



Yoga as an Alternative and Complementary Therapy for Patients Suffering From Anxiety: A Systematic Review

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Abstract

Anxiety disorders are one of the most common psychiatric disorders plaguing the United States. Comorbidities include depression, restless leg syndrome, cancer, and hypertension. The side effects and the high-costs associated with the current pharmacological therapies necessitate exploration of alternative methods of treatment. To determine the efficacy of yoga as a treatment option a systematic review is presented here. The criteria for inclusion in this review were as follows: (a) published in the English language (b) published between the period January 2010 and May 2012, (c) include any form of yoga as a part of or an entire intervention, (d) use any quantitative study design, and (e) measure anxiety as an outcome. A total of 27 studies met these criteria. Of these, 19 demonstrated a significant reduction in state and/or trait anxiety. Limitations include a lack of theory-based approaches, subjects experiencing comorbidities, and the use of numerous instruments to measure anxiety outcomes.

Keywords

yoga, anxiety, *pranayama*, stress, breathing

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The prevalence of anxiety in the United States is among the highest of all psychiatric disorders at 28.8%.¹ Anxiety is associated with increased cardiac output and autonomic nervous system activity.² Current therapies to control or treat anxiety include hospitalization, prescription drugs, and counseling. Because of the high cost associated with these therapies, as well as the damaging side effects of prescription drugs, including dependency, sedation, and weight gain, alternative therapies are being explored.¹ Yoga has been used previously as a therapy to lower heart rate and blood pressure allowing it to be a possibly effective option for those suffering from anxiety.³

Yoga promotes slow deep breathing techniques used to relax the mind and body as well as to increase oxygenation (*pranayama*). Because symptoms associated with anxiety include short and choppy breaths yoga may be able to treat warning signs of anxiety.³ Yoga has been known, classically, not only as an alternative to exercise but also as a relaxation technique to reduce the physiological and psychological responses to stress.⁴ Considering that yoga involves active attention exercises, it has been shown to increase cognition and mood of those that perform it regularly. The mechanism of action by which yoga works is probably because of activation of the parasympathetic nervous system. More specifically, studies have shown that yoga increases the neurotransmitter γ -aminobutyric acid (GABA) in the brain, which helps in

relieving anxiety. Furthermore, yoga can be practiced by those unable to perform aerobic exercise, allowing them to receive the mood enhancing benefits of aerobic exercise through yoga.⁵ By exploring yoga as an alternative or complementary therapy for anxiety sufferers will allow those previously unable to be treated because of the high cost of most therapies, drug side effects, or physical ailments, to begin managing their disease.

Questions being addressed in this study include the following: Is yoga efficacious alone, or in tangent with medication, to significantly reduce anxiety levels of healthy and anxiety-stricken subjects and is there sufficient data available to draw conclusions regarding the efficacy of yoga in treating anxiety?

Methods

The method used in this study was a systematic review of the literature regarding yoga as a therapy for anxiety. The criteria for inclusion in

