Therapeutic Application of Iyengar Yoga for Healing Chronic Low Back Pain

Kimberly Williams, Ph.D., Lois Steinberg, Ph.D., and John Petronis, M.S.

Abstract

Low back pain is a significant public health problem that has reached epidemic proportions. It places a substantial burden on the workforce and the health care system.[1] It has proven very difficult to treat, and it is one of the most commonly reported reasons for the use of complementary and alternative medicine.[2] Many different methods of Yoga exist and each has its own technique for preventing and treating disease. This article describes the rationale and method for the therapeutic application of Iyengar Yoga for chronic low back pain. Preliminary results are also presented from a pilot study evaluating the efficacy of a 16-week program of Iyengar Yoga therapy in persons with non-specific chronic low back pain.

Introduction

Yoga is a 5,000-year-old tradition whose classical aim is liberation from suffering in this life. Ancient texts make it clear that mental and physical illness or lack of health are impediments to this goal. Yoga was used in antiquity to overcome these impediments in preparation for attaining the goal of self-realization and liberation from suffering. Although the ancient seers recognized the health and healing effects of Yoga, they were not the primary goal of practice as is the case in America today. Yoga is now regarded in the West as a holistic approach to health and recently has been classified by the National Institutes of Health as a form of Complementary and Alternative Medicine (CAM).[3] In India, however, Yoga is not an alternative healing system but a part of mainstream medicine. In either case, this therapeutic application of Yoga requires the classical postures to be adapted to address the specific problems associated with each medical condition.

Many different methods of Yoga exist and each has its own technique for preventing and treating disease. The most common methods of Yoga therapy in the US are the Iyengar method, Viniyoga, Integrative Yoga Therapy, and Phoenix Rising Yoga Therapy. The Iyengar method is based on the teachings of the Yoga master B. K. S. Iyengar, author of the classics *Light on Yoga*[4] and *Light on Pranayama*.[5] Iyengar's teachings are deeply grounded in the ancient Yoga tradition, and his intense personal practice and more than 60 years of teaching have produced significant innovations. Among the most noteworthy are: 1) an emphasis on standing poses to develop strength, stability, stamina, concentration, and body alignment, 2) the use of props to facilitate learning and to adjust poses for those who are inflexible, and 3) instruction on how to use Yoga to ease various ailments and stress.

His system is based on the eight constituents of Patanjali's Astanga-Yoga that lead to self-realization and liberation. They include *yama, niyama, âsana, prânâyâma, pratyâhâra, dhârâna, dhyâna,* and *samâdhi*. Most schools of Yoga practice each limb separately using *âsana* as preparation for meditation. Iyengar's unique contribution has been the realization that all limbs may be

practiced and integrated into *âsana* and *prânâyâma*.

The therapeutic application of Iyengar Yoga has been used in medical settings[6,7] and in Yoga centers by teachers having Junior Intermediate III or higher certification.

This paper will describe the therapeutic application of Iyengar Yoga for treatment of chronic low back pain, the rationale behind the method, and preliminary findings from a pilot study evaluating the efficacy of a 16-week program with ambulatory adults with chronic low back pain.

The Goal of Yoga Therapy for Low Back Pain

The primary goal of Yoga therapy for low back pain (LBP) is the relief of pain and functional limitation caused by a chronic lower back disorder. This is achieved by minimizing, healing, and ultimately correcting underlying physical malfunctions through a series of anatomically correct postures. Unlike most conventional medical treatments that focus on treating LBP symptoms through medications and surgical procedures, Yoga therapy works to correct underlying internal malfunctions that contribute to mechanical causes of non-specific LBP. It is through the process of helping people with LBP to rest the area of pain and then educating them in proper alignment of bones, muscles, and connective tissue and movements that the healing occurs and changes the underlying root cause of the discomfort. The practice of Yoga is designed to educate students in the use of a daily regimen of self-care that acts to manage and ultimately prevent the recurrence of chronic LBP through healthy postural and movement patterns.

Reasons for Implementing Therapeutic Yoga for Low Back Pain

Although the regular practice of Iyengar Yoga is viewed to be healing and health retaining,[8,9] there are several reasons for implementing a therapeutic version of Yoga for someone with LBP. Classical postures require effort and skill to be health enhancing and therapeutic, whereas an individual in pain requires the injured area to rest prior to introducing corrective action. It also takes time to develop the awareness and neuromuscular coordination to perform the poses in a way that corrects imbalances contributing to LBP. In addition, Yoga therapy relies much more on external support through the use of props. This external support enables the student to rest the injured area and achieve correct postural alignment and movement in the postures.

Iyengar's system is based on the eight constituents of Patanjali's Astanga-Yoga that lead to self-realization and liberation.

Specific body positioning for each Yoga posture opens and creates space longitudinally, horizontally, and circumferentially without aggravating injured areas. Iyengar Yoga is noteworthy because this particular method incorporates props such as ropes, benches, bolsters, blankets, weights, straps, blocks, and other devices to provide support during performance of the postures. Props are useful for facilitating rest and relaxation, avoiding unnecessary strain, revealing latent muscle strains, inflammation, or restrictions due to stiffness or injury, and for helping the student achieve correct body position and movement in the postures. These props also help immobilize joints so that specific areas are targeted. They also provide controlled traction, which assists active or passive forms of movement depending on the pose and the capacity of the student. It is the ultimate goal of Yoga therapy to enable a student to attain a healthy back free from LBP. The teacher assists the student to transition from supported poses to the execution of classical poses without support. Practice of the classical postures furthers the student's awareness of latent imbalances and requires mastery of corrective movements.

The Evaluation Procedure

Iyengar Yoga therapy begins with an evaluation of an individual's known medical history for possible causes of pain followed by a diagnostic examination of the student. The instructor performs this initial examination as the student performs *tâdâsana* (mountain pose), a basic standing pose that permits the instructor to look for signs of dysfunction and imbalance in specific regions of the body such as the feet, legs, knees, hips, torso, chest, shoulders, neck, head, and carriage, and how these dysfunctions affect posture, levelness of the pelvic girdle, alignment of the spinal vertebrae, and gait. Attention is paid to the alignment of bones and pelvis, muscle tone, and the tightness, hardness, or color of the skin for signs of muscle imbalance and poor circulation.

