

# Current approach to low back pain

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## ABSTRACT

Low back pain is defined as pain in the area between the 12<sup>th</sup> rib and the inferior gluteal fold. Low back pain lasting 6 weeks is called acute, low back pain lasting 6-12 weeks is called subacute, and low back pain lasting more than 12 weeks is called chronic low back pain. Sedentary lifestyle, obesity, lack of fitness, smoking, working with vibrating tools, carrying heavy loads, sudden movements, depression, anxiety, pregnancy, traveling for a long time, low socioeconomic status, advanced age, anatomical disorders are risk factors for low back pain.

**Keywords:** Low back pain, mechanic pain, inflammatory pain

## INTRODUCTION

Low back pain is defined as pain in the area between the 12<sup>th</sup> rib and the inferior gluteal fold. It may occur with or without leg pain. In developed countries, its prevalence ranks 2<sup>nd</sup> after headaches.<sup>1</sup> Low back pain lasting 6 weeks is called acute, low back pain lasting 6-12 weeks is called subacute, and low back pain lasting more than 12 weeks is called chronic low back pain.<sup>2</sup> The lifetime prevalence of low back pain has been found to be 59-80% in developed countries and 44- 79% in Türkiye.<sup>3-5</sup>

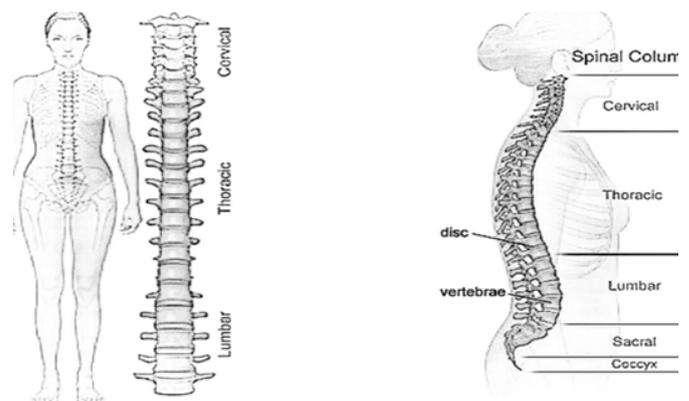
## RISK FACTORS

Sedentary lifestyle, obesity, lack of fitness, smoking, working with vibrating tools, carrying heavy loads, sudden movements, depression, anxiety, pregnancy, traveling for a long time, low socioeconomic status, advanced age, anatomical disorders are risk factors for low back pain.

## FUNCTIONAL ANATOMY

The spine consists of 33 vertebrae in total. There are 7 cervical, 12 thoracic, 5 lumbar, 5 sacral and 4 coccygeal vertebrae in the human body. Consisting of 5 active vertebrae, the lumbar vertebrae account for 25% of the entire length of the spine. The lumbar spine is in close relationship with the sacrum. For this reason, both of these vertebrae are together referred to as the lumbosacral spine. The lumbar spine is subjected to greater loads than the cervical and thoracic vertebrae and is therefore larger. Intervertebral discs have shock absorbing properties.

These discs make up 1/4 of the length of the spine in young people. This ratio decreases significantly with advanced age due to fluid loss. A facet joint is the joint between the upper articular process of one vertebra and the lower articular processes of the vertebra above it. Intervertebral foramen is the name given to the holes through which the spinal nerves leave the vertebral canal and exit. There are many muscles for the lumbosacral vertebrae to contract and move in harmony. The muscles of the extensor group are the erector spinae (iliocostalis, longissimus and spinalis) and the multifidus, interspinalis and quadratus lumborum muscles. Flexor group muscles are external and internal obliques, transversus and rectus abdominis, psoas major and iliacus muscles (Figure 1, 2, 3, 4, and 5).<sup>1</sup>



