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Effect of Ultrasound Versus Low Level Laser Therapy in Treatment of Postnatal Low Back Pain

MOHAMED A. AWAD, Ph.D.*; ASMAA M.A. EL-BANDRAWY, Ph.D.*;
ABD EL-HAMID A. ATTA ALLAH, M.D.** and MINA N. SOLIMAN, M.Sc.*

The Department of Physical Therapy for Woman's Health, Faculty of Physical Therapy, Cairo University and The Department of Orthopedic Surgery, Faculty of Medicine (Girls), Al-Azhar University**, Egypt*

Abstract

Background: Postnatal low back pain is considered as a serious health problem worldwide because it certainly can limit function and capacity in both work and personal life.

Purpose: To compare between the effect of ultrasound and low level laser in treatment of postnatal low back pain.

Participants: Thirty women were diagnosed with postnatal low back pain shared in this study. Their ages were ranged from 20 to 35 years old and their Body Mass Indices (BMI) did not exceed 30kg/m2. Patients with spinal fractures, lumbar spinal stenosis from lumbar disc herniation, degenerative joint diseases, or spondylolisthesis, women with BMI exceed 30kg/m2, patients who had polyneuropathy or other neurological disorders and patients with skin diseases interferes with ultrasound or laser application are excluded from the study. The study was conducted from June to December 2016.

Design: They were selected randomly from outpatient clinic of obstetrics department.

Location: This study conducted at Al-Zahraa University Hospital in Cairo, Al-Azhar University.

Methods: They were divided randomly into two groups equal in number. Group (A) consisted of 15 women and treated by therapeutic ultrasound three times per week for 4 weeks. Group (B) consisted of 15 women and treated by low level laser therapy three times per week for 4 weeks. Evaluations of all patients in both groups (A & B) were done before and after the treatment program.

Outcome Measures: Measuring pain intensity with VAS, lumber flexion and extension range of motion with Modified Schober method as well as lateral flexion for right and left sides with tape measurement.

Results: There was a statistically significant improvement of pain intensity, significant improvement of lumbar flexion, extension ROM and significant improvement of lateral side bending for right side and left side in both groups (A & B) when comparing post-treatment values to its corresponding pre-treatment values. When comparing both groups together, LLLT group (B) showed significant decrease in pain intensity, significant increase in lumbar flexion and extension and significant improvement of trunk side bending for right side and left side compared with ultrasound group (A).

Conclusion: The study revealed that both ultrasound and low level laser therapy are effective modalities for treating post-natal low back pain, as there were significant differences in pain intensity, flexion, extension and lateral side bending ROM after treatment. LLLT is better than ultrasound in decreasing pain intensity and increasing lumbar flexion, extension and lateral side bending ROM.

Key Words: *Ultrasound – Low-level laser therapy – Postnatal – Low back pain.*

Introduction

POST-NATAL low back pain is defined as pain and discomfort, localized below the costal margin and above the inferior gluteal folds starting soon after delivery and made worse by effort and relieved by rest. Women had postural backache combined with pain over the sacroiliac joints. This pain was worse after sitting for long periods. Increasing when lifting the baby [1].

Various explanations on the pathophysiology that leads to back pain in the postnatal period including the increase in load on the back as a result of the total weight gained during pregnancy and the weight of the fetus, hormonal changes in the pregnant woman, which destabilizes the spine and sacroiliac joints, connective tissue micro trauma in the sacroiliac joints resulting from trunk extensor muscle forces to balance the anterior flexion moment caused by the growing fetus during pregnancy, laxity of ligamentous structures in the spine and pelvis due to relaxin, direct pressure on the lumbosacral nerve roots due to the increased dimensions of the uterus muscular fatigue and pull or

Correspondence to: Dr. Mohamed A. Awad, The Department of Physical Therapy for Woman's Health, Faculty of Physical Therapy, Cairo University, Egypt

pressure on structures of the musculoskeletal system [2].

Post-natal low back pain affects 50-80% of women after childbirth and during their lives, and it appears to be an important medical condition with its consequences. Low back pain gives rise to physical and psychological problems, disability, and deterioration in the Quality of Life (QOL). Extended pain duration affects the patient's daily functions [3]. Although the wide spread of LBP problem, its treatment remain a challenge to physical therapist which require further clinical trials [4].

The goal of the treatment in the post-natal low back pain is to alleviate the pain, to enhance mobility, to prevent both the physical and the mental disability, and to improve the life quality and the physical functions [5].

Ultrasound therapy (US) in the lower back pain have used predominantly as a pain reduction modality through biological effects that including enhance blood flow, increase membrane permeability and nerve conduction, as well as stimulation of protein synthesis with fibroblast activation. Therapeutic ultrasound is generally considered safe and effective therapy in the number of conditions producing back pain, provided that no contraindications exist. Therapeutic ultrasound was shown to be effective on pain, functional performance [6].

Laser irradiation was suggested to provide analgesia by decreasing the spasm in muscle arterioles, which is essential for tissue oxygenation, and by increasing ATP formation with a consequent normalization in metabolic rate of the tissues with diminished energy levels, the other mechanisms may be related with its effects on endorphin levels and gale control of pain. By all these mechanisms, it can interrupt the vicious cycle of pain [7].

Subjects and Methods

Thirty women were diagnosed with postnatal low back pain shared in this study. The study was conducted from June to December 2016. They were selected randomly from outpatient clinic of Obstetrics Department at Al-Zahraa University Hospital in Cairo, Al-Azhar University after being examined by the orthopedist. Their ages were ranged from 20 to 35 years old and their Body Mass Index (BMI) did not exceed 30kg/m^2. Patients with spinal fractures, lumbar spinal stenosis from lumbar disc herniation, degenerative joint diseases, or spondylolisthesis, women with BMI exceed 30 kg/m^2, patients who had polyneuropathy or other neurological disorders and patients with skin diseases interferes with ultrasound or laser application are excluded from the study. They were divided randomly into two groups equal in number; Group (A) consisted of 15 women and treated by therapeutic ultrasound three times per week for 4 weeks. Group (B) consisted of 15 women and treated by low level laser therapy three times per week for 4 weeks.

