The 18th International Scientific Conference Faculty of Physical Therapy Cairo, 16-17 March, 2017

Effect of Pulsed Electromagnetic Field on Menstrual Distress in Primary Dysmenorrhic Women.

Ahmed H. Abd El Aziz*, Engy M. El Nahas*, Khadyga S. Abdul Aziz*, Hesham M. Kamal.**

*Physical Therapy Departmentof Obstetrics and Gynecology, Faculty of Physical Therapy, Cairo University.
**Department for Obstetrics and Gynecology, Faculty of Medicine, Cairo University.

ABSTRACT

***Background**: Primary dysmenorrhea is a common menstrual cramps that are recurrent and are not due to other diseases that is common cause of stay at home and school or work. **Purpose**: The purpose of this study was to investigate the effect of pulsed electromagnetic field (PEMF) on menstrual distress in primary dysmenorrhic women. **Materials and Methods:** Forty women suffering from primary dysmenorrhea were selected from Physical Therapy Department in Al Matria Teaching Hospital in Cairo. Their ages ranged from 20 to 30 years old. They were divided randomly into two groups equal in number, group (A)(Study Group), treated with pulsed electromagnetic field, 3 times /week for three months. Each session lasted for 30 minutes, in addition to medical treatment and, group (B) (Control Group) received medical treatment only [Non Steroidal Anti-Inflammatory Drugs]. Menstrual distress questionnaire and Visual analoge scale were used for assessment of menstrual distress and Pain pre and post treatment for both groups (A & B). **Results**: The results showed that there is a significant improvement in menstrual distress and pain scores in both groups (A & B) post treatment ,in favor of group (A). **Conclusion,** It was concluded that pulsed electromagnetic field is effective in improving dysmenorrhic pain and menstrual distress score.*

***Key words:** Primary Dysmenorrhea – Pulsed electromagnetic – Menstrual distress questionnaire.*

Introduction

Primary dysmenorrhea is common menstrual cramps that are recurrent and are not due to other diseases. Cramps usually begin one to two days after a woman starts getting her period. Pain usually begins 1 or 2

days before or when menstrual bleeding starts and is felt in the lower abdomen, back, or thighs and can range from mild to severe. Pain can typically last 12 to 72 hours and can be accompanied by nausea, vomiting, fatigue, and even diarrhea. Common menstrual cramps usually become less painful as a woman ages and may stop entirely if the woman has a baby **(1).**

"Dysmenorrhea" is derived from a Greek root translating to difficult menstrual flow. Primary dysmenorrhea is defined as recurrent, crampy pain occurring with menses in the absence of identifiable pelvic pathology. It usually begins in adolescence after the establishment of ovulatory cycles **(2).**

It is caused by myometrial activity resulting in uterine ischemia causing pain**(2).** This myometrialactivity is modulated and augmented by prostaglandin synthesis. Uterine contractions can last many minutes and may produce uterine pressures greater than 60 mm Hg. Multiple other factors may play a role in the perception and the severity of the pain **(3).**

Dysmenorrhea can feature different kinds of pain, including sharp, throbbing, dull, burning, or shooting pain. Dysmenorrhea may precede menstruation by several days or may accompany it, and it usually subsides as menstruation tapers off. Dysmenorrhea may coexist with excessively heavy blood loss, known as menorrhagia (**4).**

Dysmenorrhea can be classified as either primary or secondary based on the absence or presence of an underlying cause. Secondary dysmenorrhea is associated with an existing condition **(5).**

The prevalence of dysmenorrhea is estimated to be approximately 25% of women. Reports of dysmenorrhea are greatest among individuals in their late teens and 20s, with reports usually declining with age. The prevalence in adolescent females has been reported to be 67.2% by one studyand 90% by another. It has been stated that there is no significant difference in prevalence or incidence between races. Yet, a study of Hispanic adolescent females indicated a high prevalence and impact in this group. Another study indicated that dysmenorrhea was present in 36.4% of participants, and was significantly associated with lower age and lower parity **(1).**

Childbearing is said to relieve dysmenorrhea, but this does not always occur. One study indicated that in nulliparous women with primary dysmenorrhea, the severity of menstrual pain decreased significantly after age 40. A questionnaire concluded that menstrual problems, including dysmenorrhea, were more common in females who had been sexually abused **(1).**

