T.R.
KIRŞEHİR AHİ EVRAN UNIVERSITY
HEALTH SCIENCES INSTITUE
PHYSIOTHERAPY AND REHABILITATION
DEPARTMENT

COMPARISON OF HIGH-INTENSITY LASER AND LOW-INTENSITY LASER THERAPY IN PATIENTS WITH LUMBAR DISC HERNIATION

Shahad Razzaq Jawad AL-KURDI

MASTER OF SCIENCE THESIS

KIRŞEHİR/ 2022

T.R.

KIRŞEHİR AHİ EVRAN UNIVERSITY

HEALTH SCIENCES INSTITUE

PHYSIOTHERAPY AND REHABILITATION DEPARTMENT

COMPARISON OF HIGH-INTENSITY LASER AND LOW-INTENSITY LASER THERAPY IN PATIENTS WITH LUMBAR DISC HERNIATION

Shahad Razzaq Jawad AL-KURDI

MASTER OF SCIENCE THESIS

ADVISOR

Assist. Prof. Dr. Anıl ÖZÜDOĞRU

KIRŞEHİR– DECEMBER / 2022

ACCEPTANCE AND APPROVAL

Kırşehir Ahi Evran University, Institute of Health Sciences, Department of Physiotherapy and Rehabilitation Master's thesis study titled Comparison of high-intensity laser and low-intensity laser therapy in patients with Lumbar Disc Herniation prepared by your graduate student Shahad R. Jawad Alkurdi with the number 201211152 was on 28/12/2022 by the following jury and Rehabilitation Department of Physiotherapy His master's thesis was accepted as a letter.

Thesis Jury

Assist. Prof. Dr. Anıl ÖZÜDOĞRU
Kırşehir Ahi Evran University
Department of Physiotherapy and Rehabilitation
(Minister)

Assist. Prof. Dr. Caner KARARTI
Kırşehir Ahi Evran University
School of Physical Therapy and Rehabilitation
(Member)

Assist. Prof. Dr. İlyas UÇAR
Erciyes University
Faculty of Medicine
(Member)

THESIS STATEMENT

I declare that all the information in the thesis is obtained and presented within the framework of ethical behavior and academic rules, and in this study, which is prepared in accordance with the thesis writing rules, all kinds of statements that do not belong to me are fully cited to the source of the information.

Shahad AL-KURDI

In accordance with Articles 9/2 and 22/2 of the Postgraduate Education and Training Regulation published in the Official Gazette dated 20.04.2016; A report in accordance with the criteria determined by the Institute of Health Sciences was obtained by using the plagiarism software program for this postgraduate thesis.

PREFACE

First of all, I thank God, My esteemed thesis advisor, Dr. Anıl ÖZÜDOĞRU I would like to thank all my teachers in my academic life for their efforts in my education from my childhood to this stage.

And I never forget my mother, with her prayers I completed the road in peace. And my father who supports me with everything I do and thanks to my brother .

I dedicate my thesis to my beloved my wife my strength Cindy and straightening my back That mountain, who patience ,endured and sacrificed and helped me every step until I got to this day, without them I have not arrived and could not progress.

Thank you from the bottom of my heart.

Shahad AL-KURDI

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

HILT : High Intensity Laser Therapy

LILT : Low Intensity Laser Therapy

LLLT : Low Level Laser Therapy

LBP : Low Back Pain

LDH : Lumbar Disc Herniation

VAS : Visual Analogue Scale

ODI : Oswestry Disability Index

RMQ : The Roland-Morris Questionnaire

IVD : The Intervertebral Disc

NP : Nucleus Pulposus

AF : Annulus Fibrosus

CT : Computed Tomographic

MRI : Magnetic Resonance Imaging

NSAIDs : Nonsteroidal Anti-Inflammatory Drugs

IFC : Interferential Current

TENS : Transcutaneous Electrical Nerve Stimulation

Nd YAG : Neodymium-Doped Yttrium Aluminum Garnet

GaAIAs : Gallium-Aluminum-Arsenide

HeNe : Helyhum-Neon

ABSTRACT

MASTER OF SCINCE THESIS

COMPARISON OF HIGH-INTENSITY LASER AND LOW-INTENSITY LASER THERAPY IN PATIENTS WITH LUMBAR DISC HERNIATION

Shahad Razzaq AL-KURDI

Kırşehir Ahi Evran University of
Health Sciences Institute
Physiotherapy and Rehabilitation Department

Advisor: Assist. Prof. Dr. Anıl ÖZÜDOĞRU

Lumbar Disc Herniation (LDH) is a fragment of the disc nucleus that is pushed out of the annulus, into the spinal canal through a tear or rupture in the annulus. The disc presses on spinal nerves, often producing pain, It is the lumbar region of the spine that often suffers from herniated discs. Nearly all herniated lumbar discs occur between the fourth and fifth lumbar vertebrae (L4-L5) or (L5-S1). One of the most common reasons for back discomfort and even sciatica is a lumbar disc herniation.

In order to better understand how effective high-intensity therapy and low-level laser therapy are for persons suffering from a herniated lumbar disc, this study compares the two treatment modalities. However, there is a lack of evaluation in previous studies.

In Iraq's Al-Diwaniyah Governorate, this study was carried out at Al-Diwaniyah Teaching Hospital and Al-Hamza General Hospital. Sixty patients with Magnetic Resonance Imaging confirmed lumbar disc herniation, computed tomography (36 males and 24 females) aged between (18-65y) participated. The subjects randomly assigned to participate in one of three treatment groups: high-intensity laser therapy (1064 nm, 7 w), low-level laser therapy (904 nm, 500 mw), or a placebo laser with exercise 10 sessions total. The visual analogue scale (VAS), the Oswestry Disability Index (ODI), the Roland-Morris Disability (RMD), and the

Schober's test used for evaluation the efficacy of therapy. Both pre- and post-irradiation measurements were taken.

High-intensity laser therapy was found to be significantly better than low-intensity laser therapy in terms of resting pain in patients with lumbar disc hernia after 3 weeks ($p<0.05$). Low-intensity laser therapy was found to be significantly better than the placebo group in activity pain ($p<0.05$). In addition, high-intensity laser therapy was found to be significantly better in all parameters compared to the placebo groups ($p<0.05$).

The HILT and LLLT groups showed better improvement in some parameters than the placebo group.

December 2022, 92 pages.

Keywords: HILT, Lumbar Disc Herniation, Low Back Pain, VAS.

ÖZET

YÜKSEK LİSANS TEZİ

LUMBAL DISK HERNISI OLAN HASTALARDA YÜKSEK YOĞUNLUKLU LAZER İLE DÜŞÜK YOĞUNLUKLU LAZER TEDAVİSİNİN KARŞILAŞTIRILMASI

Shahad Razzaq AL-KURDI

Kırşehir Ahi Evran Üniversitesi
Sağlık Bilimleri Enstitüsü
Fizyoterapi ve Rehabilitasyon Anabilim Dalı

Danışman: Dr. Öğr.Üyesi Anıl ÖZÜDOĞRU

Lumbal Disk Herniasyonu (LDH), diskteki rüptür ve benzeri nedenlerle oluşan parçaların omurga kanalına baskı yapması olarak tanımlanabilir. Herniasyonda disk omurgadan çıkan periferik sinirlere bası yapar ve genellikle ağrıya yol açar. Disk herniasyonları genelde lumbal bölgede daha yaygındır. Lumbal bölgedeki disk herniasyonlarının yaklaşık % 95'i L4-L5 veya L5-S1 seviyelerinde görülür. Lumbal disk herniasyonu, bel ağrısının en yaygın nedenleri arasındadır.

Bu çalışma, lumbal disk herniasyonu olan hastalarda yüksek yoğunluklu lazer tedavisinin etkinliğini ile düşük yoğunluklu lazer tedavisinin etkinliğini karşılaştırmayı amaçlamaktadır.

Bu çalışma Irak'ın Al-Diwaniyah Valiliği'ne bağlı Al-Diwaniyah Eğitim Hastanesi ve Al-Hamza Hastanesinde gerçekleştirildi. Çalışmaya 18-60 yaş aralığında 36'sı erkek ve 24'ü kadın olmak üzere altmış disk herniasyonlu hasta alındı. Hastalar, rastgele üç gruba ayrıldılar, birinci grup yüksek yoğunluklu lazer tedavisi (HILT, 1064nm.7w), ikinci grup düşük yoğunluklu lazer tedavisi (LLLT, 904 nm, 500 mw) aldı. Tüm gruplara egzersiz verildi (toplam 9 seans). Üçüncü grup ayrıca plasebo lazer aldı. Tedavinin etkinliğini değerlendirmek için Roland-Morris Dizabilie İndeksi, Oswestry Dizabilite İndeksi, Schober Testi ve VAS kullanıldı. Tüm ölçümler tedaviden önce ve sonra gerçekleştirildi.

3 hafta sonunda Lumbal disk hernili hastalarda istirahat ağrısı açısından Yüksek yoğunluklu lazer tedavisi, düşük yoğunluklu lazer tedavisine göre anlamlı olarak iyi bulundu ($p<0.05$). Düşük yoğunluklu lazer tedavisi ise aktivite ağrısında plasebo grubuna göre anlamlı oarak iyi bulundu ($p<0.05$). Ayrıca yüksek yoğunluklu lazer tedavisi plasebo gruplarına göre tüm paramatrelerde anlamlı olarak iyi bulundu ($p<0.05$).

HILT ve LLLT grupları bazı parametrelerde plasebo grubuna göre daha iyi gelişme gösterdi.

Aralık 2022, 92 sayfa.

Anahtar Kelimeler: HILT, Lomber Disk Herniasyon, Bel Ağrısı, VAS **.**

1. INTRODUCTION

Demonstrated significant variations in Lumbar pain is the most frequent type of musculoskeletal discomfort. Low back pain (LBP) is second behind headaches among the causes of pain in developed nations. Approximately 80% of persons in industrialized nations affected by low-back discomfort at some point in their lives (1). In around 10% of those who have low back pain, it persists for more than three months. Due to low-back pain, around 1% of the population is completely incapacitated. Low back discomfort frequently begins at a young age, and its frequency is highest among middle-aged individuals (1). Lumbar intervertebral disc abnormalities are a major contributor to the development of low back pain (61,94%). The majority of individuals with low back discomfort have intervertebral disc issues. There are numerous ways to the relief of backache. outcome measures individually (1).

Low back pain (LBP) is a prevalent issue that is associated with illness and job loss, resulting in substantial economic expenditures in Western cultures (2). An estimated 85% of Americans will suffer from back pain at some point in their lives, and 15–45% of the population will experience it at least once a year (2). The incidence of low back problems in the United Kingdom increased from 36.5% in 1987 to 49.1% in 1997 (3).

Although the majority of studies on low back pain have been conducted in industrialized countries, the Arab world also recognizes this health problem as being of paramount importance. 64.6% of the population in the United Arab Emirates suffers from low back pain or has risk factors for it (4).whereas in Kuwait, the point prevalence is 35.0% (20.6% in males and 39.3% in females) and the lifetime rate is 57.8% (50.8% in males and 64.7% in females) (5). In Saudi Arabia, 18.8% of the adult population experiences low back discomfort. Low back pain is more prevalent in married people than in unmarried people (23.3% vs. 6.4%), and its incidence increases with age above 30 (6).

Disc Herniation: A herniated disc, slipped disc, or ruptured disc is one in which a piece of the disc's nucleus has been forced through a rip or rupture in the annulus and into the spinal canal. Herniated discs are typically in the preliminary stages of disc degeneration. Inadequate room in the spinal canal prevents the herniated disc fragment from being properly aligned with

the spinal nerve. When a disc shifts position and puts pressure on a spinal nerve, the resulting pain may be excruciating. It is possible for a herniated disc to develop in any area of the spinal column. Disc herniation is more frequent in the lower back (lumbar spine) (7).

A herniated disc in the lower back (lumbar disc herniation, or LDH) is a tear or rupture in the disc that cushions the spine. In this condition, the pulpous nucleus of an intervertebral disc is pushed through its outer surface (the fibrous ring), typically in the disc's posterolateral area, which can cause back discomfort. Pain in the sciatic region is a clinical manifestation of irritation and compression of roots of the spinal cord in the lower back (Dural sac), which can be caused by a slipped disc represented clinically by the pain known as sciatica Disc herniation was not linked to this type of pain until it was characterized by Mixter and Barr at the turn of the twentieth century, despite the fact that this type of pain has been documented since antiquity (8).

Lumbar disc herniation is one of the causes of disc pathologies were thought to cause low back pain (9). lumbar disc hernia is mostly in the 30-50 age range and often in L4-L5, L5-S1 localizations. With the displacement of the lumbar disc, pressure occurs on the spinal nerve root, spinal cord and sensitive parts the patient begins to complain of low back and leg pain In addition pain, limitation, spasm in the lower back movements and can occur disorders reflex, sensory and motor (10).

Teaching, psychosocial care, a lumbar pillow, rest, hospital attention patients with lumbar disc herniation may be treated with physiotherapy methods such massage, superficial heat/cold, exercise, transcutaneous electrical nerve stimulation, and laser therapy, as well as surgical intervention (11). The initial letters of "light amplification by stimulated emission of radiation" (laser) spell out the meaning of the phrase. When a photon's energy is passed through a certain material, it amplifies the electron spin rate and emits a laser beam with a wavelength that is different from the original light beam (12). Lasers work by stimulating tissues, which is why they are so effective. Cells, blood vessels, connective tissue, and the immune system are all stimulated. In addition, laser has both local and systemic effects when applied to tissues; its use at acupuncture sites has been shown to be very beneficial (13).

As a painless, non-invasive therapeutic option, laser therapy is increasingly being used in outpatient clinics for a variety of medical issues. Acute and chronic pain from disorders including rheumatoid arthritis, persistent osteoarthritis, carpal tunnel syndrome, fibromyalgia, knee problem, shoulder discomfort, and postoperative pain have all been shown to benefit greatly with laser therapy (13,14).

The purpose of this study was to examine the efficacy of high-intensity laser therapy (HILT), low-level laser therapy (LLLT), to illustrate the best method of laser treatment for patients with lumbar disc herniation and the hypotheses for this study are as follows:

1-H1: There is a difference between high-intensity laser treatment and low-level laser treatment for patients with lumbar disc herniation.

H0: There is no difference between high-intensity laser treatment and low-level laser treatment for patients with lumbar disc herniation.

2-H1: There is a difference between high-intensity laser treatment and placebo laser treatment for patients with lumbar disc herniation.

H0: There is no difference between high-intensity laser treatment and placebo laser treatment for patients with lumbar disc herniation.

3-H1: There is a difference between low-intensity laser treatment and placebo laser treatment for patients with lumbar disc herniation.

H0: There is no difference between low-intensity laser treatment and placebo laser treatment for patients with lumbar disc herniation.

2. GENERAL INFORMATION

2.1. Intervertebral Discs

Intervertebral disc (IVD) plays a crucial role in maintaining spine health. It is the main junction linking two vertebrae in the vertebral column and is cushioned by fibrocartilage. The human spine has 23 discs: 6 in the neck (cervical), 12 in the middle back (thoracic), and 5 in the lower back (lumbar) (lower back). Flexibility in the spine is greatly increased by IVDs without any significant loss of spinal stability. In addition to their shock-absorbing properties, they also keep the spine's vertebrae from touching and crushing against one another The inner nucleus pulposus (NP), of the discs, the cartilaginous endplates that link the discs to the vertebrae, and the outside annulus fibrosus (AF) are the three main parts of a disc (15) (Figure 2.1). It consists of an intervertebral disc, nucleus pulposus, and annulus fibrosus. Nucleus While the part is in gel form, the annulus part is a capsule consisting of collagen fibers. Compressive, tensile, and tensile stresses (16) are just a few of the loads that the disc endures. Compressive loading causes the NP to generate hydrostatic pressure, which transfers the load to the endplates and axial frame (17). This process reduces the rate applied stresses are passed to the surrounding vertebra, providing the disc its shock-absorbing qualities (18). The disc also facilitates motion between vertebral bodies, such as compression load and distraction, flexion and extension, axial rotation, and lateral flexion. The nuclear particle can migrate in the reverse way of compression if an unequal compressive loading disc is applied to the atom (19). As the lumbar spine flexes forward, the NP shifts backward. On the other hand, when bent in the back, the nucleus is squeezed anteriorly, or forwards (or extension). This notion is known as the dynamic disc model. Researchers have discovered that NP migration follows a predictable pattern in asymptomatic discs, but that this pattern changes in those with symptoms and/or degenerative IVDs (20).

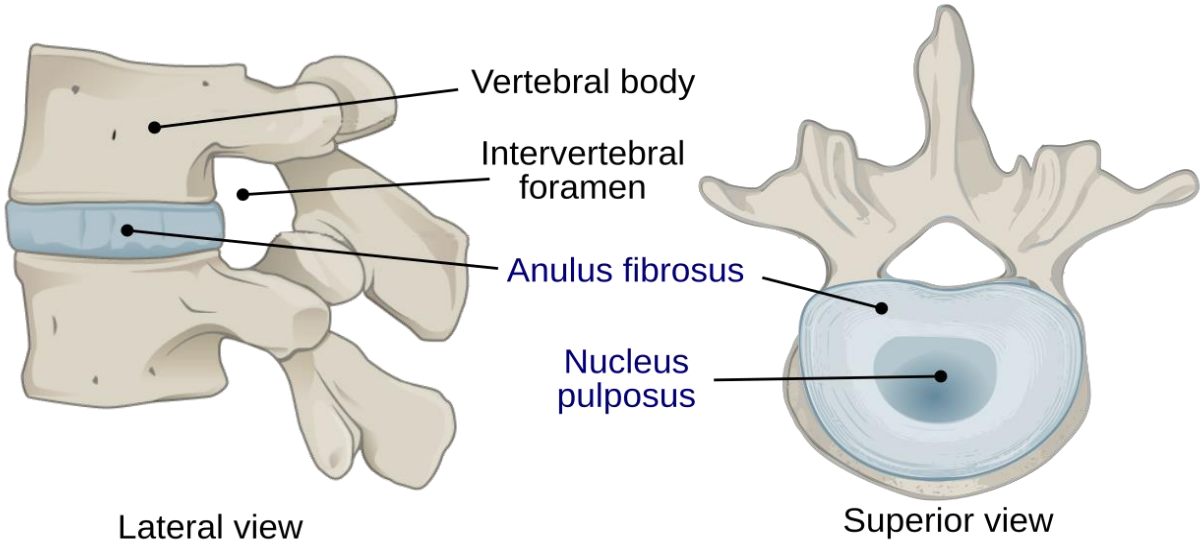


Figure 2.1: Intervertebral Disc (21).

2.2. Lumbosacral Biomechanics

The field of biomechanics investigates how forces act on living organisms (22) .

- As a crucial part of the body's biomechanics, the lumbosacral spine must be maintained.
- The lumbar spine is the part of the spine that extends below the thoracic spine; it typically consists of 5 vertebrae.
- The five fused sacral vertebrae that make up the sacrum are.

Flexion and extension in the lumbar region due to joint planes, thoracic lateral flexion and rotation movements are allowed in the region. With lumbar flexion each functional unit flexes the entire lumbar spine 8-10 degrees. Thus, the 5 units participating in the movement have a total movement of 45 degrees. The remainder of the forward flexion is completed. This is the lumbar-pelvic rhythm. Lumbar flexion is done at L5-S1 75%, L4-L5 25%, L1-L4 5-10% levels. Lengthening of the hip extensors and hamstrings in the pelvis with lumbar flexion is prominent. starts the rotation, but without significant rotation, the flexion movement is complete. In the transition to extension, the movement is the opposite. The load on the corpus is compressive (vertical direction) and shearing (oblique direction) is in the form. Compressive forces in an ideal posture with a

lumbosacral angle of 30 degrees It is carried 80% by the discs and 20% by the facet joints of the last two lumbar vertebrae. When lordosis increases, the compressive effect decreases and the shear force increases. The annulus fibrosus resists this oblique force (23). The lower back/spine area functions as a reliable bearing system. When a force is given to the spine from without, it stresses the rigid vertebral body and the pliable disc, leading to strains in the disc more readily (24). The nucleus pulposus has a pressure that is greater than zero even when the body is at rest, creating a "preload" mechanism that makes it more resistant to external pressures. When the disc's hydrostatic pressure rises, it pushes outward on the vertebral endplates, causing the annulus fibrosis to bulge and the concentric annular fibers to experience tensile pressures. This stress transfer acts as a shock absorber, reducing the rate at which one vertebra applies pressure to the next (25). As a result, the intervertebral discs are a crucial biomechanical component because they serve as a fibrocartilage "cushion" to transfer force between neighboring vertebrae throughout spinal activity. The lumbar disc is more vulnerable to damage than the cervical or thoracic discs because its annular fibers are more parallel and have a thinner posterior aspect than anteriorly, its nucleus is located posteriorly, and its cartilaginous endplates have holes (22).

