

Stress Management through Yoga

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Abstract

Stress is a common condition, a response to a physical threat or psychological distress, that generates a host of chemical and hormonal reactions in the body. In essence, the body prepares to fight or flee, pumping more blood to the heart and muscles and shutting down all nonessential functions. As a temporary state, this reaction serves the body well to defend itself. When the stress reaction is prolonged, however, the normal physical functions that have in response either been exaggerated or shut down become dysfunctional. Many have noted the benefits of exercise in diminishing the stress response, and a host of studies points to these benefits. Yoga, too, has been recommended and studied in relationship to stress, although the studies are less scientifically replicable. Nonetheless, several researchers claim highly beneficial results from Yoga practice in alleviating stress and its effects. The practices recommended range from intense to moderate to relaxed *asana* sequences, along with *pranayama* and meditation. In all these approaches to dealing with stress, one common element stands out: The process is as important as the activity undertaken. Because it fosters self-awareness, Yoga is a promising approach for dealing with the stress response.

Yoga and the Stress Response

Stress has become a common catchword in our society to indicate a host of difficulties, both as cause and effect. The American Academy of Family Physicians has

noted that stress-related symptoms prompt two-thirds of the office visits to family physicians.¹ Exercise and alternative therapies are now commonly prescribed for stress-related complaints and illness. Even a recent issue of *Consumer Reports* suggests Yoga for stress relief.² Many books and articles claim, as does Dr. Susan Lark, that practicing Yoga will “provide effective relief of anxiety and stress.”³ But is this an accurate promise?

What Is the Stress Response?

A review of the current thinking on stress reveals that the process is both biochemical and psychological. A very good summary of research on the stress response is contained in Robert Sapolsky’s *Why Zebras Don’t Get Ulcers*.⁴

He first outlines the physiological experience of stress, explaining that the sympathetic nervous system is responsible for reacting to emergencies, employing the fright and flight reflexes. “Originating in the brain, sympathetic projections exit your spine and branch out to nearly every organ, every blood vessel, and every sweat gland in your body,” Sapolsky writes. “The sympathetic nervous system kicks into action during emergencies, or what you think are emergencies. . . . The nerve endings of this system release adrenaline. . . . Sympathetic nerve endings also release the closely related substance noradrenaline.”⁵

In the United States, adrenaline, which is secreted by the sympathetic nerve endings in the adrenal gland, is referred to as epinephrine; noradrenaline, which is se-

creted by all other sympathetic nerve endings throughout the body, is referred to as norepinephrine. These are the chemicals that—within seconds—signal the organs into action. This is called the “neural route,” because the action of one cell, a neuron, travels to the next cell in line and through that cellular link mobilizes activity in response to a stressor. When the neuron secretes a messenger that “percolates into the blood stream and affects events far and wide, that messenger is a hormone,” Sapolsky continues. “All sorts of glands secrete hormones; the secretion of some of them is turned on during stress, and the secretion of others is turned off.”⁶ The parasympathetic nervous system, which mediates calm, is inhibited by the sympathetic nervous system during a stressful emergency.

The brain is the master gland. “It is now recognized that the base of the brain, the hypothalamus, contains a huge array of these releasing and inhibiting hormones, which instruct the pituitary, which in turn regulates the secretions of the peripheral glands.”⁷

When the brain experiences or thinks of something stressful, these hormones will be released. In addition to epinephrine and norepinephrine another group of hormones is released. These are called glucocorticoids. Whereas epinephrine acts immediately, the glucocorticoids come into play within minutes or hours. According to Sapolsky, the hormonal path of the stress response moves like this: “When something stressful happens or you think a stressful thought, the hypothalamus secretes an array of releasing hormones into the hypothalamic-pituitary circulatory system . . . The principal such releaser is called CRF (corticotropin releasing factor), while a variety of minor players synergize with CRF. Within fifteen seconds or so, CRF triggers the pitu-

itary to release hormone ACTH (also know as corticotropin). After ACTH is released into the bloodstream, it reaches the adrenal gland, and within a few minutes triggers glucocorticoid release. Together, glucocorticoids and the secretions of the sympathetic nervous system (epinephrine and norepinephrine) account for a large per-

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centage of what happens in your body during stress. These are the work horses of the stress response.”⁸ One way researchers measure stress is by taking blood levels of glucocorticoids.

