IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e- ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 7, Issue 4 Ver. X (Jul.-Aug. 2018), PP 16-26
www.iosrjournals.org

Effect of Transcutaneous Electrical Nerve Stimulation (TENS) on Pain Intensity among Female Students during Dysmenorrhea In Hafr Al Batin Region of Saudi Arabia

Dr. Randa Mohammed Abo Baker1. Dr. Farhan Khashim Alswailmi2, Dr. Shaimaa Ahmed Mustafa3

[1] ***Assist professor*** *of nursing department, College of Applied Medical Science, University of Hafr Al Batin, KSA.*

[2] ***MD,Assistant Professor*** *of Ophthalmology, Vice Dean College of Medicine, Vice Dean College of Applied Medical Sciences, Head of Surgery Department, Head of Internship Office, Director of PMO of University Hospital, Northern Borders University, Arar, KSA.*

[3] ***Lecturer*** *of Maternity & women Health department, Faculty of Nursing, Kafrelsheikh University, Egypt.*

Corresponding Author: Dr. Randa Mohammed Abo Baker

Abstract: *Transcutaneous electrical nerve stimulation (TENS) is one of electromagnetic therapy which involves the use of electromagnetic energy to diagnose or therapeutic purposes such as dysmenorrhoea.The present study* ***aim*** *to determine the Effect of Trans-Cutaneous Electrical Nerve Stimulation (TENS) on dysmenorrheal pain intensity among students. Intervention study was conducted at the College of Applied Medical Science, Hafer El-Batin university. A none-randomized (single blind) - placebo controlled clinical trial research was examined; a convenient sample of 80 students were included in the study from different stages in college, and chosen from 10% of the total students with primary dysmenorrhea at the previously mentioned setting. The sample was subjected to the* ***following criteria****: age ranging from 18-24 years, regular menstruation, not follow special dietary regiment, medically diagnosed for primary dysmenorrhea with various degree, healthy female (free from medical and obstetric diseases), not use any drug or physical method for relieving pain and finally doesn't use any complementary and alternative therapy. Data were collected through three tools:* ***Tool (I)****: Socio-Demographic and menstrual characteristics,****Tool (II)****: Dysmenorrheal pain profile,****Tool (III)****: Visual analogue scale (VAS).* ***Method****: subjects were assigned randomly into two groups of (40) the experimental; TENS unit was placed on site of pains and (40) the control; TENS placebo group. Visual analogue scale was used to measure the intensity of dysmenorrheal pain for both groups, three times, once before and twice after TENS application by two consecutive menstrual cycles.****Results****illustrated that, A highly statistically significant difference was observed among students of both groups before and after intervention, where (P =<0.0001).Moreover, another highly significant difference was also detected among students of the study group before & after first and second months of intervention in relation to their intensity of dysmenorrheal pain as measured by VAS, where (P =0.000). The study concludedthat, TENS is one of the effective non-pharmacological methods for reducing pain intensity and symptoms associated with dysmenorrhea.*

Keywords: *primary and secondary dysmenorrhea, Tans-Cutaneous* Electrical Nerve Stimulation(TENS), non-pharmacological, adolescence, menstruation, menstrual cramps.

Date of Submission: 20-08-2018 Date of acceptance: 03-09-2018

I. Introduction

Menstruation is usually associated with some minor discomforts. One of them is dysmenorrhea; it is the most common of all gynecologic complaints and one of the important unresolved problems in females [(1)]. The term 'dysmenorrhea' is derived from the Greek meaning 'difficult monthly flow. However, the word is currently referred to painful menstruation. Dysmenorrhea indicates to cramp-like, dull, and throbbing pain that originates from the lower abdomen. The incidence of dysmenorrhea pain in adolescents and young women ranges between 40% and 90% and differs with age, country of residence, and residents mass. Pain in general, is defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience resulting from actual or potential tissue damage". Recent literature has emphasized the importance of pain and recommends it as the fifth vital sign. [(1, 2)]

Dysmenorrhoea can be categorized into primary and secondary dysmenorrhoea. Primary dysmenorrhoea (spasmodic),is painful menstrual periods with 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[3] and also no macroscopically identifiable pelvic pathology, while in secondary dysmenorrhoea (congestive) a macroscopically detectable pelvic pathology is present, that occurs due to genital tract pathology, such as uterine leiomyomata or endometriosis[4].

Pathophysiology of pain in Primary dysmenorrhea is due to Progesterone withdrawal, which leads to increase Myometrial Contraction, Vasoconstriction, Hyper sensitization of pain fibers. Symptoms during Dysmenorrhea are Pain in lower abdomen, loss of appetite, irritability, depression, lethargy and infrequently swelling in ankle and knee. Main complain during dysmenorrhea is pain in lower abdomen during menstruation and may also be referred to hips, lower back, or thighs. The pain usually starts shortly before or during their menstrual period, peaks after 24 hours, and subsides after 2 to 3 days. Dysmenorrheic pain may be spasmodic in nature along with sharp pelvic cramps at the start of menstrual flow or congestive with deep, dull ache[6].

Pain management in dysmenorrhea, like in any other care, is one of the main goals of maternity care. Two models for pain management are identified, medical and midwifery models. The former model adopts pharmacologic methods of pain relief, such as Non-steroidal anti-inflammatory drugs (NSAID),oral contraceptive pills…etc. the next. Non-pharmacological methods such as hot pack, Trans-Cutaneous Electrical Nerve Stimulation (TENS)…etc. [7].TENS are one of electromagnetic therapy which involves the use of electromagnetic energy to diagnose or treat disease. Electrical stimulation is one of the oldest and most effective modalities used in physical therapy.

