

## INTERFERENTIAL CURRENT IN TREATING PRIMARY DYSMENORRHEA

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### ABSTRACT

Interferential current (IFC) is a common electrotherapeutic modality used to treat pain. Although IFC is widely used, the available information regarding its clinical efficacy is debatable. This study was conducted to determine the effect of Interferential current (IFC) on primary dysmenorrhea. Twenty women complaining from primary dysmenorrhea (diagnosed by gynecologist/ physician) from outpatient clinic of Dar- Elshefah Hospital, Riyadh – Saudi Arabia shared in this study. Their ages ranged from 18 to 29 years old. Primary dysmenorrhea was evaluated by visual analog pain scale and the serum cortisol level before performing interferential current IFC sessions during menses. The obtained results showed a statistically significant difference of effect of interferential current on primary dysmenorrhea. It could be concluded that IFC has a relieving effect on primary dysmenorrheal pain. However, it is unknown whether the analgesic effect of IFC is superior to that of the concomitant interventions and further research is warranted.

**KEY WORDS:** Primary dysmenorrhea- Interferential current- - cortisol level.

### INTRODUCTION

Dysmenorrhea (dysmenorrhea or painful periods) is a medical condition of pain during menstruation that interferes with daily activities. Still, dysmenorrhea is often defined simply as menstrual pain, or at least menstrual pain that is excessive [1]. Menstrual pain is often used synonymously with menstrual cramps, but the latter may also refer to menstrual uterine contractions, which are generally of higher strength, duration and frequency than in the rest of the menstrual cycle [2]. There is some suggestion that more frequent life changes, fewer social supports, and stressful close relationships may be associated with increased dysmenorrhea. There may be an increased prevalence of dysmenorrhea in lower socioeconomic groups. There is controversy about the association of obesity, physical activity, and alcohol with primary dysmenorrhea. Interferential current therapy (IFC) is one of various types of physical therapy. It uses a mid-frequency electrical signal to treat muscular spasms and strains. The current produces a massaging effect over the affected area at

periodic intervals, and this stimulates the secretion of endorphins, the body's natural pain relievers, thus relaxing strained muscles and promoting soft-tissue healing. Its use is contraindicated if the affected area has wounds, cuts or infections. The basic principle of interferential current therapy is to use physiological effects of low frequency (at < 250 pules /second) electrical stimulation of nerves without the associated painful and somewhat unpleasant side effects sometimes associated with low-frequency stimulation [3]. The aim of this study was to identify the effect of interferential current on primary dysmenorrheal pain .

### MATERIALS AND METHODS

*Subjects:* twenty virgin females complaining from primary dysmenorrhea as diagnosed by gynecologist participated in this study. They were selected from outpatient clinic of Dar-Elshefa Hospital Riyadh Saudi Arabia. The study was conducted through the period from November 2012 to March 2013. Informed consent form was

assigned from each woman before starting the study. For all patients after taking detailed history, weight and height were measured and BMI were calculated before treatment.

#### **Inclusion criteria**

All patients had regular menstrual cycles. All patients had primary dysmenorrhea. They experienced painful menstruation. They were medically stable their age ranged from 18-29 years old. Their body mass index (BMI) ranged from 20 to 30 kg/m<sup>2</sup>. No history of endometriosis, adenomyosis, adenomyomata, chronic pelvic pain, cardiovascular problems or pulmonary problems.

#### **Pain evaluation procedures**

Visual analog pain scale: Pain intensity were assessed by visual analog pain scale for each patient at 1<sup>st</sup> and 2<sup>nd</sup> day of menstrual cycle before treatment and 1<sup>st</sup> and 2<sup>nd</sup> day of 2 successive menstrual cycles.

Plasma cortisol level: it was used to evaluate the dysmenorrheal pain intensity and the degree of pain relief.

Blood sample were taken to be analyzed and show cortical level at 1<sup>st</sup> day of menstrual cycle before treatment and 1<sup>st</sup> day of the two successive menstrual cycles.

#### **Treatment Procedures**

Patients were treated by IFC device. Patients did not receive any other activity rather than the prescribed program and were not take any medical treatment.

Interferential current: Parameters of interferential current were (frequency 90-130 Hz with 20 minutes duration). It was applied through bipolar technique. It was applied one day before menstrual cycle. Treatments were done two times per day for 2 days this was repeated for successive 2 menstrual cycles.

#### **Statistical design and data analysis**

Descriptive statistics and T-test were used to compare between pre and post treatment results for all women All statistically significant differences were determined with confidence interval of 95% and thus at  $P < 0.05$ .

