Effect of Transcutaneous Electrical Nerve Stimulation on Migraine in Postmenopausal Women

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Abstract

Background: Migraine headaches are the 7th leading cause of disability globally, according to the world health organization. Hormonal factors may impact it, and it is ranked as the eleventh most common health problem among women throughout peri- and postmenopausal periods **Purpose:** This study was done to examine the impact of TENS on migraine in postmenopausal women. Subjects: fifty-two postmenopausal women with migraine. They will be selected from the outpatient clinic of El-Hussein University Hospital. The participants will be randomized into two equivalent groups: Group A (study group): It involved 26 women who will receive TENS for 20 minutes, 3 sessions per week for twelve weeks. Group B (control group): It involved 26 women who will receive advices only. **Methods:** Assessments were conducted using the Visual Analogue Scale (VAS) and the Migraine Disability Assessment Schedule (MIDAS) both at baseline and following 4 weeks. **Results:** After treatment, there was a mean difference of -2.92 in VAS scores across the groups. After treatment, the VAS of the study group was significantly lower than the control group. After treatment, there was a mean difference of 6.89 MIDAS scores across the groups. After treatment, MIDAS decreased significantly in the study group compared to the control group. **Conclusion:** Transcutaneous electrical nerve stimulation can be utilized on treatment of migraine in postmenopausal women. It has significant impact on VAS and MIDAS rather than advices only.

Key words: TENS, Migraine, post-menopause, Visual Analogue Scale, Migraine disability test Questionnaire.

Introduction

The menopause is a natural and significant part of a woman's life cycle. The reduction of ovarian follicular activity causes menstruation to permanently stop, which is characterized by menopause [1]. Numerous symptoms, including somatic-vegetative, psychological, as well as urogenital ones, are commonly reported by menopausal women [2]. Pre-menopause is defined as menstruation occurring at least once in the last twelve months; perimenopause is defined as alterations in the flow along with frequency of menstruation occurring for twelve months; and post-menopause is defined as the absence of menstruation for twelve months or more [3].

The capacity to work is improved when one's quality of life is improved. Reduced productivity, a rise in early workforce termination, and higher healthcare and employer community expenditures are all consequences of women experiencing severe menopausal symptoms, which raise the probability of working incapacity eightfold [4].

Constant, moderate-to-severe, unilateral throbbing pain on one side of the head, sometimes accompanied by a loss of smell, light sensitivity, nausea, as well as vomiting, is the hallmark of migraine, a central nervous system condition [5]. Recurrent pain attacks are a characteristic of migraine, a neurological illness that affects a large percentage of the population and has multiple causes. Migraine sufferers often find themselves immobilized due to the disorder's genetic predisposition toward neurovascular headaches [6]. Migraine headaches are the seventh leading cause of disability globally, according to the WHO. Hormonal variables can influence it, and it is ranked as the eleventh most common health issue among women throughout menopause and the years immediately after [7]. Migraine attacks are most common during a woman's reproductive years, but the hormonal changes that accompany menopause may exacerbate migraine symptoms in midlife, including an increase in the frequency and severity of headaches [8]. A non-invasive, low-cost, safe, and easy to use electrical technique that may be applied topically to the skin to stimulate nerves for the purpose of pain relief and disease treatment is known as transcutaneous electrical nerve stimulation (TENS) [9].

TENS stimulates large-diameter nerve fibers by use of waveforms transmitted through the skin by means of percutaneous electrodes. Analgesia, a reduction in pain and tension, is produced when this stimulation activates the central inhibitory systems. TENS also helps with relaxation, which in turn improves blood flow and decreases fatigue [10]. This study was done to examine the impact of TENS on migraine in postmenopausal women.

Materials And Methods

This study was done to examine the impact of TENS on migraine in postmenopausal women.

Subjects:

Fifty-two postmenopausal women were recruited from the outpatient clinic of El-Hussein University Hospital.

They aged from 55 to 65 yrs. Their BMI ranged from 26-30 kg/m^2. The patients were excluded if they were with Premature menopause, Cerebrovascular disease, Cardiac disease, using a peacemaker, Metal implantation, implanted cardiac rhythm devices, participants who were treated by hormonal therapy.

Patients were randomized into two groups equivalent in number:

Group (A) study group: it involved twenty _ six women and was given tens for 20 minutes, 3 sessions per week for 12 weeks).

Group (B) control group: it involved twenty _ six women and was given advices only.

Both the A and B groups of women were evaluated using the VAS for Pain and the MIDAS Questionnaire both at baseline and following the treatment. Ethical committee approval was obtained before this study could begin.

Evaluation instrumentations and procedures

1. Informed consent form:

Following a thorough description of the study's goals, advantages, and dangers, the women in both groups were requested to provide their consent. They were also informed that they could choose to withdraw from the study whenever they wanted.

2. Data collecting sheet:

Each patient was asked about (name, age, weight, height) and recorded in data collecting sheet.

Visual analogue scale (VAS):

A graphical rating system defined by equally spaced number values along a line. In this online pain rating system, where 0 indicates no pain, 1 moderate pain, 2 severe pain, 4 extremely severe pain, and 5 intolerable pain, the women were able identify the exact level of pain she was

experiencing. Prior to and following treatment, it evaluated each patient's pain using a scale that each woman was requested to rate using a selection of words that best described her pain.

