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Original Research Article

CONVENTIONAL THERAPY VERSUS POSITIONAL RELEASE TECHNIQUE IN THE TREATMENT OF CHRONIC LOW BACK DYSFUNCTION

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ABSTRACT

Background: Chronic low back dysfunction (CLBD) is the most common problem of the working-age population in modern industrial society. It is not a life-threatening illness but it has a long-term impact on medical care expenditures for injured workers.

Purpose: To compare the effect of conventional therapy and positional release technique on pain, lumbar range of motion and functional disability in patients with chronic low back dysfunction.

Materials and Methods: Sixty patients from both sexes were diagnosed with CLBP, aged 30 to 60 years and were divided randomly into two equal groups with thirty patients in each group; group A received conventional therapy that include (infrared, ultrasound, stretch and strength exercises for back and abdominal muscles) and group B received positional release technique. The treatment sessions were applied 3 days per week for 6 weeks. The pain was measured by Visual Analogue Scale, the lumbar range of motion was measured by Inclinometer and Functional disability was measured by Oswestry disability scale. Measurements were taken at two intervals pre-treatment and post treatment.

Results: The result of the current study revealed that there was a statistically significant reduction ($p < 0.05$) in pain level and functional disability and significant increase ($p < 0.05$) in lumbar flexion in favor to group A than group B.

Conclusion: Positional release technique and conventional therapy may be an effective treatment for individuals with chronic low back dysfunction although the result of this study revealed that conventional therapy has a significant improvement in pain severity, functional disability and lumbar flexion range of motion than positional release technique.

KEY WORDS: Chronic Low Back Dysfunction, Conventional Physical Therapy Program, Positional Release Technique, Functional Disability.

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INTRODUCTION

Low back pain is a common problem which affects the majority of the population. It considered being chronic if it has been present for longer than three months. Chronic low back pain may originate from an injury, disease or stresses on different structures of the body. The type of pain may vary greatly and may be felt as bone pain, nerve pain or muscle pain [1].

Pain may vary according to sensation to be aching, burning, stabbing or tingling, sharp or dull or ambiguous. The intensity may additionally range from mild to severe. typically, the onset of pain is acute and heals via itself in less than

two months. most of these cases attack with acute pain that becomes worse and worse in each episode. major medical challenge not recommended for all cases but may be necessary for chronic cases that lasting over two months which represent about 5 to 10% of cases [2].

Low back dysfunction refers to a variation of many large and small muscles that have relationships with the ligaments of the small joint including the piriformis, rectus femoris, gluteus maximus and minimus. Long-standing and severe cases of low back dysfunction can develop muscle deconditioning due to spasm and atrophy due to the limitation of activities throughout the body [3]. Chronic Low back dysfunction (CLBD) developed as a result of bad postural addiction, spondylolisthesis, spondylosis, repetitive trauma or derangement, the dysfunction syndrome is the condition in which tightness and instability developed causing pain before complete full normal end range movement. Essentially, the condition arises because the movement is performed inadequately at a time when shortening of soft tissues is taking place [4].

The goals of the treatment include reducing pain, improving the quality of life and increase function depending on the type and source of the pain. If a treatable source of the pain is found, then the underlying process should be treated. When the underlying cause is either not known or not treatable, then the symptoms are treated. Several categories are included in the management of CLBD. These categories are physical therapy, medications, coping skills, procedures and complementary medicine treatments [5]. Physical therapy plays an important role in the treatment of such cases which includes patient education and a variety of stretching and strengthening exercises, manual therapies and modalities (ice, heat, transcutaneous electrical nerve stimulation [TENS] and ultrasound) to treat pain. Active exercise such as exercise and strengthening, usually have the most permanent and long lasting effects [6-8].

