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Yoga as a Complementary Therapy for Clinical Depression

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Abstract

Clinical depression is a common illness, with prevalence of current depressive symptoms in the general population of nearly 10% and lifetime diagnosis almost 16%. Yoga offers an attractive option for complementary therapy of depression. The purpose of this study was to examine research regarding the benefits of yoga for depression, to learn to what extent yoga is beneficial as a complementary therapy for this condition. The method used in this study was a systematic qualitative review of interventions obtained from MEDLINE, CINAHL, and ERIC databases. A total of 18 studies met the criteria. Some of the designs utilized by the interventions were pretest posttest, quasi-experimental and randomized controlled trials. It was found that majority of the interventions (17) were able to significantly reduce depressive symptoms in the patients under study. However, several methodological limitations were identified in the conduct of the intervention trials, which future interventions must consider.

Keywords

yoga, depression, therapy, treatment, complementary and alternative medicine

Introduction

It is estimated that more than 20 million people experience some form of depression in the United States (National Institute of Health [NIH], 2010). Symptoms for depression include sadness, loss of interest/pleasure in activities that are normally enjoyed, weight changes, sleeping problems/oversleeping, loss of energy, feeling worthless, and thoughts of death/suicide (NIH, 2010). In 2006, the Behavioral Risk Factor Surveillance System (BRFSS) found that the prevalence of current depressive symptoms in the U.S. general population was 8.7% and lifetime diagnosis of depression was 15.7%, making it a common illness (Strine et al., 2008).

While there is no specific cause for depression, a range of factors are involved, including genetics, chemical imbalance, hormonal factors, stress, and/or medical illness. Treatment varies from use of antidepressants, therapy, or a combination of the two. Oftentimes, individuals turn to complementary

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forms of treatment due to the side effects of antidepressants, a lack of positive results, or by choice (Pilkington, Kirkwood, Rampes, & Richardson, 2005).

Yoga, an alternative therapy known for enhancing the mind–body connection that has been utilized widely in certain Eastern cultures, is now being studied for its usefulness for depression. Yoga consists of meditation, postures, and breathing techniques. This triad allows for relaxation and balance of the body and mind. By definition, yoga is seen as the control of the five senses and a reduction of mental activity, eventually allowing for a nirvana like state to be achieved. Various schools of yoga exist, such as Hatha, Bikram, Iyengar, Siddha Samadhi, Sudrashan Kriya Yoga (SKY), Silver Yoga, and Sahaj Yoga; although differing in their styles and emphases, all schools utilize the base triad of meditation, postures, and breathing to promote and restore mind–body health.

Benefits of yoga include an increase in muscular strength, flexibility, range of motion, energy, and sleep quality (Pilkington et al., 2005; Strine et al., 2008). Improvements in mental health, cardiovascular health, hormone levels, immune response, and respiratory functions are also seen. The nature of yoga allows for individuals to experience heightened awareness and relaxation.

According to a survey conducted in 2008, 6.9% of adults practice yoga, 8% were very/extremely interested in yoga, and 4.1% were definitely willing to try yoga in the next year (Yoga Journal, 2010). A majority of the individuals were females, living in urban areas and referred to yoga for overall wellness/particular health problems. To date, insufficient literature is available for the utilization of yoga as a form of therapy.

Pilkington et al. (2005) published a systematic review of the literature on yoga and depression, searching the literature for research articles in English through 2004. They located five studies describing the outcomes of yoga interventions for alleviating depression/depressive symptoms. Their findings suggested that yoga has beneficial effects; however, they were not able to determine which specific aspect of yoga (breathing, poses, or meditation) had a direct impact. At the same time, details of the interventions were often not supplied, making it difficult to determine how yoga was implemented therapeutically. Severity levels of depression and utilization of yoga were not established in the review. Based on the review article, there is a lack of knowledge on yoga as an alternative form of treatment.

Building on Pilkington et al.'s review, the aim of the current study was to examine to what extent yoga has been found to be beneficial as a complementary therapy for depression. The study utilized a systematic review of existing studies from 2005 through June 2010, which have explored this association.

Method

Article searches were conducted on CINAHL, Google Scholar, ERIC, and Medline for the time period 2005 to June 2010. Keywords used to search for articles were yoga for depression, alternative therapy for depression, yoga and depression, and treating depression through yoga. Two researchers conducted the search independently in arriving at the chosen studies. Due to a limited number of studies available, only 18 interventions were found to be pertinent.