Common medical conditions that TENS has been used to treat. The mechanism of the effect of TENS on primary dysmenorrheal is based on the gate control theory, and the release of endogenous morphine. In addition, skin stimulation causes local vasodilation in the same dermatome area. Therefore, the pain-relieving effect of TENS on primary dysmenorrhea is also to reduce muscle ischemia of the uterus through increased blood flow to the corresponding skin area [8, 9].In regard to Treatment Time for TENS, The first treatment should be kept short (< 30 mins) to allow the female to get sensation and monitor any adverse reactions. After the initial treatment, TENS can be applied up to an hour at a time. Personal experience has leaded the professional to advise a maximum treatment period of one hour at a time. [10]

Significant of the study:

Menstrual pain and distress can cause loss of function and activity and altered social roles hence, impairs quality of life [5].TENS is commonly used by health-care professionals i.e.: doctors, midwives, obstetricians, nurses and anesthetist. Also at home by females and patients themselves. It is used as an adjunct to or replacement for pain medication. Actually TENS has an analgesic effect. [10] Egyptian studies which investigated this topic are so limited thus this study was designed to: assess the Effect of Transcutaneous Electrical Nerve Stimulation (TENS) on Pain Intensity among Female Students during Dysmenorrhea in Hafr Al Batin Region of Saudi Arabiato be baseline data for those who are interested in carrying out further research with this regard.

Aim of the Study:

Effect of Transcutaneous Electrical Nerve Stimulation (TENS) on Pain Intensity among Female Students during Dysmenorrhea in Hafr Al Batin Region of Saudi Arabia

.

Research hypothesis

Students who receive Trans-Cutaneous Electrical Nerve Stimulation (TENS) during dysmenorrheal pain exhibit less dysmenorrheal pain intensity than those who receive TENS placebo intervention.

Operational definition:

- TENS placebo intervention in this study refer to placement of the TENS unit electrodes on both sides of the vertebral column during dysmenorrheal as it will be off.
- Dysmenorrhea in this study will be only primary dysmenorrhea.

II. Subjects and Methods

Study design, setting & sampling:

Intervention study was conducted at the College of Applied Medical Science, Hafer El-Batin university. A none-randomized (single blind) - placebo controlled clinical trial research was examined; a convenient sample of 80 students were included in the study from different stages in college, and chosen from 10% of the total students with primary dysmenorrhea at the previously mentioned setting. The sample was

subjected to the ***following criteria***: age ranging from 18-24 years, regular menstruation, not follow special dietary regiment, medically diagnosed for primary dysmenorrhea with variousdegree, healthy female (free from medical and obstetric diseases), not use any drug or physical method for relieving pain and finally doesn't use any complementary and alternative therapy.

Tools of data collection:

There are three tools were used for data collection related to this study as follow:

I- Socio-Demographic and menstrual characteristics for the students *such as*: age, Wt, Ht, BMI, hight, telephone number and what's up number. Menstrual history and characteristics *such as*; age of menarche, period interval, menstruatual duration, pattern, interval, menstrual flow and number of sanitary towels.

II- Dysmenorrheal pain profile; beginning of dysmenorrheal pain, perception of pain , nature of pains, site of pains, symptom with pains, measures to relieve pain and pain relief sites (lower abdomen- lower back - lower abdomen radiating to lower back and inner thigh.

III- Visual Analogue Scale (VAS):in English language, this toolwas originally developed by Melzack and Katz (1994). [(12)] It is a subjective self - reported device used to measure pains intensity. It is a ten - point numerical scale consisting of 10 cm horizontal straight line ranging from 0-10 cm .Pain intensity is evaluated by the student to point on the line a mark & then it is measured in cm. This tool was used once before and twice after TENS application by two consecutive menstrual cycles.

Validity & reliability of tools

Tools review for relevance of items through an expert panel to reassure content and shape validity and then a pilot study was conducted for 7 students that represent 12.5% of the sample, to assess the applicability of data collection plan .According to pilot study results, tool items were modified to be clearer for the study sample as well as assessment point were organized at thesame time & data collection planwas modified.

Administrative Design and Ethical Considerations:

An official a letter containing the title and the aim was directed to the approval for data collection. Approval was obtained from the Nursing Department Counsels & the Scientific Research Ethical Committee that were approved by the College of Applied Medical Science. The approval was forwarded to the executive directors of Hafr Al Batin University to take the permission to collect data from collage.Written informed consent was obtained after explanation of the study purpose. Each of those who agree to participate in the study was assured about their confidentiality, privacy and right to withdraw from the study at any time.

Field Work:

The study consumed one year started from January 2016 to 2017 by first author, data collected from College of Applied Medical Science at University of Hafr Al Batin 3 days a week. Telephone calls & what's App messaging were used as a direct method of contact with the students to ask and follow about any problem related to application of TENS. The average time needed to complete the tools for both groups ranged between 2 to 4 hours, depending on the degree of understanding, cooperative and response of the student. The control group was started with and completed before starting the study group to avoid contamination of the sample.

Methods of data collection:

1. The researcher (first author) earned an official certificate (knowledge and practice) from The Open Academy of Complementary Medicine After training for 50 hours.
2. Approval for data collection was obtained from the director of Faculty of Medical Applied Science at Hafer Al-Batin University for conducting the study.

