Effect of Low Level laser Therapy and Pelvic Rocking Exercise in the Relief of Primary Dysmenorrhoea

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ABSTRACT

This study was conducted to determine the effect of low level laser therapy (LLLT) and pelvic rocking exercise in reducing pain of primary dysmenorrhoea. Thirty volunteers virgin females complained of primary dysmenorrhoea engaged in this study. They were treated one day before menstruation and continued in the next two successive days of menstruation. They were evaluated by McGill Pain Questionnaire (MPQ) and estimation of serum cortisol level (SCL) before and after three months of treatment. The results revealed that LLLT and pelvic rocking exercise can alleviate pain during menstruation as there was a statistically significant reduction in pain and SCL after three months of treatment. It was concluded that LLLT and pelvic rocking exercise are effective and low cost methods for reducing dysmenorrheal pain.
Key words: *Dysmenorrhoea - pelvic rocking exercises - low level laser therapy - serum cortisol level.*

INTRODUCTION

The term dysmenorrhoea means painful menstruation -the occurrence of painful cramps during menstruation. Primary dysmenorrhoea refers to complex symptoms that may encompass nausea, vomiting, headache, nervousness, fatigue, diarrhea, syncope, lower abdominal cramping, bloating, breast tenderness, mood changes, backache and dizziness. These symptoms often appear just before (24-48 hours) or at the onset of menstruation and are maximal during the first 48 hours[2,3,31].

Primary dysmenorrhoea is also known as primary spasmodic dysmenorrhoea. This is a useful descriptive term for a condition of dull throbbing, cramping lower abdomen pain that may radiate to the lower back and thighs, often associated with gastrointestinal and neurological symptoms. During severe exacerbation, the patient may look drawn as well pale and may vomit or have diarrhea, rectal pain. It typically starts few hours, before or after the onset of menstruation and lasts between 8 and 72 hours[9, 24,27].

Dysmenorrhoea is the commonest of all gynaecological symptoms, more than half of all girls and women suffer from dysmenorrhoea. Primary dysmenorrhoea occurs in the absence of any significant pelvic pathology. It usually develops within the first 2 years of the menarche. The pain is often intense and cramping and can be crippling and severely incapacitating so that it causes a major disruption of social activities[12,15,29].

Painful menstruation is a cycle painful condition that adversely affects the women's wellbeing for a large part of her life[4,7,8].

Over the ages, women with dysmenorrhoea have received little true sympathy and even less help. Physicians and non- physicians alike have prescribed a variety of treatments over the centuries. As prostaglandins synthetase inhibitors, nonsteroidal anti- inflammatory drugs and oral contraceptives. They also added hot packs and lifestyle changes including nutritional supplements and aerobic exercise, such as

(walking, swimming and bicycling). This may produce an over all benefit and decrease the impact of dysmenorrhoea on the patient's daily activities[3,13,14].

Exercise today is an integral part of normal life for many women. It is clear that there are many health benefits for women who exercise regularly and in moderation. Exercise improves cardiovascular status, increased bone mineral content; improve dysmenorrhoea and premenstrual syndrome symptoms[5, 6, 26].

There are relationships between physical exercise and primary dysmenorrhoea in which there is a significant decrease in the prevalence and improved symptomatolgy of it with exercise. Also, it helps in reducing pain, relieving stress, elevating mood and improving health. Women who exercise show less severe dysmenorrhoea and greater positive effects than women who are sedentary. Health care providers suggest some form of aerobic exercise such as pelvic tilting, walking and bicycling. It may improve blood flow, relax abdominal muscles, reduce pelvic pain and relieve pressure on nerve centers, pelvic organs and the alimentary canal. Also, swimming for 20 to 30 minutes, three to five times weekly for 6 weeks produces an overall benefit and decrease the impact of dysmenorrhoea on the patient's daily activities[17,20,28].

Exercise increases the release of several neurotransmitters including natural endorphins (the brain natural painkillers), catechol, estrogen, dopamine and endogenous opiate peptides, as well as altering the reproduction of hormone secretion, suppressing prostaglandin from being released and raising the estrone-estradiol ratio which acts to decrease endometrial proliferation and shunts blood flow away from the uterus[18].

