

Efficacy of maternal TENS on the management of labor pain in primiparous women during first stage of labor - A pilot study

Kavitha. V., P. Senthil Selvam, Tushar J. Palekar, M. Manoj Abraham, M.S.Sundaram

Abstract:

Background: Labor pain is one of the most intense pain women experience in her lifetime. There are various invasive and noninvasive forms of pain relief available for women during labor to ease the discomfort. Transcutaneous electrical nerve stimulation (TENS) is a nonpharmacological form of physiotherapeutic modality to relieve pain during labor. The aim of this study is to investigate the effect of TENS on pain relief during first stage of labor in primiparous women.

Method: A total of 30 primiparous women were selected for the study. The subjects were randomized into either the experimental (TENS group) or control group. The women during labor were monitored thoroughly one hour once on the following parameters such as maternal heart rate, respiratory rate, blood pressure, fetal heart rate, and CTG. The laboring women in the experimental group were attached with maternal TENS unit once their cervix is 4 cm dilated. The TENS was applied in with two pairs of electrodes in the paraspinal region of the lower thoracic and sacral spines. The outcome measure was pain intensity which was measured using visual analogue scale before the application of TENS and 1 hour after the TENS application.

Results: The total number of patients were equally divided into experimental and control group. The TENS group obtained clinically significant pain relief 'p' < 0.01. One woman in the TENS group had cesarean section but 5 women in the control group had cesarean section. Only one woman in the TENS group stated that there was not much pain relief with TENS after 3 hours of application.

Conclusion: This pilot study concludes that TENS can be used as a effective pain relieving modality to ease labor pain during first stage of labor in primiparous women.

Keywords: Transcutaneous electrical nerve stimulation, first stage of labor, labor pain, physiotherapeutic agent.

Introduction

Labor pain relief is one among the important goal of the obstetric care. The pain women experiences during labor is not only because of the structural and physiological changes the women's body undergoes but it also because of the psychosocial, environmental and emotional factors. If the women are stressed, anxious or fearful, she will not be able to handle the labor pain well. When she is stressed, her body produces more of adrenaline hormone which increases her heart rate, blood pressure, respiratory rate as well as tightness of the muscles of the extremities, increases the blood flow to the extremities rather to the center of the body. As a result of the above physiological changes there is decreased blood supply to the uterus and there is decreased uterine activity. This further results in not only increased oxygen demand but also increased perception of pain. (2,3)

There are various pharmacological methods of pain relief available and is most commonly used during childbirth. When these methods of pain relief are used, the women do not have the control over her own birth, it may further result in some adverse maternal as well as fetal outcomes such as

no analgesic effect, labor may not progress, fetal distress as well as release of meconium and increased rate of interventions and cesarean section rates. When we use nonpharmacological pain relief options such as water immersion, relaxation therapy, hypnobirthing, TENS, aromatherapy, etc. The women have the control of her own birth, pain relief, decrease the need for further analgesia and have better satisfaction with their own birth. The non-medicated method of pain management is safe, easy to administer, no major side-effects, cheaper and women will have control of her delivery. (21)

TENS has been largely used as an effective pain relief modality in most of the musculoskeletal disorders, sports injuries as well as in postoperative rehabilitation. TENS either is used as a primary modality in the management of pain or it is used as a complementary therapy along with other analgesics depending on the severity of the condition. Gate control theory is the principle by which the TENS device works which was originally proposed by Wall & Melzack in the year 1965. (5). TENS not only stops but also blocks the transmission of painful signal to the brain but it also increases the production of a natural narcotic called endorphin. The endorphin helps the women to ease and relax during labor and helps her to concentrate on her own birth. In Europe, maternal TENS has been used for labor pain relief for more than three decades. In India, maternal TENS is not much available or used in the maternity care and there are very few RCT studies done in India. Using mobile hand-held maternal TENS attached through a pair of electrodes applied over the lower thoracic and sacral paravertebral region, the laboring women can not only control the intensity of the impulse but also can move and change position according.

Material and Methods:

Study Design: This is a Randomized Controlled Pilot Study.

