

# Classification, Diagnosis, and Treatment of Low Back Pain

JMAJ 47(5): 227–233, 2004

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**Abstract:** Approaches to the diagnosis and treatment of various kinds of low back pain are described in this paper. As the center and axis of the human body, the low back has to bear a variety of heavy loads during everyday movements, and low back pain has been found to be the most common of various symptoms complained of by the Japanese public in a survey by the Japanese Ministry of Health and Welfare. Thus, correct diagnosis and treatment of the underlying cause of low back pain is essential to maintaining the quality of life of many Japanese. Low back pain caused by fragility fractures in osteoporosis patients has been found to have the most significant impact on mortality among the various kinds of fractures that occur in the elderly. It is concluded that low back pain, a disease of the axis of human body, has a critical influence not only on quality of life, but on the life of the elderly in an aged society.

**Key words:** Low back pain; Diagnosis; Treatment; Physical findings; Physical therapy

## People Want to Lead Their Lives Free of Back Pain

The lower back bears the greatest burden when humans perform a variety of movements and acts as the central axis of the body during our movements in everyday life. Despite this, since the history of humankind walking on two feet is only about 5 million years, a mere 1/30 of the approximately 150-million-year history of mammalian evolution, the structure of the

lower back has not yet adapted to living in the upright position. To cope with this situation, the uterus containing a heavy fetus during pregnancy is located close to the body's center of gravity and pressed up against the lumbar spine to reduce the load, and slight adjustments have been made for the lower back to fulfill its role as the pivot of the body, such as curving forward and inclining toward the center of the trunk to support the upper part of the body.

We have reduced the load on the lower back

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This article is a revised English version of a paper originally published in the *Journal of the Japan Medical Association* (Vol. 128, No. 12, 2002, pages 1761–1765). The Japanese text is a transcript of a lecture originally aired on September 2, 2002, by the Nihon Shortwave Broadcasting Co., Ltd., in its regular program “Special Course in Medicine”.

Table 1 List of the Most Common Symptoms Complained of by the Japanese Public (per 1,000 population)

Symptom	All ages	Persons 65 years of age and over
One or more of them	305	530
Low back pain	93	201
Stiff shoulders	91	128
Joint pain in the extremities	54	152
Cough/phlegm	51	81
Fatigue	48	55
Poor vision	47	128
Nasal obstruction	45	36
Itchiness	39	62
Headache	37	50
Eyestrain	36	94
Forgetfulness	34	109

The top 11 symptoms complained of in a survey of 780,000 people in 280,000 households living in 5,240 areas throughout Japan reported in June 2000. (Ministry of Health and Welfare, Faculty of Statistics and Information, ed.: Basic survey of the everyday lives of the Japanese public (1998): Tokyo, 2000.)

in our everyday lives by consigning primary industries that entail bending the body forward, such as tilling fields, to electrical power and petroleum energy. However, a report on the incidence of low back pain among employees in the construction industry based on a survey of 18,535 workers at construction sites (mean age: 39 years) and 7,675 office workers (mean age: 39 years) revealed a rate of 30.1% in the construction workers and 31.3% in the clerical workers, and there was little difference in the incidence of low back pain between them.<sup>1)</sup> Despite affecting such a large number of people, the incidence of low back pain rises even higher with age, and approximately 43% of construction workers 55–59 years of age complain of low back pain. Even if the number of primary industry workers decreases in the future, the number of people providing nursing care in the service industries is expected to increase to 300 thousand nationwide, and since about 1/3 of them experience low back pain, it seems valid to conclude that low back pain is a symptom that human beings will find difficult to escape.

Although there seem to be many other symp-

toms that are old foes of the human race, as shown in Table 1, a national survey to identify the most common symptoms complained of by the public revealed low back pain to be the most common complaint, with a rate of 93 persons per 1,000 population, and among persons 65 years of age and older, the rate was 201 persons per 1,000. Although we tend to think of poor vision, forgetfulness, etc., as becoming the most common symptoms as people grow older, the elderly actually complain of low back pain about twice as much as these other symptoms.<sup>2)</sup> Thus, low back pain troubles many people in all decades of life, and they are hoping for a life free of low back pain.

