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Original Research Article

EFFICACY OF ONE TIME TRANSCUTANEOUS ELECTRICAL NEUROMUSCULAR STIMULATION (TENS) IN NEXT TWO MENSTRUAL CYCLES IN PRIMARY DYSMENORRHEA

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ABSTRACT

Background: Dysmenorrhea refers to the occurrence of painful menstrual cramps of uterine origin. TENS may be an alternative treatment option for women with dysmenorrhea who wish to stop using non-steroidal anti-inflammatory drugs (NSAIDs), oral contraceptives, or other analgesics because the existing medication is ineffective, has unacceptable adverse effects, or due to personal choice. An effective non-pharmacological method of treating dysmenorrhea would be of great potential value in treating dysmenorrhea.

Materials and Methods: 50 females with age group of 20-30 years having moderate or severe degree of disability due to dysmenorrhea with VAS score $\geq$ 7 without athletic background were taken into the study. Conventional TENS was applied on 1st and 2nd day of menses over the abdomen in criss-cross pattern and effect of TENS was evaluated in present and next two menstrual cycles. Assessment tools were Visual analogue scale (VAS), Short-form McGill Pain Questionnaire(SF-MPQ) and Short-form Moos Menstrual Distress Questionnaire (SF-MMDQ) and Outcome measures were Pain (assessed by VAS and SF-MPQ), Quality of life (assessed by SF-MMDQ) and Number of analgesics used.

Results: The present study demonstrates that there is decrease in pain and improvement in quality of life after application of TENS in present cycle as well as in next two menstrual cycles in primary dysmenorrhea as evident by decrease in VAS (mean) score, SF-MPQ (mean) score and SF-MMDQ (mean) score(p=0.05).

Conclusion: Conventional TENS is effective in relieving pain and improving quality of life in moderate degree of disability due to primary dysmenorrhea. Majority of subjects have shown relief of pain and improvement in quality of life in next 2 menstrual cycles and didn't need any analgesic after one time TENS treatment.

KEY WORDS: Dysmenorrhea, TENS, SF-MMDQ, Non-Steroidal Anti-Inflammatory Drugs.

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INTRODUCTION

Dysmenorrhea is defined as painful menstruation; the word is derived from the Greek words *dys*, meaning difficult/painful/abnormal; *meno*, meaning month and *rrhea*, meaning flow [1].

Dysmenorrhoea could be primary or secondary on the basis of absence or presence of pathology. Primary dysmenorrhea is seen only in ovulatory cycles usually developing within 6 to 12 months of menarche with no pathology or organic basis [2].

The levels of prostaglandin F2α are especially high during the first two days of menstruation in women with severe primary dysmenorrhea.

Vasopressin and leuko-triene concentrations have also been found to be higher in women with severe menstrual pains than in women who experience mild or no menstrual pain [2].

Secondary dysmenorrhea is menstrual pain associated with underlying pathology, and its onset may be years after menarche. It can be cused by any of a dozen or so disorders such as endometriosis, pelvic inflammatory disease, intra-uterine devices, irregular cycles or infertility problems, ovarian cysts, adenomyosis, uterine myomas or polyps, intra-uterine adhesions, or cervical stenosis [3]. The mechanism responsible for the pain in secondary dysmenorrhea varies and may not involve high levels of prostaglandins [2].

There are 3 grades of severity of dysmenorrhea. These are mild, moderate and severe. Mild degree of dysmenorrhea does not affect working ability and don't require analgesics. In moderate degree working ability is moderately affected with few systemic symptoms which get relieved by analgesics. Whereas in severe degree of disabililty females are not able to do activities of daily life and analgesics have very poor effect [4,5].

Commonly associated symptoms of menstruation and dysmenorrhea among adolescent girls are muscle stiffness, painful or tender breasts, lethargy, tiredness, irritability, inability to concentrate on work, feeling of heaviness in lower abdomen, nervousness, depression, anorexia, loss of appetite, sleeplessness and headache [6,7].