Study Setting: This study was conducted at Obstetric Care Unit in Shri IsariVelan Mission Hospital, Chennai.

Inclusion criteria:

1. Women between the age of 20-35 years.
2. Singleton fetus.
3. Gestational age more than 37 weeks and less than or equal to 40 weeks.
4. Cephalic presentation.

Exclusion criteria:

1. Gestational diabetes mellitus.
2. Pregnancy induced hypertension.
3. Multiple pregnancy.
4. Breech presentation.
5. Preeclampsia.

Tool: Visual Analogue Scale for pain relief.

Subject Selection: 30 women who were in labor were randomly divided into two groups.

Methods: Group A received TENS as a pain relief modality and group B is a control group. The women in the control group were told that they can do breathing exercises and they can change positions according to their wish during the first stage of labor to ease the labor pain. In the experimental group, TENS is applied to the paravertebral region of the lower thoracic and sacral spine when the cervix is 4 cm dilated. The management of labor is otherwise same for both the groups. All the women were given appropriate information about the procedure and informed consent was obtained. In both the groups, pain was evaluated with the use of a visual analogue scale at 4 cm of cervical dilation and 1 hour after the application of TENS. In the control group, the pain was evaluated at the same time interval. The parturient were asked to mark the intensity of pain on the line.

Statistical Analysis:

Table 1:

TENS Vs Control group pre and post Values

Group	Participants	Variable	Mean	Standard deviation	P Value
TENS	15	Pain Pretest	8.600	0.828	Significant
		Pain Post test	3.400	1.183	0.0000 'p' < 0.01
Control	15	Pain pre-test	8.333	0.724	Not significant
		Pain Post-test	8.067	0.961	0.413 'p' > 0.05

Results and Discussion: We obtained the following results in our pilot study on the effectiveness of the maternal TENS on labor pain relief. There were totally 30 participants out of which 15 were randomly assigned in the TENS group and the remaining 15 were in the control group. The pretest mean value TENS group was 8.333 and the post-test mean value was 3.400. There is a significant difference in the p value in the TENS group between the pre and post-test values. In the control group, the pretest mean value was 8.333 and the post-test mean value was 8.067. There is no significant difference in the p value in the TENS group between the pre and post-test values. When we compared the post-test mean percentage change in TENS group is significantly different from mean percentage change in control group. So, the VAS in the experimental group was significantly lesser than control group.

This pilot study was conducted to study the efficacy of maternal TENS on pain relief during labor. In this study, the pain intensity was evaluated using a visual analogue scale (VAS) one hour after the application of the maternal TENS. The visual analogue scale showed that parturient in the maternal TENS group had good pain relief 1 hour after the application of the device. The participants in the experimental group did not ask for any additional pain killers or epidural analgesia. The maternal TENS is a hand-held device which is placed on the paravertebral region of the lower thoracic and

sacral spines. The average duration of application of TENS is 5.30 ± 0.38 . The analgesic effect was obtained by 1. Blocking the painful impulse reaching the brain by increasing A-beta fiber transmission. 2. Stimulating the production of endorphin which is a natural narcotic produced by the body during childbirth.

The women in the experimental group had good pain relief. This actually correlated with the retrospective study which was performed in both primigravida and multigravida women. In a systematic review which included 9 studies involving 1079 parturient, the results showed that there was no significant difference between the experimental and control groups with respect to pain relief during childbirth. There was another case report on use of TENS in primiparous and multiparous women. This study also had a similar result that out of 15 parturient 13 had good pain relief with the use of TENS and satisfied with their birth experience. The 13 laboring women also mentioned that they would like to use TENS for their future labor.

There was another study performed in multiparous women which concluded that there was significant difference in pain intensity among the women in TENS and control group but there was no significant difference found in two groups with respect to duration of the cervical dilation.

Limitation: This pilot study was performed in only 15 subjects which is the major limitation of this study. Further research study with randomized control trial with more subjects could be done to support the evidence of this study. Labor pain is multifactorial. It involves various other factors such as emotional, psychosocial and pain threshold of the women which was not considered in this study.

