

Effect of Transcutaneous Electrical Nerve Stimulation (TENS) on the Relief of Dysmenorrheal Pain among Students of Applied Medical Science College At Hafer Al-Batin

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Abstract: Background: Transcutaneous electrical nerve stimulation (TENS) is non pharmacological method used by a variety of health care professionals to reduce pain in a variety of conditions including dysmenorrhoea. **Objective:** This study was conducted to assess the effect of tanscutaneous electrical nerve stimulation on the relief of dysmenorrheal pain among students in College of Applied Medical Science, Damam university at Hafer Al-Batin Governate in the Kingdom Saudi Arabia (KSA). **Setting:** This study was carried out at the College of Applied Medical Science at Hafer Al-Batin, on convenient sample of 40 students who were selected systematically from first, second and third year. **Methods:** Tools used for data collection were divided into three parts which are Structured Interview questionnaire, Visual analogue scale (VAS) and Follow up sheet **Results:** After demonstration of the procedure on the nursing students, there was significant improvement in the level of dysmenorreal pain. **Discussion and Conclusion:** According to the present study results, this tanscutaneous electrical nerve stimulation (TENS) can provide safe and effective non pharamacological method for pain relief of dysmenorrhea.

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1.Introduction

Menstrual disorders are a common presentation by late adolescence, most girls experience some problems associated with menstruation^(1,2). Dysmenorrhea is common, it is defined as a chronic, cyclic pelvic pain and occurrence of painful menstrual cramps of uterine origin. It can be intermittent with great variation in frequency, duration, intensity and clinical characteristics. It is a common gynaecological complaint that can affects 40-95 per cent of menstruating women, often so severe that these women has to stay in bed for one or two days, thereby often occasioning absence from work^(3,4).

Dysmenorrhea can be divided into two main subcategories of primary and secondary. Typically, primary dysmenorrhea (spasmodic), experienced as cramping pain in the lower abdomen, first appears soon after menarche (1-2 years), once ovulatory menstrual cycles are established and occurs just before and/or during menstruation usually begins during adolescence, occurs in women with normal pelvic anatomy and rarely persists after 30 years⁽⁵⁾. Secondary dysmenorrhea (congestive) is dysmenorrhea that occurs due to genital tract pathology, such as uterine leiomyomata or endometriosis⁽⁶⁾. Menstrual pain and distress can cause disability (loss of function and activity) and

handicap (altered social roles), which impairs quality of life⁽³⁾.

The most common symptoms of dysmenorrhea are fluctuating, spasmodic cramp and abdominal pain, this pain radiates from the lower abdomen to the inner thigh and lower back. This symptom that typically begin a few hours before or at the onset of menstrual flow and continues for a few days⁽⁷⁾. It affects half of all adolescents female today and represents the leading cause of periodic college/school absenteeism among that population⁽⁸⁾. Associated symptoms often occur with pain includes nausea, vomiting, diarrhea or constipation, headache and fainting.

Common treatment for dysmenorrhea includes medical therapies such as non-steroidal anti-inflammatory (NSAIDs) or oral contraceptive pills, both of which work by reducing uterine contractions⁽⁹⁾. Most patients with primary dysmenorrhea show subjective improvement with NSAID treatment⁽¹⁰⁾. In general, all medications can have short and long term unwanted side effects. Given the contraindications and side effects of NSAIDs as well as their limited efficacy. Herbal and dietary therapies are especially suitable for treatment of disorders such as dysmenorrhea, as they can self-administered and are often easily available from shops, pharmacies, and supermarkets⁽¹¹⁾.

CAM treatments for dysmenorrhea that have been studied include transcutaneous electrical nerve stimulation (TENS), acupuncture, acupressure, spinal manipulation, behavioral interventions, and herbal and dietary therapies⁽⁹⁾. Researchers suggest that promising evidence for the use of Chinese herbal medications in reducing menstrual pain in the treatment of primary dysmenorrhea compared to conventional medicine such as NSAIDs, the oral contraceptive pill, acupuncture, and/or application of heat⁽⁶⁾. One of non pharmacologic therapy has been shown in small series to be effective for dysmenorrhea is transcutaneous electrical nerve stimulation (TENS), which has been included in a Cochrane systematic review with conclusions of efficacy for primary dysmenorrhea⁽¹¹⁾.