The Yoga instructor continues to gain insight into the biomechanical causes of LBP from observing performance of the postures. Areas of tightness and hyperflexibility that create imbalances in the musculoskeletal system are exposed. The instructor is particularly interested in

evaluating a student's limitation of movement in several directions according to the person's height, weight, flexibility, and lifestyle (sedentary vs. active). In most students, dysfunction occurs due to either stiffness in the lower back muscles or tightness in the hips, quadriceps, hamstrings, groin, or thoracic spine. Such stiffness or tightness leads to difficulties in spinal and pelvic rotation, lateral bending, and forward or backward extension. Unlike many traditional physical therapy rehabilitative exercises that focus primarily on deficiencies in flexion or extension, therapeutic Iyengar Yoga works to enhance alignment, flexibility, mobility, and stability in all muscles and joints that affect spinal alignment and posture.[10]

Structuring the Therapy

The Iyengar principles of sequencing, timing, and intricacy of poses provide a framework for therapeutic instructors to structure the progression and content of therapy.[11] *Sequencing* refers to the deliberate progression of postures selected by an instructor to specifically target a group of muscles, with variations of postures that gradually release muscle tension, open up joint spaces, increase circulation, and decrease inflammation. It also refers to the order in which students are asked in more active poses to engage various muscle groups to achieve the correct alignment and movement in the postures.

Timing refers to the length of time each pose or *âsana* is held, depending on the capacity of the student, to optimize the release of tension and "opening" of joints while minimizing pain. Iyengar philosophy posits that passive weighted poses, such as prone *shavâsana* (corpse pose) and tractioned poses, such as prone *supta-pâdângushthâsana* (supine foot–big toe pose), should ideally be done for up to five minutes to reduce inflammation, achieve optimal length of the joint, muscle, and connective tissue, and to optimize retraining of muscles. When mobility is the goal, more active stretching is involved and poses are held for short time periods (15–20 seconds) and repeated up to 8 times so that soreness does not develop from strain or overstretching in beginners. Once mobility is achieved, the student is instructed to stay longer in the pose (1–2 minutes) with less repetition according to their capacity to regain proper anatomical alignment, flexibility, and strength.

Finally, all postures must be performed in a consciously aware manner that is fully appreciative of the *intricacy* of each adjustment, appraising, quantifying, and qualifying movements to obtain proper alignment in the pose. B. K. S. Iyengar noted that many beginning Yoga students have difficulty monitoring simultaneous contractions that must necessarily occur in multiple muscles groups to assure that a pose is performed to achieve the optimal therapeutic effect. For instance, in the fundamental position *tâdâsana* (mountain pose) students are asked to move their frontal thighs backward and their outer thighs inward, simultaneously. Cognitive awareness and control are required to insure that proper physical positioning occurs when many simultaneous and often opposing actions are to be performed in a posture. These movements are "intricate" and highlight the mind-body nature of Yoga that emphasizes awareness, concentration, and bidirectional communication between the mental, nervous, skeletal, and muscular systems.

Yoga is not a passive activity that simply occurs by itself; it instead requires an active mind and body integration to assure the anatomically correct pose occurs that stimulates all muscles and tissues to achieve proper alignment, strengthening, flexibility, stability, and physiological function of the surrounding tissues and organs. The intricacy that occurs allows practitioners to stay in the pose for longer periods of time, at first with effort. As they practice and progress, they can remain in the pose with a lightness and ease. Sustaining the posture in a dynamic state permits positive physical and psychological changes to occur, and intricacy is thus central to the healing of musculoskeletal imbalances. Maintaining a number of opposing muscular movements creates internal traction that lengthens constricted muscles and connective tissue and increases disc and joint space.

All postures must be performed in a consciously aware manner that is fully appreciative of the intricacy of each movement.

The Setting

Iyengar Yoga instructors work either individually or in a classroom setting with each student to create a series of postures to perform at each session that are most beneficial for each individual and that are practiced in a manner that minimizes potential harm to the student. A typical therapy session will start with several passive postures that are variations of a selected movement

(e.g., groin extension or hip opener) and move toward postures that the student must work actively to achieve involving countering the force of gravity. The end of a session is concluded with passive postures to quiet the mind and relax the body. As the student progresses, the passive postures at the beginning of the session are eliminated.

The Method

The Iyengar method of Yoga therapy for LBP targets a number of areas in the body by using a series of postures from all categories of poses to address imbalances in those areas.[12] Postures are structured to work peripherally from the injury site. The initial poses address gross or superficial layers of the imbalance or misalignment. These are followed by more challenging poses that affect deeper or more subtle misalignments. Each pose in a sequence adds to students' understanding of the imbalance and teaches students how to correctly align and work their musculoskeletal system.

Students are first introduced to passive postures aimed at relieving pain. These postures are held from *1–2 minutes* using props for support so that the student can learn to be aware of muscular and mental tension and allow it to release. According to the amount of pain the student is experiencing, instructions are repeated to help the student release incorrect gripping of the muscles and bring awareness of correct movements in the pose. Students experiencing greater pain have less capacity to focus attention and greater musculoskeletal imbalances to overcome. As a result, they require more repetition of instruction. The passive postures work to release tight superficial back muscles, increase circulation to the injured area, and decrease inflammation. It is important for the muscles to release and return to their normal position relative to tissues, bones, and organs prior to a more active phase of correcting underlying imbalances. External props such as plate weights and sandbags in conjunction with gravity are used to encourage tight muscles and tissues to relax.

Besides providing rest to the injured area, the passive postures impose a gentle lengthening of tight or inflexible areas and begin realigning imbalanced areas and increase flexibility in joints, connective tissues, and muscles.

The more active corrective phase of Yoga is consistent with current sports medicine approaches to LBP therapy.

