



To compare the effects of ultra reiz current & laser therapy along with Pilates in the management of chronic mechanical low back pain.

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INTRODUCTION

Low back pain (LBP) is defined as pain that is perceived as arising in the region bounded by the 12th rib and the inferior gluteal folds, and may also be associated with or without leg pain.¹

Mechanical low back pain arises intrinsically from the spine, intervertebral disks, or surrounding soft tissues.² Mechanical low back pain is usually categorized in 3 subtypes: acute, sub-acute and chronic low back pain. This subdivision is based on the duration of the back pain. Acute low back pain is an episode of low back pain for less than 6 weeks, sub-acute low back pain between 6 and 12 weeks and chronic low back pain for 12 weeks or more.³

Low back pain (LBP) is the fifth most common reason for physician visits, which affects nearly 60-80% of people throughout their lifetime. The lifetime prevalence of low back pain is reported to be as high as 84%, and the prevalence of chronic low back pain is about 23%, with 11-12% of the population being disabled by low back pain.²

All age groups can be affected by mechanical low back pain. but the impact on quality of life is lower in adolescents than in adults.² The etiology of LBP is not well defined, but it is known to be multifactorial. Mechanical and postural changes can be classified as nonspecific LBP, which describes much of the pain, reported by the population, and may be related to sociodemographic characteristics, physical and psychological factors, lifestyle repetitive movements, pushing and pulling activities, and a static or sitting working posture.⁴

The back (lumbar) muscles play along with the abdominal, the glutea and the leg muscles an important role in the etiology of low back pain.⁵

According to McKenzie back pain is of two types i.e. mechanical or chemical (non-mechanical) is origin. Mechanical pain is produced by deformation of structures containing nociceptive nerve endings, and there is a clear correlation between certain bodies positions and patient's symptoms. Conversely, non-mechanical pain is of constant nature. This may be exacerbated by movement or position, but importantly, no positions will be found which completely relieves the symptoms. The non-mechanical category may include inflammatory, infective, vascular, visceral, metabolic, psychological or other conditions that may produce low back pain.⁶

Overweight/obese is a strong predictor and is often seen by mechanical low back pain. Overweight and obesity have the strongest association with seeking care for low back pain and chronic low back pain.⁷

Low back pain is also associated with dysfunction of the deep abdominal muscles, such as the transverses abdominis, pelvic floor, diaphragm, and multifidus, and with a reduced coordination and stabilizing activity in the lumbar muscles, especially the extensor muscle.⁴ Low back pain muscle dysfunction is not just a problem of muscle strength and endurance; changes also occur in the neuromuscular mechanisms that affect trunk stability and movement efficiency.⁸ Evidence indicates that patients tend to increase the stiffness of the trunk muscles to gain stability at the expense of Spinal function. Mechanical low back pain can cause by Traumatic injury, Lumbar sprain or strain, Postural strain.

Most episodes of low back pain are self-limiting and are not associated with serious diseases, but it's important for the clinician to distinguish the small proportion of patients with serious underlying diseases, so called red flags. Studies suggests that psychosocial factors at the sub-acute stage are a characteristic/predictor in the development of chronic low back pain.⁹

Studies suggests that increased lumbar spine mobility is a common clinical characteristic/ presentation in mechanical low back pain and that is a high evidence risk factor for mechanical low back pain.¹⁰

The diagnosis of mechanical low back pain implies no known pathoanatomical cause. Triage aims to exclude those cases in which the pain arises from either problems beyond the lumbar spine (eg, leaking aortic aneurysm); specific disorders affecting the lumbar spine (eg, epidural abscess, compression fracture, spondyloarthropathy, malignancy, cauda equina syndrome); or radicular pain, radiculopathy, or spinal canal stenosis. Remaining cases are mechanical low back pain. Several lumbar structures are plausible sources of pain (eg, the intervertebral disc, the facet joints), but clinical tests do not reliably attribute the pain to those structures.¹¹

The various form of treatment for low back pain is bed rest, analgesic, steroid and protective bracing. First medication option should be regular paracetamol. When paracetamol alone provides insufficient pain relief, offer non-steroidal anti-inflammatory drugs (NSAIDs)¹².

Physiotherapy treatment for low back pain includes shortwave diathermy, TENS, manual therapy, exercises, posture correction and activity modification.