Conclusion: It is concluded from this pilot study that maternal TENS offered very good pain relief and could be used during the first stage of labor in primigravida women.

Source of funding: None.

Conflict of interest: No conflict of interest.

Reference:

- Maryam Maktabi, Afsaneh Nouruzi, Zahra Farzinia and Alireza Kamali studying the influence of transcutaneous electrical nerve stimulation on reducing the post natural delivery pain during breastfeeding period. *Bioscience Biotechnology research Asia* Dec 2016 Vol 13 (4) 2325-2329.
- Larissa F.D. Mello, Luciana F. Nobrega, Andrea Lemos transcutaneous electrical nerve stimulation for pain relief during labor: A systematic review and meta-analysis *Rev Bras Fisioter.* 2011; 15(3):175-84.
- Thakur Ratna, Paatidar Rekha, Comparative Study of transcutaneous electrical nerve stimulation and Tramadol Hydrochloride for pain relief in labor *Journal of ObstetGynecol Ind* Vol 54, No 4: July/August 2004 Pg 346-350
- Tashani O, Johnson MI transcutaneous electrical nerve stimulation (TENS) a possible aid for pain relief in Developing Countries review article *Ijm* 10.4176/090119
- Ramamoorthy Veyilmuthu, Sumathi Govindan, Mahalakshmi Venugopalan et. al. Effect of TENS on labor pain relief among primigravida and multigravida mothers *Int J. reproduction, contraception, Obs&Gyne* 2017 Mar ; (3):980-985

- Anne Sjogu, Si Qin, Yujie Chen, Lizhen Hu, Yang Luo, the effect of transcutaneous electrical nerve stimulation during the first stage of labor: A randomized controlled trial *BMC Pregnancy and Childbirth* (2021) 21:164.
- Hanan A. A. Farra, Hatem S. Shalaby, Ahmed A. Fahmy, MaiiNawara The Safety and Efficacy of transcutaneous electrical nerve stimulation (TENS) in reducing vaginal delivery labor pain: Randomized controlled clinical trial *Open Journal of Obstetrics and Gynecology* 2020 10, 657-670
- Anibal Baez-Suarez, Estela Martin-Castillo, Josue Garcia-Andujar, Jose Angel Garcia-Hernandez, Maria P. Quintana-Montesdeoca and Juan Francisco Loro-Ferrer Evaluation of different doses of transcutaneous electrical nerve stimulation for pain relief during labor: a randomized controlled trial *BMC Trials* (2018) 19:652
- Dowswell T, Bedwell C, Lavender T, Neilson JP transcutaneous electrical nerve stimulation (TENS) for pain management in labor (review) *Wiley*
- Penny Simkin PT, April Bolding, PT Update on Norpharmacologic Approaches to relieve labor pain and prevent suffering *J Midwifery Womens Health* 2004 49(6)
- Larissa F.D. Mello, Luciana F. Nobrega, Andrea Lemos transcutaneous electrical nerve stimulation for pain relief during labor: A systematic review and meta-analysis.
- J.T. van der spank D.C. Cambier H.M.C. De Paepe L.A.G. Danneels E.E. Witvrouw L. Beerens Pain relief in labor by transcutaneous electrical nerve stimulation (TENS) *Arch GynecolObstet* (2000) 264:131-136
- Ruchi Gupta, Shubhdeep Kaur Evaluating the effectiveness of TENS for maternal satisfaction in laboring parturients – Comparison with epidural analgesia *journal of Anesthesiology clinical Pharmacology* Jan 19 2021 IP 254.16.25.177
- J.M. van der Ploeg, H.A.M. Vervest, A.L. Liem and J.H. Schagen van Leeuwen transcutaneous electrical nerve stimulation (TENS) *International Association for the study of pain* 68(1996) 75-78
- Lilly C.D., Effectiveness of transcutaneous electrical nerve stimulation (TENS) application on pain and behavioral responses of primigravid women during the first stage of labor in a selected hospital at Mangalore *International Journal of Health Sciences and Research* Vol 10 Issue 2 Feb 2020
- Louise C. Grim, Susan H. Morey transcutaneous electrical nerve stimulation for pain relief of parturition pain *Academic* Vol 65/Number 3 March 1985
- Edwin W.C. Lee, Ivis W.Y. Chung, Janet Y.L. Lee, Pansy W.Y. Lam and Robert K.H. Chin the role of transcutaneous electrical nerve stimulation in management of labor in Obstetric Patients Asia Oceania *J. Obstet. Gynaecol.* Vol 16 no 3: 247-254 1990
- Peter Bundsen, Klas Ericson, Lars-Erik Peterson, Klara Thiringer, Pain relief in labor by transcutaneous electrical nerve stimulation *Acta ObstetGynecolScand* 61:129-136 1982