Procedures:

All patients were given a full explanation of the protocol of the study and consent form signed for each patient before participating in the study.

A- *Evaluation procedures:*

1- *Weight and height scale:* Weight and height were measured for each patient in both groups (A & B) before treatment to calculate the Body Mass Index (BMI) according to the following equation:

$$\text{BMI} = \frac{\text{Weight (Kg)}}{\text{Height (m}^2\text{)}}$$

2- *Visual analogue scale (VAS):* Visual analogue scale is 5cm calibrated line with 0 (zero) representing no pain and 5 representing worst pain, used to assess the severity of pain before and after treatment for all patients in both groups (A & B). Every patient of both groups (A & B) was asked to mark on the line that represents her level of pain before and after treatment.

3- Modified Schober method:

I- *Assessment of lumbar flexion:* Modified Schober method was used to measure anterior flexion. Each patient was asked to stand erect with her feet about shoulder-width apart to stabilize the pelvis, to aid patient in maintaining her balance, and help to increase the consistency of measurements. Then, the therapist stood behind the standing patient to determine the posterior superior iliac spines with both thumbs, and then an ink line was drawn along the midline of the lumbar spines horizontal to the posterior superior iliac spines to mark the midpoint between the Posterior Superior Iliac Spines (PSIS). Then tape measure was used to identify and mark two points: One that is 10cm superior to the midpoint (A), another that is 5cm inferior to the midpoint (B). The patient was advised to bend forward as much as she can with keeping both knees straight. When maximum anterior flexion was reached, the new distance between superior and inferior skin marking (B & C) was measured in centimeter by the tape measurement. The increased distance along the tape is due to flexion of the lumbar spine and is normally about 6-7cm (less than 5cm should be considered as abnormal). After each measurement, the patient was asked to return to the upright position Fig. (1).

Fig. (1): Modified Schober test for assessment of lumbar flexion.

II- Assessment of lumbar extension: Each patient was asked to stand erect with her feet about shoulder-width apart. This position stabilized the pelvis to aid the patient in maintaining her balance, and helped to increase the consistency of measurements. Then, the therapist stood behind the standing patient to determine the posterior superior iliac spines with both thumbs, and then an ink line was drawn along the midline of the lumbar spines horizontal to the posterior superior iliac spines to mark the midpoint between the Posterior Superior Iliac Spines (PSIS). Then tape measure used to identify and mark two points: One that is 10cm superior to the midpoint (A), another that is 5cm inferior to the midpoint (B). Then the therapist instructed the patient to bend backward into full lumbar extension and the new distance between the superior and inferior skin markings measured in centimeters. The change in the difference between the marks used to indicate the amount of lumbar extension. The increased distance along the tape is due to extension of the lumbar spine and is normally about 2-3cm (less than 1cm should be considered as abnormal) Fig. (2).

III- Assessment of lateral flexion: The patient was asked to stand erect with her feet about shoulder-width apart. This position stabilized the pelvis and helped the patient to maintain her balance to increase the consistency of measurements. Both right and left lateral flexion was measured as the distance from the tip of the index finger to the floor at maximal comfortable lateral flexion. The patient was instructed to bend her trunk laterally as much as she can Fig. (3). Normal value of lateral spinal flexion is 16.2-28.0cm.

Fig. (2): Modified Schober test for assessment of lumbar extension.

Fig. (3): Assessment of trunk lateral flexion for right side.

B- *Therapeutic procedures:*

1- Therapeutic ultrasound: It was applied for group A only. Every patient was instructed briefly and clearly about the nature of therapeutic ultrasound and its effect in order to gain her confidence and cooperation of all through the period of this study. Every patient was asked to evacuate her bladder before starting the treatment session to be relaxed, then she was asked to relax in prone lying position and support the head over her crossed forearm. Small pillow was positioned under her pelvic to flatten the lumbar region. The treated area was swiped with a cotton and alcohol to clean it. Then, ultrasound gel was applied on the treated area as a coupling medium to assist in transmission of ultrasound waves to the skin. The ultrasound apparatus was adjusted to produce continuous ultrasonic waves at frequency of 1MHz with power 2w/cm^2 for 5 minutes for the affected area. Ultrasound is applied three times/week for 4 weeks for all patients of group (A) Fig. (4).

2- Low level laser therapy: It was applied for group B only. Every patient was instructed briefly and clearly about the nature of low level laser therapy and its effect in order to gain her confidence and cooperation of all through the period of this study. Every patient was asked to evacuate her bladder before starting the treatment session to be relaxed, then she was asked to relax in prone lying position and support the head over her crossed forearm. Small pillow was positioned under her pelvic to flatten the lumbar region. The treated area was swiped with cotton and alcohol. Low level laser therapy apparatus was adjusted to produce wave length of 904nm, peak power of 75mw, frequency 1000HZ and dosage 4 joule/cm^2. LLLT was applied on paravertebral region (L2 to S2-S3) including 6 paravertebral trigger points. Each patient was irradiated by a single laser probe in contact mode at which the probe was held firmly and pressed perpendicular at the treated point. Each point was irradiated for two minutes. LLLT was applied 3 times/ week for 4 weeks for patients of group (B) Fig. (5).

Fig. (4): Application of ultrasound for group (A).

Fig. (5): Application of low level laser therapy for group (B).

Statistical design and data analysis:

Results were expressed as mean and Stander Deviation (SD). Wilcoxon Signed Ranks test was used to compare between pre and post-treatment results for VAS and Mann-Whitney U-test was used to compare between both groups. Paired *t*-test was used to compare between pre and post-treatment results for flexion, extension and lateral side bending and unpaired *t*-test was used to compare between both groups. All statistically significant differences determined with confidence interval of 95% and thus at p-value ≤ 0.05.

