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Yoga: a therapeutic approach

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The practice of yoga in the Indian subcontinent has been documented as early as 3000 B.C. The word *yoga* comes from the same Sanskrit root as the word for *yoke*; it implies harnessing oneself to a discipline or a way of life. This technique has a universal appeal in that it is not associated with religious faith, and it is considered a technique of personal development. There are several types of yoga; two are Hatha and Raja yoga, the most commonly practiced in the West. Yoga involves disciplining the mind and body through exercises and meditation.

Sage Patanjali's original description of yoga-sutra is in Sanskrit language in poetic form. Originally taught in the oral tradition, yoga-sutra later was transcribed in various languages. The original translation states that yoga is proof in itself of its benefits and has been practiced for several hundred years. It since has stood the test of time.

Yoga includes meditation, relaxation, control of breathing, and various physical postures (*asanas*). Regular practice of yoga establishes natural harmony and functional balance between various organ systems, leading to better health and a feeling of well-being.

Yoga exercises strengthen and increase tone of weak muscles and help with conscious control over autonomic functions of the body. Yoga postures, called *asanas,* help with developing correct breathing patterns, bowel habits, and regular sleeping patterns. It teaches the art of relaxation, relieving muscular and nervous tension and leads to increased energy.

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Asanas means "posture" in Sanskrit. Yoga-asanas involve standing, sitting, kneeling, lying, balancing, inverted positions, stretching, twisting, and contraction and relaxation of muscles, producing a steady posture at a given time. It is important to start yoga practices at a slow pace with slow, smooth, steady coordinated movements with full control at every stage. A regular routine is as essential as the intensity of asanas. It is beneficial to perform asanas in a quiet, well-ventilated area with the least distraction and free of dust and cold breeze.

This article describes only a few asanas that most commonly help with health maintenance and disease control. The asanas described are a compilation of several yoga texts The names of asanas are Sanskrit words and usually correspond to the posture depicting the meaning of the word (eg, *shavasana* [corpse pose], *padmasana* [lotus pose], *bhujangasana* [cobra pose]). Figs. 1–9 illustrate some common asnas.

Pranayama

Pranayama is an essential part of yoga postures. It is the science of breath. *Prana* means "breath, life, vitality, wind, and energy." *Ayama* means "length, expansion, stretching, or restraint." There are several techniques of pranayama. This article touches only on the basics. Personal supervision by a training teacher or guru is desirable for pranayama training.

Fig. 1. Padmasana: lotus pose. This cross-legged position is a basic pose in several asanas performed. Sit on the floor with spine upright. Hold the right foot with the hands, and cross the leg across to the opposite thigh. Repeat the same with the left leg.

Fig. 2. Matsyasana: fish pose. Lie supine with legs extended. Exhale and arch the back by lifting the chest and neck. Rest the crown of the head on the floor. Maintain this pose for 10 to 15 seconds. Inhale and return to the resting supine position.

Fig. 3. Dhanurasana: bow (as in bow and arrow) pose. Lie prone with arms by the side, palms facing up. Flex the knees bringing the heels to the thighs. Grasp the ankles with the hands, inhale, and arch the body like a bow. Hold the pose for 5 to 10 seconds while breathing normally. Exhale and return to prone position.

Fig. 4. Sarvangasana: shoulder stand. Lying supine, raise the extended legs up in the air, elbows resting on the floor. Placing the hands under the hips, inhale and gently raise the pelvis and trunk off the floor until the chin touches the chest. Breathe normally while maintaining this position for a few seconds. Exhale while gradually lowering the legs and trunk.

Fig. 5. Salabhasana: locust pose. Lie prone with arms by the side, palms facing up. Inhale and lift the head, chest, and legs off the floor simultaneously. Most of the weight should be on the stomach and not on the arms, which continue to lie on the floor. Maintain this position for a few seconds, exhale, and return to prone position.

