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Phonophoresis Versus Low Level Laser Therapy on Dequervain Tenosynovitis after Delivery

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Abstract

Background: De Quervain's tenosynovitis (DQV) is a painful condition affecting two tendons of the abductor pollicis longus and extensor pollicis brevis that control movement of the thumb and extend to the wrist joint that affects physical function. So, it is necessary to decrease pain in De Quervain's tenosynovitis.

Aim of Study: To compare between the efficacy of Phonophoresis and Low-level laser therapy on De Quervain's Tenosynovitis after delivery.

Patients and Methods: This study was carried out on Forty multiparous women suffering from De Quervain's Tenosynovitis (for at least 3 months after delivery), they were selected randomly from the outpatient clinic of Sadat General Hospital Al–Monofia. They were divided randomly into two groups equal in number as group (A) and group (B). Group (A) was consists of 20 patients, each patient in this group had received Ketoprofen phonophoresis on the tender point (at the base of the thumb) of her dominant hand for 5 minutes, 3 times/week, for 4 weeks. Also, each patient was asked to perform an exercise program in her dominant hand for 30 minutes, 3 times/week, for 4 weeks. Additionally, each patient was advised to wear a thumb spica splint all day and take it off during sleeping and taking a shower throughout the treatment course (4 weeks). Group (B) was consists of 20 patients, each patient in this group had received LLLT on the tender point (at the base of the thumb) of her dominant hand for 90 seconds, 3 times/week, for 4 weeks. Also, each patient was asked to perform an exercise program in her dominant hand for 30 minutes, 3 times/week, for 4 weeks. Additionally, each patient was advised to wear a thumb spica splint all day and take it off during sleep and taking a shower throughout the treatment course (4 weeks). All patients in both groups (A&B) were evaluated by Visual Analogue Scale (VAS) and measuring serum cortisol level in blood plasma before starting and after the end of treatment program.

Results: Both groups showed a statistically significant decrease in both visual analogue scale and serum cortisol level after treatment, Group (A) achieved percentage of decrease in visual analogue scale by 80.52% and achieved percentage of decrease in serum cortisol level by 61.33% while group (B) achieved percentage of decrease in visual analogue scale by 15.0% and achieved percentage of decrease in serum cortisol level by 7.75%. By comparing 2 groups (A&B) it was found that percentage of decrease in VAS and serum cortisol level in group (A) was more pronounced and more notable when compared with group (B). This means that ketoprofen phonophoresis was more effective than LLLT in decreasing Dequervain tenosynovitis after delivery.

Conclusion: Phonophoresis was more effective than Low level laser therapy in relieving De Quervain's Tenosynovitis after delivery.

Key Words: *De Quervain's Tenosynovitis – Ketoprofen Phonophoresis – Low level laser therapy – Visual analogue scale (VAS) – Cortisol level in the blood plasma.*

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Introduction

DE QUERVAIN'S tenosynovitis (DQV) is a painful condition affecting two tendons of the abductor pollicis longus and extensor pollicis brevis that control movement of the thumb and extend to the wrist joint. The swollen tendons and their covering synovial sheaths rub against the narrow tunnel (the first dorsal compartment) through which they pass. This causes pain at the base of the thumb and lower arm **[1].**

If you have De Quervain tenosynovitis, you feel pain during thumb motion and when you make ulnar deviation. Also, when you grasp anything or when you make a fist **[2].**

Dequervain's tenosynovitis can affect any one at any age, but it is very common in women than men with a ratio 8:1. De Quervain's tenosynovitis usually occurs during pregnancy due to hormonal

changes and after delivery due to holding the infant and the hormonal changes [3].

The most common symptoms of De Quervain's tenosynovitis are pain, tenderness and swelling near the base of the thumb (at the radial side of the wrist and sometimes this pain may extend along the back of the thumb directly over the two tendons. Also, there is burning pain sensation in the hand. It is hard to move the thumb or wrist joint and there is limitation in the range of motion of wrist joint due to pain [4].

De Quervain's tenosynovitis can be diagnosed through Finkelstein test, in which patient bends his thumb across the palm of his hand and bend his fingers over the thumb then he bends his wrist toward his little finger. If this movement cause pain on the thumb side of wrist, then the patient has De Quervain's tenosynovitis [5].

De Quervain's tenosynovitis should be treated, not neglected otherwise the patient will not be able to use his hand and his wrist properly and the range of motion at wrist joint will be restricted or limited due to pain [6].

The main goals of treatment of De Quervain's tenosynovitis are to reduce inflammation, swelling, pain and tenderness. To maintain range of motion of thumb & wrist joint and to prevent recurrence [7].