Results

I- *Physical characteristics of the patients:* There was no significant statistical difference between both groups (A & B) in their ages and BMI where their t & p-values were (0.51 & 0.92) and (0.615 & 0.365) as shown in (Table 1).

II- *Visual Analogue Scale (VAS):*

A- Within groups: There was statistically highly significant difference in VAS between pre and post-treatment according to Wilcoxon Signed Ranks test. In group (A) there was a statistically decrease in the median values of VAS, post-treatment compared to its corresponding pre-treatment value with Z-value (8.37) and p-value (0.001). Also in group (B), the median value of VAS was highly significant decrease in post-treatment value compared to its corresponding pre-treatment value with Z-value (14.93) and p-value (0.001). The percentage of improvement was higher in group (B) (37.5%) than group (A) (20%) (Table 2).

B- Between groups: Mann-Whitney U-test was used to show statistical difference in VAS between the two groups measured pre and post-treatment. Pre-treatment, there was no statistical significant difference between median values of VAS of group (A) and group (B) with U-value (221.5) and p-value (0.663). When comparing the two groups after treatment, there was significant difference (p-value=0.003) in favor of group B (Table 2), Fig. (6).

III- *Mean values of Modified Schober test of lumbar flexion:*

A- Within groups: There was statistically highly significant difference in lumbar flexion between pre and post treatment according to paired *t*-test. In group (A) there was a statistically increase in the mean values of Modified Schober test for lumbar flexion, with *t*-value (9.05) and p-value (0.001). Also in group (B), there was highly significant increase in the mean values of Modified Schober test for lumbar flexion, with *t*-value (21.43) and p-value (0.001). The percentage of improvement was higher in group (B) (20.2 %) than group (A) (13. 15%) (Table 3).

B- Between groups: Pre-treatment, there was no statistical significant difference between mean values of lumbar flexion of group (A) and group (B) with *t*-value (0.16), and *p*-value (0.877). Comparing the two groups after treatment, there was significant difference (*p*-value 0.007) in favor of group B (Table 3), Fig. (7).

IV- *Mean values of Modified Schober test of lumbar extension:*

A- Within groups: There was statistically highly significant difference in lumbar extension between pre and post-treatment according to paired *t*-test. In group (A) there was a statistically increase in the mean values of Modified Schober test for lumbar extension, with *t*-value (4.57) and *p*-value (0.001). Also in group (B), there was highly significant increase in the mean values of Modified Schober test for lumbar extension, with *t*-value (7.75) and *p*-value (0.001). The percentage of improvement was higher in group (B) (13.6%) than group (A) (7.76 %) (Table 4).

B- Between groups: Pre-treatment, there was no statistical significant difference between mean values of lumbar extension of group (A) and group (B) with *t*-value (0.51) and *p*-value (0.611). Comparing the two groups after treatment, there was significant difference (*p*-value=0.006) in favor of group B (Table 4), Fig. (8).

V- *Mean values of trunk right side bending:*

A- Within groups: There was statistically highly significant difference in right side bending between pre and post-treatment according to paired *t*-test. In group (A) there was a statistically decrease in the mean values of trunk side bending to the right side, Also in group (B), there was highly significant decrease in the mean values of trunk side bending to the right side, with *t*-value (34) and *p*-value (0.001). The percentage of improvement was higher in group (B) (30.6%) than group (A) (24.85%) (Table 5).

B- Between groups: Pre-treatment, there was no statistical significant difference between mean values of trunk side bending to the right side of group (A) and group (B) with *t*-value (0.2), and *p*-value (0.846). Comparing the two groups after treatment, there was significant difference (*p*-value =0.001) in favor of group B (Table 5), Fig. (9).

VI- *Mean values of trunk left side bending:*

A- *Within groups:* There was statistically highly significant difference in left side bending between pre and post-treatment according to paired *t*-test. In group (A) there was a statistically decrease in the mean values of trunk side bending to the left side, with *t*-value (12.25) and *p*-value (0.001). Also in group (B), there was highly significant decrease in the mean values of trunk side bending to the left side, with *t*-value (25.47) and *p*-value (0.001). The percentage of improvement was higher in group (B) (33.39%) than group (A) (24.43%) (Table 6).

B- *Between groups:* Pre-treatment, there was no statistical significant difference between mean values of trunk side bending to the left side of group (A) and group (B) with *t*-value (0.23), and *p*-value (0.816). Comparing the two groups after treatment, there was significant difference (*p*-value =0.001) in favor of group B (Table 6), Fig. (10).

Table (1): Physical characteristics of the patients.

Variable	Groups	Mean ± SD	*t*-value	*p*-value
Age (years)	Group (A) Group (B)	28.13±3.5 28.87±2.13	0.51	0.615NS
BMI (kg/m^2)	Group (A) Group (B)	28.01±1.46 27.93±1.45	0.92	0.365NS

Table (2): VAS for both groups (A & B) before and after treatment.

	Group (A)	Group (B)	U-value	*p*-value
Pre-treatment	5	4	221.5	0.663 (NS)
Post-treatment	3	1	303.5	0.003 (S)
Mean difference	2	3		
% of improvement	20%	37.5%		
z-value	8.37	14.93		
p-value	0.001 (S)	0.001 (S)		

Table (3): Modified Schober test of lumbar flexion (cm).

	Group (A)	Group (B)	*t*-value	*p*-value
Pre-treatment	17.03±0.92	16.98±0.95	0.16	0.877 (NS)
Post-treatment	19.27±1.15	20.41±0.96	2.93	0.007 (S)
Mean difference	2.24	3.43		
% of improvement	13.15%	20.2 %		
t-value	9.05	21.43		
p-value	0.001 (S)	0.001 (S)		

Table (4): Modified Schober test of lumbar extension (cm).

	Group (A)	Group (B)	*t*-value	*p*-value
Pre-treatment	16.22±0.53	16.32±0.54	0.51	0.611 (NS)
Post-treatment	16.85±0.62	17.43±0.41	3.05	0.006 (S)
Mean difference	0.63	1.11		
% of improvement	7.76%	13.6%		
t-value	4.57	7.75		
p-value	0.001 (S)	0.001 (S)		

Table (5): Comparison between mean values of right side bending (cm).