TENS machine (Transcutaneous Electrical Nerve Stimulation) is the application of electrical stimulation to the skin for pain control and is a non-invasive, self-controlled, drug-free method of pain relief and it's ideal for the treatment of painful menstruation. The TENS machine pulses also encourage the body to produce higher levels of its own natural pain killing chemicals called Endorphins and Enkephalins. TENS appears to work by blocking efferent pain stimuli^(12,13,14).

Published studies have lack in detailed information about which non-pharmacological and pharmacological treatments used by adolescents for dysmenorrhea. We recently completed a clinical trial examining of the efficacy of TENS on relieving pain in students with moderate to severe primary dysmenorrhea .

Aim of the present study was to assess the effect of tans-cutaneous electrical nerve stimulation on the relief of dysmenorrheal pain among nursing students in College Of Applied Medical Science, Damam university at Hafer Al-Batin governate in KSA.

Research hypothesis

The use tans-cutaneous electrical nerve stimulation (TENS) will be effective in relieving of dysmenorrheal pain among nursing than method was previous used.

Subjects and methods:

A- Research design and setting:

A quasi-experimental design was used to carry out this study. The study was carried out in College of Applied Medical Science, Damam university at Hafer El-Batin Governorate in KSA in the period from October 2012 to the end of March 2013

B- Subjects

Convenient sample of 40 students were selected systematically from first, second and third year to participate in the above mentioned settings.

The study subjects were selected according to the following criteria

- 1) Age ranging from 17-25 years.
- 2) Free from gynecological problems
- 3) Have primary dysmenorrhea.
- 4) Medically free from chronic diseases.
- 5) Not on special dietary regiment.
- 6) Don't use any drug or physical method for relieving pain.
- 7) Regular menstruation.

C-Tools of the study:-

Three tools were developed by the researchers to collect the data for this study. These tools aimed to evaluate the effect of TENS on the relief of dysmenorrheal pain as follow .

Tool (1):

An interview questionnaire was developed by the researchers based on current literature, it was constructed in English language based on recent and related literature. This tool covered the following items:-

Part 1. Socio-Demographic characteristics for the students such as: age, telephone number, weight, height..... ect.

Part 2. Menstrual characteristics such as; ; age of menarche, period interval, duration of menstruation, forms and amount of blood loss (number of pad).

Part 3. Characteristics of dysmenorrheal pain as onset of dysmenoreal pain, occurrence of pain, site of pain and associated symptoms.

Part 4. Effect of dysmenorrheal pain on physical, psychological and daily activity of the students and previous coping methods used for relieving pain.

Tool (2). Visual analogue scale (VAS):

It is used to establish baseline level of pain. It consists of 10 cm horizontal line with words No pain on the left and unbearable on the right which represented a continuum of pain intensity. Pain intensity was evaluated by asking the study subjects to point on the line the number that represented the intensity of their pain. The scores of visual analogue scale was as follows: - No pain (0), Mild pain (1 – 3), Moderate pain (4 –5), Severe pain (6 –8), unbearable (9 –10). This tool was used before and after(two months) from application of transcutaneous electrical nerve stimulation (Lancet,1974)⁽¹⁵⁾.

Tool (3): Follow up sheet:

A Follow up sheet used by the study subjects to record the intensity of pain after the application of device, it covered the following items; associated symptoms of pain, effect of pain on psychological status, academic achievement, pain intensity, site of pain, duration of menstrual cycle, type and amount of blood loss(number of pads) before and after the

application of TENS device for a period of two consecutive months. Follow up sheet was done after the first and second month.

Scoring system of this questionnaire:- It covered 7 items as previous, a number of questions were prepared for each items assessment; (1) mark was given for positive answer and (zero) for negative answer. as regard to pain intensity it was measured by VAS as previous.