Passive postures also enable the learning of different actions in poses by students prior to their attempt to practice the more demanding standing positions. Standing postures require increased body awareness, stability, and balance. Students are educated from the beginning to be aware of the differences between "healthy" discomfort due to lengthening tight muscles and opening joints versus unhealthy pain caused by pulling muscles too aggressively or in an anatomically or structurally incorrect way. A quiet focused attention heightens observation of internal states, so that during performance of postures the individual is more sensitive to the effects of the pose that are soothing or aggravating, which muscles and joints are tight, and which side of the body is performing correctly or incorrectly. This enables students to make corrections in position from this feedback with the help of the teacher.

These passive postures are followed by supported postures involving more active stretching. This is achieved by providing traction in these postures by the gentle physical adjustment of an instructor, and by the use of external props such as wall ropes, benches, trestle, and gravity. Gravity is a powerful force that is used to release muscular tension (sandbags, weights as noted above) and to create extension in the spine. This is initially provided through external support but is ultimately created by forces in the body of the skilled student, which counter the force of gravity.

As back pain mitigates and flexibility, strength, and postural alignment improve, instructors guide students through postures that challenge the back. The more active corrective phase of Yoga is consistent with current sports medicine approaches to LBP therapy in which patients must actively treat the low back pain through physical work that initially causes discomfort but reduces pain relative to a passive treatment protocol.[13] To work safely, Yoga students learn to use their intellectual judgment to discriminate between healthy and unhealthy pain.

Students learn how to control their body position and posture by gradually introducing more challenging versions of the posture. The sequence of postures progresses from supported poses on the floor in supine or prone positions and moves toward seated, standing, or inverted positions, forward or backward bends, and lateral rotational twists. Students progress gradually to postures that increase the range of flexion and extension of the hip joint and lengthen the hamstrings, hip adductors, lateral rotators, and psoas muscle by releasing tense groins. They also progress to more challenging

postures with less support and modification that retrain the deeper and smaller back muscles.

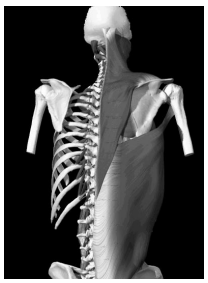
The move toward more active postures requires students to actively work to contract their muscles in an isometric contraction. All postures require the coordinated movement of agonist and antagonist muscles. Reciprocal inhibition involves the release of the antagonist muscle while the agonist muscle contracts. Proprioceptive neuromuscular facilitation involves isometric contraction of the muscles while they are being lengthened. Both techniques are taught in Iyengar Yoga through the principle of intricacy. In contrast, isotonic contraction, which shortens the muscle through repetitive motion, is avoided in Iyengar Yoga. Load-bearing poses that counter the force of gravity, such as standing poses and inversions, challenge students to develop strength and stamina. Aligning the bones and creating internal traction through intricate movements of the muscles and skin achieve this. As a result, the muscles are strengthened in their lengthened state.

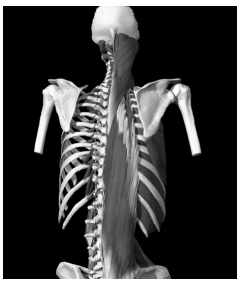
The Yoga instructor targets many muscle groups with various categories of Yoga postures to foster balanced mobility in the spine, to lengthen and widen constricted or stiff muscles, and to strengthen those that are underutilized. Yoga postures lengthen, tone, and reeducate all muscles that cause aggravation of the lower back to reinforce proper motor patterns. These include all the muscles that attach to or influence the pelvic girdle, including muscles of the abdomen, diaphragm, hamstrings, quadriceps, hip adductors and lateral rotators, buttocks, and muscles of the lumbar and thoracic areas of the back. The deep muscles of the back, including the erector spinae and transversospinalis muscles, are specific targets. These small muscles are frequently overpowered by stronger and larger peripheral muscles, which necessitates motor unit reeducation. In addition to stiffness, hypermobility is a problem that needs to be addressed by teaching students how to stabilize these areas. Initially, this task is accomplished with external support with props, followed by independent action done by students as they learn how to align their bones and work their muscles to create stability (e.g., standing on the feet and legs properly and raising the anterior spine to create proper alignment of the pelvis and femur heads in the acetabulum).

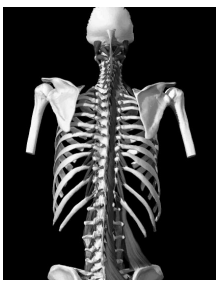
Themes Governing the Therapeutic Regime

A number of themes govern the therapeutic regime. These include:

1) Lengthening the back extensor muscles (latissimus dorsi, erector spinae, multifidi, quadratus lumborum) evenly on both sides of the torso decreases compression in the lower back. This involves creating an internal traction by elevating the sternum and lengthening the lower back through moving the buttocks inferiorly away from the waist. The sequence of poses includes: *shavâsana* II, *supta-pavanamuktâsana*, *pavanamuktâsana* on the bench, *ardha-uttânâsana* over *halâsana* box and stool, *adho-mukha-shvanâsana* using upper wall ropes to traction and align the hips against gravity, *adho-mukha-vîrâsana , ûrdhva-dandâsana,* supported *garbha-pindâsana* using wall ropes, *dandâsana, janu-shîrshâsana*, and *pashcimottânâsana*.