Low level laser therapy (LLLT) considered as an effective method of treatment of dysmenorrhoeic pain in comparison to traditional pain modalities[16].

Low level laser therapy (LLLT) decreases the production of prostaglandins E and F due to acceleration of superoxide dismutase which acts as a blocker in the production of prostaglandin[35,38,39].

Low level laser therapy (LLLT) has a double action: firstly, stimulating the endorphine production of prostaglandin and secondly, inhibiting the appropriate prostaglandin synthesis[19,21].

Cortisol is a hormone secreted by the adrenal gland. It is the major corticosteroids. It is responsible for about 95% of all glucocorticoids activity in the body. It is released into our body when we are under stress[28].

Cortisol is high in subjects suffering from pain as compared with healthy and pain free subjects as there is positive correction between the intensity of pain and increased plasma cortisol level[34].

The purpose of this study was to determine the effects of LLLT and pelvic rocking exercise in relieving of primary dysmenorrhoea.

SUBJECTS, MATERIAL AND METHODS

Subjects

This study was carried out on thirty volunteers, virgin females with primary dysmenorrhea, selected from the students of Faculty of Physical Therapy, Cairo University**.** Their age ranged between 17-22 years old (19.40 ± 1.08), they don't receive any anti-inflammatory or antispasmodic drugs during the study period.

Informed consent form were signed by each subject before starting the treatment.

Material

- Laser (gallium–arsenide), output wave-length is 635–670 nm, mode of operation (pulsed), maximum average power (5 millwatts), frequency (5 KHz), maximum pulse power (5 watts) and maximum pulse duration (200 monoseconds).
- McGill Pain Questionnaire (MPQ): It is a pencil and paper instrument consisting of 20 set of words description; it designed to quantify three dimensions of pain experience.

Methods

A- Evaluative

1- Assessment of pain intensity for each patient was performed before the starting the treatment and after the end of the treatment (three months) through MPQ. The patient was asked to choose and use only a single word that describes the pain. Sensory (1-10), effective (11-15), evaluative (16) and miscellaneous (17-15).
2- Assessment of serum cortisol level: At 10 am blood samples of about 8 cm^3 was drawn from anticubital vein by disposable sterile syringe containing anticoagulant substance and stored at -20° till analyzed. Cortisol level was measured before and after three months of treatment.

B- Procedure

All subjects were treated by LLLT and pelvic rocking exercise for three months.

Low level laser therapy (LLLT) session was carried out when the subject complained of unbearable pain (a day before the beginning of menstrual flow, and on the first and second days after the menstrual flow). The treatment was repeated on the next two consecutive menstruations.

For LLLT application, the subject was lied in comfortable crock lying, the LLLT applied on the suprapubic region for three shoots, each shoot lasted for 60 second. The treatment was also applied on the paravertebral region while the patient in prone lying position, it was applied over the lumbosacral region from L_4-S_3 by three shoots for each side and each shoot lasted 60 second.

Each subject performed pelvic rocking exercise as following:

From crock lying position, the subject instructed to contract glutei, abdominal muscles, press lumbar region down, hold then relax. The subject maintained muscles contracted for 5 seconds and repeated the exercise for 20 times. All subjects were asked to perform the exercise daily as a home program.

Statistical Analysis

Descriptive statistics was presented as mean, standard deviation (SD) and percentage for qualitative variable analytical test included student t-test for comparing of means between before and after treatment. Significant level of 0.05 was used throughout all statistical tests within this study, P value < 0.05 indicated significant results. The smaller the P value obtained the more significant was the result.

RESULTS

Somatic part

As shown in the tables (1a - 1b), the severity of pain was statistically highly significant decrease ($P < 0.001$) between, before and after the end of treatment.

Before application of the treatment the pain felt as drilling in 12 patients (40%), stabbing in 15 patients (50%) and lancinating in three patients (10%).

After the end of treatment the pain was greatly changed, it was completely absent in 23 cases (76.67%), tingling in four cases (13.33%) and itchy in 3 cases (10%), Fig. (1).

Table (1a): Shows the degree of pain (Somatic) according to MPQ before and after 3 months of treatment.