- Once the approval was taken to carry out the study, the researchers started to collect data and implement the intervention.
- Training sessions were conducted by the researcher and re-demonstration was carried out by every student under the supervision of the researcher to be sure that the students will perform it safely and accurately for two consecutive menstrual cycles.
- At the beginning of the first session, an orientation to the intervention was done; its purpose, the pretest of student's knowledge and practice
- In the next session the students were given handout about TENS with explanation for its (definition, action, advantage, disadvantage, precautions, placing the electrodes on pain site, duration of treatment, sites, the guideline for the procedure, side effects and precaution as well as how to use VAS.
- Application of TENS was done by the student and followed by researcher (1st author).
- The students were individually interviewed to collect the basic data from both groups using tool I as well as student privacy was considered. .

- Two tools I&IIwere used three times. Fitstly in both groups before using TENS, secondaly for two consecutive menstrual cycles to ensure its effect on the students.

3. Participants were equally assigned to one of two study groups (**Group 1**: the study group, 40 students upon whom TENS unit was applied and **Group 2**: the control group, 40 students upon whom TENS unit was used as a placebo).
4. Group I, TENS unit was placed near the student. The two pairs of skin electrodes were placed on pain site on both sides of the vertebral column by 5 cm at the level of 10^{th} thoracic to 1^{st} lumbar root. The lower pair of electrodes was at the level of the 2^{nd} to 4^{th} sacral nerves. Frequency of electrical pulse was started at 100-150 HZ. Electrical current was gradually increased till a pleasant tingling sensation was felt by the student.
5. Group II, TENS placebo group, TENS unit electrodes were applied as previously mentioned while the TENS unite was off. I.e. without any current production.
6. Using tool III (VAS) the intensity of dysmenorrheal pains was measured for both groups, three times, once before and twice after TENS application by two consecutive menstrual cycles. Each student was asked to put a mark on the line indicating their perceived intensity of pain. The duration of TENS application was from 10 minutes (as a minimum duration) to 30 minutes (as a maximum duration) for 3 times /day during dysmenorrhea.

STATISTICAL DESIGN:

The data were obtained, reviewed, prepared for computer entry, coded, analyzed, and tabulated. Data entry and analysis were done using SPSS 22.0 statistical software package and Microsoft excel program. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means for quantitative variables. Using chi square to determine relation between qualitative data. Statistical significance difference was considered.

III. Results

Table 1 reveals that, the mean age of students were (13.5 ± 33.5 years) in the experimental group, while 13.3 ± 33.3 years in the control group. As regard the students height, it was observed that the nearly half (45.00%, 47.50%) of both groups respectively were 155-<160 cm. Students who are weight from 50-59 Kg represented 40.00 % and 42.50 %) of the both groups respectively. When the body mass index was checked out, it was noticed that more than two thirds (87.5%) of experimental and (90%) of control groups were normal weight, while only the same percentage of two groups (02.50%) was BMI of 30 or greater.

Table 2 shows that (70.00%& 67.50 %) of the Experimental and control groups respectively reported that the period started at 10 - <14 years. Concerning menstrual duration the study explicates that the menstrual duration from (4-6days) for the study and control group were identical (57.50%). Regarding to menstrual pattern the study revealed that the majority (80.00%, 82.50%) of the experimental and control groups respectively were regular. Concerning menstrual interval, this table shows that (75.00% and77.5%) of both groups respectively were 25 - < 28 days. No statistical significant differences were found between the two groups in relation to their menstrual history and characteristics.

Table 3 demonstrates dysmenorrheal pain profile. It was observed that almost (47.50% &55.00%) of the experimental and the control groups respectively reported that the pain started after 1year from beginning the 1^{st} menses. Regarding perception of pain, it was noticed that about (57.5%) of both groups reported thatPerception of painstart before the period and lasts 2-4 days. Concerning nature of pains, it was found that about three-quarters (72.5 % & 77.50%) of both groups respectively had cramp. Regarding site of pain, the majority of the experimental and the control groups (70.00 % & 77.50%) reported pain in the lower abdomen respectively. However, the relationship between the two groups was detected to be not statistically significant considering their measures to relieve pain.

Table 4 illustrates that there is a highly statistically significant difference between the two groups concerning their sites of pain before and after intervention, where P= (0.000, 0.001, 0.000) respectively.

Table 5 indicates different methods of pain relief used by Saudi female students to relief dysmenorrhea before implementation of TENS, it was obvious that, the most common pharmacological methods used to relief menstrual pain were analgesia (45% and 37.5%) in the experimental& control group respectively. On the other hand, the most common non-pharmacological methods used to relief menstrual pain were hot drinks (47.5%, and 55%) in the experimental& control group respectively.

Table 6 show that the intensity of dysmenorrheal pain for both groups before intervention had almost similar intensity. After one &two months of intervention, unbearable pain decreased sharply from 15% to 0% among the experimental group, while it decreased slightly from 17.5% to 10% among the control group. Severe pain also reduced sharply from 57.5% to 10% among the experimental group, while it remained the same (60%) among the control group. Although no statistically significant difference was observed between the two groups before intervention, highly statistically significant difference was found between them after intervention.

Tables:

Table (1): Number and percent distribution of the study sample according to their socio - demographic characteristics.