The questionnaires were tested for its content validity and relevance by a jury of five expertises in different fields of nursing at Alexandria, Tanta and Zagazig Faculty of Nursing. The experts' responses were represented in four points rating score ranging from (4-1); 4= strongly relevant, 3= relevant, 2= little relevant, and 1= not relevant. A few changes were made for a few unclear words.

The subscales' reliability values of these factors measured by Cronbach's coefficient Alpha.

D-Ethical consideration

The agreement on participation of the study subjects was taken after the aim of the study explained to them. They were given an opportunity to refuse participating and they could withdraw at any stage of the research. Additionally, they were assured that the information would be confidential and used for the research purpose only.

E-Methods of data collection:

1. Approval for data collection was obtained from the director of Faculty of Applied Medical Science at Hafer Al-Batin, Damam university for conducting the study.
2. The tools were developed by the researchers based on reviewing literature.
3. Three tools were used three times. The first time was at the beginning of the study before using TENS. The second time was 4 weeks after using TENS to show the effect of it on the students, the third time was 8 weeks after using TENS to show the effect of it on the students.
4. A pilot study was conducted on four students for two times separated by two weeks to ensure the reliability of the tool and to assess the student's acceptance to be involved in the study.
5. Once the approval was taken to carry out the study, the researchers started to collect data and implement the program of intervention in the following way:

a-All study subjects received the structured interview questionnaire (Tool 1) to estimate the student's socio-demographic and menstrual characteristics.

b-Training sessions were conducted by the researchers and re-demonstration was carried out by every student.

c-At the beginning of the first session, an orientation to the program was done; its purpose, the pretest of student's knowledge, content activities, time, location and resources. The program was conducted in Arabic language using the English terminology to be easily understood by the students.

d-Content includes: its definition, action, advantage, disadvantage, precautions, sites of placing the electrodes of the apparatus, time of application, the guideline for the procedure.

F- TENS procedure:

- Each subject notified the researchers upon onset of her pain, and a time was scheduled for that day for TENS treatment
- Before beginning treatment, the subjects completed a menstrual history questionnaire, a consent form, a visual analog scale (VAS) were used to establish a baseline level of pain.
- The subjects were lie on prone position for 30 minutes with pillow below the head, abdomen and lower legs.
- Points must be assessed before procedure are uterus, endocrine and ovary.
- The TENS machine (Elettrostimolatore MD6078) was used, it's frequency between 100-150 hertz (Hz); pulse width between 150-500 microseconds (ms), and it's intensity between 12 and 30 (milliampere) mA; electrodes were automatically adjusted and were placed on the skin at the site of pain or near to it. This technique was applied for each subject for 10-30 minutes 3 times /day during dysmenorrhea for 2 menstrual cycles.

G-Statistical analysis

All data were collected, coded, tabulated and subjected to statistical analysis. Statistical analysis is performed by statistical Package SPSS in general (version 13), also Microsoft office Excel is used for data handling and graphical presentation. Quantitative variables are described by the Mean, Standard Deviation (SD), while qualitative categorical variables are described by proportions and percentages. Descriptive statistics are used to analyze the response to individual items and the respondents' characteristics. Chi-square and P- value test used to test correlation.

3.Results:-

Table (1) summarizes the distribution of the study subject according to their general characteristics. As regard to age, the table shows that majority of students (80%) were in the age group (20-24) years old with mean age (1.79±0.42). In relation to marital status, the table shows that the three-quarters of students (75%) were single with mean(1.35+0.66). In relation to body mass index of the students, the table

shows that the (45%) of the students have body mass index range (18.5 -24.5) and (40%) of the students have range (25-29) with mean (2.65±0.802). As regard to height of the students, the table shows that the highest percentage of students (42.5%) have height >160cm with mean (2.95±1.061). In relation to weight, the table show that the highest percentage of students (27.5%) have weight 50-59 kg with mean (2.73±1.301).