Spinal manipulative therapy is widely used for the treatment of chronic low back pain. In heterogeneous CLBP population spinal manipulative therapy (SMT) has been shown to provide greater improvements in functional disability and better short and long term pain relief compared with back school (exercises and education programme for LBP, delivered for small group) or individualized physiotherapy. However there is no evidence that SMT is more effective for CLBP than care by a general practitioner, bed-rest, analgesics and massage. Although SMT seems to be an effective treatment for CLBP, the effect appears small.¹³

TENS should be used as a short-term analgesic procedure in a multidisciplinary program for low back pain rather than as an exclusive or long-term treatment.¹⁴

Ultra reiz current used as pain relieving modality its analgesic effects shows improvement in relieving pain and functional disability.¹⁵

SWD produces deep heating and it is using as a modality of treatment in patients of chronic low back pain.¹⁶

Treatment with low-intensity laser irradiation produced a moderate reduction in pain and improvement in function in patients with musculoskeletal low back pain. Benefits, however, were limited and decreased with time.¹⁷

Pilates, has in recent years become a popular trend in rehabilitation. The late Joseph Pilates created a repertoire of exercises to optimize musculoskeletal performance and today the claimed benefits are numerous. Various Methods of Pilates training exist, but for the purpose of this study, the “STOTT” method of Pilates will be used. The focus of “STOTT Pilates” is to develop optimal strength, flexibility, endurance and posture. It is an anatomically-based approach to the original method that emphasizes neutral alignment, core or trunk stability and peripheral mobility. Optimal neuromuscular performance is developed while focusing on core stability and balancing both muscular strength and flexibility.¹⁸

HYPOTHESIS

Research Hypothesis:

H₁:- Ultra Reiz Current along with Pilates exercise will be more effective than laser along with Pilates exercise in the management of chronic mechanical low back pain.

Null Hypothesis:

H₀:- Ultra Reiz Current along with Pilates Exercise will not be more effective than laser along with Pilate's exercises in the management of chronic mechanical low back pain.

AIM & OBJECTIVES

Aim of Study:

To compare the effects of ultra reiz current & laser therapy along with Pilates in the management of chronic mechanical low back pain.

Objectives:

To study the effectiveness of laser along with the Pilates exercises on pain management in subjects of chronic mechanical low back pain.

To study the effectiveness of ultra reiz current along with the Pilates exercises on pain management in subjects of chronic mechanical low back pain.

To study the effectiveness of laser along with the pilates exercises in improving functional disability in chronic mechanical low back pain.

To study the effectiveness of ultra reiz current along with pilates exercises in improving functional disability in chronic mechanical low back pain.

METHODOLOGY

Study Design: Experimental study

Sampling: Random Sampling

Sampling Method: 30 patients were selected as per inclusion & exclusion criteria diagnosed with chronic non specific low back pain. They were randomly divided into two groups i.e. group A & Group B of 15 subjects in each group by simple random sampling.

Study Center: Study was conducted in physiotherapy department of Career College, Bhopal (M.P.) (2018).

Study Duration: 6 Months.

Treatment duration: 6 weeks.

Inclusion Criteria:

- Age between 20-40 years.
- Both male & female patient were included.
- Low Back Pain for at least 12 weeks.
- No peripheral Irradiation.

- Negative SLR test, negative lasegue's test.

Exclusion Criteria:

- History of Spinal Surgery.
- Structural deformities such as rheumatoid arthritis.
- Vertebral Fracture
- PIVD
- Tumors
- Osteoporosis
- Constant back pain due to nerve root irritation
- Pregnancy
- Patient already involved in any other physical exercise.

Tools Used:

- Ultra Reiz Current Stimulator(143 Hz Frequency)
- Laser.
- Exercise Mat
- Recording Materials.
- Consent Form
- Data Collection Sheet.
- Essential stationary Material.

Variables:

- **Dependent Variables:**

- (1) VAS
- (2) Modified Oswestry Disability questionnaire.

- **Independent Variables:**

- (1) Ultra Reiz Current
- (2) Pilates Exercise
- (3) Laser

Outcome Measures:

- **VAS:**

The pain intensity was measured on visual analogue scale (VAS). A horizontal line of 10 cm long is divided into equal intervals & patients was asked to mark his/her pain intensity on scale.

- **MOSWDQ:**

The modified oswestey disability questionnaire was used to assess the limitation of various daily living activities. A decrease in MOSWD Score is considered to be the improvement.

Procedure: 30 subjects of age between 20-40 years both male and female diagnosed with Chronic mechanical low back pain were considered in the study after having written consent from them. Once informed consent had been given the participants were allocated to either group A or group B by a process of random sampling. All the subject were assessed for level of pain by VAS scale & for the functional disability by MOSWD questionnaire at first week and All the subjects will be reassessed again after 6 weeks of intervention for above mentioned parameters.

Group A

- Ultra Reiz current was given to all the subjects of group A for 15 minutes along with frequency of 143 Hz.(5 days/week) for 6 weeks .
- Positive Electrodes placed at the L1 level and negative at the L5 level.
- All the subjects were taught modified Pilates exercise.