	Group (A)	Group (B)	*t*-value	*p*-value
Pre-treatment	26.92±0.95	26.99±1.09	0.2	0.846 (NS)
Post-treatment	20.23±0.91	18.73±1.29	3.69	0.001 (S)
Mean difference	6.69	8.26		
% of improvement	24.85%	30.6%		
t-value	46	34		
p-value	0.001 (S)	0.001 (S)		

Table (6): Comparison between mean values of left side bending (cm).

	Group (A)	Group (B)	*t*-value	*p*-value
Pre-treatment	26.93±1.34	26.83±1.14	0.23	0.816
Post-treatment	20.35±1.5	17.87±1.37	4.72	0.001
Mean difference	6.58	8.96		
% of improvement	24.43%	33.39%		
t-value	12.25	25.47		
p-value	0.001	0.001		

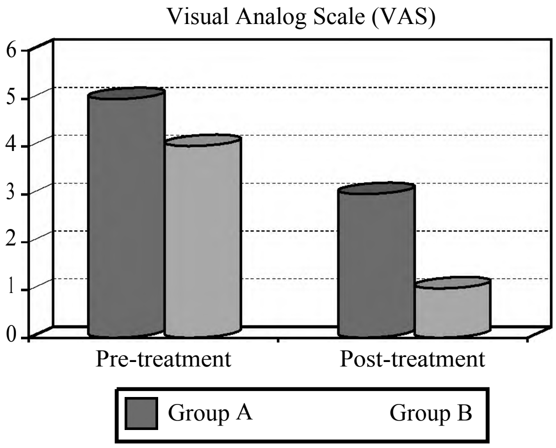

Fig. (6): VAS for both groups (A & B) before and after treatment.

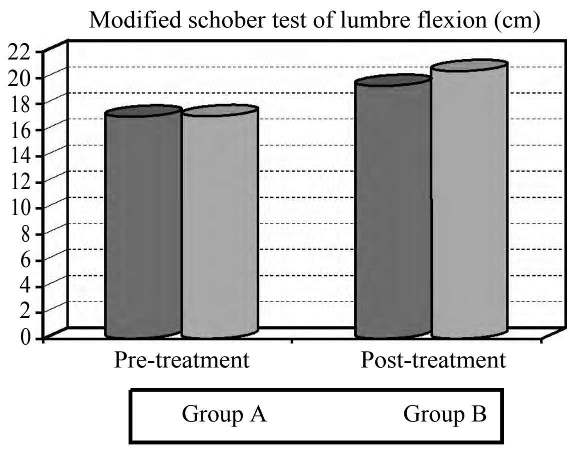

Fig. (7): Modified Schober test of lumbar flexion (cm).

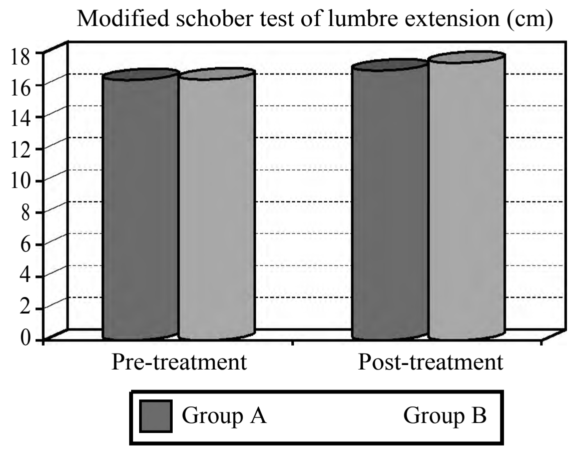

Fig. (8): Modified Schober test of lumbar extension (cm).

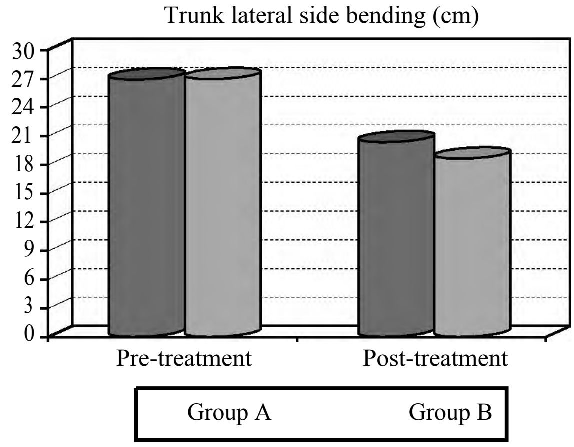

Fig. (9): Comparison between mean values of right side bending (cm).

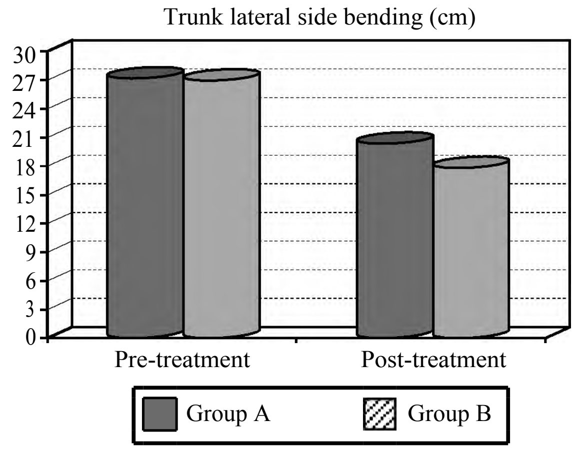

Fig. (10): Comparison between mean values of left side bending (cm).

Discussion

Postnatal Low Back Pain (LBP) is one of the most common causes of inappropriate back function after labor [8]. Back pain is a dull ache starts soon after delivery that worse by effort and relieved by rest. Examination showed only mild tenderness over the lumbar vertebrae. Other women had postural backache combined with pain over the sacro-iliac joints. This pain was worse after sitting for long periods. On each occasion, the pain had been precipitated by lifting the baby. The pain, which radiated down to both legs, is severe enough to force the woman to lie flat and rest [9].