Latissimus Dorsi

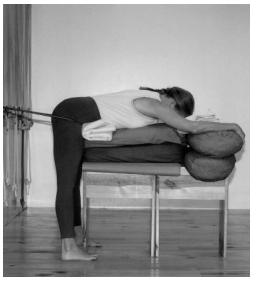

Erector Spinae Multifidi


Quadratus Lumborum

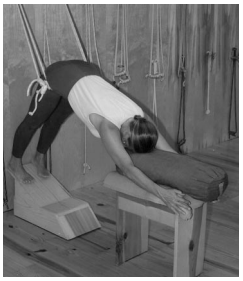
Shavâsana II

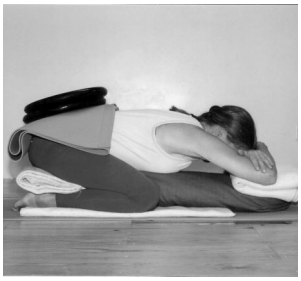
Supta-Pavanamuktâsana

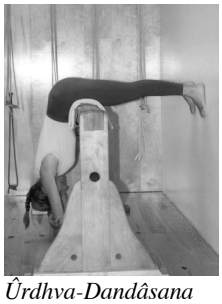
Pavanmuktâsana


Ardha-Uttânâsana

Ardha-Uttânâsana


Adho-Mukha-Svanâsana


Adho-Mukha-Vîrâsana


Ûrdhva-Dandâsana

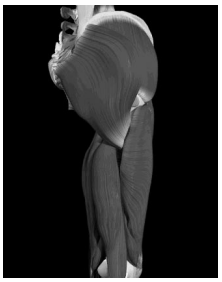
Garbha-Pindâsana

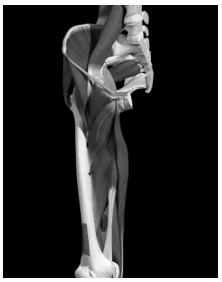
Dandâsana

Janu-Shîrshâsana

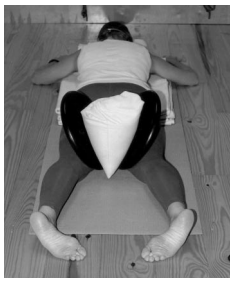
Pashcimottânâsana

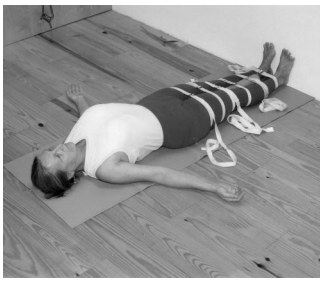
2) Broadening the back of the pelvis is achieved by moving the front thighs back, internally rotating the femurs, and drawing the outer thighs up and in toward the hip socket, and by moving the buttocks down and the tailbone forward (posterior pelvic tilt). The movement created in the sacroiliac (SI) joints by the above maneuvers is referred to as gapping or distracting the SI joint and serves to relieve compression of the SI joints and the sciatic nerve. These lower extremity and pelvic movements also function to properly align the femural heads by contracting the hip adductors and relaxing the hip external rotators. Co-contraction of the quadriceps, hamstrings, tensor fascia latae, and gluteus maximus is performed to help stabilize the broad pelvis created by the above actions. Contraction of these hip and thigh muscles is required for the correct performance of all symmetrical poses (*tâdâsana, uttânâsana, adho-mukha-shvânâsana, prasârita-pâdottânâsana, dandâsana, pashcimottânâsana, shîrshâsana,* and *sarvângâsana*) and in the grounded leg of many asymmetrical poses (*supta-pâdângushthâsana* I & II, *utthita-hasta-pâdângushthâsana* I & II, standing *marîcyâsana, parivritta-trikonâsana*, and *parivritta-ardha-candrâsana*). Sequencing to learn this action includes: prone *shavâsana, supta-tâdâsana* with legs tied together, *ûrdhva-prasârita-pâdâsana, tâdâsana* with brick between the thighs, *ardha-uttânâsana* over box, platform, and stool, *adho-mukha-shvânâsana, prasârita-pâdottânâsana, utthita-padmâsana* using the stool, *parivritta-trikonâsana, parivritta-pârshvakonâsana*, and *parivritta-ardha-candrâsana*. (See thematic category #5 for illustrations of the last three *âsanas*.)

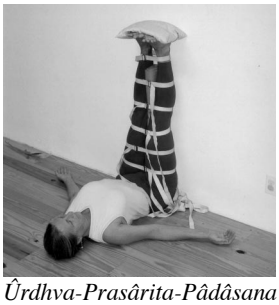

Abductors


Adductors

External hip rotators


Prone Shavâsana


Supta-Tâdâsana


Ûrdhva-Prasârita-Pâdâsana

Ardha-Uttânâsana

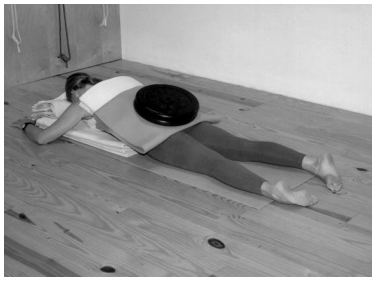
Adho-Mukha-Shvânâsana

Prasârita-Pâdottânâsana

Utthita-Padmâsana

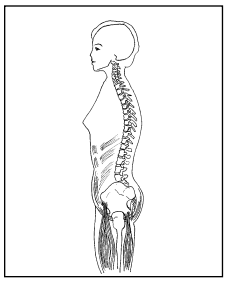
3) SI joint compression is reduced by decreasing tension in the buttock region created by shortening and overwork of the gluteal and hip lateral rotator musculature. This is achieved by manually turning the thighs inward (hip internal rotation) to broaden the back of the buttock with assistance from the use of weighted props placed on the buttock in the prone position. The added weight encourages lengthening of the buttock muscles. Sequencing includes: prone *shavâsana* (an assistant pressing knuckles into SI joint and buttock area; weight on sacrum), *supta-pâdângushthâsana* II prone with an assistant pressing the buttock inferiorly toward the feet, and watching for signs of tension in the buttocks in *tâdâsana, trikonâsana, vîrabhadrâsana* II, *pârshvakonâsana, ardha-candrâsana, vîrabhadrâsana* III, and backbends.

