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Electric therapy is used to reduce pain in a mother giving birth

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ABSTRACT

Background: *Pain during labor is a physiological response but can result in an increase in catecholamines which result in disrupting uterine contractions which can cause uterine inertia, prolonged labor, inadequate oxygenation to the fetus and fetal distress, as well as death of the mother and/or fetus if labor pain is not treated. According to (Utami & Putri, 2020) Severe pain can affect the increase in heart rate, respiratory system, increase in blood pressure and can cause stress, thereby inhibiting the release of the hormone oxytocin which results in inadequate contractions and disruption of cervical dilatation. Uterine contractions cause complaints of labor pain which can cause anxiety and fatigue in the mother during labor and have a negative influence on the progress of labor and the well-being of the fetus.Non-pharmacological pain management includes administering electrical therapy (TENS). Transcutaneous electrical nerve stimulation (TENS) is a therapy that uses electric current to treat pain due to various conditions, ranging from nerve disorders, disorders, to pain due to childbirth.*
Objectives: *Objectives of this research is to find out how much influence electrical therapy has in reducing pain in mothers giving birth.*
Methods: *The quasi-experimental research design uses a one group pretest-posttest design. The research population was mothers in the first stage of labor in the Sukoharjo Independent Midwife Practice area. The sampling technique was total sampling with a sample size of 20 people.*
Results: *obtained a reduction value of 1.55 (mean diff.) or a reduction of 23.2% and p=<0.001 (p<0.05) which means there is a significant difference in the pain scale before and after electrical therapy. therapeutic treatment.*
Conlusions*: electrical therapy is effective in reducing pain in mothers giving birth.*

KEYWORD *: electrical therapy; labor pain; mother giving birth*

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INTRODUCTION

Labor pain during the labor process is something that cannot be separated. Physiologically, all women who give birth will experience pain during the labor process. According to Ida Legiati, 91.9% of women experience pain during the first stage of labor (1). Various efforts were made to reduce it pain in labor, both pharmacologically and non-pharmacological (2). Pain methods Pharmacology is more effective than methods non-pharmacological. Pharmacological methods are more expensive and has the potential to have adverse effects, while non-pharmacological methods are more eficient, simple, effective and without adverse effects. This matter can be done as an effort made to provide comfort to birth mothers and midwives, as a health worker too played a role in this (3). Midwives are encouraged to expand their role in promoting non-pharmacological management of labor duration and pain management. The goal is to provide additional options for comfort, pain reduction, and a less time-consuming delivery. Government efforts that can be the main alternative to overcome complaints that arise during childbirth are contained in the Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07/ MenKes/320/2020 concerning Midwifery Professional Standards in the area of clinical skill competence in midwifery practice, namely as profession midwives are required to provide services in midwifery care in particular in the first stage of labor non-pharmacological methods such as positioning, hydration, providing moral support, pain relief without medication, monitoring the progress of normal labor and the use of partographs and monitoring the process of descending the fetus through the pelvis during labor and delivery (4). Causes the amount of pain experienced to vary for each individual. Anxiety and fear are generally associated with increased pain during labor. Mild anxiety is considered normal for a woman during pregnancy and childbirth. However, excessive anxiety and fear lead to excessive secretion of catecolamine and increased stimulation to the brain of the pelvis due to decreased blood flow and increased muscle tension. As a result, the pain of fear and anxiety becomes greater(5).

Non-pharmacological therapy innovations are carried out to reduce maternal pain during childbirth. The development of several non-pharmacological therapies is to increase maternal comfort by reducing feelings of anxiety and fear during childbirth. As the mother's anxiety and fear decreases, the physiological processes of birth hormones can work optimally. The resulting feeling of relaxation also reduces the sensation of pain produced, so that maternal satisfaction in receiving delivery services increases (6). Transcutaneous electrical nerve stimulation (TENS) is a therapy using electric current to treat pain due to various conditions, from nerve disorders, surgery, to pain due to childbirth. TENS therapy is carried out with a

small machine called a TENS unit. This machine functions to deliver low voltage electric current to the nervous system (7). The way TENS works is that an electric current enters the body through two electrodes attached to the skin. Dr. Sa'ad Budijono, Sp. KFR explained that TENS works using endorphin and gate control theory. “In endorphin theory, TENS will emit a low frequency electric current, around 2 Hz. This will affect the production of endorphins by the body and is often used in chronic pain. With the production of endorphins, patients will feel comfortable, reduce pain, and can fall asleep during therapy so they are more relaxed. In gate control theory, TENS will stimulate the A-β fibers and activate the pain suppression system, this process requires a high frequency of around 50-150 Hz. The electric current sent from the TENS unit will flow through the central nervous system. This can reduce the ability of the nerves to send pain signals to the brain and spinal cord so that the pain slowly decreases(8). Based on the research results of Yuliyanik et al., using the TENS method, patients became calmer in facing labor pain. Meanwhile, from the interview results obtained by respondents, they stated that the pain they felt had reduced a lot(9).