Criteria for inclusion of studies were (a) studies published between 2005 and 2010, (b) studies in the English language, (c) focus on studies that measured depression or depressive symptoms as an outcome, (d) studies that used yoga (from any school) as an intervention, (e) randomized controlled design or quasi-experimental design or pretest/posttest design. The exclusion criteria were (a) articles published before 2005, (b) non-English articles, (c) studies that did not measure depression or depressive symptoms as an outcome, (d) studies that did not use yoga as a part of their intervention, and (e) qualitative studies.

Results

Eighteen studies describing interventions that used yoga for depression treatment, meeting our criteria, were found by means of the literature search; these are summarized in Table 1. Studies used

Table 1. Summary of Yoga-Based Interventions as a Complementary Therapy for Depression Conducted Between 2005 and 2010

Study	Year	Design	Age	Intervention	Duration of Intervention	Major Findings
Sharma et al.	2005	Quasi-experimental	18−45	Sahaj yoga (meditation based)	8 weeks	Significant improvement on Hamilton Rating Scale for Depression in both groups: Group receiving antidepressant therapy and group receiving antidepressant and Sahaj yoga ($p < .001$). The number of patients who went into remission after 2 months was higher in the group with Sahaj yoga ($p < .02$)
Culos-Reed et al.	2006	Randomized	~50	Iyengar yoga	7 weeks	The EORTC C-30 tests indicated significant improvement in quality of life ($p < .05$), emotional function ($p < .01$), and decreased diarrhea ($p < .05$) for the intervention group. Significant changes at $p < .10$ were demonstrated in the POMS scores for mood disturbance, tension, and depression were observed. At the same time, scores on the SOSI showed improvement at $p < .10$ for emotional irritability, gastrointestinal symptoms, and cognitive disorganization. For the LSI significant positive changes ($p < .01$) for weight, left-hand grip, distance walked, sit and reach, and perceived exertion, and pre and post test were found
Sharma et al.	2006	Randomized	18–45	Sahaj yoga: deeply rooted in meditation allowing individuals to reach a thoughtless awareness state	8 weeks	Significant decrease on the HAM-D ($p = .003$) and improvements on the neurocognitive test battery
Vedamurthachar et al.	2006	Randomized	18–55	Sudarshan kriya program	2 weeks	Reductions in BDI, plasma cortisol, and ACTH were found ($p = .005$). A significant positive correlation between decreased BDI scores and ACTH ($r = .53$, $p < .001$) and decreased BDI and cortisol ($r = .52$, $p = .003$) were also found. Within a 2-week period, participants in the Sudarshan kriya had significant drops in depression levels
Krishnamurthy & Telles	2007	Randomized	60+	A routine of poses, regulated breathing, relaxation and philosophical conversation related to yoga	24 weeks	Participants in the yoga intervention showed significant reductions on the GDS-S at 3 ($p < .001$) and 6 months ($p < .001$). No significant results were found for those in the Ayurveda or control group
Shapiro et al.	2007	Quasi-experimental	~45	Iyengar yoga, brief relaxation and breathing	8 weeks	Significant decrease ($p < .001$) HAM-D, QIDS, STAI, Cook-Medley Hostility Scale, Pittsburgh Sleep scale, SF-36

(continued)

Table 1 (continued)

Study	Year	Design	Age	Intervention	Duration of Intervention	Major Findings
Butler et al.	2008	Randomized	~50	Inner resources program, which incorporated Hatha yoga, meditation, breathing techniques, guided imagery, and mantra repetition, while emphasizing the concept of surrender	12 weeks	Yoga group experienced remission for at least 2 months ($p < .031$) than the other 2 groups. Remission rates of 77% were found in the yoga group, 62% in the hypnosis group, and 36% in the control group. Means for depression and dysthymia declined over the 9-month period
Chen et al.	2008	Cluster randomized	60+	Silver yoga: hatha yoga modified for the elderly	6 months	Significant decrease in daytime dysfunction, ($F = 4.38$, $p = .015$), depression ($F = 10.92$, $p = .000$), subjective sleep quality ($F = 16.30$, $p = .000$), PSQI scores ($F = 6.01$, $p = .003$), and an increase in mental health perception ($F = 16.45$, $p = .000$) in the intervention group. An increase in sleep latency ($F = 10.50$, $p = .000$), depression ($F = 5.13$, $p = .010$), physical health perception ($F = 4.13$, $p = .018$) and daytime dysfunction ($F = 4.73$, $p = .010$) in the control group. At 3 months, sleep quality, daytime dysfunction, physical health perception, mental health perception, and depression had significantly improved ($p < .05$) in the yoga group
Danhauer et al. a	2008	Quasi-experimental	~56	Integral yoga, a form of restorative yoga that emphasizes poses with props, breathing and awareness	10 weeks	Quality of life ($p < .01$) and depression scores ($p < .01$) were significantly decreased after the intervention and at follow-up. Scores on the anxiety ($p < .05$) and affect ($p < .05$) showed improvement at post intervention and follow-up as well. A positive relationship between the attendance at classes and scores on the SF-12 was found
Franzblau et al.	2008	Quasi-experimental	18-45	Yoga breathing techniques	4 days	Significant decreases in scores were seen for the yogic breathing technique, testimony, and combination groups ($p < .05$). It was also found that significant reductions were due to intervention groups ($F = 3.164$, $df = 3$, $p = .037$). A significant difference between the yogic breathing and control group ($p = .031$) were found
Groessl et al.	2008	Pretest/posttest	55	Anusara yoga: alignment focused	10 weeks	Significant decreases in pain ($t = -4.27$, $p < .001$), depression ($t = -4.20$, $p < .001$) and fatigue ($t = -4.16$, $p < .001$) were indicated. A significant correlation between attendance at the yoga sessions and decreased pain ($r = -.37$, $p = .034$), self-report of home practice and significant for depression ($r = -.38$, $p = .034$), self-report home practice and fatigue ($r = .44$, $p = .012$)