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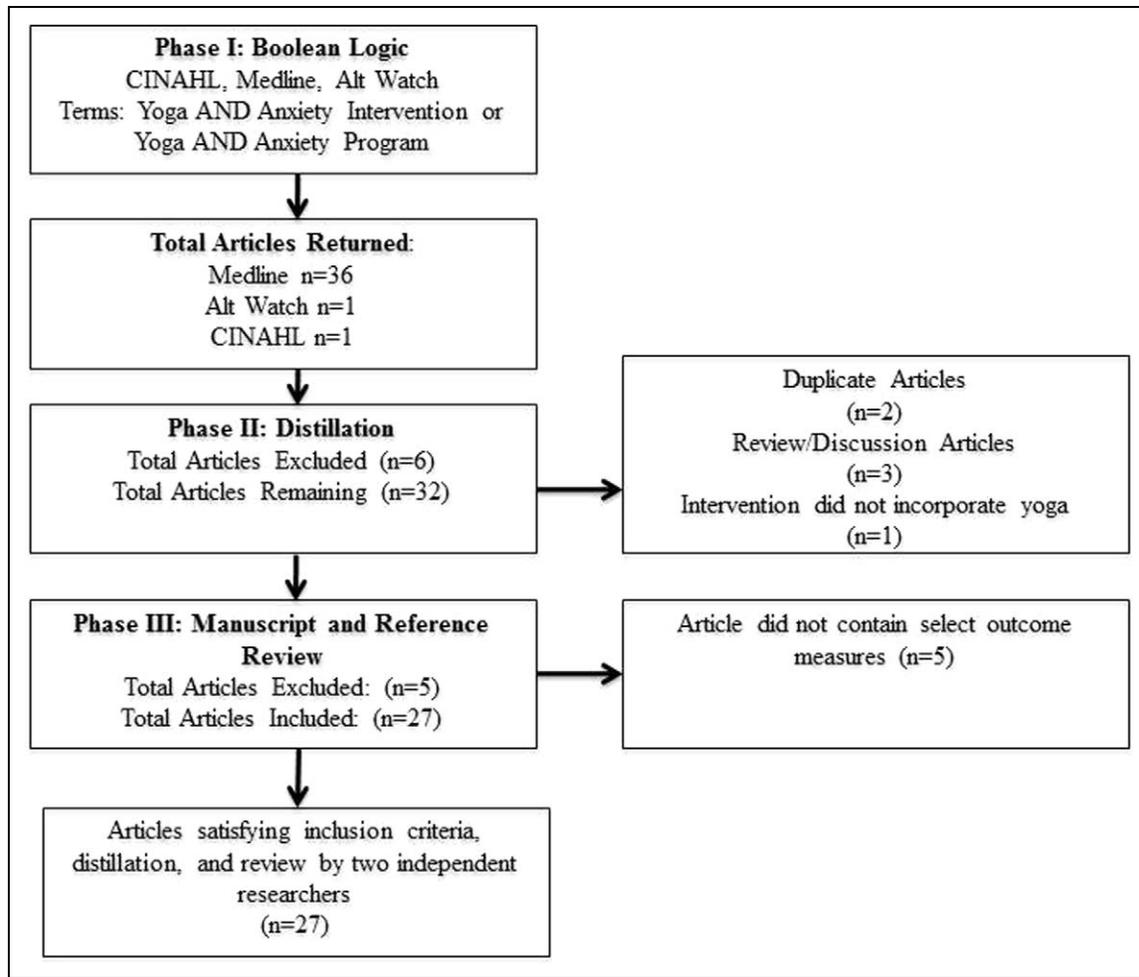


Figure 1. Flowchart depicting the 3-phase data extraction process.

this review were as follows: (a) published in the English language (b) published between the period January 2010 and May 2012, (c) include any form of yoga as a part of or an entire intervention, (d) use any quantitative study design, and (e) measure anxiety as an outcome (State-Trait Anxiety Inventory, Beck's Anxiety Inventory, Visual Analog Scale, etc). Exclusion criteria included studies that (a) did not implement a quantitative design and (b) did not index in any of the following databases—CINAHL (Cumulative Index to Nursing and Allied Health), Medline, or Alt HealthWatch. Yoga has been used as a therapy for many ailments, including hypertension, diabetes, and depression. Here, it was necessary to omit these studies by including phrases regarding anxiety and seek studies that measured anxiety with a validated and reliable scale. In addition, many of the studies measured anxiety with comorbidities such as restless leg syndrome, fibromyalgia, or schizophrenia. These studies were not omitted as they met the eligibility criteria.

The 3 phases returning studies meeting the above criteria include a Boolean search, distillation, and manuscript and reference review (Figure 1). To identify studies meeting these criteria Medline, Alt HealthWatch, and CINAHL database searches were performed for Phase I. Boolean terms used to identify studies meeting the criteria included “Yoga AND Anxiety Intervention” and “Yoga AND Anxiety Program.”

Using the above terms/phrases, 39 articles were returned: Medline (n = 37), Alt HealthWatch (n = 1), and CINAHL (n = 1). Phase

II included preliminary distillation of the articles by eliminating duplicates (n = 2), review/discussion articles (n = 3), and studies not incorporating yoga in the intervention (n = 1). Phase III included omitting articles that did not incorporate anxiety as an outcome measure. Of the remaining articles (n = 32), 5 were excluded. The remaining articles (n = 27) satisfied the eligibility criteria (Figure 1).