Positional release technique (PRT) is an osteopathic treatment technique which accomplished by placing involved tissue in an ideal position of comfort to reduce the irritability of the tender point and to normalize the tissue associated with dysfunction. this approach initially called “Spontaneous Release by Positioning” and later “Strain and Counter Strain”. Eventually became known collectively as “positional release.” Positional release is an indirect osteopathic technique, whereby dysfunctional joints and their muscle are moved away from their restrictive barrier into a position of ease in the treatment of both musculoskeletal [9] and visceral dysfunctions [10].

The mechanism behind this technique is that the shortening of the muscle sends a signal to the brain causing the muscle contraction to be reduced. This echnique is used for relief of somatic dysfunctions that are too acute or too delicate to treat with other procedures [11-12]. The purpose of the current study was to compare the effect of conventional therapy and positional release technique on pain, lumbar range of motion and functional disability in patients with chronic mechanical low back pain.

MATERIALS AND METHODS

Patients: Sixty patients with chronic low back dysfunction were collected from October 6 university hospital. they involved in the study from Marsh 2016 to December 2016. Inclusive criteria for this trial include patients had CLBD for at least 3 months and their age from 30 to 60 years with moderate score of disability (20-40%) on Oswestry Low Back Pain Disability Questionnaire and able to perform range of motion (ROM) test of Lumbar Spine (flexion, extension and side binding) within limit of pain. Exclusive criteria include clinical signs of radiculopathy, previous surgery, lumbar stenosis, neuromuscular disease like multiple sclerosis, fibromyalgia and spondylolisthesis.

Intervention:

All patients were assigned randomly into two groups by drawing of lots; group A (conventional therapy) and group B (positional release). The treatment program performed three times per week for six weeks. This study approved by an Ethics Committee of the October 6 University. All participants were informed about the aim of the study without any explanation to treatment. Consent form had been assigned from each patient before treatment.

Conventional therapy

Infrared radiation: (Enraf Nonius Model). It applied for twenty minutes at a distance of 60 cm from the lumbar region with patients in the prone lying position and a small pillow under the abdomen.

Therapeutic ultrasound (Fisiosonic - SN/ 103212. Italy). It applied on paravertebral muscles for fifteen minutes, 1MHZ, continuous mode and intensity of 1.5 W/ cm^2.

Vibrator: (THRIVE; AC 220 V-30W-50/60 Hz. Japan). Applied for ten minutes over buttocks and paravertebral muscles with soft and elastic cover to avoid any painful sensation during application.

Mild stretching exercises for hamstring, calf muscles, and back muscles. Three sets of stretching exercises, each involving thirty seconds hold and a thirty seconds rest.

Strengthening exercises for back and abdominal. two sets of strengthening exercises were performed consisting of ten repetitions with five seconds hold.

Positional release technique

Quadratus lamborum muscle: tender points are located on the lateral aspect of transverse processes from L1 to L5. Pressure is applied anteriorly and then medially. The patient was prone with the head of the table raised or pillow placed under the patient's chest, the examiner was standing on the opposite side of the tender point and reach across to grasp the ilium of the affected site. The examiner then instructed the patients to flex and abduct the ipsilateral hip to approximately 45 degrees.

Iliopsoas muscle: Anterior lumber tender points are located on the psoas major as it passes over the anterior inferior iliac spine. The patient was supine; the examiner was standing on the opposite side of the tender point. The examiner flexed the patient's hips to approximately 90 degrees, rotates the hips approximately 60 degrees away from the tender point side, and was allowed the feet to drop toward the floor to produce lateral flexion away from the tender point side. The head of the table may be raised or pillow placed under the patient's pelvis.

Piriformis: The tender point is found in the belly of the muscle approximately halfway between the inferior lateral angle of the sacrum and the greater trochanter. Pressure is applied interiorly. the patient was prone, and the examiner was standing on the tender point side. The ipsilateral leg was suspended off the table with the bent knee resting on the therapist's thigh. The hip was flexed to 60 to 90 degree and abducted; rotation was used to fine-tune the position.

