

# Effectiveness of Ultrasound and Transcutaneous Electrical Nerve Stimulation in Postnatal Painful Breast Engorgement: A Comparative Study

Apurva A. Mahadalkar<sup>1</sup>, S. Anandh<sup>2</sup>

<sup>1</sup>Intern, Krishna Institute of Medical Sciences Deemed University, Karad

<sup>2</sup>Professor, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed University, Karad.

**Abstract:** ***Introduction:** Breast engorgement is a normal biological process that typically occurs within the first 3 to 5 days of postpartum. About 20 % postnatal mothers are affected with breast engorgement. Conventional therapy currently available for this problem are therapeutic massage, application of cold and hot packs, breast squeeze, administration of analgesics and use of binders. **Objectives:** To study effectiveness of ultrasound in postnatal painful breast engorgement. To study effectiveness of TENS in postnatal painful breast engorgement. To compare effectiveness of ultrasound and TENS in postnatal painful breast engorgement. **Methods:** Subjects between the ages of 18-35 years diagnosed with breast engorgement of Krishna hospital, Karad were selected for the study. Study was conducted on 30 subjects. Subjects were divided into two groups. Pre consent was taken from each participant. The subjects were divided into group A (TENS with conventional treatment) and group B (Ultrasound with conventional treatment). The interventions were carried out twice a day for 2 days. The outcome measures for the study were subjective which includes VAS scale, 6-point self-rated breast engorgement scale and Wong baker's faces pain rating scale. **Results:** The data was statistically analysed using INSTAT software. The present study provide the evidence for the use of TENS and ultrasound along with conventional treatment including hot moist packs and therapeutic massage in the management of pain and tenderness and improving the lactation in painful breast engorgement.*

**Keywords:** Breast engorgement, ultrasound, transcutaneous electrical nerve stimulation, hot moist packs, therapeutic massage

## 1. Introduction

Breast feeding is the feeding of babies and young children with milk from a women's breast.<sup>[1]</sup> health professionals recommend that breastfeeding begins within the first hour of a baby's life and continue as often and as much as the baby wants.<sup>[2][3]</sup> during the first week of life babies may nurse roughly every two or three hours. The duration of the feeding is usually ten to fifteen minutes on each breast.<sup>[4]</sup>

Advantages of breastfeeding:<sup>[5]</sup>

- 1) Composition: breast milk is ideal food with easy digestion and low osmotic load. It contains carbohydrate, fat, protein, minerals.
- 2) Protection against infection and deficiency state to baby.
- 3) Breast milk is a readily available food to the new born at body temperature and without any cost.
- 4) Natural contraception to mother.
- 5) Psychological benefit of mother-child bonding.
- 6) Helps involution of uterus.
- 7) No risk of allergy.

Breast engorgement is a normal biological process that typically occurs within the first 3 to 5 days postpartum. Breast engorgement may result in the breasts becoming swollen, hard, throbbing, aching, tender, and painful.<sup>[6]</sup> Breast engorgement occurs in 72%<sup>[7]</sup> to 85%<sup>[8]</sup> of women.

## 2. Causes

Breast engorgement is due to exaggerated normal venous and lymphatic engorgement of the breasts which precedes

lactation. This in turn prevents escape of milk from the lactate system. Generally the onset is third or fourth day postpartum.

## 3. Symptoms

- 1) Considerable pain and feeling of tenderness or heaviness in both the breasts.
- 2) Generalized malaise or even transient rise of temperature.
- 3) Painful breast feeding.

## 4. Conventional Therapy

- 1) Hot moist packs: The application of local heat directly on the engorge breast promotes vasodilatation, and thus increases circulation and consequently the volume of milk in the breast, which physiologically, would lead to an increase in the engorgement.<sup>[9]</sup> However, no studies aimed at studying the hot compress specifically. It was used in association with massage.<sup>[10]</sup>
- 2) Therapeutic massage: Two main principles of therapeutic massage in lactation include mobilization of fluid with massage towards the axilla to facilitate lymph circulation and alternating gentle massage and hand expression to facilitate milk removal.<sup>[11]</sup>

Ultrasound has been a part of clinical practice since sometimes back in the 1950's. Ultrasound is a form of mechanical energy. Normal human sound range is from 16Hz to 15-20,000Hz. Beyond this upper limit, mechanical vibration is known as ultrasound. The frequencies used in therapy are typically between 1.0 and 3.0MHz.<sup>[12]</sup>

Ultrasound works on the principle of piezo electric effect caused by vibration of crystals within the head of the probe.