Table (1): Distribution of the study subjects according to their general characteristics

General characteristics	Number	%
Age		
<19 year	7	17.5
20-24 year	32	80
>25 year	1	2.5
Mean± SD	1.85±0.427	
Marital status		
Single	30	75
Married	6	15
Divorced	4	10
Mean± SD	1.35±0.662	
Body mass index		
<18.5	1	2.5
18.5-24.5	18	45
25-29	16	40
30-35	4	10
35-39	1	2.5
Mean± SD	2.65±0.802	
Height (Cm)		
• <149	4	10
• 150- 154	11	27.5
• 155-159	8	20
• >160	17	42.5
Mean ± SD	2.95±1.061	
Weight (Kg)		
• <49	8	20
• 50-59	11	27.5
• 60-69	10	25
• 70-79	6	15
• >80	5	12.5
Mean ± SD	2.73±1.301	

Table (2) Reveals the distribution of the study subjects according to their menstrual characteristics .In relation to age at menarche, the table shows that the more than half of nursing students (55%) were in the age group (9-13) years old with mean age (2.40±817). In relation to regularity of menstruation, the table shows that (100%) of the nursing students have regular in menstruation. Also, data in table (1) indicated that 42.5% of students participates have period interval ≥ 28 days. As regard to starting of dysmenorrheal pain, the table shows that the most of nursing students (42.5%) have pain starting with menarche. In relation

to first pain sensation for the nursing student, the table shows that more than one third of students (37.5%) the pain starts with the beginning of the menstrual cycle and lasted for 48 hours .

Table (2): Distribution of the study subjects according to their menstrual characteristics

Menstrual characteristics	No	%
Age at menarche		
9-13 year	22	55
14-15 year	14	35
>15 year	4	10
Mean ± SD	2.40±.817	
Regularity of menstruation		
Yes	40	100
No	0	0
Mean ± SD	1.00±.00	
Period interval		
<25 day	8	20
25-27 day	15	37.5
>28 day	17	42.5
Mean ± SD	2.23±.768	
Starting of dysmenorrheal pain		
Starting with menarche	17	42.5
After 1 st menses 6 month	5	12.5
After 1 st menses 1year	9	22.5
After 1 st menses 2year	9	22.5
Mean ± SD	2.25±1.235	
First pain sensation		
Before or immediately prior to menses	12	30
With the beginning of the menstrual cycle and lasts 24 hours	12	30
with the beginning of the menstrual cycle and lasts 48 hours	15	37.5
Other	1	2.5
Mean ± SD	2.95±1.154	

Figure (1) shows the percentage of the coping methods which were previously used for relieving menstrual pain among study subjects, the figure shows that the majority of previous coping methods used by study subjects for menstrual pain were analgesics, hot fluids and bed rest (87.5, 85 and 72.5%), respectively and the less previous coping method was nutritional program (15%).

Table (3) Lists the impact of TENS applications on physical and psychological symptoms among study subjects. In relation to physical symptoms, there were statistical significant improvement in physical symptoms from pre to post (two month) application of TENS device as regard to (nausea and vomiting, diarrhea, constipation, headache, fatigue and tiredness and fainting and dizziness) as follow from (85, 47.5, 40, 55, 67.5 and 62.5%) to (25, 2.5, 0.0,10,17.5 and 0.0%), respectively. As regard to psychological symptoms, there were statistical significant improvement in psychological symptoms

from pre to post (two month) application of TENS device as regard to (normal, happiness, fear and sadness, crying, shaming, irritability, nervousness and loneliness) as follow from (2.5, 0,0, 37.5, 57.5, 22, 75, 62.5 and 40%) to (60, 57.5, 5, 10, 0.0, 0.0, 0.0 and 2.5%), respectively.

Table (4) shows the effect of TENS applications on the degree and site of pain among study subjects. There were statistical significant improvement in degree of pain from pre to post (two month) application of TENS device in relation to (no pain, slight , intermediate, heavy, unbearable) as follow from (0.0, 0.0, 27.5, 40 and 32.5%) to (75, 25, 0.0, 0.0 and 0.0%), respectively. In relation to site of pain there were statistical significant difference from pre to post application of TENS device.