Iliotibial band: tender points are located on the iliotibial band along the lateral aspect of the thigh on the midaxillary line. Pressure is applied medially. The patient may be supine or prone. The examiner was stand on the side of the tender point, grasped the patient's leg, and produced marked hip abduction and with internal or external rotation to fine-tune the position.

OUTCOME MEASURES

Pain: Pain assessed by using a 10-cm Visual analog scale (VAS), where 0 represented no pain and 10 represented worst pain. Patients were asked to place a mark along the line to denote their level of pain [13].

Functional disability: Disability was assessed by Oswestry disability questionnaire [14]. It is a valid and reliable tool. It is consisting of 10 multiple choice questions for back pain, patient select one sentence out of six that best describe his pain. For each section the total possible score is 5: if the first statement is marked the section score = 0; if the last statement is marked, it = 5. If all 10 sections are completed the score is calculated and converted into a percentage. Oswestry scores may be categories as:

- Minimal disability (0-20%).
- Moderate (20%- 40%).
- Severe (40% - 60%).
- Crippled (60% - 80%).
- Patients are confined to bed (80% - 100%).

Range of motion: The inclinometer was used, it is a pendulum-based goniometry consisting of a 360-degree scale protractor with a counterweighted pointer maintained in a constant vertical position, it's a handheld, circular, air or fluid disk, and it used to measure spinal motion [15].

The assessment procedure: The double inclinometer technique (two inclinometers) was used for measuring lumber ROM.

Assessment of lumbar flexion:

a- The starting position as the patient was instructed to stand erect with feet contact to each other.

b- The examiner palpates two points on the spine S1 and T12.

c- The inclinometers were placed (centered) on the two palpation points and calibrated to zero.

d- The patient was instructed to slowly bend forward to the end of the range within the limit of pain. The reading on each inclinometer was recorded.

e- The top inclinometer measures total flexion; the bottom inclinometer measures sacral flexion. Total flexion minus sacral flexion is true flexion. True flexion is the measurement usually needed.

Assessment of lumbar extension: From the standing position whereas one inclinometer above the T12 vertebrae and the other inclinometer was placed at the S1, and then asked the patient from the neutral position to lean backward till the limit of pain.

Data analyses: All statistical measures were performed using the Statistical Package for Social science (SPSS) program version 20 for windows. Prior to final analysis, data were screened for normality assumption and the presence of extreme scores. This exploration was done as a pre-requisite for parametric calculation of the analysis of difference and analysis of relationship measures. Descriptive analysis using histograms with the normal distribution curve showed that the data were normally distributed and not violates the parametric assumption for the all measured dependent variables (pain level, functional disability, Lumbar flexion, and lumbar extension). Additionally, testing for the homogeneity of covariance using Box's test revealed that there was no significant difference with *p* values of > 0.05. The box and whiskers plots of the tested variables were done to detect the outliers. Normality test of data using Shapiro-Wilk test was used, that reflect the data was normally distributed for all dependent variables. All these findings allowed the researchers to conduct a parametric analysis. So, 2×2 mixed design MANOVA was used to compare the tested variables of interest at different tested groups and measuring periods. The alpha level was set at 0.05.

RESULTS

A total of 60 participants were included in the final data analysis**.** They have divided into two groups; group A consisted of 30 patients (18 males and 13 females) receiving conventional therapy and the group B consisted of 30 patients (21 Males and 9 Females) receiving positional release technique. The independent t test revealed that there were no significant differences (p>0.05) in the mean values of age, body mass, and height between both tested groups (Table 1).

Table 1: Demographic characteristics of patients in both groups.