There are other chemical changes in the body that facilitate the stress response and are crucial in an emergency. The pituitary gland and brain secrete substances to blunt pain known as endorphins and enkephalins. The pancreas is stimulated to produce glucagon, which helps raise levels of the sugar glucose needed by the muscles to mobilize energy. The pituitary secretes prolactin, which suppresses reproduction. Other reproductive hormones—estrogen, progesterone, and testosterone—are inhibited. Emergencies are obviously no time to reproduce. Vasopressin, an antidiuretic, is secreted from the pituitary. Growth-related hormones and insulin are both inhibited as the body mobilizes its resources for immediate survival and future needs are disregarded. And therein lies the catch.

All this arousal in an emergency becomes pathological if it is not turned off when the threat is over. It is not just the threat of physical danger that must recede, however, for the

response to end. The brain must think and understand that it is over, or the cycle continues, becoming a hindrance to health. It is not that stress itself makes us sick, but its continuation creates the conditions for other ailments to make us ill.

The cardiovascular stress response is a good illustration of this. To paraphrase Sapolsky once more: Under stress there is an increase in cardiovascular output in order to deliver oxygen and energy to exercising muscles. The blood moves faster and with more force. A vascular response of constriction of the major arteries makes the blood pressure rise. The blood is delivered with greater speed to the muscles, decreasing blood flow to the momentarily unessential parts of the body (digestive tract, kidneys, and skin). Vasopressin reabsorbs water into the circulatory system to keep the blood volume up so that it can deliver glucose and oxygen to muscles. A continued stress response, however, keeps the cardiovascular system in this heightened state, wearing out the heart and arteries. What begins as a benefit becomes a detriment.

A short list of diseases and conditions that have been linked to an overactive stress response, besides cardiovascular disease, includes depression, anxiety states, obsessive-compulsive disorder, some types of diabetes mellitus, some autoimmune diseases, colitis, irritable bowel syndrome, reproductive problems, and suppression of the immune system. It is interesting to note that because the stress response is a condition of both the body and the mind, its effects are both physical and psychological.

The stress response has its purpose, however. It saves us in emergencies when we need to react quickly and forcefully. It is a biological survival mechanism built into our

systems. But when it stays active beyond the immediate needs of a situation, when one is under the constant barrage of hormonal arousal and rapid heartbeat, tense muscles, digestive upset, etc., then steps must be taken to break into the cycle and stop it before more injury occurs.

Dr. Chandra Patel's *The Complete Guide to Stress Management* contains many excellent resources for understanding and dealing with stress. She also makes an interesting point that often is unmentioned in other works, "Recognizing the prob-

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lem is half the battle. Without knowing what stress is, and how it may strain our health, we will not be able to recognize it. Awareness is of primary importance if we are to learn to manage stress effectively. Our body is often the first place to reveal signs of a problem. Unfortunately, our upbringing often trains us to be stoic, and in our anxiety not to appear weak, we often deny signs of stress."⁹

If one doubts the wisdom of this advice, a look at Sapolsky's description of the effect of stress on the immune system may be convincing. He says glucocorticoids "initially stimulate the (immune) system and then help it to return to baseline. It is only with major stressors of longer duration, or with really major exposure to glucocorticoids, that the immune system does not just return to baseline, but plummets below into a range that really does qualify as immunosuppressing."¹⁰ If one is able to recognize the signs of the stress response in its initial stages and break into the

cycle and restore calm, then these more extreme conditions will not occur.