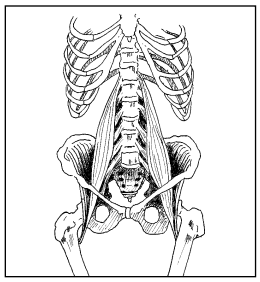
Prone Shavâsana


Prone Shavâsana

Prone Supta-Pâdângushthâsana II

4) Proper alignment of the pelvis from right to left in the frontal plane (i.e., pelvic bones are of the same height on the right and left sides of the body) and from front to back in the sagittal plane (avoiding anterior or posterior pelvic tilt) is achieved to ensure an equal distribution of the weight-bearing load on the legs so that excessive force is not placed on the spine in various positions. This occurs when the musculature of the lumbar spine, pelvis, and hips is balanced. This balance is achieved in Yoga therapy by lengthening, toning, and strengthening the muscles attached to these anatomical areas. They include the hamstrings, the hip adductors (inner thighs), abductors (outer thighs,) and rotators, the abdominals, and the back muscles (especially the quadratus lumborum). Sequencing includes: *supta-pâdângushthâsana* II prone, *supta-pâdângushthâsana* I and II supine (wall support followed by assisted traction followed by the use of a strap), and *utthita-hasta-pâdângushthâsana* I and II. Once pelvic alignment has been accomplished in the above poses, the student is challenged to maintain alignment in the following standing poses: *utthita-hasta-pâdâsana, utthita-trikonâsana, utthita-pârshvakonâsana, ardha-candrâsana, pârshvottânâsana, prasârita-pâdottânâsana, vîrabhadrâsana* III, and *parighâsana*.


Pelvis and Spine


Iliopsoas and Pelvis

Prone Supta-Pâdângushthâsana II

Supta-Pâdângushthâsana I

Supta-Pâdângushthâsana I

Utthita-Hasta-Pâdângushthâsana II

Utthita-Hasta-Pâdâsana

Utthita-Trikonâsana

Utthita-Pârshvakonâsana

Ardha-Candrâsana

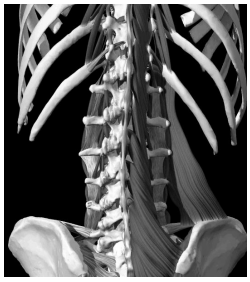
Pârshvottânâsana

Prasârita-Pâdottânâsana

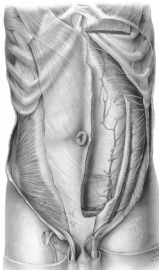
Vîrabhadrâsana III

Parighâsana

5) Rotating the spine is performed to access the deep layer of back muscles in order to realign the vertebrae, increase the intervertebral disc space, and decrease possible impingement of spinal nerve roots. This is achieved during spinal rotation by lengthening the spine through the elevation of the sternum and ribs and by stabilizing the pelvis so that it does not rotate with the spine. Active rotation of the spine activates the deep posterior back muscles, which include the rotators, the transversospinalis group, and the anterior abdominal oblique muscles. This trunk rotation maneuver coupled with active spinal extension performed by active contraction of the erector spinae muscles also will function to properly align the spine and lengthen the rectus abdominus. The latter muscle often becomes shortened in individuals with poorly aligned posture. Internal rotation of the hip relaxes and in some poses lengthens the hip lateral rotators, thus serving to maintain a broad pelvis. Sequencing includes: *bharadvâjâsana* on the chair, *utthita-marîcyâsana, marîcyâsana* III on *simhâsana* box, *ardha-matsyendrâsana* I, *parivritta-trikonâsana, parivritta-pârshvakonâsana, parivritta-ardha-candrâsana*, and *jathara-parivartanâsana* with knees bent.


Rotator

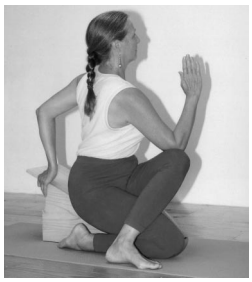
External Oblique

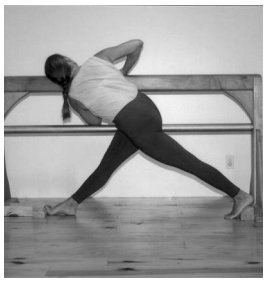

Internal oblique

Bharadvâjâsana

Utthita-Marîcyâsana

Marîcyâsana III


Ardha-Matsyendrâsana I

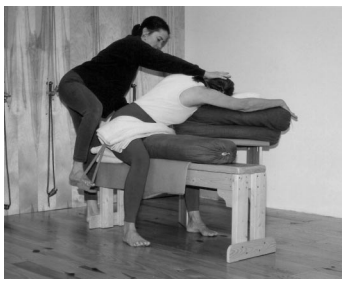

Parivritta-Trikonâsana

Parivritta-Pârshvakonâsana

Parivritta-Ardha-Candrâsana

Jathara-Parivartanâsana

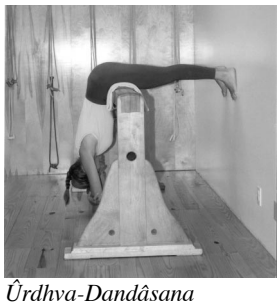
6) Trunk rotation with hip flexion and side bending with hip abduction to the same side releases tension in both the back and the side of the trunk. The former position is achieved by bending to one side at the hip and rotating the trunk while maintaining spine extension. Movements in both poses involve the quadratus lumborum and the abdominal oblique muscles. When bending to the right, both muscles are eccentrically contracted on the left to lower the trunk to the right and eventually lengthened on the left once the pose is complete. With one arm over the head, the latissimus dorsi muscle is lengthened on the same side of the trunk as the raised arm. Extension of the spine is maintained during trunk rotation and side bending by the elevation of the sternum and erector spinae contraction. This also lengthens the rectus abdominus. Sequence includes: *pârshva-pavanamuktâsana* and *parighâsana*.