Table (5) indicates the effect of TENS applications on daily activities among study subjects, there were statistical significant improvement in daily

activities from pre to post of TENS application as regards to (daily routine, lectures achievement, absence from college) from (72.5, 62.5 and 97.5%) to (10, 2.5 and 0.0%), respectively. As regard to absenteeism there were 100% no absenteeism after two months from TENS device application.

Table (6) Shows the impact of TENS applications on menstrual characteristics among study subjects, there were statistical significant changes in menstrual characteristics from pre to post TENS applications. In relation to duration of menses there were more than one half (57.5% and 52.5) of participants have there menstrual duration long after use of TENS which become(4-5) days , in relation to types of bleeding the majority of participants (87.5%) have their menstrual flow in the form of fluids and clots after the second month. As regards to numbers of pads more than one half (57.5%) of the study subjects become used four pads per daily.

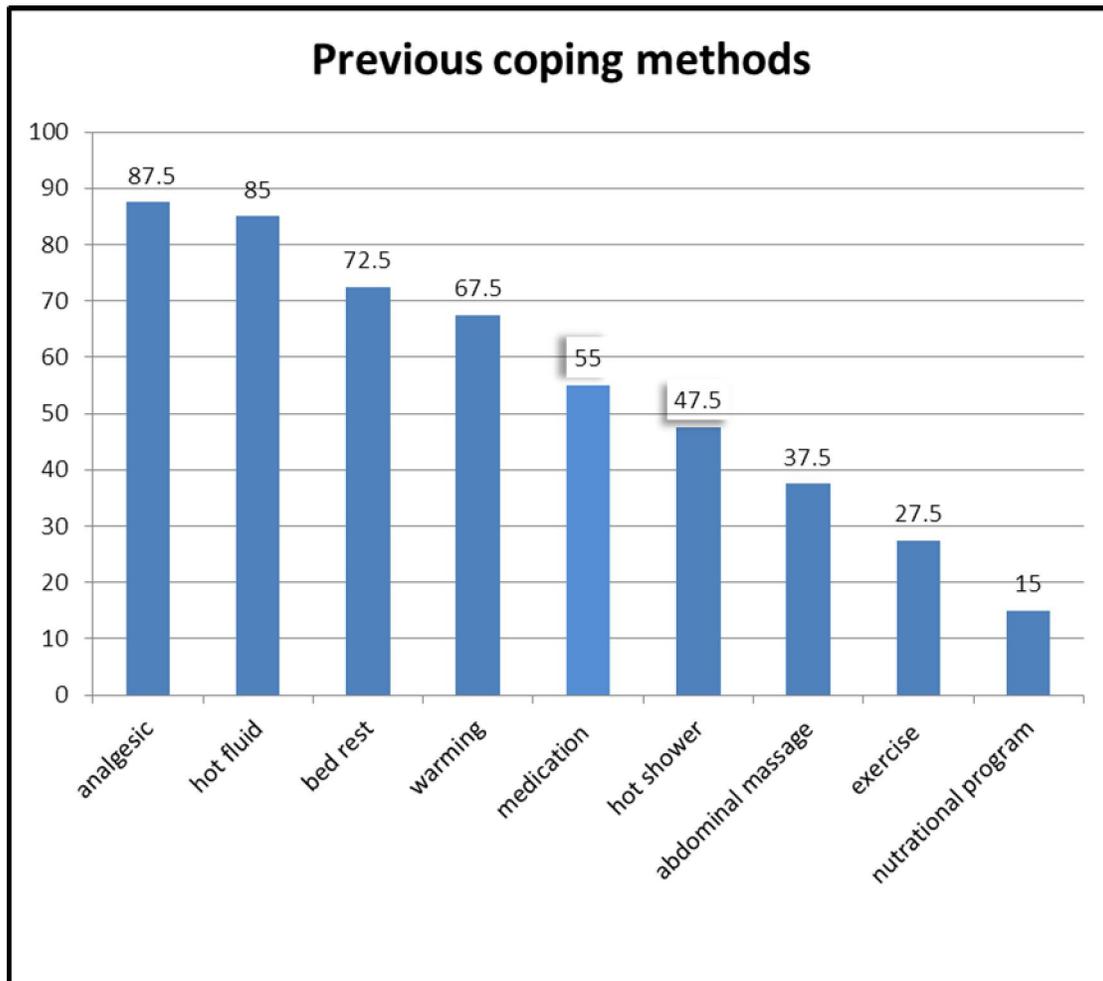


Figure 1: percentage of the coping methods which were previously used for relieving menstrual pain among study subjects.