The exercise program is usually recommended during treatment of De Quervain's tenosynovitis to improve R.O.M in the thumb and wrist joint, and to strengthen muscles of the hand and wrist joint [8].

Phonophoresis is a technique by which therapeutic ultrasound is used to introduce pharmacologic agents, usually anti-inflammatory or analgesic drugs, through intact skin into the subcutaneous tissues. Theoretically, phonophoresis can provide a safe and painless alternative to injections for treatment of common inflammatory conditions such as symphysis pubis pain, carpal tunnel syndrome, coccydynia, low back pain, bursitis, sprains, strains, and tendinitis [9].

Phonophoresis is a safe and painless procedure with no side effects like medications. It is a good treatment option to reduce inflammation and relieve pain in Dequervain tenosynovitis. Several studies confirmed that, phonophoresis is therapy tool to decrease pain & inflammation, accelerate wound healing and help patient to return to her optimal function as quickly as possible [10].

Phonophoresis is the use of ultrasound technology to enhance the body's ability to absorb topically applied analgesics and other anti-inflammatory agents. The goal is to reduce inflammation, relieve pain and improve overall mobility. Phonophoresis was compared with low level laser therapy in treating Dequervain tenosynovitis. The results showed that phonophoresis was superior to low level laser therapy [11].

Phonophoresis is the method of using ultrasound waves to increase skin permeability in order to improve the effectiveness of transdermal drug delivery. Phonophoresis is able to achieve specific and efficient delivery of drugs through the skin and ensure that the drug reaches the target area in the tissue environment. Phonophoresis is a noninvasive procedure that is commonly used in physical therapy field to treat many musculoskeletal conditions because it has the ability to reduce inflammation, alleviate pain and improve functional performance of the patient. The experimental studies showed that Ketoprofen phonophoresis has a great efficacy on Dequervain tenosynovitis after delivery [12].

Ketoprofen gel is a nonsteroidal anti-inflammatory drug. Several studies demonstrated that "Ketoprofen phonophoresis provides, significant pain-relieving effect in Dequervain tenosynovitis after delivery and the results were amazing [13].

Fastum Gel is a topical medication belongs to Non-Steroidal Anti- Inflammatory Drugs (NSAIDs). Fastum gel has a beneficial effect to reduce inflammation and relieve pain [14].

LLLT is a non-invasive light source treatment that uses red and near-infrared monochromatic light to treat soft tissue injuries without increasing skin temperature. It has low energy output (between 1 and 1000mW) and generates a single wavelength of light (between 600 and 1100nm). Lasers have been used for photo biomodulation, Low level laser is effective in the management of de Quervain's tenosynovitis [15].

Low level laser therapy (LLLT) has been used as a non-pharmacological alternative to treat painful musculoskeletal conditions for 3 decades. While laboratory research consistently shows that low energy irradiation from lasers changes cellular processes, producing among others anti-inflammatory effects and increased collagen turnover [16].

It has been reported that LLLT therapy had anti-inflammatory and anti-oedematous actions due to its reduction effect in prostaglandin synthesis. Its inhibition effect on prostacyclin has especially been reported to provide pain and inflammation regression [17].

In another study, the authors had suggested that an inhibition of neuronal activity might be responsible for the therapeutic effect, and the laser irradiation selectively inhibited nociceptive signals at peripheral nerves [18].

During this procedure, different wavelengths and outputs of low level light are applied directly

to a targeted area. The body tissue then absorbs the light. The red and near-infrared light cause a reaction, and the damaged cells respond with a physiological reaction that promotes regeneration. Superficial tissue is commonly treated with wavelengths between 600 and 700 nanometers (nm). For deeper penetration, wavelengths between 780 and 950 nm are used. Although you'll feel the laser device touching your skin, the procedure is painless and noninvasive. There will be no sound and you'll feel no vibration or heat. Each treatment typically takes only a few minutes *[19]*.

One theory regarding the mechanism of action of LLLT purports that the laser is capable of influencing photoreceptors in the cells. This mechanism is referred to as photobiology or biostimulation. It has been reported that photobiostimulation occurs via the electron transport chain enzymes in mitochondria, inducing high cell respiration rates by either the endogenous porphyrins in the cell or by cytochrome c, which increases cellular metabolism and function. The biostimulating effect of LLLT results in an increase in microcirculation, higher production rates for ATP, RNA, and DNA synthesis, thus improving cellular oxygenation, nutrition, and regeneration and an enhanced mitochondrial electron transport system *[20]*.

