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**Review Article**

# **Regular Physical Exercise for Prevention and Treatment of Low Back Pain: A Systematic Review**

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**Abstract:** Introduction: Low back pain is one among the main health problems during life time with a high prevalence, which causes functional loss and reduced productivity. Low back pain specifically affects the lumbar region of the spine. The pain is usually related with mostly muscle tension, and often limits our range of movement. Low back pain (LBP) is a common problem involving the muscles, nerves, and bones of the back. Objective: The purposes of this review study are to describe about low back pain and to examine the most recommended exercise for prevention and management of low back pain, to review scientific evidence on the effect of physical exercise on low back pain and to review the risk factors which lead to develop low back pain. Methods: The review of related literature search strategy were used the terms in relation with LBP and exercise, exercise prescription for LBP, exercise testing for LBP, recommended exercise for LBP, the effect of exercise on back pain and etc. A search was conducted in the following databases: online research databases, web of knowledge, and science direct, sport discus, Google scholar and from other relevant citations. Results: Based on LBP analysis and outcome functions, can be categorized as acute (<6 wk), sub-acute (6-12 wk), and chronic. Risk factors associated with low-back pain include age greater than 34 years, degenerative diseases such as arthritis or osteoporosis, a family or personal history of back pain or trauma, a sedentary lifestyle, low job satisfaction, and low socioeconomic status, excess body weight, psychological stress or depression and physically hard work. Common symptoms of LBP: pain that is dull or achy, contained to the low back, stinging, burning pain that moves from the low back to the backs of the thighs, sometimes into the lower legs or feet, muscle spasms and tightness in the low back, pelvis, and hips, pain that worsens after prolonged sitting or standing, difficulty standing up straight, walking, or going from standing to sitting and pain that worsens with bending, lifting, standing or walking. Regular exercise particularly endurance and stretching exercises such as walking, biking, and swimming, has the good evidence of efficacy among exercise regimen, whether for whom with acute, sub-acute, or chronic low back pain. Generally, to reduce and manage LBP following low-impact endurance, strength and stretching regular exercises are advised.

**Keywords:** Low Back Pain, Physical Exercise Prescription, Risk Factors and Recommendation

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## **1. Introduction**

Low back pain (LBP) is defined as pain, muscle tension, or stiffness localized below the rib margin and above the inferior gluteal folds, with or without leg pain symptoms [1, 2]. LBP is one of major public health problem, with the life time prevalence reported as high as 84% [3]. Anywhere between 4% and 33% of the adult population experience LBP at any given point in time [4], and recurrent episodes of LBP can occur in over 70% of cases [5]. Approximately 20% of cases become chronic and about 10% of the cases progress to a disability [3].

Lumbago is a pain in the lumbar region. Lumbago can be acute or chronic and the cause of the problem is still not completely understood, but the pain is often related with cramps in the back muscles. This condition may in turn be triggered by temporary pressure or a tension stretch to one of the roots of the sciatic nerve. Acute lumbago is very common and mostly affects aged between 30 and 40 years. 80% of all people have at some time suffered lumbago. The lumbar spine, or low back, is a remarkably well-engineered structure of interconnecting bones, joints, nerves, ligaments, and muscles all working together to provide support, strength, and flexibility. However, this complex structure also leaves the

low back susceptible to injury and pain. Low back pain is a universal human experience almost everyone has it at some point. The lower back, which starts below the ribcage, is called the lumbar region. Pain here can be intense and is one of the top causes of missed work [6].

Low back pain (lumbago) affects the lumbar part of the spine. This is the lower part of the back, between our hips and the bottom of our ribcage. The pain is usually associated with muscle tension, and often limits our range of movement. The pain sometimes radiates (spreads) down to one or both legs [7]. Low back pain (LBP) is a common disorder affects the muscles, nerves, and bones of the back [6]. Pain can vary from a dull constant ache to a sudden sharp feeling LBP may be categorized based on duration as acute (pain lasting less than 6 weeks), sub chronic (6 to 12 weeks), or chronic (more than 12 weeks) [7]. The situation may be in addition classified via the underlying motive as both mechanical, or non-mechanical, or referred ache. The signs and symptoms of low back pain normally enhance within a few weeks from the time they start, with 40-90% of people completely higher by using six [8]. In most episodes of low returned ache, a selected underlying reason isn't always diagnosed or even looked for, with the pain believed to be due to mechanical troubles which include muscle or joint stress. If the ache does no longer depart with conservative remedy [8].