One of the optimal breathing patterns is diaphragmatic—deep, smooth, even, quiet, free of pauses, involving exhalation and inhalation. In yogic tradition, voluntary control of breathing has long been used to foster self-awareness and reduce autonomic reactivity. The diaphragm is the primary muscle of respiration, and when the diaphragm contracts and its dome descends, pressure within the thorax falls enough to draw air into the lungs, simultaneously altering the shape of the abdomen and the rib cage, causing the anterior abdominal wall, the sides, and the lower back to expand. By regular practice, misuse of accessory muscles is eliminated. Examples of pranayama are as follows:

Kapala bhati is a fast, rhythmic breathing using abdominal muscles. *Kapala* means ''brain,'' and *bhati* means ''shine.'' Kapala bhati flushes out stale residual air in the lungs, and with a fresh air supply, lung ventilation is increased, and elasticity of the diaphragm is increased.

Ujjayi is a slow, rhythmic breathing (3–4 times/min), with retention of breath in each cycle. *Ujjayi* increases lung capacity and helps to establish a natural rhythm of the breath.

Asanas should be performed synchronized with rhythmic breathing, which helps to concentrate on the movements. Breathing is done through the nostrils with the mouth closed. A general guideline is inhaling as one

Fig. 6. Janu sirsana: head-to-knee pose. Sit on the floor with legs extended in front. Slide left leg laterally, and flex it until the big toe touches the opposite thigh, keeping the right leg extended. Exhale and lean forward toward the right foot and hold this leg (or foot if possible) with the hands in an effort to touch the face to the right knee. Maintain this position for a few seconds breathing normally. Inhale and raise the trunk upright. Repeat the pose on the left side.

bends backward or stretches and exhaling as one bends forward. The practice of asana (yogic postures) develops muscle strength and flexibility, which facilitates diaphragmatic breathing. Similarly, relaxation and meditation help with diaphragmatic breathing by releasing physical and emotional tension. The asanas invigorate and regulate the working of muscles; viscera; glands; and vascular, nervous, and lymphatic systems. The basic tenets of asanas are as follows:

1. All asanas are done in combination with breath control.
2. Force is never used to assume a posture.
3. Asanas are done at one's own pace.
4. Asanas should not be practiced to the point of fatigue.
5. Asanas can be modified or assisted as necessary.

Precautions

Precautions in regard to yoga practice include the following:

Avoid fatigue
Avoid pain and stress
Avoid full or empty stomach
Avoid during acute illness

Fig. 7. Trikonasana: triangle pose. Stand with legs slightly apart. Abduct the arms 90° parallel to the floor, palms facing down. Turn the right foot sideways to the right and the left foot slightly to the right. Exhale, and bend the trunk laterally to the right, bringing the right palm toward the right ankle or to the floor if possible, simultaneously raising the left arm up in the air. Look up at the raised left arm. Maintain this position for a few seconds breathing normally, inhale, and return to standing position. Repeat the pose on the left.

Yoga works on the whole person, bringing mind and body into harmony. The postures demand enormous concentration and stilling of the mind. Yoga and psychotherapy have several similarities. The goal of both practices is to bring the person into harmony with the environment, both human and material. Both practices work on the principle of self-knowledge, which can be channeled into a positive lifestyle.

Yoga as therapy is not disease oriented; however, some techniques and asanas may have special relevance to certain medical disorders (eg, pranayama for asthma). Yoga has been described to be beneficial in several medical conditions; the most commonly studied are coronary artery disease and asthma. Others that have been mentioned include osteoarthritis, rheumatoid arthritis, hypertension, diabetes mellitus, epilepsy, and carpal tunnel syndrome. By nature of the yoga intervention, it is not possible to have blinded studies, and a placebo effect cannot be excluded. Objective physiologic changes noted through intervention cannot be ignored, however. Yoga practices are only an adjunct to medical treatment if disease has been established.

Yoga practices are well established for health promotion and disease prevention. This article describes some well-studied and not so well-studied

Fig. 8. Sirsana: head stand. A beginner may need help with this pose, and it is best done against a wall. Kneel with the forearms on the floor, hands clasped against the head. Raise the knees from the floor, keeping the toes in contact with the floor. Exhale, and with a slight rocking motion lift the toes off the floor to raise the legs into the air, initially knees flexed, then extended. The body weight now is supported on the crown of the head. Breathe normally while maintaining this position for a few seconds. Exhale, flex the knees, and reverse the postures to the kneeling position.

