Low Back Pain in Japanese Women: Including cases caused by osteoporosis


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Abstract: Low back pain is an unavoidable symptom among humans because of their bipedal standing posture and is one of the most common complaints of outpatients. Women, in particular, experience low back pain due to various factors throughout their life cycle. Low back pain can be caused by both physiological and pathological factors, including menstrual pain during puberty, pregnancy and par-turition during sexual maturity, vague symptoms during the climacteric, and osteoporosis during old age. These factors lead to a higher prevalence of low back pain in females than in males. This review discusses the roles of anatomical and endocrinological factors in the development of low back pain in women. Apart from low back pain associated with pregnancy, most cases of low back pain due to organic disease in middle-aged and elderly women are related to orthopedic or gynecological conditions. The specific underlying diseases and conditions are reviewed. This article also discusses low back pain related to vague symptoms caused by autonomic disorders. This discussion is based on studies of 400 patients with low back pain. Although there was no significant relation between bone mineral density and the presence or severity of low back pain, we confirmed that vertebral fractures associated with osteoporosis cause symptoms such as low back pain and adversely affect patients’ quality of life. Low back pain is closely related to life style. The close associations with personality and interpersonal relations require that low back pain is comprehensively diagnosed and treated.

Key words: Low back pain; Gynecological disease; Indefinite complaint syndrome; Osteoporosis; Bone fracture

Introduction

Irrespective of age and sex, about 80% of humans have low back pain some time during their lives. Because humans are bipedal and are subjected to the forces of gravity, the develop-
ment of low back pain is inevitable. Anatomically, the head is supported by the neck and shoulders, the upper body by the thoracic and lumbar vertebrae, and the trunk by the knees. Increased physical stress that exceeds support strength can lead to symptoms such as shoulder stiffness, low and upper back pain, and knee pain.

Although both sexes experience low back pain, there are several important distinctions. Females have specific physiological characteristics related to pain throughout their life cycle. From menarche and throughout sexual maturity, females have considerable menstrual pain, which may be expressed as low back pain. Pregnancy and parturition are also associated with low back pain. During the climacteric, women experience various types of pain, such as headache, shoulder stiffness, low and upper back pain, knee pain, and lower abdominal pain, which comprise a constellation of symptoms referred to as indefinite complaint syndrome. Older age is associated with an increased risk of osteoporosis. The incidence of osteoporosis is much higher in women than in men. Osteoporosis is often initially diagnosed in patients who have low back pain due to fractures.

This article reviews the various causes of low back pain in females. It focuses on low back pain caused by gynecological conditions and discusses the role of osteoporosis.

Causes of Low Back Pain in Females

The incidence of low back pain is far higher in females than in males. This increased incidence is related to the anatomic and endocrinological characteristics of females.

1. Anatomic characteristics

The female pelvis must accommodate a large abdominal cavity, required for pregnancy and parturition. It must also have a distensible and smooth bony birth canal and soft birth canal. The female pelvis is therefore flat and wide. These features are important for pregnancy and parturition, but place muscles and ligaments under considerable physical stress, necessary to maintain balance while walking. This stress can lead to chronic fatigue and low back pain.

The female pelvis is more complex than the male pelvis. The uterus, a female organ, and its appendages such as the ovaries and oviducts have diverse functions. These appendages are suspended from various support systems. Relaxation of these systems causes uterine descent and prolapse, which are also associated with low back pain.

The vaginal orifice is exposed to the external environment and is contiguous with internal organs. These anatomic features increase the risk of ascending infections. Such infections cause inflammation, which can spread from the uterus to surrounding organs and lead to parametritis and related conditions. These conditions are also potential causes of low back pain.

The female pelvis has a well-developed venous plexus and a vascular system prone to hyperemia and congestion. Pelvic hyperemia and congestion can directly cause low back pain. The lymphatic system is also well developed and prone to lymph node swelling. Lymph node swelling can compress the nervous system, causing low back pain.

Tumors of the uterus or ovaries, both benign and malignant, that attain a certain size or are located in specific locations can stimulate surrounding nerves and produce low back pain and other symptoms.