In most episodes of low again pain, a specific underlying cause isn't always recognized or maybe searched for, with the pain believed to be due to mechanical troubles along with muscle or joint stress. If the ache does now not go away with conservative remedy or if it is followed by "pink flags" together with unexplained weight reduction, fever, or significant problems with feeling or movement, further testing may be had to search for extreme underlying problem [9]. In maximum instances, imaging gear along with X-ray computed tomography aren't useful and carry their own risks. Despite this, using imaging in low back pain has increased. a few low returned aches are as a result of broken intervertebral discs, and the instantly leg improve check is useful to perceive this purpose. In those with persistent ache, the pain processing gadget might also malfunction, causing big quantities of pain in response to non-serious occasions [10].

Regular pastime needs to be persevered as plenty because the ache permits. Medicines are endorsed for the length that they may be useful. Some of different options are available for individuals who do now not enhance with traditional treatment. Opioids can be useful if easy pain medications are not sufficient, but they're now not generally encouraged due to aspect consequences [11]. Surgical procedure can be useful for people with disc-related chronic pain and disability or spinal stenosis. No clear gain has been located for other instances of non-unique low returned ache. Low lower back ache often impacts temper, which may be progressed by counseling or antidepressants [9].

Additionally, there are many alternative medicine therapies, including the Alexander technique and herbal remedies, but there is not enough evidence to recommend them confidently. The evidence for chiropractic care and spinal manipulation is mixed [12]. Approximately 9-12% of people (632 million) have LBP at

any given point in time, and nearly 25% report having it at some point over any one-month period. About 40% of people have LBP at some point in their lives, with estimates as high as 80% among people in the developed world. Difficulty most often begins between 20 and 40 years of age. Men and women are equally affected. Low back pain is more common among people aged between 40 and 80 years, with the overall number of individuals affected expected to increase as the population ages [7].

#### *Objectives of the study*

- 1) To examine recommended exercise for prevention and management of low back pain
- 2) To review scientific evidence on the effect of physical exercise on low back pain
- 3) To review the risk factors which lead to develop low back pain

## **2. Methods**

*Search strategy:* Articles were searched by the terms “low back pain (LBP) and exercise”, “exercise prescription for LBP”, “exercise testing for LBP”, “recommended exercise for LBP”, “the effect of exercise on back pain” and etc. A search was conducted in the following bibliographic databases: online research databases, web of knowledge, and science direct, sport discus, Google scholar, Scopus, web science, science PG the references of all saved articles and organizations were reviewed for relevant citations.

### **2.1. Inclusion Criteria**

All publications or articles focused in which there was the terms in relation with low back pain (LBP) and exercise”, “exercise prescription for LBP”, “exercise testing for LBP”, “recommended exercise for LBP”, “the effect of exercise on back pain” and etc. Studies based on written in English, between the years 2000 to recent were also included. Publications issued by scientific organizations regarding with biomechanical performance analysis in sport were selected.

### **2.2. Exclusion Criteria**

The criteria such as articles written in other languages rather than English and published before the year 2000.

### **2.3. Screening of Articles for Eligibility**

Data were first appraised for quality and then extraction was made by using data extraction form. The author developed the data extraction form that suits the specific objective of the systematic review. It included date of publication, name of author, objective of the study, setting, study methods and results.

From the selected publications, organizations and articles the following data such as year of study, characteristic of analysis, evaluation and results/findings/conclusions were extracted. The electronic databases and the manual search of reference lists identified 65 articles. On the basis of title and abstract, we excluded 18 studies that did not meet inclusion criteria. All information was obtained directly from the

articles.