MATERIALS AND METHODS

Participant characteristics and research design. The type of research used in this research is quasi-experiment using a one group pretest-posttest design(10). This research was conducted at 3 Independent Midwife Practices in the Sukoharjo area including Independent Practice of Midwife Siti Maryam S.Keb, Independent Practice of Midwife Vonny Farida S.Keb, Independent Practice of Midwife Susi Damayanti S.Keb. This research will be carried out in February - March 2024.

Sampling procedures

The population in this study were mothers giving birth at the Independent Midwife Practice. The research sample used total sampling (11). There were 20 respondents in this study. Samples were taken that met the following criteria: Inclusion criteria: Inpartum mothers entering the 1st stage, who had never been given non-pharmacological treatment before, mothers who gave birth normally. Exclusion Criteria: Pathological conditions, for example: pre-eclampsia, heart disease, hypertension, and premature rupture of membranes, Experiencing wounds or inflammation on the skin in the area where the TENS electrode is applied, Inability to understand verbal commands. This research instrument TENS product code FM - B1501) has received a distribution permit certificate from the Director General of Pharmaceuticals and Medical Devices, so this tool is safe to use by anyone, both respondents and midwives. This research has obtained ethical clearance from the Ethics Committee with an ethical clearance letter No. Number: 026A / LPPM / ITS.PKU / II / 2024. The researcher provided

an explanation to prospective respondents about the intent and purpose and Standard Operational Procedure for using the TENS device to prevent misunderstandings. Then the Respondent filled out the informed consent sheet if they agreed to be used as a sample in the study. In this study, the researcher was assisted by a field assistant in installing the TENS device.

Measures and covariates The tools and materials used in this research are: Research explanation form, Respon-dent request letter, Informed Consent Form, SOP for electrical therapy, Research Master Table. Validity and Reliability of this research instrument for electrical therapy (TENS product code FM-B1501) has received a marketing authorization certificate from the Director General of Pharmaceuticals and Medical Devices. And the pain scale Comparative Pain Scale (Pain Scale 0-10) is a standardized pain assessment.

Data analysis

Univariate analysis produces the distribution and percentage of each variable studied. Bivariate analysis was carried out on two variables that were thought to be related or correlated. This analysis was carried out using the Wilcoxon rank test (numerical data is not normally distributed).

RESULTS AND DISCUSSION

RESULTS

Based on journal reference articles reviewed by researchers, this variable is very important in the factors that influence childbirth**. Table 1** Shows the proportion of respondents' demographic data research variables, namely Age, Education, Parity and Periode.

Table 1. Description of characteristics of mothers giving birth

Characteristics	Result	
	n	%
Age *mean ±SD (min-maks)*	20	(21-40)100
Education		
elementary school	1	5
Junior High School	7	35
Senior High School	12	60
Parity		
Primipara	5	25
Multiparous	15	75
Period I		
Latent	10	50
Active	10	50

Univariate analysis results

Based on **Table 1**, it is known that of the 20 patients giving birth, it was found that the average age of the mothers giving birth was 28.95 ± 5.85 years with a minimum age of 21 years and a maximum age of 40 years, for education most were high school (60.0%), then middle school (35.0%), and least with elementary school education (5.0%). The parity of most patients is in the multiparous category (75.0%), while the rest are in the primiparous category (25.0%), Stage I in the latent category (50.0%) have the same proportion as Stage I in the Active category (50.0%).

Bivariate Analysis Results

Based on **Table 2**, it is known that age

Table 2. Analysis of the relationship between the characteristics of research subjects and the effectiveness of electrical therapy in reducing pain in mothers in birth

Characteristics	Decline	Result	
	Painful *(mean ±SD)*	r	p
Age a[a]	-1.15 ±0.93	-0.272	0.247
Education[a]		-0.149	0.532
elementary school	-1 -		
Junior High School	-1 ±0.58		
Senior High School	-1.25 ±1.14		
Parity[b]		0.222	0.347
Primipara	-0.8 ±0.84		
Multiparous	-1.27 ±0.96		
Period I[b]		0.055	0.818
Latent	-1.2 ±1.14		
Active	-1.1 ±0.74		

***Note**: [a]Analisis korelasi Spearman Rank (numeric data is not normally distributed or data ordinal); [b]analisis korelasi Eta (data kategorik nominal vs numerik).*

has a value of r=-0.272; p=0.247, which means that the older you get, the greater the decrease in the pain scale resulting from electrical therapy, however the correlation results are weak (r=0.200 -0.399) and not statistically significant with a p value>0.05.

