

ORIGINAL ARTICLE

IJPHY

COMPARISON OF THE EFFECTIVENESS OF TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS) VS. INTERFERENTIAL THERAPY (IFT) FOR RELIEF OF PAIN IN PRIMARY DYSMENORRHEA

¹Mayur Tukaram Revadkar¹Trineta Mohan Bhojwani

ABSTRACT

Background: Dysmenorrhea or pain during menstruation is commonly seen in young women and largely impacts their quality of life. Pain medications are largely used to tackle this situation; however, they have side effects with regular use. Safe, effective pain-relieving modalities are crucial to help women cope with this situation. There is extensive literature proving the effectiveness of TENS for relieving the pain in primary dysmenorrhea; however, literature proving the same for IFT is sparse. Thus this research aims to investigate and compare the effectiveness of both the modalities in primary dysmenorrhea.

Methods: 30 samples(17-25) were included in this study. Using the Simple Random Sampling method, the subjects were divided into two groups. One group received therapy through TENS(80-120 Hz, 20mins, Intensity as per tolerance)and the other through IFT(4PV,80-150HZ, 20 mins, Intensity as per tolerance). Electrical stimulation was given in the region of maximal pain. The Intensity of pain before and after treatment was recorded using the Numerical Pain Scale. The duration of pain relief and the need for analgesic post the therapy was also noted.

Results: TENS and IFT are both extremely effective for the relief of pain in primary dysmenorrhea ($P < 0.0001$). There is no significant difference in their effect on the comparison ($P = 0.422$). And most of the subjects in both groups did not need analgesics after therapy.

Conclusion: Both TENS and IFT are equally effective in the relief of pain in primary dysmenorrhea. However, tolerance to IFT currents is better among young women as they are medium frequency currents.

Keywords: TENS, IFT, primary dysmenorrhea, pain, quality of life, stimulation.

Received 03th October 2019, accepted 02nd December 2019, published 09th December 2019



www.ijphy.org

10.15621/ijphy/2019/v6i6/190223

CORRESPONDING AUTHOR

¹Mayur Tukaram Revadkar, MPT

Associate Professor, K. J. Somaiya College of Physiotherapy, Ayurvihar Complex, Everard Nagar, Eastern Express Highway, Sion East, Mumbai 400022,
email: mayur.kr@somaiya.edu

¹Bachelor of Physiotherapy, Project Intern,
K. J. Somaiya College of Physiotherapy, Ayurvihar Complex, Everard Nagar, Eastern Express Highway, Sion East, Mumbai 400022.

INTRODUCTION

Dysmenorrhea or menstrual cramps is pain experienced during menstruation. It usually begins around the time that menstruation begins. The pain is usually experienced in the lower abdominal/ pelvic region. It may also refer to the lower back and inner thigh region. Other symptoms of dysmenorrhea include nausea, vomiting, headaches, diarrhea etc. [1]. Dysmenorrhea is classified into two types, namely primary and secondary, based on the presence or absence of an underlying gynecological condition [2].

A combination of factors has been proposed to cause primary dysmenorrhea. They include the release of prostaglandins and other inflammatory mediators after the destruction of endometrial cells during menstruation, stimulation of type C fibers due to these mediators, alteration in uterine tone due to prostaglandins leading to stronger and faster contractions, constriction of endometrial blood vessels due to uterine activity resulting in ischemia, etc. [3].

Primary dysmenorrhea largely affects the quality of life of women, often seen as absenteeism from work or college, decreased participation in sports or other physical activities, reduced concentration during exams. In severe cases of dysmenorrhea women often find it difficult to even get out of bed [4]. Various NSAIDS (Non-steroidal anti-inflammatory drugs) and other analgesics have been advocated to reduce this pain. However, the regular consumption of these drugs can have side-effects on some individuals [5,6].

Transcutaneous nerve stimulation (TENS) and Interferential Current Therapy (IFT) are two electrical modalities that can reduce pain without any side effects. TENS is a low-frequency electrical modality that activates the pain-gate mechanism/ opioid system by exciting the sensory nerves [7]. It can provide a great degree of symptomatic pain relief by activating the natural pain relief mechanisms of the body [8]. IFT also offers pain relief in similar ways; however, the effect may be deeper as currents are produced by the 'interference' of two medium frequency currents. Also, TENS being a low-frequency electrical stimulation, is impeded by biological skin resistance. For the penetration to be deeper, the intensity must be increased which cannot be tolerated by the patient. Medium frequency currents do not face as much skin impedance and thus, the penetration with IFT is deeper [9].