### 3. Types of Low Back Pain

Individuals with LBP can be categorized into three vast classifications: (1) low returned ache probably associated with any other precise spinal purpose (like: most cancers, fracture, contamination); (2) LBP doubtlessly related to radiculopathy or spinal stenosis; and (three) and nonspecific low lower back pain, which encompass extra than 85 % of all instances [13]. Based on its analysis and outcome functions, LBP can be defined as acute (<6 wk), sub-acute (6-12 wk), and chronic (>12 wk) [3, 14]. Near to 90% of acute low back episodes resolve within 6wk regardless of treatment [15]. To lessen the chance of disability, individuals with LBP ought to make energetic themselves by using keep normal pastime within pain limits, avoid mattress rest, and go back to work as quickly as feasible [16]. If the disabling ache continues greater than 6 wk, a multidisciplinary approach that consists of addressing psychosocial elements is suggested [14]. Many people with LBP may have worry, anxiety, or incorrect information regarding their LBP, exacerbating a continual pain kingdom [17]. By which include healing and aerobic exercise together, together with ache education, improves character attitudes, results, perceptions, and pain thresholds [18, 19]. Psychosocial elements that growth the threat of growing or perpetuating long-term disability and paintings loss related to LBP [20].

### 4. Causes of Low Back Pain

Risk factors associated with low-back pain include age greater than 34 years, degenerative diseases such as arthritis or osteoporosis, a family or personal history of back pain or trauma, a sedentary lifestyle, low job satisfaction, and low socioeconomic status. Smoking increases risk because smoking appears to hasten degenerative changes in the spine. Excess body weight also increases strain on the back, and psychological stress or depression can cause muscle tension and back pain. Occupations and activities associated with low-back pain are those involving physically hard work, such as frequent lifting, twisting, bending, standing up, or straining in forced positions; those requiring high concentration demands (such as computer programming); and those involving vibrations affecting the entire body (such as truck driving) [20]. Underlying causes of back pain encompass negative muscle persistence and energy in the core muscle mass; excess frame weight; terrible posture or frame position while standing, sitting, or sleeping; and poor body mechanics while appearing moves like lifting and carrying, or sports movements. Strained muscular tissues, tendons, or ligaments can motive ache and may over time, lead to accidents to vertebrae, intervertebral disks, and surrounding muscle groups and ligaments. Stress can motive disks to interrupt down and lose a number of their ability to absorb surprise. A broken disk might also bulge out between vertebrae and placed stress on a nerve root, a situation usually referred to as a slipped disk. Painful pressure on nerves can also arise if harm to a disk narrows the distance between vertebrae

[18, 19]. With age, you lose fluid from the disks, making them much more likely to bulge and positioned strain on nerve roots. Depending on the amount of pressure on a nerve, symptoms may encompass numbness within the returned, hip, leg, or foot; radiating pain; loss of muscle feature; depressed reflexes; and muscle spasm. If the pressure is excessive sufficient, loss of feature can be everlasting [17, 18, and 19].

### 5. Signs and Symptoms of Low Back Pain

In the common presentation of acute low back pain, pain develops after movements that involve lifting, twisting, or forward-bending. The symptoms may start soon after the movements or upon waking up the following morning. The description of the symptoms may range from tenderness at a particular point to diffuse pain. It may or may not worsen with certain movements, such as raising a leg, or positions, such as sitting or standing. Pain radiating down the legs (known as sciatica) may be present. The first experience of acute low back pain is typically between the ages of 20 and 40. This is often a person's first reason to see a medical professional as an adult. Recurrent episodes occur in more than half of people with the repeated episodes being generally more painful than the first [8]. Other problems may occur along with low back pain. Chronic low back pain is associated with sleep problems, including a greater amount of time needed to fall asleep, disturbances during sleep, a shorter duration of sleep, and less satisfaction with sleep. In addition, a majority of those with chronic low back pain show symptoms of depression or anxiety [12]. Low back pain can incorporate a wide variety of symptoms. It can be mild and merely annoying or it can be severe and debilitating. Low back pain may start suddenly, or it could start slowly possibly coming and going and gradually get worse over time. Depending on the underlying cause of the pain, symptoms can be experienced in a variety of ways. For example, [12]:

- a) Pain that is dull or achy, contained to the low back
- b) Stinging, burning pain that moves from the low back to the backs of the thighs, sometimes into the lower legs or feet; can include numbness or tingling (sciatica)
- c) Muscle spasms and tightness in the low back, pelvis, and hips
- d) Pain that worsens after prolonged sitting or standing
- e) Difficulty standing up straight, walking, or going from standing to sitting
- f) Muscle ache
- g) Shooting or stabbing pain
- h) Pain that radiates down your leg
- i) Pain that worsens with bending, lifting, standing or walking
- j) Pain that improves with reclining