Current Research on the Stress Response

Many experiments have been conducted with both rats and humans to explore the stress response. Conclusions from these experiments, reports Sapolsky, show that "stress responses can be modulated or even caused by psychological factors, including loss of outlets for frustration and social support, a perception of things worsening and under some circumstances, a loss of control and predictability."¹¹ However, there are many stressors that are out of our control: being born into poverty, for example, or war, or pollution. Yet studies confirm that it is our response to stressors which is of crucial importance and that each of us sees and experiences these stressors through our own personal filter.

There are ways, of course, in which we can modify our stress response. In a review of the current research on exercise and mental well-being that examines several hundred studies and over 30 narrative or meta-analytic reviews of research in this field, Dr. Kenneth R. Fox concludes, "There is growing evidence demonstrating that exercise can be effective in improving the mental well-being of the general public, largely through improved mood and self-perceptions. There is good evidence to demonstrate that exercise is effective as a treatment for clinical depression and anxiety. Together this adds to the already convincing literature that exercise reduces morbidity and mortality from coronary heart disease, diabetes, obesity and some cancers."¹²

Almost all of the large studies on

exercise and mental and physical health are based on aerobic activities such as running, jogging, stationary bike riding, or resistance training with weights. There are excellent review articles on these studies that summarize their results.¹³

The research on Yoga and mental and physical health is not as sophisticated nor as well controlled as the studies that Fox has reviewed. A 1982 review of the studies on Yoga states, "The review of the . . . reports on yoga therapy shows that none of these studies [has] been done under real scientific discipline. There [are] hardly any controlled scientific clinical [trials] reported on yoga therapy. Secondly, it is seen that different workers have used different sets of yoga practices for the same disease, which does not permit assessment of the reproducibility of results. In most cases, combinations of many practices have been used. . . . Thus the present status of research on yoga therapy is largely preliminary in nature."¹⁴

Disregarding the problematic methodology of some studies, a 1990 review of the literature of Yoga research concludes, "In summary, this review of the literature suggests that Hatha yoga has potential as a useful intervention for improved physical well-being, reducing anxiety, and enhancing personality development . . . Hatha yoga could be a helpful adjunct to medical and psychological treatment when practiced regularly by clients on their own to improve feelings of physical health, reduce their anxiety, and enhance their self-concepts and emotional tone."¹⁵

In *Stress and Its Management by Yoga*,¹⁶ K. N. Udupa outlines his research on normal, healthy subjects and on patients in his clinic. He treated 1,007 cases of various stress disorders with a combination practice of *asana*, *pranayama*, and medi-

tation. He reports, "The patients [with] high blood pressure, diabetes and asthma who came to us at an early stage showed very good improvement. Those who came later, their drug requirement was considerably reduced after starting yogic practice."¹⁷

Another review of articles published in 1996 summarizes twenty-one studies on Yoga in modern medicine.¹⁸ This review again confirms that "Yoga therapy seems to be of great value [for] asthma, cardiac patients, multiple sclerosis, migraine, rheumatoid arthritis and rehabilitation."¹⁹ These are conditions in which stress may play a part in the course of the disease.²⁰

Other studies have looked at discrete parts of yogic practice to measure their effectiveness in reducing specific aspects of the stress response. A number of studies examine the physiology of the head-low position.²¹ In both rat and human studies, Udupa found that the head-low posture reduced the catecholamine (epinephrine and norepinephrine) content of the heart and the blood. It also increased stress tolerance, and therefore, Udupa conjectures, may act as a tranquilizer.²²

Another study produced the interesting finding that fine motor coordination improved more for those who had volunteered for Yoga training than for those who were recruited for the program. The motivation to learn Yoga appeared to influence the magnitude of increase in skill more than other variables.²³ The physical practice itself is not the only key in a study; the attitude of the subjects also is important.

Where Do the Benefits Lie?

In his review of the current literature on physical activity and mental health, Kenneth Fox concludes, "Currently the evidence suggests that factors associated with the process of exercise rather than the physiological adaptations resulting from regu-

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lar exercise training are primarily responsible for improvements in short- and long-term well-being."²⁴ The factors he is referring to, he explains, are issues of self-esteem and body image, the empowerment that achieving change provides, an improved perception of competence, and the social interaction that activity can offer.

