to the placebo TENS group. The result of this study agreed with those reported by Wang et al., (2005) who studied the effect of Acu-TENS on post-operative analgesic requirement, investigated the effect of different TENS intensities on patient controlled analgesia (PCA) for hydro morphine (HM) in 101 patients following elective abdominal surgery. Participants were randomised into four groups: (1) PCA, (2) PCA and 'sham' TENS, (3) PCA and low intensity TENS (4–5 mA), (4) PCA and high intensity TENS (9–12 mA), (to provide a strong, tolerable tingling sensation). A power calculation was reported, to detect a 30% or greater decrease in PCA opioid analgesic requirement following surgery. Stimulation was applied at 2 and 100 Hz (dense and disperse mode) to acupuncture point LI4 and sites either side of the surgical incision. High intensity stimulation decreased HM requirement by 65%, low intensity stimulation by 34% and placebo by 23% compared to the control (PCA only) group. PCA usage in the first 24 hours was significantly lower in the high intensity TENS group ($p < 0.001$) and in the low intensity TENS group ($p < 0.01$) compared with PCA only and placebo TENS [18]. Chen et al., (1991) investigated the effects of TENS applied at the dermatomal level or to ST36 acupuncture point on 100 patients following surgery for elective hysterectomy or myomectomy. A power calculation was reported to detect a 30% or greater decrease in PCA analgesic requirement. A significant decrease in post-operative analgesic requirement ($p < 0.05$) compared to placebo TENS applied to the same acupuncture point or stimulation at a distant non acupuncture point was reported. Stimulation at the dermatomal level and the acupuncture point produced comparable levels of pain relief. The credibility of the placebo TENS in these two studies could not be determined from the information provided. Chen et al., (1991) informed participants in the placebo group that they may not be able to feel the TENS. How effective this method was could not be ascertained from the report [19]. In the Wang et al., (2005) study the placebo TENS was visibly functioning, but with no stimulation. The information given to participants with regards to the placebo TENS was not provided. Both the Wang et al., (2005) and the Chen et al., (1991) studies failed to report methods of randomization. The results of this study are supported by the results of Chao et al., (2007), who carried out a double blind placebo controlled trial investigating the efficacy of Acu-TENS (100 Hz, burst frequency of 2 Hz) on 105 women during the first stage of labour. For the placebo Acu-TENS group, low frequency stimulation without burst mode was applied. Research nurses were trained to apply the TENS to the LI4 and SP6 acupuncture points. Methods of randomisation and a power calculation were reported. Results found statistically significant ($P < 0.001$) lower pain questionnaire in the Acu-TENS group compared to the placebo Acu-TENS group [20].

A major limitation of our study was the small size of the group, recruiting subjects for this type of study was difficult due to emotional source as fear and lack of education. Other limitations were the psycho physiological, social and culture level of each woman

5. CONCLUSION

It could be concluded that TENS on acupuncture points appears to be effective in relieving labour pain, providing a simple, safe, inexpensive and successful alternative rather than pharmacological treatment.

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