It was concluded that 14 % of females between the ages of 20 to 35 experience symptoms so severe that they stay home from school or work. Among adolescent girls, dysmenorrhea is the leading cause of recurrent short-term school absence **(6).**

A new treatment that is able to relieve menstrual cramps is based on magnetic therapy. Magnetic therapy has been advancing for a number of years resulting in countless patients receiving much needed assistance to relieve menstrual cramps **(7).**

To relieve menstrual cramps with magnetic technology, just as with relieving any pain, it is most effective when you can stop the pain at the source. Magnetic therapy is based on a simple but effective premise. People feel pain when the pain impulses in nerves travel through body and register in the brain. Magnetic treatments are designed to stop pain impulses from reaching the brain. Magnetic treatments work when the right strength magnets are placed in the proper locations (**7&8).**

SUBJECTS, MATERIALS AND METHODS

Subjects:

The study was carried out on forty women suffering from primary dysmenorrhea. They were be selected from Physical Therapy Department in Matria Teaching Hospital.

Inclusion criteria:
Their age ranged between 20-30 years, their body mass index ranged from 18 to 25 kg/m^2, they had regular menstrual cycle.

Exclusion criteria:
Pelvic inflammatory diseases, any pelvic pathological condition, cardiac affection, and using a pace maker, metal implantations, epileptic fits and mechanical back pain.
All subjects were given a full explanation of the protocol of the study & informed consent form will be signed from each subject before participating in the study.

The subjects were divided randomly into two groups equal in number, group (A) (Study group) and group (B) (Control group).

- **Group (A)(Study group):**

It consisted of 20 women who were treated with pulsed electromagnetic field, 3 times /week for three months. Each session lasted for 30 minutes, in addition to medical treatment in form of Mefenamic acid 250 mg, three times a day for three days at onset of menstruation

Materials:

1-Weight and height scale.
It was used to measure the weight and the height to calculate the body mass index before the beginning of the study.

2-Visual Analog Scale:
It was used to assess and measure the amount of pain of each subject before and after the study.

3-Menstrual distress questionnaire:
It was used to assess the physical and psychological symptoms that associated with primary dysmenorrhea that has an effect on daily activities.

4- Pulsed electromagnetic field:

Healthwaves generator is controlled by SIMED s.r.l. software. (Level s.r.l.. SEDE LEGALE: Via Vicenza 51, 95127 Catania, Italia) advice for magneto therapy consists of the control panel, motorized bed ,and two solenoids (52 cm in diameter for the stand and 80cm in diameter for the bed). The control panel is connected to electrical mains supplying 230 V. AC 50Hz.

Graphic display, multi-function control with encoder selection through a MENU-SUBMENU, making the machine easy and intuitive to use.

Pillows and cushions were used to support body parts in comfortable relaxed position and sheets were used to cover the subjects during treatment sessions.

- **Group (B)(control group):**

It consisted of 20 women who received medical treatment only Mefenamic Acid 250 mg, three times a day for three days at onset of menstruation as group (A)

Methods:

a) Evaluation procedure:

The following evaluation procedures was used for both groups (A & B) before and after end of the period of treatment at three months

1- Pain assessment:

Assessment of pain through using visual analog scale (VAS) will be performed before and after the treatment. Each subject was asked to place a mark along the line to denote their level of pain.

A visual analog scale (VAS) was used as the primary tool for pain quantification. It is a self reported 10 cm straight line which represents the pain intensity, the two opposite ends representing no pain and worst pain. In between these two phrases, words like mild pain, moderate pain, severe

pain and very severe pain are assigned to each 2 cm distance respectively **(9)**.

2- Menstrual distress questionnaire: It was used to assess a normal menstrual cycle.

A set of questions was used to evaluate the menstrual symptomatology, which consisted of 47 symptoms under 8 different headings.

1-Pain (muscle stiffness, headache, cramps, backache, fatigue and general pains).

2-Concentration(Insomnia,Forgetfulness, Confusion,Lowered judgment, Difficulty concentrating, Distractible,Lowered motor coordination and Accidents during driving a vehicle).