The risk factors reported in the literature for dysmennorhea are: age <20, nulliparity, higher/upper socioeconomic status, heavy menses, attempts to lose weight, physical activity, smoking, disruption of social networks, depression and anxiety; however, studies have been quite heterogeneous in terms of association [8].

Primary dysmennorhea should be diagnosed as a specific entity, but there is no laboratory test for it [9]. A focused history and physical examination are usually sufficient for diagnosis of primary dysmennorhea [10].

Severe dysmennorhea is most prevalent in young single women leading sedentary lives and its frequency has some economic importance, for patients are incapacitated from work for one or more days during each period [11]. Furthermore, dysmenorrhea is a common cause of sickness absenteeism from both classes and work by the female student community [12,13].

The prevalence of dysmenorrhea varies between 16% and 91% in women of reproductive age, with severe pain in 2%–29% of the women studied. Being a debilitating condition for many women, it has a major impact on health-related quality of life, work productivity, and health-care utilization [14].

Treatment includes medicinal therapeutic options, surgical options, non medicinal options and complementary and alternative medicine [9]. Treatments such as paracetamol, aspirin, and NSAIDs work by reducing the activity of cyclo-oxygenase pathways, thus inhibiting prostaglandin production. Treatments such as oral contraceptives work by inhibiting ovulation [15].

Transcutaneous electrical nerve stimulation (TENS) is a non-pharmacological intervention shown to be effective for pain relief in a variety of conditions. TENS may be able to alter the body's ability to receive and perceive pain signals rather than having a direct effect on uterine contractions [16]. The previously established value of TENS as a non medicinal means of pain control in both visceral and somatic pain syndromes, most specifically, labor and delievery, supports its use in dysmennorhea [17].

The purpose of this study is to evaluate the long term effect of TENS, used in present menstrual cycle, on next two menstrual cycles.

MATERIALS AND METHODS

Female participants with complain of primary dysmenorrhea from NIMS University campus and those referred to Physiotherapy O.P.D., NIMS Hospital after the initial assessment and examination in Department of Obstetrics and Gynaecology, NIMS Hospital were recruited for the study. On the basis of baseline characteristics, inclusion and exclusion criteria and willingness to participate in the study 50 female participants were selected. All the participants gave signed consent forms.

Inclusion criteria: College going females of age group 20-30 years with primary dysmenorrhea

having moderate and severe degree of disability due to dysmenorrhea reporting VAS score ≥ 7, non-athlete and willing to participate in the study.

Exclusion criteria: Primary dysmenorrhea with mild degree of disability, secondary dysmenorrhea, intermenstrual bleeding, urinary tract infection, mentally retarded females, presence of any other pathological condition like gynecological, urological, gastrointestinal, anorectal pathology etc. and use of analgesic less than 4 hours before treatment.

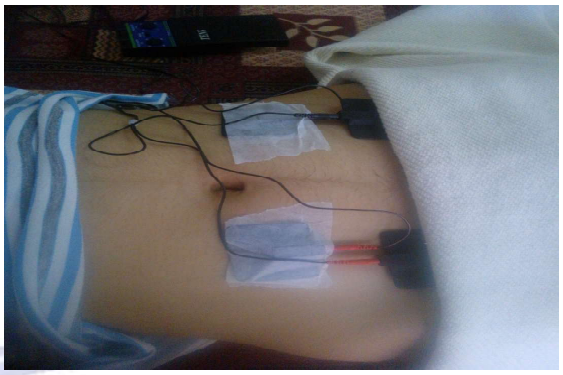
Assessment tools: Visual Analogue Scale (VAS), Short Form McGill Pain Questionnaire (SF-MPQ) and Short Form-Moos Menstrual Distress Questionnaire (SS-MMDQ).

Outcome measures: Pain (assessed by VAS and SF-MPQ), Quality of life (assessed by SF-MMDQ) and number of analgesics used as reported by participants.