Transcutaneous electrical nerve stimulation (TENS) is a commonly used non pharmacological and noninvasive treatment for pain. TENS is the application of electrical current through electrodes placed on the skin for pain control. It can be applied with varying frequency, from low (<10 Hz) to high (>50Hz).<sup>[14]</sup> Low frequency is also known as acupuncture TENS has a low pulse rate. It acts by stimulating the A-delta nerve fibres to produce endorphins which in turn relieve pain.

## 5. Review of Literature

- Pawar Priyanka, Ramnavr A, Geeta Kurhade, Arvind Kurhade, Rajaram Pawar. In their study of comparative effect of ultrasound therapy with conventional therapy on breast engorgement in immediate post-partum mothers: a randomized controlled trial concluded that ultrasound therapy added with conventional therapy helps in reduction of pain with tender breast which further helps the post-partum mothers to recover better from discomfort of breast engorgement. This in turn can facilitate better breast feeding.
- Valerie Lavigne and brian J. Gleberzon. In their retrospective case series study Ultrasound as a treatment of mammary blocked duct among 25 postpartum lactating women. Twenty – five cases were retrospectively identified of women who presented with a breast lump that was consistent with a blocked duct. Patients had been treated with therapeutic ultra sound receiving between 1 and 7 treatments (average 3.3) to experience improvement in their presenting symptoms. A majority of the patients reported improvement in breastfeeding and symptoms after treatment.no adverse reactions were identified in the patient record.
- H. M. Snowden, Mary Josephine Renfrew, Michael Woolridge. In their study of Treatments for breast engorgement during lactation three different studies were identified which used cabbage leaves or cabbage leaves extract; no overall benefit was found. Ultrasound treatment and placebo were equally effective. Use of Danzen (anti-inflammatory agent) significantly improve the symptoms.
- Moumita Manna, Lily Podder, Sujata devi. In this study of effectiveness of hot fomentation versus cold compression on breast engorgement among postnatal mothers they concluded that hot fomentation and cold compression both are effective in reducing breast engorgement. Reduction in pain intensity score of cold compression group was significantly higher than that for the hot fomentation group. Reduction in breast engorgement score of cold compression group was not significantly higher than that for hot fomentation group.
- Kalpana B., Rabinerson D, Pardo J, Krieser RU, Neri A. In their study of transcutaneous electrical nerve stimulation as a pain- relief device in obstetrics and gynecology concluded that in obstetrics and gynecology, TENS has been found to be effective in alleviating labour pain and in the treatment of dysmenorrhea. Patients and medical staff should be encourage to try the TENS device

for obstetric and gynecological indications, since it is non-invasive, efficient and easy to use.

## 6. Material and Methodology

Subjects between the age of 18-35 years diagnosed with breast engorgement of Krishna hospital, Karad were selected for the study. Study was conducted on 30 subjects. Subjects were divided into two groups. Pre consent was taken from each participant. The subjects were divided into group A (TENS with conventional treatment) and group B (Ultrasound with conventional treatment). The interventions were carried out twice a day for 2 days. The outcome measures for the study were subjective which includes VAS scale, 6-point self-rated breast engorgement scale and Wong baker's faces pain rating scale.

### 6.1 Outcome Measures

#### 1. Visual analogue scale:

The VAS has shown greater sensitivity than discrete points of categorical scale. The pain rating scale allows the subject to visually gauge the amount of pain along a solid 10 cm line. Where 0 represent no pain and 10 represent maximum pain.