Degree of pain (Somatic) Before treatment		Degree of pain (Somatic) after treatment					
		No pain		Tingling		Itchy	
		No.	%	No.	%	No.	%
Drilling	12	11	91.67	1	8.33	0	00.0
Stabbing	15	10	66.67	3	20.0	2	13.3
Lancinating	3	2	66.67	0	00.0	1	33.3
Total	30	23	76.67	4	13.33	3	10%

Table (1b): Shows the means and S.D. of the pain (Somatic) according to MPQ before and after 3 months of treatment.

	Degree of pain (Somatic)	
	Before treatment	After treatment
Mean	3.70	0.33
S.D.	± 0.65	± 0.66
P-value	0.001**	

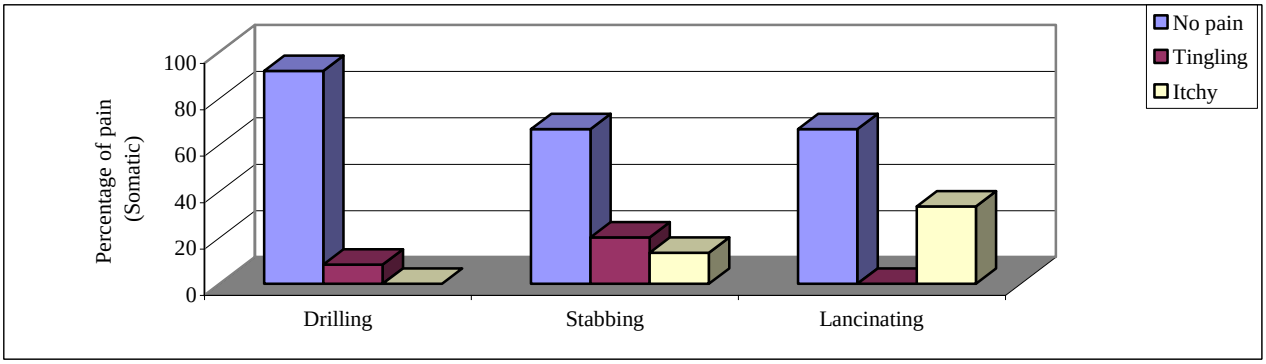

Fig. (1): Illustrates the percentage of pain (Somatic) according to MPQ before and after3 months of treatment.

Affective part

As shown in tables (2a -2b), the severity of pain was statistically highly significant decrease (P<0.001) between before and after the end of treatment.

Before application of the treatment, the pain was felt as blinding in one case (3.33%) cruel in 12 cases (40%), vicious in 15 cases (50%) and killing in two cases (6.67%).

After the end of the treatment the pain was greatly changed, it was completely absent in 24 cases (80%), tiring in one cases (3.33%) and blinding in5 cases (16.67%), Fig. (2).

Table (2a): Shows the degree of pain (Affective) according to MPQ before and after 3 months of treatment.

Degree of pain (Affective) Before treatment		Degree of pain (Somatic) after treatment					
		No pain		Tiring		Blinding	
		No.	%	No.	%	No.	%
Blinding	1	1	100.0	0	00.00	0	00.0
Cruel	12	11	91.67	1	08.33	0	00.00
Vicious	15	10	66.67	0	00.0	5	33.3
Killing	2	2	100.0	0	00.00	0	00.00
Total	30	24	80	1	3.33	5	16.67

Table (2b): Shows the means and S.D. of pain (Affective) according to MPQ before and after 3 months of treatment.

	Degree of pain (Affective)	
	Before treatment	After treatment
Mean	3.60	0.37
S.D.	± 0.67	± 0.76
P-value	0.001**	