**Figure 1.** Anterior and lateral view of the spine, intervertebral discs and vertebrae

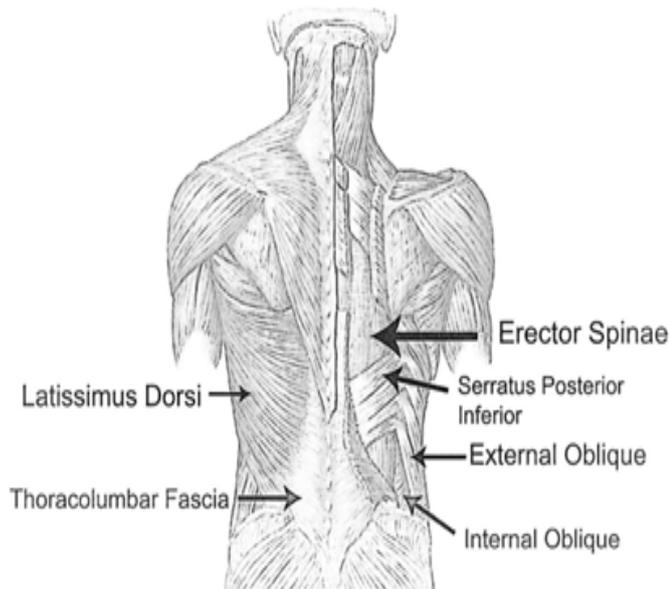


Figure 2. Muscles of the thoracolumbar region, posterior view

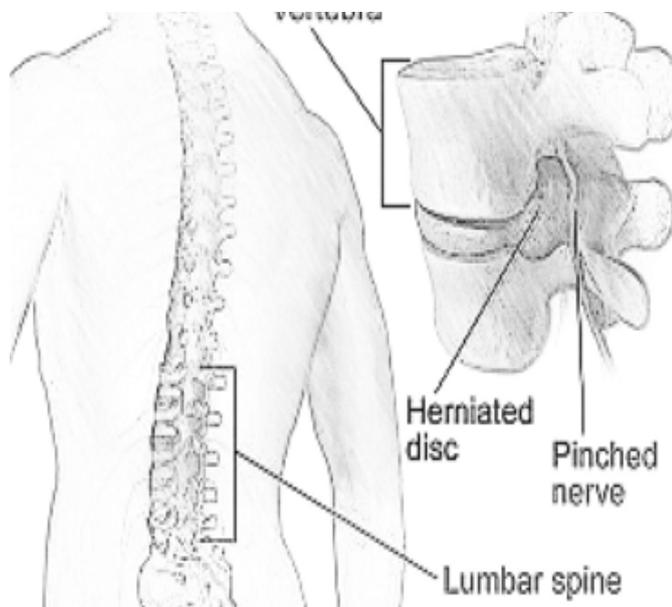


Figure 3. Nerve root compression due to lumbar disc herniation

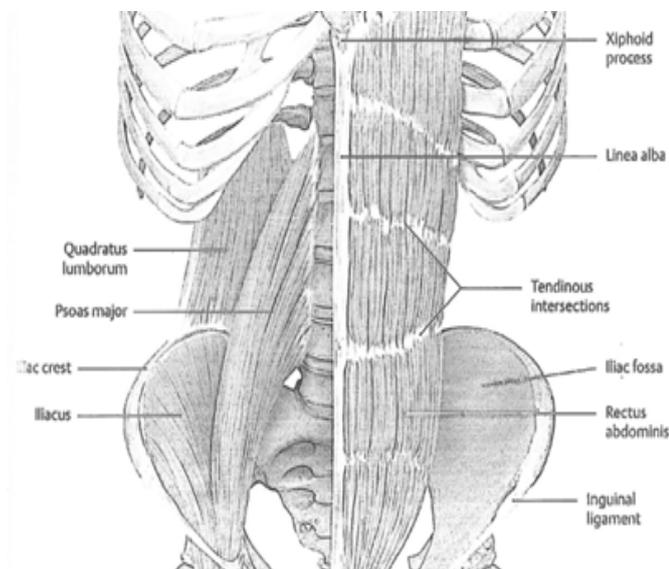


Figure 4. Some flexor and extensor muscle groups in the lumbosacral region

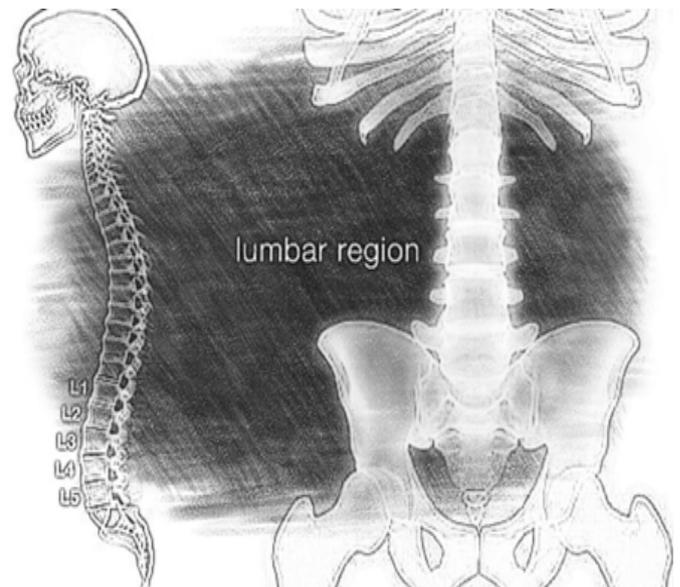


Figure 5. Lumbar vertebrae anatomy, this region constitutes 25% of the entire spine length.

### CLINICAL EVALUATION

The causes of low back pain range from mild trauma and mechanical disorders to infectious and neoplastic diseases.<sup>1</sup> Lumbar spine disorders are mainly classified as mechanical or systemic. Mechanical causes account for 90% of low back pain. Mechanical pain is caused by overuse of normal anatomical structures, trauma or deformities in anatomical structures (discogenic pain, lumbar radiculopathy, spinal stenosis, facet syndrome, sacroiliac joint dysfunction, etc.).<sup>6</sup>

In clinical evaluation; firstly, it is determined whether the pain is specific or non-specific. Then, it is essential to identify red flags in low back pain in clinical diagnosis. If there are no red flags in low back pain, it is highly likely that the pain is non-specific. Over 50 years of age, unexplained fever, sweating, unexplained weight loss, severe trauma, nocturnal pain, saddle anesthesia, urinary and/or fecal incontinence, history or suspicion of cancer, history of osteoporosis, corticosteroid use, iv substance use, immunosuppression, progressive neurological disorders, lack of response to 6 weeks of conservative treatment, morning stiffness are among the red flags in low back pain.<sup>1,7</sup> Psychosocial factors that can influence low back pain are called 'yellow flags'. Yellow flags are psychosocial barriers that carry disability and labor risks. Yellow flags need to be treated to prevent low back pain from becoming chronic.<sup>8</sup>