Photons enter the cell and are readily absorbed by biological chromophores located either in the mitochondria or in the cell membrane. These chromophores strongly interact with the laser irradiation. The photonic energy is converted to chemical energy within the cell, in the form of ATP, which enhances cellular functions and cell proliferation rates. Cell membrane permeability is altered, followed by physiological changes in the target cells. The magnitude of the laser bio stimulation effect depends on the wavelength used as well as the physiological state of the cell at the moment of irradiation *[21]*.

To explain the bio stimulation effect of LLLT, Karu proposed a chain of molecular events starting with the absorption of light by a photoreceptor and leading to the photoactivation of enzymes in the mitochondria, including the signal transduction and amplification events, and ending with the photo response. Light is absorbed by components of the respiratory chain, which leads to changes in both the mitochondria and the cytoplasm. At low-laser doses, additional Ca2+ is transported into the cytoplasm by an antiport process that triggers or stimulates various biological processes such as DNA and RNA synthesis, cell mitosis, and cell proliferation. At higher doses, too much Ca2+ is released, which results in hyperactivity for the calcium-adenosine triphosphatase (ATPase) calcium pumps and exhausts the ATP pool of the cell, thereby inhibiting cell metabolism *[22]*.

LLLT has a high beneficial effect on nerve cells which block pain transmission to the brain (close pain gait). Another pain blocking mechanism involves the production of high level of natural pain killing chemicals such as endorphins and enkephalins from the brain and adrenal gland through stimulating descending inhibitory system *[23]*.

LLLT has an anti-oedema effect as it causes alternation in cell membrane permeability, vasodilation in blood vessels and activates lymphatic drainage system (drains swollen area) as a result, there is a reduction in swelling caused by inflammation *[24]*.

LLLT generates stimultaneous ant-inflammatory and analgesic effects. It reduces inflammation, swelling and pain. The anti-inflammatory effects of LLLT work at the cellular level. Laser does not suppress inflammation but it stimulates the body s' cells to reduce inflammation, swelling and pain. 90% of patients who had DQV reported an improvement and solution of pain after low level laser therapy *[25]*.

LLLT becomes a popular technology, it is used to treat a variety of conditions because it showed a strong evidence of effectiveness in pain relief. LLLT synchronizes continuous and pulsed emission of light wave to generate simultaneous ant-inflammatory and analgesic effects. Several studies had confirmed that LLLT is beneficial in treating pain and inflammation in DQV. All results of these studies showed a statistical significant decrease in VAS scores and high percentage of improvement in hand grip muscle strength after laser therapy *[26]*.

In De Quervain's tenosynovitis it is best to administer LLLT treatment as soon as possible for faster recovery. The sooner the inflammation is reduced, the pain is relieved, the earlier the recovery process can begin. For those who have De Quervain's tenosynovitis, laser therapy can help to address persistant pain and inflammation associated with them. So, no need for medication or surgery [27].

It is approved that, LLLT has anti- inflammatory effects, anti-edematous effect, it closes pain gait and stimulates natural pain killer chemicals, such as endorphins and enkephalins. So due to less inflammation, there is less oedema and less pain. For this reason LLLT is usually recommended to treat DQV [28].

Low level laser therapy is the faster physical therapy modality to relieve pain and reduce inflammation as well as swelling in DQV. After first session of LLLT patients feel better and good with no pain and tenderness *[29]*.

Laser therapy uses a process called photobiomodulation. Photons enter the tissue and interact with the cytochrome c complex within mitochondria. This interaction triggers a biological cascade of events that leads to an increase in cellular me-

tabolism and a decrease in both pain and inflammation. Unlike medications, laser therapy reduces pain without undesirable side effects. After laser therapy, patients with De Quervain's tenosynovitis reports long-acting pain relief. Many patients experienced long lasting pain relieve after only a couple of treatments. LLLT is particularly effective when it is administration as soon as possible following injury. The faster the inflammation is reduced and the healing process can begin. LLLT helps to restore normal function of the affected hand quickly. LLLT is the best modality to treat De Quervain's tenosynovitis, it gives amazing results **[30].**

Table (1): It illustrate Demographic characteristics of all patients in both groups (A&B).

	Group A (n=20)	Group B (n=20)	*t*-value	*p*-value
Age (yrs.)	28.65±2.11	29.50±3.53	–0.924	0.361
Weight (kg.)	77.95±6.02	77.78±6.08	0.091	0.928
Height (cm)	167.10±4.12	166.60±4.10	0.385	0.702
BMI (kg/m^2)	27.96±1.37	27.99±1.39	–0.046	0.964

Data are expressed as mean ± SD. NS = p>0.05 = Not significant.

Subjects, Material and Methods

This study was carried out on Forty multiparous women suffering from De Quervain's Tenosynovitis (for at least 3 months after delivery), they were selected randomly from the outpatient clinic of Sadat General Hospital Al-Monofia. This study had lasted 12 months from June 2023 to June 2024). They were divided randomly into two groups equal in number as group (A) and group (B). Their ages were ranged from (20-30) years old; their body mass index didn't exceed 30 kg/m^2, and their parity was (2-4) children.