Results

Results of the data extraction process included 27 articles meeting the eligibility criteria. The year of publication, authors, study design and sample size, age of participants, intervention modality/dosage, and the salient findings are summarized in Table 1. The studies are in ascending order by year of publication.

Discussion

The purpose of this review was to determine the efficacy of yoga, with or without pharmacological therapy, to treat anxiety disorders by analyzing studies of this nature between 2010 and May 2012. A total of 27 studies meeting the inclusion criteria were found. Of these, 11 were conducted in the United States, 8

Table 1. Summary of Studies Examining the Role of Yoga in the Treatment of Anxiety Disorders (n = 27)

Year	Authors	Design and Sample	Age (Years)	Intervention Modality	Intervention Dosage	Salient Findings
2010	Carei, Fyfe-Johnson, Breuner, and Brown ⁶	Randomized controlled design; n=50 boys and girls diagnosed with an eating disorder divided into standard of care and yoga groups	11-21	Yoga (unspecified)	Twice weekly yoga for 1 hour for 8 weeks	Scores from the State-Trait Anxiety Inventory (STAI) show that state anxiety ($P < .02$) and trait anxiety decreased significantly ($P < .001$) similar to standard of care group
2010	Carson, Carson, Jones, Bennett, Wright, and Mist ⁷	Randomized control design; n = 53 females with fibromyalgia divided into yoga and control groups	>21	Yoga and Awareness Training (Kripalu school of yoga)	Home practice 20 to 40 minutes daily, 5 to 7 days a week guided by a DVD for 8 weeks	Fibromyalgia Impact Questionnaire (FIQ) showed that anxiety was reduced by 42.2%, although FIQ anxiety scores pretest and posttest were not significant
2010	Chandwani, Thornton, Perkins, Arun, Raghuran, Nagendra, Wei, and Cohen ⁸	Randomized control design; n = 61 women with stage 0 to III breast cancer undergoing radiotherapy divided into yoga and waitlist groups	31-67	Yoga Sutras (Ashtanga, asanas, pranayamas, yama and niyama) and meditation	Biweekly yoga classes taught by an instructor during their 6 weeks of radiotherapy	Scores from the STAI indicate that there was no significant change in anxiety from pretest to post test
2010	Field, Diego, and Hernandez-Reif ⁹	Pretest–posttest design; n = 38 yoga naïve adults	21-59	Tai chi/yoga (unspecified)	One 20-minute session of 10 minutes Tai chi movements and 10 minutes of yoga	Immediate results from the STAI show a decrease in anxiety from 33.64 ± 7.01 to 31.62 ± 7.99 (not significant)
2010	Harner, Hanlon, and Garfinkel ¹⁰	Self-controlled match design; n = 21 incarcerated females who had served at least 3 months with 6 months remaining	36-56	Iyengar Yoga (IY)	Twice weekly 120-minute IY sessions with an instructor for 12 weeks	Results from the Beck's Anxiety Inventory (BAI) show that anxiety did decrease over time but was not significant, 42 ± 13.762 to 17 ± 6.346
2010	Streeter, Whitfield, Owen, Rein, Karri, Yakhkind, Perlmutter, Prescott, Renshaw, Ciraulo, and Jensen ¹¹	Randomized control design; n = 52 subjects with no significant medical or psychiatric disorders divided into walking or yoga groups	18-45	Iyengar Yoga (IY)	12 weeks of 60-minute yoga sessions 3 times weekly taught by an instructor for 4 weeks then unpervised home sessions were used	Results of the STAI show a significant decrease in the anxiety of the yoga group versus the walking group ($P < .05$)
2010	Telles, Singh, Joshi, and Balkrishna ¹²	Randomized control design; n = 22 males affected by flooding in Bihar, India assigned to a yoga or waitlist non-yoga group	32.1 ± 9.3	Sudarshan Kriya Yoga (SKY)	1 hour daily of yoga 7 days a week for 1 week	Results from the Visual Analog Scale (VAS) show a decrease in anxiety from 5.72 ± 3.19 to 4.48 ± 2.64 (not significant) for yoga group
2010	Thygesson, Hooke, Clapsaddle, Robbins, and Moquist ³	Pretest–posttest design; n = 16 children/adolescents with cancer and n = 33 parents of children with cancer	Children: 7-12, adolescents 13-18	Hatha yoga	A single yoga session of 45 minutes	Results from the STAI show no significant change in children's anxiety, adolescents had a significant decrease in anxiety ($P < .04$) as did parents ($P < .001$)
2010	Ulger and Yagci ¹³	Pretest–posttest design; n = 20 breast cancer patients undergoing treatment	30-50	Asanas, relaxation, and meditation	Twice weekly yoga sessions for 4 weeks lasting 1 hour each	STAI showed a significant decrease in anxiety levels ($P < .05$)
2010	Yogitha, Nagarathna, John, and Nagendra ¹⁴	Randomized control design; n = 60 patients with common neck pain assigned to a yoga or control group	20-70	Yoga-based relaxation technique	10 days of 20-minute yoga sessions daily through the use of pre-recorded audiotape	Results from the STAI-Y1 show a significant change in anxiety for yoga group from 56.80 ± 8.10 to 45.83 ± 10.66 ($P < 0.1$)
2011	Curtis, Osadchuk, and Katz ¹⁵	Pretest–posttest design; n = 22 women with fibromyalgia	17-71	Hatha yoga	75-minute yoga session twice weekly for 8 weeks taught by an instructor	Results from the Hospital Anxiety and Depression Scale (HADS) show a change in anxiety from 10.83 ± 4.40 to 9.78 ± 4.26 (not significant)