### 6. Preventing and Managing of Low-Back Pain

The exercises that follow are designed to help you maintain a healthy back by stretching and strengthening the major muscle

groups that affect the back-the abdominal muscles, the muscles along your spine and sides, and the muscles of your hips and thighs. If you have back problems, check with your physician before beginning any exercise program. Perform the exercises slowly and progress very gradually. Stop and consult your physician if any exercise causes back pain. The role of exercise in preventing and treating back pain is still being investigated. However, many experts recommend exercise, especially for people who have already experienced an episode flow-back pain. Regular exercise aimed at increasing muscle endurance and strength in the back and abdomen is often recommended to prevent back pain, as is life style physical activity such as walking. Movement helps lubricate your spinal joints and increases muscle fitness in your trunk and legs.

General guidelines for back exercise programs include the following [12].

- a) Do low-back exercises at least 3 days per week. Most experts recommend daily back exercises.
- b) Emphasize muscular endurance rather than muscular strength-endurance is more protective.
- c) Don't do spine exercises involving a full range of motion early in the morning. Your disks have high fluid content early in the day and injuries may result.
- d) Engage in regular endurance exercise such as cycling or walking in addition to performing exercises that specifically build muscular endurance and flexibility. Brisk walking with a vigorous arm swing may help relieve back pain. Start with fast walking if your core muscles are weak or you have back pain.
- e) Be patient and stick with your program. Increased back fitness and pain relief may require as long as 3 months of regular exercise.
- f) The adage "no pain, no gain" does not apply to back exercise. Always use good form and stop if you feel pain.
- g) Maintain a healthy weight. Excess fat contributes to poor posture, which can place harmful stresses on the spine.
- h) Stop smoking, and reduce stress.
- i) Avoid sitting, standing, or working in the same position or too long. Stand up every hour or half-hour and move around.
- j) Warm up thoroughly before exercising.
- k) Progress gradually when attempting to improve strength or fitness.

Unexpected (acute) lower back ache normally involves tissue injury. Signs and symptoms may also encompass ache, muscle spasms, stiffness, and infection. Many cases of acute back pain go away by themselves within a few days or weeks. You may be able to reduce pain and inflammation by applying cold and then heat [12].

## 7. Psychological Risk Factors for Chronic Disability and Work Loss Associated with LBP [20]

- a) A negative attitude that back pain is harmful or potentially severely disabling

- b) Fear avoidance behavior and reduced activity levels
- c) An expectation that passive, rather than active, treatment will be beneficial
- d) Social or financial problems

Current researches does not indicate a clear cause for initial bouts of LBP [14]. However, previous LBP is one of the strongest predictors for future back pain episodes [1]. Recurrent episodes of low back pain tend toward increased severity and duration, higher levels of disability, including work disability, and higher medical costs [22]. Current recommendations give emphasis on preventive measures and early interventions to minimize the risk of an acute LBP episode from becoming chronic and/or disabling [1]. Current good evidence give emphasis for treating LBP indicates PA as a key component in managing the condition ([1, 13, and 23].

Individuals with LBP who are scared of pain or re-injury frequently misread any aggravation of signs as a worsening in their spinal circumstance and preserve the fallacious belief that pain way tissue harm [24]. In evaluation, those with LBP who persist in PA may not allow injured tissues the time that is had to heal. Each behavior is related with persistent pain [26]. a few considerations have to receive to individuals with LBP who're frightened of pain or re-injury and hence keep away from PA in addition to those folks that persist in PA notwithstanding worsening symptoms [25, 26]. When low lower back ache is a symptom of some other severe ailment/disorder (e.g., diabetes), workout checking out and counseling ought to be guided by concerns related to the preceding situation. For all different causes, and within the absence of a comorbid situation (e.g., cardiovascular sickness [CVD] with its associated chance elements), pointers for exercise checking out and prescription are comparable as for healthy people. For the reason that the maximum majority of LBP cases aren't described, the focus of the exercising recommendations provided right here will address people with LBP that isn't always related with trauma or any particular underlying situations (e.g., cancer or infection).