Socio-demographic characteristics	Experimental group		Control group		F / χ^2 (P)
	No (40)	%	No (40)	%	
Age in (years):					
18 - <20	8	20.00	6	15.00	1.57
20 - <22	30	75.00	31	77.5	(00.26)
22 - 24	2	5.00	3	7.50	
Mean ± SD	13.5 ± 33.5		13.3 ± 33.3		
Height (Cm)					2.17
<149	2	05.00	3	07.50	(0.12)
150- <155	18	45.00	17	42.50	
155-<160	18	45.00	19	47.50	
>160	2	05.00	1	02.50	
Mean ± SD	4.0 ± 11.5		4.65 ± 11.64		
Weight (Kg)					3.05
<49	1	02.50	1	02.50	(0.03) *
50-59	16	40.00	17	42.50	
60-69	11	27.50	10	25.00	
70-79	8	20.00	8	20.00	
>80	4	10.00	4	10.00	
Mean ± SD	2.14 ± 5.30		2.23 ± 0. 59		
Body mass index					1.89
-Underweight = <18.5	1	02.50	-	-	(0.12)
-Normal weight = 18.5–24.9	35	87.50	36	90.00	
-Overweight = 25–29.9	3	07.50	3	07.50	
-Obesity = BMI of 30 or greater	1	02.50	1	02.50	
Mean ± SD	6.46 ± 16.2		6.73 ± 16.8		

χ^2 (P): Chi-Square Test &P for χ^2 Test
F (P): Fisher Exact test &P for F Test
*: Significant at P ≤0.05

Table (2):Number and percent distribution of the study sample according to their menstrual history and characteristics.

Menstrual history and characteristics.	Experimental group		Control group		F / χ2(P)
	No (40)	%	No (40)	%	
Age of menarche (year)					
- 10 - <14	28	70.00	27	67.50	14.73
- 14- < 18	11	30.00	13	32.50	(0 .195)
Mean ± SD	38.98 ± 4.11		40.18 ± 2.51		
Menstrual duration (days)	13	32.50	12	30.00	
2-3	23	57.50	23	57.50	0.151
4-6	4	10.00	5	12.50	(0.927)
7-8					
Mean ± SD	1.55 ± 1.449		1.53 ± 1.536		
Menstrual pattern					
- Regular	32	80.00	33	82.50	0.082
- Irregular	8	20.00	7	17.50	(0.775)
Mean ± SD	38.65 ± 1.001		38.68 ± 1.023		
Menstrual interval (days)					12.45
- < 25 day	8	20.00	6	15.00	(0.772)
- 25 - < 28	30	75.00	31	77.5	
- >28 day	2	5.00	3	7.50	
Menstrual flow (bleeding amount)					
- Heavy		30.00			0.058
- Moderate	12	70.00	13	32.50	(0.810)
	28		27	67.50	
Mean ± SD	2.95 ± 1.548		2.98 ± 1.656		
Number of sanitary towels (pads)					
- Mild (2 pad daily)	3	7.50	-	-	
- Moderate (3-4 pad daily)	29	72.50	27	67.50	4.26
- Severe (> 4 pad daily)	8	20.00	13	32.50	(0 .119)

χ^2 (P): Chi-Square Test &P for χ^2 Test
F (P): Fisher Exact test &P for F Test
***: Significant at P ≤0.05**

Table (3): Distribution of the study sample according to their dysmenorrheal pain profile

Dysmenorrheal pain profile	Experimental group		Control group		F / χ^2 (P)
	No (40)	%	No (40)	%	
Beginning of dysmenorrheal pain					
-Starting with menarche	1	02.50	1	02.50	0.492
-After 1st menses 6 month	2	05.00	2	05.00	(0.921)
-After 1st menses 1year	19	47.50	22	55.00	
-After 1st menses 2year	18	45.00	15	37.50	
Perception of pain					
-Start from one day or immediately before period	4	10.00	5	12.50	
-With the beginning of the period and lasts 2 days.	13	32.50	12	30.00	0.151 (0.927)
-Start before the period and lasts 2-4 days	23	57.50	23	57.50	
Nature of Pains:					
Colicky	11	27.50	9	22.50	0.267
Cramp	29	72.50	31	77.50	(0.605)
Site of pains:					
Lower abdomen	8	20.00	7	17.50	
Lower back	8	20.00	7	17.00	0.643
Lower abdomen and lower back	12	30.00	13	32.50	(0.725)
Lower abdomen radiating to lower back and inner thigh.	12	30.00	13	32.50	
Pains can be accompanied by:					
- Nausea-and-vomiting					
- Fatigue	19	47.50	22	55.00	0.537
- Diarrhea	18	45.00	16	40.00	(0.765)
	3	07.50	2	05.00	
Measures to relieve pain:		80.00	33	82.50	0.082
- Yes	32	20.00	7	17.50	(0.775)
- No	8				
Mean ± SD	38.65 ± 1.001		38.68 ± 1.023		
If yes;					
- Effective	13	32.50	11	27.50	0.299
- Relatively effective	23	57.50	24	60.00	(0.861)
- Not effective	4	10.00	5	12.50	
Mean ± SD	1.58 ± 1.448		1.63 ± 1.547		

χ^2 (P): Chi-Square Test &P for χ^2 Test
F (P): Fisher Exact test &P for F Test
*: Significant at P ≤0.05

Table (4): Distribution of the study sample according to their mean sites of pain relief before and after intervention.