## **RESULTS**

### **Cortisol level**

The group means and SDs for Cortisol level At first day of first cycle, at first day of second cycle, and At first day of third cycle are shown in table (1) and graphically at first day of first cycles in Fig (1). The mean of Cortisol level at first day of first cycle was (7.44±0.21). The

Cortisol level at first day of second cycle was (7.39±0.2), and finally the Cortisol level at first day of third cycle was (7.34±0.2).

### **Within subjects**

The change in Cortisol level at first day of first cycle, at first day of second cycle, and at first day of third cycle are at first day of first cycles by application of the repeated measurement ANOVA as shown in table (2).

For the study Group, Repeated measurement ANOVA revealed a significant change in cortisol level as the F value was 50.75 and ( $P < 0.0001$ )(table 3)

To reveal the differences between the Cortisol level at first day of first cycle, at first day of second cycle, and at first day of third cycle Bonferroni post hoc test was conducted.

For the study Group ,there was a significant difference of Cortisol level values between at first day of first cycle value and at first day of second cycle value as t-value was (5.01) and p-value was ( $P < 0.001$ ) , there was significant difference of Cortisol level values between at first day of first cycle value and at first day of third cycle value as t-value was (10.07) and p-value was ( $P < 0.001$ ), and finally there was a significant difference of Cortisol level values between at first day of second cycle value and at first day of third cycle value as t-value was (5.06) and p-value was ( $P < 0.001$ ) as shown in table (3), Fig (2).

## **DISCUSSION**

Primary dysmenorrhea involves the entire organism. The problem is its cyclic repetition and everlasting painful expectation. Pain during menstruation is almost universal experience among women and an all-too-frequent part of life. When severe, it has a significant economic impact through loss of time from work or education [4]. Non-steroidal anti-inflammatory drugs (NSAIDs) - these are the most commonly used drugs for the treatment of dysmenorrhea due to their inhibition of prostaglandin synthesis. This is a class effect and all NSAIDs appear equally effective [5].

An interferential current (IFC) is the resultant current produced when two or more alternating currents are applied simultaneously to produce a low frequency current at point of intersection. When two medium-frequency circuits of slightly different cycles per second are superimposed, interference is formed which blocks the transmission of pain messages at the spinal cord level.

**Table 1. Mean and SD of Cortisol level At first day of first cycle, at first day of second cycle, and At first day of third cycle for study group**

| Cortisol level               | Study Group (n=20) |       |
|------------------------------|--------------------|-------|
|                              | Mean               | ±SD   |
| At first day of first cycle  | 7.44               | ±0.21 |
| At first day of second cycle | 7.39               | ±0.2  |
| At first day of third cycle  | 7.34               | ±0.2  |

\*SD= standard deviation

**Table 2. Repeated measurement ANOVA of Cortisol level At first day of first cycle, at first day of second cycle, and At first day of third cycle for study group**

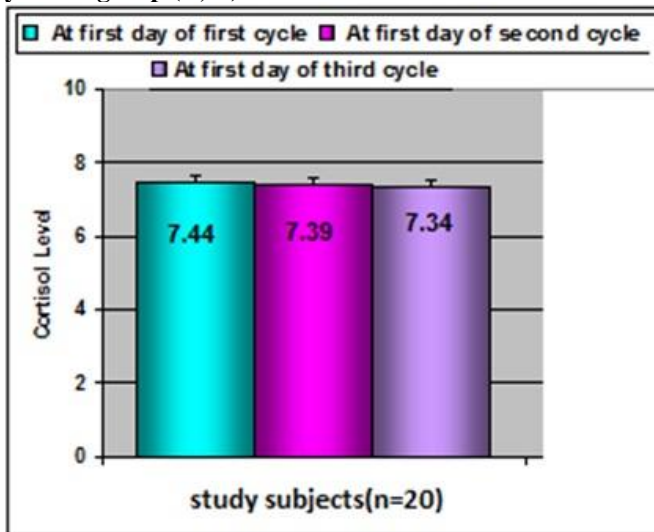
| Group             | Source of variation | SS   | MS     | F     | P      | S |
|-------------------|---------------------|------|--------|-------|--------|---|
| Study group(n=20) | Within subjects     | 0.09 | 0.04   | 50.75 | 0.0001 | S |
|                   | Between subjects    | 2.42 | 0.12   |       |        |   |
|                   | Error               | 0.03 | 0.0009 |       |        |   |