Fig. 9. Shavasana: corpse pose. This a good pose to end the yoga sessions with. Lie supine with arms and legs extended, arms at the side, and palms facing up. Concentrate on breathing evenly and smoothly as you feel the whole body relax. Maintain this position for at least 3 to 5 minutes.

organ systems that have been cited in the literature on yoga. This article is not a complete medical review or a detailed description of yoga, which is practiced in many forms. Photographs of a few of the asanas described are provided.

Cardiovascular system

The most well-known studies of the Eastern medical practices of meditation and yoga along with a vegetarian diet showing positive cardiovascular effects are by Ornish et al [1–5]. A randomized study of 23 control and 23 intervention subjects who followed dietary changes, yoga, and lifestyle changes for 24 days showed improved left ventricular regional wall motion during peak exercise and a net increase of 6.4% in left ventricular ejection fraction from rest to maximal exercise. Other beneficial effects noted were a 20.5% mean decrease in plasma cholesterol levels and a 91% mean reduction in frequency of anginal episodes. Other studies, such as those done by Manchanda et al [6,7], support these findings. In a prospective, randomized controlled trial, Manchanda et al [6,7] studied 42 men with coronary artery disease; all underwent strict control of risk factors, but half also had yoga instructions. At the end of 1 year, the yoga group showed a decrease in the number of anginal episodes; improved exercise capacity; and decrease in body weight, total cholesterol, and triglyceride levels.

Significantly more coronary lesions regressed (20% versus 2%) in the yoga group, as shown by coronary angiography. Several limitations were noted by the authors, however, including compliance of yoga exercise, which was self-reported and not monitored; relatively small number of patients in the study; and no blinding of the study.

It is speculated that stress plays an important role in causing coronary artery spasm mediated by direct α-adrenergic stimulation or due to release of thromboxane A_2 and catecholamines, both of which are powerful smooth muscle constrictors and stimulators of platelet aggregation [1]. The Texas Heart Institute used yoga as an adjunct to their cardiac rehabilitation program as a stress reliever and to improve musculoskeletal flexibility. Associated decrease in arterial blood pressure that results after relaxation training is thought to play a large role [8,9] in cardiovascular rehabilitation. Alternate nostril breathing has been shown to decrease blood pressure through sympathetic stimulation [10,11]. Many East Indian authors have shown beneficial effects of yoga in management of hypertension in conjunction with other lifestyle changes [12–15]. Selvamurthy et al [12] studied the possible role of the baroreflex mechanism in the cause of essential hypertension and whether restoration of baroreflex sensitivity can be achieved by postural stimulus. Baroreflex sensitivity was studied by head-down or head-up tilt on a tilt table and by yoga postures simulating head-up/head-down position. A daily 30-minute session was conducted for 3 weeks, at the end of which the blood catecholamines, plasma rennin, and cold pressor response at 4°C water were measured. Changes in these indices and lowering of blood pressure showed the influence of baroreflexes on sympathoadrenal and renin-angiotensin systems and, more importantly, possible physiologic mechanism of yoga postures on lowering blood pressure. The other possible explanation for the lowering of blood pressure in this study could be from influence on the vestibule-cerebellar system. Specific postures recommended in cardiovascular disease are padmasana, matyasana, sarvangasana, shavasana, and pranayama.

Asthma

A traditional yoga system of meditation and breathing, sahaja yoga, has been studied in poorly controlled asthma in adults [16]. A 4-month, double-blinded, randomized controlled trial subjected patients in both groups to relaxation exercises, the study subjects to sahaja yoga, and the controls to progressive muscle relaxation and visualization techniques. Both groups continued the conventional allopathic medications during this period. Results at the end of 4 months and 2 months later showed statistically significant decreases in frequency of acute attacks in the yoga group compared with controls. The forced expiratory volume-to-forced vital capacity ratio increased from 48% at baseline to 66% at the conclusion of the study in the yoga group, whereas there was no change in the control

group. Similar beneficial effects were shown in a study by Singh et al [17], in which the ratio of inspiratory to expiratory time was altered, and breathing was slowed.