## 8. Recommended Physical Exercise for Individuals with LBP

### Cardio-respiratory Exercise

Avoidance behavior because of ache can also bring about reduced PA, which may also lead to the unavoidable result of decreased cardio-respiratory fitness (CRF) [27]. Modern-day scientific research, but, has no longer proven a clear affiliation between CRF and pain [28]. A few studies have counseled individuals with LBP to workout checks to exhaustion. Submaximal workout tests are considered recommendable for people with LBP [26], however, actual or anticipated pain can also restriction submaximal trying out as often as maximal checking out [29, 26, 30, 31]. Consequently, the choice of maximal versus submaximal checking out in individuals with LBP should be guided by way of the identical considerations as for the healthful populace.

### 8.1. Muscular Strength and Endurance Exercise

Individuals with LBP often have troubles in trunk muscle electricity and patience and neuromuscular imbalance however, the effect those play within the development and progression of LBP remains not clear [32, 33]. Reduction in muscular electricity and staying power can be independent of the period and intensity of low back ache [34, 35].

### 8.2. Flexibility

There is no clean association between gross spinal flexibility and coffee returned ache. Different studies have shown relationships between measures of spine flexibility, hip flexibility, and low lower back ache [36], but the character of these relationships seems complex and wishes similarly look at. There appears to be some justification, although based totally on distinctly terrible proof, for flexibility trying out within the decrease limbs, and especially the hips of individuals with low back pain [36, 37]. In fashionable, flexibility trying out in people with low again ache must be guided through the similar considerations as for the healthy populace. It's miles essential, however, to pick out whether or not the assessment is confined by means of stretch tolerance of the target systems or exacerbation of low again pain signs and symptoms.

## 9. Exercise Prescription for Low Back Pain

Current recommendations for the treatment of low back pain consistently suggested physically active and avoiding sedentary lifestyle [3, 38, 14, 1, and 16]. Although it may be good to avoid exercise in the first some days immediately when an individual with an acute and severe episode of low back pain so as not to exacerbate symptoms [37] individuals with sub-acute and chronic low back pain, as well as recurrent low back pain, are motivated to be physically active. Within two weeks of an acute low back pain episode, activities can be carefully introduced. Regular walking is a best way to motivate individuals with low back pain to participate in exercise that does not bad symptoms [1]. Endurance exercise, particularly walking, biking, and swimming, has the good evidence of efficacy among exercise regimens, whether for who with acute, sub-acute, or chronic low back pain [15, 37].

Although there is a consensus that physical activity is very important in the management of chronic back pain, there is no commonly recommended exercise intervention that has demonstrated superiority [37]. When recommendations are provided, they should follow very closely with the recommendations for the healthy population, including resistance, endurance, and flexibility exercise. In chronic low back pain, physical exercise programs that incorporate individual tailoring, supervision, stretching, and strengthening are related with the best outcomes [13, 38]. Furthermore, the scientific evidence supporting the multidimensional nature of nonspecific chronic low back pain shows most favorable results with an individualized approach that indicates

psychological distress, fear avoidance beliefs and self-efficacy in managing pain.

## 10. Special Considerations During Physical Exercise Prescription for Individual with Low Back Pain

Trunk coordination, strengthening, and endurance exercises can be used to reduce low back pain and disability in individuals with sub-acute and chronic low back pain with movement coordination impairments [14].

Individual response to back pain can be improved by providing assurance, motivating activity, and emphasizing that more than 90% of low back pain complaints resolve without any specific therapies [37].

There is a lack of consensus on the definition, components, and assessment methods associated to core stability [40, 25].

Abdominal bracing (co-contraction of trunk muscles) [41] should because with extreme caution because the increases in spinal compression that occur with abdominal bracing. Limits should be placed on any activity that causes pain [42].

Repeated movements and exercises such as prone push-ups that promote centralization (*i.e.*, a reduction of pain in the lower limb from distal to proximal) are encouraged to reduce symptoms in patients with acute low back pain with associated lower extremity pain [14].

Flexibility exercises are generally encouraged as part of in any exercise program. Hip and lower limb flexibility should be promoted, although no stretching intervention studies have shown efficacy in managing or preventing low back pain

It is generally not suggested to use trunk stretching exercise as a treatment goal in low back pain [42].

Consider, low intensity endurance exercise for individuals with chronic low back pain with generalized pain (pain in more than one body part) and moderate-to-high intensity aerobic exercise for individuals with chronic low back pain without generalized pain [14].