2.3. Lumbar Disc Herniation

The most prevalent back pain issues are LDHs, or herniated lumbar discs. Disc herniation’s most commonly occur in the lumbar spine at the L4-L5 or L5-S1 levels (95% of the time). Herniated discs in the lumbar region are a typical source of back pain and sciatica (8). There are five vertebrae and discs in the lower back that bend forward (lordosis). The spinal nerves emerge through a canal formed by the intervertebral discs, lamina, pedicles, and articular structures of neighboring vertebrae (26). The intervertebral discs are made up of the cartilages at the anterior end that attach the disc to the vertebrae and the inner nucleus pulposus (NP). Degeneration of the disc is a common precursor to herniated discs. Senescence and a decrease in proteoglycan synthesis are hallmarks of aging in the disc chondrocytes. Fatigue and disc collapse brought on by a lack of proteoglycans increase pressure on the annulus fibrosus, which in turn causes rips and fissures that make herniation of the nucleus pulposus more easy. As a result, when subjected to repeated mechanical stimuli, the disc develops slowly and

develops chronic symptoms. Conversely, axial overloading causes significant biomechanical stress on the disc, which might cause disc material to extrude through a compromised annulus fibrosis even in an otherwise healthy disc. Acute symptoms from such injuries tend to be more severe. Connective tissue abnormalities and congenital problems, such as short pedicles, are other, less prevalent causes (27,28) (Figure 2.2).

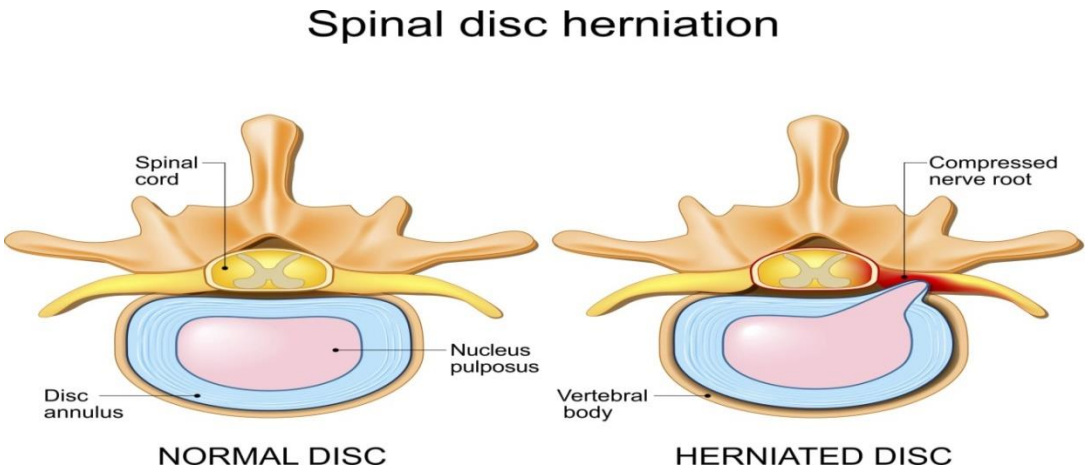


Figure 2.2: Spinal disc herniation (29)

2.3.1 Clinical Symptoms of Lumbar Disc Herniation

When assessing a patient for possible lumbar disc herniation, it is crucial to conduct a comprehensive history and physical. In particular, radicular pain, low back pain, and headaches are typical complaints. Limitations in trunk flexion, aberrant sensation areas of the body where the lumbosacral nerve roots begin to develop, and lumbosacral plexus dysfunction are all symptoms of lumbosacral nerve root dysfunction. Symptoms intensify while making an effort, such as when coughing, sneezing, or straining. When compared to standing, pain is worsened by sitting because seated positions place roughly 40% more pressure on the nerve root. To get a full picture of the patient's condition, it's important to ask about how the pain has affected their daily life. It is crucial to understand how an injury occurs. The clinician has to know if the patient has a history of cancer, inflammation, systemic infection, immunosuppression, or drug use, as well as if they are currently experiencing or have ever experienced urine or fecal incontinence or have ever undergone a saddle anesthetic. Symptoms including high body temperature, perspiring excessively at night, unexpectedly dropping

pounds, not eating, and severe pain, and vertebral body point discomfort are all red flags that should be checked since they could indicate an infection, inflammatory disease, or cancer (28).

If a lumbar disc herniation is to blame for the patient's radiculopathy, a thorough clinical assessment can help pinpoint the precise degree of the problem. The clinical signs associated with this illness can be correctly interpreted if one is familiar with the biology of nerve roots and spinal disc herniations. The radiculopathy caused by LDH varies in severity and location, depending on the nature and location of the herniation. L4–5 lateral herniation causes L5 radiculopathy. The transverse nerve root is frequently affected by paracentral and lateral herniations. An existing nerve root can be jeopardized by a herniation that is too far laterally located, for example, radiculopathy at the L4 level is caused by a slipped disc at the L4–L5 level. When trying to diagnose LDH or rule out other major pathologic disorders, a more detailed description of the pain is essential. The term "red flags" is used to describe a variety of conditions that warrant immediate medical attention, including but not limited to a history of serious trauma, melanoma, constitutional symptoms, night pain, immunodeficiency, recent inflammation, bladder and/or bowel abnormalities, bilateral neurologic deficits, saddle anesthesia, progressive neurologic deficits, and unrelenting pain. Any of these symptoms or indicators should prompt immediate follow-up with the patient. This is particularly accurate for cases of cauda equina syndrome, which is brought on by a massive central herniation (30). Herniated disc sufferers may exhibit a lack of lumbar lordosis, operational scoliosis as a result of tilting away from the uncomfortable side, and mild flexion and external rotation of the afflicted hip and knee to alleviate pressure on the damaged nerve root (31).

2.3.2. Evaluation

Even faster recovery is seen in those who do not have radiculopathy. A suggestion has been made to refrain from ordering imaging scans owing to the frequency of occurrences at this period of disc herniation in asymptomatic routine radiology patients. However, if there is clinical suspicion of a serious underlying illness or neurological deterioration, additional assessment and imaging are indicated. Patients with red flag symptoms require imaging and laboratory tests. Imaging should be considered after two or three months of conservative therapy in patients who have not improved (28).

Laboratory Tests: Inflammatory markers such as C-reactive protein and erythrocyte sedimentation rate are sought when a persistent inflammatory disorder or infection may be to blame. When an infection or cancer is suspected, a full blood count is helpful.

X-rays: When diagnosing the source of low back pain, the first imaging test to be taken is a series of X-rays of the lumbar spine. Examining the spine from three different angles (anteroposterior (AP), lateral (lateral), and oblique (oblique)) allows a doctor to check for fractures, identify degenerative or spondylitis changes, and assess the spine's general alignment. When evaluating spinal instability, horizontal flexion and extension views are helpful. X-ray abnormalities such as decreased intervertebral space, traction osteophyte formation, and compensatory scoliosis are highly suggestive of a herniated lumbar disc. When an acute fracture is suspected, a CT scan or MRI is usually performed for additional evaluation (32).

Computed Tomography (CT): When it comes to examining the vertebrae and other bone components of the spine, this imaging technique is the most sensitive. Radiologists may use CT scans to diagnose conditions such as calcified herniated discs or diseases that cause bone deterioration. It is not adequate for radiculopathy diagnostics because nerve roots cannot be seen clearly. For individuals who are unable to get an MRI due to medical conditions, Myelography using CT is the diagnostic method of choice for detecting slipped discs. However, since it is invasive, it must be performed by a certified radiologist. Post-spinal headache, brain parenchyma infection, and radiation exposure are all potential complications of a myelogram. Multidetector CT scans have recently advanced to the diagnostic level of an MRI (32).

Magnetic Resonance Imaging (MRI): Is the reference standard for verifying a diagnosis of LDH. When it comes to diagnosing a herniated disc, this investigation has the highest sensitivity because of its remarkable soft tissue imaging capacity, at 97%. In comparison to other imaging modalities, MRI also offers greater inter-observer reliability. T2-weighted signal enhancement in the posterior 10% of the disc, that's a strong indicator of a herniated disc. Changes in medical transcription factor have been linked to degenerative disc degeneration (33). Unless there are contraindications, it is advised that a postoperative MRI be

conducted with contrast to evaluate lumbar radiculopathies. MRI is superior to CT in differentiating between LDH's inflammatory, malignant, and inflammatory causes. When a patient exhibits a constellation of symptoms that suggests a certain diagnosis, including severe pain, neurological motor impairments, and cauda equina syndrome, early in the diagnostic process (within the first 8 weeks), surgery is warranted. It is possible to identify microstructural changes in the nerve root with the use of diffusion tensor imaging, a specific MRI sequence. Knowing the alterations that take place when a Slipped disc in the low back pushes on a nerve root might be useful in identifying which individuals need surgical intervention. Nerve conduction investigations are recommended for individuals who have a strong clinical diagnosis suspect Radiculopathy owing to herniation of a lumbar disc but whose MRI results are ambiguous or inconclusive(8,34) (Figure 2.3).

2.3.3. Diagnostics Differentiation

Lumbar disc herniation (LDH) is diagnosed clinically by ruling out other back and leg conditions that present with similar symptoms. These conditions include: mechanical back pain, muscular pain, osteopenia, spondylolisthesis, degenerative spinal stenosis, cauda equina syndrome, extradural empyema, epidural hematoma, diabetic amyotrophic lateral sclerosis, neoplasms, and Ankylosing spondylitis (28).

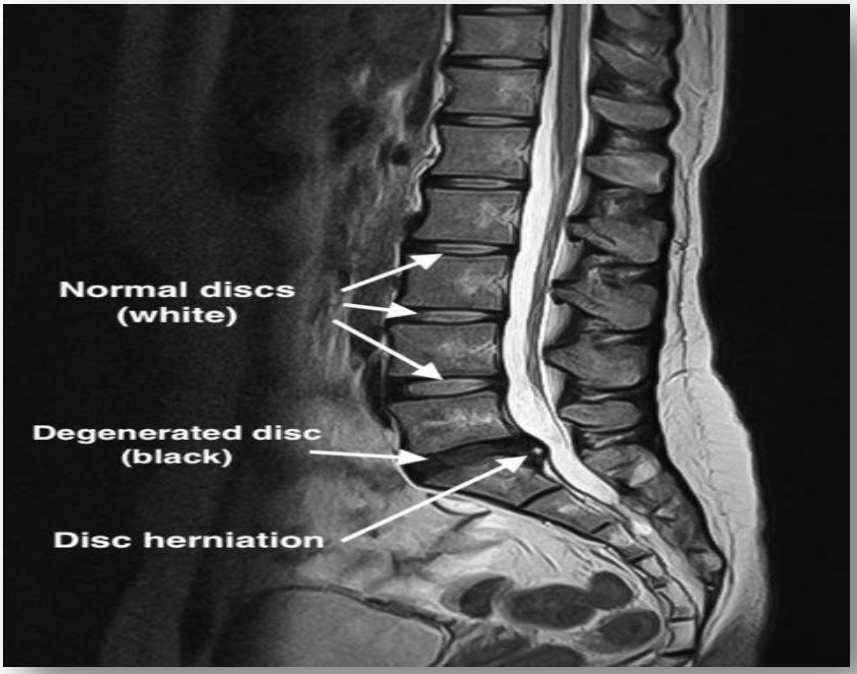


Figure 2.3: MRI for lumbar disc herniation (35).

2.4. Treatment Methods For LDH

Most clinical manifestations of LDH are transient and resolve within six to eight weeks; thus, it is usually treated conservatively until red flag symptoms appear, raising suspicion for emergent diseases such as increasing neurologic impairment or cauda equine syndrome. Recent research has shown that the intermediate and lengthy outcomes of conservative treatment are comparable to those of surgical intervention. However, some studies have found that surgically treated groups fared better, possibly because they experienced speedier symptom relief and an overall enhancement of living quality. Even though there is no definitive literature on a non-operative versus surgical criterion, there are comparative indications for immediate surgical treatment while dealing with patients that have warning signs. Non-emergent LDH treatment is ultimately decided through discussion between the treating physician and patient based on the severity of the condition, how long the symptoms have persisted, and the patient's preferences (36).

2.4.1. Conservative Treatment

Herniation of the lumbar disc is an asymptomatic disease. The purpose of the treatment is to alleviate pain and promote neurological rehabilitation, allowing for a speedy return to everyday activities and employment. Young individuals with sequestrated hernias with modest neurological impairments, whose hernias are tiny and have little disc degeneration, are the most likely to benefit from conservative therapy. Included in conservative treatment are supportive physiotherapy, analgesics, and relaxation methods, particularly in the form of exercises and stretching. The primary goal of non-invasive therapy is to control pain in the early period and to prevent recurrence of pain, thereby preventing chronicity and disability to be able to return. The purpose is determined according to the patient and the treatment is in accordance with that purpose should be planned (37).

-Bed Rest

Because supine rest is the least stressful on the disc, many doctors advise it as a first line of treatment for disc herniation. However, prospective randomized clinical trials documenting the effectiveness of bed rest and its optimum length are lacking. It has been suggested that patients relax for no more than a week and then gradually return to their regular routines (37). The most comfortable resting position is the Semi-Fowler position. In this position, lying in the lateral fetal position with hips and knees flexed is ideal. Legs the pillow to be placed between them provides support and keeps the body in flexion. It helps and prevents the upper leg from sliding down supine position if preferred, a comfortable position is supported with a pillow placed on the knees and waist (38). In one study, patients with low back pain and sciatica were given bed rest in the acute phase. Those who were given bed rest and those who were not given bed rest and continued to live actively. Separated. Bed rest when patients are evaluated for pain and functionality patients who take the drug have more pain and less functional It was found that they reached recovery (39).

-Medical Treatment

A meta-analysis of over 51 clinical studies found that the use of NSAIDs was superior to the use of placebo for acute LBP, but there was insufficient evidence to recommend the use of NSAIDs for chronic LBP. In terms of acute LBP treatment, the evidence supporting the superiority of NSAIDs over muscle relaxants is mixed, while the evidence indicating they are

no better than other drugs is modest. There was no evidence that one NSAID was better than another. Few studies have examined the impact of oral steroid usage on LDH levels. Although a recent meta-analysis found that muscle relaxants are more helpful than a placebo for individuals with LBP, caution is warranted due to the not-insignificant occurrence of side effects. Benzodiazepines, no benzodiazepines, and antispasmodic muscle relaxants were all shown to be equally effective (40).

Analgesic drugs: Aspirin, acetaminophen, and metamizole are frequently used drugs. Acetaminophen 325-1000 mg every 4-6 hours is especially recommended for patients with acute low back pain. It is given orally (43).

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs): NSAIDs It is effective in improving symptoms in patients, but which method should be used for patient selection? It is unclear whether the criteria are required. In terms of side effects and cost, none of these drugs outperform the others for 7-15 days. Should be used in an effective dose (41).

Muscle Relaxants: Mechanism of action is by central polysynaptic neuronal inhibition. Muscle Relaxants, which are thought to occur, are used in the onset of symptoms. Muscle spasm can be detected with palpation and those who have sleep problems due to pain use alone or in combination with analgesics and NSAIDs in patients suitable. Muscle Relaxants that inhibits muscle contraction without sedation (39, 43).

Corticosteroids: These drugs are oral, intramuscular and epidural in acute low back pain. It is used by way (41).

Epidural Steroid Injections: Although its efficacy is controversial, it is temporary they provide recovery They facilitate exercise after the application. This treatment method is applied to the patient at intervals of 7 –15 days (42).

Antidepressants: in patients with chronic pain with or without depression they are used. Tricyclic antidepressants (TSA) are analgesic when used in low doses they make an impact. If we look at the studies on this subject, randomized controlled moderately strong evidence of no studies and ineffectiveness has been observed (41).

Opioids: In severe pain with acute disc herniation and radicular compression Adequate analgesia cannot be provided with NSAIDs. For this reason, narcotic analgesic used. Long-

term use of opioids in chronic low back pain is becoming widespread Addiction and tolerance to opioids were not observed to be high in patients taking chronic opioids (41).

-Physiotherapy

Patients with low back pain and/or scoliosis can greatly benefit from physical therapy. Not only does physical therapy help feel better, but it also cuts down on the time to spend recovering from an injury. Studies have shown that prolonged bed rest weakens the muscles supporting the upper back and abdomen, while patients who undergo comprehensive rehabilitation are able to return to work sooner, use fewer sick days, and experience less subjective handicap. Treatment options such as interference current, ultrasound, heat or cold, massage or traction, transcutaneous electrical nerve stimulation (TENS), acupuncture, manipulation, laser, and exercise are all included (43).

- Interferential Current (IFC)

Electric current, such as interferential current (IFC), stands out among the different physiotherapy modalities used for the treatment of chronic low back pain. Existing IFC guidelines and systematic reviews are based on a small number of high-quality studies, and there is no consensus on the best IFC parameter values (46, 47). IFC is a transcutaneous medium-frequency (1–10 kHz) alternating current that changes the size of the current at low frequencies. It has been reported that IFC decreases skin impedance and penetrates deeper into tissues. It produces therapeutic benefits by lowering pain feeling, however its mechanism of action is not entirely understood. IFC is utilized extensively because it is regarded as a noninvasive and cost-effective therapy, and it produces nearly no adverse effects compared to surgical and pharmaceutical care (46). The interference current used for pain relief is combined with low-frequency currents to achieve this purpose. Pain relief is provided by the door control theory This combined with stimulation of the descending pain suppression system, endogenous opioid release, and nervous system stimulation Temporary transmission blockage and the local pump effect are also effective. It also has a placebo effect, which is taken into account. It helps to increase circulation and reduce edema with rhythmic

applications. These effects of the interference current are related to muscle contraction. The autonomic nervous system is also effective in this situation (47).

- Ultrasound Therapy

They are sound waves with a frequency of 20,000 Hz. During absorption, ultrasonic waves from tissues release heat energy. Warming with ultrasound is the most effective physical therapy modality. Because adipose tissue absorbs so little, bone tissue absorbs the most. High absorption in muscle tissue However, heat is lost rapidly due to the high vasculature of the muscles. Tendons and other structures such as ligaments retain heat better because they have less vasculature. Briefly, bone, tendon, and joint capsules are well heated by ultrasound. Physiologically, peripheral blood It is possible to say that it increases blood flow, tissue metabolism, and tissue flexibility. Low-frequency applications penetrate the tissue better. At frequencies, 1 MHz is frequently used. Depending on the situation, the dose may be 0.1-3 Watt/cm2. Application time Although it varies according to the application area, it is between 3 and 10 minutes (48).

- Heat Therapy

It is effective in treating chronic low back pain. Therapeutic heat can be applied superficially (hot pack, paraffin, infrared, hydrotherapy, hot towel, and so on) or deeply (short wave diathermy, ultrasound, and radar diathermy, for example). Mechanism of action: inhibits muscle spasm and gate control by activating the theory, increases circulation and eliminates ischemic pain, accelerates metabolic process removal, increases endorphins, raises the pain threshold, provides sedation, and changes tissue viscoelasticity. With all these effects, the pressure, tension, and hypoxia in the nerve endings are reduced, and thus an effect on pain occurs (49).

- Cold Therapy

Cold application works by reducing edema and muscle spasms, slowing nerve transmission, and activating endogenous opioid release. This reduces pain. Local application for 10-15 minutes is required. It is especially effective in treating acute low back pain (48).

- Massage Therapy

To alleviate symptoms or promote overall health, many people turn to massage treatments. The practice entails working with the body's softer tissues. Massage has been used in most cultures, both Eastern and Western, throughout human history and is one of the oldest methods that humans have employed to attempt to cure pain. Several forms of pain, such as headaches, osteoarthritis of the knee, neck pain, and shoulder pain, have been researched in relation to massage treatment (50).

- Traction Therapy

Traction is often used in conjunction with other physical therapy agents. Lordosis reduction, separating the facet joints, opens the intervertebral foramen, and it has mechanical effects such as relieving paravertebral muscle spasm. In the lumbar region to be effective, a force of 25% of the body's weight is required (48).

- Transcutaneous Electrical Nerve Stimulation (TENS)

There is little evidence to suggest that TENS even works. As early as the 1960s, when the gate control hypothesis of pain was first proposed, it was being used. Stimulating nerves, as the idea goes, may help get rid of the feeling of pain by closing a "gate" mechanism in the spinal cord. Electrodes are positioned on the skin over the painful region of the back during a TENS therapy. The result is a tingling feeling caused by electrical impulses carried along the nerves. In most cases, the pain reduction begins right away and ends soon after therapy. Stimulating the nerves, according to a second notion, might prompt the body to manufacture its own painkillers, termed endorphins (51) . TENS has five different types applicable (52).

Conventional TENS: High frequency, low amplitude, and muscle contraction is not current. Frequency: 50–100 Hz; current duration: 40–75 μsec, current intensity: 10–30 mA. The analgesic effect starts in 1–15 minutes and continues for 1–15 minutes.

Acupuncture-like TENS: Low frequency, high amplitude, and muscle It is the current that creates the contraction. The frequency is 1-4 Hz, the duration 150–2500 seconds, and the

current intensity is 30-80 mA. Its analgesic effect starts within a few hours and lasts for 2–66 hours. Chronic Its use in patients with pain is more effective than conventional TENS.

Burst-type TENS: A mixture of conventional and acupuncture-like TENS is available. Alternating two currents with a frequency of 60–100 and 0.5–4 Hz With this, burst-type TENS is obtained. Its effect starts within a few hours and lasts for several hours.

Short-intense TENS: A current with high frequency and amplitude. Both sensory and motor fibers are stimulated by short-term, intense TENS. The analgesic effect starts quickly and disappears.

Modulated TENS: current transit time or intensity, or both, as coincidentally given as the aim of modulated TENS is to increase the patient's tolerance and provide accommodation. To prevent its formation. It was developed for this purpose. Situations in which the use of TENS is dangerous; those who use heart rate monitors, in pregnant women, the abdomen, over the carotid sinuses, the eyes, mucous membranes, and skin integrity are distorted regions (54, 55).

- Acupuncture

In cases with chronic low back pain that does not respond to other physical therapy modalities It is performed as an adjunctive treatment method (48).