2. Endocrinologic characteristics

Females have hormone cycles controlled mainly by the ovaries and uterus. The menstrual period occurs after the luteal phase of the ovaries and the secretory phase of the uterus. Menstrual bleeding occurs with exfoliation of the endometrium. Menstrual pain can develop during physiological hormonal
changes in the absence of organic disease. Endometriosis or uterine myoma can increase the risk of dysmenorrhea. Changes in various organs involved in pregnancy, parturition, and the puerperium, including alterations of the uterus, pelvic joints, muscles, and ligaments, can cause low back pain and other symptoms.

During the climacteric, decreased production of female hormones, interacting with psychic factors and stress, can cause climacteric symptoms and disturbances. Although hormonal changes are not solely responsible for indefinite complaints, the indefinite complaints associated with the climacteric do not occur in the absence of decreased hormone levels. Such indefinite complaints include low back and other types of pain. Endocrinological characteristics thus play an important role in the development of low back pain as well as other types of pain.

### Low Back Pain Caused by Gynecological Factors

Potential causes of low back pain in middle-aged and elderly women, excluding pregnancy-related causes, are shown in Table 1. The major causes of low back pain are related to gynecological or orthopedic factors.

#### 1. Positional abnormalities such as uterine descent or prolapse

Middle-aged and elderly women often have positional abnormalities of the uterus, such as uterine descent or prolapse. The major symptoms of this condition include the feeling of an intravaginal or vulvar mass, as well as difficulty in urination or defecation caused by prolapse of the bladder and rectum, organs adjacent to the female genital tract. Increased tension on ligaments or peritoneum supporting the uterus can produce hypogastric discomfort or abdominal pain. Uterine descent usually involves the vaginal portion of the cervix and is intravaginal, but can progress to prolapse of the cervix outside the vaginal orifice. Prolapse of the uterus can progress further to complete uterine prolapse, characterized by downward displacement of the body of the uterus outside the vaginal orifice. Chronic prolapse of the

<table>
<thead>
<tr>
<th>Gynecological causes</th>
<th>Orthopedic causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Organic causes</td>
<td>Intervertebral disk hernia, spondylosis deformans, spondyloysis, spondylolisthesis, lumbar spinal canal stenosis, osteoporosis, spinal caries, purulent spondylitis, spinal tumors, spinal cord tumors, coccygeal fractures, spinal metastasis from cancer (breast cancer, thyroid cancer, gastric cancer, lung cancer, uterine cancer), so-called lumbago syndrome</td>
</tr>
<tr>
<td>1) Positional abnormalities of uterus (uterine descent or prolapse)</td>
<td>Urological causes</td>
</tr>
<tr>
<td>2) Uterine tumors (uterine myoma, uterine cancer)</td>
<td>Inflammation (pyelonephritis, renal pelvic tumors), calculi, urinary tract obstruction</td>
</tr>
<tr>
<td>3) Abnormalities of uterine appendages (ovarian tumors)</td>
<td>Orthopedic causes</td>
</tr>
<tr>
<td>4) Abnormalities of tissue supporting the uterus (parametritis, etc.)</td>
<td>Orthopedic causes</td>
</tr>
<tr>
<td>2. Indefinite complaints caused by autonomic disorders</td>
<td>Orthopedic causes</td>
</tr>
</tbody>
</table>

uterus can cause hydronephrosis due to compression of the urinary tract and passage disturbances, associated with low back pain.

Retroflexion of the uterus was previously considered a common cause of low back pain associated with positional abnormalities of the uterus. Corrective surgery was even performed in young infertile women. Currently, however, retroflexion of the uterus is not regarded to be a cause of either low back pain or infertility.

2. Uterine tumors such as uterine myoma and uterine cancer

Uterine myoma, a benign tumor arising in the uterus, is rarely a direct cause of pain because most myomas arise in the body of the uterus. However, myomas originating in certain locations can produce pain. Subserosal myomas developing in the broad ligament of the uterus (intraligamentous myomas) or myomas arising in the uterine cervix or vaginal portion of the cervix can present with low back pain caused by compression of the surrounding nerves and urinary tract and produce symptoms such as feeling of an abdominal mass.