When taking the patient's history, the patient's age, gender, occupation, when and how the low back pain started, whether it radiates to the thigh and leg, what causes the pain to increase or decrease, whether there is numbness, tingling, felting, whether there is urinary and/or fecal incontinence, night pain, morning stiffness should be questioned. The patient should be asked to show the painful area with his/her hand and draw its borders.<sup>9</sup>

### CHARACTERISTICS OF PAIN

Pain is classified as superficial somatic, deep somatic, radicular, neurologic, reflected visceral and psychogenic pain.<sup>6</sup>

### Superficial Somatic Pain

Originates in the skin, subcutaneous tissue. It is sharp and burning.

### Deep Somatic Pains

Caused by muscle, fascia, periosteum, ligaments, joints, veins and dura. It is sharp, distressing and dull.

### Radicular Pain

Caused by spinal nerves (disc herniation, spinal stenosis). It is radiating, shooting and tingling.

### Neurological Pain

Caused by mixed motor and sensory nerves. It has a burning character.

### Radiating visceral pain

Originating in the abdominal organs, pelvic organs, aorta, etc. It is distressing and colicky.

### Psychogenic pain

It originates in the cerebral cortex and is variable in nature.

The cause of low back pain varies according to the age of the patients. Reiter's syndrome, endometriosis, osteoid osteoma, lymphoma, pyogenic sacroileitis, aneurysmal bone cyst, ankylosing spondylitis start in the 20s. The age of onset of lumbar discopathies, isthmic spondylolisthesis, ochronosis, psoriatic spondylitis is 25-30. The age of onset of Paget's disease, osteoarthritis and metastatic bone cancers is usually 35-40 years. Polymyalgia rheumatica, osteoporosis, spinal stenosis and multiple myeloma are usually over 40. Parkinson's disease should be considered in sudden onset of stiffness and low back pain in the elderly.<sup>10,11</sup>

Duration of pain helps to diagnose low back pain. Mechanical low back pain is usually triggered by physical activity and lasts a short time, whereas specific low back pain starts more slowly and the initiating cause is usually not found. The cause usually becomes apparent after weeks or months.<sup>1</sup>