Material:

A- Informed Consent Form: Each patient in both groups (A&B) was asked to sign on the Consent Form before participating in this study.

B- Recording data sheet: All data of each patient in both groups (A&B) were recorded in a data sheet including: Name, age, address, occupation, weight, height, BMI, date of delivery, type of delivery, number of parities, chief complain, diagnosis, past & present history.

C- Visual Analogue Scale (VAS): It is a graphic rating scale with numerical values ranged from (0-4), placed equidistantly on a line of 10cm long drawn horizontally. The description and numbers help the patient to describe her level of pain.

(0) Represents no pain.

(1) Represents mild pain.

(2) Represents moderate pain.

(3) Represents severe pain.

(4) Represents intolerable pain.

D- Syringes: They were used to withdrawn blood samples from each patient in both groups (A&B) before and after treatment course in the early morning to measure cortisol level in blood plasma. About 3cm of blood was withdrawn from the antecubital vein in the early morning from each patient in groups (A&B) pre and after treatment and they were sent immediately to laboratory centre to analysis.

E- Weight-height scale: It will be used to measure weight and height of each patient in both groups (A&B) before starting the treatment program to calculate body mass index (BMI) through this equation:

BMI = Bbody weight (Kg) / square of body height (m^2) =. Kg/m2

F- Ultrasonic device: It was used to treat all patients in group (A).

G- Ketoprofen gel (Fastum gel): It was used during ultrasonic treatment. For all patients of group (A).

H- Low Level laser therapy device: It was used to treat all patients in group (B).

I- Two Goggle glasses: They were used by the patient and physiotherapist during application of low level Laser therapy to protect their eyes from Laser beam during application of low level laser therapy.

J- Thumb spica splint: It was used by each patient in both groups (A&B) to rest the tendons throughout the treatment Course (4 weeks).

K- Stopwatch: It was used to determine time of each treatment session.

L- Plinth, disposable sheets, towels, 2 chairs, a bottle of alcohol and cotton.

M- A cane, a rubber ball, an elastic band, and small weight dumbbells: These things was used by each patient in both groups (A&B) during exercise Program.

Evaluative procedures:

1- All data of each patient in both groups (A&B) were recorded in the recording data sheet before starting the treatment course.

2- Weight and height of each patient in both groups (A&B) were measured and BMI was calculated before starting the treatment course.

3- Each patient was asked to sit on armchair. The antecubital area was cleaned with alcohol. A blood sample of 3cm was withdrawn from the antecubital vein from each patient in both groups (A&B) by disposable sterile syringe. All the

samples were collected sent immediately to the laboratory centre for analysis.

4- Each patient was asked to put a mark on visual analogue scale (VAS) before and after the treatment course to estimate intensity of her pain.

Treatment procedure:

Group (A):

Each patient in group (A) was asked to sit on an armchair and rest her dominant hand on the treatment table in the midline while the wrist joint was supported on a towel and the tender point was detected and remarkable. The physiotherapist was sitting on another armchair in front of the patient to apply the treatment session for her. At first the skin of the treated area was cleaned with a piece of cotton immersed in alcohol to decrease skin resistance. The transduces head (treatment head) of ultrasonic device was covered by a condom to prevent transfer of infection. Then the ultrasonic device was adjusted on the Following parameters: Frequency: 1 MHz, Intensity:0.5-1w/cm^2, Mode: Continuous mode, Duration: 5 minutes. The physiotherapist put a sufficient amount of Ketoprofen gel on the skin of the treated area (the tender point). Then, the physiotherapist held the transducer head from its handle and switch on the ultrasonic device. After that, the physiotherapist started to move the transducer head of ultrasonic device on the skin of the treated area in a circular movement continuously for 10 minutes. Then the ultrasonic device was switched off and the treated area was cleaned with a piece of cotton. After finishing the session, the patient was asked to perform mobilizing exercises and strengthening exercises for wrist joint and muscles of the hand for 30 minutes. At the end, the Patient was asked to wear the thumb spica. This procedure will be repeated 3 times/week for 4 weeks.

The exercise program including:

1- *Mobilizing exercises:*

• Make a Fist exercise: A gentle fist, the patient was asked to wrap her thumb across her fingers, hold for 30 to 60 seconds, release and spread her fingers wide and repeat at least four times.

• Thumb flexion/extension exercise: The patient rested her hand and her forearm on a plinth with the thumb pointing up. Then, the patient was asked to bend her thumb downward and across her palm so that her thumb touches the base of her little finger. Hold that position for about 6 seconds. Then, straighten her thumb. This exercise was repeated from 8 to 12 times.