(continued)

Table 1 (continued)

Study	Year	Design	Age	Intervention	Duration of Intervention	Major Findings
Kozasa et al.	2008	Quasi-experimental	Mean age 42.8 years	Siddha Samadhi yoga (a program in which meditation is associated with pranayama—breathing exercises).	1 month	A significant reduction in scores on anxiety, depression, and tension in the yoga group. Also an increase in well-being in yoga group compared to control group.
Ando et al.	2009	Pretest/posttest	~60	Mindfulness-based meditation: Yoga poses along with breathing and mindfulness meditation, that encourages moment-to-moment purposive nonjudgmental awareness	2 sessions	Scores for depression on the HADS scale significantly decreased from pre- to posttest (p =.01), along with the overall HADS scores (p = .004). A negative significant relationship between the FACIT-Sp and HADS (r = −.78, p = .000) score, FACIT-Sp and growth (r = −.35, p = .04), FACIT-Sp and pain(r = −.41, p = .02) and growth and appreciation (r = .45, p = .009)
Danhauer et al. b	2009	Randomized	~56	Integral yoga, a form of restorative yoga that emphasizes poses with props, breathing and awareness	10 weeks	Improvement on the PANAS (p = .01), all of the FACT tests (p < .05), SF-12 (p = .004) and CES-D (p = .026). Post yoga, participants showed a decrease in time to fall asleep (p = .078). Attendance was associated with a decrease in depression and positive and negative affect (p = .02)
Javnbakht et al.	2009	Randomized	31-41	Ashtanga yoga	2 months	Decrease in BDI and STAI scores were found, they were not significant. Differences in anxiety and depression levels were nonexistent before the study and significant changes were not shown after the intervention
Vadiraja et al.	2009	Randomized	46-58	Integrated Yoga: asanas, breathing techniques, meditation, relaxation w/ imagery	6 weeks	Significant decrease in salivary cortisol levels at 6 a.m. in the intervention (p < .001), hospital anxiety and depression scale indicated a significant decrease in the intervention (p < .001), perceived stress scale (p < .001)
Williams et al.	2009	Randomized	23-66	Iyengar Yoga: therapeutic poses for chronic back pain	24 weeks	Scores on ODI, VAS, BDI-II reduced significantly for the intervention group (p < .001) at Weeks 12 and 24. Decrease on all assessments at 6 months follow-up; significant reduction in pain medication (p = .02) at 12 and 24 for intervention group
Descilo et al.	2010	Quasi-experimental	17+	breath, water, sounds with Sudarshan Kriya yoga (BWS)	6 weeks	PCL-17 indicated a mean 60% lower at Weeks 6 and 24 for the BWS and the TIR + BWS groups (p < .001). For BDI, a 90% decrease in scores was seen for the BWS and the TIR + BWS group at weeks 6 and 24 (p < .001). A decrease on the GHQ-12 was also seen for the same groups at Week 6 (p < .01). Mixed effects regression results also showed a faster rate of improvement with the BWS and the TIR + BWS groups for PCL-17 (p = .000), BDI-21 (p = .0000), and GHQ-12 (p = .000)

Note. POMS = profile of mood states; PCL-17 = Posttraumatic Checklist-17; GHQ-12 = General Health Questionnaire; ODI = Oswestry Disability Index; VAS = Visual Analogue scale; BDI-II = Beck Depression Inventory II; STAI = Spielberger State Trait Anxiety Inventory; FACT = functional assessment of cancer therapy; CES-D = Center for Epidemiologic studies−Depression scale; FACIT-Sp = Functional Assessment of Chronic Illness Therapy−Spiritual Well-Being scale; HADS = Hospital Anxiety and Depression scale; PSQI = Pittsburgh Sleep Quality Index; QIDS = Quick Inventory of Depressive Symptoms; GDS-S = Geriatric Depression scale; ACTH = adrenocorticotropic hormone; HAM-D = Hamilton Rating Scale for Depression; SOSI = Symptoms of Stress Inventory; EORTC C-30 = European Organisation for Research and Treatment of Cancer.

quasi-experimental, randomized controlled or pretest/posttest designs in their evaluation. These studies are described sequentially, in order of their publication by year.