Some exercise for Low back pain [12]:



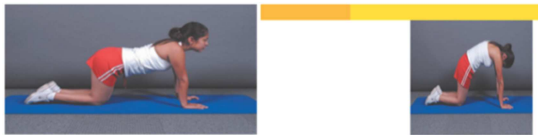
**Figure 1.** Curl-Up: Improved strength and endurance in the lower back and sides the abdomen.



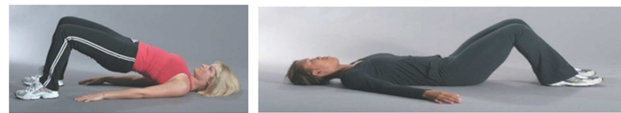
**Figure 2.** Trunk Twist: Improved flexibility.



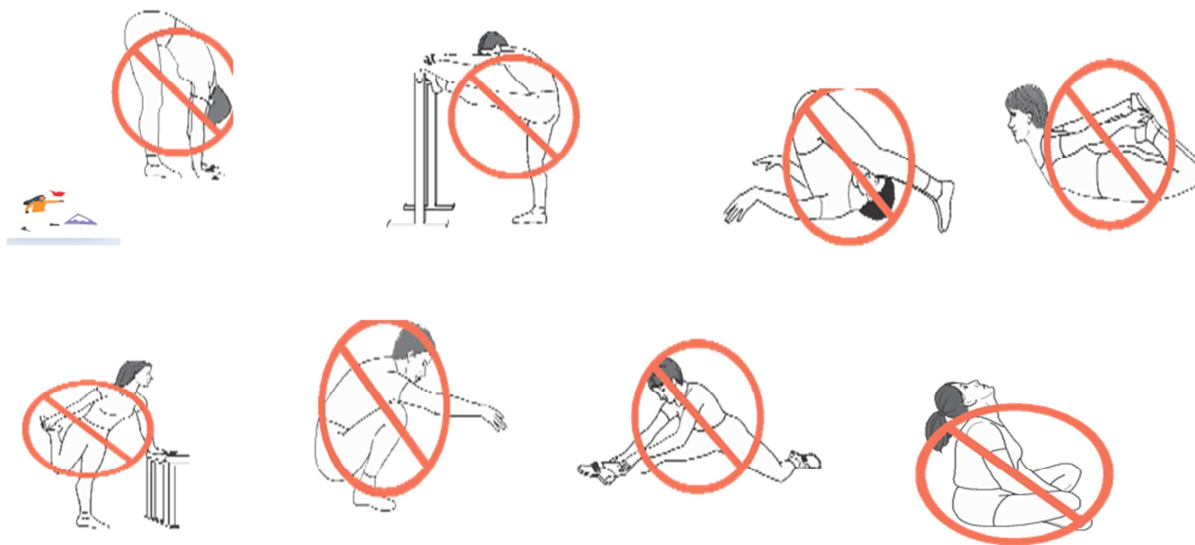
**Figure 3.** Wall Squat (Phantom Chair): Increased strength and Endurance in the lower back, thighs, and abdomen.



**Figure 4.** Cat Stretch used improved flexibility, relaxation, and reduced stiffness in the spine.



**Figure 5.** Back Bridge: Increased strength and endurance in the hips and buttocks.



**Figure 6.** Stretches exercise to Avoid for those individuals with low back pain.

## 11. Conclusion

Following any period of prolonged inactivity, a regimen of low-impact exercises is advised. Endurance exercise, particularly walking, biking, and swimming, has the good evidence of efficacy among exercise regimen, whether for whom with acute, sub-acute, or chronic low back pain. Speed walking, swimming, or stationary bike riding 30 minutes daily can increase muscle strength and flexibility. Yoga also can help stretch and strengthen muscles and improve posture. Emphasize muscular endurance rather than muscular strength-endurance is more protective. The exercises that follow are designed to help you maintain a healthy back by stretching and strengthening the major muscle groups that affect the back-the abdominal muscles, the muscles along your spine and sides, and the muscles of your hips and thighs. Risk factors associated with low-back pain include age, degenerative diseases such as arthritis or osteoporosis, a family or personal history of back pain or trauma, a sedentary lifestyle and occupational risk factors.

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