Procedure: All the participants were given a brief description of physiology of menstruation. All participants were asked to score their symptoms on all three assessment tools. These are Visual Analogue Scale, McGill Pain Questionnaire (short form) and Moos Menstrual Distress Questionnaire (short form).These tools were used before the treatment on the first day and after the end of treatment on the second day. All the participants were instructed not to take any analgesic at least 4 hours prior to their treatment. All the participants were told to keep a record of number of analgesics used after the treatment and duration of relief in their symptoms after the physiotherapy treatment. To determine any long term effect of the treatment, all participants scored their symptoms on all the 3 assessment tools on the last day of the next two menstrual cycles.

All the participants were given TENS in supine lying position. The parameters of TENS were high frequency of 100 Hz with narrow pulse width of 70 µs having continuous pulse pattern with intensity producing a comfortable perceptible paresthesia without muscle contraction. Electrodes were placed in a criss-cross manner over the abdomen. Reference landmarks to put the electrodes were most anterolateral area of pain but not higher than umbilicus and not lower than ASIS. Duration of treatment was 20 minutes. All subjects received their respective treatments twice daily at a regular interval of 4-6 hrs. for first 2 days of the menses, thus total 4 sessions of treatment were given to each participant.

Fig.1 Placement of TENS electrodes (criss cross pattern).



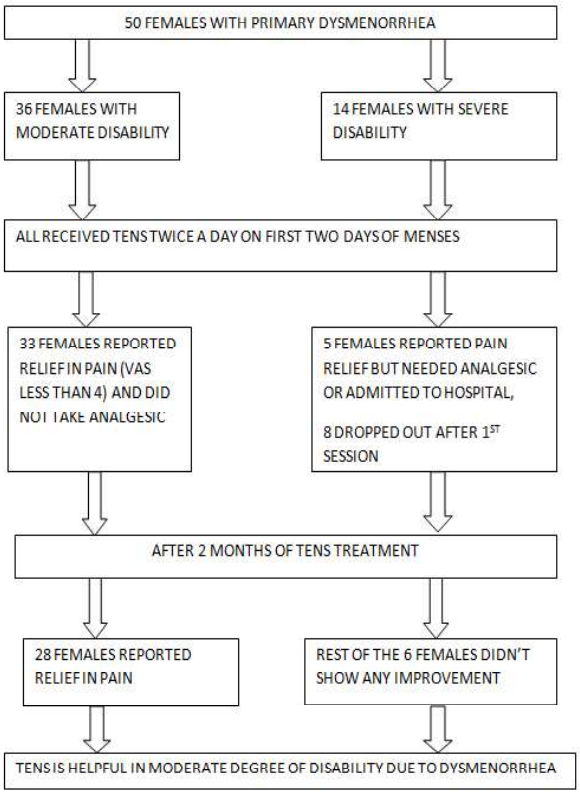
Data analysis: Data analysis with SPSS Windows Version 17.0, Related t-test was used to compare pre-treatment and post-treatment scores. Related t-test was used to compare pre-treatment scores and scores of next two menstrual cycle.

Formula used:

$$t = \frac{\sum d}{\sqrt{\frac{N\sum d^2 - (\sum d)^2}{N-1}}}$$

All the calculated t values were found to statistically significant at p=0.05.

Flow chart showing results



RESULT

The present study demonstrates that there is decrease in pain and improvement in quality of life after application of TENS in present cycle in primary dysmenorrhea as evident by decrease in VAS (mean) score, SF-MPQ (mean) score and SF-MMDQ (mean) score. The result is statistically significant with p-value 0.05.

The present study also demonstrates that there is decrease in pain and improvement in quality of life after 1st and 2nd month of treatment. The result is statistically significant with p-value 0.05.

There were total 50 subjects in the study. 36 subjects were having moderate degree of disability due to dysmenorrhea.

I. Out of these 36, 7 subjects gave history of admission to emergency department in hospital sometimes but not in every menstrual cycle. Rest all subjects reported need of 1 or 2 painkillers for first 2 days of menses.