Early uterine cancer is not associated with low back or other types of pain, but advanced disease with tumor invasion of surrounding tissue and direct stimulation of nerves can cause low back pain and other symptoms. Tumor metastasis to the spinal column can produce severe low back pain.

3. Abnormalities of uterine appendages, such as ovarian tumors

Ovarian tumors, irrespective of benign or malignant status, present with the features of intraligamentous tumors, similar to uterine myomas. Very large tumors can cause abdominal pain as well as low back pain due to compression of surrounding nerves or the urinary tract. Ovarian tumors may cause torsion, and rupture can produce sudden abdominal and low back pain. Torsion can cause tumor necrosis, and rupture with release of the contents can result in peritonitis. These conditions are also associated with pain.

Advanced ovarian cancers directly invade the uterus, ovaries, colorectal region, and ureters, causing urinary tract disturbances and hydronephrosis. Metastasis to bone can cause low back pain.

Acute inflammation of uterine appendages, particularly the oviducts, can cause adnexitis with fever and lower abdominal pain. Lower back pain also sometimes occurs. When appendages adhere to the posterior surface of the uterus because of chronic inflammation, low back pain as well as abdominal symptoms such as lower abdominal discomfort and abdominal fullness sometimes develop.

4. Abnormalities of uterine support tissue, such as parametritis

Connective tissue along the uterine cervix is referred to as parametrium. Inflammation of this tissue is called parametritis. Along with adnexitis, parametritis is a common inflammation of intrapelvic organs. Parametritis-related abscesses fill one side of the pelvic category and compress the uterus, bladder, and colorectum on the contralateral side, leading to fever as well as severe lower abdominal pain and low back pain.

Low Back Pain as an Indefinite Complaint Syndrome

Our department surveyed the prevalence and severity of low back pain in 400 women attending our climacteric outpatient clinic (mean age, 49.2 years; range, 22–80 years) (Figs. 1–3). These subjects did not include women with distinct evidence of osteoporosis or gynecological or orthopedic diseases related to low back pain. This survey indicated that about 70% of women in their 30s to 60s have “low back pain,” irrespective of their specific age group. About 35% of these women have severe low back pain interfering with daily activities. The prevalence of low back pain increases gradually between the ages of 30 and
39 years and reaches a peak value between 50 and 59 years. There was no clear-cut difference in disease status among women in their 30s to 50s. However, the prevalence of severe low back pain was lower in women in their 30s than in older women. In conclusion, the prevalence of low back pain was slightly lower and that of severe cases was lower in women in their 30s than in older women. However, there was no remarkable difference in the prevalence or severity of low back pain as compared with women in their 40s to 50s.

Low back pain associated with the indefinite complaint syndrome is attributed to fatigue of ligaments and muscles surrounding the spinal cord, caused by activities of daily life. Such symptoms cannot be detected on imaging studies or blood tests and are considered transient, extremely mild, reversible changes. In terms of Chinese medicine, fatigue results from abnormalities in the distribution of intrapelvic

<table>
<thead>
<tr>
<th>Pain (+)</th>
<th>Pain (−)</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>108 cases (27.0%)</td>
<td>400 cases (68.3%)</td>
<td>19 cases (4.8%)</td>
</tr>
</tbody>
</table>

**Fig. 1** Presence or absence and severity of low back pain (From Ohta, H. et al.: Low back pain in middle-aged and elderly women. Obstetrical and Gynecological Therapy 1996; 73: 286–292)

<table>
<thead>
<tr>
<th>Pain</th>
<th>Severe</th>
<th>Moderate</th>
<th>Mild</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 cases (34.8%)</td>
<td>273 cases (52.4%)</td>
<td>104 cases (38.1%)</td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 2** Presence or absence of low back pain according to age group (From Ohta, H. et al.: Low back pain in middle-aged and elderly women. Obstetrical and Gynecological Therapy 1996; 73: 286–292)