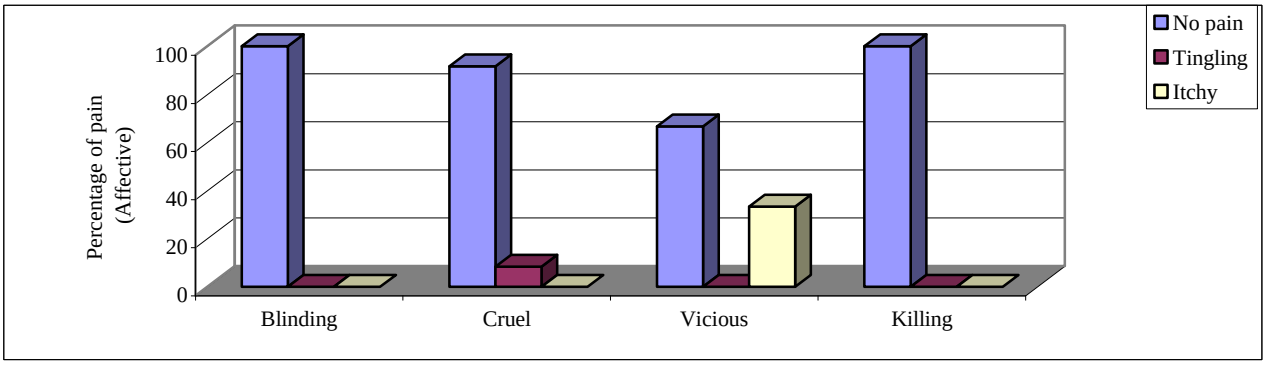

Fig. (2): Illustrates the percentage of pain (Affective) according to MPQ before and after 3 months of treatment.

Evaluative part:

As shown in tables (3a -3b), the severity of pain was statistically highly significant decrease (P<0.001) between before and after the end of treatment.

Before application of the treatment the pain felt as annoying in one case (3.33%), troublesome in 14 cases (46.67%), intense in four cases (13.33%) and unbearable in11 cases (36.67%).

After the end of the treatment, the pain was greatly changed; it was completely absent in23 cases (76.67%) and annoying in seven cases (23.33%), Fig. (3).

Table (3a): Shows the degree of pain (Evaluative) according to MPQ before and after 3 months of treatment.

Degree of pain (Evaluative) Before treatment		Degree of pain (Somatic) after treatment			
		No pain		Annoying	
		No.	%	No.	%
Annoying	1	1	100.0	0	00.00
Troublesome	14	13	92.86	1	07.14
Intense	4	4	100.0	0	00.00
Unbearable	11	5	45.45	6	54.55
Total	30	23	76.67	7	23.33

Table (3b): Shows the means and S.D. of the pain (Evaluative) according to MPQ before and after 3 months of treatment.

	Degree of pain (Evaluative)	
	Before treatment	After treatment
Mean	2.83	0.23
S.D.	± 0.98	± 0.43
P-value	0.001**	

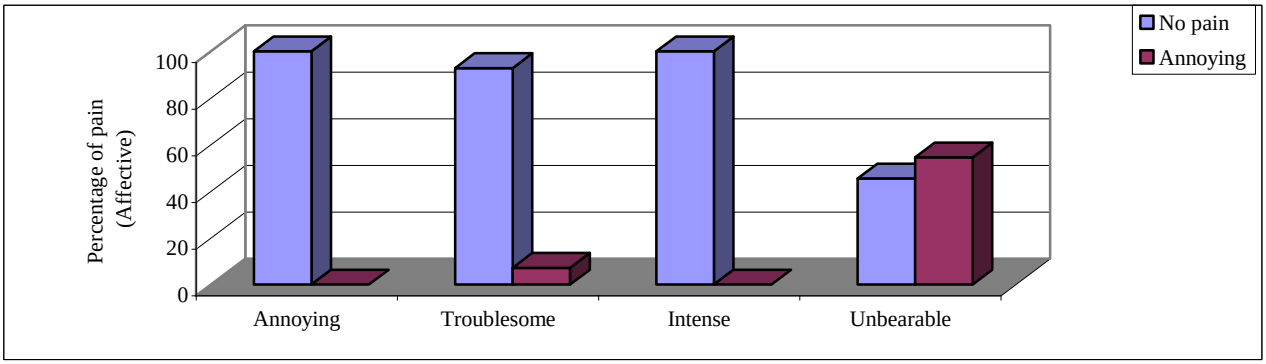

Fig. (3): Illustrates the percentage of pain (Evaluative) according to MPQ before and after 3 months of treatment.

Miscellaneous part:

As shown in tables (4a - 4b), the severity of pain was statistically highly significant decrease (P<0.001) between, before and after the end of treatment.

Before application of the treatment, the pain was felt as numb in six cases (20%), squeezing in 15 cases (50%) and tearing in nine cases (30%).