#### 2. 6-Point self-rated engorgement scale:

The scale scoring ranges from 1 to 6. Scoring is given by the patient.

#### 3. Wong bakers faces pain rating scale :

The scale is developed by Donna Wong and Connie Baker. The scale shows series of faces ranging from happy face at 0 “no hurt” to crying face at 10 “ hurts worst”

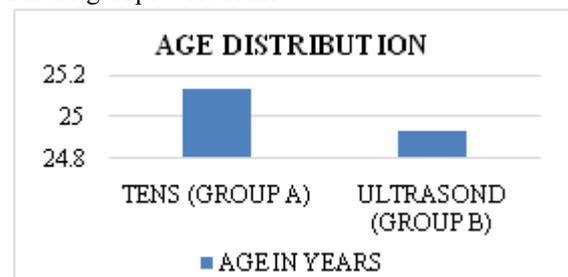
#### 4. Statistical analysis

Statistical analysis was done using

- 1) INSTAT software.
- 2) Intra group comparison (within group) using paired t test.
- 3) Inter group comparison (between group) using unpaired t test.

## 7. Results

1. Age distribution: In the present study mean age distribution in group A was 25.13±2.41 and mean age distribution in group B was 24.93±2.89 which showed no statistical difference in both the groups suggesting mean age of both the groups were same.



Graph 1: Age distribution in group A and B

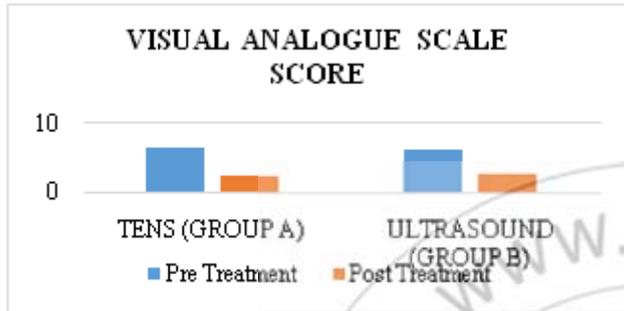
**Table 1:** Age distribution in group A and B

Parameter	Group A		Group B		'p' value	't' value
	Mean	SD	Mean	SD		
Age	25.13	2.41	24.93	2.89	0.8386	0.2056

2. Outcome measures:

**1. Visual analogue scale:**

In the present study pre interventional mean of Visual analogue scale was  $6.49 \pm 1.20$  in Group A and  $6.15 \pm 1.33$  in Group B whereas post-interventional mean of Visual analogue scale was  $2.27 \pm 1.02$  in Group A and  $2.56 \pm 0.99$  in Group B respectively



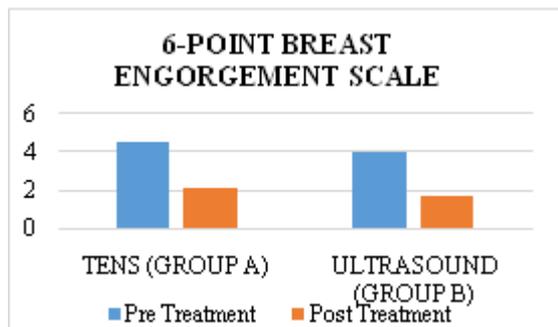
**Graph 2:** Comparison of Mean Pre-treatment and post-treatment VAS score of group A and B

**Table 2:** Comparison of Mean Pre-treatment and post-treatment VAS score of group A and B

Groups	Pre-treatment VAS score		Post-treatment VAS score		'p' value	't' value
	Mean	SD	Mean	SD		
TENS (Group A)	6.49	1.20	2.27	1.02	< 0.0001	20.15
Ultrasound (Group B)	6.15	1.33	2.56	0.99	< 0.0001	18.31

**2. 6-Point breast engorgement scale**

In the present study pre interventional mean of 6-Point breast engorgement scale was  $4.53 \pm 0.99$  in Group A and  $4 \pm 0.92$  in Group B whereas post-interventional mean of 6-Point breast engorgement scale was  $2.066 \pm 0.70$  in Group A and  $1.66 \pm 0.72$  in Group B respectively.