30s:
- Severe: 11 cases (23.8%)
- Moderate: 43 cases (36.4%)
- Mild: 49 cases (41.5%)

40s:
- Severe: 5 cases (26.3%)
- Moderate: 7 cases (36.8%)
- Mild: 19 cases (36.8%)

50s:
- Severe: 28 cases (35.9%)
- Moderate: 31 cases (33.7%)
- Mild: 92 cases (30.4%)

60s:
- Severe: 28 cases (35.9%)
- Moderate: 31 cases (33.7%)
- Mild: 92 cases (30.4%)

**Fig. 3** Severity of low back pain according to age group (From Ohta, H. et al.: Low back pain in middle-aged and elderly women. Obstetrical and Gynecological Therapy 1996; 73: 286–292)
blood flow and reflects “stagnant” blood flow. In addition to such undetectable organic changes, indefinite complaints arising from so-called autonomic disorders due to climacteric disturbances may also be involved as psychic factors. This assumption is supported by the following five findings:

1. Low back pain is one of the most common symptoms of climacteric disturbances.6)
2. The Kupperman menopausal index,7) long used to diagnose climacteric disturbances and evaluate treatment response, includes articular and muscular pain. Low back pain would fall under this category.
3. The classification of autonomic symptoms associated with climacteric disturbances includes low back pain as a sensory and muscular system symptom.
4. Low back pain or upper back pain is included as a skeletal/muscular symptom used to evaluate psychosomatic status.
5. About 80% of patients with chronic low back pain are depressed, indicating that psychic pain is closely related to physical pain. The American Psychiatric Association has thus established diagnostic criteria for chronic pain (physically expressed painful disorders) (Table 2).8)

These findings strongly suggest that low back pain is related to indefinite complaints caused by autonomic disorders.

**Low Back Pain and Osteoporosis**

Low back pain has long been considered a clinical symptom of osteoporosis. Examina-
tions for osteoporosis are done in patients who have low back pain. However, the World Health Organization (WHO) diagnostic criteria and the Japanese diagnostic criteria for primary osteoporosis\(^{10-12}\) do not include the presence or absence of low back pain.

We therefore studied whether the presence and severity of low back pain are related to lumbar bone mineral density as assessed by dual-energy X-ray absorptiometry (DXA) or to the severity of osteoporosis as evaluated by radiographic examination of the spine.\(^3\) We found that the presence of low back pain was not related to either lumbar bone mineral density or to osteoporosis. There was also no significant relation between low back pain and lumbar bone mineral density in any age group (Fig. 4). Similar results were obtained for the relation between the severity of low back pain and the level of bone mineral density. These results indicated that low back pain does not necessarily imply low bone mineral density or a diagnosis of osteoporosis (i.e., a risk of osteoporosis). Our findings are in accord with the diagnostic criteria for osteoporosis proposed by the WHO\(^9\) and the Japanese Society for Bone and Mineral Research.\(^{10-12}\)

Fractures associated with osteoporosis are known to present with low back pain. Fractures accompanied by pain are symptomatic and are referred to as clinical fractures. Asymptomatic fractures that are initially diagnosed on radiographic examination are called morphometric fractures. Old fractures are referred to as prevalent fractures, and new fractures as incident fractures. Fractures of the spinal vertebrae initially develop in patients in their 50s and increase gradually after 70 years of age. The lifetime fracture risk in Japanese women is 40%, similar to that in white women. About one-third of women with spinal vertebral fractures experience pain. Fractures in the other two-thirds are asymptomatic and are referred to as silent disease.\(^13\)

The mechanism leading to pain may be direct, with pain occurring at the fracture site, or indirect, with pain resulting from fracture-related deformity. Progression of osteoporosis leads to more fractures. The development of hunchback or humpback is consistently accompanied by low and upper back pain. Compresion of the spinal process region induces pain and increases tension on ligaments located between spinal processes. The site of ligament adhesion to bone becomes inflamed, thus causing pain. Hunchback or humpback is associated with spinal kyphosis. Muscles responsible for extension of the back are therefore constantly overextended, concurrently causing fatigue-induced or ischemic low back pain. Such low back pain is characterized by decreased tension on back muscles on elbow or knee presentation.