II. Out of total 36 subjects, 33 subjects reported pain relief after application of TENS and needed no medicine. 3 subjects reported pain relief for 5-6 hrs. after application of TENS but needed one painkiller overnight due to intolerable pain and disturbance in sleep.

III. After 1st and 2nd month of treatment, 28 subjects out of 36 shown relief of symptoms, needed no painkiller and the VAS score was ≤ 4. In these 28 subjects 4 were those who needed emergency treatment sometimes.

8 out of 36 has had no relief of symptoms and had same degree of disability as in previous cycles. These subjects shown interest in TENS treatment rather than taking painkillers as their first choice.

14 subjects were having severe degree of disability due to dysmenorrhea.

i. Out of these 14, 5 subjects shown relief of pain for 1 or 2 hrs after application of TENS but very soon they needed either painkiller or admission to emergency in hospital.

ii. Out of 14, 9 subjects didn't show any appreciable improvement in pain or quality of life and took any painkiller or admitted to hospital.

iii. 8 subjects out of 14 refused for 2nd treatment

Table1: VAS score before treatment and after treatment in present cycle.

Pre- treatment VAS (mean± SD)	Post-treatment VAS (mean± SD)	t cal.	p-value
8.90±0.870	4.5±3.257	10.71	0.05

Table 2: VAS score after 1st and 2nd months of treatment.

Post treatment 1st month VAS (mean± SD)	t cal.	Post treatment 2nd month VAS (mean± SD)	t cal.	p-value
4.2±3.675	10.17	4.1±3.218	10.23	0.05

Table 3: SF-MPQ score before treatment and after treatment in present cycle.

Pre-treatment SF-MPQ score (mean± SD)	Post-treatment SF-MPQ score (mean± SD)	t cal.	p-value
21.78±2.313	9.68±8.813	10.705	0.05

Table 4: SF-MPQ score after 1st and 2nd month of treatment.

Post-treatment 1st month SF-MPQ score	t cal.	Post-treatment 2nd month SF-MPQ score	t cal.	p-value
10.21±8.453	10.671	10.19±9.813	10.254	0.05

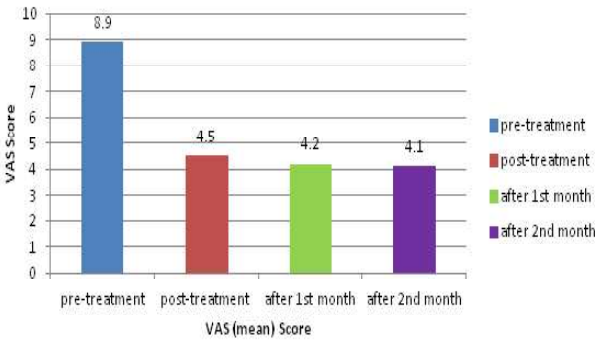
Table 5: SF-MMDQ score before treatment and after treatment in present cycle.

Pre-treatment SF-MMDQ score (mean± SD)	Post-treatment SF-MMDQ score (mean± SD)	t cal.	p-value
58.72±9.320	30.14±8.121	10.54	0.05

Table 6: MMDQ-SF score after 1st and 2nd month of treatment.

Post treatment 1st month SF-MMDQ score (mean± SD)	t cal.	Post-treatment 2nd month SF-MMDQ score (mean± SD)	t cal.	p-value
29.54±8.162	10.23	29.13±8.921	10.33	0.05

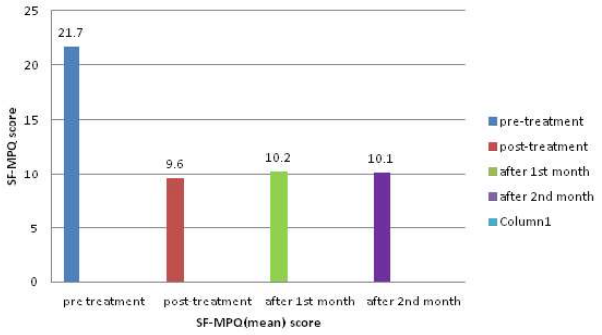
Graph 1: Comparison of mean VAS score in pre-treatment, post-treatment, after 1st month and 2nd month of treatment.