- Manipulation

Manipulation involves passive movement beyond normal physiological functioning, as well as manual, controlled, and sudden movement that exceeds the limits of anatomical movement while not exceeding the limits of anatomic pushing. It is applied after positioning, stretching, and mobilization. Application in the first 4-week period is beneficial for acute low back pain. Acupuncture, manipulation, and therapy are included in the treatment program for those with chronic spinal pain. The effectiveness of these methods was investigated in a group of medically treated patients.

Early the best recovery in this period is with manipulation (if not contraindicated), then it has been observed that it is provided with acupuncture, and finally with medical treatment. However, it is not recommended to use treatment modalities alone (48).

- Exercise

Exercise has been a staple in the fight against and cure for this debilitating illness for a long time now. Recommended that research into the role of physical exercise in both primary and secondary prevention of low back pain be prioritized. It is vital to take into account the physical, psychological, functional, social, and occupational aspects due to the complexity of the causes likely to cause low back pain. Mayer's functional restoration strategy, which came out in the 1980s, was the first therapy to take all of these things into account (54). The exercise program to be applied to the patient with lumbar disc herniation should be evaluated in detail. After the evaluation, it should be arranged in accordance with the needs of the patient. Muscle strength, mobility, flexibility of the lumbar and dorsal regions, and lower extremities, as well as exercises to increase endurance, should be chosen. In addition, increasing aerobic capacity should be one of the main goals. The goal is to reduce pain through exercises that strengthen muscles, stretch contracted muscles, stabilize hypermobile segments, mobilize hypo mobile segments, minimize mechanical stress, eliminate postural disorders, and improve physical harmony (48). Exercise treatments used to relieve low back pain are as follows (48):

- General exercises (stretching, strengthening, etc.) and posture control
- Lumbar stabilization exercises
- McKenzie and Williams exercises/treatment
- Aerobic exercise
- Pilates and yoga
- Aquatic exercises

- Laser Therapy

For a detailed explanation of what a laser is, you must know its entire acronym: "Double Light, by Incitement Spread of Radiation". In order to alleviate pain from soft-tissue injuries, laser therapy employs utilization of low-intensity laser light. This aids in the recovery of

damaged tissues and the restoration of regular cellular activity. Experts rely on it to alleviate pain and aid in wound healing (55). When compared to the intensity of light used in other types of laser therapy, such as those used to kill tumors and coagulate tissues, this type of laser therapy is relatively mild.

"Light" is a suitable term for the laser. The characteristics of artificial light are different from those of natural light (56).

- History of Laser

Following a reservation of Max Planck's equation of radiation in terms of possible coefficients (Einstein coefficients) for the sip, spontaneous spread, and stimulated emission of electromagnetic radiation, Albert Einstein published his ideas on the quantum theory of radiation in his 1917 paper, "On the Quantum Theory of Radiation." This paper lays the theoretical groundwork for the laser and the maser (57) . Stimulated emission and negative absorption were both verified to exist by Rudolf W. Ladenburg in 1928. It was predicted in 1939 by Valentin A. Fabrikant that "short" waves may be amplified by stimulated emission. The first demonstration of stimulated emission was performed in 1947 by Willis E. Lamb and R.C. Retherford, who discovered visible induced emission in hydrogen spectra (58). Nobel Laureate in Physics (1966) Alfred Kastler first introduced the idea of optical pumping in 1950, and two years later, Brossel, Kastler, and Winter were able to verify it experimentally.

- The Principles of Laser

According to Einstein, atoms and molecules are strongly stimulated by oscillations. They are in some excited atoms that settle in a hundred millionth of a second, and this photon energy is produced. When atoms excite a light source, more photon energy is produced. If a strong current is applied to the light tube the atoms gain enough energy to get excited and release this acquired energy, which is what they want. When the degree of excitation exceeds a certain point, it acquires chromium atoms. It releases energy, thus releasing the energy of a photon. The excitement continues to increase, and the resulting photon energy increases. One ring on each end of the sapphire wand If the mirror is positioned, the motion of the atoms and therefore the resulting energy will increase. So this If one of the mirrors is semi-permeable, energy will go out of it and new light will come out. spread out. This light is laser light (59).

- Standards of Laser

Quantified in nanometers, the laser wavelength is denoted by the symbol. The band gap of the crystal material in the active layer and the length of the chip's resonator dictate this. The laser wavelength at which the maximum gain is produced around the band gap will fluctuate within the resonator length, amongst other contenders. When the laser's case temperature and light output increase, the laser's oscillation wavelength will also increase because the resonator length grows proportionally with the junction (active layer) temperature**.** It is important to use the appropriate wavelength according to the indication. Which still although it is not known which wavelength is more effective for the indication, some laser types and wavelengths are considered the best treatment for some indications by experts. For example, He-Ne at a wavelength of 633-670 nm HeNe (helyhum-neon) laser in ulcer and nerve regeneration, 904 nm wavelength The application of GaAs (gallium-aluminum-arsenide) laser in sports injury, postoperative pain, and other conditions. In edema, a GaAlAs (gallium-aluminum-arsenide) laser with a wavelength of 780–890 nm In addition to the treatment of tendinitis, it is effective for pain, edema, and chronic ulcers. Power is the most important factor in determining the dose, and it is measured in watts. Tissue is important in penetration. High power means high power density. Thee advantage of working with high power is that the time to reach the determined dose is short. However, this is not an indicator of good results.

Power Density (W/cm2): This is the power per unit area. Power density and area inverse are proportional. In biostimulation therapy, power density should not be low. Dot In the treatment of the disease, the duration of treatment is short since the local dose can easily be high (59).

Energy (J): Power multiplied by time gives the energy used. joule = unit watt x seconds

Energy Density (J/cm2): Per unit area of treated tissue, the amount of energy is the treatment dose. It is the most important parameter of the treatment. Considering the low-dose laser treatment, an application of 0.5 J/cm2 It creates a photobiological effect in tissues. Wound healing requires 4 J/cm2; bioinhibition requires 8-12 J/cm2; and tissue healing requires 0.5-5 J/cm2. laser therapy in one session daily and intermittently, so that the total dose administered does not exceed 100 joules, if applicable. 10–20 sessions can be applied, with a treatment duration of 2–5 minutes (60).

Penetration Intensity: There are many factors that affect penetration depth. For example, the penetration depth of GaAIAs and GaAs lasers is 5–6 cm, while the penetration depth of HeNe

lasers is 4-5 millimeters. Short and high peak output power, i.e., ultra-pulse operation, allows for greater laser penetration. Accordingly, as the output power and power density increase, the depth of penetration also increases. In addition to energy density, tissue temperature, and tissue type, sensor design and processing technology are also factors that affect penetration depth. Lasers applied with single fiber probes are more powerful than those applied with fiber beam-shaped probes. penetrate deeper. At the same time, the application is in direct contact with the skin, as confirmed It penetrates deeper than the remote app because in the remote app more rays are reflected (60).

- Physical Properties of Laser

Monochromatic (photon conformity with each other): single wavelength, single, It has a very narrow spectrum.

Coherence, light waves are in the same phase and are parallel to each other. Being in the same phase creates a reinforcing effect. Small dispersion, Far away even in thinner hair this feature allows it to be transported without dispersing over long distances. Energy carrier, Laser beams have energy carrier properties. The reason is that they have a strong electromagnetic field The reason is that they have a strong electromagnetic field. to small surfaces transferring intense energy, and 18 has the feature of directing (59).

- Types of Laser

Low Power Laser Some of the names for low-powered lasers are "cool lasers," "medical lasers," "soft lasers," and "sub-thermal" lasers. Low- to mid-power lasers (0.5 mW to 500 mW) In general, therapeutic (cool) lasers emit light in the 600–1000 nm range with an output of 90 mW or less. The Arndt-Schulz principle states that if a stimulation is too weak, no effect is apparent; this is the case with low-power lasers. Photobiomodulation is a technique used in wound repair and pain treatment in which increased stimulation and the optimal dose result in the maximum benefit, whereas an increased dose results in a lower effect and an increased dose further inhibits stimulation. Using a low-powered laser is a painless, non-invasive option. It is uniform in hue, collimates (all rays are parallel to each other and don't diverge

appreciably even over long distances), and is coherent (all the light waves are in phase both spatially and temporally). Miniature Laser with Minimal Power Helium-neon (HeNe) gas, which is employed as the material, is composed of 85% helium and 25% neon and is extremely active. Continuous or pulsed delivery are also viable options. At all times toward the source of illumination To look at it is harmful to the eyes. Transcutaneous irradiation is where it is most commonly utilized. Because of its low absorption and high dispersion, this laser is ideal for treating broad areas of tissue. has persuasive powers; can persuade (48).

Medium Power Lasers : Also known as a semiconductor or diode laser. The active ingredient gallium-aluminum-arsenide (GaAIAs-GaAs). Its wavelength is 830–904 nm. Indirect penetration is up to 5 cm (48).

High-power lasers termed "hot lasers" because of the heat they produce. Lasers with energies between 3,000 and 10,000 (Mw) are used in surgery.

Based on the Effective and drug-free, HILT is a viable option for managing pain. It accelerates recovery and regeneration by transferring energy in the manner intended by nature (biostimulation and photomechanical effect). The pain associated with a herniated disc, carpal tunnel syndrome, persistent osteoarthritis, rheumatoid arthritis, shoulder discomfort, and other conditions that affect the musculoskeletal system respond well to HILT. Its uses in both medicine and manufacturing are well documented. Neodymium, carbon dioxide, and argon To that end, yttrium aluminum oxide garnet (YAG) lasers exist. Seeing through an Argon laser eye Carbon dioxide lasers are preferred in microsurgery, notwithstanding their utility in treating illness. Infrared light is emitted by neodymium and yttrium aluminum garnet (YAG) lasers (62, 63).

Mechanism of Action Photochemical effects by light scattering in the whole direction. By increasing tissue stimulation. High Intensity Laser Therapy (HILT), It contains high intensity laser radiation and slower light than other types of laser It causes absorption (8). Its main activity is biostimulation and regeneration, Analgesic, anti-inflammatory and antihypertensive. high intensity laser It is believed that deep tissue and pain receptors are stimulated by penetration. Plank It has a length of about 1000 nanometers. Morphine and morphine slow down the transmission of pain with its analgesic effect. Increases the production of similar materials. Consider these effects, with improvements in tissue High-intensity laser can be used to control pain considered (62, 63).

Two common HILT modes are pulsed and continuous. Tissue response and subsequent therapeutic effects vary by mode. Biostimulation, pain relief, an anti-inflammatory effect, a thermal effect on the skin, and muscle relaxation are some of the more general medical effects (63).

- Biophysical Properties of Laser

Analgesic effect: With the gate control theory and the increase of endorphins, the analgesic effect is thought to occur. With laser beams, prostaglandin synthesis is decreased, and pain is decreased. formation is prevented (48).

Bio stimulant effect: Self-repair and treatment of the living organism with this effect It is expected that the ability will be stimulated, revived, and accelerated. bio stimulation, dependent on both the direct effect of the laser itself and the technique of using the laser. It is caused by the drainage effect, which has an indirect effect. The laser's biostimulation effect increases membrane permeability, increasing the amount of oxygen, glucose, and amino acids that the cell receives. The metabolism is accelerated. Thus, enzymes that actively transport into the cell membrane It also becomes active and the synthesis of collagen and elastin accelerates (64).

Wound healing effect: open wounds with low-energy laser application It is effective in healing as a result of the stimulation of fibroblasts (48).

- Physiological Properties Of Laser

The physiological properties of a laser depend on its wavelength, amount of energy, and irradiation time. varies accordingly. After dehydration, protein control takes place. As the dose and duration of irradiation increase, thermolysis occurs and causes evaporation (65).

- Indications of Laser

- Wound healing
- Burns
- Skin ulcers
- Fractures

- Healing of nerve tissue
- Degenerative diseases
- Disc herniation
- Soft tissue rheumatism
- Chronic pain
- Neuralgias
- Reduction of acute muscle spasm
- Stump pains
- In eye, ear-nose-throat, neurosurgery, urology, gynecological oncology and dentistry (60, 66).

- Contraindications of Laser

It should not be applied directly to the cornea, as it may cause retinal bleeding. Protective glasses must be worn because of the damage that the laser may cause to the eyes during the treatment.

- On infected areas and varicose veins.
- In acute periods of inflammatory rheumatic diseases.
- To the chest areas of patients with pacemakers.
- To the thyroid gland as it can cause hypersecretion.
- It should not be applied on fetus, gonads and malignant tumors (60, 66).

2.4.2 Surgical Treatment

Decompressing nerve structures is the goal of surgical therapy. What follows is a list of surgical treatment indications. Indicators of an urgent need include cauda equina syndrome or a severe degree of paresis. Indications include persistent pain in the sciatic nerve or discomfort at the root of the nerve for more than the end of six weeks, the patient had a motor impairment worse than that seen in third grade, according to published articles; however, those who had surgery sooner experienced a more rapid recovery. Surgical therapy, the authors argue, is economically preferable since it facilitates a quicker recovery and subsequent return to work (66). Surgical intervention may be required in 2-4 percent of these patients. Deterioration in nerve conduction velocity, response to conservative treatment sciatica and recurrent sciatica attacks that do not give (67).

3. MATERIAL AND METHODS

3.1. Study Design

This research was planned and conducted as a randomized controlled experiment in (Al-Diwaniyah Teaching Hospital and Al-Hamza Hospital in the Physiotherapy and Medical Rehabilitation Unit) In Iraq, Diwaniyah Governorate, which is 190 km south of the capital, Baghdad.

This study was approved by the Scientific Research Ethics Committee in the Ministry of Health (Decision No.: 4 on 2/2/2022) (Appendix .1).

Sixty patients with herniated lumbar discs who met the criteria were included. After diagnosis by an orthopedic specialist and consultant radiologist. An interview and screening were conducted to obtain informed consent after matching the inclusion criteria. The ages of the study volunteers ranged from 18 to 60 years, and assessments were conducted between March and July 2022, in which patients were randomly divided into three groups. The first group consisted of twenty patients (men = 13 and women = 7), who were given high intensity laser therapy HILT, and the second group consisted of twenty patients (men = 12 and women = 8) and this group received low level laser LLLT and the third group consisted of twenty patients (men = 11 and women = 9) This group receives a placebo laser and personal exercises, with each group having nine sessions for three weeks, then they read the questionnaire and get approval.

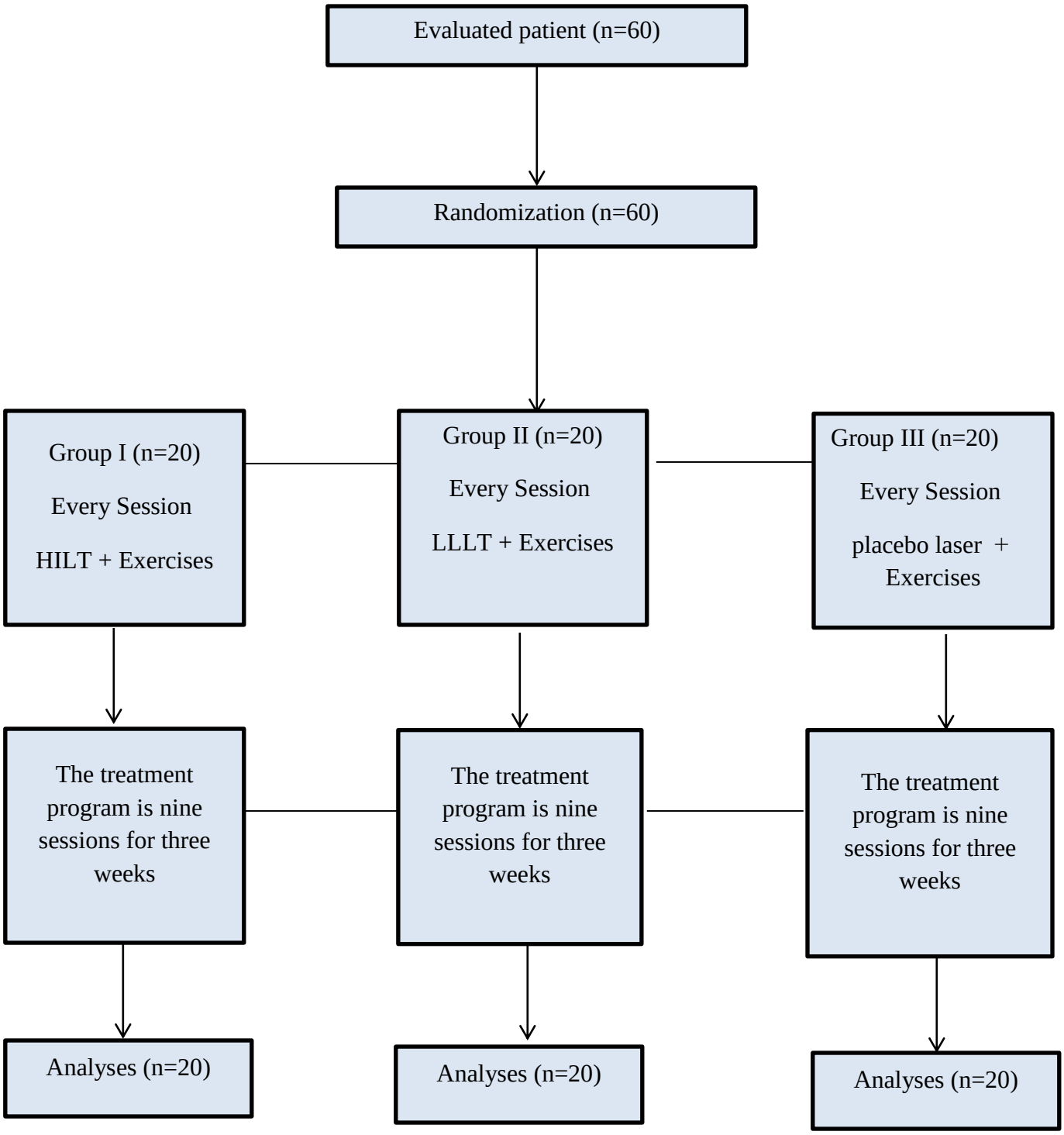


Figure 3.1: Diagram showing the number of patients included, the randomized study and the groups

3.2. Sample Size

The sample size of the study was calculated as at least 18 individuals in a group, with a 95% confidence interval and 85% power. Analyses made in the G Power program (version 3.1.9.7) by looking at the literature (Ref). Against the probability of 10% drop out, this number was determined as 20 individuals for each group and totally 60 individuals for three groups (68).

3.3. Randomization And Treatment Groups

To be eligible, participants must meet all inclusion criteria. We will use a simple random sampling technique to distribute these participants into groups for the intervention. Every patient has the opportunity to randomly select the intervention group by picking up a small piece of paper written in the same type.

The sixty patients were randomly divided into three groups, each group containing twenty patients: the first group used HILT, the second group used LLLT, and the last group used a placebo laser, with home exercises for each group and nine sessions for each patient during three weeks, three sessions each week, patients were evaluated before and after the intervention.

3.4. Selection of Cases

Inclusion Criteria

These were the inclusion criteria:

1. Individuals who, after a CT or MRI scan of the lumbar spine, were given a diagnosis of disc herniation in that region.
2. Patients with lumbosacral nerve root radiation discomfort, including those with low back pain or leg pain (69).
3. Patients aged 18-60 years old.
4. The participant must be fully educated and cooperative.
5. Study participants who had not yet begun systematic therapy within a month of enrollment.
6. Patients who voluntarily participated in testing after signing informed permission forms.

Exclusion Criteria

The following factors used as exclusion:

1. Patients having a history of lumbar spondylolisthesis, spinal canal stenosis, a lumbar vertebra fracture, or spinal structural abnormalities (spondylolysis).
2. Tumor and tuberculous spinal disease patients.
3. Indicators for surgery or people who have undergone lumbar spinal fusion.
4. Patients with severe conditions of the heart, liver, and kidneys, as well as those with tumors.
5. Women who are pregnant.
6. Individuals with advanced osteoporosis.
7. Patients with advanced osteoporosis persons with heart disease or other implantable medical devices or skin lesions in the treatment area.
8. Individuals who exhibited tattoo or melanocytic nevi in or near treatment regions.
9. People with thrombophlebitis, anemia, or a cutaneous hypersensitivity, as well as those with lupus or other autoimmune illnesses.
10. Patients who did not given treatments as necessary.

3.5. Resources for Quantifying

All of these medical tests must be performed immediately was used to assess the efficacy of laser treatment in the research participants in terms of subjective pain rating, functional efficiency, and disability level: All tests and measurements were performed both before the study endeavor started and after it was completed.

3.5.1. Patient Assessment Form

With the help of the patient follow-up form created, the personal information of the patients was collected. Patient's name, surname, age, sex, height, weight, BMI, marital status, occupation and phone number (Appendix 2).

3.5.2. A Visual Analog Scale

Visual analogue scale (VAS), represented by a horizontal line of meter-shaped scales of 10 cm, with end points marked "no pain" and "worst pain imaginable," will be administered to check the pain intensity before and after the intervention. The patients will be asked to rate their pain intensity by placing a mark on the line with the extremes labeled "no pain" at 0 mm and "worst imaginable pain" at 10 cm; the moment at which they believe best depicts their

sense of their present condition (at rest and again during the functional performance test). In order to calculate the VAS score, we measure in millimeters from the line's left end to the spot where the patient makes a mark indicating how much pain they are in (70)(Appendix 3).