The first intervention by Sharma, Das, Mondal, Goswami, and Gandhi (2005) was conducted with patients diagnosed with major depressive disorder in New Delhi, India. Patients were on antidepressants, as participants were recruited from the psychiatric ward. Subjects were randomly assigned to either an 8-week intervention of Sahaj yoga, a form of yoga that is primarily meditative in nature or a control group that received usual care. The Hamilton Rating Scale for Depression (HAM-D) and Anxiety (HAM-A), given to participants before and after the intervention, were the primary outcome measures.

While both groups showed a decrease in depression scores, the intervention group had a more significant decrease ($p < .0001$). Unlike the control group, almost half (46.6%) of the participants in the intervention groups were in remission after completing the course of Sahaj yoga. These results indicate the beneficial impact of yoga in conjunction with antidepressants.

In the second intervention, yoga was used with cancer survivors to assist in relieving cancer-related symptoms, such as depression (Culos-Reed, Carlson, Daroux, & Hately-Aldous, 2006). A form of Iyengar yoga, called yoga therapy, was utilized as it allows individuals to go through poses more slowly and take more deep breaths while building bodily awareness. The intervention lasted for 7 weeks. Participants consisted of predominantly female cancer survivors, mean age 51.18 years, residing in Canada, who were at least 3 months post treatments. The following battery of tests was administered: profile of mood states (POMS), symptoms of stress inventory (SOSI), european organisation for research and treatment of cancer (EORTC C-30) quality of life questionnaire, and the leisure score index of the Godin Leisure Time Physical Activity Index (LSI). The EORTC C-30 tests indicated significant improvement in quality of life ($p < .05$), emotional function ($p < .01$), and decreased diarrhea ($p < .05$) for the intervention group. Nonsignificant changes at $p < .10$ were demonstrated in the POMS scores for mood disturbance, tension, and depression. At the same time, scores on the SOSI showed a trend toward improvement at $p < .10$ for emotional irritability, gastrointestinal symptoms, and cognitive disorganization. For the LSI, significant positive changes ($p < .01$) for weight, left-hand grip, distance walked, sit and reach, and perceived exertion, and pre- and posttest were found. Results point toward the benefits of incorporating yoga in cancer survivors.

In the third intervention, it was shown that yoga can also be useful for those experiencing major depression and comorbid loss of neurocognitive function, according to Sharma, Mondal, Goswami, and Gandhi (2006). In a study conducted in New Delhi, India, 30 males and females diagnosed with major depression were recruited. Participants were randomly assigned to a yoga intervention or an antidepressant treatment group. Yoga for this study was deeply rooted in meditation, allowing individuals to reach a thoughtless awareness state. It was referred to as Sahaj Yoga meditation. The group met for 30 minutes, 3 times a week for 8 weeks. A neurocognitive test battery and the HAM-D was administered at pre and post intervention. These measurements assessed depression and neurocognitive abilities of participants. There were no significant differences on the assessments at baseline between the two groups. After the intervention, a significant decrease on the HAM-D ($p = .003$) and improvements on the neurocognitive test battery was seen in the intervention group. Those on the antidepressants showed improvement in neurocognitive functioning but not depression levels at the end of 8 weeks. These findings suggest that Sahaj yoga may be a useful aid in relieving depression levels while enhancing neurocognitive functionality.

The fourth intervention, which took place in Bangalore, India, was with individuals undergoing an inpatient treatment for alcohol dependence; these patients typically experience feelings of depression during the initial stages of cessation of alcohol use (Vedamurthachar et al., 2006). The study used Sudarshan Kriya yoga as the form of treatment. Sudarshan Kriya yoga treatment constituted breathing techniques conducted in the mornings. Study subjects were randomly assigned to the Sudarshan Kriya program or inpatient care only for 2 weeks. The Beck Depression Inventory (BDI),

morning plasma cortisol, adrenocorticotropic hormone (ACTH), and prolactin were measured prior to and after the 2 weeks. Reductions in BDI, plasma cortisol, and ACTH were found ($p = .005$) in the yoga group, while lesser reductions were found in the control group. A significant positive correlation between decreased BDI scores and ACTH ($r = .53$, $p < .001$) and between decreased BDI and cortisol ($r = .52$, $p = .003$) were also found. Within a 2-week period, participants in the Sudarshan Kriya had significant drops in depression levels, as compared with the control group. This indicates the usefulness of yoga in alleviating depression during the early stages of abstinence in alcohol-dependent individuals.

