

Yoga in the management of anxiety disorders

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Summary

Holistic approaches are gaining increasing popularity in the management of psychiatric disorders. Yoga is among the oldest sciences with a holistic approach and hence, has been studied extensively in psychiatry. Many uncertainties and methodological problems and both theoretical as well as practical issues, surround research pertaining to yoga in health and disease. Various studies have emphasized the benefits of incorporating yoga practice in the management of

anxiety disorders. The effect of this technique needs to be further explored and more scientific studies should focus on the usage, long term effects and physiological basis of yoga practice. The present review covers the role of yoga in the management of anxiety disorders and future research needs that are warranted.

SL J Psychiatry 2012; 3 (1):3-9

Introduction

Yoga refers to a scientific scheme of physical and mental practices that originated in India approximately 3000 years ago (1). The word 'Yoga' is derived from the Sanskrit root word 'Yuj', meaning 'to control' or 'to unite'. The spiritual connotation of this word is the union of the jeevatma (mortal) with the parmatma (immortal). There is mention of yoga postures in texts of the Upanishads from the 6th century BCE, but it was the sage, Patanjali, in 2nd century BCE, who first described the main principles of the best yoga practices (called 'Raja' or 'royal' yoga) in the Yoga Sutras and incorporated them into an eight-part system called Ashtanga (Sanskrit for 'eight limbs') (2,3). The system is comprised of ethical behaviour (yamas), self-discipline (niyamas), postures (asanas), breath control (pranayamas), sensory withdrawal (pratyahara), expansion of awareness (dharana), meditation (dhyana) and universal consciousness (Samadhi) (2,3).

Between the 6th and 15th centuries ACE, other yoga texts appeared that provided more practical applications of these principles, such as the Hatha Yoga Pradipika by Swatmarama, the Goraksha Samhita by Yogi Gorakhnath, the Gherand Samhita by Gherand, and Hatharatnavali by Srinivasabhakta Mahayogindra (3). Current forms of yoga are based on these ancient teachings, and though there are varied schools of practice, the standard components are specific postures (asanas), breathing exercises (pranayamas), and meditation (dhyana) (4,5). They may also include loosening exercises (sithilikarana vyayama) and cleansing practices (kriyas)(6).

Purposes of Yoga

The yoga practices were designed to facilitate development and integration of the human body, mind, and breath to produce structural, physiological, and psychological effects. The aims of yoga are the development of the following viz. a strong and flexible body free of pain, a balanced autonomic nervous system with all physiological systems, e.g., digestion, respiration, endocrine, functioning optimally; and a

calm, clear, and tranquil mind. Beyond these specific outcomes, yoga practices are intended to facilitate self transformation at every level of functioning, with the goal of improving the overall quality of life (5).

Yoga is an ancient Indian science which includes the practice of loosening exercises (sithilikarana vyayama), specific postures (asanas), cleansing practices (kriyas), voluntarily regulated breathing (pranayamas), yoga-based guided relaxation and meditation (dhyana) (6). Yoga therapy is defined by the International Association of Yoga Therapists (IAYT) as "the process of empowering individuals to progress toward improved health and wellbeing through the application of the philosophy and practice of yoga" (7).

The electrophysiology of Yoga techniques

Evoked potentials denote the response to a discrete stimuli and the level of attention of the subject. It has been demonstrated that there is a reduction in the latency and an increase in the amplitude of P300 evoked potentials in yogic practitioners practicing cyclic meditation (8). The middle latency auditory evoked potentials have also shown a change in the meditators suggesting a prolonged latency in the neural generators in cortical areas (9). This signifies a greater cortical inhibition and effective neural modulation at the subcortical level leading to optimal autonomic nervous function.

EEG activity in the higher frequency range such as beta or gamma waves are associated with behavioral conditions when an animal is alert and focusing his attention on a target (10). A similar increase in beta activity is observed in subjects who are practicing Sudarshana Kriya Yoga (SKY) regularly than in healthy controls (11). Extensive studies on practitioners of Transcendental Meditation (TM) have confirmed an increase in the alpha: delta ratio and a reduction in the beta: alpha ratio (12). Long-term Vihangam Yoga meditation improves attention span, processing speed, attention alternation ability and performance in interference tests (13).

Sleep studies have demonstrated an enhanced quality of sleep, enhanced slow wave sleep and enhanced Rapid Eye Movement (REM) sleep in those practicing yoga. REM sleep is associated with memory consolidation. REM sleep enhances brain plasticity as it increases the activity of neuronal circuits which are usually dormant during wakefulness. Hence a possible beneficial role of yoga in sleep-wakefulness behavior may be postulated (13).