Group B

- Laser therapy was given to all subject of group B (5 day/ week) for 6 weeks
Wave length- 808 nm.
Surface Density of Radiation- Continues
Wave form- Scanning
Dose- 12 J/cm^2 on surface of 100 cm^2 [10x10 cm]
- All the subjects were taught modified pilates exercise.



Pilates Exercise

Modern theories of exercise science and spinal rehabilitation have been incorporated through five basic biomechanical principles.¹⁸

The following principles are re-inforced in every exercise, increasing the mind-body awareness and hence the precision and control of the exercise programme.

- (1) Breathing is co-ordinate with movement and the focus of the “breath” is the engagement of the transversus abdominus muscle. It is emphasized that the “breath” and awareness of stabilisation of the spine and pelvis through the transversus abdominus muscle, multifidus and pelvic floor activation precedes any actual movement.

- (2) Pelvic placement and the stabilization of the pelvis and the lumbar spine in neutral alignment and imprint (a slight posterior tilt of the pelvis) is emphasized.
- (3) Attention is paid to the placement and stabilization of the rib cage through abdominal muscle engagement. Indirectly the correct alignment of the thoracic spine is maintained.
- (4) Scapular stabilization is emphasized in order to prevent the muscle around the neck and upper quadrant over working.
- (5) Correct head and cervical spine placement ensures that the superficial cervical spine, flexors and extensors do not overwork.¹⁸

According to the principles described above, Pilates can be beneficial in the rehabilitation of chronic low back pain patients.

MODIFIED SIDE KICK

Side lying legs straight, one hand in front to support and other hand supports head.

Inhale for 2 counts, maintain torso stabilization and flex top hip reaching leg forward with ankle dorsiflexed. Exhale and extend hip, reaching leg backward, plantar flexing the ankle. Complete 8-10 repetition on each side.

FIGURE



MODIFIED ONE LEG STRETCH

Crook lying, flex one leg and slide other leg as far as possible and then return to start position. Exhale to stretch one leg away from the body (whilst maintaining neutral spine and pelvis), Inhale return leg to tabletop position, Repeat with other leg. Complete 5-10 repetition.

FIGURE



MODIFIED SHOULDER BRIDGE

Supine lying with knees flexed, feet on the mat and legs parallel and abducted. Hands placed on both anterior superior iliac spine and scapulae stabilized. Exhale and extend hips to lift off from the mat. Inhale pause with hips up. Exhale to articulate through the spine and return to neutral. Complete 5-10 repetitions.

FIGURE



THE HUNDRED

Supine lying with both the knees flexed, feet on the mat, Exhale and lift one leg with knee above the hip and shin parallel to the floor. Repeat this 5-10 times.

FIGURE



MODIFIED SPINE TWIST

Seated up right with pelvis and spine in neutral. Arms are folded and scapulae stabilized. Exhale and turn trunk while pelvis is kept square and forward facing. Inhale lengthen and return to centre. Repeat 3-5 times on each side.

FIGURE



MODIFIED ROLL UP

Start the Roll-Up from a sitting position, legs together, knees bent, and feet flat. Thighs are grasped just below your knees. Inhale slowly and roll spine backward towards the mat, vertebra by vertebra; don't move the hands. When the arms are straight, stop rolling. Exhale and curls spine back up towards the knees. Repeat this 5-10 times.

FIGURE



MODIFIED SWAN DIVE

Prone with pelvis and spine in neutral position. Legs are extended along mat, arms bent, hands by shoulder and palm down. Exhale and gently lengthen the thoracic spine allowing upper part of chest off the mat. Inhale maintain position again return to starting position on exhalation. Repeat this 3-5 times in each side.

FIGURE



DOUBLE ARM STRETCH

Supine with both the knees bent, Exhale and raise both the arms towards ceiling and with both the arms make small circle. Try to stretch your arms as high as possible. Repeat this 5-10 times.

FIGURE



MODIFIED ONE LEG CIRCLE

Crook lying. Lift knee over hip, so that it becomes parallel to ground. Make small circle motion from the hip. Repeat on other leg. Repeat this 5-10 times.

FIGURE



MODIFIED SWIMMING

Kneel position so that knees lie under hips and shoulder vertically above wrist, then slowly one foot along the floor behind and return to start position. Repeat this 5-10 times for each leg.

FIGURE



RESULT

Result obtained when comparing pre and post intervention based data within the group showed that, both the groups i.e. group A and group B showed extremely significant difference in vas score and MOSWDQ value from base line to final readings.

The results of group A are as follows:

The mean and SD of vas score before treatment was 7.07 and 1.39 respectively.

The mean and SD of vas score after treatment was 1.47 and 0.64 respectively.

The mean and SD of MOSWDQ score before treatment was 25.73 and 5.21 respectively.

The mean and SD of MOSWDQ score after treatment was 5.66 and 2.96 respectively.