The goals of the treatment in the post-natal low back pain are to alleviate the pain, to enhance mobility, to prevent both the physical and the mental disability, and to improve the life quality as well as the physical functions. To attain these goals, various treatment programs are suggested. Medical treatment, therapeutic modalities, massage, manipulation, traction, and therapeutical exercises are the frequently administered therapies [5].

This study was carried out to compare between the effect of ultrasound and low level laser in treatment of postnatal low back pain. Thirty women diagnosed with postnatal low back pain shared in this study. They were selected randomly from outpatient clinic of Obstetrics Department at Al-Zahraa University Hospital in Cairo, Al-Azhar University. They were divided randomly into two groups equal in number; Group (A) consisted of 15 women and treated by therapeutic ultrasound three times per week for 4 weeks. Group (B) consisted of 15 women and treated by low level laser therapy three times per week for 4 weeks.

Evaluations of all patients in both groups (A & B) were done before and after the treatment program through measuring pain intensity using VAS, lumber flexion and extension range of motion using Modified Schober method as well as lateral flexion for right and left sides using tape measurement.

The results of the study revealed that: Regarding group (A) who was treated by ultrasound, there was a significant decrease in low back pain after treatment as revealed by VAS. This come in agreement with Durmuş et al., [6] who evaluated the effects of therapeutic ultrasound on patients with post-natal Chronic Low Back Pain (CLBP). They noted a significant improvement in pain, disability, walking performance, depression, and QOL in both groups after treatment. Improvement was significantly greater in the US group compared to the sham ultrasound group.

Also, Durmuş et al., [10] studied the effects of Electric Stimulation (ES) and Ultrasound (US) on patients with post-natal chronic low back pain. They stated that ES and ultrasound were effective in decreasing pain and improving parameters of QOL. ES and ultrasound may, therefore, become a valuable treatment modality for patients with (CLBP) before the exercise and conditioning programs.

Unlu et al., [11] found that traction and ultrasound therapies were effective in the treatment of patients with acute post-natal LBP. There were significant reductions in pain and disability scores between baseline and follow-up periods.

In contrast, Faber et al., [12] compared between the effects of extracorporeal shock-wave therapy, therapeutic ultrasound and exercise on treatment of low back pain. They found there is moderate evidence that ultrasound is not effective treatment for low back pain.

Also the results of this study disagreed with Robertson and Baker, [13] who found little evidence that continuous therapeutic ultrasound is more effective than placebo ultrasound for treating people with pain and soft-tissue disorders of the lower back.

Harris and Susman, [14] reported that there was no scientific evidence demonstrating the effectiveness of continuous US in decreasing intensity of low back pain or improving function disability. Also the results of this study disagreed with Van der Windt et al., [15] who found there was little evidence to support the use of continuous ultrasound therapy in the treatment of musculoskeletal disorders.

Kurtaiş Gürsel et al., [16] reported that true US compared with sham US bring no further benefit when applied in addition to other physical therapy interventions in the management of soft tissue disorders of the lower back. Also, Michener et al., [17]found that therapeutic ultrasound had low quality evidence on reducing low back pain.

Regarding group (A) who was treated by ultrasound, there was a significant increase in flexion, extension as revealed by Modified Schober test as well as lateral side bending for right and left sides. The results of this study agree with Rajek et al., [18] who concluded that continuous ultrasound therapy received by patients with low back pain lead to increase physical activities for flexion, extension and decreased patients degree of disability.

Charlusz et al., [19] evaluated the efficacy of ultrasound in improving lumbar mobility in patient with LBP by using the Schober test for flexion, extension and the finger-to-floor test for lateral side bending for right and left side. They found increasing in lumbosacral spine mobility after ultrasound therapy.

The results of this study also explained by Ansari et al., [20] who compared the effect of continuous Ultrasound (US) in patients with Low Back Pain (LBP) with placebo ultrasound. The study supported the significant effect of US on LBP and suggested that US improved the functional ability and ROM of patients with low back pain.

Improvement in lumbar range of motion may be caused by decreasing pain through reduction of swelling, edema and the gentle massage of muscle tendons and/or ligaments in the treated area because no strain is added and any scar tissue is softened. These benefits are achieved by two main effects of therapeutic ultrasound including thermal and non-thermal effects. Thermal effects are due to the absorption of the sound waves. Non thermal effects are from cavitation, microstreaming and acoustic streaming [21].

In contrast, Grubisic et al., [22] reported that there was no significant difference between ultrasound group and sham ultrasound group in improving range of motion of lumbar spine in patients with chronic low back pain. Also, Ebadi et al., [23] who reported that ultrasound has a small effect on improving the quality of life and range of motion in patients with non-specific chronic LBP by using Functional Rating Index, Modified Schober method (cm) and finger-tip-to-floor method (cm) before and after treatment. Mohseni-Bandpei et al., [24] proved that patients received manipulation and exercise showed a greater improvement compared with those receiving ultrasound and exercise.

Regarding group (B) who was treated by low level laser therapy, there was a significant decrease in low back pain after treatment as revealed by VAS. This come in agreement with Huang et al., [25] who stated that LLLT is an effective method to relieve low back pain in patients with post-natal LBP. Also, Cotler et al., [26] found that LLLT is beneficial for pain relief in low back pain and can accelerate the body's ability to heal itself.

Saunders, [27] added that patients with low back pain and treated with LLLT had less pain, less secondary weakness and less tenderness after the treatment than before.

Fiore et al., [28] stated that LLLT is more beneficial than placebo when applied as a single intervention for patients with low back pain in the short time. Fred and Michael, [29] reported that four trials (566 patients) demonstrated that laser therapy was effective and one trial (140 patients) found laser therapy to be no more beneficial than a sham laser device.