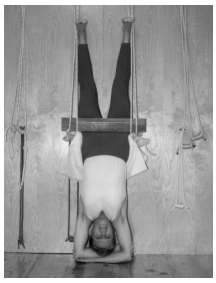
Pârshva-Pavanamuktâsana

Parighâsana

7) The compressive effects of gravity on the intervertebral disc space are reversed through performance of inverted poses that use external support (props) and the weight of the upper body to create a traction effect on the spine. In these poses, with the knees in terminal extension and the props supporting the legs and pelvis, the back extensors lengthen resulting in a traction effect on the lumbar, thoracic, and cervical spine. Sequence includes: *ûrdhva-dandâsana*, rope *shîrshâsana*, and *halâsana*.



Ûrdhva-Dandâsana

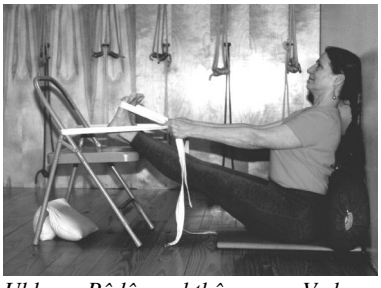


Rope Shîrshâsana

Halâsana

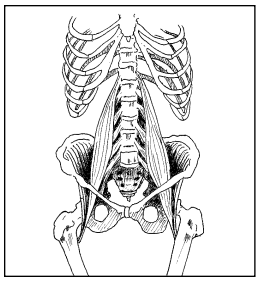
8) The abdominal muscles (rectus abdominus, internal and external obliques) are toned to prevent anterior pelvic tilt by elevating the sternum, contracting the abdominals to lift the legs off the floor, and rotating the spine. Sequence includes: *jathara-parivartanâsana* with knees bent, *ubhaya-pâdângushthâsana* or V-shape supported by a chair, plus standing poses and back extensions.

Jathara-Parivartanâsana

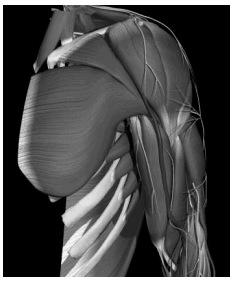


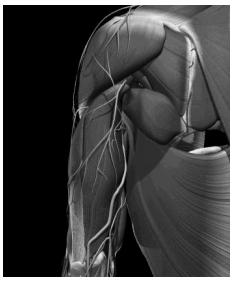
Ubhaya-Pâdângushthâsana or V-shape

9) Mobility of the sacrum, shoulder girdle, and thoracic spine is increased and lumbar spine and pelvic stability is established in order to distribute the concave curvature in back extensions evenly throughout the spine. All the actions listed in thematic category #2 are required to maintain the stability of the pelvis during back extensions. In addition, the iliopsoas major must lengthen in order for the sacrum to move forward to prevent compression of the lumbar spine during back extensions. The normal kyphotic curve of the thoracic spine is decreased by performing active thoracic spine extension (erector spinae) and by elevating the sternum and ribs. Proper alignment of the shoulder girdle together with increasing its mobility is accomplished by activating scapular adductors and depressors (trapezius) to draw shoulders back and down and by lengthening pectoralis major and minor. Active extension of a normally aligned spine strengthens and increases endurance of the back muscles that can contribute to the reduction of interveterbral disc space compression. Sequence includes the following supported poses: *vîrabhadrâsana* I at the trestler, *ûrdhva-mukha-shvânâsana* on the stool or using upper wall ropes, *ushtrâsana* over bolsters on the *halâsana* box, *ûrdhva-dhanurâsana* over trestler or using the backbender, *sâlamba-sarvângâsana* at the trestler, and *shalabhâsana* over bolsters.

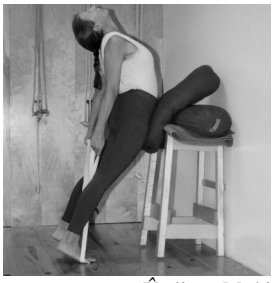

Iliopsoas and Pelvis

Hip Flexors


Chest Muscles

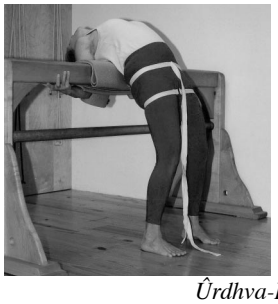

Upper Back Muscles

Vîrabhadrâsana I

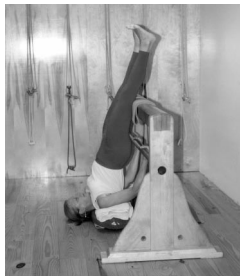


Ûrdhva-Mukha-Shvânâsana

Ushtrâsana



Ûrdhva-Dhanurâsana


Sâlamba-Sarvângâsana

Shalabhâsana

Scientific Studies of Yoga Therapy for LBP

The scientific study of Yoga is in its infancy. To date, there has only been one study in a peer-reviewed journal on the effect of Yoga on LBP. Vidyasagar et al. examined the effect of Yoga on non-specific LBP in 33 patients.[14] In the 29 patients that were followed, 22 reported complete pain relief, 5 required modification of the therapy because of severe pain, and 7 obtained no pain relief and discontinued treatment. The Yoga intervention consisted of three phases, each three weeks long, and primarily used classical postures involving back extension. In the first phase, patients practiced *nirâlambâsana* and *bhujângâsana* daily for 45 minutes with 10 minute intervals of rest in *makarâsana*. In the second phase, patients practiced *pârvatâsana* and *ushtrâsana*. In the third phase, patients practiced *shalabhâsana* and *dhanurâsana*. Although

the majority of patients reported pain relief, this study was not adequately controlled, had a small sample size, and did not describe how pain status was assessed.

There are very few studies of Iyengar Yoga. However, those that have been done have been well designed and have overcome some of the pitfalls of other Yoga studies. Garfinkle et al. conducted two well-controlled studies of the therapeutic application of Iyengar Yoga on carpel tunnel syndrome and osteoarthritis of the hands.[15,16] Subjects randomized to the Yoga regime in both studies demonstrated significant improvements compared to control groups. Patients with carpal tunnel syndrome reported significant improvement in grip strength, phalen sign, and pain reduction whereas patients with osteoarthritis reported significant improvements in pain during activity, tenderness, and finger range of motion. DiCarlo et al. compared the cardiovascular, metabolic, and perceptual responses of 10 beginning subjects performing a vigorous routine of Iyengar-style standing poses to a 32-minute treadmill walk.[17] They found that heart rate, blood pressure, and perceived level of exertion were higher during Yoga than treadmill walking, while oxygen consumption was higher during walking than Yoga. This study used a very demanding protocol for beginning students, and poses would not typically be held for 40 seconds each side with beginners.