(continued)

Table 1. (continued)

Year	Authors	Design and Sample	Age (Years)	Intervention Modality	Intervention Dosage	Salient Findings
2011	Gopal, Mondal, Gandhi, Arora, and Bhattacharjee ²	Randomized control design; n = 60 first year female medical (MBBS) students assigned to a yoga or control group	17-20	Yogic prayer, <i>sukshma, sthula vyayam, sthula vyayama, asanas, pranayamas, and dhiana</i>	Yoga practice 35 minutes daily for 12 weeks with a yoga instructor	STAI showed an increase in anxiety in both groups, but significantly higher in the control group ($P < .05$) at the end of the study STAI results show that state anxiety decreased in the senior group from 41.13 ± 8.43 to 30.8 ± 6.48 ($P < .05$) and in the younger group from 38.7 ± 4.8 to 30.8 ± 4.1 ($P < .05$) Results from the Psychological General Well-being Index (PGWBI) show that anxiety decreased significantly in the yoga group versus the control group ($P < .003$)
2011	Gururaja, Harano, Toyotake, and Kobayashi ¹⁶	Pretest-posttest; n = 25 healthy yoga naive volunteers (n = 15 seniors and n = 10 younger adults)	65-75 (n = 15) and 20-30 (n = 10)	<i>Asanas, pranayamas, and meditation</i>	90-minute yoga classes twice weekly for 4 weeks	STAI results show that state anxiety decreased from 51.60 ± 9.18 to 47.65 ± 8.43 ($P = .003$) Results of the Depression Anxiety Stress Scales (DASS) demonstrate that only the integrated yoga group experienced decreased anxiety ($P = .007$)
2011	Rani, Tiwari, Agrawal, Ghildiyal, and Srivatava ⁴	Randomized control design; n = 150 women with menstrual irregularities assigned to a yoga or control group (received medication)	18-45	Yoga <i>Nidra</i>	Yoga classes for 35 minutes daily 5 days a week for 6 months	STAI results show that for there was a significant decrease in anxiety among the MBSR group compared with the active control group ($P = .04$). Within MBSR group anxiety decreased from 51.60 ± 9.18 to 47.65 ± 8.43 ($P = .003$) Results of the Depression Anxiety Stress Scales (DASS) demonstrate that only the integrated yoga group experienced decreased anxiety ($P = .007$)
2011	Schmidt, Grossman, Schwarzer, Jena, Naumann, and Walach ¹⁷	Randomized control design; n = 177 women with fibromyalgia assigned to mindfulness-based stress reduction (MBSR), active control, and waitlist	18-70	Meditation and yoga lessons as part of the MBSR	An all day retreat, 7 hours, teaching yoga from an instructor then 2.5 session each week of MBSR and 45-60 minutes of daily yoga practice at home for 8 weeks	STAI results show that for there was a significant decrease in anxiety among the MBSR group compared with the active control group ($P = .04$). Within MBSR group anxiety decreased from 51.60 ± 9.18 to 47.65 ± 8.43 ($P = .003$) Results of the Depression Anxiety Stress Scales (DASS) demonstrate that only the integrated yoga group experienced decreased anxiety ($P = .007$)