There is extensive literature proving the effectiveness of TENS for relieving the pain in primary dysmenorrhea; however, literature proving the same for IFT is sparse. Thus, this research aims to study the effectiveness of IFT for primary dysmenorrhea and compare the effectiveness of both the modalities for this condition. The results of the study will give health care professionals an understanding of the effect of both the modalities on this condition. A comparison of the two helps to understand which one provides better pain relief and help women cope up with this situation effectively.

MATERIALS AND METHODS

The sample size was calculated using OpenEpi software and as per previous studies. After obtaining Institutional Review Board approval, 30 Women facing primary dysmenorrhea, within the age group of 17-25 years, with grade 2 and above of dysmenorrhea as per Verbal Multidimensional scoring system [10] (Table 1), were included in the study. Whereas, Women suffering from other gynecological conditions like PCOD, endometriosis and Married women were excluded from the study. Source of the population was K.J.Somaiya college of Physiotherapy and K. J. Somaiya hospital, tertiary health care center.

Table 1: Verbal Multidimensional Scoring System

Grade	Working Ability	Systemic Symptoms	Analgesics
Grade 0: Menstruation is not painful, and daily activity is not affected	Unaffected	None	Not Required
Grade 1: Menstruation is painful but seldom inhibits the woman's normal activity. Analgesics are seldom required — mild pain.	Rarely Affected	None	Rarely required
Grade 2: Daily activity affected. Analgesics required and gave relief so that absence from work or school is unusual. Moderate pain.	Moderately affected	Few	Required
Grade 3: Activity inhibited. Poor effect of analgesics. Vegetative symptoms, Eg: headache, tiredness, nausea, vomiting and Diarrhea, severe pain.	Inhibited	Apparent	Poor effect

Subjects were divided into two groups (A and B) by random allocation method, thus 15 in each group. Group A and B received TENS and IFT, respectively. Before therapy, similar instructions were given to all the subjects and verbal consent was taken. The outcome measure used was the Numerical Pain Scale [11]. The NPS rating before and after therapy was recorded. The duration of pain relief was also recorded.

The subjects did not take any analgesics before the therapy. However, if the subjects needed any analgesics/other modalities after the treatment, the same was recorded. Therapy was given on the days of the menstrual cycle that the subject experienced pain (day one and day two).

The following parameters were used for both the modalities. TENS: Four-channel, Conventional mode: High frequency (80-120 Hz) Duration: 20 minutes [12,13].

IFT: Quadripolar (4P-V), scanning frequency of 80-150hz. Intensity as per tolerance. Duration: 20 minutes [14,15]. The electrodes were placed in such a way that it covered the region of maximal pain with both the modalities. The region of stimulation was decided as per the patient's complaints. E.g., Back, abdominal region etc

Statistical Analysis Methods

The Mean and Standard Deviation was calculated for each group. Graph pad InStat software (version 3.10) was used for analysis. The Paired t-test was used to test results in the

IFT group as pre and post values pass normality. The Wilcoxon matched paired test was used to test results within the TENS group as post NPS values did not pass normality. The Man-Whitney test was used to compare the results of both the groups as post NPS values of TENS did not pass normality.

RESULTS

Subjects in both groups were comparable in terms of age, weight, and height. Demographic details as per table 2.