This study examines the therapeutic application of Iyengar Yoga in people with chronic LBP. The intervention is quite different from that used by Vidyasagar et al.[18] No back extensions were taught during the 16-week Iyengar Yoga therapy program described below. Furthermore, when back extensions are incorporated in Iyengar yoga therapy, they are done using props for external support. They are taught after the student has learned the basic actions in standing and seated poses, inversions, forward bends, and twists. According to B. K. S. Iyengar, the above back extensions used by Vidyasagar[19] are harmful to persons with LBP who are not trained in the intricate movements of the pose. Beginners are unable to obtain correct alignment of the spinal vertebrae and musculature in the back extensions without the guidance of an experienced teacher in the Iyengar method and without external support. B. K. S. Iyengar has observed that although there is a concave appearance of the back bend, in the untrained student the spinal vertebrae undergo an incorrect convex movement, along with the musculature improperly contracting toward the vertebrae.

The current study uses a randomized controlled trial with subjects with nonspecific chronic LBP to compare Iyengar Yoga therapy to an educational control group receiving weekly newsletters on topics related to recovery of LBP. Both programs were 16 weeks long and included two education sessions on chronic LBP by a physical therapist and an occupational therapist prior to the start of the programs. Study inclusion criteria were as follows: history of nonspecific LBP with symptoms for ≥ three months, >18 years of age, English speaking, and ambulatory. Individuals were excluded if their LBP was due to nerve root compression, disc prolapse, spinal stenosis, tumor, spinal infection, alkylosing spondylitis, spondylolisthesis, kyphosis, structural scoliosis, symptomatic osteoarthritis or degenerating disc disease, or a widespread neurological disorder. Also precluded were pre-surgical candidates involved in litigation or compensation, those who had a compromised cardiopulmonary system, were pregnant, had a body mass index ≥ 35, and/or had major depression or a substance abuse issue. Only individuals who were willing to commit to attending 14 of the 16 weeks of classes (if randomized to the Yoga therapy group) and who agreed to forgo other forms of CAM during the study were included. Both groups were allowed to continue medical care for LBP.

The following results were obtained from a study by Williams et al.[20] Of 210 candidates invited to participate in the study, 70 (33%) met the inclusion criteria and 60 (29%) agreed to enroll. One hundred-forty candidates were excluded before enrollment for the following reasons: logistical conflicts (72.8%), contraindicated medical conditions (13.6%), unwillingness to forgo other forms of CAM (13.6%). In addition, ten (14.3%) of the 70 eligible candidates dropped out before enrollment. Three of the remaining 60 eligible subjects were excluded following the start of the study due to pregnancy, degenerative disc disease, and a herniated disc. Out of 57 subjects enrolled at the beginning of the study 42 completed the study, giving an overall rate of completion of 74%. Of the 20 subjects completing the Yoga intervention, an attendance rate of 91.9% was achieved for the 16-week protocol.

Of the final 42 participants who completed the entire study, the overall mean age was 48.3 ± 1.5 years with the youngest participant 23 years old and the oldest 67. Ninety-one percent of the participants in the study were Caucasian (N=40) with ethnic diversity represented by two African-Americans (4.5%), one Asian (2.2%), and one Native American (2.2%). Sixty-eight percent of the sample was female and 32% was

male. Subjects had LBP for an average of 11.2 ± 1.54 years, 48% used pain medication, and 30% used some form of CAM for LBP. A one-way analysis of variance (unpaired t-test) revealed no significant differences in demographics and medical history between the Yoga group and the control group ($p > .05$) suggesting that randomization was effective. Comparison of baseline scores of outcome variables in the two groups indicated that no significant differences existed in the majority of variables with the exception of 4 subscale scores. The Yoga group reported significantly higher functional ability on the self-efficacy questionnaire ($p=.005$), lower catastrophizing on the coping strategies questionnaire ($p=.007$), and less perceived disability ($p=.002$) and harm ($p=.02$) on the survey of pain attitudes questionnaire than the control group.

One-way analysis of demographic factors, medical history, baseline pain intensity, and disability comparing subjects who completed the study (N=42) and subjects who either dropped out or were lost to follow-up (N=15) revealed no significant between-group differences in demographics or baseline disability or pain intensity. However, non-completers had LBP for a longer period of time (16.4 ± 2.5 yrs) compared to completers (10.21 ± 1.51 yrs).

In the Yoga group, there was 84% attendance of classes (including dropouts; 92% excluding dropouts) and a 74% completion rate at the post and three-month follow-up. In the control group, 80% of subjects completed the post assessment and 73% completed the three-month follow-up assessment.

In the analysis of covariance that controlled for baseline score, subjects in the Yoga therapy group reported significant improvements in the primary outcome and in a number of secondary outcomes compared to the control group after completion of the program. These include a 77% reduction in functional disability ($p=.0053$), 64% decrease in present pain ($p=.0180$), 10% increase in standing hip flexion ($p=.015$), and 25% increase in perceived control over pain ($p=.005$). In addition, the Yoga group has a trend toward greater pain tolerance to pressure compared to controls at a number of locations in the low back and pelvis. These include standard trigger point locations for right gluteus medius ($p=.053$), right iliocostalis ($p=.085$), and left iliocostalis ($p=.08$). Between-group differences were only obtained in pain tolerance on the left quadratus lumborum muscle ($p=.016$).The Yoga group had a 16% increase in pain tolerance at this site after the 16-week Yoga therapy program. Pain medication usage was also significantly reduced in the Yoga group compared to the control group at both post and three-month follow-up assessments ($p < .01$). In the Yoga group, 88% of the subjects taking pain medication for LBP at baseline either stopped or used less compared to 35% in the control group immediately after completion of the program.