After the end of the treatment, the pain was greatly changed; it was completely absent in 23 cases (76.67%), cool in six cases (20%) and numb in one case (3.33%), Fig. (4).

Table (4a): Shows the degree of pain (Miscellaneous) according to MPQ before and after 3 months of treatment.

Degree of pain (Miscellaneous) Before treatment		Degree of pain (Miscellaneous) after treatment					
		No pain		Cool		Numb	
		No.	%	No.	%	No.	%
Numb	6	6	100.0	0	00.00	0	00.00
Squeezing	15	13	86.67	2	13.33	0	00.00
Tearing	9	4	44.44	4	44.44	1	11.11
Total	30	23	76.67	6	20	1	3.33

Table (4b): Shows the means and S.D. of pain (Miscellaneous) according to MPQ before and after 3 months of treatment.

	Degree of pain (Miscellaneous)	
	Before treatment	After treatment
Mean	3.90	0.27
S.D.	± 1.06	± 0.52
P-value	0.001**	

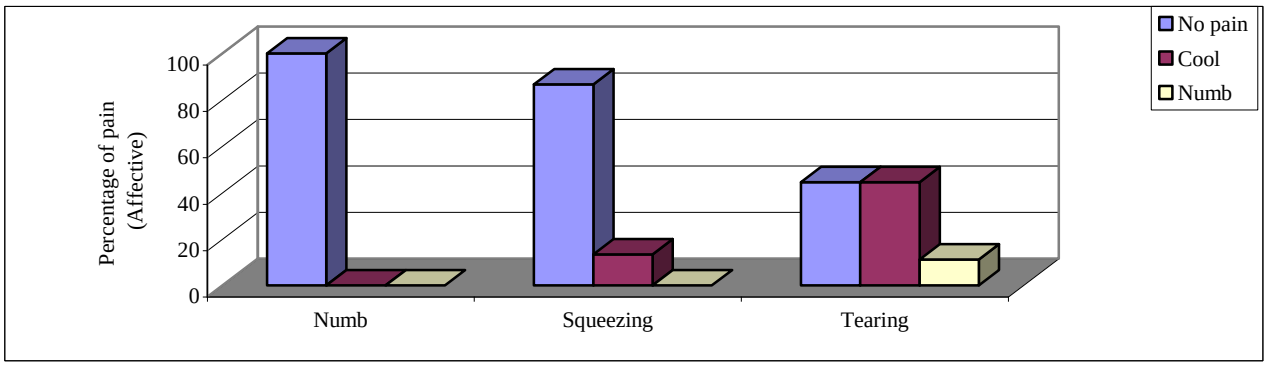

Fig. (4): Illustrates the percentage of pain (Miscellaneous) according to MPQ before and after3 months of treatment.

As shown in table (5), S.C.L. was 17.23 ± 2.24 before treatment. After treatment it was 5.9 ± 0.73. There was a statistically highly significant decrease (P< 0.001) between before and after the end of treatment.

Table (5): Shows the mean value of S.C.L before and after 3 months of treatment.

	S.C.L. (mg/dl)	
	Before treatment	After treatment
Mean	17.23	5.9
S.D.	± 2.24	± 0.73
P-value	0.001**	

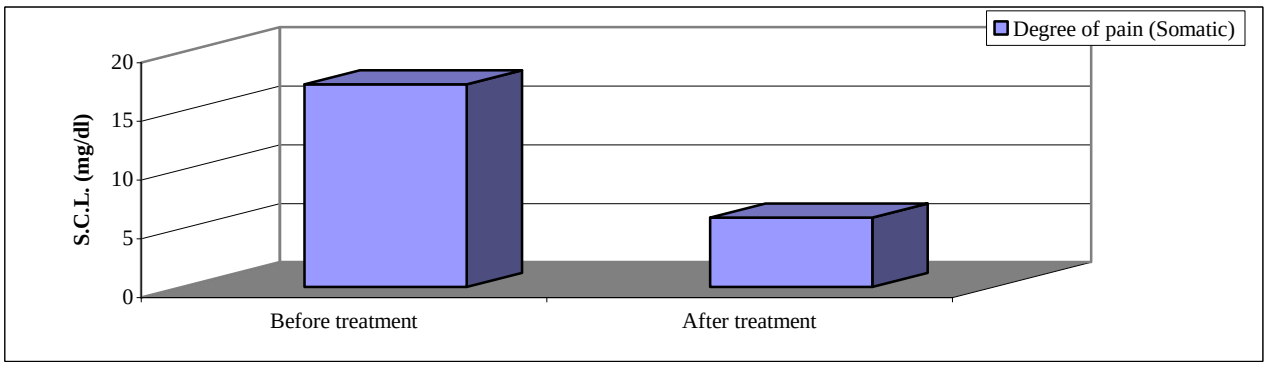

Fig. (5): Illustrate the mean value of S.C.L. before and after3 months of treatment.