2011	Smith, Greer, Sheets, and Watson ¹⁸	Randomized control design; n = 81 students with mild to moderate depression, anxiety, or stress assigned to an integrated yoga, yoga as exercise (no meditation), or control group	18+	<i>Hatha yoga (yamas, niyamas, and asanas)</i>	14 yoga sessions of 60 minutes for 7 weeks (twice weekly)	Results of the BAI show that anxiety decreased significantly from pretest (mean score of 33.33) to posttest (mean score of 8.93) for yoga meditation group ($P = .05$). Between-group comparisons show a significant decrease in anxiety among yoga group versus controls ($P = .05$) STAI results show state anxiety from 44.17 ± 12.82 to 33.30 ± 9.92 ($P < .0001$) with yoga and exercise combined, no significant anxiety changes in control
2011	Srivastava, Talukdar, and Lahan ¹⁹	Quasi-experimental design; n = 30 subjects with adjustment disorder (depression and/or anxiety) to a yoga meditation or control group	30-45	Yoga meditation	60-minute group sessions of yoga daily for first 4 weeks, then to 1 weekly group session and at home practice the rest of the week for the remaining 24 weeks	Results of the BAI show that anxiety decreased significantly from pretest (mean score of 33.33) to posttest (mean score of 8.93) for yoga meditation group ($P = .05$). Between-group comparisons show a significant decrease in anxiety among yoga group versus controls ($P = .05$) STAI results show state anxiety from 44.17 ± 12.82 to 33.30 ± 9.92 ($P < .0001$) with yoga and exercise combined, no significant anxiety changes in control
2011	Vancampfort, De Hert, Knapen, Wampers, Demunter, Deck, Maurissen, and Probst ²⁰	Randomized control design; n = 40 subjects with schizophrenia or schizoaffective disorder assigned to yoga/exercise or no exercise control group	Males, 31.8 ± 8.7 ; females, 32.74 ± 8.93	<i>Hatha yoga</i>	One 30-minute yoga session and 20 minutes of aerobic exercise	Results of the BAI show that anxiety decreased significantly from pretest (mean score of 33.33) to posttest (mean score of 8.93) for yoga meditation group ($P = .05$). Between-group comparisons show a significant decrease in anxiety among yoga group versus controls ($P = .05$) STAI results show state anxiety from 44.17 ± 12.82 to 33.30 ± 9.92 ($P < .0001$) with yoga and exercise combined, no significant anxiety changes in control
2011	Yoshihara, Hiramoto, Sudo, and Kubo ²¹	Quasi-experimental design; n = 38 healthy females with 2+ years yoga experience and n = 37 age-matched controls	20-60	Classic yoga postures, breathing exercise, and meditation	Long-term yoga group practiced on average 2.94 ± 2.04 days weekly for 1.37 ± 0.49 hours for 3.70 \pm 2.27 years	Long-term yoga group showed lower tension-anxiety scores than controls ($P = .017$)

(continued)

Table 1. (continued)