Migraine assessment

The MIDAS questionnaire calculates an individual's score by adding up the number of days they were absent from work, housework, as well as non-work-related headaches, as well as the number of days they were productively decreased by at least half when at work or doing housework (the total of questions 1–5). The MIDAS score does not account for two extra items that measure the frequency and degree of pain on the MIDAS questionnaire. The MIDAS questionnaire uses the following 4-point scoring system: Grade I correspond to minimal or no disability (scores 0–5), Grade II to mild disability (scores 6–10), Grade III to moderate disability (scores 11–20), and Grade IV to severe disability (scores 21+) (12).

Treatment instrumentations and procedures

Study group (A) received transcutaneous electrical nerve stimulation (TENS) **(Figure 1).** frequency: using 60 Hz, pulse width: 30 µs, and intensity:16 mA stimulation, duration:20–30 min three sessions per week for 12 weeks (13).

The treatment will be applied while the woman in a comfortable position. Mobile phones were apart from the equipment. Explanation of equipment and the protocol of treatment to woman before the treatment

Placement of electrode:

Put one electrode on upper neck and other electrode on frontalis on the affected side. Group (B) received advices only **(Figure 2).**

Figure (1): Transcutaneous electrical nerve stimulation

Figure (2): Placement of electrodes

Statistical analysis

The subject characteristics of the two groups were compared using an independent t-test. The Shapiro-Wilk test was used to ensure that the data followed a normal distribution. The homogeneity of variances among groups was tested using Levene's test. To examine the treatment impact on VAS and MIDAS, a mixed MANOVA was used. For the following multiple comparison, post hoc tests were performed with the Bonferroni correction. All statistical tests were set to have a significance level of $p < 0.05$. For this study, we used SPSS 25 for Windows (IBM SPSS, Chicago, IL, USA) to carry out all of our statistical analysis.

Results

Subject characteristics:

The participant characteristics of both the study as well as control groups are shown in **Table 1**. Age, weight, height, BMI, and number of years till menopause did not differ significantly ($p > 0.05$).

Table 1. Comparison of subject characteristics between the group A and B:

	Study group	Control group			
	Mean ±SD	Mean ±SD	MD	t- value	p-value
Age (years)	58.54 ± 2.82	59.04 ± 2.93	-0.5	-0.62	0.53
Weight (kg)	79.69 ± 9.71	78.57 ± 8.89	1.12	0.43	0.66
Height (cm)	170.69 ± 7.47	169.08 ± 8.69	1.61	0.72	0.47
BMI (kg/m²)	27.31 ± 2.49	27.43 ± 1.49	-0.12	-0.19	0.84
Years of menopause	14.65 ± 2.63	13.88 ± 4.31	0.77	0.77	0.44

SD, Standard deviation; MD, mean difference; p value, Probability value

Impact of treatment on VAS and MIDAS:

The results of the mixed-effects MANOVA showed that the treatment and time factors interacted significantly (F = 30.19, p = 0.001). F = 7.03, p = 0.002 indicates that the treatment had a significant main impact. F = 263.25, p = 0.001 indicates a significant main impact of time.

Within group comparison

The VAS and MIDAS scores of both the treatment and control groups decreased significantly after treatment (p > 0.001). According to Table 2, the percentage change in VAS and MIDAS for the study group was 68.64% and 33.33%, respectively, whereas for the control group it was 31.67%.

Between group comparison

The groups did not differ significantly before treatment (p > 0.05). The VAS and MIDAS scores of the study group were significantly lower after treatment in comparison with the control group (p < 0.001) **(Table 2).**

Table 2. Mean VAS and MIDAS pre and post treatment of study and control groups:

	Pre treatment	Post treatment			
	Mean ±SD	**Mean ±SD**	**MD**	**% of change**	**p value**
VAS					
Study group	8.23 ± 1.63	2.62 ± 2.38	5.61	68.17	0.001
Control group	8.31 ± 1.67	5.54 ± 2.06	2.77	33.33	0.001
MD	-0.08	-2.92			
	p = 0.86	***p = 0.001***			
MIDAS					
Study group	16.42 ± 5.28	5.15 ± 3.49	11.27	68.64	0.001
Control group	17.62 ± 4.09	12.04 ± 3.77	5.58	31.67	0.001
MD	-1.2	-6.89			
	p = 0.37	***p = 0.001***			

SD, Standard deviation; MD, Mean difference; p value, Probability value

Discussion

Fifty two postmenopausal women were recruited from the outpatient clinic of El-Hussein University Hospital. They aged from 55 to 65 years there have migraine.

The findings of the study showed that TENS had significant impact on VAS and MIDAS on treatment of migraine in postmenopausal women.

Research by Riederer et al., 2015 (14) corroborated the present study's findings. The widespread use of TENS as a migraine treatment may suggest that the ST nerves are specifically targeted by this method. Furthermore, it may suggest that, despite its track record of effectiveness, stimulation could be further enhanced by increasing the recruitment of SO nerves.

In line with Martel et al., 2015 (15), the study's findings support the idea that non-invasive neuromodulation can change brain activity by stimulating nerves or neural tissue. To treat migraines, this technology is quickly becoming an effective and safe substitute for traditional pharmaceutical treatments.

A study conducted by Puledda et al., 2017 (16) corroborated the findings of the current study, which found that neuromodulation devices have been extensively researched for the treatment and prevention of migraine, especially in the last ten years.

The study's findings corroborated those of Puledda et al., 2018 (17), which found that numerous non-invasive devices have been created to alleviate migraine symptoms. These methods use electrical stimulation of the central or peripheral nervous system to alter the pain mechanisms associated with headaches.

Conclusion

Accordingly, transcutaneous electrical nerve stimulation has a significant impact on VAS and MIDAS in treatment of migraine in postmenopausal women.

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