Sahaja yoga is a state of "mental silence," in which the person is fully alert and aware but has quieted the mind by psychological affirmations. This state serves to slow down and promote controlled breathing. Goyeche et al [18] attributed the positive effects of yoga in the management of asthma to three major processes that are believed to occur, as follows:

1. Yoga promotes postures to facilitate lung expansion.
2. Yoga breathing techniques help to calm anxiety and facilitate muscle relaxation.
3. Meditation is believed to improve oxygen use.

The specific postures recommended for asthma are the following:

1. Sarvangasana—shoulder stand, which achieves the head-low posture for increasing the range of diaphragmatic movement and for pulmonary drainage
2. Savasana—which achieves total body relaxation
3. Dhanurasana
4. Matyasana

Concentration and meditation practice in a stabilized sitting position, such as the lotus posture, helps the biofeedback process of using the primary respiratory muscles. It is well known that during asthma attacks, the accessory repiratory muscles come into play. Methods to improve self-control and feedback of these muscles logically should serve to make efficient use of the muscles. Most of the studies using yoga have been conducted in India in yoga institutions, so there may be a bias. The study methods and criteria are not as controlled as one would like and do not conform to Western standards. Nevertheless, the few good studies done may be considered an important start. At the very least, these methods have no ill effects, and at the very best, they promote overall well-being.

Arthritis

There is paucity of objective studies in the area of musculoskeletal disorders and the effect of yoga on these conditions. Most descriptions point to the benefits of joint realignment and active stretch producing traction of muscles during the asanas. Garfinkle and Shumacher [19], who reviewed the yoga literature, proposed that yoga be used as a preventive and curative approach for the body, spirit, and mind. In their objective study of osteoarthritis of the hands [20], a 10-week program of 60-minute sessions of yoga asanas and relaxation showed significant improvement ($P = .002$) in tenderness of fingers of both hands as measured with a dolorimeter. Other measures, such as range of motion of finger joints, circumference of finger

joints, hand pain on visual analogue scale, and hand function as measured by the Stanford Hand Assessment Questionnaire, also showed improvement, but it was not statistically significant. A similar controlled study by Haslock et al [24] of 20 patients with rheumatoid arthritis showed similar benefits. The control group received conventional treatment with medications, and the yoga group was provided 2-hour yoga sessions 5 days a week for 3 months. Grip strength showed significant improvement ($P < .02$) in the yoga group compared with controls. Other indicators, such as ring sizes, Stanford Health Assessment, and duration of morning stiffness, showed improvement but were not statistically significant. A significant observation of the exercise programs for osteoarthritis is the importance of stretching in conjunction with strengthening compared with strengthening alone, which provided the most benefit as studied in knee osteoarthritis [21,22]. It follows that because yoga postures provide strengthening and stretching, the benefits could be attributed to these factors.

Effects of mechanical and fluid pressure on the cartilage suggest that yoga postures might alter joint function. The low levels of intermittent fluid pressure during joint distraction have been shown in vitro to decrease production of catabolic cytokines, such as interleukin 1 and tumor necrosis factor-α [23].

Asanas of benefit noted in the literature are the following:

Sarvangasana
Salabasana
Janu sirsasana
Ujjayi breathing

Yogic exercises are of indirect benefit in arthritis by reducing obesity, correcting faulty postures, and improving joint mobility. They also strengthen supporting muscles and protect diseased joints from further damage. These asanas are done only when acute symptoms subside.