Table (3): Impact of TENS applications on physical and psychological symptoms among study subjects

Associated symptoms	before use of TENS		After use of TENS				X ²	p-value
	No	%	1 st month		2 nd month			
*Physical symptoms	No	%	No	%	No	%		
- Nausea & vomiting	34	85	21	52.5	10	25	29.069	0.000
- Diarrhea	19	47.5	2	5	1	2.5	34.174	0.000
- Constipation	16	40	5	7	0	0	27.139	0.000
- Headache	22	55	17	42.5	4	10	18.774	0.000
- Fatigue and tiredness	27	67.5	12	30	7	17.5	22.914	0.000
- Fainting and dizziness	25	62.5	6	15	0	0.0	43.077	0.000
*Psychological symptoms								
- Normal	1	2.5	13	32.5	24	60	30.57	0.000
Happiness	0	0	15	37.5	23	57.5	31.5021	0.000
- Fear & sadness	15	37.5	12	30	2	5.0	12.641	0.002
- Crying	23	57.5	10	25	4	10	22.117	0.000
- Shaming	22	22	3	7.5	0	0	43.150	0.000
- Irritability	30	75	9	22.5	0	0	45.017	0.000
- Nervousness	25	62.5	3	7.5	0	0	52.081	0.000
- Loneliness	16	40	2	5.0	1	2.5	26.389	0.000

*More than one answer

Table (4): Effect of TENS applications on the degree and site of pain among study subjects.

Pain Characteristic	before use of TENS		after use of TENS				X ²	p-value
	NO	%	1 st Month		2 nd Month			
Degree of Pain	NO	%	NO	%	NO	%		
No pain (zero)	0	0	9	22.5	30	75	110.99	0.000
Slight pain (1-3 degrees)	0	0	18	45	10	25		
Intermediate pain (4-5 degrees)	11	27.5	9	22.5	0	0		
Heavy pain (6-7 degrees)	16	40	4	10	0	0		
Unbearable (>8 degrees)	13	32.5	0	0	0	0		
Site of pain								
Lower abdomen	36	90	19	47.5	6	15	62.811	0.000
Lower back	36	90	12	30	2	5.0		
Lower extremities	31	77.5	7	1.5	1	2.5		

Table (5): Effect of TENS applications on daily activities among study subjects

Daily Activities	Before use of TENS		After use of TENS				X ²	p-value
	NO	%	1 st Month		2 nd Month			
• Daily routine	29	72.5	23	57.5	4	10	34.219	0.000
• Lectures and clinical attendance	23	57.5	9	22.5	4	10	23.095	0.000
• Grades	21	52.5	2	5.0	0	0	43.363	0.000
• Lecture discussion	23	57.5	3	7.5	0	0	46.055	0.000
• Lecture achievement	25	62.5	3	7.5	1	2.5	48.382	0.000
Number of absenteeism								
• No absent	0	0	24	60	40	100		
• One day	1	2.5	16	40	0	0		
• Two day	39	97.5	0	0	0	0		

Table (6): Impact of TENS applications on menstrual characteristics among study subjects

Menstrual Characteristic	Before use of TENS		After use of TENS				X ²	p-value
			1 st Month		2 nd Month			
	NO	%	NO	%	NO	%		
Duration of Menses								
• 2-3day	25	62.5	1	2.5	0	0	61.33	0.000
• 4-5	12	30	23	57.5	21	52.5		
• 6-7	3	7.5	16	40	19	47.5		
Type of Bleeding								
• Fluid	3	7.5	4	10	4	10	55.544	0.000
• Clots	27	67.5	3	7.5	1	2.5		
• Fluid & clots	10	25	33	82.5	35	87.5		
Number of pads								
• Mild (one pad daily)	25	62.5	1	2.5	0	0	66.059	0.000
• Moderate (2-3 pad daily)	12	30	25	62.5	17	42.5		
• Severe (four pad daily)	3	7.5	14	35	23	57.5		

