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Case Series

Effect of transcutaneous electrical nerve stimulation and maternal positioning on pain and satisfaction of labour among primigravida women during the first stage of labour: an analytical case series

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ABSTRACT

Labour is a physiological process in which mechanical and hormonal events influence the foetus expulsion through uterine contraction. Labour is commonly divided into three different stages. The first stage, or dilatative stage, is the phase when the dilatation of the uterine cervix occurs. This study aims to find out the effect of transcutaneous electrical nerve stimulation (TENS) and maternal positioning on pain and satisfaction among women undergoing labour. This is a case series based on convenience sampling among 12 primigravida women in the labour department, Indira Gandhi Medical College and Research Institute, Puducherry. The participants were divided into two groups based on patient convenience. Group A received conventional treatment and Group B received TENS and maternal positioning during the first stage of labour in addition to conventional treatment. The post-interventional assessment is taken in both the groups and results are interpreted. There was a reduction in the pain intensity and improved maternal satisfaction in the intervention group than the control group. Transcutaneous electrical nerve stimulation (TENS) and maternal positioning are feasible, affordable methods of reducing pain and improving maternal satisfaction that can be used to lower the fear of pain among primigravida, increase maternal mobility during labour, enhance maternal care, have a positive experience in labour, and improve women's quality of life.

Keywords: Non-pharmacological treatment, Maternal mobility, Physiotherapy, Maternal care

INTRODUCTION

Labour is a physiological process in which mechanical and hormonal events influence the expulsion of foetus through uterine contraction.[1,2] Labour is commonly divided into three different stages. The first stage, or dilatative stage, is the phase when the dilatation of the uterine cervix occurs. This stage can be further divided into three phases, namely the latent or passive phase (mean duration 11.8 hours), during which more irregular and far apart uterine contractions cause the uterine cervix to slowly dilate until the reference point of 4 cm of cervical dilatation is reached, active (from 4 cm to 8 cm with a median duration from 3.7 to 5.9 hours) and transitional phase (from 8 cm to 10 cm). There are numerous non-pharmacological treatments for women in labour.[3,4] Transcutaneous electrical nerve stimulation (TENS) is one of the non-pharmacological modes of pain management used to alleviate pain. TENS works by the mechanism of pain gate theory.[5] The maternal positioning using peanut balls, swiss balls and

gravity-assisted positions aids in the mobility of the mother during the first stage of labour reducing the duration of labour, the risk of caesarean birth and the need for epidural.[6]

CASE SERIES

This study is a feasibility case series that aims to find out the effect of TENS and maternal positioning on pain intensity and maternal satisfaction. The aim of the study is to find out the effect of TENS and maternal positioning on pain and maternal satisfaction among primigravida women undergoing labour. This study is a feasibility case series based on convenience sampling. Ethical approval was obtained from the institute ethics committee before the commencement of the study. The study was conducted in the labour department, Indira Gandhi Medical College and Research Institute, Puducherry. Primigravida women aged between 20 to 35 with no underlying risk factors, those who have attended antenatal education classes and are willing to participate in the study were recruited. Primigravida women with risk factors and not willing to participate in the study were excluded. The sample size of the case series is 6 in each group. The age of the participants ranges from 20-29 in this case series with an average age of 24.1 years old. 83% of women has conceived spontaneously whereas 17% through ovulation induction. 50% of women become pregnant within two years of marriage, and 50% after two years. one participant has an history of consanguinity marriage. Since the participants with abnormal vitals were excluded from the study. The vitals of the participants in baseline and demographic details of the participants are tabulated in Table 1. The purpose and nature of the study were explained to all the participants through an information sheet and informed consents were obtained from them. The group A received conventional treatment and group B received TENS and maternal positioning during the first stage of labour in addition to conventional treatment. The treatment protocol of the study is detailed in Table 2. The post-interventional assessments are taken in both groups and the results are interpreted.

Table 1: Baseline characteristics and vitals of the participants.