DISCUSSION

There is a significant portion of female population who exhibit sever pain with associated symptoms during the menstrual period, resulting in varying levels of impairment of personal and social functions and absenteeism from work and inability to perform daily routine.

In the present study there is a highly significant decrease in dysmenorrheal pain after three months of LLLT and pelvic rocking exercise.

The obtained results agreed with those reported by Israel et al. (1985)[25] who carried out a study to detect the effects of aerobic training on primary dysmenrrhoea

symptomology in 36 college females. The training group participated in 30 minutes of exercise 3 days a week compared to the sedentary control group and found that aerobic exercise significantly lowered menstrual distress by relieving stress, anxiety and tension.

The results also are supported by those reported by Hood and Dincher (1992)[23] who suggested a program of exercise for dysmenorrhoeic patient 2-3 times a day before the period which includes; supine lying position with head and legs raised simultaneously with arms kept at sides and legs straight, deep knees bent with back kept straight and walking on hands and feet. They reported that exercise reducing pain during menstruation by relaxing abdominal muscles and relieves pressure on the nerve centers, pelvic organs and decrease pelvic congestion.

In addition, the results are agreed with those of Aganoff and Boyle (1994)[1] who carried out a pilot study on two groups. A group of female exercise regularly (97) and a second group of female who are sedentary (159) to examine the effects of regular, moderate exercise on mood states and menstrual cycle symptoms. The results revealed that there were significant effects on negative mood states and physical symptoms. The regularly exercised female obtained significantly lower scores on impaired concentration, negative affect, behavior change and pain.

Also, the obtained results agreed with those reported by Choi and Salamon (1995)[10] who belief that women who exercise experience fewer premenstrual symptoms and less severe dysmenorrhoea via protecting them from deterioration of mode before and during menstruation than women who are sedentary.

The results of the current study had an agreement with the work of Rostami et at. (2000)[37] who carried out a randomized clinical trail on 150 students suffering from severe dysmenorrhoea to detect the effect of exercise on primary dysmenorrhoea. They were divided into two study groups (exercise and non exercise groups). The results showed that the intensity of the pain in the exercise group declined. Hence, the difference between the two groups. The average of the pain duration declined from 7.15 hours to 4.22 hours and the difference of $P < 0.01$ is seen in the groups. They concluded that the exercise would decrease duration and severity of dysmenorrhoea by increasing circulation and blood supply to the uterine muscles.

Also, these results are supported by Christianne (2002)[11] who approved that doing mild exercise like stretching and walking or bicycling exercise are good ways to relax abdominal muscles and promote circulation thus, reducing painful cramping also he advised getting plenty of rest and avoiding stressful situation as the period approaches. Health care providers suggest some form of aerobic exercise such as walking, hiking, bicycling, or swimming for 20 to 30 minutes three to five times weekly for 6 weeks. It produces an overall benefit and decreases the impact of dysmenorrhoea on the patient's daily activities.

These results are in agreement with McKesson (2004)[32] who added that performing pelvic tiling exercise help to relieve menstrual pain via relieves the pressure on the nerve centers and boots uterine circulation.

In contradiction, Metheny and Smith (1989)[33] who examined the relationship between physical exercise and menstrual pain on 176 student nurses. They stated that exercise relieves the stress that may intensify dysmenorrhoea, yet it aggravates symptoms and makes it worse.

Also, the results of the present study are contradicted with those of Sundell et al. (1990)[39], they carried out an epidemiological study on 489 females were assessed longitudinally in a representive sample of young women born in 1962. They found no association between the prevalence and severity of primary dysmenorrhoea and the frequency of physical exercise.