Year	Authors	Design and Sample	Age (Years)	Intervention Modality	Intervention Dosage	Salient Findings
2012	Ebnezar, Nagarathna, Yogitha, and Nagendra ²²	Randomized control design; n = 250 subjects with osteoarthritis knees assigned to yoga or control group	35-80	Asanas, pranayamas, and meditation	Yoga group taught yoga then requested to practice at home 40 minutes daily for 3 months	Results of STAI show reduction in state anxiety ($P < .001$) and trait anxiety reduced ($P < .001$) in the yoga group than in the control group
2012	Field, Diego, Hernandez-Reif, Medina, Delgado, and Hernandez ²³	Randomized control design; n = 84 prenatally depressed women assigned to yoga, massage therapy, or standard prenatal care (control) group	18-40	Yoga (unspecified)	12 weeks of twice weekly yoga for 20 minutes taught by an instructor for second and third trimester women	The STAI results show decrease in anxiety among massage and yoga groups versus controls ($P < .001$)
2012	Innes and Selfe ²⁴	Randomized control design; n = 75 women (n = 20 with restless leg syndrome, 10 to each group) assigned to yoga or educational film group	45-79	Gentle Iyengar Yoga	8 weeks of 90-minute yoga classes twice weekly and requested to practice at home with DVD on nonclass days	Results of the STAI show significant decrease in anxiety among yoga group ($P < .05$). For yoga group pre/post state anxiety reduced from 33.29 ± 2.59 to 26.14 ± 2.22 ($P < .05$), not significant for trait anxiety
2012	Katzmann, Vermani, Gerbang, Brown, Iorio, Davis, Cameron, and Tsigielis ¹	Pretest-posttest design; n = 41 patients with a primary diagnosis of generalized anxiety disorder (GAD)	18-65	Sudarshan Kriya Yoga (SKY)	Training sessions for 4 days (6.5 hours for day 2 and 10 hours for days 3 and 4) with 20 minutes at home practice introduced on day 5 with offered group session 2 hours once weekly	BAI scores show no significant difference in anxiety pretreatment and posttreatment ($P < .08$)
2012	Rani, Tiwari, Singh, Singh, and Srivastava ²⁵	Randomized control design; n = 150 women with menstrual disorders (mild to moderate anxiety or depression) assigned to control or yoga group	18-45	Yoga Nidra	Yoga classes were 35 minutes daily, 5 days a week for 6 months	Hamilton Anxiety Scale (HAM-A) results show significant decrease in mild ($P < .01$) and moderate ($P < .02$) anxiety for yoga group, nonsignificant change in those with severe anxiety
2012	Rocha, Ribeiro, Rocha, Sousa, Albuquerque, Ribeiro, and Silva ⁵	Randomized control design; n = 36 men enlisted in the Brazilian army assigned to yoga or control group, both received physical exercise	20-40	Yoga (unspecified)	Two yoga classes and 2 exercise classes 60 minutes each weekly for 6 months	BAI scores show a significant decrease in anxiety among the yoga group ($P < .001$) versus the control group
2012	Shankarapillai, Anathakrishnan, Nair, and George ²⁶	Randomized control design; n = 100 dental students to perform their first periodontal surgery assigned to a yoga or lecture on stress reduction (control) group	22 (average age)	Asanas, pranayamas, and sithilikarana vyayama	60 minutes of yoga training daily for 1 week, then a cassette tape for 20 minutes of independent practice daily	For both VAS and STAI, there was a significant decrease in anxiety in the yoga group versus the control ($P < .05$). State anxiety reduced from 39.320 ± 1.183 (baseline) to 34.140 ± 3.989 (before surgery) for the yoga group ($P = .001$)
2012	Stoller, Greuel, Cimini, Fowler, and Koomar ²⁷	Randomized control design; n = 70 military personnel in Iraq divided into yoga or control group	32 (average age)	Hatha yoga	Attend a minimum of 2 sessions/week of 75-minute yoga classes for 3 weeks	STAI scores show significant decrease in state (mean decrease of 8.23) and trait anxiety (mean decrease of 6.86) in the yoga group ($P < .001$)

Abbreviations: STAI, State-Trait Anxiety Inventory; VAS, Visual Analog Scale; BAI, Beck's Anxiety Inventory

in India, 2 in Canada, 2 in Japan, and 1 each in Brazil, Belgium, Germany, and Turkey. Yoga has been known to have a positive effect on stress, especially through the use of rhythmic breathing techniques, allowing its benefits to cross many cultural and regional boundaries, although its origins are in India.¹ It is noteworthy to mention that many of the above studies discussed anxiety disorders as a comorbidity to a number of other disease and disorders.