S. no.	Age (years)	Mode of conception	Years of marriage (years)	Heart rate	Blood pressure	Respiratory rate	Temperature (°C)
1	20	Spontaneous	2	72	120/75	10	36.1
2	24	Spontaneous	1.4	76	122/80	14	37.1
3	21	Ovulation induction	2.5	70	121/72	17	36.5
4	23	Spontaneous	1.6	74	125/85	28	37.8
5	22	Spontaneous	1.5	71	130/80	14	36
6	25	Spontaneous	1.7	80	125/80	16	36.4
7	27	Spontaneous	2.6	77	127/79	15	37.1
8	26	Spontaneous	2	75	135/81	16	37
9	25	Spontaneous	1.10	82	128/74	20	37
10	29	Spontaneous	1.11	85	125/72	24	38
11	24	Spontaneous	2	74	122/70	22	37.6
12	24	Ovulation induction	3	72	120/74	14	36.7

Table 2: Study treatment protocol.[7,8]

Variables	Protocol
TENS	Electrode placement - one pair of electrodes covering either side of the spinous processes of T10-L1; another pair of electrodes covering either side of the spinous processes of S2-S4
Positioning	Sitting, standing, walking, forward lean position, supported squatting, prone knee fall position, stranded beetle, flying cowgirl positioning, rotating and rocking to the pelvis, all four kneeling, and lateral decubitus position (listening to the body of women undergoing labour)

Study outcomes

The post-test mean values of Wong-Baker faces pain rating scale in group A and group B is 8.50 and 6.50 respectively and the mean difference is 2 (Table 3).

The post-test mean values of the short assessment of patient satisfaction (SAPS) in group A and group B is 21.0 and 24.50 and the mean difference is 3.5 points (Table 4).

Table 3: Comparison of post-test values of Wong baker faces pain rating scale between control and experimental group.

Wong-Baker faces pain rating scale	Mean	SD	Mean difference
Control group	8.50	0.84	2
Experimental group	6.50	1.05	

The graphical representation of a comparison of Wong Becker faces pain rating scale is represented in (Figure 1).

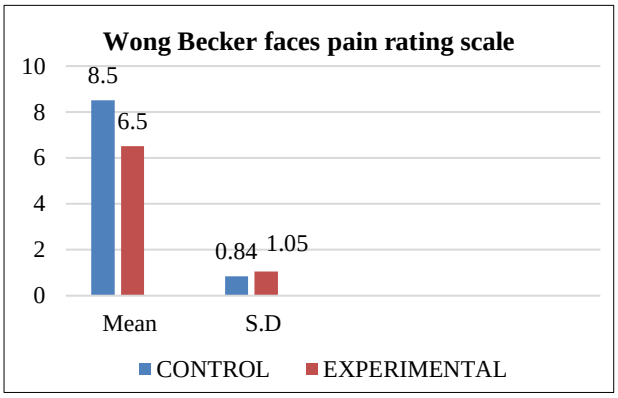

Figure 1: Comparison of Wong baker faces pain rating scale between control and experimental group.

Table 4: Comparison of post-test values of the short assessment of patient satisfaction between control and experimental group.

Short assessment of patient satisfaction (SAPS)	Mean	SD	Mean difference
Control group	21.00	1.79	3.5
Experimental group	24.50	2.35	

The graphical representation of comparison of the short assessment of patient satisfaction (SAPS) is represented in (Figure 2).

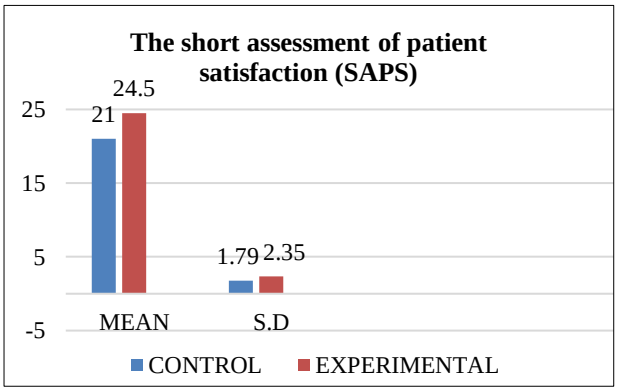

Figure 2: Comparison of the short assessment of patient satisfaction between the control and experimental group.