## PHYSICAL EXAMINATION

### Inspection

Before the examination, the patient's dorsal, lumbar and sacral areas should be completely stripped. The patient's gait, posture, color and shape changes in the lower back should be checked. In acute painful conditions, the lordosis is usually flattened and the paravertebral muscles are prominent. In disc herniations, antalgic scoliosis may be observed with flattening of the lordosis. Lipoma, increased hair growth, milky coffee and birthmarks on the skin often help the physician to identify an underlying neurologic or congenital bony pathology.<sup>1</sup>

### Palpation

The line joining the upper points of the crista iliaca often passes through the L4-L5 interspinous interval. From this point, the spinous processes and interspinous intervals are palpated during the examination. If there is a step between the spinous processes, it suggests spondylolisthesis, and if the spinous process cannot be palpated and a depression is felt

here, it suggests spina bifida. Palpation of peripheral pulses, especially a. dorsalis pedis and a. tibialis posterior, is helpful in differentiating whether leg pain is of vascular or neurogenic origin. Palpation is completed by palpating the gluteal muscles, ischial tuberosity, trochanter major and abdomen. Palpation of the abdomen can reveal causes of low back pain such as aortic aneurysm, renal colic and tumors.<sup>1</sup>

### Range of Motion

The main movements of the lumbar vertebrae are flexion, extension, right left lateral flexion, right left rotation. Physiologic ROMs are flexion 40 degrees, extension 15 degrees, lateral flexions 30 degrees, rotations 40 degrees.<sup>1</sup>

### Neurological Examination

The roots most commonly affected by lumbar spine pathologies are L4, L5 and S1. The cutaneous innervation area of L4 is the medial part of the lower leg. The quadriceps, the knee extensor, is examined for muscle strength. L5 has no specific reflex. Extensor hallucis longus is checked for muscle strength. S1 cutaneous innervation is the lateral aspect of the dorsum of the foot and the sole of the foot. Its reflex is achilles reflex. Muscle strength examination is done by looking at the plantar flexion strength of the thumb and foot. Neurologic examination is completed with superficial and pathologic reflexes, clonus and deep sensory examination.<sup>1</sup>

## SPECIAL TESTS

### Straight Leg Raise Test (SLRT)

This test is performed by grasping the heel and kneecap of the patient lying on the back and flexing the leg at the hip. The test is considered positive if there is pain between 30-70 degrees radiating to the lower back and/or the whole leg. Pain before 30 degrees or after 70 degrees is nonspecific. If there is pain only in the back of the thigh, Bragard's maneuver can be used for confirmation, as there may be stretching of the Hamstring muscles. SLRT test is sensitive but not specific for disc herniation. The SLRT test performed on the non-painful leg is called the contralateral SLRT test. When the non-painful leg is raised, we consider the test positive if movement is stopped on the painful side due to pain and this usually indicates a large central herniation.<sup>12-14</sup>

### Femoral Nerve Stretch Test

With the patient in prone position, the leg is grasped below the knee and brought to extension. If there is pain in the leg, it means that there is L4 root compression.<sup>1</sup>

### Double Leg Raise Test

The test is considered positive if a patient lying on his/her back feels pain in the lower back when raising the legs to 30 degrees without bending the knees, or if the test cannot be performed because of pain. This test indicates posterior element pathologies such as facet syndrome and spondylolisthesis. With the patient standing upright, 10 centimeters is marked from the S1 spinous process upwards. The patient then flexes as far as possible and the measurement is repeated. Normally, there should be a difference of at least 5 centimeters between the two measurements. If there is less than this, the test is positive and is a good indicator of lumbar flexibility.<sup>1</sup>

## VISUALIZATION

In a patient presenting with low back pain, imaging is not indicated in the first 4-6 weeks unless there are neurologic findings, a systemic symptom, history of trauma, malignancy and/or suspicion, signs of infection, osteoporosis and old age.<sup>15,16</sup>

### X-Ray Imaging

If there is no improvement in the patient's condition within the first 4-6 weeks, X-Ray imaging can be used to exclude malignancy, infection, fracture, instability, spondylolisthesis or spondyloarthropathies.<sup>1</sup>

### Computed Tomography (CT)

Early and late degenerative changes in bone structures as well as traumatic changes can be seen.<sup>17</sup>

### Magnetic Resonance Imaging (MRI)

Unlike X-Ray and CT images, it does not contain ionizing radiation. Three-dimensional images can be obtained. Another advantage is that it shows soft tissue pathologies that cannot be obtained with other imaging methods.<sup>18</sup>