3-Behavioural change(Lowered school or work performance, Take naps or stay in bed, Stay at home (absenteeism), Avoid social activities, Decreased efficiency and Change in eating habits).

4-Autonomic reaction (Dizziness, Cold sweats, Nausea and Hot flashes)

5-Water retention(Weight gain, Skin disorders, Painfull breasts and Swelling)

6-Negative effect (Crying, Loneliness, Anxiety, Restlessness, Irritability, Mood swings, Depression and Tension

7-Arousal(Affectionate, Orderliness, Excitement, Feelings of wellbeing and activity)

8-Control(Feeling of suffocation, Chest pains, Ringing in the ears, Heart pounding, Numbness and fuzzy vision)

These factors under each heading, even though represent separate will be empirically inter related clusters of symptoms **(10&11).**

b) Treatment procedure:

- **Pulsed electromagnetic field (PEMF) for Group (A)(Study group):**

It consisted of 20 women who were treated with pulsed electromagnetic field, 3 times /week, for three months. Each session lasted for 30 minutes, pulsed electromagnetic field (PEMF) applied at low frequency (below 25 Hz) and intensity of 50 Gauss with equal 60% of the maximum intensity supplied by the applicators according to the manual of (Level s.r.l.. SEDE LEGALE).

- **Non steroidal anti inflammatory drugs for both groups (A)(Study group) andgroup(B)(Control group):**

Which was Mefenamic acid 250 mg, three times a day for three days at onset of menstruation

RESULTS

1) Physical characteristics of the subjects:

Table 1 represents the physical characteristics of all subject in both groups (A&B) which showed statistically non significant difference (p>0.05) in age and body mass index (BMI).

Variables	Group (A) Study group	Group (B) Control group	t value	P value	Level of significant
Age (years)	26.20 ± 2.86	24.80 ±2.82	-1.559	p> 0.05	NS
BMI (kg/ m^2)	21.81 ± 2.31	21.92 ±2.23	0.164	p> 0.05	NS

2) Visual analoge scale scores:

Table 2 represents the VAS scores for both groups (A&B) pre and post treatment.There was a non significant statistical difference (p>0.05) between both groups (A&B) pre treatment.While, there was ahighly statistical significant difference (p< 0.001) between both groups (A&B) post treatment in favor of group (A), **(Fig.1)**.

Table2: Inter- and intra-group comparison between mean values of VAS scores in both groups (A&B).

VAS scores	Group (A) Study group	Group (B) Control group	t value	P value	Level of significant
Pre treatment	6.30 ± 1.84	6.70 ± 1.63	0.729	p>0.05	NS
Post treatment	2.75 ± 1.33	4.55± 1.54	3.955	p< 0.001	HS
Mean Difference	3.55	2.15			
% change	56.35 ↓↓	32.09 ↓↓			
t value	12.862	11.831			
P value	p< 0.001	p< 0.001			
Level of significant	HS	HS			