The results of group B are as follows:

The mean and SD of vas score before treatment was 7.0 and 1.25 respectively.

The mean and SD of vas score after treatment was 2.26 and 0.95 respectively.

The mean and SD of MOSWDQ score before treatment was 25.0 and 6.15 respectively.

The mean and SD of MOSWDQ score after treatment was 10.40 and 1.88 respectively.

Therefore its proved from above calculation that both the group showed statistically significant improvement but the total improvement is statistically more significant in group A as compared to group B.

DISCUSSION

The present study was conducted to determine the effectiveness of ultra reiz current and laser therapy along with pilates exercises in the management of mechanical low back pain.

The subjects in the group A and group B were assessed using the VAS for pain and the modified oswestry disability questionnaires for functional disability before the treatment and following completion of the intervention.

The statistical analysis of the data was done and results were statistically significant for both groups. The results suggests that group A and group B both are effective in reducing pain and functional disability in chronic mechanical low back pain patients but intergroup comparison between two groups show better improvement in pain and functional disability in group A than group B.

Low back pain is a well-recognized problem of the nation and resulting in substantial social loss. Spinal instability is considered to be one of the important causes of low back pain. The basic concept of spinal instability is that abnormally large intervertebral motions cause either compression and/or stretching of the inflamed neural elements or abnormal deformation of ligaments, joint capsules, annular fibers, and end-plates which are known to have significant density of nociceptors. In both situations, the abnormally large intervertebral motions may produce pain sensation. Studies have shown that patients with chronic LBP have reduced strength and greater atrophy of the back muscles in comparison with healthy control patients. More globally, strength of the core muscles has been found to be preferentially affected in patients with LBP.

Back strengthening exercises has been used as a successful strategy to reduce LBP and improve function. Other benefits include the potential for reduced risk of re-injury and an increased sense of wellbeing in patients with LBP. Traditional strengthening of the back extensors is based on the progressive overload principle whereby increases in muscle strength are associated with muscular hypertrophy and enlargement of muscle cross-sectional area.

Ultra reiz current is a direct current with a rectangular pulse having a phase duration of 2 ms and a phase interval of 5 ms and the frequency of the current is approx. 143 Hz. This current type is suitable for selective stimulation of thick fibres. Ultra reiz current is a physiotherapeutic pain relieving modality, it is a non-invasive and safe method of pain relieve with no major side effects. The Ultra reiz reduces pain by directly acting on the

large diameter afferent fiber and facilitating the pre-synaptic inhibition of T-cells (pain gate theory) and close the pain gate at spinal segments related to the pain. But in addition, Ultra reiz have special effect that it improves the circulation.

It has been shown that increased circulation can wash out pain producing noxious bio chemical elements like prostaglandin and bradykinin.

Use of laser therapy as an adjuvant treatment for chronic low back pain stems from its beneficial effects on the pain reduction and inflammation process without any significant complication.

Treatment with low intensity irradiation of Nd:YAG laser resulted in a moderate reduction in pain and improvement in function, but this effect was limited and decreased with time.

Furthermore, it seems that to achieve the best results in treatment of chronic low back pain, a combination of interventions are necessary.

Pilates is a mind body conditioning exercises program that target deep postural muscles of the abdomen and spine to improve overall central core stability and posture. The concept of stabilization of the spine through the activation of the transverses abdominus muscle together with multifidus is central to Pilates.

The other principles that apply directly to Pilates namely, lateral costal diaphragm breathing, activation of the pelvic floor and correct alignment of the spine have also been documented as effective techniques for stabilization of the spine without global muscular activation. It is therefore understandable that with increased stabilization achieved through Pilates there is a decrease in spinal instability and a decrease in pain. An effective exercise program for LBP should include stretching, strengthening and mobility exercises. Pilates fulfills the above criteria while applying the principles of stabilization.

Pilates focuses on local as well as global muscles which is important for stability of the spine. Exercises that evolved from the concept of Pilates are thought to facilitates such movement behavior by allowing the patient to be in a position that minimizes unwanted muscle activity, often responsible for inefficient movement patterns and early fatigue which can lead to injury.

Thus Pilates, as a specific method of exercise with specific principles and well defined exercises, incorporates certain techniques that have been shown to be important in the rehabilitation of CLBP.

LIMITATIONS

- 1) Study was conducted for short period of time.
- 2) It was a small sample study.

Future Study

- 1) A larger population sample, and long term follow up could be included in a future study.
- 2) Effectiveness of ultra reiz current along with pilates in patients with low back pain associated with radiculopathy.

CONCLUSION

The results of study indicate that:

- Ultra reiz current and laser along with pilates both are effective in reducing pain and disability in chronic mechanical low back pain.
- On comparing the two groups ultra reiz current along with pilates found to be more effective in reducing pain and functional disability as compared to laser along with pilates.

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