**Graph 3:** Comparison of Mean Pre-treatment and post-treatment 6-point breast engorgement scale score of group A and B

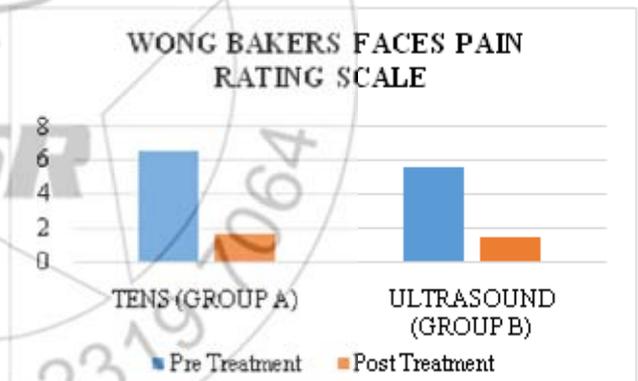
**Table 3:** Comparison of Mean Pre-treatment and post-treatment 6-point breast engorgement scale score of group A and B

Groups	Pre-treatment 6-point breast engorgement scale score		Post-treatment 6-point breast engorgement scale score		'p' value	't' value
	Mean	SD	Mean	SD		
TENS (Group A)	4.53	0.99	2.06	0.70	< 0.0001	12.85
Ultrasound (Group B)	4	0.92	1.66	0.72	< 0.0001	18.52

**3. Wong bakers faces pain rating scale:**

In the present study pre interventional mean of Wong bakers faces pain rating scale was  $6.53 \pm 1.76$  in Group A and  $5.6 \pm 1.54$  in Group B whereas post-interventional mean of Wong bakers faces pain rating scale was  $1.73 \pm 1.48$  in Group A and  $1.46 \pm 1.4$  in Group B respectively.

Groups	Pre-treatment Wong bakers faces pain rating scale score		Post-treatment Wong bakers faces pain rating scale score		'p' value	't' value
	Mean	SD	Mean	SD		
TENS (Group A)	6.53	1.76	1.73	1.48	< 0.0001	18.33
Ultrasound (Group B)	5.6	1.54	1.46	1.4	< 0.0001	13.48



**Graph 4:** Comparison of Mean Pre-treatment and post-treatment Wong bakers faces pain rating scale score of group A and B

Table 4: Comparison of Mean Pre-treatment and post-treatment Wong bakers faces pain rating scale score of group A and B

**8. Discussion**

The study "Effectiveness of ultrasound and TENS with conventional treatment in postnatal painful breast engorgement: A comparative study" was conducted to compare the two treatments and find out the best treatment method for breast engorgement. Breast engorgement is a normal biological process that typically occurs within the first 3 to 5 days postpartum. Breast engorgement may result in the breasts becoming swollen, hard, throbbing, aching, tender, and painful.

Study was conducted on 30 subjects. Subjects were divided into two groups. Pre consent was taken from each participant. The subjects were divided into group A (TENS with conventional treatment) and group B (Ultrasound with conventional treatment). The interventions were carried out twice a day for 2 days. The outcome measures for the study were subjective which includes VAS scale, 6-point self-rated breast engorgement scale and Wong baker's faces pain rating scale.

This study shows significant difference in the pre and post treatment values in both the groups. The present study supported null hypothesis which stated that there is no significant difference between the effectiveness of ultrasound and TENS in postnatal painful breast engorgement. This was confirmed using statistical analysis by using 'Paired t- test' for within group comparison and 'Unpaired t-test' for between the group comparisons. In the present study, we found that after intervention there was significant improvement in the outcome of both the groups and both the treatment methods are equally effective to treat painful breast engorgement.

In the present study mean age distribution in group A was  $25.13 \pm 2.41$  and mean age distribution in group B was  $24.93 \pm 2.89$  which showed no statistical difference in both the groups suggesting mean age of both the groups were same.