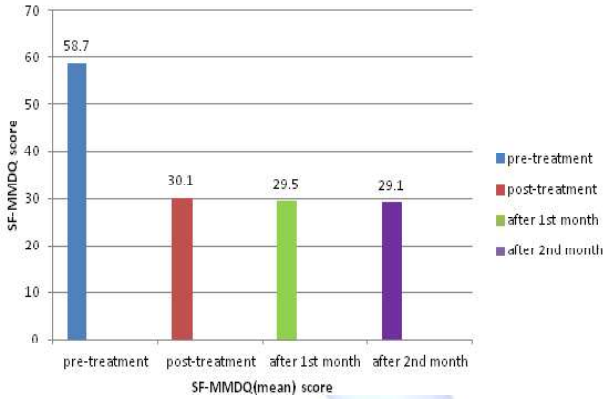
session either because of no pain due to the effect of medicines or because of dissatisfaction of 1st session.

iv. 6 out of 14 continued their treatment session but the pain relief could not be justified because of TENS application as they received emergency care in hospital or took medicines.

Graph 2: Comparison of mean SF-MPQ (mean) score in pre-treatment, post-treatment, after 1st month and 2nd month of treatment.



Graph 3: Comparison of mean SF-MMDQ score in pre-treatment, post-treatment, after 1st month and 2nd month of treatment.



DISCUSSION

Transcutaneous Electrical Nerve Stimulation (TENS) is a non pharmacological intervention that activates a complex neuronal network to reduce pain by activating descending inhibitory systems in the central nervous system to reduce hyperalgesia [18].

There were four studies comparing the use of high-frequency TENS with placebo TENS for the treatment of dysmenorrhea. Overall results showed that high-frequency TENS was more effective for pain relief than placebo TENS. When pain relief was measured with a VAS the weighted mean difference (WMD) was 45.0 (95% CI 22.5 to 67.5) in favor of high-frequency TENS (one trial).

There were three studies comparing the use of low-frequency TENS with placebo TENS and two studies comparing low-frequency TENS with a placebo pill for the treatment of dysmenorrhea. Overall results suggested no significant difference between low-frequency TENS and placebo TENS or a placebo pill for pain relief [16].

Higher intensity TENS increases the likelihood of activating extrasegmental descending pain inhibitory path- ways and activating diffuse noxious inhibitory controls via counter irritant effects TENS-induced activity in small diameter afferents (A-delta) leads to activation of the midbrain periaqueductal grey and rostral ventromedial medulla (i.e. descending inhibitory pathways) and inhibition of descending pain facilitatory pathways [19].

TENS may be an alternative treatment option for women with dysmenorrhea who wish to stop using non-steroidal anti-inflammatory drugs (NSAIDs), oral contraceptives, or other analgesics because the existing medication is ineffective, has unacceptable adverse effects, or due to personal choice [16].

Limitation of study: Sample size taken was small.

Further scope of study: Study with a large sample size can be conducted, study with athletic participants can be done, different parameters and time duration can used to evaluate the effects.

CONCLUSION

Conventional TENS is effective in relieving pain and improving quality of life in moderate degree of disability due to primary dysmenorrhea. Majority of subjects have shown relief of pain and improvement in quality of life in next 2 menstrual cycles and didn't need any analgesic after one time TENS treatment. Conventional TENS can be used to treat females with moderate degree of disability due to dysmenorrhea.

ABBREVIATION

VAS - Visual Analogue Scale.
SF-MPQ - Short Form McGill Pain Questionnaire
TENS - Transcutaneous Electrical Neuromuscular Stimulation.
SF-MMDQ - Short Form Moos Menstrual Distress Questionnaire.

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Conflicts of interest: None

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