4. Discussion

Dysmenorrhea is a chronic, cyclic pelvic pain associated with menstruation⁽¹⁶⁾. There are two main types of dysmenorrhea which are, primary dysmenorrhea is defined as painful menses in women with normal pelvic anatomy and Secondary dysmenorrhea which is painful menstruation that is frequently associated with a pelvic pathology⁽¹⁷⁾. Medical therapy for dysmenorrhea commonly consists of nonsteroidal anti-inflammatory drugs or the oral contraceptive pill both of which works by reducing myometrial (uterine muscle) activity⁽¹⁸⁾. Transcutaneous electrical nerve stimulation (TENS) involves the application of low-voltage electrical currents to the skin.

This study was conducted to assess the effect of TENS on relief of dysmenorrheal pain through the menstrual cycle for relieving primary dysmenorrhea.

The present study results showed that the majority of the study subjects were in the age group (20-24) years. This finding was agreed with *Mario et al.*⁽¹⁹⁾ in Mexico who studied prevalence and impact of primary dysmenorrhea among Mexican high school students. Who reported that mean age students who answered the multiple-choice questionnaire were range between (17–26) years.

As regards body mass index (B.M.I) the present study results revealed that the majority of the study sample BMI were between normal and pre-obese range as there is no relation between dysmenorrhea and B.M.I of students because this result supported by *Shaban*⁽²⁰⁾ reported that there is no relation between dysmenorrhea and B.M.I of females. In the same line *Amita, (2008)*⁽¹⁰⁾ reported that 80% of his study subjects BMI ranged between (18.5-24.99). On the other hand the recurrent study not agreed with *Unsal (2010)*⁽²¹⁾ reported that dysmenorrhea was significantly associated with low body mass index.

Regarding menstrual characteristics the present study results showed that all of the study subjects have regular menstruation and half of them have there menses started between 9-13 years old. Meanwhile, dysmenorrheal pain starting with menrche in nearly half of them. And this pain started with the beginning of the menstrual cycle and lasts 48 hours. This result was agreed with *Gulsen et al.*⁽²²⁾ who reported that more than half of the female adolescents (53.6%) had experienced dysmenorrhea during the last one to three years. And menstrual pain primarily began at the onset of menstrual flow (45.8%) and mostly lasted for one to three days (56.6%). Only 14.9% of girls had more than 4 days of pain.

On the other hand *Santina*⁽²³⁾ who conducted a study about dysmenorrhea and menstrual experiences among Lebanese female adolescents found that the mean cycle length was 26.4 days and the average duration of menses was 6 days. Duration of menses was 6 days for 44.7% and 7 days for 55.3%. One-third of the respondents (35.2%) reported having irregular menstrual cycles.

Concerning common coping methods for relieving dysmenorrheal pain, the current study demonstrates that the most previous coping methods used by the majority of the students for menstrual pain include analgesics, hot fluids and bed rest in order. This result was agreed with *Allaire et al.*⁽²⁴⁾ who reported that female adolescents found that the participants with dysmenorrhea reported using multiple treatments to relieve their symptoms: rest (58%), medications (52%), hot fluid (26%), tea (20%), exercise (15%), and herbs (7%).

Investigating relation between effects of TENS device on physical and psychological symptoms associated with dysmenorrhea the present study results highlighted that there is statistical significant

improvement in physical symptoms from pre to post application of TENS device as regard to (nausea and vomiting, diarrhea, constipation, headache, fatigue, tiredness and fainting and dizziness).

This finding is matched with study carried out by **Dawood and Ramos** ⁽²⁵⁾ who reported that TENS alone provided good to excellent subjective pain relief in 42.4% of subjects with significantly reduced diarrhea, menstrual flow, clot formation, and fatigue.