Soriano and Rios, [30] compared low-level laser therapy treatment with sham laser therapy treatment. They stated that, LLLT was more effective in pain relief at intermediate follow-up (44.7%) compared with sham LLLT (15.2%).

Longo et al., [31] measured the intensity of pain and functional limitation after treatment of low back pain with LLLT. They found completely disappeared or improved of pain in 97.5% of patients in the LLLT group and 37.5% of the control group after one month.

The action of laser developed on nervous terminations with an analgesic effect. Laser radiation in general produce monochromatic light, that is able to alter cellular and tissue function in a manner dependent on the characteristics of light itself (e.g., wavelength, coherence). By definition LLLT (often also known "low-energy" or "low-power" laser therapy) takes place at low radiation intensities. Therefore, it is assumed that any biological effects are secondary to direct effects of photonic radiation, and are not the result of thermal process [32].

In contrast, Bjordal et al., [33] suggested that LLLT may be effective at reducing pain relative to placebo, but the results were not statistically significant. Also, Bingol et al., [34] reported that 10 applications of LLLT for 2 weeks did not induce significant pain relief.

The results of this study also disagreed with Brosseau et al., [35] who showed small effects of LLLT on pain relief.

There are some studies who assumed that LLLT had temporary effect like the study designed by Enwemeka et al., [36] who made a study on patients with low back pain found that LLLT had only a short-term benefit for pain, self-reported function, active ROM, stiffness, and restriction after 2 weeks of treatment when compared with a placebo laser.

Regarding group (B) who was treated by low level laser therapy, there was a significant increase in flexion, extension as revealed by Modified Schober test as well as lateral side bending for right and left sides. This come in agreement with Djavid et al., [37] who reported that, low level laser therapy is more beneficial than exercise alone in increasing lumbar range of motion by 0.9cm as revealed by Schober test.

Basford et al., [38] found that LLL therapy improve function and a decrease of pain in patients with LBP. Gur et al., [39] found a significant increase in lumbar range of motion including anterior flexion and lateral flexion in low power laser therapy group compared with exercise group.

The results of this study also come in agreement with Hsieh and Lee, [40] who conducted that LLLT therapy associated with reductions in the severity of disability and fear avoidance beliefs in patients with chronic low back pain.

Yousefi-Nooraie et al., [41] compared low level laser therapy with sham treatment. They found that LLLT was beneficial for decreasing disability and function limitation by improving lumbar range of motion in patients with post-natal low back pain.

Jovicić et al., [42] found that LLLT an effective physical therapy modality for increasing ROM, decreasing pain levels, functional disability and the radiculopathy associated with LBP because it provided analgesia by decreasing the spasm in muscle arterioles, which is essential for tissue oxygenation.

Also, Chow et al., [43] reported the analgesic effect of LLLT is based on different mechanisms of action including its ability to slow the transmission of the pain stimulus and to increase the production of morphine-mimetic substances in the body. It have a direct effect on nerve structures which could increase the speed of recovery from conduction block or inhibit A δ and C-fiber transmission. Also increasing blood flow, vascular permeability and cell metabolism. Zarkovic et al., [44] reported that there is an elevation of endorphin levels after treatment of trigger zones in muscles by Low Intensity Laser Therapy (LILT). By all these mechanisms, it can interrupt the vicious cycle of pain and improve range of motion.

The results of this study disagreed with Airaksinen et al., [45] who reported that, there is limited evidence of the effectiveness of laser therapy in improving lumbar range of motion for flexion, extension and lateral flexion. Klein and Eek, [46] compared LLLT plus exercise with sham plus exercise. They did not find any significant effect of any intervention for lumbar range of motion and function disability.

Regarding to comparison between the effect of ultrasound versus low level laser therapy. Results found that LLLT is effective than ultrasound in treatment of postnatal low back pain.

The results of this study agreed with Amr et al., [47] who found that LLLT in combination with exercise was shown to have greater benefit for mechanical low back pain than ultrasound therapy in combination with exercise in reducing pain and improving the functional ROM.

Conclusion:

From the previous finding, the study revealed that both ultrasound and low level laser therapy are effective modalities for treating post-natal low back pain as there were significant differences in pain intensity, flexion, extension and lateral side bending ROM after treatment comparing with pretreatment results. LLLT is better than ultrasound in decreasing pain intensity and increasing lumbar flexion, extension and lateral side bending ROM.

References

1- BREEN A., REAL M.T.G., HUTCHINSON A., KOES B., LAERUM E. and MALMIVAARA A.: European guidelines for the management of acute nonspecific low back pain in primary care. Eur. Spine J., 15: 169-91, 2006.

2- TO W.W.K. and WONG M.W.N.: Factors associated with back pain symptoms in pregnancy and the persistence of pain 2 years after pregnancy. Acta Obstet. Gynecol. Scand., 82: 1086-91, 2003.

3- FRANK A.O. and SOUZA L.D.: Conservative management of low back pain. Int. J. Clin. Pract., 55: 21-31, 2001.

4- MURTIZANI A., HUNDOZI H., OROVACANCE N., SLLAMNIKU S. and OSMANI T.: A comparison of high intensity aerobic exercise and passive modalities for the treatment of workers with low back pain: A randomized controlled trial. Eur. J. Phys. Rehabil. Med., 47: (3): 359-66, 2011.

5- MANNION A.F., MÜNTENER M. and TAIMELA S.: Comparison of three active therapies for chronic low back pain: Results of a randomized clinical trial with one-year follow-up. Rheumatol., 40: 772-8, 2001.

6- DURMUS D., DURMAZ Y. and CANTURK F.: Effects of therapeutic ultrasound and electrical stimulation program on pain, trunk muscle strength, disability, walking performance, quality of life and depression in patients with low back pain. Rheumatology International, 30: 901-10, 2010a.

7- OZDEMIR F., BIRTANE M. and KOKINO S.: The clinical efficacy of low power laser therapy upon pain and function in cervical osteoarthritis. Clinical Rheumatology, 20: 181-4, 2001.