### Classification of Low Back Pain

Low back pain occurs as a result of a variety of causes and pathological conditions, and because it is sometimes difficult to diagnose, there are times when the physician has no other choice than to make a diagnosis of “low back pain”, which simply describes the symptom. However, when examining low back pain patients, as shown in Table 2, an effort must be

Table 2 Diseases Associated with Low Back Pain Classified According to Etiology

Etiology	Disease
Trauma	Lumbar intervertebral disc hernia Muscular/fascial low back pain [acute muscular low back pain (sprained back), chronic muscular low back pain] Low back pain associated with fractures (traumatic vertebral body fractures, fragile vertebral body fractures associated with osteoporosis)
Inflammation	Tuberculous spondylitis Purulent spondylitis Ankylosing spondylitis
Tumors	Spinal metastasis by malignant tumors Multiple myeloma Spinal cord tumors
Degeneration	Spondylosis deformans Intervertebral disc degeneration Intervertebral articular low back pain Lumbar non-spondylytic spondylolisthesis Ankylosing spinal hyperostosis Lumbar spinal canal stenosis
Abdominal organs	Diseases of the liver, gallbladder, pancreas, etc.
Psychological	Psychogenic low back pain, in hysteria, depression, etc.

made to make a diagnosis according to its etiology based on the history, physical findings, and results of the diagnostic tests, because identifying the etiology is essential to providing appropriate treatment.

### 1. Low back pain caused by trauma

Acute muscular low back pain (sprained back) occurs when exposure to an external force, such as in a collision with a person or while lifting a heavy object, damages muscles and fascia, while lumbar intervertebral disc herniation occurs when an intervertebral disc collapses and compresses nerves anteriorly, and traumatic vertebral body fractures occur when a vertebral body collapses as a result of a fall, etc. Chronic muscular low back pain develops when repetitive muscle use is performed over and over again, and fragile vertebral body fractures associated with osteoporosis occur when bone fragility progresses and bones collapse even in the absence of exposure to major external force.

### 2. Low back pain caused by inflammation

Tuberculous spondylitis or purulent spondylitis develops when tubercle bacilli or pyogenic bacteria destroy vertebral bodies or intervertebral discs. If the vertebrae are connected like bamboo, the patient has ankylosing spondylitis, a rheumatic disease that is negative for rheumatoid factor.

### 3. Low back pain caused by tumors

Malignant tumors, such as lung cancer, stomach cancer, breast cancer, prostate cancer, etc., sometimes metastasize to the lumbar spine, and disseminated metastasis to the lumbar spine is one of the pathological pictures of multiple myeloma. When tumors such as neuromas or angiomas develop in the lumbar cord or lumbar spine, patients experience intense low back pain.

### 4. Low back pain caused by degeneration

As construction workers advance in age, their incidence of low back pain increases, and the