### Electrodiagnostic Tests

Although imaging modalities are now predominant in the management of low back pain, electrodiagnostic testing remains important. Electrodiagnosis is most commonly used to detect the presence of radiculopathy and to differentiate it from entrapment neuropathies.<sup>19</sup>

## CAUSES OF LOW BACK PAIN

It is often difficult to determine the cause of pain in patients presenting to outpatient clinics with low back pain. In addition to physical examination, radiological examinations are also used for this purpose. The location and origin of the pain is quite complex. The most common factors that cause low back pain are listed below (Tables 1, 2, and 3).<sup>1,3,6-10</sup>

## TREATMENT OF LUMBAR SPINE DISEASES

### General Information

- Bed rest longer than 2 days is generally not recommended and may leave the patient weak. Patients should be encouraged to ambulate in the acute phase.
- Analgesics or NSAIDs are useful in pain control.
- Low-stress aerobic exercises can be started in the first 2 weeks of symptoms. Back-muscle exercises should be postponed until the end of the 2<sup>nd</sup> week.<sup>6</sup>

### Conservative Approaches

The conservative approach includes patient education, controlled physical activity, bed rest, exercise and drug therapy with NSAIDs and muscle relaxants. The best outcome for patients with low back pain is associated with maintenance of normal activity as opposed to bed rest or extension exercises.<sup>20,21</sup>

Table 1. Mechanical causes of low back pain (97%)

	Congenital Anomalies
	Kyphosis, scoliosis
i.	Transitional Vertebra
	Facet joint asymmetry
	-Spina bifida occulta
ii.	Trauma
iii.	lumbar sprain and strain
	Degenerative diseases of the lower back
	Spinal Stenosis
iv.	Disc herniation
	Combined disc and facet degeneration
	Facet syndrome
	Discogenic pain
v.	Post operative disorders
vi.	Coccydine
vii.	Sacroiliac joint disorders
viii.	Myofascial pain syndromes
ix.	Thoracolumbar junction syndrome
x.	Compression fractures
xi.	Spondylolysis/ Spondylolisthesis

Table 2. Non-mechanical causes of low back pain (1%)

	Neoplasms
i.	Primary vertebral tumor
	Spinal neoplasms
	Multiple myeloma
ii.	Metastasis
	Infections
iii.	Vertebral osteomyelitis and discitis
	Epidural abscess
iv.	Seronegative spondyloarthropathies
v.	Scheuerman's disease
vi.	Metabolic bone diseases

Table 3. Nonspinal/visceral causes of low back pain (2%)<sup>1</sup>

i.	Pathologies originating from the gastrointestinal system (cholecystitis, pancreatitis, pepticulcer, etc.)
ii.	Pathologies originating from pelvic organs (prostatitis, endometriosis, pelvic inflammatory disease etc.)
iii.	Renal pathologies (nephrolithiasis, pyelonephritis, perinephritic abscess, etc.)
iv.	Psychological disorders

### Transcutaneous Electrical Nerve Stimulation (TENS)

TENS therapy is based on the gate-control theory of pain and regulates pain perception in the cerebral cortex by counter-stimulation of the sensory system. TENS primarily stimulates low-threshold A alpha fibers. Stimulation of these fibers is thought to inhibit the nociceptive impulses of small nonmyelinated C fibers and A delta fibers.<sup>6</sup>

## Medical Treatment

These agents include acetaminophen, non-steroidal anti-inflammatory drugs, myorelaxants, opioids, anti-depressants, anti-epileptics and systemic corticosteroids.<sup>22</sup> Surgical options should be considered in the absence of response to conservative treatment, development of cauda equina syndrome and progressive motor deficits.<sup>23</sup>

## CONCLUSION

Regardless of the underlying cause, low back pain is a serious public health problem that is common in societies. History and physical examination are very important in diagnosing low back pain. Low back pain is divided into various classes according to their characteristics. Laboratory findings and radiological imaging options are very helpful to the clinician regarding low back pain. Recently, satisfactory alternatives have been discovered regarding treatment. Exercises and medical treatment are among the first preferred methods for PMR physicians in the treatment of low back pain. Surgical methods are used in cases that do not respond to treatment or in the development of progressive neurological deficits.

## ETHICAL DECLARATIONS

### Referee Evaluation Process

Externally peer-reviewed.

### Conflict of Interest Statement

The authors have no conflicts of interest to declare.

### Financial Disclosure

The authors declared that this study has received no financial support.

### Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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