Pain relief	Experimental group (No= 40)		Control Group (No = 40)		T test (P) Before	T test (P) After
	Before intervention	After intervention (1&2 month)	Before intervention	After intervention (1&2 month)		
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Lower abdomen	89.55 ± 9.212	79.93 ± 3.174	85.13 ± 6.642	97.08 ± 5.259	**2.462 (0.016)***	**17.658 (0.000)***
T test (P)	6.244 (0.000)*		8.921 (0.000)*			
Lower back	107.75 ± 12.504	119.38 ± 13.310	107.50 ± 11.435	111.00 ± 6.325	**0.093 (0.926)**	**3.597 (0.001)***
T test (P)	4.028 (0.000)*		1.693 (0.094)			
Lower abdomen radiating to the back and	20.93± 2.303	17.98± 1.993	20.25 ± 2.658	24.95 ± 2.459	**1.223 (0.225)**	**13.927 (0.000)**

inner thigh						
T test (P)	6.126 (0.000)*		8.209 (0.000)*			

#More than one answer

χ^2 : Chi Square Test

* P < 0.05 (significant)

Table (5): Distribution of the study sample according to their Methods used to relief dysmenorrhea before TENS.

Methods	**Experimental group**		**Control Group**		**^{MC}P**
	(No= 40)	**%**	**(No= 40)**	**%**	
o Pharmacological Methods:					
Sedative	1	2.50	2	5.00	**^{MC}P = 0.852**
Analgesics	18	45.00	15	37.50	
NSAIDS (Nonsteroida anti-inflammatory drugs)	11	27.50	11	27.50	
Oral contraceptives	10	25.00	12	30.00	
MEAN ± SD	117.5 ± 8.7		117.5 ± 9.3		
t (P)	**0.001 (0.999)**				
o Non-pharmacological Methods:					
- Alternative therapies Herbal remedy TENS	8 0	20.00 00.00	6 0	15.00 00.00	**^{MC}P = 0.910**
Hot bath	12	30.00	11	27.50	
Hot drinks	19	47.50	22	55.00	
Exercises	1	2.50	1	2.50	
MEAN ± SD	73.3 ± 8.3		74.5 ± 7.8		
t (P)	**0.69 (0.490)**				

^{MC}P: Mont Carlo exact probability *: significant at P ≤ 0.0

t: independnet samples t-test*: significant at P ≤ 0.0

Table (6): Distribution of the study sample according to their intensity of dysmenorrheal pain using VAS before and after TENS and TENS placebo application.

Intensity of dysmenorrheal pain using VAS	**Before TENS application**				**After TENS application (1 month)**				**After TENS application (2 month)**			
	Experimental group (G1)		**Control group (G2)**		**Experimental group (G1)**		**Control group (G2)**		**Experimental group (G1)**		**Control group (G2)**	
	No (n=40)	**%**	**No (n=40)**	**%**	**No (n=40)**	**%**	**No (n=40)**	**%**	**No (n=40)**	**%**	**No (n=40)**	**%**
- No pain (zero) - Mild pain (1 – 3 cm) - Moderate pain (4 – 6 cm) - Severe pain (7 – 9 cm) - Unbearable pain (10cm)	0 0 11 23 6	00.00 00.00 27.50 57.50 15.00	0 0 9 24 7	00.00 00.00 22.50 60.00 17.50	8 13 15 4 0	20.00 32.50 37.50 10.00 00.00	0 2 10 24 4	00.00 05.00 25.00 60.00 10.00	8 13 15 4 0	20.00 32.50 37.50 10.00 00.00	0 2 10 24 4	00.00 05.00 25.00 60.00 10.00
F/ χ^2 (P)	0.298 (0.862)				35.352 (<0.0001)*				35.352 (<0.0001)*			
χ^2 (P) before with after (one month) or (two month) for study group 40.985 (0.000)*												

χ^2 (P): Chi-Square Test &P for ^{2}Test

FET (P): Fisher Exact Test & P for FET-Test

*: Significant at P ≤0.05

IV. Discussion

Thepresent study was conducted to investigate the effect of transcutaneous electrical nerve stimulation on pain in Saudi female student with dysmenorrhea. This method has the advantage of being non-invasive, inexpensive and easy applicable technique .(13) According to the results of the current study it can be noticed that both the intervention and the control groups were matching in almost their entire socio-demographic and no statistical significant differences were found between the two groups (13). In relation to body mass index, the present study had revealed that there was no relation between two groups and body mass index. the current finding is relatively similar to the study of Alyousef et al (2013) (14), Shaban,(2011) (15,16),Amita, (2008) (17), Ali (2004) (18)who found 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. On the other hand the recurrent study not agreed with Unsal (2010) (19)reported that dysmenorrhea was significantly associated with low body mass index. This may be due to change of life style &dietary habit. Also, the current finding shows that the majority of the both groups started menarche at 10 - <14 years, while explicates that a sizable proportion (57.50%) of the two groups respectively were menstrual duration from 4-6 days.As regard to menstrual pattern the study revealed that (80.00%, 82.50%) of the experimental and the control groups were regular, while three fourth and more of both groups respectively were 25 - < 28 in menstrual interval in days. No statistical significant differences were found between the two groups in relation to their menstrual history and characteristics. The present finding is also relatively in accordance with Alyousef et al (2013) (14) who found that the age at menarche, more than half of students (55%) were in the age group (9-13) years old. Also the study agreement with Shaban 2011(15, 16)who found that more than half of the students had their menarche at 13-15 years. Another study by Abd El Fattah 2008(20), had found that more than three quarter 78% of his studied sample had their menarche at an age between 12 and less than 16 years. These similarity may be due to this age is the usual age of menarche

The present finding is also partially in accordance with Alyousef et al (2013) (14) who found that the regularity of menstruation was (100%) of the nursing students have regular in menstruation. Also the study agreement with Shaban 2011 (15, 16) who found that the majority of the students 74% had regular menstruation. In addition, the current finding is in congruence with the study of Abd El Fattah 2008(20), had found that the menstruation was regular in almost three quarter 73% of the students. The current results also matching in both groups in regularity such results may be because of the inclusion criteria in the current study (Age, free from chronic diseases, Regular menstruation…etc. on the contrary disagree with the present study by Santina et al (2012) (21) who reported that one-third of the respondents (35.2%) reported having irregular menstrual cycles.