• Thumb abduction/adduction exercises: The patient was asked to rest her forearm and her hand on the plinth with the palm up. Her wrist was relaxed. Then, she was asked to pull her thumb away from her palm as far as she can. Hold that position for about 6 seconds. Then, slowly move her thumb back to the starting position, with her thumb resting against her index (pointing) finger. This exercise was repeated from 8 to 12 times.

• Thumb Touch (thumb /finger opposition) exercise: This exercise was used to increase the range of motion in the thumb. The patient was asked to point her fingers and thumb straight up like in the picture. Then, allow her thumb to touch her other fingers (each finger separately) then relax. This exercise was repeated several times was repeated.

• Wrist flexion and extension exercises: The patient was asked to sit on a chair and rest her wrist joint of her dominant hand on the edge of the table while the therapist was supporting the patient's wrist joint by her inner hand. Then, the patient was asked to make flexion and extension in her wrist joint several times as in the picture.

• Wrist radial and ulnar deviation exercises: The patient was asked to sit on a chair and rest her wrist joint of her dominant hand on the edge of the table. Then, the patient was asked to move her hand slowly to the right side then to the lift side (to make ulnar & radial deviation). This exercise was repeated several times.

2- *Stretching exercises:*

• Opposition stretch: The patient was asked to sit on a chair and rest her forearm on the table in midline while the therapist was sitting in the front of her holding the patient's thumb by her inner hand while her outer hand was supporting the four fingers of the patient. Then, the therapist started to move the patient's thumb to touch the tip of her little finger then return to the starting position. This exercise was repeated several times.

• Finkelstein stretch: The patient was sitting on a chair resting her forearm on the table in the midline while her wrist joint was rested on the edge of the table. The physiotherapist was sitting in front of patient holding the patient's thumb and the four fingers by her inner hand while her outer hand was supporting the patient's wrist joint. Then, the therapist started to bend the patient's thumb towards the palm of her hand and gently stretch the thumb and wrist joint downward until the stretch was felt at the side of the wrist. The therapist hold this position for 30 seconds then relax. This exercise was repeated several times.

• Wrist stretch exercises: The patient was asked to sit on a chair, rested her forearm on the table and her wrist joint on the edge of the table, while the therapist was holding patient's hand by her inner hand while her outer hand was supporting the patient's wrist joint on the edge of the table. Then, the physiotherapist started to make flexion in the patient's wrist joint with giving a slight pressure at the end of the movement. Hold this position for 30 seconds then relax. The same exercise was repeated for a wrist extension with giving a slight pressure at the end of movement, hold for 30 seconds then relax. This exercise was repeated several times.

3- *Strengthening exercises:*

• Wrist flexion & extension strengthening exercises: The patient was asked to keep her forearm in supination and hold a small weight in her hand then make flexion in her wrist joint, hold then relax. After that, the patient was asked to turn her forearm in pronation and hold the same weight then make extension in her wrist joint, hold then relax. This exercise was repeated several times.

• Wrist radial & ulnar deviation strengthening exercises: The patient was asked to rest her forearm on the treatment table in midline position while her wrist joint was rested on the edge of the table and hold a small weight in her dominant hand. The physiotherapist was sitting at the edge of the table supporting the patient's wrist joint and asked her to make ulnar and redial deviation in her wrist joint then relax. This exercise was repeated several times.

• Hand grip strengthening exercise: The patient was asked to rest her elbow joint on the treatment table and hold a small rubber ball in her dominant hand. Then, she was asked to squeeze the ball firmly and relax. This exercise was repeated several times.

• Finger spring strengthening exercise: The patient was sitting, resting her elbow joint on the treatment table and place an elastic band around her thumb & fingers. The elastic band was tight enough to offer some resistance. Then, the patient was asked to open her thumb and four fingers to stretch the elastic band as far as she can then relax. This exercise was repeated several times.

Group (B):

Each patient in group (B) was asked to sit on armchair and rest her dominant hand on the treatment table in the midline while the wrist joint was supported on a towel and the tender point was detected and remarkable. The physiotherapist was sitting on another armchair in Front of the patient to apply the treatment session for her. Then the Low-Level laser device was adjusted on the Following Parameters: Wavelength: 830nm, Energy density: 20J/cm^2, Power: 30-40mw, Continuous output of 100, Beam diameter: 4mm , Irradiation rate (time of treatment session): 90 seconds on the tender point. The Protective goggle glasses was worn by the patient and the physiotherapist to protect their eyes from the laser beam: After that, the laser probe held perpendicular on the treated area (the distance between the probe and the skin was 2.5cm). Then, the low-level laser device was switched on to deliver the low-level laser beam on the tender point for 90 seconds. After finishing the session, the low-level laser device was switched off, and the patient was asked to perform mobilizing exercises and strengthening exercises for wrist joint and muscles of the hand for 30 minutes as group (A). At the end, the Patient was asked to wear the thumb spica. This procedure was repeated 3 times/week for 4 weeks.