Education gets a value of r=-0.149; p=0.532, which means that the higher the level of education, the greater the reduction in the pain scale resulting from electrical therapy, however the results of this correlation are very weak (r=0.000 -0.199) and not statistically significant with a value of p>0.05. Parity gets a value of r=0.222; p=0.347, where it is known that multiparas tend to have a greater reduction in the pain scale resulting from electrical therapy than primiparas, however the results of this correlation are of weak strength (r=0.200 - 0.399) and are not statistically significant with a value of p>0.05.

Stage I got a value of r=0.055; p=0.818, where it is known that stage 1 in the latent category tends to have a greater reduction in the pain scale resulting from electrical therapy compared to stage 1 in the active category, however the results of this correlation are very weak (r=0.000 -0.199) and not significantly significant statistics with p value>0.05.

Table 3. Effectiveness of electrical therapy in reducing pain in birthing women

Parameter	.Elektrotherapy		p-value	*mean Diff.*	95%CI	
	Pretest	Posttest			lower	Upper
Pain (VAS)	4.95 ±1.32	3.80 ±1.40	<0.001	1.15	0.71	1.59

***Keterangan** : Uji wilcoxon rank test (data numerik tidak beditribusi normal); * signifikan pada p<0.05*

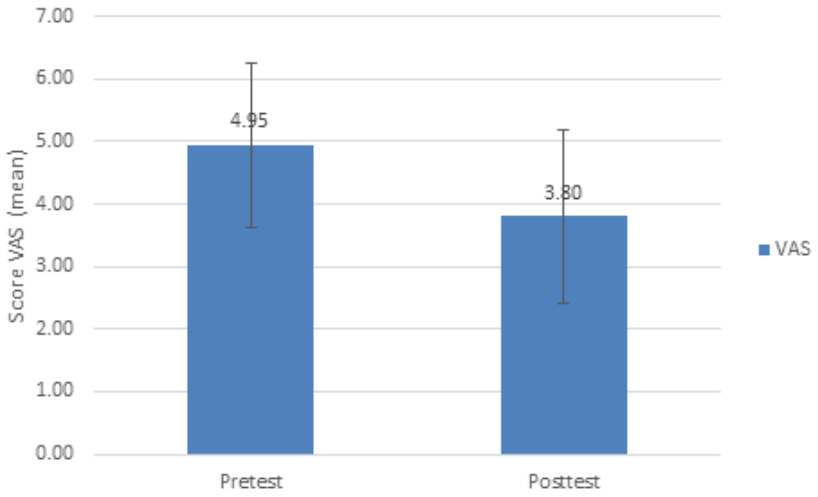

Figure 1. Bar Chart Comparison of Pain Scale Before and After Electrical Therapy

The Effectiveness of Electrical Therapy in Reducing Pain in Maternity Women

Before electrical therapy, the average VAS value was 4.95 ± 1.32, then after electrical therapy the average VAS value was 3.80 ± 1.40, thus there was a decrease of 1.55 (mean diff.) or a decrease of 23.2%. The statistical test results obtained a value of p=<0.001 (p<0.05), which means that there was a significant difference in the pain scale before and after the electrical therapy treatment. Thus, electrical therapy is effective in reducing pain in mothers giving birth.

DISCUSSION

Based on **Table 2**, it is known that the majority of patients were aged 26-30 years (38.5%). According to Muttaqin 2008, as one gets older, a person's ability to senses decreases. In accordance with Melzack's theory, which states that the mother's age influences the degree of labor pain, the younger the mother's age (<20 years), the more painful it will be when compared to an older mother's age. Age influences a mother's success in carrying out her role as a mother, age also determines her readiness to decide and act, in this case a mother's readiness to face childbirth (12).

Based on **Table 2** research results, the educational level of most senior high school students (53.8%), citing (Rejeki & Hartiti, 2017), lack of education will hinder the development of a person's attitude towards the values introduced. In Lestari et al's research, the level of education has an influence on responding to everything that comes from outside, where someone with higher education will respond more rationally than someone with medium or low education. Most of the respondents in this study had a final high school education level, namely 29 people (76.2%), while 2 people had an elementary school education level (5.3%), junior high school as many as 5 people (13.2%), and University as many as 2 people (5.3%) (13). Based on parity in **Table 2**, most patients with multigravida (57.7%), in mothers

who have more than one child will be better prepared when facing childbirth based on previous pain experiences (Brunner et al., 2010). In the study of Legiati, Widiawati there was no difference in pain intensity in primipara and multipara, because pain in labor has the same physiological pathway. It is important to understand and recognize the physiology of pain in the first and second stages of labor so that midwives can provide pain relief in accordance with the physiological pathway. Accurate education about reducing pain in labor must be informed during antenatal care to increase women's confidence during labor(1)(14).