The result of the current finding revealed that explicates that a sizable proportion (57.50%) of the two groups respectively were menstrual duration from 4-6 days. The presented result with line in Shaban 2011(15, 16) who found that, the highest percentage of students had menstrual duration between 4-6 days. On the other hand Santina et al. (2012) (21) 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%. This result is inconsistence with that of Alyousef et al (2013)who found that 62.5% from 2-3days (13). This difference may be due to change of psychological &nutritional factorsbetween samples of two studies.

The result of the current study shows that about three-quarters of both groups were 25 - < 28 in menstrual interval in days. No statistical significant differences were found between the two groups in relation to their menstrual history and characteristics. The present finding is relatively concordant with the studies of Alyousef et al (2013) (13) who found that the 42.5% of students participates have period interval ≥28 days. Also the study agreement with Shaban 2011 (14) who found that an average interval of menstruation between 25-28 days. In addition, it falls in line with the study of Ghonamy (1996)who had found that the mean length of menstrual cycle was 26 day among students in faculty of nursing at Cairo University (22).

The result of the present finding demonstrates that about half of the experimental and the control groups reported that the pain started after 1st menses 1year. Regarding perception of pain about three-fifths of both groups respectively, reported start before the period and lasts 2-4 days. On asking about nature of pains, it was found that about three-quarters of both groups had cramp, while the majority (70.00 % & 77.50%) reported pain in the lower abdomen respectively. However, the relationship between the two groups was detected to be not statistically significant considering their measures to relieve pain. The current result is relatively concordant with the study of Shaban 2011who found that dysmenorrheal was started with first menarche for almost two fifth of the studentsand the highest percentage of the students had dysmenorrhea began with the beginning of menstruation and continued to the first 24 hours also,mentioned that more than one site mentioned by student was lower abdomen and low back pain. (15, 16).

It also tallies with the study of Alyousef et al (2013)who found that dysmenorrheal pain starting with menarche in nearly half of them, hence (57.5%) of both groups respectively, reported start before the period and lasts 2-4 days and dysmenorrheal pain started with the beginning of the menstrual cycle and lasts 48 hours (14).

Moreover is in conformity with Ali (2004) who stated that more than half of the study sample had dysmenorrheal pain started in the menarche and also revealed that both low back and low abdomen was commonest site of menstrual pain in study sample. (18).Furthermore, is in harmony with the study of Gulsen et al. (2010) who reported that menstrual pain began at the onset of menstrual flow (45.8%) and mostly lasted for one to three days (56.6%) (23).

Furthermore, it conform as well with the study of Smith &Metheny (1996) stated that dysmenorrhea occurred commonly in first or second and third cycle after menarche (24). Also co-incises with the study of Mohsseb et al 2007 who showed that dysmenorrheal pain developed within hours of the start the menstruation and peaked as flow become the heaviest through the first days or two of the cycle. El-Gendy et al 2007 revealed the pains started at first day of menstruation with the pain in suprapubic area and may be radiating to low back. As such differences between the aforementioned results may be were because of differences in place, weather change and living condition between them (25, 7).

The explosive growth of knowledge in every aspect of pains occurs in recent years helped in classification and management of dysmenorrhea. More than one study explained that, Primary dysmenorrhea in teen-age girls is caused by an increase production and discharge of prostaglandin. The uterus contains profusely of smooth muscle stimulator and prior to the onset of period, prostaglandins increase in concentration. At the end of monthly cycle as the uterine lining starts to break up and shed, prostaglandins are released in the uterus causing the uterine smooth muscles to contract. These contractions compress the blood vessels in the uterus so; decreasing uterine blood & oxygen, and causing pain. With the onset of the menstrual flow, the prostaglandin is discharged into the menstrual flow, which explains why the associated painful symptoms tend to decline after the first few days of the period (7, 26, 27, 28).

The current finding revealed, on asking about nature of pains, it was found that about three-quarters of both groups respectively had cramp, while the majority of the experimental and the control groups (70.00 % & 77.50%) reported pain in the lower abdomen respectively. The present finding is also similar to the study of Shaban(2011), found the majority of students had severe pain (15, 16). It is also in agreement with the study of El-Gendy et al 2007 (7)revealed a highest percent of study sample had severe and very severe pain. In addition, the present finding is relatively in accordance with the study of Davis & Wasthoff (2001) and Taylor (2001) who mentioned that, about 15% of adolescent described their dysmenorrheal as severe. Moreover, the present finding is relatively in accordance with the study Taylor et al (2004) who found that Menstrual pain severity (worst pain and symptom intensity) (29,30,31).