#### 1) Visual analogue scale

In the present study pre interventional mean of Visual analogue scale was  $6.49 \pm 1.20$  in Group A and  $6.15 \pm 1.33$  in Group B whereas post-interventional mean of Visual analogue scale was  $2.27 \pm 1.02$  in Group A and  $2.56 \pm 0.99$  in Group B respectively. Pre interventional mean of Visual analogue scale showed no statistical difference in both the groups which suggest that the mean score was same in both the groups. Intra group statistical analysis revealed statistically significant increase in post interventional for both the groups. This was done by using paired t test Group A ( $t=20.15$ ,  $p=0.001$ ), Group B ( $t=18.311$ ,  $p=0.001$ )

The pre and post treatment values of visual analogue scale shows extremely significant difference in group A ( $t=20.15$ ) and group B ( $t=18.31$ ). Post treatment values of both the groups do not show significant difference.

#### 2) 6-point self-rated breast engorgement scale:

In the present study pre interventional mean of 6-Point breast engorgement scale was  $4.53 \pm 0.99$  in Group A and  $4 \pm 0.92$  in Group B whereas post-interventional mean of 6-Point breast engorgement scale was  $2.066 \pm 0.70$  in Group A and  $1.66 \pm 0.72$  in Group B respectively. Pre interventional mean of 6-Point breast engorgement scale showed no statistical difference in both the groups which suggest that the mean score was same in both the groups. Intra group statistical analysis revealed statistically significant increase in post interventional for both the groups. This was done by using paired t test Group A ( $t=12.853$ ,  $p=0.001$ ), Group B ( $t=18.520$ ,  $p=0.001$ )

The pre and post treatment values of 6-point self-rated breast engorgement scale shows extremely significant difference in

group A ( $t=12.85$ ) and group B ( $t=18.52$ ). Post treatment values of both the groups do not show significant difference.

#### 3) Wong bakers faces pain rating scale:

In the present study pre interventional mean of Wong bakers faces pain rating scale was  $6.53 \pm 1.76$  in Group A and  $5.6 \pm 1.54$  in Group B whereas post-interventional mean of Wong bakers faces pain rating scale was  $1.73 \pm 1.48$  in Group A and  $1.46 \pm 1.4$  in Group B respectively. Pre interventional mean of Wong bakers faces pain rating scale showed no statistical difference in both the groups which suggest that the mean score was same in both the groups. Intra group statistical analysis revealed statistically significant increase in post interventional for both the groups. This was done by using paired t test Group A ( $t=18.330$ ,  $p=0.001$ ), Group B ( $t=13.484$ ,  $p=0.001$ )

The pre and post treatment values of Wong bakers faces pain rating scale shows extremely significant difference in group A ( $t=18.33$ ) and group B ( $t=13.48$ ). Post treatment values of both the groups do not show significant difference.

Hence the present study can provide the evidence for the use of TENS and ultrasound along with conventional treatment including hot moist packs and therapeutic massage in the management of pain and tenderness and improving the lactation in painful breast engorgement.

### 9. Conclusion

In conclusion, the present study provided evidence to support the use of both treatments methods i.e. TENS and ultrasound for painful breast engorgement. In addition, result supported that there is no significant difference between effectiveness of ultrasound and TENS with conventional treatment in postnatal painful breast engorgement. Thus the null hypothesis is proved.

### 10. Further Scope

The Sample size used in this study was relatively small. This makes it difficult to extrapolate the results on general population. This study can be done on larger population.

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### Author Profile

**Dr. Apurva A. Mahadalkar:** I have done my BPT, from Krishna college of Physiotherapy, Krishna Institute of Medical Sciences Deemed University, Karad- 415110. District: Satara, State: Maharashtra. I have done my research during graduation course in year 2016-17 under the guidance of Dr. S. Anandh from Krishna college of Physiotherapy, KIMSU, Karad, and Maharashtra, India.

**Dr. S. Anandh.** I am physiotherapist Mastered in the field of community health sciences. Presently I am working as professor in Krishna college of Physiotherapy, Krishna Institute of Medical Sciences Deemed University, Karad.