During TENS application in menstruation, the pain scores were significantly lower using visual analogue scale, the present study results revealed that there were statistical significant improvement in degree of pain from pre to post application of TENS device as the following (no pain, slight, intermediate, heavy, unbearable) as follow from (0.0, 0.0, 27.5, 40, 32.5%) to (75, 25, 0.0, 0.0, 0.0%), respectively. In relation to site of pain there were statistical significant difference from pre to post (application of TENS device).

This finding agrees with **Parsa** ⁽²⁶⁾ who studies effectiveness of TENS on the primary dysmenorrhea his results support that using TENS could be efficient in pain reduction among women with primary dysmenorrhea. TENS alone provided good to excellent subjective pain relief in 42.4% of subjects. This result also supported by **Deborah et al.** ⁽²⁷⁾ who reported that women who suffer from primary dysmenorrhea could benefit by using TENS through pain-relieving effects. Also TENS relief of the autonomic symptoms associated with dysmenorrhea this supported with **Proctor et al.** ⁽²⁸⁾ who reported TENS is thought to excite receptors or nerve fibres which, through a complicated interaction with mediators such as serotonin and endorphins, blocks pain impulses. Moreover, **Carroll et al.** ⁽²⁹⁾ found that a significant improvement in daily activities of the students in three studied groups and the highest improvement was observed with TENS group. Also, **Proctor et al.** ⁽³⁰⁾ and **Tugay et al.** ⁽³¹⁾ reported that TENS appears to reduce pain and improve the range of movement in cases of dysmenorrhea. Moreover, **Jones** ⁽³²⁾ suggested that TENS is more effective in treating dysmenorrhea than a shame procedure. On the opposite side **Milne et al.** ⁽³³⁾ and **Khadilkar et al.** ⁽³⁴⁾ reported that no evidence to support the use of TENS in the treatment of chronic low back pain also dysmenorrhea.

Considering to the effect of dysmenorrheal pain on student's daily activities the present study results revealed that more than half of the study subjects unable to focus on their lecture, clinical attendance and lecture discussion and (97.5%) of them have two days absence from the collage before applications TENS during menstrual cycle. This finding was agreed with study carried out by

Jamicson and Steege ⁽³⁵⁾ who found that half of girls were unable to focus on their courses (50%), expressed an inability to answer the questions in the exams despite having the knowledge (26.9%), missed school (18.6%), and were unable to take tests (4.5%). One third of the subjects (31.8%) had problematic relationships with their families due to dysmenorrhea.

According to the present study results there were statistical significant changes in menstrual characteristics from pre to post application of TENS device. In relation to duration of menses half of subjects have their menstrual flow lasted for (4-5) days, in relation to types of bleeding majority of the study subject have menstrual bleeding in the form of fluids and clots. As regard to numbers of pads per day more than half of the study subjects become use four pads daily. This finding is disagreed with **Shaban** ⁽²⁰⁾ who reported that TENS therapy had the most improvement in reducing the amount of blood flow, the majority of the student (96%) had light blood loss after third month of TENS application. In addition the clotted blood was absent in TENS group after the third month of application, while the majority of the students had fluids blood loss after application of TENS group especially in third month. This finding is agreed with **Dawood and Ramos** ⁽²⁵⁾ who reported that TENS therapy provided significantly changed in menstrual characteristics as reduced in menstrual blood flow and clot formation.

Conclusion and recommendations

Transcutaneous electrical nerve stimulation appears to be safe, effective, non-medicative method in management of primary dysmenorrhea. As they are free from the potentially adverse effects of analgesics, and non-adverse effects are reported in the literature nor observed in this study. Based on the results of the current study, the following recommendations come to mind for health care, education, and research are proposed:-

- Attention needs to be given for raising the awareness of female as well as care giver about alternative therapy(non-pharmacological) for management of dysmenorrheal pain
- Complementary therapy should be an integral part of nursing education
- More research is needed to be done to evaluate the effect of another alternative therapy as herbal exercises and TENS to confirm their effectiveness in management of dysmenorrheal pain.

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