The current result found that, both groups experienced pain before intervention, but after one & two months of intervention, 20% of the experimental group experienced no pain, while the control group remained the same (0%). Although no statistically significant difference was observed between the two groups before intervention& highly statistically significant difference was found between them after TENS application when assessed the intensity of dysmenorrheal pain by VAS. The present finding is relatively concordant with the study of Muragod et al (2017) who found that statistically significant with p= <0.001 for both the groups in terms of VAS.(5) It is also in line with the study conducted by Shah (2015) with the aim to compare the effect of High and Low frequency TENS they concluded that both are effective in relieving pains and management of dysmenorrhea.(32) In addition, it relatively matches with the study conducted by Hegganavar et al (2015) who found that therapies with TENS reduced pain effectively and has analgesic effects and help to improve the functional abilities in the subjects. (33)

Moreover, the current finding is in harmony with the study ofParsa&Bashirian (2013) who found that pain intensity in active TENS was significantly decreased than the placebo group(9). Another literature researches by Naka et al (2013) which dealing with different painful conditions was selected in total. A clinically relevant analgesic effect was described in 90 painful conditions (67%). In 30 painful states (22%), the outcome was inconclusive due to the study design. Most of the studies revealed an analgesic effect in various painful conditions, confirming the usefulness of TENS in clinical practice (34).Also co-incises with the study done by Wang et al (2009) who found that Pain intensity in TENS is significantly decreased than in the placebo group (p= 0.018) (35). Moreover, the present finding is consistent with the study of Patel (2016) who found that after assess the pain by VAS shows significant difference between groups and concluded that use of TENS for 3 days before or during menstrual cycle is effective in reducing pain, however use of TENS in premenstrual phase is more effective for reducing pain(36).Thus, evidence continues to emerge from both basic science and clinical trials supporting the use of TENS for the treatment of a variety of painful conditions.Furthermore, the present finding is disagreement with the study of Mistry et al 2015 who found that results were not statistically significant (p> 0.05) for VAS. Pain relief was approximately the same for the two groups (6).This difference may be due to misuse of TENS device or ineffective action of the device.

V. Conclusion And Recommendations

In the light of the present study findings, it can be concluded that:

- TENS is one of the effective non-pharmacological methods for reducing pain intensity and symptoms associated with dysmenorrhea.
- TENS application during menstruation seems to have a positive effect on reducing intensity of dysmenorrheal pain as measured by VAS.

In the light of the study findings, it is recommended that:

1. Counseling program should be developed for students about management of primary dysmenorrhea by TENS.
2. Further studies are still needed to investigating the effect of TENS on patients with common gynecologic symptoms.
3. TENS should be advocated as a non-pharmacological approach for management of dysmenorrheal pain
4. TENS should be available as one of the options for analgesia especially for students who wish to be treating with non-pharmacological management.

Limitations of the study:

- There is drop out of 3 students were excluded due to inability to follow management with TENS for 3 days and some of them take alternative therapy.
- Withdrawal from the study in mid of intervention or after finish because unable to complete sheet.
- Afraid of machine although after explanation and re-demonstration such as: Short circuit, more discomfort.
- Unable to differentiate between pain during menstruation and give true result about TENS.

References

[1]. El-Gendy S., and Rizk S. Impact of acupressure on dysmenorrhea among adolescent. The new Egyptian Journal of medicine. 36(3):1st March 20007;7-10.

[2]. Cheng Y. Normal Labor and Delivery. 2014. Available at URL: http://emedicine. Medscape. Com/article/260036-overview. Retrieved on: 16 Aug 2014.

[3]. Harel z., Dysmenorrhea in Adolescents and Young Adults: Etiology and Management. J. pediatric adolescgynecol 2006; 19(15): p 363, 371.

[4]. Yusoff D., Primary Dysmenorrhea Advances in Pathogenesis and Management Clinical Expert Series Continuing Medical Education is Available Online at www.greenjournal.org , 2006; no. 2: P108.

[5]. Muragod A, Mathias O ,Bhoir P. Effectiveness of Transcutaneous Electrical Nerve Stimulation and Diadynamic Current on Primary Dysmenorrhea : A Randomized Clinical Trial. March 2017; JMSCR Vol (5) 3, Page 18557-18562. DOI: https://dx.doi.org/10.18535/jmscr/v5i3.48.

[6]. Mistry M, Vardhan V, Palekar T, Panse R. Effect Of Conventional Tens Versus Spinal Mobilization In Primary Dysmenorrhea In Adolescent Girls: A Comparative Study. International Journal of Physiotherapy and Research, Int J Physiother Res 2015, Vol 3(5):1227-32. ISSN 2321-1822. DOI: http://dx.doi.org/10.16965/ijpr.2015.181.

[7]. Abo Baker R. Effect of Trans-Cutaneous Electrical Nerve Stimulation (TENS) on Pain Intensity during the Active Phase of the First Stage of Labor. Faculty of Nursing University of Alexandria. 2015. p 11-20.

[8]. Natures–Gate-Tens. 2014. Available at URL: http://blog.naturesgatetens.com/ page/4. Retrieved on: 30 Oct 2014.

[9]. Parsa P, Bashirian S. Effect Of Transcutaneous Electrical Nerve Stimulation (Tens) On Primary Dysmenorrhea In Adolescent Girls. J Postgrad Med Inst 2013; 27(3):326-30.

[10]. Foundations of Electrical Stimulation. 2014. Available at URL::http://media.lanecc.edu/users/thorpeb/pta101lab/FoundationsofEstim/FoundationsofEstim_print.html. Retrieved on: 1 December 2014.

[11]. National Institutes of Health. Calculate Your Body Mass Index. https://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm.

[12]. Melzac R, Katz J. Pain measurement in persons in pain. In: Wall P, Melzac R. Textbook of pain. London: Churchill Livingstone, 1994. 337-51.

[13]. Simkin P, Bolding A. Update on non-pharmacologic approaches to relieve labor pain and prevent suffering. Journal of Midwifery & Women's Health 2004; 49 (6): 489-496. DOI: 10.1016/j.jmwh.2004.07.007.