These preliminary data are important for a number of reasons. They determined that the majority of self-referred persons with nonspecific chronic LBP would comply with Iyengar Yoga therapy. Furthermore, a significant number of subjects reported improvement in pain-related outcomes from a 16-week program. From the variety of outcomes tested, present pain intensity, functional disability, perceived control over pain, and hip flexion were significantly improved and pain medication usage was decreased by Iyenger Yoga therapy. Surprisingly, beliefs, attitudes, and behaviors about pain, with the exception of perceived control over pain, were not significantly different from the control after the intervention. This may be due to the weekly education of the control group about a variety of topics related to chronic LBP including psychological and behavioral factors. The pilot study gave the Yoga instructor and assistants an opportunity to test the 16-week Yoga therapy curriculum. It was quickly realized that the time allotted was too short to deliver the complete protocol for LBP designed by B. K. S. Iyengar as described above and for subjects to become proficient in the actions and alignment required for optimal therapeutic benefit. The subjects also expressed that they were just beginning to become proficient in the poses by the end of the program and would have liked to continue. Thus future studies will involve a longer program and the opportunity for students to practice the poses outside of class time at the Yoga studio under supervision. We have submitted a proposal to the National Center for Complementary and Alternative Medicine at the National Institutes of Health to continue this research.

I would like to thank all the people who have helped me to understand the therapeutic application of Iyengar Yoga for chronic low back pain. First and foremost, I would like to acknowledge the genius of B. K. S. Iyengar and how his deep understanding of Yoga guided him in the development of this program. I am deeply grateful for his suggestions for this article. I would also like to thank Geeta Iyengar for her guidance in my own recovery from chronic low back pain at the Ramamani Iyengar Memorial Yoga Institute in Pune, India. Special thanks to

the senior Iyengar teachers (Marlene Mawhinney, Lois Steinberg, and Manouso Manous) and Iyengar-trained clinicians who continue to teach me how to stay pain free through proper performance of âsana. *I would also like to acknowledge the assistance of David Goodrich, Marybeth Korf, N. Noerachmanto, and Kirsten Dennison in the preparation of this manuscript. Special thanks to graphic artist Francoise Stauber for her drawings of the musculoskeletal system pertaining to the back.*

With the exception of the "Pelvis and Spine" and "Iliopsoas and Pelvis" illustrations, all musculoskeletal images courtesy of Primal Pictures. For more information on their interactive 3D anatomy software please go to www.primalpictures.com.

Endnotes

1. Druss, B. G., S. C. Marcus, M. Olfson, and H. A. Pincus. The most expensive medical conditions in America. *Health Affairs*, 2002, 21:105–111.

2. Eisenberg, D. M., R. C. Kessler, C. Foster, F. E. Norlock, D. R. Calkins, and T. L. Delbanco. Unconventional medicine in the United States: Prevalence, costs, and patterns of use. *The New England Journal of Medicine*, 1993, 328:246–252.

3. NCCAM. Mind-body interventions. 20 Sep 2003. URL: http://nccam.nih.gov/health/whatiscam/.

4. Iyengar, B. K. S. *Light on Yoga*. New York: Schocken Books, 1976.

5. Iyengar, B. K. S. *Light on Pranayama: The Yogic Art of Breathing*. New York: Crossroad Publishing, 1989.

6. Schatz, M. P. *Back Care Basics*. Berkeley, Calif.: Rodmell Press, 1992.

7. Raman, K. *A Matter of Health: Integration of Yoga and Western Medicine for Prevention and Cure*. Chennai (Madras), India: Eastwest Books, 1998.

8. Garfinkel, M. S., H. R. Schumacher, Jr., A, Husain, M. Levy, and R. A. Reshetar. Evaluation of a yoga based regimen for treatment of osteoarthritis of the hands. *Journal of Rheumatology*, 1994, 21: 2341–2343.

9. Garfinkel, M. S., A. Singhal, W. A. Katz, D. A. Allan, R. Reshetar, and H. R. Schumacher, Jr. Yoga-based intervention for carpal tunnel syndrome: A randomized trial. *Journal of the American Medical Association*, 1998, 280:1601–1603.

10. Schatz, op. cit.

11. Iyengar, P. S. Yoga and the new millennium. *Yoga Rahasya,* 1998.

12. Steinberg, L. *Iyengar Yoga Therapeutics: The Lower Back*. Unpublished work, 2002.

13. Lively, M. W. Sports medicine approach to low back pain. *Southern Medical Journal*, 2002, 95:642–646.

14. Vidyasagar, J. V. S., B. N. Prasad, M. V. Reddy, P. S. Raju, M. Jayshankar, and K. Sampath. Effects of yoga practices in non-specific low back pain. *Clinical Proceedings of NIMS*, 1989, 4:160–164.

15. Garfinkel, Schumacher, et al., op. cit.

16. Garfinkel, Singhal, et al., op. cit.

17. DiCarlo, L. J., P. B. Sparling, B. T. Hinson, T. K. Snow, and L. B. Rosskopf. Cardiovascular, metabolic, and perceptual responses to hatha yoga standing poses. *Medicine, Exercise, Nutrition and Health*, 1995, 4:107–112.

18. Vidyasagar et al., op. cit.

19. Ibid.

20. Williams, K., J. Petronis, D. Smith, L. Steinberg, E. Doyle, M. Kolar, et al. Effect of Iyengar Yoga therapy on chronic low back pain. Submitted to *Pain Journal* 2003.

© Kimberly Williams, Lois Steinberg, and John J. Petronis 2003

Kimberly Williams
Tel.: 304-293-7559
Email: *kwilliams@hsc.wvu.edu*

Lois Steinberg
Tel.: 217-344-YOGA
Email: *lsteinbe@uiuc.edu*

John Petronis
Tel.: 304-293-1561
Email: *jpetronis@hsc.wvu.edu*