Obesity

Some yoga postures, besides expending calories and mobilizing bone and soft tissue structures, are thought to stimulate the thyroid gland and reduce fat accumulation in specific areas. There are no objective studies to document this effect; however, the following asanas seem to have a positive effect in reducing abdominal obesity:

Sarvangasana
Salabasana
Dhanurasana
Sirsasana
Trikonasana
Kapala bhati

Low back pain

Most back pain problems are secondary to poor posture, mechanical postural changes, weak abdominal muscles, degenerative joint and disk problems. Muscle weakness and lack of flexibility are the leading causes of chronic back pain. Inadequate sleep and emotional tensions aggravate back pain. The following asanas are helpful in the management of back pain:

Salabasana
Dhanurasana
Shavasana

Patients with disk problems should not do forward bending movements. Janu sirsana and padmasana are helpful for radicular-type and arthritic-type low back pain.

Gastrointestinal symptoms

Indigestion can be relieved by sitting in vajrasana for 10 minutes after meals. Other measures that also are helpful are drinking plenty of water after meals, avoiding emotional upsets, and reducing fatty meals. Helpful asanas are *sarvangasana* and *salabasana*.

The common causes for constipation can be divided broadly into intrinsic factors, such as poor tone in abdominal and pelvic musculature and abnormal tone of the gastrointestinal system, and extrinsic factors related to diet. The following postures help to strengthen abdominal and pelvic muscles, increase intra-abdominal pressure, and stimulate peristalsis:

Salabasana
Dhanurasana
Janusirsana

Diabetes mellitus

Diabetes mellitus is a complicated metabolic disorder primarily causing excessive glucose in blood and urine. The management of this disorder comprises attention to exercise, diet, and medication. Yoga is believed to improve blood circulation, enhance the activity of the pancreas, stimulate insulin secretion, promote digestion, and help with disease control. In a study by Suresh Jain et al [25], of 149 patients with non–insulin-dependent diabetes mellitus, 104 patients showed better control of blood glucose after 40 days of yoga therapy. Beneficial effects of exercise in diabetes are well known. Yoga postures, which involve maintenance of static postures, cannot be equated to a conventional exercise program, however. The benefits seen were attributed to the unique effects of yoga practice and not to exercise. The maximal benefits were seen in patients with mild cases of diabetes (fasting glucose <140 mg/dL) and in patients with diabetes of less than 10 years' duration.

Patients in this category were able to control their diabetes with yoga therapy alone.

Specific asanas for diabetes mostly are inverted positions that help with the stimulation of the pancreas. Caution should be exercised in patients with hypertension. The specific asanas are as follows:

Shavasana
Padmasana
Matsyasana
Sarvangasana
Kapala bhati

Pain management

Rehabilitation practitioners commonly encounter pain control issues. In many instances, besides the triggering factors that cause pain, pain is influenced by stress and depression. Yoga asanas have been known to have beneficial effects by controlling stress and depression through relaxation and breath control techniques.

The effect of relaxation techniques could be explained partially by nonspecific decreased activation of the brain secondary to decreased input of stimuli from the internal and external environment. Decreased anxiety and depression through relaxation techniques influences the emotional component of pain.

Different relaxation techniques have common features, such as muscle awareness, breath awareness, and relaxation. These elements also are present in yogic exercises, such as shavasana.

Local relaxation of a painful area cannot be overemphasized. This relaxation is accomplished by activation of antagonistic muscle groups. Gentle stretching has similar effects. Strengthening of weakened muscles and correction of faulty postures can be pain relieving. Some special breathing and meditation techniques may have a positive influence on the central nervous system to increase pain control and pain tolerance.

Pain modifies the pattern of respiration. This modification may be secondary to an emotional component and muscle guarding. Deep breathing, which includes prolonged expiration, tends to relax skeletal muscles and reduce pain.

Anxiety, stress, and depression

Asanas helpful in control of anxiety, stress, and depression are the following:

Salabhasana
Sarvangasana
Shavasana

Janu sirsasana
Ujjayi

Summary

Many factors, such as general health, available time, individual expectations, and previous experience, are considered for planning a yoga program. Yoga as therapy takes a holistic approach considering each person as an individual. In situations in which disease is established, yoga is performed only as an adjunct to medical treatment. To practice yoga safely and effectively, learning yoga with a trained professional is necessary. Yogic exercises are not limited use with disease states. They are highly recommended for healthy individuals as well.

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Further readings for asanas

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