The fifth intervention, by Krishnamurthy and Telles (2007), used yoga and Ayurveda to combat depression levels often seen in the elderly. Ayurveda is a sister science of yoga, in which herbs are used for therapeutic purposes. Three groups —yoga, Ayurveda, and wait-list control—were established. Subjects were 69 older male and female participants, living in Bangalore, India, residential homes. Participants were stratified by age and gender and then randomly assigned to the three groups. Herbal therapies were given to the Ayurveda group, while the yoga group went through a routine of poses, regulated breathing, relaxation, and philosophical conversation related to yoga. The yoga intervention was conducted for 30 min/week for 24 weeks. A shortened version of the Geriatric Depression scale (GDS-S) was given at baseline, after 3 months and after 6 months, to assess depression levels in participants. Participants in the yoga intervention showed significant reductions on the GDS-S at 3 ($p < .001$) and 6 months ($p < .001$). No significant results were found for those in the Ayurveda or control group. At baseline, severe levels of depression were observed through GDS-S scores. The improvements in the yoga group are indicative of the profound benefits of alleviating depression in the elderly.

The sixth intervention examined the effects of yoga as a complementary treatment on individuals with unipolar major depression in partial remission (Shapiro et al., 2007). The study used three groups, each consisting of 20 sessions of Iyengar yoga with 37 participants. A pretest-posttest design was implemented with no control group; randomization of groups was not stated. In the Iyengar yoga practice, breathing and meditation were given minimal attention. A majority of the participants were White females with unipolar major depression in partial remission. To assess change in depression levels, pre-post measures were assessed on the HAM-D and the Quick Inventory of Depressive Symptoms (QIDS). In addition, subjects were assessed using the Spielberger Anger Expression Scale (Anger In and Anger Out), Spielberger State Trait Anxiety Inventory (STAI), Cook-Medley Hostility Scale, Pittsburgh Sleep Scale, SF-36 short-form health survey, mood ratings before and after class, electrocardiogram, and blood pressure. Significant decreases in all measurements were seen ($p < .001$). Based on the mood ratings, significant improvements in mood ($p < .001$) immediately after class were found. In addition, mood, measured by a mood rating scale with 20 items, over the course of classes steadily increased to happy ($p < .03$). These results indicate the advantageous impacts of yoga on depression.

The seventh intervention, by Butler and colleagues (2008), explored the use of meditation with yoga in a group of individuals with long-term depressive disorders in the United States. Participants were randomly assigned to one of three groups: a meditation with yoga group and psychoeducation, group therapy with hypnosis and psychoeducation, or psychoeducation only (control) group. Psychoeducation is a form of education tailored to individuals experiencing some form of a mental illness. The yoga was based on the inner resources program and emphasized surrender. Surrender allowed individuals to let go of thoughts and emotions as they arose. Each group session was held for 2 hr each for 8 weeks, plus a 4-hr retreat, followed by a booster session at Week 12 with a follow-up at 9 months. Measurements taken prior to the study as well as at the 9-month follow-up, included the structured *Diagnostic and Statistical Manual of Mental Disorders* (*Fourth Edition* [*DSM-IV*]) interview, HAM-D, Cornell Dysthymia Rating Scale Self-Report, and a self-report treatment history. Participants in the meditation with yoga group experienced significantly greater remission

($p < .031$) at follow-up, in comparison with the other two groups. Remission rates of 77% were found in the yoga group, 62% in the hypnosis group, and 36% in the control group. Rate of remission for the control group was not found to be significant. Means for depression and dysthymia declined over the 9-month period for the yoga and group therapy groups. It was also found that three participants from the control group developed a new depressive episode during the study. The results indicate the positive impacts of yoga and group therapy in long-term depressive disorders, but more significant improvements were seen with yoga.