- An-Shine Chao, Angel Chao, TTzu-Hao Wang, Yu-Cheng Chang pain relief by transcutaneous electrical nerve stimulation (TENS) on acupressure points during the first stage of labor: a randomized double-blind placebo-controlled trial *Pain* 127 (2007) 214-220
- E. Crothers, Y. Coldron, T. Cook, T. Watson, W. Notcutt, safe use of transcutaneous electrical nerve stimulation for musculoskeletal pain during pregnancy *Journal of the Association of Chartered Physiotherapists in Women's Health* Autumn 2012 111.22-26
- PENG Ting, Li Xiao-Tian, ZHOU Shu-Feng Xiong Yu, transcutaneous electrical nerve stimulation on Acupoints relieves labor pain: A non-randomized controlled study *Chin J Integr Med* 2010 Jun; 16(3):234-238
- Randa Mohammed Abo Baker, Wafaa Abd Elhamid Rashad effect of transcutaneous electrical nerve stimulation (TENS) on pain intensity among multiparous women during the first stage of labor *American Journal of Research Communication* 201+; Vol 4 (8)
- Shelley Rowlands, Michael Permezel, Physiology of labor pain *Bailliere's Clinical Obstetrics and Gynecology* Vol 12 No 3, September 1998 0950-3552/98/030347-362
- Meera N. Gonzalez MD, Gaurav Trehan MD, Ihab Kamel, Pain management during labor Part 1: Pathophysiology of labor pain and Maternal evaluation for Labor Analgesia *Topics in Obst&Gyne* Vol 36 July 2016 Number 11 1-6
- PRABHU, M., and S. ALLY SORNAM. "COMPUTER WORKSTATION ERGONOMIC ISSUES IN SELF-FINANCING ENGINEERING COLLEGE LIBRARIES IN COIMBATORE: A PILOT STUDY." *International Journal of Library Science and Research (IJLSR)* 6.6 (2016): 69-76.
- JHA, SANJAY KUMAR. "EXPLORING THE CAUSES OF SANSKRIT'S DECLINE (A PILOT STUDY)." *International Journal of Educational Science and Research (IJESR)* 8.3 (2018): 165-172.
- Choube, Govind, et al. "A pilot scale process for the production of high shelf life multi-functional liquid bio-fertilizer." *International Journal of Bio-Technology and Research (IJBTR)* 8.5 (2018): 1-10.
- LENKA, SASANKA, and BISWA RANJAN PATNAIK. "A REDUCTION OF CLIMATE CHANGE EFFECTS THROUGH INFORMATION NETWORKS IN CCKN-IA PILOT BLOCKS OF GANJAM DISTRICT." *International Journal of Agricultural Science and Research (IJASR)* 8.6 (2018) 33-40
- Ramachandran, Arjun, and A. V. Santhoshkumar. "A Pilot Experiment on the Vegetative Propagation of a Dioecious Medicinal Plant, *Pyrenacantha Volubilis* Wight." *International Journal of Agriculture Science and Research (IJASR)* 10.4 (2020): 115-118.
- Nair, Vani P. "PATIENTS IN CELLULOID: EMPLOYING MOVIES AS AN INSTRUCTIONAL TOOL TO STUDY THE PSYCHOSOCIAL EXIGENCIES OF HIV/AIDS PATIENTS." *IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL)* 7.2 (2019) 379-388