8- MIDDELKOOP M.V., RUBINSTEIN S.M., KUIJPERS T., VERHAGEN A.P., OSTELO R., KOES B.W. and VAN TULDER M.W.: A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain, 20 (1): 19-39, 2011.

9- RUSSELL R., GROVES P., TAUB N., O'DOWD J. and REYNOLDS F.: Assessing long term backache after childbirth. B.M.J., 306: 1299-303, 2005.

10- DURMUŞ D., AKYOL Y., CENGIZ K., TERZI T. and CANTÜRK F.: Effects of Therapeutic Ultrasound on Pain, Disability, Walking Performance, Quality of Life, and Depression in Patients with Chronic Low Back Pain: A Randomized, Placebo Controlled Trial. Turk. J. Rheumatol., 25: 82-7, 2010b.

11- UNLU Z., TASCI S., TARHAN S., PABUSCU Y. and ISLAK S.: Comparison of 3 physical therapy modalities for acute pain in lumbar disc herniation measured by clinical evaluation and magnetic resonance imaging. J. Manipulative Physiol. Ther., 31: 191-8, 2008.

12- FABER E., KUIPER J.I., BURDORF A., MIEDEMA H.S. and VERHAAR J.N.: Treatment of impingement syndrome: A systematic review of the effects on functional limitations and return to work. J. Occup. Rehabil., 16: 7-25, 2006.

13- ROBERTSON V.J. and BAKER K.G.: A review of therapeutic ultrasound: Effectiveness studies. Phys. Ther., 81 (7): 1339-50, 2001.

14- HARRIS G.R. and SUSMAN J.L.: Managing musculoskeletal complaints with rehabilitation therapy: A summary of the Philadelphia Panel on evidence-based clinical practice guidelines on musculoskeletal rehabilitation interventions. J. Fam. Pract., 51: 1042-6, 2002.

15- VAN DER WINDT D.A., VAN DER HEIJDEN G.J., VAN DEN BERG S.G., TER RIET G., De WINTER A.F. and BOUTER L.M.: Ultrasound therapy for musculoskeletal disorders: A systematic review. Pain, 81: 257-71, 2000.

16- KURTAIŞ GÜRSEL Y., ULUS Y., BILGIÇ A., DINÇER G. and VAN DER HEIJDEN G.J.: Adding ultrasound in the management of soft tissue disorders of the shoulder: A randomized placebo-controlled trial. Phys. Ther., 84 (4): 336-43, 2004.

17- MICHENER L.A., WALSWORTH M.K. and BURNET E.N.: Effectiveness of rehabilitation for patients with subacromial impingement syndrome: A systematic review. J. Hand. Ther., 17: 152-64, 2004.

18- RAJEK W.M., KUKLIK L.E., ORLOWSKA K., CZERNIACHOWSKA I., RADZIMIŃSKA A. and MOSKA W.: Evaluating the effectiveness of various forms of physical therapy in low back pain treatment. TRENDS in Sport Sciences, 3 (23): 147-54, 2016.

19- CHARLUSZ M., GASZTYCH J., IRZMAŃSKI R. and KUJAWA J.: Analysis of the analgesic effectiveness of selected methods Physical therapy in people with pain syndromes lumbosacral spine. Ortop. Traumatol. Rehab., 12 (3): 225-36, 2010.

20- ANSARI N.N., EBADI S., TALEBIAN S., NAGHDI S., MAZAHERI H., OLYAEI G. and JALAIE S.: A randomized, single blind placebo controlled clinical trial on the effect of continuous ultrasound on low back pain. Electromyogr. Clin. Neurophysiol., 46: 329-36, 2010.

21- MO S., COUSSIOS C.C., SEYMOUR L. and CARLISLE R.: Ultrasound-Enhanced Drug Delivery for Cancer. Expert Opinion on Drug Delivery, 9 (12): 1525, 2012.

22- GRUBISIC F., GRAZIO S., JAJIC Z. and NEMCIC T.: Therapeutic ultrasound in chronic low back pain treatment. Reumatizam, 53 (1): 18-21, 2006.

23- EBADI S., HENSCHKE N., NAKHOSTIN ANSARI N., FALLAH E. and VAN TULDER M.W.: Therapeutic ultrasound for chronic low-back pain. Cochrane Database of Systematic Reviews, Issue 3. Art. No.: CD009169. DOI: 10.1002/14651858.CD009169.pub2, 2014.

24- MOHSENI-BANDPEI M.A., CRITCHLEY J., STAUNTON T. and RICHARDSON B.: A prospective randomised controlled trial of spinal manipulation and ultrasound in the treatment of chronic low back pain. Physiotherapy, 92: 34-42, 2006.

25- HUANG Z., MA J., CHEN J., SHEN B., PEI F. and KRAUS B.V.: The effectiveness of low-level laser therapy for nonspecific chronic low back pain: A systematic review and meta-analysis. Arthritis Research, Vol. 17: 360, 2015.

26- COTLER H.B., CHOW R.T., HAMBLIN M.R. and CARROLL J.: The Use of Low Level Laser Therapy (LLLT) For Musculoskeletal Pain. MOJ. Orthop. Rheumatol., 2 (5) 1-16, 2015.

27- SAUNDERS L.: The efficacy of low level laser therapy in supraspinatus tendonitis. Clin. Rehabil., 9: 126-34, 2005.

28- FIORE P., PANZA F., CASSATTELA G., RUSSO A., FRISARDI V., SOLFRIZZI V., RANIER M., Di TEO L. and SANTAMATO A.: Short-term effects of high-intensity laser versus ultrasound therapy in the treatment of low back pain: A randomized controlled trial. Eur. J. Phys. Rehabil. Med., 47: 367-73, 23, 2011.

29- FRED K. and MICHAEL P.: Laser Therapy for Disc Herniation. Dynamic Chiropractic, 27 (25): 25-30, 2009.

30- SORIANO S. and RIOS R.: Gallium arsenide laser treatment of chronic low back pain: A prospective, randomized and double blind study. Laser Ther., 10: 175-80, 2000.