[14]. AlYousef S, Abd El-Hay S, Mohamed N, Abo Baker S. Effect of Transcutaneous Electrical Nerve Stimulation (TENS) on the Relief of Dysmenorrheal Pain among Students of Applied Medical Science College At Hafer Al-Batin. Journal of American Science 2013;9(11).

[15]. Shaban R. comparative study between three different techniques on relieving dysmenorrhea among students of faculty of nursing at Tanta University. Faculty of Nursing. Doctoral thesis, Tanta University.2011.

[16]. haban R. prevalence of dysmenorrhea among teenager. Nursing and Midwifery Research. 3rd ed., Mosby Elsevier Co., 2011; p 45-49.

[17]. Amita S., Dukhu k., Harminder S., Bithika N., Prabhakar S., Prevalence and Severity of Dysmenorrhea: A problem Related to Menstruation, Among First and Second Year Female Medical Students. Indian J. PhysiolPharmacol. 2008; 52 (4) : 389–397.

[18]. Ali H.2004. Alternative therapy for relieving dysmenorrheal pain: comparative study master degree. Faculty of nursing El-Menia University.2004.

[19]. Unsal A., Ayranci U., Tozun M., Arslan G. and Calik E., Prevalence of dysmenorrhea and its effect on quality of life among a group of female university students, Ups. J. Med. Sci., 2010;115(2): p 138-145. doi: 10.3109/03009730903457218.

[20]. Abd El Fattah H. Body Mass Index and its relation to menstrual patterns and blood pressure. Doctoral thesis. Faculty of nursing Assut University. 2008.
[21]. Santina T, Wehbe N, Ziade F. Exploring dysmenorrhoea and menstrual experiences among Lebanese female adolescents. East Mediterr Health J. 2012 Aug; 18(8):857-63.
[22]. Ghonamy, G. The menstrual symptoms, self-care & attitude toward menstruation among cairo university students. Master thesis, high institute of nursing, cairo university 1996.
[23]. Gulsen E., Funda O., Turkan P., Original Study Dysmenorrhea Prevalence Among Adolescents in Eastern Turkey: Its Effects on School Performance and Relationships With Family and Friends Health Science Faculty Ataturk University, Erzurum, Turkey Journal of Pediatr. Adolesc. Gynecol. (2010); 23: p267-272.
[24]. Smith R, Metheny W. The relationship among exercise, stress, and primary dysmenorrhea. Journal of Behavioral Medicine 1989 Dec; 12(6):569-86. DOI: 10.1007/BF00844826.
[25]. Mohasseb S, Abd El-Fattah H, and Fahmy N. Uses of Complementary and Alternative Therapy for relief of Dysmenorrheal pain: a clinical trial. The new Egyptian Journal of medicine. 31 (1), 1st July 2007.
[26]. Luesley D, Barer P. Obstetrics and Gynecology .An Evidence- based text for MRCOG. London: Arnold Co., 2004; 539-42.
[27]. Higgins J. and Green S., Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0, The Cochrane Collaboration, 2011, http://handbook.cochrane.org/.
[28]. EL-Gendy S. Impact of Acupressure on Dysmenorrheal Pain among Teen-aged Girls Students Wulfenia Journal .Klagenfurt, Austria. Feb 2015.Vol 22, (2).
[29]. Davis R& Wasthoff L. Primary dysmenorrhea in adolescent girls and treatment with oral contraceptives. J PediatrAdolesc Gynecol. 2001; 14:3-8.
[30]. Taylor, C; Lollos, C., and Lemone, P. fundamental of nursing: The art & science of nursing care, 4th ed. Philadelphia, New York, Liberary of Congress, Lippincott Williams & Wilkins, Nurse-pract-form.2001:chapter 40:1059.
[31]. Taylor D, MiaskowskiCh, Kohn J. A Randomized Clinical Trial of the Effectiveness of An Acupressure Device (Relief Brief) for Managing Symptoms of Dysmenorrhea. The Journal of Alternative and Complementary MedicineVol. 5 Jul 2004; 8 (3). https://doi.org/10.1089/10755530260128050
[32]. Shah C. To Compare the Effect of High Frequency (Conventional) Tens At
[33]. Dermatome Level & Low Frequency (Acupuncture Like) Tens at Root Level In
[34]. Pain Management of Dysmenorrhea.Indian Journal of Physical Therapy. 2015 Jun11; 2(2):34-8.
[35]. Heggannavar A, Ramannavar P, Bhodaji S. Effectiveness of diadynamic current and MENS in heel pain: a randomized clinical trial. Int J Physiotherapy Res. 2015;3(2):992-8.
[36]. Naka A, Keilani M, Loefler S, Crevenna R. Analgesic effect of TENS in different painful conditions. A literature review European Journal Translational Myology - Basic Applied Myology 2013; 23 (3): 95-104.
[37]. Wang SFLee JPWang SF, Lee JP, Hwa HL. Effect of transcutaneous electrical nerve stimulation on primary dysmenorrhea. Neuromodulation. 2009 Oct; 12(4):302-9. doi: 10.1111/j.1525-1403.2009.00226.x.
[38]. Patel V, Sheth M, Vyas N. Effect of Transcutaneous Electrical Nerve Stimulation On pain in subjects with Primary Dysmenorrhea. IAIM, 2016; 3(6): 1-5.

Dr. Randa Mohammed Abo Baker1. "Effect of Transcutaneous Electrical Nerve Stimulation (TENS) on Pain Intensityamong Female Studentsduring Dysmenorrhea In Hafr Al Batin Region of Saudi Arabia Principal Investigator"." IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 7, no.4 , 2018, pp. 16-260.