Results

Table (2) and Fis. (1-3): Illustrates mean ± SD for VAS scores before and after treatment for both groups (A & B).

Variable	Group A		Group B	
	Before treatment	After treatment	Before treatment	After treatment
Mean ± SD	3.85±0.37	0.75±1.12	4.00±0.00	3.40±0.68
MD	3.10		0.60	
t# value	10.716		3.943	
p-value	0.001		0.001	
- % of in VAS	80.52%		15.00%	
Significance	Highly significant		Highly significant	

MD = Mean difference.

By comparing the two groups (A & B) after treatment regarding to VAS scores, it was found that, both groups showed a decrease in pain sensation after treatment, group (A) achieved 80.52% while group (B) achieved 15.0% but the percentage of decrease in VAS was more pronounced and more notable in group (A) when compared with group (B), this means that ketoprofen phonophoresis was more effective than LLLT in treating Dequervain tenosynovitis after delivery.

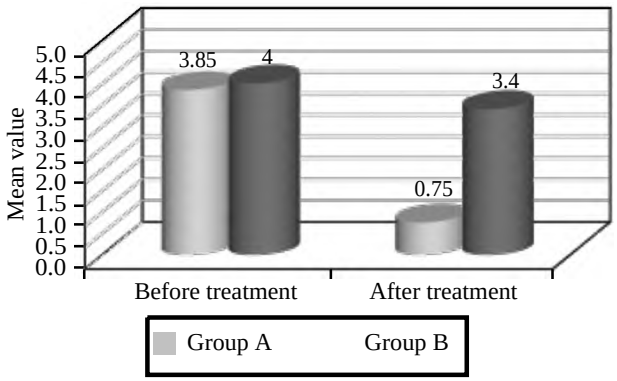

Fig. (1): Illustrates mean values of VAS measured before and after treatment in the two studied groups (A & B).

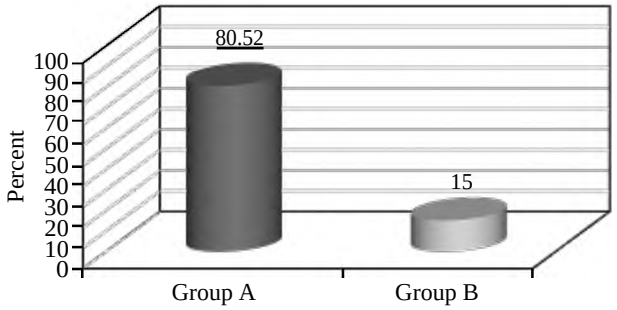

Fig. (2): Illustrates percent of decrease in VAS scores in both groups (A & B) after treatment.

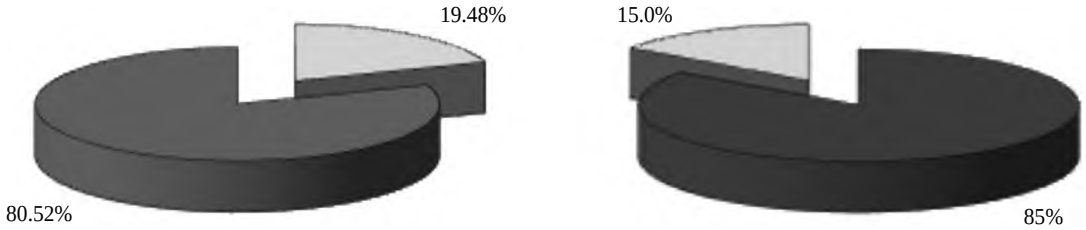

Fig. (3): Illustrates percent of decrease in VAS scores after treatment in both groups (A & B).

Table (3) and Figs. (4-6): Illustrates mean ± SD for serum cortisol before and after treatment for both groups (A & B).

Variable	Group A		Group B	
	Before treatment	After treatment	Before treatment	After treatment
Mean ± SD	18.62±0.37	7.20±3.88	20.25±1.95	18.68±3.27
MD	11.42		1.57	
t# value	13.893		3.275	
p-value	0.001		0.001	
% of in cortisol	61.33%		7.75%	
Significance	Highly significant		Highly significant	

MD = Mean difference.