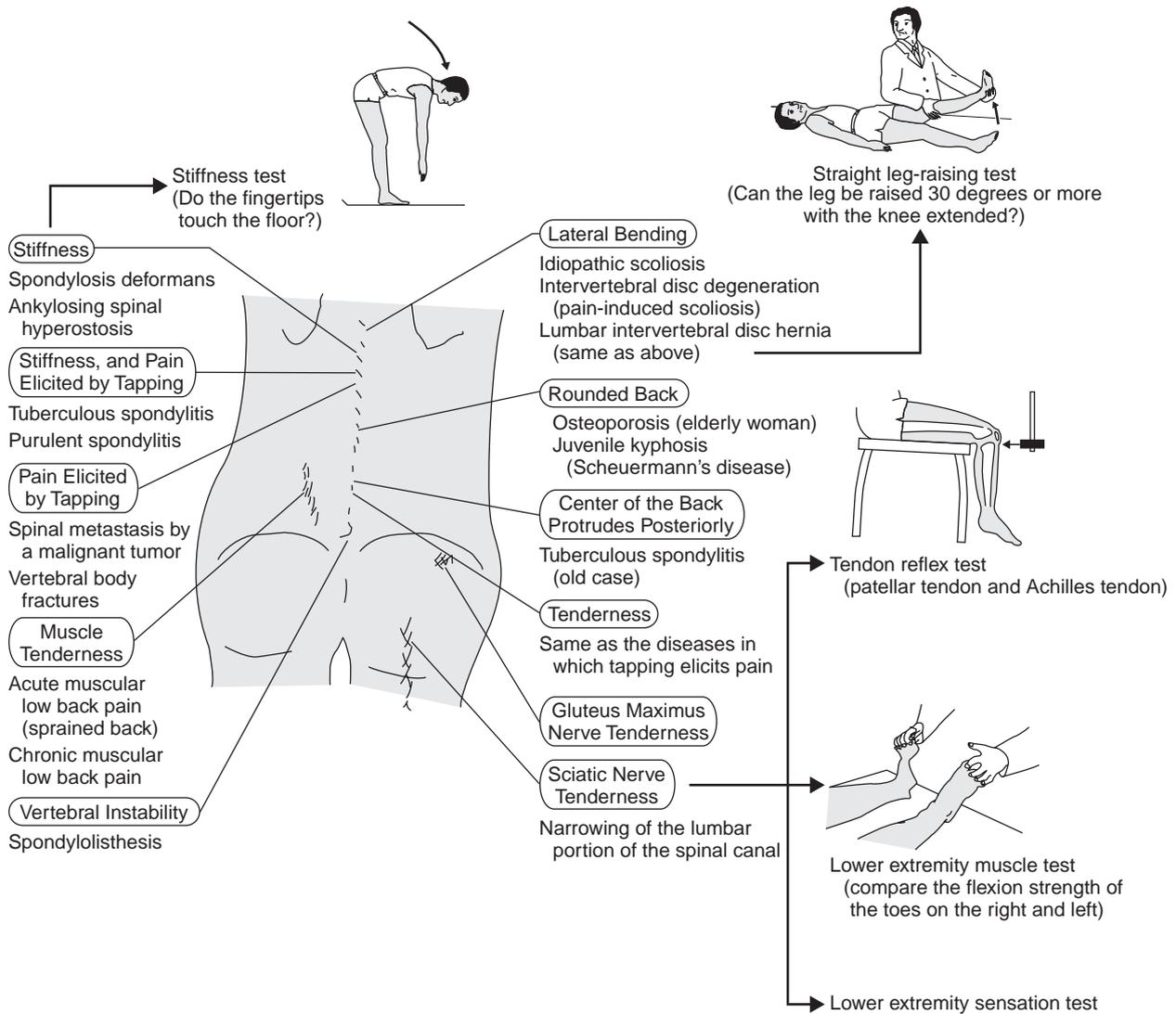


Fig. 1 Methods of diagnosing low back pain by inspection and palpation

increases are attributable to the development of lesions associated with degeneration of the lumbar spine and surrounding tissues. Degeneration leads to the development of spondylosis deformans, lumbar intervertebral disc degeneration, intervertebral articular low back pain, lumbar non-spondylolytic spondylolisthesis, ankylosing spinal hyperostosis, and lumbar spinal stenosis.

### 5. Low back pain due to other causes

In addition to diseases that arise in the structures that compose the lower back, which is the

pivot of the body, pain arising from diseases of intra-abdominal organs, including the liver, gallbladder, and pancreas, and referred pain are also seen among the diseases that give rise to low back pain. Pain also arises from posterior abdominal organs, including the uterus, ovaries, and urine bladder. The existence of psychogenic pain associated with hysteria and depression must also not be forgotten.

### Diagnosis of Low Back Pain

When low back pain has been determined

to be of skeletal origin based on the history, proceed to inspection and palpation of the lower back. The diagnostic methods are shown in Fig. 1. First, inspect for curvature of the spinal column anteriorly, posteriorly, and to the right or left. No curvature to the right or left is seen in normal persons, but when the spinal column is curved laterally and tilted in just one direction, interpret it as representing scoliosis in an effort to avoid pain, and consider lumbar intervertebral disc hernia or intervertebral disc degeneration. If the center of the scoliosis is in the thoracic spine and compensatory scoliosis in the opposite direction in the lumbar spine gives the spine as a whole the shape of the letter "S", consider idiopathic scoliosis. When the lower back protrudes posteriorly in a gentle manner, interpret it as representing kyphosis, and consider Scheuermann's disease (juvenile kyphosis) if the patient is young, and osteoporosis if the patient is an elderly woman. If the posterior protrusion of the lumbar portion of the back is steep, it often represents an old case of tuberculous spondylitis.