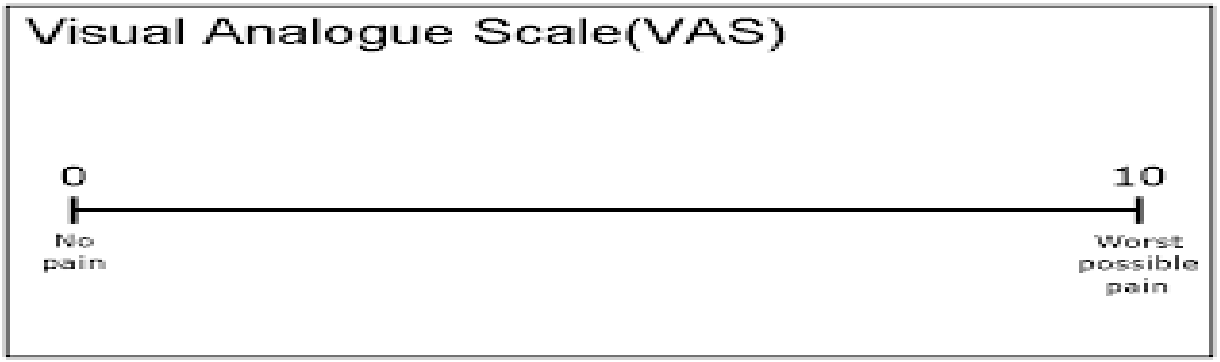


Figure 3.2: A10-cm visual analogue scale (Horizontal line meter shaped scale of 10 cm).

Scoring and Interpretation: Using a ruler, the distance (in centimeter) between the "no pain" anchor and the patient's mark on a 10-centimeter line is calculated to yield a score in the range of 0-10. A higher score indicates greater pain intensity it has been suggested that the pain VAS cutoffs range from 0 to 4 millimeters for no pain, 5 to 44 millimeters for light pain, 45 to 74 millimeters for moderate pain, and 75 to 100 millimeters for severe pain (71). Normative values are not available. The VAS takes< 1 minute to complete.

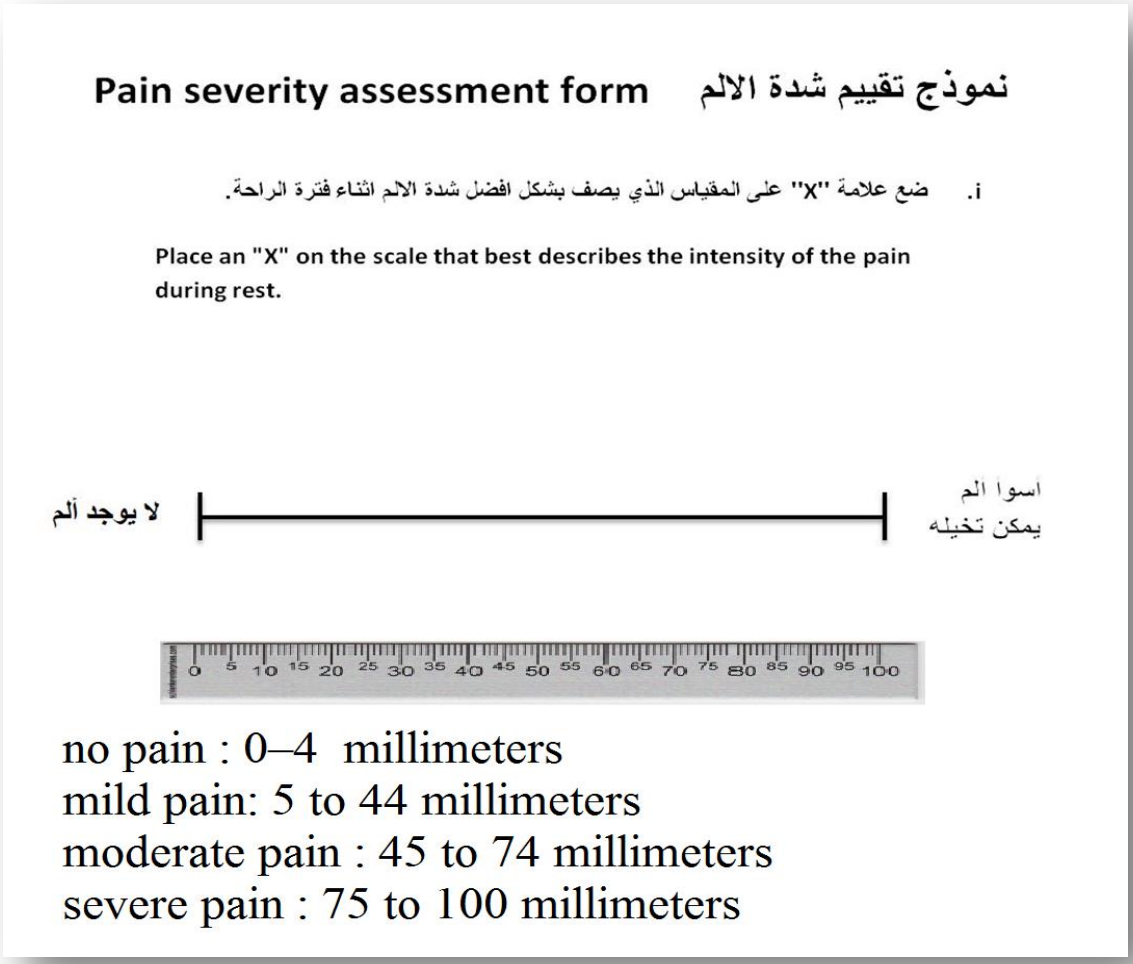


Figure 3.3: Measuring a visual analog scale at rest.

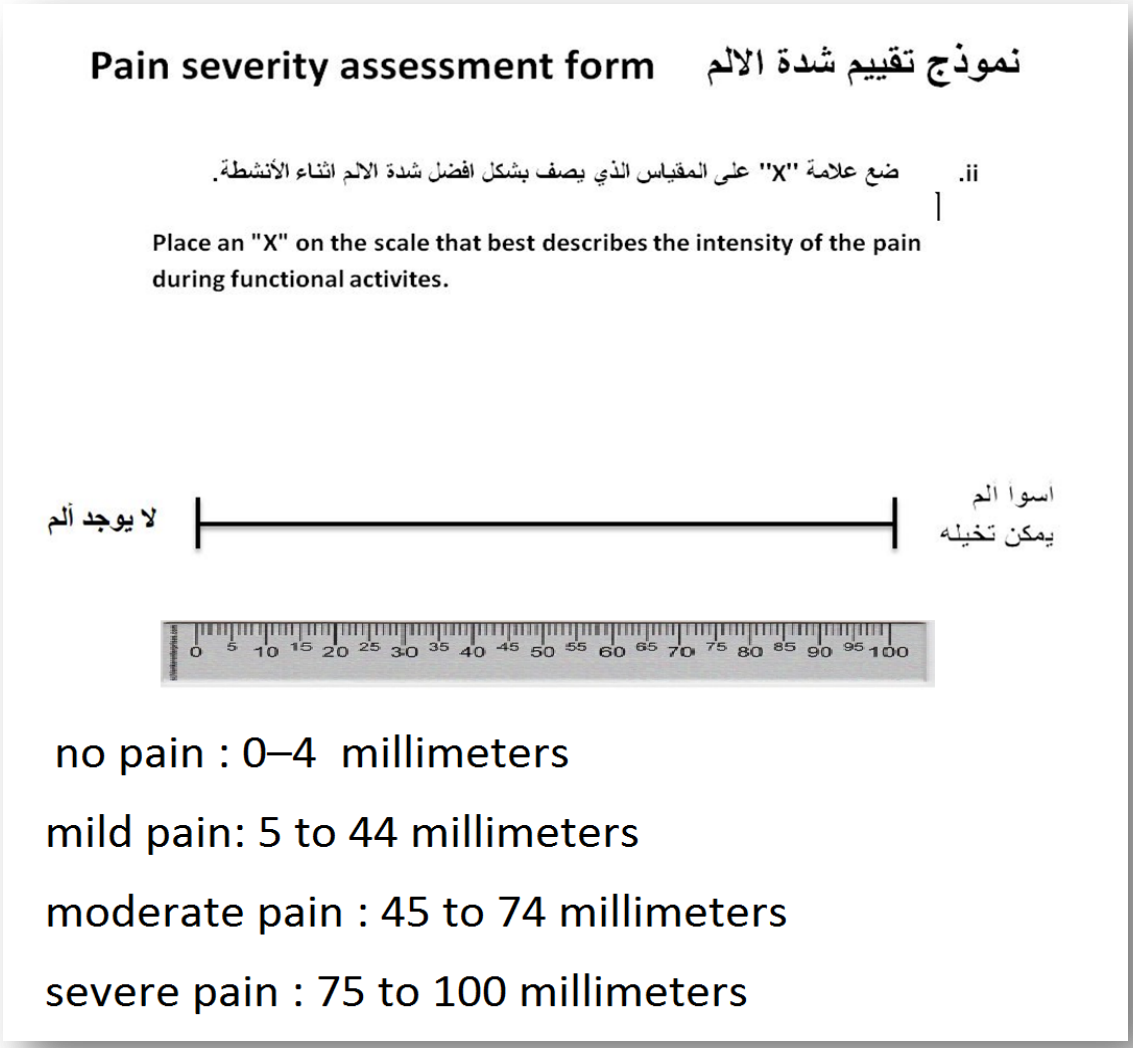


Figure 3.4: Measuring a visual analog scale at activity.

3.5.3. Oswestry Disability Index

Clinicians and researchers often utilize the Oswestry Disability Index (ODI), which is based on the Oswestry Low Back Pain Questionnaire, to measure the extent to which patients are impaired by low back pain. Originally published by Jeremy Fairbank et al. in 1980 in Physiotherapy, this validated questionnaire. The present version appeared in Spine magazine in 2000 (72).

The self-administered questionnaire has ten questions about pain intensity, lifting, capacity to care for oneself, ability to walk, ability to sit, sexual function, ability to stand, social life, sleep quality, and travel ability. Each subject group is followed by six sentences detailing various possible patient-related circumstances. The patient then selects the sentence that best describes their condition. Each item is rated on a scale from 0 to 5, with a score of 0 indicating the least amount of handicap and a score of 5 indicating the most severe degree of disability. The index is calculated by adding the scores for all questions and then multiplying by two (range 0 to 100). Zero is equivalent to no disability, while 100 is the greatest conceivable level of impairment (72). As there is an Arabic translation and its veracity has been established, the document is considered reliable (73)(Appendix 4).

Scoring and Interpretation

0% - 20% = Minimal disability. The patient can cope with most living activities. Usually no treatment is indicated apart from advice on lifting, sitting and exercise.
20% - 40% = Moderate disability. Low back pain mildly interferes with the patient's daily life restricts.
40% - 60%= Severe disability Low back pain affects all facets of the patient's life.
60% - 80%= Disability. Low back pain completely restricted the patient's daily life.
80% - 100%= Bedridden (or the symptoms are exaggerated) (72).

3.5.4. Roland-Morris Low Back Pain And Disability Questionnaire

Roland-Morris Questionnaire (RMQ): Is a self-reported assessment with higher scores indicating less functional capacity on a 24-point scale used to evaluate the extent to which an individual experiences impairment. The RMQ has been demonstrated to be sensitive to change over time for populations of individuals with low back pain, provide credible data, and allow inferences about the amount of impairment. If a patient agrees with a statement, he or she should check the box next to it. A patient's score is calculated by tallying up the number of checked boxes (74). Given the accessibility and proven accuracy of the Arabic translation (75) (Appendix 5).

Scoring and Interpretation

Roland and Morris did not describe the varied degrees of impairment (e.g., 40% to 60% is a severe handicap). The grading of clinical progress over time may be determined by analyzing serial questionnaire ratings. If, for example, a patient's score at the beginning of therapy was 12 and their score at the end of treatment was 2 (10 points of improvement), we would compute an 83% (10/12 x 100) improvement (74).

3.5.5. Schober's Test

Patients' abilities to bend their lower backs are evaluated with the Schober's test, which is utilized in the fields of family medicine, physiotherapy and rehabilitation, and rheumatology (76). German physician Dr. Paul Schober (March 11, 1865 - August 22, 1943) initially described the test in 1937 (77).

Examination Method

While the patient is standing, the examiner marks the patient's back at the level of the L5 vertebra (fifth lumbar vertebra). We've indicated two other spots, five centimeters below and ten centimeters above this one (for a total distance of 15 cm).The next step is to have the patient touch his or her toes while maintaining a straight knee position. Limitation in lumbar flexion is indicated if the length between the two sites does not rise by at least 5 cm (with the total length being greater than 20 cm). If a patient is suspected of having Ankylosing spondylitis, this might be a helpful part of the diagnostic process. This test's results may be used for diagnosing Ankylosing spondylitis and other low back pain pathologies, as well as monitoring their development and responding to treatment (78). The measurements of the Schober's test is mild If the distance is more than 4 cm. Moderate if the distance is between 2-4 cm , Severe if the distance is less than 2 cm. (Figure: 3.5, 3.6).

3.6. Treatment Procedure

Following the completion of procedures on sixty herniated lumbar disc patients, the patients are random assignment to one of three groups. HILT, LLLT, and placebo groups.

The HILT Group included 20 participants (13 males and 7 females) received High Intensity Laser Therapy Nd: YAG lasers have a wavelength of 1064 nm and emit infrared rays The device is German origin With an average power of 7 watts at a depth of 5-8 cm for two minutes and fifty seconds, the total energy received was 1200 joules, Frequency strength 25 Hz, the energy density is 50 joules / cm2. The beam diameter area is 1 cm, where its continuous The technique used for movement is the scanning technique and duration of treatment nine sessions within three weeks, three sessions every weeks. Laser treatment is accompanied by home exercises throughout the treatment period (HILT+EX group) (Figure: 3.7, 3.9).

The LLLT Group included 20 participants (12 males and 8 females) who underwent low level laser therapy gallium-aluminum-arsenide (GaAIAs) at a wavelength of 904 nm, output power of 500 Mw, and frequency of 5000 Hz a depth 1-4 cm The duration of treatment in each session is 4 minutes in the form of four fixed points in the lumbar region, and the total energy of each point is 3 joules. Also, laser therapy is accompanied by home exercises throughout the treatment period and duration of treatment nine sessions within three weeks (LLLT+EX group) (Figure: 3.10, 3.11).

The Placebo Group included 20 participants (11 males and 9 females) This group receives a placebo laser with exercises (PL+EX group) (Figure: 3.12).

All patients were given a thorough description of the treatment regimen and requested to sign an informed permission form for research participation and publishing of the findings after the first evaluation.

Figure 3.5: Schober's test Picture.

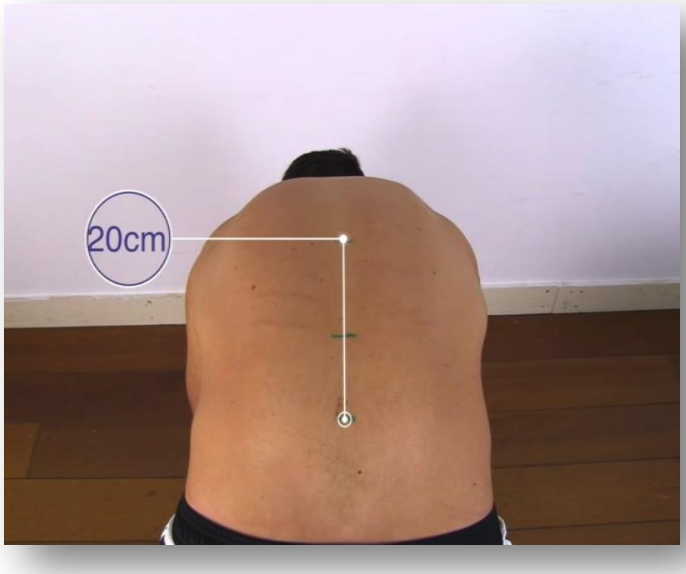


Figure 3.6: Schober's test.

Figure 3.7: Laser (HILT) Device.

.

Figure 3.8: HILT Application.

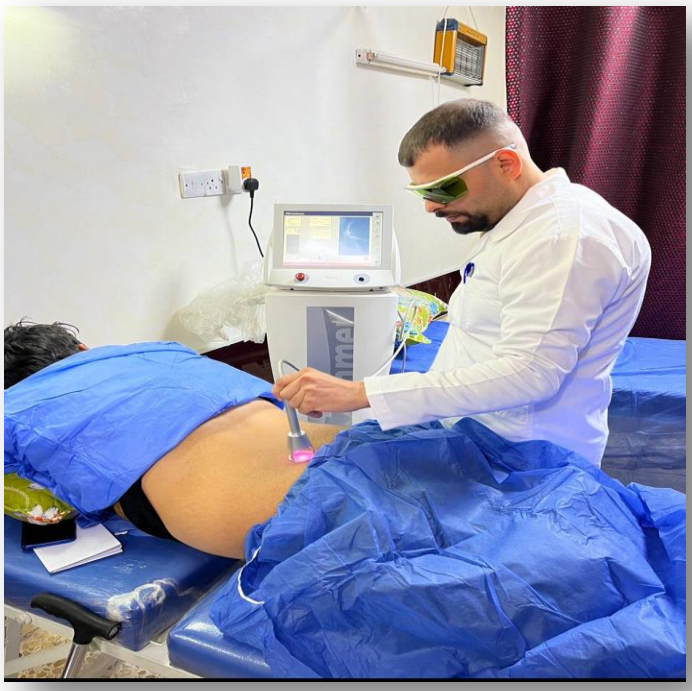


Figure 3.9: HILT Application**.**

Figure 3.10: Laser (LLLT) Device.

Figure 3.11: LLLT Application.

Figure 3.12: Placebo Application.

Exercise

All 60 patients have received personal exercises. A number of special exercises have been prepared that help strengthen and stretch the abdominal muscles and lower back muscles There was zero need for unique tools or a dedicated workout space. Depending on each patient's individual clinical result, exercises focused on either strengthening or extending the abdomen, back, pelvic, and lower limb muscles, or on moving, coordinating, and stabilizing the lower limb muscles (79).

All participants are given written instructions on how to complete the exercises properly; I led the initial exercise session for each patient, after which they continued the exercises at home. At least twice per day and five to ten repetitions during the therapy period Patients have been asked not to receive analgesics or steroidal antiseptics for the duration of the trial (Appendix 6).

3.7. Statistical Analysis

Descriptive statistics are presented in the form of frequencies and percentages for categorical variables. Mean and standard deviation are used to present the numeric variables. Median and IQR are used to present the non-normally distributed numerical variables. One way ANOVA and kruskal Wallis test were used to compare variables across different groups. Chi square and exact test were used to compare categorical variables. Spearman correlation was done between age, BMI, and change in different scores after treatment.

SPSS 28 IBM software for windows was used for the statistical analysis. P-value < 0.05 is considered statistically significant. In order to discover statistically significant changes between three groups, at least 15 patients per group were necessary. Patients in study groups before and after therapy were evaluated.

4. RESULTS

Data of 60 patients who voluntarily participated in and completed the study, aged between 18-60 years (36 males and 24 females).

Table 4.1: Characteristics of participants (N=60).

	Placebo (N=20)		**Low dose (N=20)**		**High dose (N=20)**		**P-value**
	N	**%**	**N**	**%**	**N**	**%**	
Gender							0.083
Male	11	55.0%	12	60.0%	13	65.0%	
Female	9	45.0%	8	40.0%	7	35.0%	
Marital status							0.820
Single	2	10.0%	3	15.0%	3	15.0%	
Married	18	90.0%	17	85.0%	17	85.0%	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
BMI	28.09	3.18	26.03	3.17	27.71	4.55	0.179
Age	42.00	12.10	41.60	11.90	39.85	11.18	0.828

60 patients participated in this study. The purpose of this study was to examine the efficacy of high-intensity laser therapy (HILT), low-level laser therapy (LLLT) for patients with lumbar disc herniation, so we have 3 groups as presented in (Table 4.1).

For high dose group, 65% of patients are males and 35% are females. 85% of them are married and only 15% of them are single. Their mean BMI is 27.71 kg/m^2 and mean age is 39.85 years old.

For low dose group, 60% of patients are males and 40% are females. 85% of them are married and only 15% of them are single. Their mean BMI is 26.03 kg/m^2 and mean age is 41.6 years old.

For placebo group, 55% of patients are males and 45% are females. 90% of them are married and only 10% of them are single. Their mean BMI is 28.09 kg/m^2 and mean age is 42 years old. Chi square test for gender, exact test for marital status, and one way ANOVA test for age

and BMI were used to compare characteristic of the 3 groups, but no statically significant difference were found.

Table 4.2: Comparison of the scales between the three groups at baseline time (N=60).

	Placebo		**Low dose**		**High dose**		**P-value**
	Median	IQR	Median	IQR	Median	IQR	
VAS (rest)	6.15	1.75	6.10	2.00	6.75	1.75	0.076
VAS (activity)	7.80	2.00	7.75	2.00	8.35	1.00	0.374
OSW (%)	63.80%	0.16	61.90%	0.18	64.30%	0.10	0.783
RM	14.50	3.75	14.40	4.00	15.05	2.75	0.756
	N	%	N	%	N	%	
ST							0.404
Mild	0.00	0.00%	0.00	0.00%	0.00	0.00%	
Moderate	4	20.0%	7	35.0%	3	15.0%	
Severe	16	80.0%	13	65.0%	17	85.0%	

Kruskal Wallis test, chi square test, and fisher exact test were used to compare between the three groups at baseline time. No statically significant difference was found.

Table 4.3: Comparison between the three groups after treatment (N=60).