The various Yoga techniques

Yoga is defined as a practice consisting of three components, gentle stretching; exercises for breath control; and meditation as a mind-body intervention (14). The version used mainly in the West is hatha yoga, which consists of an integration of asana (postures), pranayama (breathing exercise), and meditation (3). In addition to pranayama, Sudarshan Kriya Yoga (SKY) courses include asanas (yoga postures), meditation, group processes, and basic yogic knowledge. Four main SKY breath techniques are Ujjayi or “Victorious Breath”, Bhastrika or “Bellows Breath”, *Om* (chanting) and Sudarshan Kriya or “Proper Vision by Purifying Action” (an advanced form of cyclical breathing at varying rates) (15). A complete list of various yoga techniques is given in Table 1.

The neurobiology of Yoga

Yogic relaxation can check sympathetic over activity. The objective manifestations of anxiety – a racing heart, palpitations, tremors, sweating, increased blood pressure, dry mouth, avoidance behavior, signs of restlessness, and heightened responsiveness decrease and slowly disappear.(17) Studies have demonstrated a 27% increase in brain gamma amino butyric acid (GABA) levels after a session of yoga in experienced yoga practitioners (18). It is suggested that the practice of yoga should be explored as a treatment for disorders with low GABA levels such as depression and anxiety disorders. This also raises the question as to whether yoga or exercise alone can alter GABA levels (18). A Study has also however revealed a 12-week yoga intervention to be associated with greater improvements in mood and anxiety than a metabolically matched walking exercise. This study also demonstrated that increased thalamic GABA levels are associated with improved mood and decreased anxiety and also suggested that yoga postures were associated with a positive correlation between acute increases in thalamic GABA levels and improvements in mean scores on mood and anxiety scales (19).

Neuroimaging studies have shown that meditation results in an activation of the prefrontal cortex, activation of the thalamus and the inhibitory thalamic reticular nucleus and a resultant functional deafferentation of the parietal lobe. The neurochemical changes as a result of meditative practices involves all the major neurotransmitter systems. The neurotransmitter changes contribute to the amelioration of anxiety and depressive symptomatology and in part explain the psychogenic property of meditation (20). Meditation induced neurochemical changes can produce an anxiolytic effect. The factors decreasing anxiety during meditation are increased parasympathetic activity, decreased locus ceruleus firing with decreased noradrenaline,

increased GABAergic drive, increased serotonin and decreased levels of the stress hormone cortisol. The increased levels of endorphins and AVP also contribute to the anxiolytic effects of meditation (21). Sudarshan Kriyayoga (SKY), a sequence of specific breathing techniques (ujjayi, bhastrika, and Sudarshan Kriya) can alleviate anxiety, depression, everyday stress, post-traumatic stress, and stress-related medical illnesses. Mechanisms contributing to a state of calm alertness include increased parasympathetic drive, calming of stress response systems, neuroendocrine release of hormones, and thalamic generators (22).

Yoga for the management of anxiety disorders

The earliest reported benefit of yoga in alleviating mood and anxiety symptoms was published by Girodo (23). Studies have shown that the practice of yoga reduces perceived stress and negative feelings and improves mental and physical symptoms (24-26).

Studies have indicated that anxiety, depression, anger, fatigue, and confusion in psychiatric in-patients improved following at least one yoga session (27). Research has demonstrated that long-term yoga practitioners have lower mental disturbances, anxiety, anger and fatigue scores in the Profile Of Mood State (POMS) test in comparison to non-experienced participants, although there were no significant differences in the levels of urinary stress-related markers (28). Anxiety has been selected in the socio-biological organisms for its probable adaptive value, as it signals potential danger and can contribute to mastery of a difficult situation and thus to personal growth. Excessive anxiety on the other hand is maladaptive, either because it is too intense or because it is inappropriately provoked by events that present no real danger. Thus anxiety is pathological when excessive and persistent, or when it no longer serves to signal danger (28).

There are a number of studies that look at the effects of yoga on anxiety levels in non-clinical samples. Studies have compared the effects of swimming, fencing, body conditioning, and yoga classes and found that only the yoga treatment group recorded a significant short term reduction in state anxiety (29). Ray et al. reported that yoga reduced anxiety but only among male students (30). Research has shown that participants in yoga as well as swimming and the Feldenkrais method recorded lower anxiety levels than a control group (31). However, in a study of elderly people, it was found that yoga participants fared worse than those in an aerobic exercise group and no better than the other treatment regimens on anxiety measures (32,33).