In the eighth intervention, Chen et al. (2008) conducted a yoga intervention in Taiwan, with older adults attending local senior activity centers to alleviate sleep disturbances, depression, and decreased perception of health. The intervention, entitled the Silver Yoga Program, was designed especially for older adults, and begins with eight warm-up postures, followed by Hatha yoga, seven poses for increased range of motion and progressive muscle relaxation, relaxation and guided imagery. A cluster randomized design was chosen, with eight senior centers, in Kaoshing, Taiwan, involving 139 participants 60 years of age or older. Each yoga session lasted 70 min, with sessions meeting 3 times a week for 6 months. Assessments were done with a Chinese version of the Pittsburgh Sleep Quality Index (PSQI) a Taiwanese Depression Questionnaire, and the SF-12 Health Survey in Chinese. At follow-up, results showed a significant decrease in daytime dysfunction, $F = 4.38$, $p = .015$; depression, $F = 10.92$, $p = .000$; subjective sleep quality, $F = 16.30$, $p = .000$; PSQI scores, $F = 6.01$, $p = .003$; and an increase in mental health perception, $F = 16.45$, $p = .000$, in the intervention group. In comparison, in the control group there was an increase in sleep latency, $F = 10.50$, $p < .001$; depression, $F = 5.13$, $p = .010$; physical health perception, $F = 4.13$, $p = .018$; and daytime dysfunction, $F = 4.73$, $p = .010$. At 3 months, sleep quality, daytime dysfunction, physical health perception, mental health perception, and depression had significantly improved ($p < .05$) in both groups, although the intervention group showed more improvements ($p < .05$) than the control group. These same variables showed significant improvements ($p < .05$) at 6 months, indicating the positive impacts of the Silver Yoga program, including enhanced overall well-being.

In the ninth intervention, restorative yoga was applied in women with ovarian or breast cancer to help relieve comorbid levels of depression (Danhauer et al., 2008). As noted above, this form of yoga is popular among cancer patients due to its gentleness on the body and emphasis on breathing and relaxation. Participants met for 75 min a week for 10 weeks for a pilot study that utilized the pretest-posttest design. Functional assessment of cancer therapy (FACT), FACT-Fatigue, FACT-spirituality (FACT-Sp), Center for Epidemiologic studies–Depression scale (CES-D), STAI, Positive and Negative Affect Schedule (PANAS), and a SF-12 health survey were given at pre and post intervention and at 2-month follow-up. These assessment instruments were taken to measure depression levels, quality of life, anxiety, and affect. Quality of life ($p < .01$) and depression scores ($p < .01$) were significantly decreased after the intervention and at follow-up. Scores on anxiety ($p < .05$) and affect ($p < .05$) showed improvement at post intervention and follow-up as well. A positive relationship between the attendance at classes and scores on the SF-12 was found, indicating positive effects of yoga on perception of health.

The 10th intervention was with battered women in whom depression is found due to their traumatic experiences (Franzblau, Echevarria, Smith, & Van Cantfort, 2008). Yoga breathing techniques were used to replace negative thoughts with positive ones to improve their emotional health. The testimony group talked about their abuse with a trained listener. A two (races: European Americans and African Americans) by four treatment groups, pretest/posttest study design was implemented. Yogic breathing techniques, testimony only, a combination of the two, and a control group comprised the study. A total of 40 women, 18–45 years old, participated in the yoga program, which took place over 4 consecutive days. The BDI-II was used to measure depression levels at pre and post intervention. Significant decreases in scores were seen for the yogic breathing technique, testimony, and combination groups ($p < .05$). Significant between-group differences were also

found, $F = 3.164$, $df = 3$, $p = .037$, with a significant difference found between the yogic breathing and control group ($p = .031$), indicating it had a better impact on the participants than the testimony-only group. These findings suggest that yogic breathing can serve as an aid in relieving feelings of depression and negative affect in battered women.

The 11th intervention was conducted by Groessl, Weingart, Aschbacher, Pada, and Baxi (2008) in U. S. veterans experiencing chronic low back pain. A majority of the participants were White males, of mean age 55 years. Participants were new to the practice of yoga. Anusara yoga was used as the intervention. This form of yoga is heavily focused on body alignment and goes through a sequence of 32 poses while taking slow, deep breaths. Pain, depression, fatigue, and health-related quality of life were assessed before and after the intervention. Results were available for only 33 patients due to drop out. Significant decreases in pain, $t = -4.27$, $p < .001$; depression, $t = -4.20$, $p < .001$; and fatigue, $t = -4.16$, $p < .001$, were indicated. A significant correlation between attendance at the yoga sessions and decreased pain, $r = -.37$, $p = .034$; self-report of home practice and significant for depression $r = -.38$, $p = .034$; self-report home practice and fatigue, $r = .44$, $p = .012$, were also found. Results indicate the significant impact of yoga on reducing chronic low back pain and depression. Based on the outcomes, a dose–response relationship between participation in classes/at home and levels of depression was established for this study.

The 12th intervention, conducted by Kozasa and colleagues (2008), was a quasi-experimental study using Siddha Samadhi Yoga, a form of yoga in which meditation is associated with breathing techniques called pranayama. Meditation in this yoga is similar to transcendental meditation, in which a specific mantra is given to an individual based on their personality. Individuals practice this mediation for about 20 min, twice a day, along with the pranayama. A lacto-vegetarian diet was the only thing not adopted as part of the Siddha Samadhi Yoga.