By comparing the two groups (A & B) after treatment regarding to serum cortisol level, it was found that, both groups showed a decrease in serum cortisol level after treatment, group (A) achieved 61.33% while group (B) achieved 7.75% but the percentage of decrease in serum cortisol level was more pronounced and more notable in group (A) when compared with group (B), this means that ketoprofen phonophoresis was more effective than LLLT in treating Dequervain tenosynovitis after delivery.

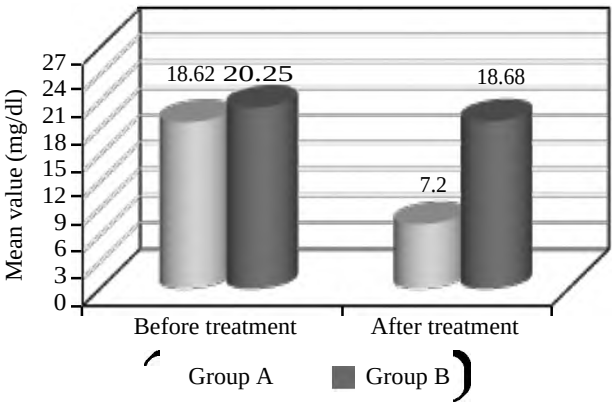

Fig. (4): Illustrates mean values of serum cortisol measured before & after treatment in the two studied groups (A&B).

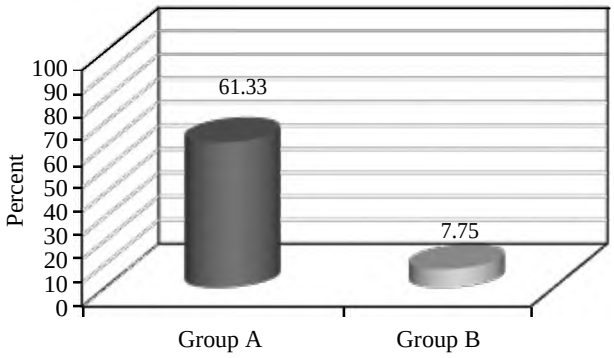

Fig. (5): Illustrates percent of decrease in serum cortisol level in both groups (A & B) after treatment.

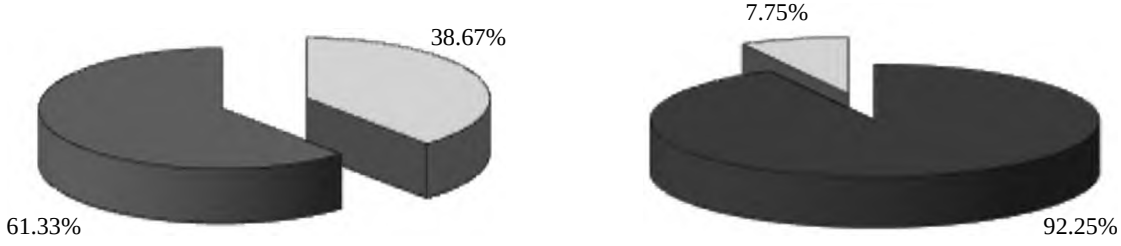

Fig. (6): Illustrates percent of decrease in serum cortisol after treatment in both groups (A & B).

Discussion

Koca et al., **[31]** conducted an experimental Study to Compare between effect of Ketoprofen phonophoresis and low-level laser therapy on Dequervain tenosynovitis after delivery. The results of his study revealed that, phonophoresis achieved a highly Statistically Significant decrease in pain sensation and serum Cortisol level in blood Plasma greater than low level laser therapy. This means that, phonophoresis was advanced to low Level laser therapy in alleviating Pain, reducing inflammation, and decreasing blood cortisol level in blood plasma after treating De Quervain's tenosynovitis. Koca added that," IF you are a physiotherapist, don't hesitate to choose phonophoresis to treat De Quervain's tenosynovitis. It is the best modality to relieve pain, reduce inflammation and improve muscle Function. The patients can return to their normal activities of daily Living with pain Free after only a Few Sessions. This in turn affects greatly on their emotional and psychological status making them So happy with their newborns". This came in agreement with the results of the current study.

The results of the present study agree with the results of Nishanet al., **[32]** who reported that, "Phonophoresis has become a very popular clinical technique for the management of musculoskeletal injuries. This technique has been widely used in physical therapy Field to relieve pain and reduce inflammation in So many musculoskeletal pathological conditions such as Dequervains tenosynovitis, L.B.P, Carpal tunnel syndrome and coccydynia. Nishan had made several experimental studies to investigate the difference between the effect of Ketoprophen phonophoresis and laser therapy on De Quervain's tenosynovitis after delivery. ALL results of his studies emphasized that, there was a remarkable decrease in VAS scores and Cortisol level in Favour to phonophoresis when compared with results of low-level laser therapy".