Table 2: Demographic table

	TENS	IFT
Sample Size	15	15
Age	22	21.06±1.48
BMI	23.44±4.00	22.07±1.85

Comparison of the Pre and Post NPS values within the IFT group using the Paired t-test indicated that the difference was statistically significant ($P < 0.0001$). (Graph 1)(Table 3)

Graph 1: IFT is extremely effective in the relief of pain in primary dysmenorrhea

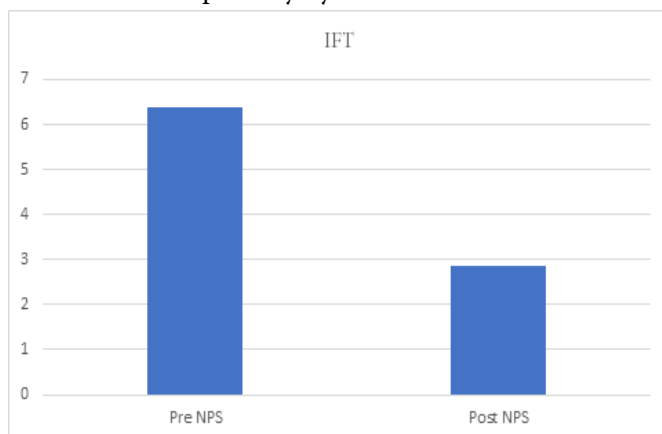


Table 3: Numerical Pain Scale Ratings in IFT

Pre NPS	Post NPS	p-value
6.4±1.24	2.86±1.99	<0.0001 (Extremely Significant)

Comparison of Pre and Post NPS values within the TENS group using the Wilcoxon matched paired test indicated that the difference was statistically significant ($P < 0.0001$). (Graph 2)(Table 4)

Graph 2: TENS is extremely effective in the relief of pain in primary dysmenorrhea

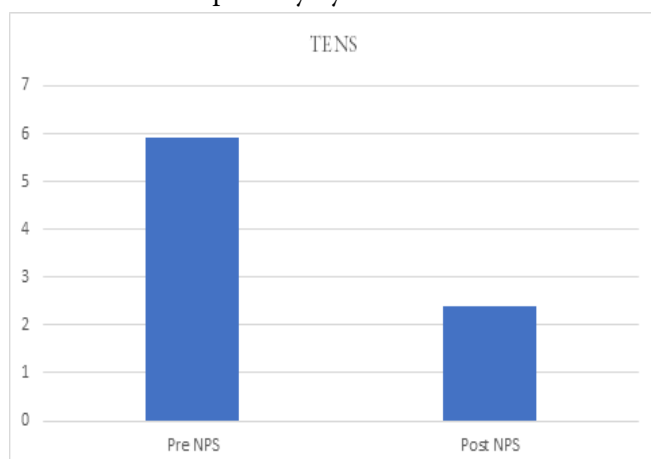


Table 4: Numerical Pain Scale Ratings in TENS

Pre NPS	Post NPS	p-value
5.93 ± 1.43	2.4 ± 2.09	<0.0001 (Extremely Significant)

Thus both IFT and TENS are extremely effective in the relief of pain in primary dysmenorrhea. A comparison of the post-therapy NPS values of the IFT and TENS group using the Man-Whitney test indicated that the difference was not statistically significant ($P = 0.422$). (Graph 3 and Table 5)

Graph 3: Both TENS and IFT are equally effective in the relief of pain in primary dysmenorrhea

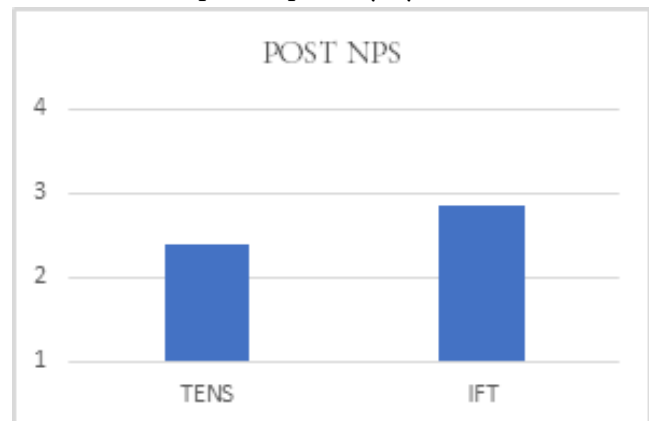


Table 5: Numerical Pain scale Ratings of both TENS and IFT

Post NPS (IFT)	Post NPS (TENS)	p-value
2.86±1.99	2.4±2.09	0.422 (Not Significant)

This indicates that both TENS and IFT are equally effective in the relief of pain in primary dysmenorrhea.