DISCUSSION

The main purpose of the study was to evaluate the effect of TENS and maternal positioning on pain relief and maternal satisfaction during the first stage of labour. The comparison of the Wong Becker Faces pain rating scale at the end of the study indicated a clinically significant reduction in the pain perception in the participants in the interventional group as compared with the control group. Reports from the previous studies also suggested that there are different opioid peptides like encephalins and β-endorphins are released by the application of TENS which has a powerful analgesic effect explains the mechanism behind the reduction of pain.[9] The afferent fibres are blocked by the high intensity titrated at the height of the excruciating contractions, preventing pain from emanating from the uterus and reaching the spinal cord synapses. The heightened levels of stress and hypoglycemia resulting from labour pain cause alterations in the sympathetic nervous system, which raises the release of catecholamines such as norepinephrine and adrenaline. Vasoconstriction, elevated blood pressure, heart rate, and other autonomic reactions are brought on by these catecholamines. These modifications lead to decreased uterine blood flow, which in turn results in bradycardia or acidosis in the foetus as well as a drop in uterine tone. This prevents the contraction of the uterus and impedes the labour's advancement.[10] TENS will inhibit catecholamine release by strengthening the parturient's coping strategy and accelerating the onset of labour. The benefits of TENS use for mothers include its non-invasive nature, ease of application, safety, and lack of serious adverse effects. It also does not affect the mother's consciousness or mobility. Reduced contractions and an extended labour period have been linked to the elevated physiological arousal during labour brought on by fear over the birth experience, as well as foetal discomfort.[11]

The comparison of the SAPS was clinically significant in the intervention group than the control group. The women can listen to their own body and change their position accordingly throughout the first stage of labour is encouraged. Compared to more static positions, labouring individuals have a larger ability for mobility and can adopt numerous positions throughout the labour process, which helps the foetus descent and the widening of the pelvic diameters. Sitting or walking upright promotes better uterine blood flow, efficient uterine activity, the foetal head's progress through the birth canal, and the maintenance of the pushing sensation.[12,13] Furthermore, compared to recumbent positions, upright positions have been demonstrated to shorten labour duration, have a higher probability of vaginal birth, and have a lower probability of instrumental or caesarean birth. Gravity forces the foetal head to press against the cervix in these upright postures, triggering Ferguson's response, which increases oxytocin secretion and, consequently, uterine contractions, with maximal effect while the labouring person is pushing the foetus out at birth.[14-17] Even with the parturient in a lateral decubitus position or semi-flexed posture, the influence of gravity would promote the foetal pole's descent into the pelvic cavity, aiding in the cervix's dilatation and effacement.[18]

In a labour room setting, the effects of transcutaneous electrical stimulation and the maternal position of the mother during the first stage of labour are practical and help parturient women feel reduced pain perception and

have more mobility. Our findings are in line with recommendations from the World Health Organisation and support the use of flexibility in posture and movement during natural delivery. It improves the quality of life of the women and the maternal satisfaction.[19]

This study is the first study of its kind in which TENS and maternal positioning as an intervention for women undergoing the first stage of labour. This study proves the feasibility and usage of physiotherapeutic intervention along with the conventional treatment for the betterment of the parturient in the labour room setting.

Limitations

The study's limitations include its small sample size, lack of participant randomization, and brief study period. Further research can be conducted with a larger sample size and longer study duration. Randomized controlled trial can be conducted. More studies on different non-pharmacological interventions can be combined with the conventional treatment to enhance maternal satisfaction with labour, improve the quality of the labour experience for primigravidae, and increase maternal care.

CONCLUSION

This study on the effect of TENS and maternal positioning has a more clinically significant impact on pain and maternal satisfaction during the first stage of labour in primigravida women than does conventional treatment alone. The findings demonstrated a considerable improvement in the degree of pain perception and mother satisfaction with the birth process. Therefore, in addition to conventional treatment in the labour room, transcutaneous electrical nerve stimulation and maternal positioning are feasible, affordable methods of reducing pain and improving maternal satisfaction that can be used to lower the fear of pain among primigravida, increase maternal mobility during labour, improve maternal care, have a positive experience in labour, and improve women's quality of life.

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