	Placebo		**Low dose**		**High dose**		**P-value***	**P-value for post hoc test****		
	Median	IQR	Median	IQR	Median	IQR		**P-L**	**P-H**	**L-H**
VAS (rest)	5.00	4.50	3.50	3.75	0.00	4.00	**0.004**	>0.999	**0.011**	**0.014**
VAS (activity)	5.50	6.00	3.00	5.00	1.00	5.00	**0.010**	**0.029**	**0.023**	>0.999
OSW (%)	53.0%	0.42	38.00%	0.35	15.00 %	0.43	**0.021**	0.749	**0.017**	0.320
RM	10.00	8.75	7.00	7.50	4.00	7.00	**0.036**	0.576	**0.029**	0.604
	N	**%**	**N**	**%**	**N**	**%**				
ST							**0.027**	>0.999	**0.039**	0.186
Mild	3	15.0 %	5	25.0 %	12	60.0 %				
Moderate	9	45.0 %	10	50.0 %	4	20.0 %				
Severe	8	40.0 %	5	25.0 %	4	20.0 %				

* p-value is reported for Kruskal Wallis test or chi square test ** p-value is reported for post hoc testing (P-L: placebo versus low dose, P-H: placebo versus high dose, L-H low dose versus high dose).

Kruskal Wallis test and chi square test were used to compare between the three groups after laser treatment. Bonferroni adjustment was used for post-hoc testing.

VAS score at rest showed a statistically significant difference among the three groups, p-value=0.004. VAS score is lower at high dose group (median=0) as compared to low dose group (median=3.5) and placebo group (median=5), but no significant difference was found between placebo and low dose group.

VAS score at activity showed a statistically significant difference among the three groups, p-value=0.010. VAS score is lower at high dose group (median=1) as compared to placebo group (median=5.5) but no significant difference was found between high dose and low dose group.

The Oswestry Disability Index showed a statistically significant difference among the three groups, p-value=0.021. OSW is lower at high dose group (median=15%) as compared to placebo group (median=53%) but no significant difference was found between (placebo and low dose group) or (high dose and low dose group).

The Ronald Morris score showed a statistically significant difference among the three groups, p-value=0.036. RM is lower at high dose group (median=4) as compared to placebo group (median=10) but no significant difference was found between (placebo and low dose group) or (high dose and low dose group).

The schober test results showed a statistically significant difference among the three groups, 60% of participants who had high-intensity laser therapy have mild pain, and 25.0% of participants who had low-intensity laser therapy have mild pain, and 25.0% of participants who placebo therapy have mild pain, p-value=0.027.

RM is higher at high dose group (median=19) as compared to placebo group (median=17) but no significant difference was found between (placebo and low dose group) or (high dose and low dose group).

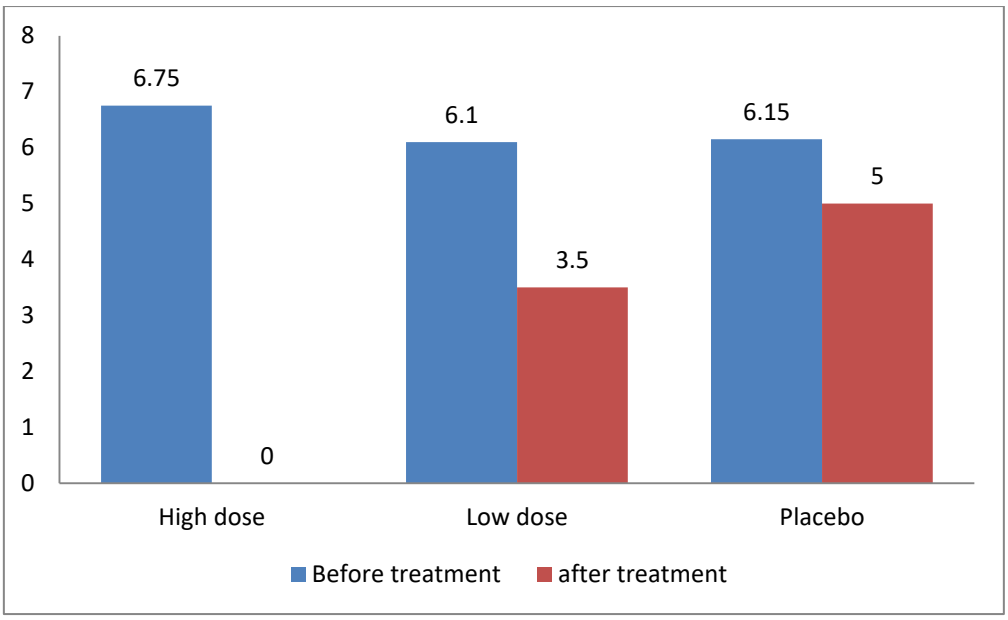


Figure 4.1: VAS score at rest before and after treatment.

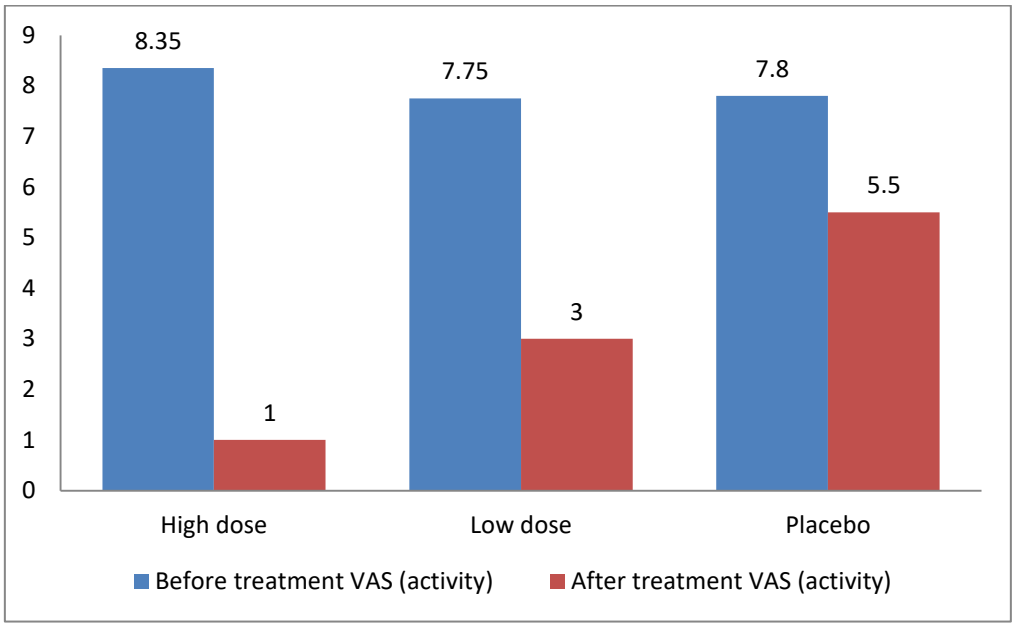


Figure 4.2: VAS score at activity before and after treatment.

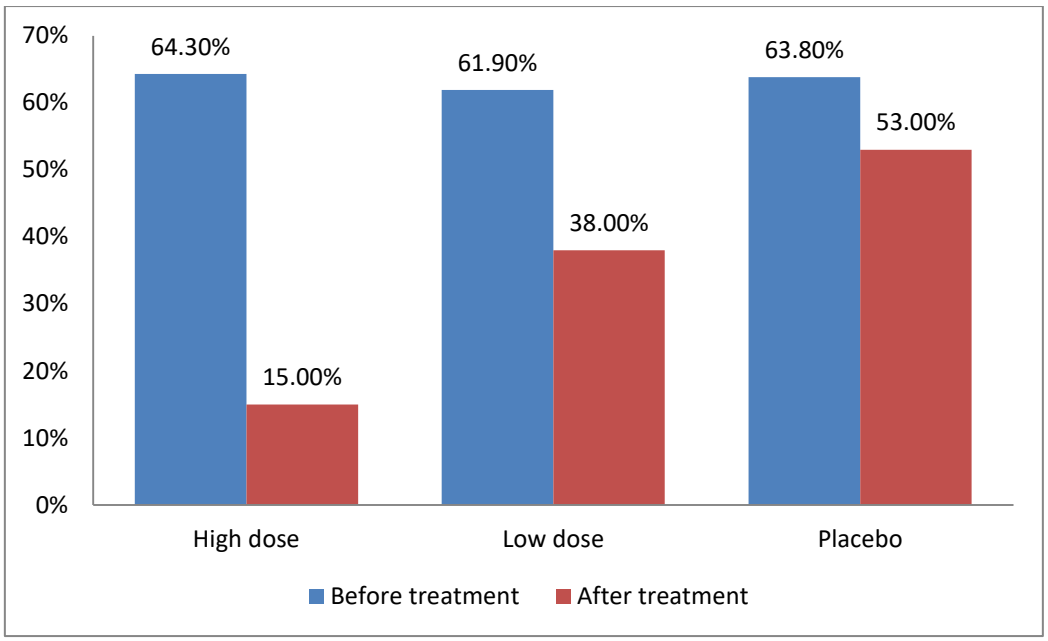


Figure 4.3: The Oswestry Disability Index before and after treatment.

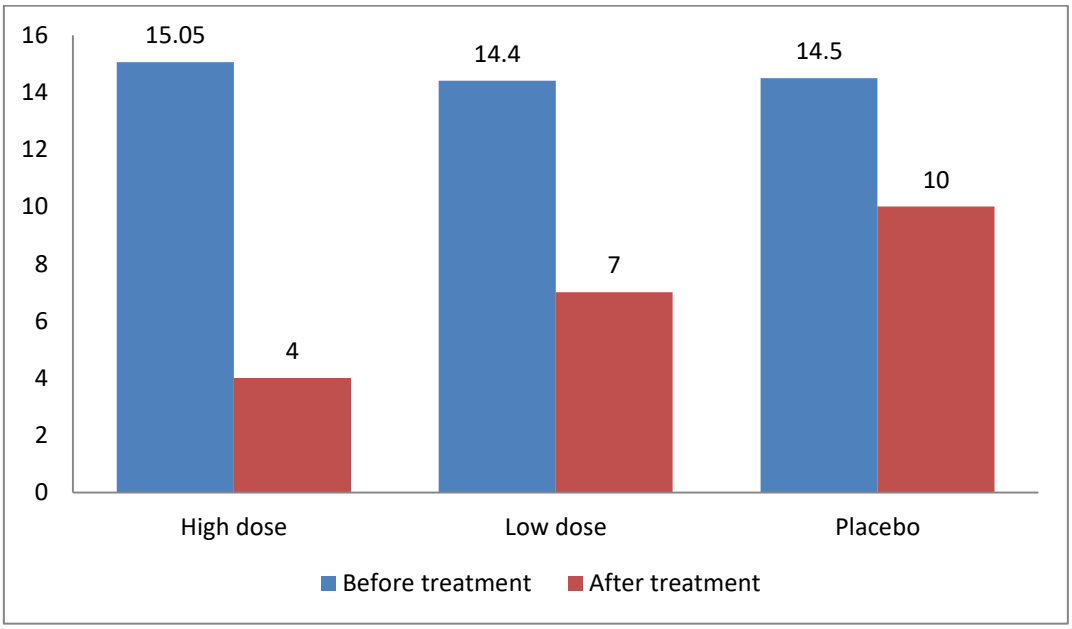


Figure 4.4: The Ronald Morris score before and after treatment.

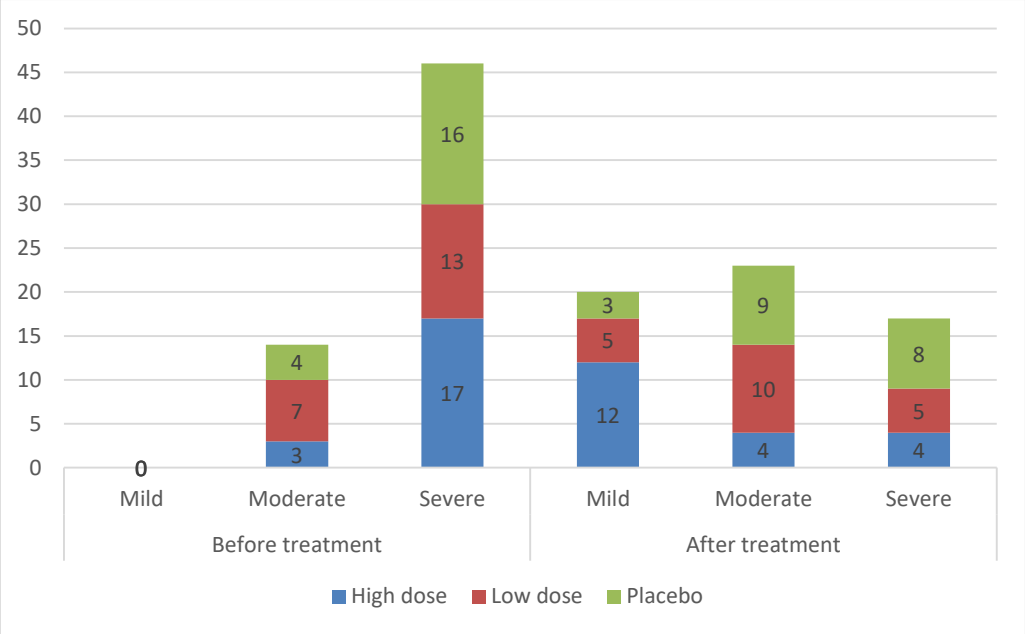


Figure 4.5: The schober test results before and after treatment.

Table 4.4: Comparison of the change after treatment between the three groups (N=60).

	Placebo		**Low dose**		**High dose**		**P-value***	**P-value for post hoc test****		
	Median	IQR	Median	IQR	Median	IQR		**P-L**	**P-H**	**L-H**
VAS (rest)	-1.50	3.00	-3.00	4.5	-6.00	4.75	**<0.001**	>0.999	**0.003**	**0.004**
VAS (activity)	-1.00	4.75	-5.50	4.75	-7.00	6.0	**0.002**	**0.028**	**0.002**	>0.999
OSW (%)	-15%	0.28	-27.50	0.29	-41.0	0.40	**0.002**	0.825	**0.002**	0.062
RM	-3.50	7.00	-8.00	5	-10.00	5.75	**<0.001**	0.540	**<0.001**	**0.043**
RM improvement %	25.5%	0.53	53.00%	0.46	73.0%	0.47	**0.004**	0.477	**0.003**	0.163

* p-value is reported for Kruskal Wallis test, ** p-value is reported for post hoc testing (P-L: placebo versus low dose, P-H: placebo versus high dose, L-H low dose versus high dose).

Kruskal Wallis This test was used to evaluate differences between the three groups after treatment. Bonferroni adjustment was used for post-hoc testing.

Change in VAS score at rest showed a statistically significant difference among the three groups, p-value <0.001. The change in VAS score is higher at high dose group (median=-6) as

compared to low dose group (median=-3) and placebo group (median=-1.5) but no significant difference was found between placebo and low dose group.

Change in VAS score at activity showed a statistically significant difference among the three groups, p-value=0.002. The change in VAS score is higher at high dose group (median=-7) as compared to placebo group (median=-1) However, there was no discernible difference between the high-dose and low-dose groups.

The Change in Oswestry Disability Index showed a statistically significant difference among the three groups, p-value=0.002. Change in OSW is higher at high dose group (median=-41%) as compared to placebo group (median=-15%) However, there was no discernible difference between (placebo and low dose group) or (high dose and low dose group).

The Change in Ronald Morris score showed a statistically significant difference among the three groups, p-value<0.001. The Change in RM is higher at high dose group (median=-10) as compared to placebo group (median=-3.5) but no significant difference was found between (placebo and low dose group) or (high dose and low dose group).

The RM improvement results showed a statistically significant difference among the three groups, p-value=0.004. The RM improvement results is higher at high dose group (median=73.0%) as compared to placebo group (median=25.5%) but no significant difference was found between (placebo and low dose group) or (high dose and low dose group).

Table 4.5: Correlation between age, BMI, and changes after treatment.

		Placebo		Low dose		High dose	
		Age	**BMI**	**Age**	**BMI**	**Age**	**BMI**
VAS (rest)	Correlation Coefficient	0.62	0.60	0.44	0.38	0.27	0.11
	P-value	**0.003**	**0.005**	0.053	0.096	0.256	0.630
VAS (activity)	Correlation Coefficient	0.45	0.41	0.34	0.06	0.42	0.37
	P-value	**0.046**	0.074	0.144	0.797	0.065	0.105
OSW (%)	Correlation Coefficient	0.55	0.57	0.64	0.41	0.29	0.23
	P-value	**0.012**	**0.009**	**0.002**	0.071	0.209	0.337
RM	Correlation Coefficient	0.53	0.55	0.57	0.27	0.26	0.19
	P-value	**0.017**	**0.013**	**0.009**	0.243	0.267	0.428
R M improvement %	Correlation Coefficient	-0.52	-0.67	-0.61	-0.22	-0.63	-0.49
	P-value	**0.018**	**0.001**	**0.004**	0.350	**0.003**	**0.027**

Spearman correlation was done between age, BMI, and change in different scores after treatment.

In high dose group, Age and R M improvement % exhibited a negative correlation, Correlation Coefficient=-0.63, p-value=0.003. Negative correlation was found between BMI and R M improvement %, Correlation Coefficient=-0.49, p-value=0.027.

In low dose group, positive correlation was found between age and change in OSW %, Correlation Coefficient=0.64, p-value=0.002.

Positive correlation was found between age and change in RM, Correlation Coefficient=0.57, p-value=0.009.

Negative correlation was found between age and change in R M improvement %, Correlation Coefficient=-0.61, p-value=0.004.

In placebo group, positive correlation was found between age and change in VAS score at rest, Correlation Coefficient=0.62, p-value=0.003. Positive correlation was found between age and change in VAS score at activity, Correlation Coefficient=0.45, p-value=0.046.

Positive correlation was found between age and change in OSW %, Correlation Coefficient=0.55, p-value=0.012.

Positive correlation was found between age and change in RM, Correlation Coefficient=0.53, p-value=0.017.

Negative correlation was found between age and R M improvement %, Correlation Coefficient=-0.52, p-value=0.018.

Positive correlation was found between BMI and change in VAS score at rest, Correlation Coefficient=0.60, p-value=0.005.

Positive correlation was found between BMI and change in OSW %, Correlation Coefficient=0.57, p-value=0.009.

Positive correlation was found between BMI and change in RM, Correlation Coefficient=0.55, p-value=0.013.

Negative correlation was found between BMI and R M improvement %, Correlation Coefficient=-0.67, p-value=0.001.

Table 4.6 shows a heat map for the Correlation between correlation between age, BMI, and changes after TTT. The darker the color, the stronger the correlation.

Table 4.6: Heat map for correlation between age, BMI, and changes after TTT.

	Placebo		**Low dose**		**High dose**	
	Age	**BMI**	**Age**	**BMI**	**Age**	**BMI**
VAS (rest)	0.62	0.60	0.44	0.38	0.27	0.11
VAS (activity)	0.45	0.41	0.34	0.06	0.42	0.37
OSW (%)	0.55	0.57	0.64	0.41	0.29	0.23
RM	0.53	0.55	0.57	0.27	0.26	0.19
RM improvement %	-0.52	-0.67	-0.61	-0.22	-0.63	-0.49

5.DISCUSSION

According to the findings of our study there is among significant difference between high intensity laser treatment and placebo, and there are no clear differences between high intensity laser and low intensity laser in some parameters after three weeks of treatment, as the high intensity laser controls pain and improves the level of disability more than laser Low intensity and faster long-term improvement and allow patients to return early to work and their families.

The use of lasers in the field of physical therapy is one of the most prominent recent developments, As far as we know Our study may be the second to compare the efficacy of high-intensity laser therapy to low-intensity laser therapy in patients with lumbar disc herniation, based on recent literature found in medical and scientific databases like PEDro, PubMed, Web of Science Core Collection, Google Scholar, and MEDLINE. It can be difficult to compare our findings to those of other researchers' because there aren't many articles on this issue.

Patients meeting the criteria were randomly allocated to one of three groups in this research. where the first group received a high-intensity laser, the second group received a low-intensity laser, and the last group received a placebo laser with personal exercises for each group Scales were used VAS, ODI, ROQ and Schober's test whose validity and reliability were proven

The our outcome is consistent with earlier research to Abdelbasset et al (80) which evaluate the effects of HILT versus LLLT on patients with chronic Nonspecific Low Back Pain Participants had all been diagnosed with persistent nsLBP. One hundred and twenty people were divided at random into three groups. Patients with chronic nonspecific low back pain (nsLBP) who were randomized to either (LLLT) or (HILT) program or no laser therapy at all had similar changes in outcome measures before and after 12 weeks of treatment (Oswestry Disability Index, visual analogue scale, lumbar range of motion, and European Quality of Life [EuroQol]) in the patients underwent HILT application with a wavelength of 1064 and a of 12 w power and a total energy per session of 1200 joules, and in patients who were treated with LLLT with a wavelength of 850 nm and a 800 mw power , it was found that both HILT and LLLT have an result to lessen suffering and disability, and increase lumbar range of motion

and well-being. We used RMQ instead of EuroQol and after three weeks of evaluation we found in our study that the HILT is faster and more time to minimize suffering and enhance quality of life.

The evaluate the effectiveness of low-level laser therapy (LLLT) and high-intensity laser therapy (HILT) in patients with lumbar disc degenerative It was done by Tarada et al (81).