The subjects included in studies analyzed experienced anxiety with depression (n = 5), cancer (n = 3), stress (n = 3), fibromyalgia (n = 3), menstrual disorder (n = 2), restless leg syndrome (n = 1), osteoarthritis (n = 1), common neck pain (n = 1), schizophrenia (n = 1), and eating disorders (n = 1). The remaining studies consisted of subjects suffering from anxiety or measured only anxiety as an outcome (n = 2) and 4 studies included healthy subjects with no history of psychiatric disorders. Studies performed on healthy subjects, measuring their before and after intervention anxiety levels, are meant to examine the preventive effects of yoga.⁵

Nineteen of the 27 studies analyzed showed a significant decrease in state and/or trait anxiety through the use of yoga.^{2-6,13,14,16-27} Although not all studies found a significant decrease in anxiety, many did find reductions not at a statistically significant level. Randomized control design, considered the most robust because of minimum threats to external and internal validity, was instituted in 18 of the studies.* This design enlists pretests/posttests and assigns subjects randomly to control and experimental groups. Five studies used the simplest and less costly design of pretest–posttest.^{1,3,9,13,15} No control group for comparison is used and threats to internal validity can be found, including history and maturation. Quasi-experimental design was enlisted by 3 studies.^{16,19,21} This is similar to randomized control design, except that quasi-experimental design does not assign subjects randomly to control and experimental groups. This sometimes occurs when researchers' intent is to match subjects between groups or when random selection is not ethical.²⁸ Finally, one study used the self-controlled match design.¹⁰ This type of design is similar to randomized control design, except that subjects act as their own controls in the intervention, therefore no randomization is necessary.

Yoga is most notably specified as a mind–body therapy composed of various breathing and relaxation techniques, including meditation, postures, and phrase recitation to improve physical and mental illness.⁵ Four of the studies identified used Iyengar Yoga, which focuses on correct postural alignment and movement precision, while promoting the use of props (mats, blocks, blankets, and belts).¹⁰ SKY or *Sudarshan Kriya* Yoga, used in 2 of the studies,^{1,12} incorporates rhythmic breathing techniques performed in the sitting posture with eyes and mouth kept closed.¹² Yoga *Nidra*, a deep relaxation technique, was performed in 2 of the studies,^{4,25} integrating a form of “sleep” to attain a form of blissful awareness,

unable to be achieved through other forms of yoga.⁴ *Hatha* yoga, or physical yoga, was enlisted as the intervention for 5 of the identified studies.^{3,15,18,20,27} It incorporates yoga postures (*asanas*), breathing exercises (*pranayamas*), brief meditation (*dhyana*), and balancing of opposite properties (heat/activation with cool/calming) to foster mental health development.¹⁶ The remaining studies incorporated unspecified yoga techniques,^{5,6,9,14,23} various techniques, including the ones mentioned above and others,^{2,8,13,16,19,21,22,26} Kripalu,⁷ and mindfulness-based stress reduction.¹⁷

Among the studies identified the duration of yoga intervention ranged from one-time yoga session^{3,9,20} to a 7-month yoga intervention.¹⁹ In addition, one study followed up with advanced yoga adults that had participated in yoga for 3 plus years.²¹ Intervention durations also included 1 week (n = 1), 10 days (n = 1), 3 weeks (n = 1), 1 month (n = 2), 6 weeks (n = 1), 7 weeks (n = 1), 2 months (n = 6), 3 months (n = 5), 6 months (n = 3), and 2 that were of unspecified durations.^{1,26} To determine correctly if a yoga intervention is efficacious in treating or lowering anxiety levels 2 to 3 months of regularly sustained yoga practice must be implemented.

The majority of studies identified incorporated the use of certified yoga instructors to teach yoga classes twice weekly ranging in duration from 20 to 120 minutes.[†] Studies requesting practice of yoga 5 to 7 days weekly did not enlist the services of an instructor regularly, but offered either an initial training or DVD/audio tapes to assist subjects.[‡] Two studies offered yoga sessions with an instructor once a week, requesting additional practice at home daily, one study requested practice independently three times a week, and three offered a one-time yoga session. The majority of studies emphasizing in-class training with an instructor demonstrated more significant reductions in anxiety as opposed to those that encourages at home independent practice. Not only is 2–3 months, at minimum, of regular practice necessary, it may be surmised that studies incorporating the use of an instructor may be most effective to improving anxiety disorders. The downfall is that this type of study is not only more costly, but requires attendance of the subjects regularly, possibly influencing attrition rates.