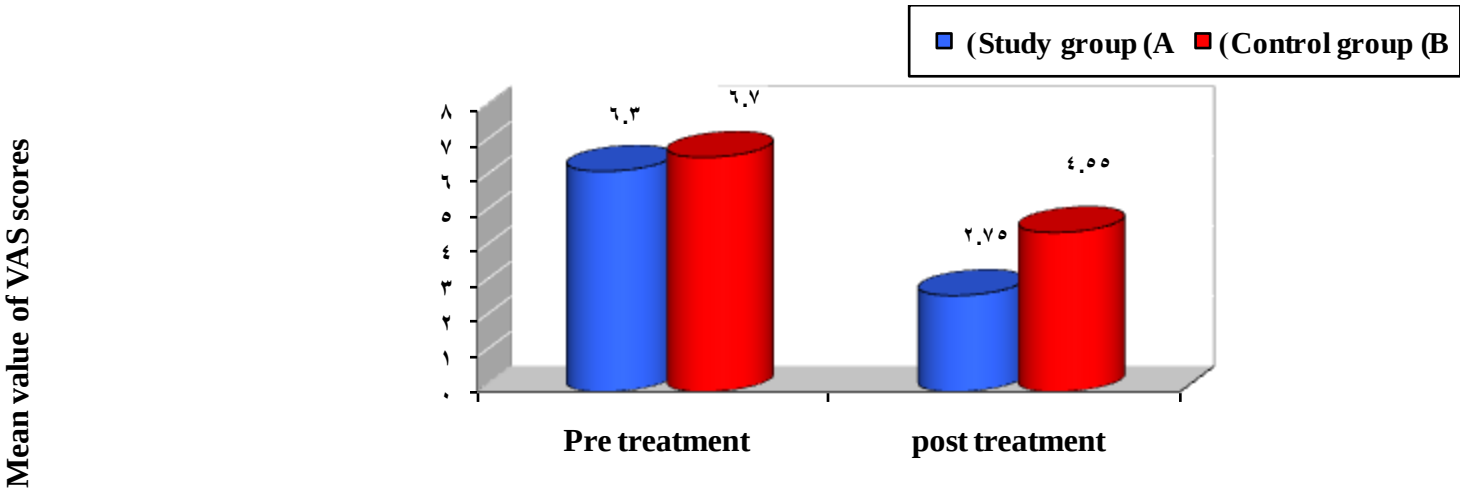

Fig. (1): Mean values of VAS in both groups (A&B) pre- and post-treatment.

3- Menstrual Distress Questionnaire (MDQ)

Table 3 Represents the menstrual distress questionnaire scores in both groups (A&B). There was a statistical non significant difference (p> 0.05) between groups (A&B) in menstrual distress questionnaire scores pre treatment.While there was a highly statistical significant difference (p<0.001) after treatment in both groups (A&B) in favor of group (A), **(Fig.2)**.

Table 3: Inter and intra-group comparison between median value of Menstrual Distress Questionnaire scores in both groups (A&B) pre- and post-treatment.

MDQ scores	Group (A) Study group	Group (B) control group	Z value	P value	Level of significant
Pre-treatment	110.0 (73.0-123.0)	103.0 (64.0-125.0)	-0.772	p> 0.05	NS

Post-treatment	65.0 (48.0-89.0)	80.5 (52.0-109.0)	-3.518	p< 0.001	HS
Z value	-3.922	-3.924			
p value	p< 0.001	p< 0.001			
Level of significant	HS	HS			

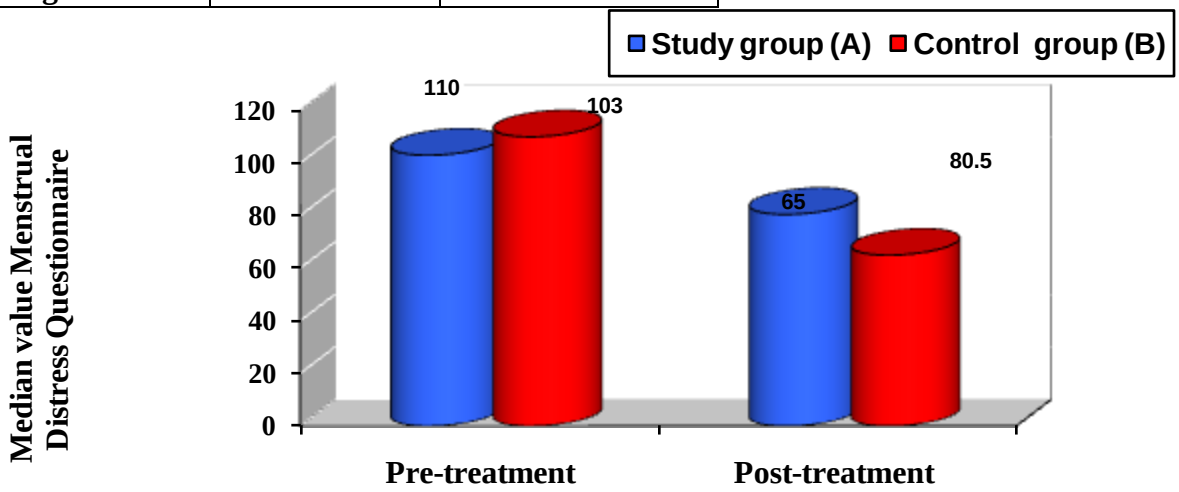

Fig.2 : Median value of Menstrual Distress Questionnaire in both groups (A&B) pre- and post-treatment.