The results of the current study are confirmed with the results of Jasten et al., **[33]** who stated that, "Phonophoresis is the use of ultrasound technology to enhance the body's ability to absorb topically applied analgesia and other anti-inflammatory agents. The goal is to relieve pain, reduce inflammation and improve overall mobility. Phonophoresis was compare with low level laser therapy to treat Dequervain tenosynovitis after delivery. The results showed that, phonophoresis was superior to laser therapy in relieving pain in cases of Dequervains tenosynovitis after delivery. Jasten added that, "Phonophoresis is a marvelous intervention to relieve pain and reduce inflammation in a very short time without any side effects like medications: Also, it safe, painless and its outcomes are amazing than low level laser therapy The results of the current study are consistent with the results of Derbali et al., **[34]** who demonstrated that, "Ketoprofen phonophoresis is a good treatment option to relieve pain, reduce inflammation and swelling of Dequervains tenosynovitis after delivery and it is more potent and more efficient than Law level Laser therapy.

Derbali added that, "Phonophoresis is significantly more effective for pain relieve than medication, or using low level laser therapy or using ultrasound alone Phonophoresis helps the analgesic drug to penetrate Skin to reach up to 5 cm deep in the subcutaneous tissues of the affected area, so its results are very Fast, more efficient and superior to low Level laser therapy in alleviating pain and other symptoms of De Quervain's tenosynovitis".

Conclusion:

Ketoprofen Phonophoresis is more effective than low level laser therapy in treating Dequervain tenosynovitis after delivery.

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ماده الكيتوبروفين المدخلة بواسطة الموجات فوق الصوتية مقابل الليزر منخفض المستوى على التهاب أوتار الابهام فى السيدات بعد الولادة

تهدف هذه الدراسه الى مقارنه ماده الكيتوبروفين المدخله بواسطه الموجات الفوق صوتيه العلاجيه بتأثير الليزر منخفض الشدة العلاجى فى علاج إلتهاب أوتار الابهام فى السيدات بعد الولاده.

شملت هذه الدراسة أربعين امرأة مرضعة متعدده الاجنه يعانين من ألتهاب أوتالر الابهام بعد الولادة (لمده ٣ شهور على الأقل بعد الولاده). تراوحت أعمارهم بين (٢٥ –٣٥) عاماً . لم يتعدى مؤشر كتلة الجسم ٣٠ كغم / م ٢ وكان عدد انجابهم يتراوح بين (٢–٤) طفل وقد تم إختيار المرضى من العيادة الخارجية من مستشفى السادات المركزى وقد تم تقسيم المرضى عشوائيًا إلى مجموعتين متساويتين:

المجموعة (أ) : اشتملت هذه المجموعة على عشرين مريضة تلقين العلاج بماده الكيتوبروفين المدخله بواسطه الموجات الصوتيه العلاجيه لمدة خمس دقائق ، ٣جلسات إسبوعياً لمدة ١٢ أسبوع مع استخدام جبيره المعصم وبالاضافه الى عمل تمارين علاجيه لمدة ٣٠ دقيقة ٣ مرات / أسبوع لمدة ١٢ أسبوع.

المجموعة (ب) : اشتملت هذه المجموعة على عشرين مريضة تلقت هذه المجموعة العلاج بالليزر منخفض الشده العلاجى لمده ٩٠ ثانيه ٣ جلسات إسبوعياً لمدة ١٢ أسبوع مع استخدام جبيره المعصم وبالاضافه الى عمل تمارين علاجيه لمدة ٦٠ دقيقة ٣ مرات / أسبوع لمدة ١٢ أسبوع.

طرق التقييم: ا– إختبار مقياس النظير البصرى. ب– قياس مستوى الكروتيزول فى الدم.

نتائج البحث: وقد أظهرت نتائج البحث وجود فارق ذو دلاله إحصائية فى كل من المجموعتين بعد العلاج.

وبمقارنة نتائج المجموعتين وجد التالى:

١– وجود نقص ذو دلالة احصائية فى المؤشر البصرى للألم لصالح المجموعة (أ).

٢– وجود نقص ذو دلالة احصائية فى مستوى الكورتيزول فى الدم لصالح المجموعة (أ).

الاستنتاج: نستنتج من هذه الدراسه أن تأثير ماده الكيتوبروفين المدخله بواسطه الموجات الصوتيه العلاجيه أعلى من تأثير الليزر المنخفض الشده العلاجى فى تقليل شدة الألم الحالية و خفض مستوى الكورتيزون فى الدم لدى السيدات اللاتى يعانين من التهاب أوتار الابهام ما بعد الولاده.