Notable studies include that of a randomized control trial comparing yoga practice versus a walking program for health individuals with no known psychiatric disorders. Here the yoga group showed a significant decrease in anxiety versus the walking group ($P < .05$) as reported by the State-Trait Anxiety Inventory.¹¹ In another randomized control trial, women with menstrual disorders were assigned to a yoga or control group. Results from the Psychological General Well-being Index indicated that there was a significant decrease in anxiety in the yoga group versus the medicated control group regarding between-group comparisons ($P < .003$).⁴ Two more randomized control trials, that incorporated yoga with meditation demonstrated significant decreases in anxiety for subjects with

*References 2, 4-8, 11, 12, 14, 17, 18, 20, 22-27.

†References 5, 6, 8, 10, 13, 15, 16, 18, 23, 24, 27.

‡References 2, 4, 7, 12, 14, 17, 22, 25, 26.

psychiatric disorders (anxiety, stress, or depression).^{18,19} It is important to note that the study with 3 assigned groups showed that yoga as exercise alone, without meditation, was not as efficacious as the integrated yoga course with meditation ($P = .007$).¹⁸ Because the above studies compared subjects with diverse comorbidities, it is apparent that yoga is a dynamic tool that is applicable to treat many disorders.

An additional noteworthy study, using a pretest–posttest design, offered subjects the same intervention divided into 2 groups, senior and young adults, allowing comparisons of the efficacy of yoga for anxiety based on age alone. Here healthy yoga naïve adults, 15 seniors aged 65 to 75 years, and 10 young adults aged 20 to 30 years, practiced yoga for 90 minutes 1 to 2 times a week for 1 month. Results indicated that both groups saw a statistically significant reduction in trait and state anxiety levels ($P < .05$). Between groups comparisons showed no statistically significant difference in the reductions of anxiety.¹⁶ This further illustrates yoga's ability to work across age groups and disorders.

As mentioned previously, many of the studies identified incorporated the use of self-reporting yoga practice, as the implementation was an intervention that consisted of a portion of or entirely of home-based yoga practice. Studies incorporating a home-based yoga practice may be flawed because errors occur with self-reporting, such as inaccurate recall of practice duration and incorrect practice technique. In addition, no study incorporated the use of a theory, although theory-based interventions tend to have increase empirical evidence to prove their efficacy.²⁹ Considering the majority of the studies ($n = 25$) enlisted an intervention targeting anxiety and additional disorders (depression, menstrual irregularity, fibromyalgia, etc), it can be difficult to determine if anxiety reductions were secondary to reductions in comorbidities that the subjects suffered. This means that some subjects suffered anxiety as a secondary condition, whereas others were healthy, and still other subjects were diagnosed with generalized anxiety disorder as their primary ailment. Because of these variations in anxiety, results may not be comparable between studies.

Besides research applications, it is also important to consider applications of yoga for anxiety management in the real-world setting. These days yoga instructors are available in almost all cities and towns. They need to be linked to psychiatric hospitals and mental health clinics just like physiotherapists and occupational therapists are linked to rehabilitation units. Insurance companies and health maintenance organizations must be convinced to reimburse for yoga classes. Benefits of yoga and practical classes of yoga should be included in the curricula of counselors, medical students, and psychiatrists.

Disadvantages associated with any novel approach to anxiety treatment are inevitable. Current therapies, such as medications, have been moderately successful for short periods of time unless dosage is increased.¹⁷ Yoga, proven to decrease the activity of the autonomic nervous system,²² is a possible healthier alternative to the dangers of developing dependencies associate with anxiety medications. In addition, yoga intervention of subjects

suffering from comorbidities of anxiety—hypertension, fibromyalgia, depression, and stress—has shown to benefit these populations as well. Considering that anxiety is the fastest growing psychiatric condition in the United States, finding a cost-effective treatment with few harsh side effects is essential.

Author Contributions

This work was performed by Dr Manoj Sharma and Ms Taj Haider. MS conceptualized the study, developed the inclusion criteria, collected the data, developed the table, analyzed the data, and reviewed the article. TH collected the data, analyzed the data, and wrote the first draft of the article.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical Approval

This study did not warrant institutional review board review as no human subjects were involved.

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