DISCUSSION

Primary dysmenorrhea is characterized by a crampy suprapubic pain that begins somewhere between several hours before and a few hours after the onset of the menstrual bleeding. Symptoms peak with maximum blood flow **(12)** and usually last less than one day, but the pain may persist up to 2 to 3 days. Symptoms are more or less reproducible from one menstrual period to the other **(13).** The pain is characteristically colicky and located in the midline of the lower abdomen but may also be described as dull and may extend to both lower quadrants, the lumbar area, and the thighs. Frequently associated symptoms include diarrhea, nausea and vomiting, fatigue, light-headedness, headache, dizziness and, rarely, syncope and fever **(14, 15)**. These associated symptoms have been attributed to prostaglandin release **(2, 3).**

Occasionally adolescents may experience menstrual pain with their first periods without any demonstrable underlying cause, especially when the bleeding is heavy and accompanied by clots **(16).**

This study was conducted to investigate the effect of Pulsed electromagnetic field on primary dysmenorrhea. Forty women suffering of dysmenorrhea shared in this study were chosen from Al Matria Teaching Hospital in Cairo. Their ages were ranged from 20 to 30 years old. They were divided randomly into two groups equal in number, group (A) It consisted of 20 women who was treated with pulsed electromagnetic field, 3 times /week for three months. Each session lasted for 30 minutes, in addition to medical treatment (Non steroidal anti-inflammatory drugs (NSAIDs), and group (B) It consisted of 20 women who received medical treatment only (Non steroidal anti-inflammatory drugs (NSAIDs)).

Visual analog scale (VAS) and menstrual distress questionnaire were used to assess dysmenorrhic pain and pain distress.

The results showed that there was significant improvement post treatment in both groups (A&B) in favor of goup (A) regarding visual analog scale and menstrual distress questionnaire scores.

So, it can be concluded that Pulsed electromagnetic field is very effective adjunct method in reducing dysmenorrheal pain and menstrual distress.

PEMFs have been used extensively in many conditions and medical disciplines. PEMFs produced significant reduction of pain, improvement of spinal functions and reduction of paravertebral spasms**(18).**

The results agree with **(Markov,2000)**who stated that magnetic field therapy has analgesic, anti inflammatory, vasodilitation and anti oedematos activity without side effect and accompanied by an increase in the threshold of pain sensitivity and activation of the anticoagulation system. PEMF treatment stimulates production of opioid peptides; activates mast cells and increases electric capacity of muscular fibers **(20).**

stated that high frequency PEMF over 10-15 single treatments every other day either eliminates or improves, even at 2 weeks following therapy, in 80% of patients with pelvic inflammatory disease, 89% with back pain, 40% with endometriosis, 80% with postoperative pain, and 83% with lower abdominal pain of unknown cause.

The result was supported by **(22)** stated that PEMFs have also been found only slightly useful in treating pain, muscle spasms and swelling during wisdom tooth extraction**(21).**

PEMF therapy has been used successfully in the management of postsurgical pain and edema, the treatment of chronic wounds, and in facilitating vasodilatation and angiogenesis **(23).**

These results are in agreement with **(24)** who reported that magnetic fields affect pain perception in many different ways. These actions are both direct and indirect. Direct effects of magnetic fields are: neuron firing, calcium ion movement, membrane potentials, endorphin levels, nitric oxide, dopamine levels, acupuncture actions and nerve regeneration. Indirect benefits of magnetic fields on physiologic function are on: circulation, muscle, edema, tissue oxygen, inflammation, healing, prostaglandins, cellular metabolism and cell energy levels.