A state in which the flexion and extension movements of the spinal column are poor is described as "stiffness", and the spinal column is as rigid as bamboo and exhibits stiffness in spondylosis deformans, ankylosing spinal hyperostosis, and ankylosing spondylitis. Intense low back pain and stiffness of the spinal column occur in the initial stage of tuberculous spondylitis and in purulent spondylitis. In diseases in which pain is elicited by tapping or palpating spinal processes at the center of the posterior of the spinal column, there is spinal metastasis by a malignant tumor or a vertebral body fracture in addition to the above-described spondylitis. When tenderness is elicited in the paravertebral muscles immediately adjacent to the lumbar spine, consider acute muscular low back pain (sprained back), caused by a sudden tear of muscle or fascia in the same area, or chronic muscular low back pain. In lumbar spinal stenosis, tenderness is observed along the ends of the gluteus major nerve in the supero-

Table 3 Principles for Treating Low Back Pain

1. Low back pain originating in abdominal and posterior abdominal organs. Low back pain due to spinal metastases of malignant tumors  
Cure the low back pain by treating the underlying disease.
2. Low back pain that can be cured by surgery  
Decide whether to perform surgery in the early stage or after monitoring the patient conservatively.
3. Low back pain without indications for surgery
  - a. Rest: Restriction of physical activity, or local rest with a corset, etc.
  - b. Physical therapy: Principally thermotherapy, but also traction
  - c. Exercise therapy: Attempt (1) to increase muscle strength and produce a "natural" corset by means of abdominal and low back muscles, (2) to perform stretch and relaxation exercises, and (3) to increase bone strength by imposing mechanical loads on bones.
  - d. Orthoses: Not just immobilizing the low back, but eliminating pain by correcting kyphosis and scoliosis as much as possible.
  - e. Drug therapy: (1) Curative therapy with antibiotics or antitubercular agents, (2) symptomatic therapy with anti-inflammatory analgesics, and (3) elimination of pain by means of local blocks and nerve blocks.
  - f. Psychotherapy: Counseling for chronic low back pain and psychogenic low back pain.
  - g. Guidance for everyday living: Guidance in regard to inappropriate life styles and work.

lateral area of the buttocks or along the center of the posterior aspect of the thigh. While touching the spinal processes of the lower 3 lumbar vertebrae, have the patient flex and extend the lumbar spine, and palpate the vertebral bodies for instability, in other words, to see whether they slide due to spondylolisthesis.

In addition to examining the lower back, other methods that are useful in making a definitive diagnosis of low back pain are the stiffness test, in which the patient bends forward and the distance between the fingertips and the floor is measured, and the straight leg-raising test, in which the legs are raised with the knees extended in the supine position. Testing sensation, muscle strength, and tendon reflexes in the legs and determining whether paralysis is present in the area supplied by the sciatic nerves are also important from a diagnostic standpoint.

## Treatment of Low Back Pain

Because of the diverse etiology of low back pain, there are various methods of treating it, and the principles of treatment are listed in Table 3.

### 1. Treatment of the causative disease

Treatment of the underlying disease causing the pain is given priority in patients complaining of low back pain originating in abdominal or posterior abdominal organs. Similarly, treatment with anticancer drugs, radiation therapy, etc., must be considered in patients complaining of low back pain who have spinal metastases of malignant tumors or bone lesions produced by multiple myeloma.

### 2. Surgery

Low back pain that is considered to have indications for surgical treatment includes extension of sciatic nerve paralysis toward the lower extremities, progression of nerve root compression symptoms, and infection caused by *M. tuberculosis* or other bacteria. Care must be taken not to miss the time for surgery while conducting conservative therapy before the operation. The criteria for surgical indications are reduced mobility in everyday life and development of paralysis in lumbar spinal stenosis, and progression of the paralysis in lumbar intervertebral disc hernia. If paralysis develops in a patient with a spinal cord tumor, surgery must be performed without delay.

### 3. Conservative therapy

Rest is usually advised as the first method of reducing low back pain, without considering surgery. Rest can be approached in two ways, by restricting daily activity and by attempting to achieve local rest by fixing the lower back with a corset, etc.

Among physical therapy modalities, in addition to thermotherapy with hot packs, disposable body warmers, and bathing, pelvic traction by applying traction force to the lumbar spine

is an effective means of physical therapy for lumbar intervertebral disc hernia. Thermotherapy is contraindicated for low back pain caused by inflammation or tumors.

Exercise therapy, such as performing relaxation and stretching exercises to eliminate muscle tension, creating a "natural" corset by abdominal and low back muscle training, and attempting to strengthen bones by imposing mechanical loads on them are useful in treating low back pain.