68 patients were divided into four groups and compared the first group with HILT (18 patients) wavelength 1064 nm, energy 10 w, energy density 60 J/cm, and total energy 1200 joules, the second group with HILT placebo (17 patients) used sham treatment the third group had LLLT (16 patients) wavelength 785 nm, with a power of 65mw, and the last group had LLLT placebo (17patients) who used sham treatment, following tests were used to assess the effectiveness of treatment VAS , the Laitinen Questionnaire Indicators of Pain, ODI, RMQ and Schober's test were carried out before and after irradiations (3 weeks) and in follow-ups (1 and 3 months).

In this research, they concluded that high-intensity laser therapy and low-level laser therapy are ineffective for patients with lumbar disc degenerative, and there is no difference between them and placebo. This is the opposite of what was concluded in our study, which proved that high-intensity laser treatment differs from placebo treatment by a large difference, as well as low-level laser has an effect, and the reason for this is that in their study a small sample size was used that may reach 16 patients in the group, so the statistical analysis is not clear Because it is supposed to use a larger sample size, at least 20 patients per group, and another reason was adopted in the low-level laser, with a wavelength of 785 nm, with a power of 65mw, and this effect is not noticeable on the patient and does not differ from the placebo.

In another study, to compare HILT with ultrasound and its effect on patients with lumbar disc herniation Boyraz et al (82) Lumbar MRI revealed disc herniation in 65 individuals. Patients were randomly split into three groups: First group got HILT. Group 2 had ten sessions of ultrasonography every two weeks, whereas Group 3 underwent ten days of medicinal treatment (NSAII). the evaluation of patients before therapy, after therapy, and in between therapy sessions were used to evaluate the treatment methods' effectiveness, and in third month after the therapy parameters that be use VAS, ODI and quality of life SF-36 exercises

were done at home by each patient in each of the three groups. has been said. In patients who underwent HILT, a wavelength of 1064 nm, a power of 3.8 W, 14 The application was made with a total energy of 1800 J According to the measurements used, there is no noticeable difference was detected between HILT and ultrasound in terms of general health, social and psychological function, quality of life and Emotional role and mental health. Our study may not be compatible with this study and the reason is that we used RMQ instead of quality of life SF 36 as a measurement and used LLLT array instead of ultrasound where we found variables and improvement in pain in VAS.

Alayat et al a single-blind, randomly selected study was carried out For the long-term evaluation of HILT for patients with chronic lower back pain, 72 male patients participated in this study. They were divided into three groups. The first group received HILT with exercises, the second group received placebo laser with exercises, and the third group received HILT only.

HILT had a wavelength of 1064 nm with a power of 3 watts and a total energy of 3000 joules over three phases, the first phase is 1400 joules, the middle phase is 200 joules, and the last phase is 1400 joules the duration of treatment was 12 sessions for four weeks The evaluation was carried out after the fourth week of treatment and the twelfth week by VAS, ODI, RMQ and lumbar ROM. The final results showed significant effectiveness in the HILT +EX Compared by Groups to the placebo group and HILT alone the result (63) was similar with our study in which the same measures were used, VAS, ODI, RMD, with the Schober test to examine lumbar flexion.

Djavid et al. evaluated low-level lasers in patients with lower back pain 60 patients (20-60 years old) suffering from chronic low back pain were assigned to three groups. The first group received only a low-level laser with a wavelength of 810 nm and a power of 50 mw, the second group received a low intensity laser with exercises, and the last group received a placebo laser with exercises for two sessions. Weekly for six weeks and the following tests were used after the sixth and twelfth week: schober test, VAS and ODI. Results showed no statistically significant differences among the three groups for any of the measured characteristics (83). This result contradicts what we reached in our study and the reason is that in this research they used LLLT with a wavelength of 810 nm and a power of 50mw, where

these values are not clear and not effective on patients suffering from chronic lower back pain, as well as the number of treatment sessions two sessions per week is not effective.

A Turkish team led by Gur et al (84) Seventy-five people with chronic low back pain were split into three groups to see if low-intensity laser therapy would be helpful , group one (laser with exercise) and group two (laser alone) group three (exercise alone) with a card of 1 joule / cm^2 Pre- and post-treatment assessments were made on the patients with ODI, RMQ, VAS and schober test, and this study concluded that low-level laser therapy is effective for reducing pain and degree of disability for patients with chronic low back pain. This is similar to the results of our study, although we realized that the effect of LLLT was not on all standards.

The role of HILT in the treatment of patients with lumbar disc protrusion by Chen et al (87). This study included 36 patients suffering from intervertebral disc protrusion, They were arbitrarily divided into two groups, the first group was treated with HILT and spinal decompression system (traction device) and the second group was treated with traction device alone, HILT wavelength 1064 nm with a power of 12 watts and the total energy was 7500 joules. In three phases, the first phase was 3000 joules, the second phase was 1500 joules, and the last phase was like the first phase where it was evaluated by means of VAS, ODI and lumbar flexion range for one session only after two weeks of treatment and follow-up after a month and the result was that HILT improves the movement of the lumbar part and allows patients to return to their community at large. This is similar to our study, although our study outperformed the number of sessions, which is 10 sessions for a period of three weeks, meaning that HILT improves and accelerates the performance and effectiveness of patients for a long time.

In this study on chronic neck pain by Alayat et al (88). Which revolved around the treatment of chronic neck pain, a randomized controlled trial that looks for the effect of HILT on patients with chronic neck pain on the cervical range of motion, pain, and functional activity.

60 male patients were allocated in this study to two groups, the first group was HILT with exercises and the second group received placebo laser with exercises VAS and functional activity by neck disability index (NDI) was used to evaluate patients after treatment that lasted for 6 weeks, two sessions per week HILT had a wavelength of 1064 nm and a power of 3W

and a total energy of 2050 joules on three phases and the application is on four points on each side. At the end of the study, it was found that HILT is an effective method that increases functional activity, reduces pain, and increases cervical ROM motility for patients with chronic neck pain.

In our study, HILT was applied to the lumbar region, and we also found that it is effective and increases the movement and flexibility of the lumbar ROM.

In another study, Kheshie et al. compared HILT with LLLT on pain relief and functional improvement in patients with knee osteoarthritis, male patients were randomly assigned to 3 groups, the first group received HILT with exercises, the second group received LLLT with exercises, and the last group received placebo laser with exercises, patients were assessed using these parameters (VAS) and knee function measured by Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) after 6 weeks of treatment, two sessions per week. In the HILT group, the total energy during one session was 1250 joules through three stages, the first stage was 500 joules, the middle stage was 250 joules, and the last stage was the same as the first stage, but in the LLLT group with a wavelength of 830 nm and a frequency of 1000 The result of this study was that HILT and LLLT had an effect, but HILT was more helpful for people with knee osteoarthritis in terms of relieving pain and improving their ability to function (85).

This study is consistent with our study on the performance of HILT with LLLT, although in our study the laser was used on patients with lumbar disc herniation, and here in this study it was used on patients with knee prolapse, but the results were similar, meaning that HILT is an effective treatment and improves of the healing process for patients.

At the Medical Sciences Research Center, Tehran, Shahid Beheshti University, a study was conducted to evaluate low-level lasers on patients with back pain Kholoosy et al (86). 40 samples were taken in this study randomly into two groups a case group (LLLT laser) and a control group (sham laser) Naproxen was prescribed with a free dose (250-1000 mg daily) to both groups used visual analogue scale, Roland Morris disability questionnaire assess functional status and spinal ROM with a duration of 12 sessions, LLLT with wavelength 808

and power 160 mw. This result is consistent with the result that was concluded in our study that LLLT is effective in some measurements.

In another study, a team from Turkey compared a high-intensity laser with transcutaneous nerve stimulation(TENS) and ultrasound (US) treatment in patients with chronic lumbar radiculopathy Kolu et al Where this randomized study was conducted by taking 54 patients suffering from lumbar radiculopathy and Those involved were split in half, the first group got hot pack, TENS and US (87).

In a study by Ordahan et al (88) evaluating the efficacy of high-intensity lasers and low-intensity lasers in the treatment of patients with plantar fasciitis. 70 patients with plantar fasciitis were randomly assigned to two groups, HILT group and LLLT group, each group 35 patients with stretching exercises for each group and assessed using VAS, heel tenderness index and FAOS before and after treatment three sessions per week for three weeks. The high-intensity laser with a power of 12 watts and a wavelength of 1064 nm and a low-level laser with a wavelength of 904 nm and a power of 240 mw and a frequency of 5000 Hz The result of this study showed that after completing 3 weeks of treatment for both HILT and LLLT there was an improvement in the level of pain and life functions despite the improvement The HILT was better than the LLLT in patients with plantar fasciitis This study is similar to our study, which concluded that both HILT and LLLT are affected, but HILT was better and faster in all measurements, although our study was on patients with lumbar disc herniation and in this study on patients with plantar fasciitis.

In the Graduate School of Physiotherapy at Sahmyook University, Korea This research was conducted by Seo et al. (91) to explain why patients with persistent low back pain had improvements in their range of motion (ROM) after undergoing both low-level laser treatment (LLLT) and Mulligan sustained natural apophyseal glides (SNAGs). Totaling 49 people, all of whom suffered from persistent low back pain, took part in the research, they were randomly divided into three groups, the first group is (SNAGs with LLLT group received SNAGs for 10 min, LLLT for 10 min, and electrotherapy for 10 min), the second group is (SNAGs for 10 min and electrotherapy for 20 min), and the third group is (control group received electrotherapy for 30 min) . Three sessions per week for four weeks were used for this study's measurements (visual analog scale, Roland Morris Disability Questionnaire, and Schober test),

and the results showed that pain and function improved more in the SNAGs group with LLLT than in the second and third groups, and that the combined treatment of Mulligan mobilization and LLLT is significant to reduce pain and improve ROM and function in patients with chronic low back pain.

In a PhD study by Abdelbasset et al (89) to demonstrate the short-term effects of treatment of persistent nonspecific low back pain with pulsed Nd:YAG laser .This study involved 36 participants with chronic nonspecific low back pain, their ages ranged from (30-50 years) and They were split into two groups based on a random draw. 18 patients in Nd:YAG group and 18 patients in sham laser group 18 patients with home exercises for both groups and measurements used during this research, participants completed the Modified Oswestry Disability Index (MODI), Pain Disability Index (PDI), Visual Analog Scale (VAS), and Range of Motion (ROM) in Lumbar Flexion (LFR) three times weekly for a total of six weeks.

Nd:YAG group with a power of 12 watts and a wavelength of 1064 nm was applied in two stages, the first stage was a total energy of 300 joules for a period of 75 seconds and a power of 8 watts for the first two weeks when the second stage was for the remaining four weeks, it was a total energy of 12-150 joules and a power of 6 watts and The other group (control group) received a placebo laser. The outcome of this study was that the short-term pulsed Nd: YAG laser (6 weeks) reduces pain and functional impairment and improves lower back flexion in patients with chronic nonspecific low back pain , When compared with our study, which we conducted, this type of laser (Nd:YAG) is the same that was used in our study, and our results were completely similar to this study, and in our study also, pain, disability level, and the rate of improvement were rapid for patients with lumbar disc herniation.

6. CONCLUSION

This study was conducted to compare the efficacy of high intensity laser therapy with low intensity laser therapy for patients with lumbar disc herniation.

According to the results showed that both high intensity laser (Nd: YAG lasers have a wavelength of 1064 nm With an average power of 7 w) and low level laser (GaAIAs at a wavelength of 904 nm, output power of 500 Mw) was effective for patients with lumbar disc herniation, but there was a difference between HILT and LLLT in some parameters as the effect of HILT was more controllable and pain-reducing, effective and long-term method, as well as reducing postural disability and improving mobility lumbar ROM and we found that it is faster in the degree of recovery for patients with lumbar disc herniation, furthermore the effects of laser therapy are prolonged when coupled with physical therapy for the management of lumbar disc herniation. One of the recommendations that we must take is that high-intensity laser treatment is an auxiliary physiotherapy method that provides better results for patients with lumbar disc herniation.

Samples were counted in the Department of Physiotherapy and Medical Rehabilitation, both male and female, for patients with lumbar disc herniation, and we found within the limits of this study It is if a more sample number is chosen, HILT will be more clarified and broader, and also if the follow-up is for 6 months, it will be in the long term, we may get positive results. There were not many studies in the literature comparing the effectiveness of high intensity laser with low level laser, and neither acute cases were determined from chronic cases nor the dose used, and therefore we need a lot of studies on this subject.

REFERENCES

1. Manchikanti L. Epidemiology of low back pain. Pain Physician. 2000;3(2):167–192.

2.Andersson GBJ. Epidemiological features of chronic low-back pain. Lancet. 1999;354(9178):581–585.

3. Palmer KT, Walsh K, Bendall H, Cooper C, Coggon D. Back pain in Britain: comparison of two prevalence surveys at an interval of 10 years. Bmj. 2000;320(7249):1577–1578.

4. Bener A, Siyam A, Abuzaid MO. Epidemiology of low back pain in the United Arab Emirates. APLAR. J. Rheumatol. 2004;7(3):189–195.

5. Shehab D, Al-Jarallah K, Al-Ghareeb F, Sanaseeri S, Al-Fadhli M, Habeeb S. Is low-back pain prevalent among Kuwaiti children and adolescents? Med Princ Pract. 2004;13(3):142–146.

6. Al-Arfaj AS, Al-Saleh SS, Alballa SR, Al-Dalaan AN, Bahabri SA, Al-Sekeit MA, et al. How common is back pain in Al-Qaseem region. Saudi. Med. J. 2003;24(2):170–173.

7. Jordan JL, Konstantinou K, O'Dowd J. Herniated lumbar disc. BMJ. Clin. Evid. 2011; 18(6):232–238.

8. Amin RM, Andrade NS, Neuman BJ. Lumbar Disc Herniation [Internet]. 2017[4 Oct.2017]. Access Address: https://link.springer.com/article/10.1007/s12178-017-9441-4.

9. Sinaki M, Mokri B. Low back pain and disorders of the lumbar spine. Phys Med Rehabil Philadelphia WB Saunders. 1996;813-850.

10. Furlan AD, Yazdi F, Tsertsvadze A, Gross A, Van Tulder M, Santaguida L, et al. A systematic review and meta-analysis of efficacy, cost-effectiveness, and safety of selected complementary and alternative medicine for neck and low-back pain. Evidence-Based Complement. Altern. Med. 2012;21(10):62.

11. Van Middelkoop M, Rubinstein SM, Kuijpers T, Verhagen AP, Ostelo R, Koes BW, et al. A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain. Eur Spine J. 2011;20(1):19–39.

12. Naeser MA, Hahn K-AK, Lieberman BE, Branco KF. Carpal tunnel syndrome pain treated with low-level laser and microamperes transcutaneous electric nerve stimulation: a controlled study. Arch. Phys. Med. Rehabil. 2002;83(7):978–988.

13. Özdemir F, Birtane M, Kokino S. The clinical efficacy of low-power laser therapy on pain and function in cervical osteoarthritis. Clin. Rheumatol. 2001;20(3):181–184.
14. Peplow P V, Chung TY, Baxter GD. Application of low level laser technologies for pain relief and wound healing: overview of scientific bases. Phys. Ther. Rev. 2010;15(4):253–285.
15. Waxenbaum JA, Reddy V, Futterman B. Anatomy, back, intervertebral discs. 2017;40(3):120-127.
16. Stokes IAF, Iatridis JC. Mechanical conditions that accelerate intervertebral disc degeneration: overload versus immobilization. Spine.Phila. Pa. 2004;29(23):2724.
17. Reuber M, Schultz A, Denis F, Spencer D. Bulging of lumbar intervertebral disks. 1982;30(2):6.
18. Shah JS, Hampson WG, Jayson MI. The distribution of surface strain in the cadaveric lumbar spine. J. Bone Joint Surg. Br. 1978;60(2):246–251.
19. Schnebel BE, Simmons JW, Chowning J, Davidson R. A digitizing technique for the study of movement of intradiscal dye in response to flexion and extension of the lumbar spine. Phila. Pa. 1988;13(3):309–312.
20. Kolber MJ, Hanney WJ. The dynamic disc model: a systematic review of the literature. Phys. Ther. Rev. 2009;14(3):181–189.
21. Urban JPG, Roberts S. Degeneration of the intervertebral disc. Arthritis. Res. Ther. 2003;5(3):1–11.
22. Jensen GM. Biomechanics of the lumbar intervertebral disk: a review. Phys. Ther. 1980;60(6):765–773.
23. Drezner JA, Herring SA, Harmon K, Rubin A. Managing low-back pain: steps to optimize function and hasten return to activity. Phys. Sports. med. 2001;29(8):37–43.
24. Fountas KN, Kapsalaki EZ, Karampelas I, Feletes CH, Dimopoulos VG, Machinis TG, et al. Clinical biomechanics of the spine Clinical biomechanics of the spine, 1978. Spine. Phila Pa. 2005;30(6):661–669.
25. Chalian M, Soldatos T, Carrino JA, Belzberg AJ, Khanna J, Chhabra A. Prediction of transitional lumbosacral anatomy on magnetic resonance imaging of the lumbar spine. World. J. Radiol. 2012;4(3):97.
26. Desai C, Reddy V, Agarwal A. Anatomy, back, vertebral column. In: Stat.Pearls [Internet]. 2021 [Access Date 8 Aug. 2022]. Access Address

:https://www.ncbi.nlm.nih.gov/books/NBK525969/.

27. Schoenfeld AJ, Weiner BK. Treatment of lumbar disc herniation: Evidence-based practice. Int. J, Gen. Med. 2010;3:209.

28. Al Qaraghli MI, De Jesus O. Lumbar Disc Herniation [Internet]. 2021 [Access Date 22 Aug. 2022]. Access Address: https://www.ncbi.nlm.nih.gov/books/NBK560878/.

29. LuFei H. The effects of the McKenzie Method and strengthening/stabilization exercises in patients with chronic nonspecific low back pain [Internet]. 2021 [Access Date 19 May 2021]. Access Address: https://upswinghealth.com/conditions/cervical-disc-herniation/.

30. Ahn UM, Ahn NU, Buchowski JM, Garrett ES, Sieber AN, Kostuik JP. Cauda equina syndrome secondary to lumbar disc herniation: a meta-analysis of surgical outcomes. Spine. Phila. Pa. 2000;25(12):1515–1522.

31. Andersson GB, Deyo RA. History and physical examination in patients with herniated lumbar discs. Spine. Phila. Pa. 1996;21(24 Suppl):10-18.

32. Notohamiprodjo S, Stahl R, Braunagel M, Kazmierczak PM, Thierfelder KM, Treitl KM, et al. Diagnostic accuracy of contemporary multidetector computed tomography (MDCT) for the detection of lumbar disc herniation. Eur. Radiol. 2017;27(8):3443–3451.

33. Yu L-P, Qian W-W, Yin G-Y, Ren Y-X, Hu Z-Y. MRI assessment of lumbar intervertebral disc degeneration with lumbar degenerative disease using the Pfirrmann grading systems. PLo. S. One. 2012;7(12):48074.

34. Dydyk AM, Khan MZ, Singh P. Radicular back pain. [Internet] 2021 [Access Date 24 Oct. 2022]. Access Address: https://www.ncbi.nlm.nih.gov/books/NBK546593/.

35. Wang Y, Xu Y, Tian G, Dai G. Pediatric lumbar disc herniation: a report of two cases and review of the literature. Eur. J. Med. Res. 2022;27(1):1–5.

36. Kreiner DS, Hwang SW, Easa JE, Resnick DK, Baisden JL, Bess S, et al. An evidence-based clinical guideline for the diagnosis and treatment of lumbar disc herniation with radiculopathy. Spine. J. 2014;14(1):180–191.

37. Boos N, Aebi M. Spinal disorders: fundamentals of diagnosis and treatment. Springer. 2008;11:65.

38. Vroomen P, De Krom M, Knottnerus JA. Diagnostic value of history and physical examination in patients suspected of sciatica due to disc herniation: a systematic review. J. Neurol. 1999;246(10):899–906.

39. Borenstein DG, Wiesel SW, Boden SD. Low back pain: medical diagnosis and comprehensive management. Saunders company. 1989;71(8):1278.
40. Hagen KB, Jamtvedt G, Hilde G, Winnem MF. The updated cochrane review of bed rest for low back pain and sciatica. Spine. Phila. Pa. 2005;30(5):542–546.
41. Weber H. Lumbar disc herniation: a controlled, prospective study with 10 years of observation.2nd. ed. Taylor: London; 2019.
42. Van Tulder MW, Scholten RJPM, Koes BW, Deyo RA. Nonsteroidal anti-inflammatory drugs for low back pain: a systematic review within the framework of the Cochrane Collaboration Back Review Group. Spine. Phila. Pa. 2000;25(19):2501–2513.
43. Rozenberg S, Allaert F-A, Savarieau B, Perahia M, Valat J-P. Compliance among general practitioners in France with recommendations not to prescribe bed rest for acute low back pain. Jt. Bone. Spine. 2004;71(1):56–59.
44. Deyo RA. Drug therapy for back pain. Spine. Phila. Pa. 1996;21(24):2840–2849.
45. Saal JA. Natural history and nonoperative treatment of lumbar disc herniation. Spine. Phila. Pa. 1996;21(24):2-9.
46. Nijs J, Apeldoorn A, Hallegraeff H, Clark J, Smeets R, Malfliet A, et al. Low back pain: guidelines for the clinical classification of predominant neuropathic, nociceptive, or central sensitization pain. Pain. Physician. 2015;18(3):333–345.
47. Chou R, Qaseem A, Snow V, Casey D, Cross Jr JT, Shekelle P, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Ann. Med. 2007;147(7):478–491.
48. Almeida N, Paladini LH, Korelo RG, Liebano RE, de Macedo ACB. Immediate effects of the combination of interferential therapy parameters on chronic low back pain: a randomized controlled trial. Pain. Pract. 2020;20(6):615–625.
49. Meydan OD, Tutar İ, Yildirim A, Konuralp N, Arsalan BN, et al. Ramsay-Hunt sendromlu bir olgu sunumu: Elektrostimülasyonla tedavi edilen periferik fasial paralizi. Türkiye. Fiz. Tıp ve Rehabil Derg. 2005;51(3):111–113.
50. Peplow PV, Chung TY, Baxter GD. Application of low level laser technologies for pain relief and wound healing: overview of scientific bases. Phys. Ther. Rev. 2011;50(3):123–135.
51. Lehmann JF, Lateur BJ. Ultrasound, shortwave, microwave, laser, superficial heat and cold in the treatment of pain. In: Handbook of Pain Management: A Clinical Companion to

Textbook of Pain. Elsevier Inc. 2003; 42(2):473–483.

52. Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. Noninvasive treatments for low back pain.[Internet]. 2016 [Access Date 18 Mar 2016]. Access Address: https://europepmc.org/article/nbk/nbk350276/

53. Khadilkar A, Odebiyi DO, Brosseau L, Wells GA. Transcutaneous electrical nerve stimulation (TENS) versus placebo for chronic low-back pain. Cochrane Database Syst. Rev. 2008;12(4):32-44.

54. Karacan İ., Koyuncu H, Fiziksel Tıp ve Rehabilitasyonda Elektroterapi. 3. baskı.İstanbul: Güneş Kitabevi; 2003.

55. Bjordal JM, Lopes-Martins RA, Joensen J, Iversen VV. The anti-inflammatory mechanism of low level laser therapy and its relevance for clinical use in physiotherapy. Physical Therapy Reviews. 2010;15(4):286-293.

56. Taylor N. LASER: The inventor, the Nobel laureate, and the thirty-year patent war. 4th ed. USA: Simon and Schuster; 2002.

57. Sarı H, Tüzün Ş, Akgün K. Hareket sistemi hastalıklarında fiziksel tıp yöntemleri. 2. Baskı İstanbul: Nobel Tıp Kitabevleri; 2002.

58. Hecht J. A short history of laser development.2010; 49(25):99-122.

59. Strömbeck P, Kar A. Self-focusing and beam attenuation in laser materials processing. J. Phys. D. Appl. Phys. 1998;31(12):1438.

60. Karabulut M. Subakromial Sıkışma Sendromu Konservatif Tedavisinde Lazerin Etkinliğinin Araştırılması. 3. Baskı. İstanbul: T.C. Sağlık Bakanl; 2006.

61. Tuner J, Hode L. Some basic laser physics, Therapeutic lasers. new laser Ther. Handb. 2010;22(4):1–47.

62. Štiglić-Rogoznica N, Stamenković D, Frlan-Vrgoč L, Avancini-Dobrović V, Schnurrer-Luke Vrbanić T. Analgesic effect of high intensity laser therapy in knee osteoarthritis. Coll Antropol. 2011;35(2):183–185.

63. Ninomiya T, Miyamoto Y, Ito T, Yamashita A, Wakita M, Nishisaka T. High-intensity pulsed laser irradiation accelerates bone formation in metaphyseal trabecular bone in rat femur. J. Bone Miner Metab. 2003;21(2):67–73.

64. Alayat MSM, Atya AM, Ali MME, Shosha TM. Long-term effect of high-intensity laser therapy in the treatment of patients with chronic low back pain: A randomized blinded

placebo-controlled trial. Lasers Med. Sci. 2014;29(3):1065–1073.
65. Dökmeci D, Özdemir F, Ulugöl A, Karadağ ÇH, Kokino S, Dökmeci İ. Kronik Adjuvant artritli sıçanlarda diklofenak ve bioptron'un antiinflamatuvar etkilerinin karşılaştırılması. Turk. J. Phys. Med. Rehab. 1998;2:67–70.
66. Kelle B, Kozanoglu E. Low-level laser and local corticosteroid injection in the treatment of subacromial impingement syndrome: a controlled clinical trial. Clin. Rehabil. 2014;28(8):762–771.
67. Henchoz Y, de Goumoëns P, Norberg M, Paillex R, So AKL. Role of physical exercise in low back pain rehabilitation: a randomized controlled trial of a three-month exercise program in patients who have completed multidisciplinary rehabilitation. Spine. 2010;35(12):1192-1199.
68. Vialle LR, Vialle EN, Henao JES, Giraldo G. Lumbar disc herniation. Rev. Bras. Ortop. 2010;45(1):17–22.
69. Şar C. Lomber omurganın dejeneratif hastalıkları ve cerrahi tedavisi. Ketenci A, Bel Ağrısı Tanı ve Tedavi. 5. Baskı. İstanbul: Nobel Kitabevi; 2002.
70. Parker SL, Godil SS, Mendenhall SK, Zuckerman SL, Shau DN, McGirt MJ. Two-year comprehensive medical management of degenerative lumbar spine disease (lumbar spondylolisthesis, stenosis, or disc herniation): a value analysis of cost, pain, disability, and quality of life. J. Neurosurg. Spine. 2014;21(2):143–149.
71. Crichton N. Visual analogue scale (VAS). J. Clin. Nurs. 2001;10(5):706.
72. Fairbank JC, Pynsent PB. The Oswestry Disability Index. Spine. 2000; 25(22):2940-2952.
73. Fairbank JC, Couper J, Davies JB, O'Brien J.P. The Oswestry low back pain disability questionnaire. Physiotherapy. 1980;66(8):271–273.
74. Fairbank JCT, Pynsent PB. The Oswestry disability index. Spine. Phila. Pa. 2000;25(22):2940–2953.
75. Algarni AS, Ghorbel S, Jones JG, Guermazi M. Validation of an Arabic version of the Oswestry index in Saudi Arabia. Ann. Phys. Rehabil. Med. 2014;57(10):653–663.
76. Stratford PW, Binkley J, Solomon P, Finch E, Gill C, Moreland J. Defining the minimum level of detectable change for the Roland-Morris questionnaire. Phys .Ther. 1996;76(4):359–365.
77. Maki D, Rajab E, Watson PJ, Critchley DJ. Cross-cultural translation, adaptation, and

psychometric testing of the Roland-Morris disability questionnaire into modern standard Arabic. Spine. Phila. Pa. 2014;39(25):1537–1544.

78. McMorran J, Crowther D. Personalised Medical Reference to General Practice Notebook (GPnotebook)-an evolutionary tale. J. Innov. Heal Informatics. 2002;10(3):173–177.

79. Schober P. Lendenwirbelsäule und kreuzschmerzen. Munch. Med. Wochenschr. 1937;84:336–338.

80. Yen Y-R, Luo J-F, Liu M-L, Lu F-J, Wang S-R. The anthropometric measurement of schober's test in normal taiwanese population. Biomed. Res. Int. 2015;20(15):123-135.

81. Van Dillen LR, Sahrmann SA, Norton BJ, Caldwell CA, Fleming D, McDonnell MK, et al. Effect of active limb movements on symptoms in patients with low back pain. J. Orthop. Sport. Phys. Ther. 2001;31(8):402–418.

82. Abdelbasset WK, Nambi G, Alsubaie SF, Abodonya AM, Saleh AK, Ataalla NN, et al. A randomized comparative study between high-intensity and low-level laser therapy in the treatment of chronic nonspecific low back pain. Evidence-Based Complement. Altern. Med. 2020;20(2):6.

83. Taradaj J, Rajfur K, Shay B, Rajfur J, Ptaszkowski K, Walewicz K, et al. Photobiomodulation using high-or low-level laser irradiations in patients with lumbar disc degenerative changes: disappointing outcomes and remarks. Clin. Interv. Aging. 2018;13:1445.

84. Boyraz I, Yildiz A, Koc B, Sarman H. Comparison of high-intensity laser therapy and ultrasound treatment in the patients with lumbar discopathy. Biomed Res. Int. 2015;20(15):6.

85. Djavid GE, Mehrdad R, Ghasemi M, Hasan-Zadeh H, Sotoodeh-Manesh A, 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 randomised trial. Aust. J. Physiother. 2007;53(3):155–160.

86. Gur A, Karakoc M, Cevik R, Nas K, Sarac AJ, Karakoc M. Efficacy of low power laser therapy and exercise on pain and functions in chronic low back pain. Lasers Surg. Med. 2003;32(3):233–238.

87. Chen L, Liu D, Zou L, Huang J, Chen J, Zou Y, et al. Efficacy of high intensity laser therapy in treatment of patients with lumbar disc protrusion: A randomized controlled trial. J. Back. Musculoskelet. Rehabil. 2018;31(1):191–196.

88. Alayat MSM, Mohamed AA, Helal OF, Khaled OA. Efficacy of high-intensity laser therapy in the treatment of chronic neck pain: a randomized double-blind placebo-control trial. Lasers. Med. Sci. 2016;31(4):687–694.
89. Kheshie AR, Alayat MSM, Ali MME. High-intensity versus low-level laser therapy in the treatment of patients with knee osteoarthritis: a randomized controlled trial. Lasers. Med. Sci. 2014;29(4):1371–1376.
90. Kholoosy L, Elyaspour D, Akhgari MR, Razzaghi Z, Khodamardi Z, Bayat M. Evaluation of the therapeutic effect of low level laser in controlling low back pain: a randomized controlled trial. J. lasers. Med. Sci. 2020;11(2):120.
91. Kolu E, Buyukavci R, Akturk S, Eren F, Ersoy Y. Comparison of high-intensity laser therapy and combination of transcutaneous nerve stimulation and ultrasound treatment in patients with chronic lumbar radiculopathy: A randomized single-blind study. Pakistan. J. Med. Sci. 2018;34(3):530.
92. Ordahan B, Karahan AY, Kaydok E. The effect of high-intensity versus low-level laser therapy in the management of plantar fasciitis: a randomized clinical trial. Lasers. Med. Sci. 2018;33(6):1363–1369.
93. Abdelbasset WK, Nambi G, Elsayed SH, Alrawaili SM, Ataalla NN, Abodonya AM, et al. Short-term clinical efficacy of the pulsed Nd: YAG laser therapy on chronic nonspecific low back pain: A randomized controlled study. Medicine. Baltimore. 2020;99(36):73–77.

APPENDIXES

Appendix 1. Ethics Committee Approval

SAĞLIK BAKANLIĞI

ELDIVANIYAH SAĞLIK İDARESİ

İNSAN VE EĞİTİM GELİŞİM DAİRESİ BAŞKANLIĞI

BİLGİ VE ARAŞTIRMA DAİRESİ BAŞKANLIĞI

ARAŞTIRMA KURUL KARARI

DOSYA NO:10/2021

KARAR NO: 4

KARAR TARİHİ:02.02.2022

ARAŞTIRMA KURUL KARARI

ELDIVANIYAH SAĞLIK İDARESİ DEPARTMANI ARAŞTIRMA KOMİTESİNCE ,ARAŞTIRMACI TARAFINDAN SUNULAN ARAŞTIRMA PROJESİ İNCELENDİ SAYIN(**SHAHAD RAZZAQ JAWAD**) TÜRKİYE DEVLETİNDE BULUNAN AHİ EVRAN ÜNİVERSİTESİ YÜKSEK LİSANS ÖĞRENCİMİZİN SUNULAN DÖNEM TEZİ DOĞAL İLAÇ VE SAĞLIK TIP ALANINDA YAZIŞMA TEZİ.

(Lumbal disk hernisi olan hastalarda yüksek yoğunluklu lazer ile düşük yoğunluklu lazer tedavisinin karşılaştırması).

Comparison of high-intensity laser and low-intensity laser therapy in patients with lumbar Disk Herniation

ARAŞTIRMACI TARAFINDAN EĞİTİM VE İNSAN GELİŞİMİ DEPARTMANI,BİLGİ YÖNETİMİ VE ARAŞTIRMA DEPARTMANINA SUNULMUŞTUR.ELDİVANİYYE SAĞLIK İDARESİ TARİH:02.02.2022.

KURULUN KARARI:

BU ARAŞTIRMA TEZ PROJESİ KURULUMUZ TARAFINDAN KABUL GÖREREK SAĞLIK BAKANLIĞI TARAFINDAN ONAYLANDI.BU TEZİN ARAŞTIRMASINDA VE UYGULAMASINDA BİR ENGEL BULUNMAMAKTADIR.EKLER/DEĞİŞİKLİKLER/ONARIM VE ARAŞTIRMA KOMİSYON NOTLARI/YOKTUR.

ARAŞTIRMA BİLİMSEL KOŞULLARI KARŞILAR VE BİLİMSEL ARAŞTIRMA ETİĞİNE UYGUNDUR.

BİZE GÖRE ARAŞTIRMA YAPMASINDA ENGEL YOKTUR (ELDİVANİYYE HASTANESİ /ARAŞTIRMA FAKÜLTESİ).

ARAŞTIRMA KURUL BAŞKANI

BRANŞ DOKTORU/ Dr.YAHYA FALİH MUHAMMED

İMZA- 02.02.2022

DOKTOR KAŞESİ

İŞ BU FOTOKOPİ BELGE ARAPÇADAN TÜRKÇEYE TARAFIMDAN TERCÜME EDİLMİŞTİR.

Ömer ASLAN
Arapça Yeminli Tercüman
Tel : 0533 [illegible] 72

IRAK CUMHURİYETİ

SAĞLIK VE ÇEVRE BAKANLIĞI

ÇEVRE VE SAĞLIK BAKANLIĞI ARAŞTIRMA PROJESİ İÇİN ONAY FORMU

FORM NO:01/2021

Bu sağlık bakanlığı form belgesi elektronik olarak doldurularak bütün sağlık kurumlarında ve bağlı kuruluşlarında var mıdır yoksa yok mudur?(bu form elle doldurulmayacaktır.)sağlık bakanlığı ve sağlık idaresinde araştırma birimlerinde sağlamak üzere araştırma komitesinin onayını almak. Araştırmacı şayet bu onay alınmadan herhangi bir araştırma veya anket formu yapıldığında formun talimata aykırı olduğu kabul edilir. Bu forma sağlık bakanlığı web sitesinden aşağıdaki linkten indirilebilir.

1-ARAŞTIRMACILARIN KİŞİSEL BİLGİLERİ

1-1:ANA(BAŞ) ARAŞTIRMACI VERİLERİ:

ADI VE SOYADI	AKADEMİK ÜNVAN	İŞ YERİ	TELEFON NO	EMİİL ADRESİ
Shahad razaq alkurdi	FİZYOTERAPİST	Al Diwaniyah Eğitim Hastanesi		

1-2: VARSA BİLİMSEL SÜPERVİZÖRÜN VERİLERİ(LİSANSÜSTÜ ÖĞRENCİLER İÇİN GEREKLİDİR)KATILAN ARAŞTIRMACILARIN VERİLERİ:

ADI VE SOYADI	AKADEMİK ÜNVAN	İŞ YERİ	TELEFON NO	EMİİL ADRESİ
Dr.Anıl ÖZÜDOĞRU	Dr. Öğretim Üyesi	KIRŞEHİR AHİ EVRAN ÜNİVERSİTESİ		

2- ARAŞTIRMASI BİLGİLERİ

2-1:BU ADRESE DAYALI ARAŞTIRMA SAĞLIK BAKANLIĞININ ARAŞTIRMA ÖNCELİKLERİ ARASINDA MI?

EVET ■ **HAYIR** □

2-2:ARAŞTIRMAYI YÜRÜTMENİN AMACI: yüksek lisans

EGER CEVABINIZ FARKLI İSE RİCA EDERİZ FARKLI DÜŞÜNCENİZİ VE İSTEĞİNİZİ YAZINIZ.

3.ARAŞTIRMA BAŞLIĞI VE HEDEFLERİ

3-1:BAŞLIK ARAPÇA VE İNGİLİZCEDİR

ARAPÇA: مقارنة بين الليزر عالي الكثافة وليزر منخفض الكثافة في مرضى الانزلاق الغضروفي القطني

İNGİLİZCE: Comparison of high-intensity laser and low-intensity laser therapy in patients with Lumbar Disc Herniation

3-2:ARAŞTIRMA SORUSU: Lomber disk hernisi olan hastalarda yüksek yoğunluklu lazer tedavisi ile düşük seviye lazer tedavisi arasında fark var mı?

3-3:ARAŞTIRMANIN BİLİMSEL ARKA PLANI:VAN COUVER GÖRE DÜZENLENMİŞ KAYNAKLARLA KISALTILMIŞTIR:

Bel bölgesi kas-iskelet ağrısının en sık görüldüğü bölgedir. Gelişmiş ülkelerde bel ağrısı, diğer ağrı nedenleri arasında baş ağrısından sonra ikinci sırada yer almaktadır. Sanayileşmiş ülkelerde yaşayan insanların yaklaşık %80'i hayatlarının bir noktasında bel ağrısı yaşayacaktır. Bel ağrısı olan kişilerin yaklaşık %10'unda kronik bel ağrısı vardır. Nüfusun yaklaşık %1'i bel ağrısı nedeniyle tamamen devre dışıdır. Bel ağrısı genellikle genç yaşta başlar ve orta yaşlı popülasyonda prevalansı daha yüksektir. (L. Manchikanti, "Epidemiology of low back pain, 2000)

Bel ağrısının önemli bir etiyolojik nedeni olan lomber disk hernisi en sık lomber bölgede (%61,94) görülmektedir. Bel ağrısı olan kişilerin çoğu, intervertebral disklerinde sorun yaşar. Lomber disk hernisi, bel ağrısı ve siyatiğin en yaygın nedenleri arasındadır. Lomber disk herniasyonunun etiyolojisi ve lomber disk herniasyonunun sırt ağrısı ve siyatik ile ilişkisi tam olarak aydınlatılamamıştır, ancak büyük olasılıkla mekanik ve biyolojik süreçlerin bir kompleksini içermektedir. Ayrıca, lomber disk herniasyonunun doğal seyri genellikle yeterli görünmektedir ve lomber disk herniasyonu için optimal tedavi literatürde tartışılmaktadır. Bel ağrısı, Amerika Birleşik Devletleri'nde doktor ziyaretlerinin ikinci en yaygın nedenidir

(Frymoyer JW. Back pain and sciatica. N Engl J Med. 1988;318: 291-300)

Bel ağrısının yaygın nedenlerinden biri spinal kanalda fıtıklaşmış bir disktir.

(Damkot DK, Pope MH, Lord J, Frymoyer JW. The relationship between work history, work environment and low-back pain in men. Spine.1984)

3-4: İLMİ BAŞLIK SEÇMENİN VE SINIRLAMANIN ÖNEMİNİN BELİRLENMESİ: Lomber disk hernisi bel ağrısının en yaygın nedenlerinden biri olmasına rağmen, lazer cihazlarının kullanımı ile ilgili dünya çapında az sayıda çalışma bulunmaktadır.

3-5:ARAŞTIRMA AMAÇLARI VE HEDEFLERİ: Bu çalışmanın amacı, yüksek yoğunluklu lazer tedavisinin ve düşük seviyeli lazer tedavisinin etkinliğini incelemekti. Lomber disk hernisi hastaları için en iyi lazer tedavisi yöntemini göstermek için

4-1:ARAŞTIRMA İŞLEMLERİ NE ZAMAN TAMAMLANACAK

BAŞLANGIÇ: 1 Mart 2022 **BİTİŞ:** 1 Temmuz 2022

4-ARAŞTIRMADA SINIRLAMA

4-2:ARAŞTIRMA İŞLEMLERİ NEREDE TAMAMLANACAK: Araştırma işlemlerinin bitmesi için belirli bir sınırlama müddeti yoktur ancak yukarıdaki sınırlama zamanına göre araştırma işlemleri durumuna göre uzatmada sınırlama sorunu yoktur çünkü işlemin tamamlanması önemlidir.(Anket kuruluna işlemler ve icraatlar sunulmadan önce yetkili idareden onay alması gerekir.)

DAİRENİN ADI/SAĞLIK KURULUŞUNUN ADI	YETKİLİ İSİM	İMZA-MÜHÜR
Al Diwaniyah Eğitim Hastanesi		

4-3:ARAŞTIRMANIN SAĞLIK KURUMUNDAN NEYE İHTİYACI VARDIR:

İSTENİLEN GEREKLİ NUMUNELER		MUAYENE DETAYLARI MİKTARI VE ÇEŞİTLERİ
LABORATUVAR ÖRNEKLERİ(KAN,İDRAR,... VE DİGER TAHLİLLER)	☐	
LABORATUVAR CİHAZLARI/ ALET VE EDEVATLARI.....VE DİGERLERİ)	☐	
HASTA KAYITLARINDAN ALINAN VERİLER VE ÖRNEKLER	☐	
HASTALAR/ SAGLIK İÇİN MURACAATLAR /MEMURLAR	■	Bel ağrısı olan hastalar (bel fıtığı)
DİGER HATIRLATMALAR	☐	

4-4:ARAŞTIRMA FİNANSMANI: Kişiye özel
Şayet başka bir istek varsa finansman üzerine rica ederiz bunu yazıyla bildiriniz:

5.ARAŞTIRMA METODOLOJİSİ

5-1:EGİTİM BİÇİMİ: Eğer başka bir cevap varsa buraya yazınız: Randomize Kontrollü Çalışma

5-2:ARAŞTIRMALARA GÖRE DAHİLİ VAKALARIN TANIMI:

1. lomber vertebra bilgisayarlı tomografi veya manyetik rezonans görüntüleme incelemesi sonucunda lomber disk hernisi tanısı alan hastalar.