Also, these results are in agreement with **(25)** who reported that the effect of pulsed electromagnetic field (PEMF) therapy could be attributed to one of the following mechanisms: First, the physiological mechanism for relieving pain through presynaptic inhibition or decreasing excitability of pain fibers **(26).** Second, the molecular mechanism may through changes in the ion channels or neuronal membrane **(27).** Third, PEMF can modulate the actions of hormones, anti-bodies and neurotransmitters at surface receptor sites of a variety of cell types **(28).** Fourth, PEMF reduces inflammation, improve circulation, and improve joint mobility by its effect on connective tissue, muscles and organs **(29).**

Also, exposure to magnetic field significantly inhibits the experimentally induced inflammation and edema. PEMF was used to treat soft tissue inflammation through the magnetic field action by altering the cell membrane potential and influencing ionic fluxes. Inflammatory edema and hematoma formation were decreased by PEMF treatment and microcirculation was significantly enhanced **(30).** PEMF was used to reduce edema and improve microcirculation by facilitating water reabsorption, accelerating hematoma resolution and decreases the number of circulating neutrophils **(31).**

REFERENCSE

1. **Janssen, Rijkers, Hoppenbrouwers K, Meuleman and D'Hooghe (2013):** "Prevalence of endometriosis diagnosed by laparoscopy in adolescents with dysmenorrhea or chronic pelvic pain: A systematic review". Human Reproduction 19 (5): 570–582.

2. **Akerland M.(1979):** Pathophysiology of dysmenorrhea. Acta Obstet Gynecol ;87(Suppl):27–32.
3. **Rosenwaks Z and Seegar-Jones G. (1980):** Menstrual pain: its origin and pathogenesis. J Reprod Med.; 25(4):207–212.
4. **Vink C, Labots-Vogelesang S .and Lagro-Janssen A (2006):** "Menstruation disorders more frequent in women with a history of sexual abuse". Ned Tijdschr Geneeskd (in Dutch; Flemish) 150 (34): 1886–1890.
5. **Hacker N, George M .and Gambone J (2004):** "Essentials of Obstetrics and Gynecology", 4th ed., Elsevier Saunders, p.p.475.
6. **Proctor M, Murphy P, Pattison H, Suckling J .and Farquhar C (2007):** "Behavioural interventions for primary and secondary dysmenorrhoea". Cochrane Database Syst Rev (3): CD002248.
7. **Lethaby A, Augood C, Duckitt K .and Farquhar C (2007):** "Nonsteroidal anti-inflammatory drugs for heavy menstrual bleeding". Cochrane Database Syst Rev (4): CD000400.
8. **Proctor M, Roberts H .and Farquhar C (2001):** "Combined oral contraceptive pill (OCP) as treatment for primary dysmenorrhoea". Cochrane Database Syst Rev (4): CD002120.
9. **Larroy C.(2002):** Comparing visual-analog and numeric scales for assessing menstrual pain. Behav Med.;27:179–81.
10. **Moos R.(1969):** Typology of menstrual cycles symptoms. American Journal of Obstetrics and Gynecology, 103, 390-402.
11. **Narayanan G.(1996):** Menstrual distress questionnaire, Department of Psychology, University of Kerala, India.
12. **Coco AS. (1999):** Primary dysmenorrhea. Am Fam Physician; 60(2):489–96.
13. **Iglesias EA, Coupey SM.(1999):** Menstrual cycle abnormalities. Diagnosis and management. Adolesc Med; 10(2):255–73.
14. **Emans SJ, Laufer RL, Goldstein DP. (2005):** Pediatric & adolescent gynecology. 5th ed. Philadelphia. Lippincott, Williams & Wilkins;. p. 417–22.
15. **Twigg J. (2002):** Dysmenorrhoea. Curr Obstet Gynaecol ;12:341–5.
16. **Banikarim C, Middleman AB. (2004):**Primary dysmenorrhea in adolescents. UpToDate Online 12.2, 2004.
17. **Kobinger W, Fischer G, Barovic, T, Turk Z, Skat N. and Zivac D (2005):** Using Magnetic Fields to Increase Flexibility and Reduce Pain with Respect to Ailments of the Ambulatory Apparatus. 26th Conference of the Austrian Society for Internal Medicine.
18. **Trock, D., Bollet, A. and , Markoll, R. (2004):** The effect of pulsed electromagnetic fields in the treatment of osteoarthritis of the knee and cervical spine. Report of randomized, double blind, placebo controlled trials. J Rheumatol; 21:1903-11.
19. **Markov, M. and Colbert, A. (2000):** Magnetic and electromagnetic field therapy, Back musclosk rehabil, 17(2): 57-67.
20. **Khamaganova, I., Boinich, Z. and Arutiunova, E. (1993):** Clinical aspects of the use of a pulsed magnetic field. Fizicheskaia Meditzina 3(1-2):35-37.
21. **Dawood, M. and Yusoff, M.(2006)**. Primary Dysmenorrhea: Advances in Pathogenesis and Management,108 (2):428441.
22. **Jorgensen, W. A.; Frome, B. M. and Wallach, C. (1994):** Electrochemical therapy of pelvic pain: effects of pulsed electromagnetic fields (PEMF) on tissue trauma. Eur J Surg 160(574):83-86.
23. **Strauch, B., Herman, C., Dabb, R., Ignarro, L. and Pilla, A. (2009):** Evidence-based use of pulsed electromagnetic field therapy in clinical plastic surgery ",Aesthet Surg J., 29(2):135-43.