Characteristics	Group A (n =30)	Group B (n =30)	t-value	P-value
Age (years)	49.73±8.66	49.33±9.62	0.169	0.866
Body mass (Kg)	86.5±2.62	87.03±2.83	-0.756	0.452
Height (cm)	171.86±2.45	172.2±2.77	-0.493	0.624

***Significant level is set at alpha level <0.05.**

Statistical analysis using mixed design MANOVA analyzed thirty patients assigned into two equal groups. It revealed that there were significant within subject effect (F = 776.852, p = 0.0001) and treatment*time effect (F = 67.949, p = 0.0001). while there was no significant between subject effect (F= 31.063, p = 0.0001). Table (2) present descriptive statistic (mean ± SD) and multiple pairwise comparison tests (Post hoc tests) for the all dependent variables. In the same context regarding within subject effect, the multiple pairwise comparison tests revealed that there were significant decreases (p <0.05) in pain level and functional disability in the post-treatment condition compared with the pre-treatment in both groups and significant increase (p <0.05) in ROM of lumbar flexion and extension in the post-treatment condition compared with the pre-treatment in both groups. Regarding between subject effects, multiple pairwise comparisons revealed that there was no significant difference of lumbar extension between both groups (p >0.05). While there was a significant reduction (p <0.05) in pain level and functional disability and significant increase (p <0.05) in lumbar flexion in favor to group A than group B.

Table 2: Descriptive statistics and Multiple pairwise comparison tests (Post hoc tests) for the all dependent variables for both groups at different measuring periods.

Variables	Group A		Group B	
	Pre	Post	Pre	Post
Pain level	7.20 ±1.15	2.36±0.55	7.16±1.28	4.50 ±0.97
Function disability	19.9 ±1.64	10.83 ±1.26	19.20 ±1.12	13.33±1.26
Lumbar flexion	27.36 ±1.51	43.1±1.88	28.03±1.60	35.73 ±1.59
Lumbar extension	8.93 ±1.41	12.20±2.60	9.16 ±1.31	11.56±1.07

***Significant at the alpha level (p < 0.05).**

Table 3: Comparison between pre and post groups within groups and between groups.

Within groups (Pre Vs. post)				
p-value	Pain level	Function disability	Lumbar flexion	Lumbar extension
Group A	0.0001*	0.0001*	0.0001*	0.0001*
Group B	0.0001*	0.0001*	0.0001*	0.0001*
Between groups (group A Vs. group B)				
p-value	Pain level	Function disability	Lumbar flexion	Lumbar extension
Pre treatment	0.916	0.06	0.104	0.51
Post treatment	0.0001*	0.0001*	0.0001*	0.223

DISCUSSION

The result of this study revealed that both conventional therapy and positional release technique were effective in reducing pain severity, functional disability and improving lumbar range of motion.

Conventional therapy: Reduction in pain may be attributed to the physiological effect of infrared, ultrasound, stretching and strengthening exercises. The effect of infrared which was used in a form of heat for pain relief, reduction of muscle spasm and for an increase in sensory responses via an increase in endorphins, this could affect the pain gate mechanism [16]. Heat application had been proven to be effective in relieving pain, reducing muscle spasm and disability in acute and chronic low back pain [6].

Ultrasonic increases the threshold of pressure produced by pain receptors. the conduction velocity of large diameter nerve fibers (a beta) increased after application of ultrasonic while the conduction velocity of small diameter nerve fibers (a delta fibers) that are responsible for pain decreased [17]. It causes a significant tissue heat that altered the viscoelastic properties of connective tissue making it move extensible [18]. This is in contrast with a systematic review of ultrasound in the treatment of chronic LBP that concluded that ultrasound is ineffective [19].

Strengthening exercises send normal signals to the neuromuscular control unit, which generates muscle response patterns to activate and coordinate spinal muscles to provide muscle mechanical stability. Repetition of strengthening exercise has a role in the reduction of pain by increased plasma concentration level of beta endorphins and activation of ergoreceptors (the ending of a delta fibers) which stimulate enkephalinergic nerve cells in the thalamus which decrease the pain and improve functional activities [20].