Based on the opening of birth in **Table 2**, most respondents experienced the active phase (53.8%). The stages of labor are divided into 4, namely stage I, namely the opening stage from opening 1 to 10, this phase occurs thinning and opening of the cervix, stage 1 is divided into stage 1 latent phase, namely from opening 1 cm -3 cm, stage 1 active phase from opening 4 cm to 10 cm. Discomfort (pain) during the first stage of labor is caused by cervical dilation and effacement and uterine ischemia, this is due to decreased blood flow so that local oxygen is in deficit due to contraction of the myometrial arteries, this pain is called visceral pain. While at the end of stage I and stage II, the pain felt in the perineum area occurs due to stretching of the perineum, pulling of the peritoneum and uterocervical area during contractions, pressure on the urinary bladder, intestines and sensitive pelvic structures by the lowest part of the fetus, this pain is called somatic pain(15).

Another alternative method for managing pain in mothers giving birth is TENS. TENS works on the theory of endorphins and gate control. “In endorphin theory, TENS will emit a low frequency electric current, around 2 Hz. This will affect the production of endorphins by the body and is often used in chronic pain. With the production of endorphins, patients will feel comfortable, reduce pain, and can fall asleep during therapy so they are more relaxed.(16) In gate control theory, TENS will stimulate the A-β fibers and activate the pain suppression system, this process requires a high frequency of around 2-150 Hz.(17) The electric current sent from the TENS unit will flow through the central nervous system. This can reduce the ability of the nerves to send pain signals to the brain and spinal cord so that the pain slowly decreases(18).

Based on the research results of Njogu et al. (2021) conducted a single blind randomized clinical trial with 326 pregnant women with spontaneous vaginal delivery. With the experimental group having 161 participants and the control group having 165 participants. VAS was used for pain assessment and high-tech TENS was used at 30, 60, and 120 minutes and from 2 to 24 hours after delivery. The results of the experimental group had statistically significantly lower mean VAS scores at different times and the experimental group showed a statistically significant shorter

duration of the active phase of labor than the control group. The authors concluded that the use of TENS resulted in reducing pain and shortening the active phase(19).

Karlinah et al's research gave similar results that the effect of acupressure was better used at an opening of 4 cm, while the effect of TENS was better used at an opening of 8 cm. Using an experimental research method with a post test only control group design with consecutive sampling. The total sample is 20 respondents for each group, the total sample is 60 respondents. Data were analyzed univariately and bivariately using the chi-square test. The proportion of pain intensity in the moderate category in the acupressure intervention group was greater than in the control group at 4 cm cervical dilation. Based on statistical tests, there is a significant effect where the p value = 0.011 (<0.05). There was a significant effect between the TENS intervention group and the control on cervical dilation of 8 cm with a p value = 0.011 (<0.05)(20).

The researcher's assumption is that the use of TENS provides results to reduce pain, because the electric current sent from the TENS unit will flow through the central nervous system. This can reduce the ability of the nerves to send pain signals to the brain and spinal cord so that the pain slowly decreases, and based on evaluations from respondents the duration of the contractions becomes shorter - on average it decreases by 5-10 seconds. The characteristics of the population in this study still vary so that it could be a confounding factor in the results of pain measurements after treatment**.** The condition of pain at the beginning (before treatment) is not the same where the population is in different phases of labor, namely in the latent phase and the active phase**.** The electrode installation point is at the lumbar and spinal points, making the birthing mother's position limited, causing discomfort for the birthing mother. In this study, there are still confounding variables such as support from husband, breathing relactation, pregnancy exercise.

CONCLUSION AND RECOMMENDATION

Based on the results of research regarding electrical therapy in reducing pain in women giving birth, the following conclusions can be drawn: The results of statistical analysis before electrical therapy showed an average VAS value of 4.95 ± 1.32, then after electrical therapy an average VAS value of 3.80 ± 1.40 was obtained, thus there was a decrease of 1.55 (mean diff.) or a decrease of 23.2% .

The statistical test results obtained a value of p=<0.001 (p<0.05), which means that there was a significant difference in the pain scale before and after the electrical therapy treatment. Thus, electrical therapy is effective in reducing pain in mothers giving birth. For Midwives' Independent Practice Providing electrical therapy can be an alternative in providing midwifery care in the non-pharmacological management of labor pain.

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