Similarly, it is not the physical activity alone that makes Yoga transformative. Headstand, for example, might lead someone into great panic. Meditating may cause more, not less, anxiety. *Pranayama* might lead to increased obsessiveness, not more calm. What, then, makes any of these practices beneficial instead of harmful?

It is possible that some of the most beneficial aspects of Yoga practice are the sense that things are improving and that one has some control over what is happening, two factors that help mediate stress. There is the support and encouragement of the teacher and the social interaction of the class or center, both of which provide a buffer from isolation, another well-known stressor. Of course

these things are not automatically positive: What about the critical teacher, the competitive class, the environment of coercion that exists in some situations? These might elicit advanced performance of *asana*, but certainly not a reduction in stress. Yoga postures, breathing, and meditation may or may not be stress-reducing. Under some circumstance they might actually increase stress.

Yoga to Stop the Stress Response

The recommendations for *asana* practice to change the stress response are different in different traditions. A Yoga practice that focuses only on physical remedies is limited, for it deals only with physiology and not psychology. Similarly, a practice that is formed around moral precepts and exhortations to change one's lifestyle has distinct limitations, for behavior modification is not simple. K. N. Udupa suggests, "Thus, a combined practice of physical postures, breathing exercises and meditation in a sequence is the best compromise to meet the present day needs of the society. The results of these practices can be enhanced much more if one follows all the recommended restraints and observances in everyday life."²⁵

The restraints and observances he refers to are the *yamas* and *niyamas* of Classical Yoga. The ethics and morality of the traditional texts help lay the groundwork for moderate, compassionate living, but behavior change is complex and one's personality is rooted in layers of unconscious conditioning.

Some teachers recommend a simple, varied *asana* practice with specific *pranayama* techniques. An example of this approach is contained

in Swami Shivapremananda's *Yoga for Stress Relief*.²⁶ He suggests a three-month program that begins with simple chest opening in a seated, cross-legged position. He introduces *nadi-shodhana* (alternate nostril breathing) and *ujjayi* (breathing with a slight contraction in the glottis) in the first weeks. He then moves into forward-bending postures that are dynamic in nature in order to open the hips.

In order to change the stress response it is necessary to become familiar with relaxation.

The following weeks introduce *sarvangasana* (shoulder stand) along with variations. This is followed by *setu-bandhasana* (bridge pose), then a dynamic *pashchimottanasana* (seated forward bend), *shitali* (tongue curled on inhale) and *sitkari* (tip of the tongue to palate) *pranayama* are suggested. Finally, after eight weeks, come *ardha-shirshasana* (modified headstand with feet on the ground), *shalabhasana* (locust), *vyaghraasana* (cat), *dhanurasana* (bow), and *ardhamatsyendraasana* (simple twist). In the last weeks of the program one is introduced to Sun Salutation and *kapalabhati* (cleansing breath), along with meditation and deep relaxation.²⁷ In other words, a complete and varied Yoga practice is prescribed.

Judith Lasater advocates supported restorative poses, gently opening the chest in moderate, supported back bends and inverting in *viparita-karani-mudra* along with supported forward bends. Nothing that requires exertion or is uncomfortable.²⁸

Roger Cole, taking a more traditional Iyengar perspective, outlines a rigorous relaxation sequence that aims at changing the physiological

response of the stress response.²⁹ He advocates the following: "To promote deepest relaxation, one must (1) minimize stimulation of the brain's reticular activating system (RAS), posterior hypothalamus and sympathetic nerve centers in the brainstem, and (2) maximize stimulation of the brain centers that actively inhibit the RAS and promote parasympathetic activity."³⁰