Stretching exercise reduced muscle tension and relieved the compression on muscles nociceptors and on the nerve root and broke the vicious circle. also, it decreased cellular connective tissues in paravertebral muscles and decreased muscle stiffness which leads to a reduction of pain [21].

This agrees with the study of Kankaanpaa et al. who illustrated that the effect of exercise seems sufficiently large and durable to be a clinically important at 12-month follow-up as the subjects who undertook the exercise program had an improvement in their pain and disability [22]. Reduction in pain supported by previous studies [23-24] that investigate the effect of trunk exercises on pain reduction in patients with CLBPD.

Regarding the range of motion of lumbar flexion and extension, there was a significant increase in the lumbar range of motion flexion and extension at conventional therapy group. this finding was supported by Magnusson et al. (1998) [25]. who found that functional ability and range of motion of lumbar flexion, extension, right side bending and left side bending improved after physical therapy treatment included strength and flexibility exercises because of increasing muscle strength, reduction of pain, improve muscle flexibility and improve motor control skills. Jari et al. (2004) [8] reported that increased trunk flexion range of motion after flexion and extension exercises may be attributed to increased flexibility and mobility of the trunk. this supported by Sullivan et al., 2000 [26] who stated that improvement in physical activities and pain severity responsible for decrease disability and increase the range of motion. This finding also, has been supported by Johanssen et al., (1995) [27] who

found that dynamic exercises for back and abdomen with stretching exercises were effective in reducing functional disability. improve multifidus muscle strength (which atrophy in low back pain) improve functions [28].

Positional release technique: The analgesic effect of positional release technique may be attributed to the relaxation of the damaged tissues which achieved by placing patients in a position of ease that enhance the removal of sensitizing inflammatory mediators. Reduction in pain in PRT group supported by Meseguer et al. (2006) [12] who concluded that the application of PRT may be effective in producing hypoalgesia and decreased the reactivity of tender points in the upper trapezius in subjects with neck pain. in their study, Meseguer et al. (2006) reported moderate effect sizes for the VAS for pain intensity between pre and post - intervention measurement following the application of PRT. Improvement in functional disability agree with Lewis and Flynn (2001) [29] findings which may be attributed to; a) neurological and circulatory changes, which occur when a distressed area is placed in its most comfortable, most easy, most pain-free position, hence it can use as an effective treatment technique in mechanical low back pain patients. b) automatic resetting of muscle spindles [30 - 31]. Once agonist muscle spindle activity is reset, antagonist muscle spindle activity can also return to the resting state relieving aberrant neuromuscular activity and restoring normal function [32].

This result also supported by (Michael r, 2001) [33] who provide a study to investigate the effects of positional release on the symptoms associated with delayed onset muscle soreness (DOMS). The outcomes measurement used in this study was a visual analog scale for perceived pain ratings, pressure algometry for pain threshold and a standard goniometry for measurement of flexion and extension range of motion at the elbow joint, the result showed that the symptoms associated with DOMS were reduced with positional release.

The findings of this group were in agreement with Lewis and Flynn (2001). Who reported that there was an improvement in; the disability levels measured by Oswestry low back pain dis ability questionnaire and pain severity measured by mc gill pain questionnaire in all patients with low back pain.

Recommendation: A large sample size and an additional group treated with both conventional therapy and positional release technique with more outcome.

CONCLUSION

Positional release technique and conventional therapy may be useful therapeutic modalities in the improvement of pain severity, functional disability and lumbar flexion and extension range of motion although the result revealed that conventional therapy has a statistically significant improvement than positional release technique. So positional release technique should combine with other modalities to gain better results.

ABBREVIATIONS

CLBD - Chronic Low back dysfunction
TENS - Transcutaneous Electrical nerve stimulation
PRT - Positional release technique
VAS - Visual analogue scale
ROM - Range of motion
DOMS - Delayed onset muscle soreness

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Conflicts of interest: **None**

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