2. Tipik lumbosakral sinir kökü radyasyon ağrısı ile birlikte bel ağrısı veya alt ekstremite ağrısı çeken hastalar .

3. 18-60 yaş arası hastalar .

4. Çalışmadan bir ay önce sistematik rehabilitasyona girmeyen hastalar.

5. Bilgilendirilmiş onam formlarını imzalayan ve testlere katılmaya gönüllü olan hastalar.

5-3:HARİÇ TUTULAN HALLERİ BELİRLEMEK:

1. Kombine lomber spondilolistez, kemikli spinal kanal stenozu, lomber vertebra kırığı veya spinal yapı displazisi (spondilolizis) olan has

2. Omurilik tüberkülozu ve tümörü olan hastalar.

3. Lomber spinal füzyon yapılan veya ameliyat endikasyonu olan hastalar.

4. Ciddi kalp, karaciğer ve böbrek hastalıkları ve tümörleri olan hastalar.

5. hamile hastalar.

6. Ciddi osteoporozu olan hastalar.

7. Tedavi alanlarında veya yakınında dövme veya melanositik nevus şikayeti olan hastalar.

8. Lupus veya diğer otoimmün hastalıkları, tromboflebit veya anemisi ve cilt aşırı duyarlılığı olan hastalar.

9. Tedaviyi gerektiği gibi almayan hastalar.

5-4:ÖRNEK SEÇİM YÖNTEMİ: Örnekleme yöntemi olasılıklı olmayan örneklemedir.

5-5:RASTGELE SEÇİM YOLU İSE RASTGELELEŞTİRMEDE KULLANILMIŞ YOLDUR: Bu katılımcıları müdahale gruplarına ayırmak için uygun bir basit örnekleme tekniği kullanılacaktır.

5-6:MEKANİZMA SEÇİMİNDE KONTROL GURUPLARI UNSURLARI ,ELEMENTLERİ: Bir grup hasta kullanılacak ve plasebo verilecek ve kontrol grubu olarak kabul edilecekler.

5-7:TEMEL DEĞİŞKENLERİ VE BUNLARIN NASIL ÖLÇÜLECEĞİNİ TANIMLAMAK: Hasta tedaviye başlamadan önce değerlendirilir ve tamamlandıktan sonra Görsel Analog Skalası (VAS), Oswestry Engellilik İndeksi, Roland Morris Engellilik Anketi, lomber hareket açıklığı gonyometresi, Schober testi ve Beck'i kullanır. Depresyon Ölçeği. Bu çalışmada kullanılan ölçme araçları geçerli ve güvenilirdir.

5-8:ARAŞTIRMA İCRAAT ADIMLARI: Bu çalışma lomber disk hernisi olan 60 hastayı içerecek ve örnekler her biri 20 hastadan oluşan üç gruba ayrılacaktır. Daha sonra yukarıda belirtilen standartlarda olguların tedavisine başlanmadan önce bir değerlendirme yapılır.Birinci grup yüksek yoğunluklu lazer cihazı ile egzersizler ile üç hafta boyunca dokuz seans, ikinci grup da düşük yoğunluklu lazer ile tedavi görecektir. aynı süre ve sayıda seans için egzersizleri olan cihaz Son grup, grup kontrolü olduğu ve vakaların nihai değerlendirmesinin belirtilen aynı önlemlerle gerçekleştirildiği bir plasebo tedavisi alacaktır.

5-9:ÖRNEK BOYUTUNUN İSTATİSTİKSEL ANALİZİ: 60 hasta, tedavi grubunda kırk hasta ve kontrol grubunda yirmi hasta Söz konusu standartlar ile ölçülen değişkenlere göre SPSS programında istatistiksel analiz yapılır.

6.ETİK DÜŞÜNCELER : Çalışmada yapılacak müdahaleler hastaya zarar vermeyecek olup, etik kurul onayı ve hastanın onayı alındıktan sonra gerçekleştirilecektir.

7.EKLİ DOSYALAR(UYGUN OLANI SEÇİN) : Araştırmada yatan hastalar için tedavi yönteminin açıklanması ve olası yan etkileri.

KATILIM İÇİN ONAY FORMU ☑ **TOPLULUK FORMU ÖRNEK VEYA ANKET TEYİD** ☑

ÜNİVERSİTE ÖGRENCİ ÇALIŞMALARI ☐

KİŞİSEL BELGE ☐ **DİGER HATIRLATMALAR** ☐

8.TAAHHÜT ETMEK

BİZ ARAŞTIRMACI OLARAK/AŞAGIDA Kİ İMZASI BULUNAN ARAŞTIRMACILAR DOĞRU ARAŞTIRMA YAPACAKLARINA SÖZ VERİYORLAR:

1-Araştırmacı projesini uygulamada bu sürümde belirtildiği bu versiyonda, düzetmelerden, değişiklerden sonra oynama olmaması gerekir, ancak sağlık departmanındaki araştırma komitesinden yazılı izin alarak bu projeyi doğrular.

2-ön onay alındıktan sonr ,bir arama yaparak araştırmacı bütün olanaklardan yararlanır ve tüm kolaylık sunulur ,buna istinaden bu formda belirtilenlere imzanın ve mührün gerçekliği tasdik edilir ve paragrafta yer alır.

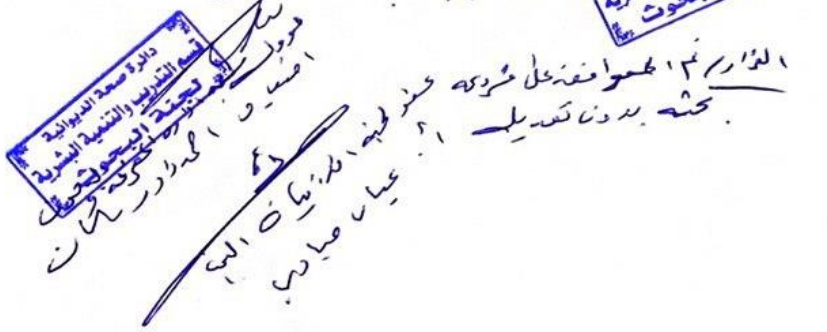
3-muhakkakki biz bütün sistemlere, emirlere ve uygulamalara uyarak, ayını zamanda araştırmacının yürütmekte olduğu sağlık kuruluşunun idaresi tarafından verilir.

4-saglık kuruluşunun tüm mülklerini biz koruruz ,binalarını,cihazlarını,aletlerini,tüm ekipmanlarını malzemelerini,belgelerini maddi ve manevi olarak zararlı kullanmaya dikkat ederiz koruruz.kurum içerisinde günlük çalışmalarda veya içinde bulundugumuz süre boyunca araştırmalara faydalı olmak başarısıza sebeb olmamak gerekir.

5-yalnızca arama prosedürlerini onaylamamıza izin verenleri elde ederek öncelikle sağlık kuruluşlarının ve araştırmanın yapıldıgı il sağlık kuruluşunun onayına dayanmaktadır.

6-muhakkakki biz saglık bakanlıgı tarafından güvenilir etik araştırma oldugunu

Araştırmacının adı ve imzası : shahad razaq alkurdi



Appendix 2. Patient Assessment Form

الاسم	
اللقب	
الجنس	
العمر	
الوزن	
الطول	
الحالة الاجتماعية	
الوظيفة	
الهاتف	
نوع العلاج	
عدد الجلسات	

Appendix 3. Visual Analogue Scale

استمارة تقييم المرضى

Pain severity assessment form **نموذج تقييم شدة الالم**

i. ضع علامة "X" على المقياس الذي يصف بشكل افضل شدة الالم اثناء فترة الراحة.

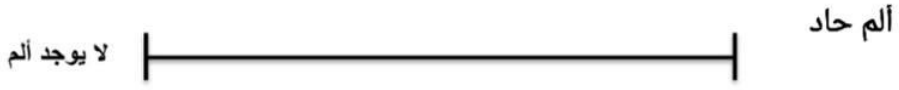
Place an "X" on the scale that best describes the intensity of the pain during rest.

Score: ----------

Treatment session:

ii. ضع علامة "X" على المقياس الذي يصف بشكل افضل شدة الالم اثناء فترة اداء الفعاليات الفيزيائية.

Place an "X" on the scale that best describes the intensity of the pain during physical activities.



Score: ----------

Treatment session:

Appendix 4. Oswestry Disability Index

الفقرة 1: شدة الآلام:

- ☐ 0- ليس لدي الآلام في أسفل ظهري حاليا .
- ☐ 1- أشعر حاليا بالآلام خفيفة في أسفل ظهري .
- ☐ 2- أشعر حاليا بالآلام متوسطة في أسفل ظهري .
- ☐ 3- أشعر حاليا بالآلام شديدة الى حد ما في أسفل ظهري.
- ☐ 4- أشعر حاليا بالآلام شديدة جدا في أسفل ظهري.
- ☐ 5- أشعر حاليا بالآلام في اسفل ظهري أكثر مما يمكن تصورها .

الفقرة 2: العناية الشخصية - كالإغتسال ولبس الثياب:

- ☐0- يمكنني أن أعتني بنفسي واهتم بأموري الخاصة بشكل طبيعي دون أن يزيد ذلك في آلآلام أسفل ظهري.
- ☐1- يمكنني أن أعتني بنفسي واهتم بأموري الخاصة ولكن ذلك يزيد في الآلام اسفل ظهري.
- ☐2- يمكنني أن أعتني بنفسي واهتم بأموري الخاصة ولكن يأخذ ذلك مني وقتا أطول من المعتاد.
- ☐3- أحتاج إلى بعض المساعدة ولكن يمكنني القيام بمعظم أموري الخاصة بنفسي .
- ☐4- أحتاج إلى المساعدة بشكل يومي للقيام بأموري الخاصة .
- ☐5- أبقي في سريري وأغسل بصعوبة ولا أستطيع أن ألبس ثيابي .

الفقرة 3: رفع الأشياء ونقلها:

- ☐ 0- أستطيع أن أرفع الأشياء الثقيلة من غير أن يزيد ذلك في الآلام أسفل ظهري.
- ☐ 1- أستطيع أن أرفع الأشياء الثقيلة ولكن ذلك يزيد في الآلام أسفل ظهري.
- ☐ 2- آلآلام أسفل ظهري تمنعني من رفع الأشياء الثقيلة إذا كانت على الأرض, لكن يمكنني رفعها إذا كانت في مكان مرتفع-عال كالطاولة مثلا.
- ☐ 3- آلآلام أسفل ظهري تمنعني من رفع الأشياء الثقيلة, لكن بإمكاني رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في مكان مرتفع – عال.
- ☐ 4- أستطيع رفع الأشياء خفيفة الوزن فقط.
- ☐ 5- لا أستطيع رفع أو حمل أي شيء على الإطلاق.

الفقرة 4: المشي:

- ☐ 0- لاتمنعني آلآلام أسفل ظهري من المشي لأي مسافة (كالمشي بجوار المنزل).
- ☐ 1- الآلام أسفل ظهري تمنعني من المشي أكثر من ألف وخمسمئة متر (كيلو ونصف) .
- ☐ 2- آلآلام أسفل ظهري تمنعني من المشي أكثر من ألف متر (كيلومتر واحد).
- ☐ 3- آلآلام أسفل ظهري تمنعني من المشي أكثر من أربعمئة متر.
- ☐ 4- لا أستطيع المشي دون الاستعانة بعصا أو عكاز.
- ☐ 5- أبقى في الفراش معظم الوقت وازحف للوصول الى المرحاض (دورة المياه).

الفقرة 5: الجلوس :

- ☐ 0- يمكنني الجلوس على أي كرسي المدة التي أريدها.
- ☐ 1- يمكنني الجلوس فقط على كرسي مريح المدة التي أريدها.
- ☐ 2- الآلام أسفل ظهري تمنعني من البقاء جالسا على أي كرسي أكثر من ساعة .
- ☐ 3- آلآلام أسفل ظهري تمنعني من البقاء جالسا على أي كرسي أكثر من نصف ساعة.
- ☐ 4- آلآلام أسفل ظهري تمنعني من الجلوس لأكثر من عشر دقائق .
- ☐ 5- آلآلام أسفل ظهري تمنعني من الجلوس مطلقا.

الفقرة 6:الوقوف:

☐ 0- أستطيع البقاء واقفا المدة التي أريد ها دون أن يزيد ذلك في الآلام أسفل ظهري.
☐ 1- أستطيع البقاء واقفا المدة التي أريدها ولكن ذلك يزيد في الآلام أسفل ظهري.
☐ 2- آلآلام أسفل ظهري تمنعني من الوقوف لأكثر من ساعة
☐ 3- آلآلام أسفل ظهري تمنعني من الوقوف لأكثر من نصف ساعة.
☐ 4- آلآلام أسفل ظهري تمنعني من الوقوف لأكثر من عشر دقائق.
☐ 5- آلآلام أسفل ظهري تمنعني من الوقوف مطلقا.

الفقرة 7:النوم :

☐ 0- نومي لايضطرب أبدا بسبب الآلام أسفل ظهري.
☐ 1- يضطرب نومي احيانا بسب الآلام أسفل ظهري .
☐ 2- أنام أقل من 6 ساعات يوميا بسبب الآلام أسفل ظهري.
☐ 3- أنام أقل من 4 ساعات يوميا بسبب الآلام أسفل ظهري .
☐ 4- أنام أقل من ساعتين يوميا بسبب الآلام أسفل ظهري.
☐ 5- لا أستطيع النوم مطلقا بسبب الآلام أسفل ظهري.

الفقرة 8:الحياة الجنسية (هذه الفقرة للمتزوجين أو من سبق لهم الزواج ومارسوا الحياة الجنسية , إذا لم ينطبق عليك هذا الشرط الرجاء الانتقال للفقرة رقم 9):

☐ 0- حياتي الجنسية عادية ولا تسبب زيادة في الآلام أسفل ظهري.
☐ 1- حياتي الجنسية عادية ولكنها تسبب زيادة في بعض الآلام أسفل ظهري .
☐ 2- حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي الآلاما شديدة في أسفل ظهري.
☐ 3- حياتي الجنسية نادرة جدا بسبب الآلام أسفل ظهري.
☐ 4- حياتي الجنسية تقريبا مقطوعة بسبب الآلام أسفل ظهري.
☐ 5- آلآلام أسفل ظهري تمنعني من الحياة الجنسية مطلقا.
☐ 6- لم يسبق لي الزواج ولم أمارس الحياة الجنسية .

الفقرة 9: الحياة الاجتماعية(زيارة واستقبال الأقارب والأصحاب،الخروج مع الاصدقاء,المشاركة في الاحتفالات أو الأنشطة الاجتماعية...):

☐ 0- حياتي الاجتماعية عادية ولا تزيد في الآلام أسفل ظهري.
☐ 1- حياتي الاجتماعية عادية ولكنها تزيد من حدة الآلام في أسفل ظهري.
☐ 2- الآلام أسفل ظهري لا تؤثر على حياتي الاجتماعية ولكنها تقلل من أعمالي التي تتطلب مجهودا كبيرا.
☐ 3- تاثرت حياتي الاجتماعية وتقلصت علاقاتي مع الأخرين بسبب الآلام أسفل ظهري.
☐ 4- بسبب الآلام أسفل ظهري أصبحت حياتي الاجتماعية منحصرة في المنزل .
☐ 5- حياتي الاجتماعية انقطعت بسبب الآلام أسفل ظهري.

الفقرة 10:السفر:

☐ 0- استطيع السفر إلى أي مكان من غير أن يزيد ذلك في الآلام أسفل ظهري.
☐ 1- استطيع السفر إلى أي مكان ولكنه يزيد في الآلام أسفل ظهري.
☐ 2- الآلام أسفل ظهري شديدة ولكني استطيع تحمل السفر في حدود الساعتين.
☐ 3- آلآلام أسفل ظهري تقيد رحلاتي (سفري) لأقل من ساعة.
☐ 4- آلآلام أسفل ظهري تقيد رحلاتي القصيرة الضرورية (سفري القصير) لأقل من نصف ساعة.
☐ 5- الآلام أسفل ظهري تمنعني من السفر لأي مكان إلا لتلقي العلاج
☐ 6- لم أسافر يوما ما (لم أفعل ذلك)

Appendix 5. Roland-Morris Questionnaire

إستبيان (رولاند موريس) لألم أسفل الظهر والعجز

اسم المريض : _____ العمر : _____ الجنس :

يرجى قراءة التعليمات: عندما يؤلمك ظهرك ، قد تجد صعوبة في القيام ببعض الأشياء التي تقوم بها عادة. ضع علامة فقط على الجمل التي تصفك .

- ☐ أبقى في المنزل معظم الوقت بسبب ظهري .
- ☐ أقوم بتغيير وضعي بشكل متكرر لمحاولة إراحة ظهري .
- ☐ أمشي ببطء أكثر من المعتاد بسبب ظهري .
- ☐ بسبب الألم في ظهري ، لا أقوم بأي عمل أقوم به عادة في المنزل .
- ☐ بسبب الألم في ظهري ، أستخدم الدرابزين للصعود إلى الطابق العلوي .
- ☐ بسبب الألم في ظهري ، أستلقي لأستريح كثيرًا .
- ☐ بسبب الألم في ظهري ، لا بد لي من التمسك بشيء لأخرج من كرسي منخفض .
- ☐ بسبب الألم في ظهري ، احاول الاستعانه بالأخرين كي يقومو بالأمور بدلا عني .
- ☐ أرتدي ملابسي بشكل أبطأ من المعتاد بسبب الألم في ظهري .
- ☐ أقف لفترات قصيرة فقط بسبب الألم في ظهري .
- ☐ بسبب الألم في ظهري ، أحاول عدم الانحناء أو الركوع .
- ☐ أجد صعوبة في النهوض من الكرسي بسبب الألم في ظهري .
- ☐ ظهري يؤلمني طوال الوقت تقريبًا .
- ☐ أجد صعوبة في التقليب في السرير بسبب الألم في ظهري .
- ☐ شهيتي للطعام ليست جيدة جدا بسبب الألم في ظهري .
- ☐ أجد صعوبة في ارتداء جوربي (أو جواربي) بسبب الألم في ظهري .
- ☐ لا يمكنني المشي إلا لمسافات قصيرة بسبب آلام ظهري .
- ☐ أنام بشكل أقل من المعتاد بسبب الألم في ظهري .
- ☐ بسبب آلام ظهري ، أرتدي ملابسي بمساعدة شخص آخر .
- ☐ أجلس معظم اليوم بسبب الألم في ظهري .
- ☐ أتجنب الأعمال الشاقة حول المنزل بسبب الألم في ظهري .
- ☐ بسبب آلام الظهر ، أصبحت أكثر عصبية ومعكر المزاج مع الناس أكثر من المعتاد .
- ☐ بسبب ظهري ، أصعد إلى الطابق العلوي بشكل أبطأ من المعتاد .
- ☐ أبقى في السرير معظم الوقت بسبب الألم في ظهري .

Appendix 6. Personal Exercises

تكرار هذه التمارين مرتين يوميا طيلة فترة العلاج

ابدأ على الأرض ، على يديك وركبتيك ارفع إحدى رجليك عن الأرض وثبتها خلفك مباشرة. استمر لمدة 10 - 15 ثوانٍ تقريبًا ، ثم أنزل رجلك وانتقل إلى الرجل الأخرى كرر 10 مرات في كل رجل.

استلق على ظهرك مع ثني ركبتيك. ادفع كعبيك على الأرض وارفع وركيك بعيدًا عن الأرض حتى يصبح الكتفين والوركين والركبتين في خط مستقيم استمر لمدة 6 ثوانٍ مع استمرار التنفس بشكل طبيعي ، ثم أنزل الوركين ببطء إلى الأرض واسترح لمدة تصل إلى 10 ثوانٍ. كرر 10 مرات ولا تستمر في هذا التمرين اذا سبب لك الم.

استلق على ظهرك مع ثني ركبتيك وقدميك مفرودتين على الأرض اجلب ركبة واحدة على صدرك ثم الأخرى اقبض لمدة 15 إلى 30 ثانية بعدها استرخي وأنزل ساقيك واحدة تلو الأخرى على الأرض استرح قليلا وكرر 5 مرات.

استلق على ظهرك مع ثني ركبتيك وقدميك مفرودتين على الأرض اجلب ركبة واحدة إلى صدرك ، مع إبقاء القدم الأخرى مسطحة على الأرض اضغط ظهرك على الارض اقبض لمدة 15 إلى 30 ثانية على الأقل استرخ واخفض الركبة إلى وضع البداية. كرر مع الرجل الأخرى كرر 5 مرات مع كل رجل.

استلق على ظهرك على الأرض مع ثني ركبتيك و ذراعيك الى جانبيك شد عضلات البطن و اضغط بضهرك على الارض . الورك والحوض يتأرجحون اقبض لمدة 5 – 10 ثانيه وتنفس بسلاسة وكرر 10 مرات.

استلق على بطنك ، وادعم جسمك بذراعيك اضغط على مرفقيك لأسفل على الأرض لرفع أعلى ظهرك أرخي عضلات بطنك واترك ظهرك ينقوس اقبض لمدة 5 – 10 ثانية وكرر 5 مرات.

RESUME

Personal Information	
Name and surname	Shahad Razzaq AL-KURDI
Place of birth	Iraq, Diwaniyah
Nationality	Iraqi

Education Information	
License	
University	Baghdad
Faculty	Medical Technology College
Department	Physical therapy and rehabilitation
Graduation Year	
Articles and Papers	
International Conferences and Symposia: 1- AHI EVRAN 2nd International Conference on Scientific Research hold on (Kırsehir, September October 21- 23, 2022)	