The duration of the intervention was 2 weeks, with a follow-up after 1 month. Participants' mean age was 42.8 years, predominantly female, with no experience in meditation and yoga. Two groups, intervention and a wait-list control, were established. The study found a significant reduction in scores on anxiety, depression, and tension in the yoga group, as well as an increase in well-being, compared to the control group.

In the 13th intervention, Ando and colleagues (2009) used mindfulness-based meditation to alleviate depression, anxiety, and infuse spirituality in individuals going through anticancer radiation therapy in Japan. A pretest/posttest study design was implemented with an intervention-only group. Participants were predominantly females. In addition to the mindfulness meditation, which encourages moment-to-moment purposive nonjudgmental awareness, the program included yoga poses along with breathing. Assessments were conducted via the Japanese version of the Hospital Anxiety and Depression scale (HADS), Functional Assessment of Chronic Illness Therapy–Spiritual Well-Being Scale (FACIT-Sp), and the Caregiving Consequence Inventory. Scores for depression on the HADS scale significantly decreased from pre- to posttest ($p = .01$), along with the overall HADS scores ($p = .004$). A negative significant relationship between the FACIT-Sp and HADS score, $r = -.78$, $p < .001$; FACIT-Sp and growth, $r = -.35$, $p = .04$; FACIT-Sp and pain, $r = -.41$, $p = .02$; and growth and appreciation, $r = .45$, $p = .009$, were also found. These results indicate an improvement in depression, coping, spirituality, anxiety, and appreciation of self and others. Overall, this study signifies the value of yoga in easing depression, particularly in persons undergoing cancer treatment.

In the 14th intervention, women diagnosed with breast cancer were given a restorative yoga intervention to improve their physical and psychological well-being (Danhauer et al., 2009). Integral yoga, a form of restorative yoga that emphasizes poses with props, breathing, and awareness, was applied. This form of yoga allows for active relaxation to occur and has been widely used among cancer patients (Danhauer et al., 2009). The sessions were 75 min each, once a week for 10 weeks. Participants were randomly assigned to the intervention or control group. The following

measurements were administered prior to and after the intervention: SF-12 health survey, FACT-Breast Cancer (FACT-B), FACT-Fatigue, FACT-Spirituality (FACT-Sp), CES-D, PSQI, and the PANAS. Participation in the intervention resulted in an improvement on the PANAS ($p = .01$), all of the FACT tests ($p < .05$), SF-12 ($p = .004$), and CES-D ($p = .026$). Post yoga, participants showed a decrease in time to fall asleep, ($p = .078$). A decrease in depression and positive and negative affect were also found ($p = .02$). Attendance at classes played a role in improved behaviors such as reduced sleep disturbances ($p = .0287$), sleep medication, ($p = .04$), and improved scores on the FACT-B ($p = .04$), physical well being (PWB) ($p = .003$), and functional well being (FWB) ($p = .01$). These results indicate the beneficial use of yoga in breast cancer patients.

In the 15th intervention, effects of yoga were studied in a group of women experiencing depression and anxiety in Iran (Javnbakht, Kenari, & Ghasemi, 2009). Ashtanga yoga was implemented with the experimental group; the control group consisted of a group of women on a wait-list. Each yoga session lasted 90 min, twice a week for a little over 2 months. The BDI, STAI, and a personal information questionnaire were administered prior to and following the intervention. There were no between-group differences in baseline anxiety and depression levels. While a decrease in BDI and STAI scores were found from pretest to posttest for both groups ($p = 0.13$), these changes were not significant. Reductions in anxiety ($p = .03$) and depression ($p < .0001$) scores in the yoga group compared to the control group were seen when comparing posttest results only. This showed a possible impact of yoga on these participants.