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Fig. 4 Lumbar bone mineral density according to age group. (From Ohta, H. et al.: Low back pain in middle-aged and elderly women. Obstetrical and Gynecological Therapy 1996; 73: 286–292)
while bending the back posteriorly. Intramuscular pressure thus decreases and blood flow increases, thereby improving or eliminating low back pain.

Most fractures associated with osteoporosis accompanied by low back pain involve the body of vertebrae. The positioning of vertebral fractures resulting from osteoporosis is shown in Table 3. This table clearly shows the importance of vertebral body fractures in deciding the starting point of treatment for osteoporosis.

The development of hunchback or humpback requires caution because these conditions can present with an extremely diverse range of symptoms (Table 4) in addition to low and upper back pain. Once vertebral fractures develop, the decrease in the quality of life (QOL) after 1 year is about one-tenth of that associated with femoral neck fractures and is similar to that associated with distal radius fractures. Subsequently, however, the decrease in QOL is one-third of that at 1 year in patients with femoral neck fractures and two or three-tenths of that at 1 year in patients with distal radius fractures. In contrast, QOL does not change appreciably in patients with vertebral fractures. These fractures are thus characterized by a trend toward delayed recovery of QOL (Table 5).

### Table 3 Starting Point of Therapy for Osteoporosis
(Dec. fracture prevention, particularly of vertebral fractures)

- 1. Initial fracture site present
- 2. Vertebroplastique attempted, but no cure
- 3. Disturbance of organ function
- 4. Incidence of osteoporosis-related fractures higher than that in common sites of fracture, such as the femoral neck and distal radius
- 5. Pain frequently delayed
- 6. Psychological disadvantages caused by cosmetic problems


### Table 4 Symptoms Associated with Spinal Deformity

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Intramuscular pressure</th>
<th>Blood flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervico-omo-brachial syndrome</td>
<td>decreases</td>
<td>increases</td>
</tr>
<tr>
<td>Nervous system: Symptoms mimicking those of cervical spondylosis, drop attacks, cervical vertigo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscular system: Chronic cervical pain, brachial pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptoms of low and upper back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic pain and fatigue of long back muscles, gluteal muscles, or tensor fascia lata muscles, nocturnal convulsions of lower extremities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoventilation caused by humpback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic reflux esophagitis, diaphragmatic hiatal hernia, constipation, flatulence, hemorrhoids, anorexia, vomiting sub-ileus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in appearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of feminine feeling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### Table 5 Decrease in QOL Caused by Osteoporosis-Related Fractures

<table>
<thead>
<tr>
<th>Fracture Type</th>
<th>QOL After 1 Year</th>
<th>QOL After More than 1 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy adults</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Femoral neck fracture</td>
<td>-0.4681</td>
<td>-0.1695</td>
</tr>
<tr>
<td>Vertebral fracture*</td>
<td>-0.0502</td>
<td>-0.0490</td>
</tr>
<tr>
<td>Distal radius fracture</td>
<td>-0.0464</td>
<td>-0.0060</td>
</tr>
</tbody>
</table>

*Decrease in QOL caused by vertebral fracture is continuous.


### Concluding Remarks

Low back pain in females can be caused by gynecological diseases as well as by indefinite complaint syndrome and osteoporosis. Treatment of low back pain is difficult because examinations often reveal no evidence of disease and psychosomatic factors are frequently involved. Because there is no single cause, women who successfully undergo surgery for gynecological disease sometimes continue to have pain. Some cases of chronic low back pain are therefore of unclear etiology and are referred to as so-called lumbago syndrome.

Low back pain is closely related to lifestyle and can be affected by human and social fac-
tors, such as individual personality and interpersonal relations at home or the workplace. Low back pain is therefore a condition of modern society. Treatment requires comprehensive assessment of patients including psychological factors and living environment as well as clinical symptoms. Providing patients with support to allow them to understand the underlying causes of low back pain is essential for a successful treatment outcome.

REFERENCES