In the present study serum cortisol level decreased significantly after three months of LLLT and pelvic rocking exercise.

The obtained results agreed with Loucks and Redman (2004)[30], they concluded that functional menstrual disorders as dysmenorrhoea are associated with an increase in cortisol level and with exercise it returns nearly to its normal values.

Robert et al. (1987)[36] reported that cortisol level normally ranged from 7-25 mg/dl at morning. Similarly, in early study by Domzel et al. (1983)[14] had shown that patients with chronic pain have higher than normal cortisol plasma level, this referred to organic and psychological effects of pain. Similar results reported by Reda et al. (1988)[35] found a rise in plasma cortisol level during pain which dropped after analgesia. Also, Farr (2004)[17] noticed that corticosteroids were secreted in large amount in response to prolonged pain and stress.

The obtained results agreed also with those of (Foss and Keteyian, 1998)[18] they reported that with light or moderate exercise, there is no change or a small decrease in blood levels of cortisol. However, if the exercise is prolonged to exhaustion, an increase in cortisol may be seen. In addition, physical training does not appear to alter the responses of cortisol to exercise. An increased secretion of cortisol is a general response to stress. Therefore, in mild or light exercise where the stress may be low there is no change in cortisol can be detected. On the other hand, during exhaustive exercise, stress is maximal, and cortisol would be expected to be elevated for less than one hour, and then return to its normal level.

The results of the present study are contradicted with those of Pool and Axford (2001)[34], who found that exercise increases the production and catabolism of cortisol. The level rises transiently during severe exercise and falls rapidly to the basal level or below within a few hours of completion of the exercise.

In addition, Krzeminski et al. (2003)[28] found that graded bicycle ergometer exercise accompanied by increases in plasma catecholamine and growth hormones, while plasma cortisol level didn't change.

Also, the results of the study are contradicted with those of work of Reda et al. (2000)[35] who revealed a significant rise in the post-exercise serum level of cortisol compared to the pre-exercise values.

The obtained results agree with those of England (2000)[16] who reported that LLLT is an effective method for reducing acute and chronic pain.

Also, the results agree with those reported by Jones (2004)[26] who concluded that LLLT has a biological effects similar to that of non steroidal anti-inflammatory and steroids. So, it can reduce pain through increasing the level of serotonin production and B- endorphin (the body natural mood enhancing and pain relief hormones).

Also, the results are supported by those reported by Gold (2002)[19] who stated that LLLT is an effective way to treat painful condition by increasing B- endorphin, normalize the speed of A- alpha nerve fiber rather than on C- fiber, LLLT increase blood and lymph flow so, eliminates waste metabolism from the site of pain.

Conclusion

From the statistical point of view it can be concluded that LLLT and pelvic rocking exercise have an excellent effect in the management of primary dysmenorrhoea. They are realistic and inexpensive methods with no side effect rather than pharmacological treatment.

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الملخص العربي

تأثير العلاج بالليزر المنخفض الشدة وتمرين ميل الحوض في تخفيف عسر الطمث الأولي

أجريت هذه الدراسة لمعرفة تأثير العلاج بالليزر المنخفض الشدة وتمرين ميل الحوض في تخفيف عسر الطمث الأولى . وقد أجريت هذ ه الدراسة على ثلاثين فتاة متطوعة من طالبات كلية العلاج الطبيعي- جامعة القاهرة . وتم علاجهن باستخدام الليزر المنخفض الشدة مع تمرين ميل الحوض . وتم تقيم شدة الألم باستخدام مقياس الاستبيان وأيضا" مقياس مستوى الكورتيزول في الدم قبل وبعد انتهاء العلاج والذي استمر لمدة ثلاثة اشهر وقد أثبتت النتائج وجود نقص ذو دلالة إحصائية عالية في شدة الآم عسر الطمث الأولى وكذلك في نسبة الكورتيزول في الدم بعد الانتهاء من البرنامج العلاجي ، مما يؤكد أن العلاج بالليزر المنخفض الشدة وتمرين ميل الحوض وسيلة فعالة لعلاج ألآم عسر الطمث الأولي لدى السيدات .

الكلمات الدالة : آلام عسر الطمث الأولى- تمرين الحوض- الليزر منخفض الشدة- الكورتيزول .