31- LONGO L., TAMBURINI A. and MONTI A.: Treatment with 904nm and 10600nm laser of acute lumbago, double blind Control-laser. Journ. Eur. Med. Laser Ass., 3: 16-9, 2010.

32- NICOLAU R.A., MARTINEZ M.S., RIGAU J. and TOMAS J.: Neurotransmitter release changes induced by low power 830nm diode laser irradiation on the neuromuscular junctions of the mouse. Lasers Surg. Med., 35: 236-41, 2004.

33- BJORDAL J.M., COUPPÉ C., CHOW R.T., TUNÉR J. and LJUNGGREN E.A.: A Systematic review of low level laser therapy with location-specific doses for pain from chronic joint disorders. Australian Journal of Physiotherapy, 49 (2): 107-16, 2003.

34- BINGOL U., ALTAN L. and YURTKURAN M.: Low power laser treatment for shoulder pain. Photomed Laser Surg., 23: 459-64, 2005.

35- BROSSEAU L., ROBINSON V., WELLS G., De BIE R., GAM A. and HARMAN K.: Low level laser therapy (Classes I, II and III) for treating rheumatoid arthritis. Cochrane Database of Systematic Reviews, Issue 1. [DOI: 10.1002/14651858.CD002049.pub2.], 2006.

36- ENWEMEKA C.S., PARKER J.C., DOWDY D.S., HARKNESS E.E., SANFORD L.E. and WOODRUFF L.D.: The efficacy of low-power LASER in tissue repair and pain control: A meta-analysis study. Photomed Laser Surg., 22: 323-9, 2004.

37- DJAVID G.E., MEHRDAD R., GHASEMI M., HASANZADEH H., SOTOODEH-MANESH A. and POURYAGHOUB G.: In chronic low back pain, low level laser therapy combined with exercise is more beneficial than exercise alone in the long term: A randomized trial. Aust. J. Physiother., 53 (3): 155-60, 2007.

38- BASFORD J.R., SHEFFIELD C.G. and HARMSEN W.S.: Laser therapy: A randomized, controlled trial of the effects of low-intensity Nd: YAG laser irradiation on musculoskeletal back pain. Archives of Physical Medicine and Rehabilitation, 80 (6): 647-52, 2005.

39- GUR A., KARAKOC M., CEVIK R., NAS K., SARAC A.J. and KARAKOC M.: Efficacy of low power laser therapy and exercise on pain and functions in chronic low back pain. Lasers in Surgery and Medicine, 232: 233-23, 2003.

40- HSIEH R. and LEE W.: Short-term therapeutic effects of 890-nanometer for chronic low back pain: A double-blind randomized placebo-controlled study. Laser Med. Sci. 29, 671-9, 10.1007/s10103-13-1378-2, 2013.

41- YOUSEFI-NOORAIE R., SCHONSTEIN E., HEIDARI K., RASHIDIAN A., PENNICK V., AKBARI-KAMRANI M., IRANI S., SHAKIBA B., MORTAZ HEJRI S., JONAIDI A.R. and MORTAZ-HEDJRI S.: Low level laser therapy for nonspecific low-back pain. Cochrane Database of Systematic Reviews, Issue 2. Art. No.: CD005107. Doi: 10.1002/14651858.CD005107.pub4, 2008.

42- JOVICIC´ M., KONSTANTINOVIC´ L., LAZOVIC´ M. and JOVICIC V.: Clinical and functional evaluation of patients with acute low back pain and radiculopathy treated with different energy doses of low level laser therapy. Vojnosanit Pregl., 69 (8): 656-62, 2012.

43- CHOW R., ARMATI P., LAAKSO E.L., BJORDAL J.M. and BAXTER G.D.: Inhibitory effects of laser irradiation on peripheral mammalian nerves and relevance to analgesic effects: A systematic review. Photomed Laser Surg., 29 (6): 365-81, 2011.

44- ZARKOVIC N., MANEV H., PERICIC D., SKALA K., MISLAY J. and RESIAN A.: Effect of semiconductor Gas laser irradiation on pain perception in mice. Lasers in Surgery and Medicine, 9: p. 63-6, 2009.

45- AIRAKSINEN O., BROX J.I., CEDRASCHI C., HILDEBRANDT J., KLABER-MOFFETT J. and KOVACS F.: COST B 13 Working Group on Guidelines for Chronic Low Back Pain. Chapter 4. European guidelines for the management of chronic nonspecific low back pain. Eur. Spine J., 15 (Suppl 2): 192-300. 15. NICE: National Institute for Health and Clinical Excellence. Low back pain: Early management of persistent nonspecific low back pain. Clinical guideline 88; 2009. www.nice.org.uk/cg88, 2006.

46- KLEIN R.G. and EEK B.C.: Low-energy laser treatment and exercise for chronic low back pain: Double blind controlled trial. Archives of Physical Medicine and Rehabilitation, (71): 34-7, 2000.

47- AMR A., EMAD T. and MOUS SA A.: Laser versus ultrasound in treatment of mechanical low back pain. Journal of American Science, 8 (4): 346-52, 2012.

تأثير كلاً من الموجات فوق الصوتية والليزر منخفض الشدة لعلاج آلام أسفل الظهر

من خلال النتائج السابقة، كشفت الدراسة أن كلا من الموجات فوق الصوتية والليزر منخفض الشدة وسائل فعالة لعلاج آلام أسفل الظهر بعد الولادة لأن هناك فرق ذو دلالة إحصائية فى شدة الألم، ثنى وفرد الجذع والإنحناء الجانبى للجذع للجانب الآيمن والجانب الآيسر بعد العلاج مقارنة مع قيم ما قبل العلاج. الليزر منخفض الشدة أفضل من الموجات فوق الصوتية فى تقليل مستوى الآلم وزيادة ثنى وفرد الجذع والإنحناء الجانبى للجذع للجانب الآيمن والجانب الآيسر.