It is difficult to predict the effect of yoga on people with anxiety or a specific anxiety disorder on the basis of the findings of these studies. Anxiety disorders are not categorized as psychiatric disorders but also play a major role in the pathogenesis of a number of medical disorders such as cardiovascular diseases, diabetes mellitus and bronchial asthma (34-36). Researchers have studied the effect of yoga based lifestyle interventions on a group of 175 patients suffering from medical or psychiatric disorders (depression, anxiety). The program included breathing exercises, *asanas*, meditation and lectures and films on yoga. They

Table 1 – Various Yoga techniques	
Main features	Appropriate population
Ananda Yoga Deep relaxation in postures Purpose of asanas is preparation for meditation Process enhanced by use of affirmations Used to heighten self awareness preparation for meditation	Those seeking both physical and spiritual practice
Ashtanga Yoga (Power Yoga) not to be confused with the 8 limbs of yoga Rigorous practice Continuous flow of postures(Vinyasa system) Begins with sun salutation series	Athletic individuals who want a vigorous 'active' yoga routine Thermoregulatory concerns as heat is used Those with back or joint problems may have difficulty
Bikram's hot yoga Performed in a heated room (>80 degree F) 26 poses performed twice Class begins and ends with breathing Precise practice Final "shivasana" (posture is for relaxation)	Beginners through advanced practitioners Practise with caution in persons with heat intolerance (People currently receiving chemotherapy are particularly at risk of thermodyregulation)
Iyengar Yoga Precise and dynamic Slow and moderate practice pace Uses props such as blocks Pranayama breathing not taught until proficiency is reached	Good for those wanting to build strength and balance Inversions may not be appropriate for all (specially persons with eye disorders or hypertension)
Kripalu Yoga Internally directed approach Noncompetitive Meditation in motion Uses "wisdom of the body"	Very deliberate and mild to moderate practice It can be adjusted to suit many different levels of ability
Kundalini Yoga Special breathing techniques emphasized Works to awaken "coiled energy" in the sacrum	May not be appropriate for all physical conditions (Caution with cardiac abnormalities such as bradycardia. The constant emphasis on breathing techniques during postures may lower heart rate or induce dysrhythmias)
Restorative Yoga Focus is on the healing of specific body parts Postures are held for longer periods of time Teacher may assist student in getting into posture Props such as blankets and cushions maybe used	Slow paced, appropriate for most people Particularly good for older individuals with medical conditions Some focus on "meditation" whereby one becomes more aware of his/her body
Viniyoga Step by step approach to asanas Form sacrificed for proper breathing Often taught privately Instructors well versed in therapy	Good for people with injuries, needs physician's advice before starting Posture applications are very precise

reported a significant reduction in the anxiety scores of patients as compared to controls from baseline till end of intervention. Significant reductions were found in patients with psychiatric disorders, coronary artery disease, hypertension, obesity and cervical spondylosis (37).

Other researchers have conducted two studies as part of a larger nine year trial of what they term psychophysiological treatment for psychoneurosis. Psychoneurosis is a term no longer used as a diagnosis, which originally referred to both anxiety and depressive disorders. The psychophysiological treatment was a form of yoga based on the concepts of Patanjali (38,39). In the first of the studies, the yoga treatment was compared with a pseudo-yoga treatment, designed to act as a control which could ensure patient blinding (38). Both groups of participants had equivalent levels of baseline anxiety measured by Taylor's anxiety scale. After their respective treatments, the genuine yoga group recorded significantly lower anxiety scores than the control group. In the second study yoga treatment was compared with the anxiolytic and antidepressant drugs chlordiazepoxide and amitriptyline, this time among patients with a diagnosis of either psychoneurosis or psychosomatic disorder (39). The results suggested that the patients who had practiced yoga recorded a significantly greater reduction in Taylor's anxiety scale score than those in the drug treatment group.

In a systematic review of eight studies on the use of yoga in anxiety, all the eight studies reviewed reported positive findings for the use of yoga in Obsessive Compulsive Disorder (OCD), examination anxiety, snake phobia, anxiety neurosis and psychoneurosis, although the latter two diagnostic terms are no longer used (4, 39-45). They concluded that there were many methodological inadequacies, and only the OCD study was described as being methodologically rigorous. Another research concluded that participation in a two-month yoga class can lead to significant reduction in perceived levels of anxiety in women who suffer from anxiety disorders. They also suggested that yoga can be considered as a complementary therapy or an alternative method for medical therapy in the treatment of anxiety disorders (46).

A study on Siddha Samadhi Yoga (a program in which meditation is associated with *pranayama* or breathing exercises), studied 22 volunteers with anxiety complaints (Mean age = 42.8 years, SD = 10.3) who were assigned to two groups: 14 attended the yoga group, and 8 attended a waiting-list or control group. They were evaluated before the intervention and one month later on the State-Trait Anxiety Inventory, the Beck Depression Inventory, Tension Feelings Self-evaluation Scales, and the Well-being Self-evaluation Scales. A significant reduction in scores on anxiety, depression, and tension was found in the yoga group, as well as an increase in well-being in comparison with the control group (47). Authors have also indicated that an intervention consisting of a six-session yoga program reduced the anxiety of dementia caregivers who did not have an anxiety disorder (48). An eight week randomised controlled trial compared a "mental silence" approach to meditation with a "relaxation"

control group and a "wait-list" control group in adult workers. The mental silence meditation (MSM) group was taught to elicit a state of mental silence or "thoughtless awareness" (49). The technique is based on Sahaja yoga, which employs a simple series of silent affirmations based on a traditional understanding of yogic psychophysiology (50). There was a significant improvement for the meditation group compared to both the relaxation control and the wait-list groups on the Psychological Strain Questionnaire (PSQ) and the depression-dejection (DD) subscale of the Profile of Mood States (POMS). Sahaja Yoga meditation was concluded to be a safe and effective strategy for dealing with work stress and depressive feelings. The findings suggest that "thought reduction" or "mental silence" may have specific effects relevant to work stress and hence occupational health (49).