24. **Laurence, A. and Lynne, M. (2009):** "The Complete Idiot's Guide to Fibromyalgia" 2nd Edition: p.p. 152
25. **Mohamed, A. and Mostafa, S. (2013):** "Combined Effect of Electromagnetic Field and Therapeutic Exercises on Muscle Mass in Juvenile Rheumatoid Arthritis", Journal of American Science, 9(3): 22-27.
26. **Hinman, M.; Ford, J. and Heyl, H. (2002):** "Effects of Static magnets on chronic Knee Pain and Physical Function a double-blind study", Altern. Ther. Health Med., 8(4): 50-55.
27. **Segal, N.; Huston, J.; Fuchs, H.; Holcomb, R. and McLean, M. (1999):** "Efficacy of a static magnetic device against knee pain associated with inflammatory arthritis", J. Clin. Rheumatol., 5(5): 302-304.
28. **Adey, W. (1998):** "Physiological signaling across cell membranes and cooperative influences of extremely low frequency electromagnetic fields", In: **Frohlich, H.,** ed., Biological Choherence and Response to External Stimuli., New York, Springer-Verlag., p.p. 148-170.
29. **Hsu, C.; Lin, Y.; Yang, Y. and Chiang, B. (2004):** "Factors affecting clinical and therapeutic outcomes of patients with juvenile rheumatoid arthritis", Scand. J.Rheumatol., 33(5): 312–317.
30. **Mizushima, Y. and Nishida, Y. (2005):** "Effect of magnetic field on inflammation", Experientia., 31(21): 1411-1412.
31. **Bassett, S. and Lewis, S. (2001):** "Effects of pulsed electromagnetic fields on steinberg ratings of femoral head osteonectosis", Clinical Orthopaedics and Related Research, 246: 172-185.

الملخصالعربي

الغرض من ه ذه الدراسة هو معرفه تأثير المجال الكهرومغناطيسي المتقطع على آلام عسر الطمث . وقد شاركه في هذه الداراسة سنة.وقد تم تقسيم الحالات عشوائيا إلى 30اربعون سيده تعانين من آلام عسر الطمث . تراوحت أعمارهن ما بين 20 الى مجموعتين: مجموعة(أ) (مجموعه الدراسه) و مجموعه (ب) (المجموعه الضابطه). مجموعه (أ) تم علاجهن بإ ستخدام المجال الكهرومغناطيسي المتقطع ، ثلاث مرات بالاسبوع لمده ثلاثه اشهر بالاضافه الى العلاج الدوائى، بينما المجموعة (ب) قد تم علاجهن بإستخدام العلاج الدوائى فقط. وقد تم تقييم الحالاتبواسطه استخدام (مؤشر قياس الالم المرئى)(استبيان شده آلام عسر الطمث) قبل و بعد العلاج.و قد اوضحت النتائج تحسن ملحوظ فى نسبه الام فى كل من مجموعتين (أ،ب)بعد العلاج لصالح المجموعه (أ).

وهكذا يمكن أن نستخلص أن المجال الكهرومغناطيسي المتقطع وسيله مؤثره ومساعده في تقليل آلام عسر الطمث.

الكلمات الدالة: الام الطمث الاولى، المجال المغناطيسى، استبيان شده آلام عسر الطمث.