The mean duration of pain relief and the need for analgesics were recorded as secondary outcomes. The mean duration of pain relief in the TENS group was 82 minutes, and in the IFT group was 55 minutes. The returning pain intensity was much lower as compared to prior therapy. Most of the subjects in both groups did not need analgesics after treatment — only three subjects in the IFT group and two subjects in the TENS group medications required.

DISCUSSION

The aim and objective of this study were to analyze the effect of TENS and IFT on primary dysmenorrhea and to compare their effectiveness. Extensive literature exists on the effects of TENS on primary dysmenorrhea; however, enough literature does not exist to describe the effect of IFT on primary dysmenorrhea.

The group that received TENS showed extremely significant pain relief (p -value < 0.0001). The mean age of this group was 22 years. The parameters used for stimulation were that of Conventional TENS. Jeffrey S. Manheimer et al. (1985) conducted a study comparing the effect of different parameters of TENS on dysmenorrhea and it was found that Conventional TENS activates the large myelinated A alpha and beta fibers. These afferent fibers transmit proprioceptive information, which according to the

gate control therapy, inhibits the small nociceptive fibers primarily at the level of substantia gelatinosa into the dorsal horn. It was also found that the electrical paraesthesia produced by conventional tens is comfortable and does not interfere with the daily activities of the individual. Participants could go about their activities with the stimulator functioning simultaneously [10].

The group that received IFT also showed extremely significant results (P-value: <0.0001). The mean age of this group was 21.06 years. Although the use of IFT in urinary problems as incontinence and detrusor instability is presented extensively in the literature, experimental work on the analgesic effects of IFT in dysmenorrhea is sparse. Most authors claim that the amplitude-modulated interference wave is what makes IFT potentially effective. N.Tugay et al. (2007) suggested in their study that delivering this form of current between frequencies of 1 and 250 Hz will elicit a physiological response that leads to pain relief. The mechanisms of pain relief are pain gate mechanism, increased circulation, descending pain suppression, and physiological block of nerve conduction [11].

A comparison of the results in both groups indicates that the difference in the effectiveness of both the modalities is not significant (P-value =0.422). The duration of pain relief and the need for analgesics in each of the subjects was noted as secondary outcomes. The pain that returned after this duration was much lower in intensity. Some subjects did not experience any pain after therapy

It was also noted that most of the subjects in each of the groups did not need analgesics after treatment. Thus, the present study shows that IFT is equally effective as TENS for dysmenorrhea. The findings of this study prove that healthcare providers can use either of the modalities for pain relief based on other practical parameters such as availability of device, expense, tolerance of stimulation by patient etc. Sensitive patients could tolerate currents from IFT with ease as compared to TENS. TENS machines, on the other hand, are relatively inexpensive, easily available in portable and battery-operated forms. They can also be self-administered. IFT, on the other hand, is an expensive device and usually requires a therapist.

IFT and TENS are both ideal for relief of pain as no side effects were found. They can be given for long durations (10-12hours), and portable forms can be used by women continuously during activities aiding them to participate in them with ease. Gentle rubbing of skin, superficial heating or massage is other forms of non-pharmaceutical pain relief modalities; however, they cannot be used during activity due to inconvenience. Thus results of this study led us to conclude that both methods seem to be equally effective in managing primary dysmenorrhea and can contribute largely to improving the quality of life of women suffering from the same. Factors like cost, availability of the device, tolerance to currents etc can be determined while selecting the device. Future research could look at comparing different programs in these modalities and also in other age groups to better analyze the effectiveness.

The present study, however, came with a few limitations, like only women in the age group of 17-25 years were chosen; hence, this study may not stand true for women in other age groups. Ultrasonography was not performed to rule out other gynecological conditions and a control group was not formulated to rule out the placebo effect.

Conclusion

Both TENS and IFT are incredibly effective in the relief of pain in primary dysmenorrhea. In comparison, it was found that both are equally effective. However, tolerance to IFT currents is better among young women as they are medium frequency currents.

Clinical Significance

TENS and IFT can largely improve the quality of life of women facing primary dysmenorrhea. However, tolerance of IFT currents being medium frequency was better. As both are equally effective and have no side effects, health care providers and women can use either of them based on individual factors like cost, availability of device, tolerance etc.

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