Yoga ameliorated performance anxiety and mood disturbances in young professional musicians in a two month controlled study with a yoga and lifestyle intervention group, a group practicing yoga and meditation and a control group (51). A study has also concluded that yoga prevented an increase in anxiety among flood survivors with just a week of yoga practice (52). In another study, a month after the December 2004 tsunami, the effect of a one week yoga program was evaluated on self rated fear, anxiety, sadness and disturbed sleep in 47 survivors in the Andaman Islands (53). There was a significant decrease in self rated fear, anxiety, sadness and disturbed sleep in both groups of mainland settlers and endogenous people, suggesting that yoga practice may be useful in the management of stress following a natural disaster in people with widely differing social, cultural and spiritual beliefs (53). SKY has been used as a public health intervention to alleviate post-traumatic stress disorder (PTSD) in survivors of mass disasters (54).

Yoga helps to improve the mental health in both the young and old age groups. Individuals from both these groups were subjected to 90 minutes of yoga classes once or twice a week for a month. Decrease in salivary amylase activity after a month was concluded to be due to reduction in sympathetic response. Reduction in State and Trait anxiety scores signified that yoga has both immediate as well as long-term effects on anxiety reduction irrespective of age (55).

Yoga for childhood and adolescent anxiety disorders

Three child and adolescent studies (56-58) were identified that evaluated yoga as a treatment intervention for anxiety (56-58). The yoga participants (and not the controls) reported decreased anxiety and increased positive affect, and they were observed to show less anxious behavior and fidgeting. Using a non-randomized, controlled treatment design, the effectiveness of the "Training of Relaxation with Elements of Yoga for Children" program based on Sivananda yoga was evaluated with participants aged 11 and 12 who evidenced high levels of school examination anxiety (57). The participants showed significant reductions in aggression, helplessness in school, physical complaints, and an increase in stress-coping abilities and general well being, but no

significant reduction in school exam anxiety or increase in self efficacy (57).

In their comprehensive review of yoga as a complementary therapy for children and adolescents, researchers concluded that there is a small effect in favor of exercise in reducing depression and anxiety scores in the general population of children and adolescents and that it made little difference on the outcome whether the exercise was of high intensity, e.g., aerobics class, or low intensity, e.g., relaxation classes or yoga (59). In a study that compared cyclic meditation (which has cycles of yoga postures alternating with guided relaxation while supine) to an equal duration of supine rest in the corpse posture (shavasana), it was concluded that cyclical meditation improved memory scores immediately after the practice and decreased anxiety more than resting in a classical yoga relaxation posture (shavasana) (60).

Long term studies of use of Yoga in anxiety disorders

Researchers have examined adherence to yoga and exercise over six months in a group of healthy seniors. They reported average yoga class attendance as 77% and home practice on 64% of all days. There were no clear effects of adherence on the significant study outcomes (quality of life and physical measures). Adherence was significantly correlated with baseline measures of depression, fatigue, and physical components of health-related quality of life and not related to age, gender, or education level (61). Decreased adherence to a potentially beneficial intervention for fatigue or depression has the potential to decrease the effect of the intervention in a clinical trial. Strategies to maximize adherence among subjects at greater risk for low adherence will be important for future trials, especially complementary treatments requiring greater effort than taking medication. Low participation and high attrition rates, with a 50% drop out rate within three to six months, have been found for exercise (62). Dropout rates were significant or high in all three studies which examined this aspect (44-45). Using family support structures and emphasizing the non-competitive nature of yoga may improve compliance (63).

Conclusions

Yoga has been with us since ancient times and has been used by mankind to alleviate various problems. Yoga is supported by research evidence as a safe, and effective method that the patient can follow at home to reduce anxiety symptoms. Anxiety is a symptom that is often psychological in nature and has its determinants in the patient's environment. Therefore at times biological treatment and drug treatment may not be able to reduce the patient's symptoms. Yoga may serve as an effective substitute or accompaniment to biological treatments in anxiety. Further use of various yogic postures and exercises in specific populations with specific anxiety disorders needs to be researched. This could add to the number of treatments available for the management of anxiety disorders.

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