\*SS: Sum of square \*MS: Mean square \*S: significant \*S: significant

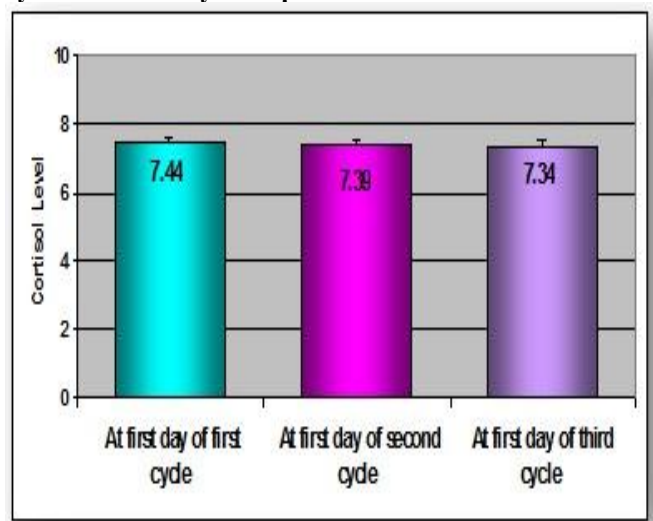
**Table 3. Post hoc test of the Cortisol level at first day of first cycle, at first day of second cycle, and at first day of third cycle for the study Group.**

| Comparison   | Mean Difference | t-value | P-value | S |
|--|-----------------|---------|---------|---|
| At first day of first cycle vs. at first day of second cycle | 0.049           | 5.01    | P<0.001 | S |
| At first day of first cycle vs. at first day of third cycle  | 0.099           | 10.07   | P<0.001 | S |
| At first day of second cycle vs. at first day of third cycle | 0.05            | 5.06    | P<0.001 | S |

**Fig. 1. Mean and ±SD of Cortisol level At first day of first cycle, at first day second cycle, and At first day of third cycle for group (A, B).**



**Fig. 2. Mean and ±SD of Cortisol level at first day of first cycle, at first day of second cycle, and At first day of third cycle for the study Group”**



**Table 4. The effectiveness of IFC in management of musculoskeletal pain (derived from Jorge P. et al (2010) meta-analysis results - found online at: <http://ptjournal.apta.org/content/90/9/1219>**

| Study or Subgroup                | IFC Alone |      |       | Placebo |      |       | Weight | Mean Difference IV, Random, 95% CI | Mean Difference IV, Random, 95% CI |
|----------------------------------|-----------|------|-------|---------|------|-------|--------|------------------------------------|------------------------------------|
|                                  | Mean      | SD   | Total | Mean    | SD   | Total |        |                                    |                                    |
| Defrin et al, <sup>54</sup> 2005 | 2.1       | 0.5  | 12    | -0.5    | 0.7  | 9     | 51.4%  | 2.60 (2.06, 3.14)                  |                                    |
| Taylor et al, <sup>61</sup> 1987 | 1.75      | 1.96 | 20    | 2.08    | 1.53 | 20    | 48.6%  | -0.33 (-1.42, 0.76)                |                                    |
| Total (95% CI)                   |           |      | 32    |         |      | 29    | 100.0% | 1.17 (-1.70, 4.05)                 |                                    |

Heterogeneity: tau<sup>2</sup>=4.10, χ<sup>2</sup>=22.33, df=1 (P<.00001), I<sup>2</sup>=96%

Test for overall effect: z=0.80 (P=.42)

Forest plot of comparison: interferential current therapy (IFC) alone versus placebo treatment on pain intensity at 1 week and 4 weeks (data presented as change scores). IV=inverse variance, 95% CI=95% confidence interval.



Forest plot of comparison: interferential current therapy (IFC) alone versus comparison treatment on pain intensity at 3 weeks and 8 weeks (data presented as change scores). IV=inverse variance, 95% CI=95% confidence interval.