Cole's series of postures begins with *adhomukha-shvanasana* (downward dog), *uttanasana* (standing forward bend) with head support, and short *adhomukha-vrikshasana* (handstand) as preparation for *salamba-shirshasana* (headstand). This is followed by supported *divipada-viparita-dandasana* (back bend supported on a chair), supported *kapotasana* (again, back arching off chair with arms in headstand position on the floor), *setu-bandhasarvangasana* (supported bridge), *salamba-sarvangasana* (chair-supported shoulder stand), *halasana* (supported plow), *viparita-karani-mudra* (supported partial shoulder stand), *supta-virasana* (reclining bent-knee pose), *supta-baddhakonasana* (reclining, soles of feet together, knees apart), reclining *ujjayi-pranayama* (with an emphasis on the exhalation), *sukhasana* or *padmasana* (sitting posture to elevate baroreceptor firing and so increase alertness without excess physiological activation), and finally *shavasana*. This sequence emphasizes the head-down positions and chest expansion. Cole adds, "Note that many physiological changes require a good deal of time (e.g., ten minutes to one hour) to express themselves, so devote sufficient time to each relaxation practice. Repeated practice of relaxation techniques improves their effectiveness by reducing novelty, increasing physical and psychological comfort and creating

conditioned relaxation responses in the nervous system."³¹

Relaxation

In order to change the stress response it is necessary to become familiar with relaxation. *Shavasana* (corpse pose) provides the perfect training ground for relaxation. Here is an area where Yoga clearly differs from a simple exercise prescription for stress relief. Training the body to respond to the request for relaxation on a muscular level and breathing deeply create a habit of relaxation that can be very helpful in turning off the stress response.

But *shavasana* practice is not the solution for everyone. A severely stressed and depressed person, or someone in acute mental distress, might find that *shavasana* practice worsens his or her symptoms. Likewise, meditation is not always good; for some people it may cause increased disorientation and disturbance. Each person's approach to stress reduction must flow from his or her particular situation. For some, the aerobic challenge of a powerful *ashtanga* practice, generating endorphins and profuse sweat, is the best way to learn the sensation of release, as the body is flooded with chemical change and the mind quiets when the practice ends. For others, the profoundly relaxing, supported, restorative postures are the best solution to stress. All these practices are only tools to achieve certain states of mind.

No matter how many postures one does, in whichever sequence or style, no matter how many cycles of breathing in intricate patterns of inhalations and exhalations, no matter how many hours of meditation one sits in, chanting or not chanting *mantras*, the stress response may or may

not be affected. In the complex cycle of body and mind there are no mechanical answers. Searching for one would only be a stressful endeavor.

What Promise Can Yoga Make?

Exercise may indeed be stress-reducing, as multiple studies have concluded, but the self-observation necessary to recognize and stop the deleterious effects of the stress response before it spirals out of control is the key. One can learn to feel the stress response as physical symptoms: rapid heartbeat; fast, shallow breathing; gastrointestinal upset; sleep disturbances. The decision to stop and address the problem, to admit that it is there and that it is no longer acceptable or productive, is difficult. One needs to interrupt a cycle of behavior already set in motion. Perhaps the stress response actually feels comfortable, for it is known, habitual. A daily Yoga practice provides the time and space to experience the sensations of the body and to interpret them. Is the breath short, are the muscles tense? But a practice may also mask symptoms if it is driven by a list of actions to do and ways to do them. Then the desire to do the "right" thing, the "right" way, or to do the most "spiritual" thing, becomes another prison, not a liberation.

The heart of Yoga practice resides in self-awareness, so it is appropriate that we turn to it for behavior modification. In this way Yoga may provide a framework to address the chronic stress response. It is not only a daily exercise sequence, but as Barbara Stoller Miller writes in her translation of the *Yoga-Sutra*, "The goal of yogic transformation is realized in contemplative practice. The Path to freedom consists of a gradual unwinding of misconceptions that al-

lows for fresh perception. . . . The way of Yoga is not a simple, linear path. Rather, it is a complex method involving a radical change in the way we experience the world and conceive the process of knowing ourselves. It gives us techniques with which to analyze our own thought processes and finally to lay bear our true human identity."³²

The promise of Yoga is not the easy arithmetic of "do this and that will happen." The promise is that Yoga offers a path to self-discovery.

Endnotes

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