Scoliosis and kyphosis cannot be completely corrected with orthoses, but they have the advantage of preventing progression and instilling a sense of security.

Drug therapy is available for curative therapy and symptomatic therapy. Local infiltration (trigger point) blocks or nerve blocks with anesthetics also sometimes have a curative effect on low back pain.

Psychological counseling is effective for chronic low back pain and psychogenic pain, and guidance in regard to everyday living should not be forgotten.

## Diagnosis and Treatment of Low Back Pain are an Inevitable Part of Medical Care in an Aged Society

Since low back pain is extremely common among the various symptoms and diseases with which clinicians are confronted, uncovering its precise cause and diagnosing and treating it occupies an important position in continuing to maintain the quality of life of elderly patients and in maintaining longevity in the medical care of an aged society. I will now elaborate on these points in regard to osteoporosis, one of the principal diseases responsible for low back pain in the elderly.

The main goal of the treatment of osteoporosis 40 years ago, when there were few alternatives to choose from, was remission of the low back pain. As a result of advances in medical care, the goal of treatment subsequently changed to increasing bone density and

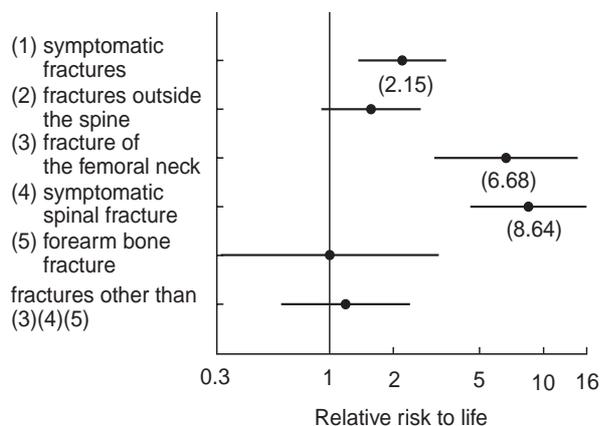


Fig. 2 Relative risk of various bone fractures to the life of elderly patients

Of the various types of bone fractures assessed, vertebral body fractures associated with low back pain posed the highest risk to the life of elderly persons. A total of 6459 women, mean age 69 years, were followed up for an average of 3.8 years. Fractures occurred in 907 of them, and the relationship between the deaths of 122 of them and the fractures was investigated. Relative risks are shown in parentheses. (Quoted from Cauley, J.A. *et al.*: Risk of mortality following clinical fractures. *Osteoporosis Int* 2000; 11: 556–561).

then to lowering the fracture rate, and now attention is being focused on how to reduce femoral neck fractures, which have the most negative impact on the functional prognosis of osteoporosis patients. Accordingly, lumbar compression fractures and kyphosis, as well as the low back pain attributable to them, are being treated as warning signs of leg fractures, and there is a feeling of having become detached from the main targets of diagnosis and treatment. However, when analyzed from the standpoint of the quality of life of the elderly, kyphosis, low back pain, etc., were found to make the elderly tend to become reclusive as a result of psychological factors, such as lowering their body image, causing them to fear falling, etc., and as a result of the instability factor of gait difficulty with festination and their standing posture because of flexion contractures of the knees secondary to kyphosis.<sup>3)</sup> Because of this, how to reduce vertebral body fractures associated with clinical manifestations in the treatment of osteoporosis has been restored as a parameter for evaluating the efficacy of drugs

for the treatment of osteoporosis.<sup>4)</sup>

Numerous large-scale clinical studies have been conducted to investigate the efficacy of drugs for the treatment of osteoporosis, and in one of them 6,459 women with a mean age of 69 years were followed up for an average of 3.8 years.<sup>5)</sup> Fractures occurred in 907 of the 6,459 women, and 122 women died. As shown in Fig. 2, vertebral body fractures, which were manifested by low back pain, etc., posed the highest risk to life among the wide variety of fractures they experienced. There were no differences in amount of exercise, smoking history, morbidity of heart disease, bone mineral density, etc., among patients with different types of fractures, and the largest number died of only vertebral body fractures associated with low back pain. With this point I will conclude by stating that the lower back is the pivot of the body, and the diagnosis and treatment of low back pain rank fairly high.

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