This interferential stimulation is concentrated at the point of intersection, deep in the tissues, between the electrodes. IFC modulates a high frequency (4000 Hz), versus Transcutaneous Electric Nerve Stimulation (TENS) which typically delivers at 125 Hz. When current is applied to skin, skin resistance decreases as pulse frequency increases. Thus, IFC crosses the skin with greater ease and with less stimulation than with TENS. Interferential current reaches greater depths and over a larger volume of tissue than other forms of electrotherapy. Normally, very deep pain is difficult to reach with traditional modalities. IFC increases circulation as well. IFC do not produce any sensory nerve irritation. The physiological effects of interferential current depend on magnitude of current, type and mode of current, frequency, and accuracy of electrode positioning [6]. Interferential current therapy has been used extensively to help manage pain, edema, and inflammation due to soft tissue irritation from trauma or degenerative changes, with less dependence on narcotics. IFC can be used for pain associated with several conditions including: Back pain (most common), Arthritis, Strains and sprains, Neuralgia, Reflex Sympathetic Dystrophy (RSD), Shingles, Degenerative joint disease, Interstitial Cystitis etc. There are main clinical applications for which IFC appears to be used: Pain relief. Muscle stimulation. Increased local blood flow, reduction of edema. Stimulating healing and repair and for various specialized application as stress incontinence. In addition to the 5 key areas identified above, there are several other specialist applications for which IFC has been employed. These include stimulation as part of the management of incontinence and pelvic floor training, constipation in children fibromyalgia and trigger point intervention enhancement of fracture healing has also been investigated. Interferential current stimulate the pain gate mechanism and thereby mask the pain symptoms and can be used to activate the opioid mechanisms, again providing a degree of relief. Relief of pain is an important physiological effect obtained by the use of IFC. The increase in local blood circulation due to the local pumping effect of the stimulated muscles or the effect on autonomic nerves and

thus the blood vessels help removing the chemicals from the local area. Short duration pulses at a frequency of 100 Hz may stimulate large diameter nerve fibers which will have an effect on the pain gate in posterior horn, and inhibit transmission of small diameter nociceptive traffic. A frequency of 80-100 Hz rhythmic is usually chosen for this effect, as the problem of accommodation is reduced. In order to selectively activate the descending pain suppression system, a frequency of 15 Hz is required and the stimulation of small diameter fibers produced will eventually cause the release of endogenous opiates at a spinal level. A physiological blocking of nerve transmission is also postulated as a mechanism of pain modulation produced by interferential therapy.

Very few studies have independently assessed the efficacy of IFC alone on musculoskeletal pain conditions. Most available studies have used IFC in conjunction with other therapeutic modalities, as part of a combined treatment plan where it seemed to work well. Hence, the systematic review of Jorge et al [7] becomes especially important in objectively presenting the results of four studies that used IFC only in the treatment group while placebo or other comparison was used for control. (table 4) They suggested that it is unknown whether the analgesic effect of IFC is superior to that of the concomitant interventions. Interferential current alone was not significantly better than placebo or other therapy at discharge or follow-up. Results must be considered with caution due to the low number of studies that used IFC alone. In addition, the heterogeneity across studies and methodological limitations prevent conclusive statements regarding analgesic efficacy.

Interferential current appears to be effective in primary dysmenorrhea. As they are free from the potentially adverse effects of analgesics [8]. Both transcutaneous electrical nerve stimulation and interferential current appear to be effective in primary dysmenorrhea [9]. Women who suffer from primary dysmenorrhea could benefit by using TENS. In addition to pain relieving effects, relief of the autonomic symptoms associated with dysmenorrhea. Our

findings stand in agreement with others indicating the immediate positive effects of IFC in women with primary dysmenorrhea [10]. Also, IFC is safe and effective alternative to pain control medication, is non-addictive and minimal side effects and furthermore, patients can manage their own pain.

The study was limited by the following respects: The physical and psychological status of the volunteers. The patient ability to follow the instruction of the program. The regularity of sessions. Personal and individual difference between patients would affect assessment and treatment outcomes.

## CONCLUSION

Primary dysmenorrhea is a very common problem in young women. It is usually defined as cramping pain in the lower abdomen occurring at the onset of menstruation in the absence of any identifiable pelvic disease. Physical therapy is an art beside its scientific basis, nowadays it is used as an adjunct to the pharmacological treatment of

dysmenorrheal pain. This study was conducted to contribute and add new information of knowledge of physical therapy. It provided an evidence basis for the efficacy of interferential current and TENS on primary dysmenorrheal pain which constitutes a great problem facing gynecological therapist and patients.

So, this study was conducted to determine the efficacy of IFC on dysmenorrheal pain. The obtained results showed a statistically significant therapeutic effect of IFC sessions on relieving primary dysmenorrheal pain.

We suggest further researches on larger patient groups to determine the effect of IFC on primary dysmenorrheal pain. Further researches about other physical therapy treatment methods for primary dysmenorrheal pain need to be probed. Also, encouraging walking and sports for women might help to alleviate some symptoms naturally. Arranging campaign targeting key beneficiaries might help to increase the awareness about methods of treatment of primary dysmenorrheal pain.

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