The 16th intervention was a randomized controlled study by Vadiraja and colleagues (2009) that looked at the effects of yoga on depression, anxiety, and stress in early breast cancer patients undergoing adjuvant radiotherapy. Participants were randomly placed in a 6-week yoga group or brief supportive therapy. Saliva samples were obtained at 6 a.m., 9 a.m., and 9 p.m. to determine cortisol levels, and the HADS survey and a perceived stress scale survey were administered before and after the intervention. Results from a paired t test indicated a significant decrease in salivary cortisol levels at 6 a.m. in the intervention, $t = 2.79$, $p < .001$, but not the control group, $t = 0.34$, $p = .96$; analysis of covariance (ANCOVA) results also showed a significant decrease in the intervention group, $F(1,53) = 7.45$, $p = .009$. No changes were found at the other times. Scores from the HADS indicated a significant decrease in scores in both the intervention, $t = 7.24$, $p < .001$, and control groups, $t = 2.15$, $p = .04$; the ANCOVA showed a significant decrease for the intervention group as compared with the control group, $F(1,73) = 10.7$, $p = .002$. Finally, results from the perceived stress scale indicated a significant decrease in the intervention group, $t = 5.5$, $p < .001$, but not the control, $t = 1.42$, $p = .17$; ANCOVA scores showed similar results, intervention: $F(1,72) = 18.05$, $p < .001$. Overall, participants in the yoga group showed significantly lower levels of perceived and hormonal stress, indicating its beneficial use in patients. Reduction in cortisol levels and thus depression can be attributed to poses, breathing, meditating, and relaxation practices.

In the 17th intervention, Williams et al. (2009) looked into the effectiveness and efficacy of Iyengar yoga therapy on chronic low back pain and the accompanying depression. Iyengar yoga was chosen, as its poses are applicable for chronic low back pain relief. Each class was 90 min in length and met twice a week for 24 weeks. There were a total of 90 participants: 43 were randomly assigned to the intervention and 47 to a control group. The Oswestry Disability Index (ODI), Visual Analogue scale (VAS) and the BDI-II were given to participants at baseline, Weeks 12, 24, and 48, to determine levels of disability, pain, and depression. Scores on the assessments reduced significantly for the intervention group ($p < .001$) at Weeks 12 and 24. Follow-up at 6 months indicated a continued decrease on all assessments for those in the yoga group only. Analysis was also performed for intake of pain medication in both groups. These scores revealed a significant reduction in pain medication ($p = .02$) at 12 and 24 weeks for the intervention group. Findings indicate that practicing yoga was effective in easing back pain and functional disability as well as depression. Use of Iyengar yoga with participants served as an effective and efficacious method of treatment.

In the final intervention, yoga was used therapeutically for the 2004 Asian tsunami survivors to improve levels of depression and posttraumatic stress disorder ([PTSD] Descilo et al., 2010). Breath, water, sound (BWS) with Sudarshan Kriya yoga was adopted due to its ability to lower PTSD and depression and increase the quality of life (Descilo et al., 2010). This program was composed of victorious breaths, bellow breaths, chanting OM, and going through a purification action to attain clear visions (Sudarshan Kriya). Participants constituted survivors, male and female, 17 years and older. Traumatic incident reduction (TIR) exposure along with BWS and a control group were also part of the study. There were 183 participants recruited; 60 were in the BWS-only group, the next 60 were placed in the TIR + BWS and the following 63 individuals were part of the control group. (Randomization was not implemented to avoid any perceptions of unfairness) Pre- and posttreatment assessment were conducted for depression and PTSD, using a Posttraumatic Checklist-17 (PCL-17), BDI-21, and the General Health Questionnaire (GHQ-12) at 6, 12, and 24 weeks. Scores from the PCL-17 indicated a mean 60% lower at Weeks 6 and 24 for the BWS and the TIR + BWS groups ($p < .001$). For BDI, a 90% decrease in scores was seen for the BWS and the TIR + BWS group at Weeks 6 and 24 ($p < .001$). A decrease on the GHQ-12 was also seen for the same groups at Week 6 ($p < .01$). Mixed effects regression results also showed a faster rate of improvement with the BWS and the TIR + BWS groups for PCL-17 ($p = .000$), BDI-21 ($p = .0000$) and GHQ-12 ($p = .000$). These outcomes all point toward the importance of yoga components in easing depression levels along with PTSD. More importantly, these statistics indicate the use of BWS in rapid reduction of depression and PTSD.

Discussion

The aim of this systematic review was to examine to what extent yoga is beneficial as a complementary therapy for depression and depressive symptoms. In our search of the English-language peer-reviewed literature, we found 18 interventions conducted between 2005 and June 2010. This is a significant increase over the number of studies published in the previous 5 years. These studies were carried out in Brazil (1), Canada (1), India (6), Iran (1), Japan (1), Taiwan (1), and United States (7).

Yoga as a complementary or alternative method of treatment was found to be beneficial in a majority of the interventions. Our review found that yoga was of benefit among those diagnosed with cancer, among victims of traumatic experiences, as well as among the elderly who experience aging-related depression. A wide assortment of yoga methods were used in these studies. Some studies focused on the meditative aspects of yoga, while other studies delved into the gentle forms of movement and awareness, with the aim of uniting the body and mind. Schools of yoga included were Anusara yoga (1), Ashtanga yoga (1), Inner resources program (1), Integral yoga (2), Integrated yoga (1), Iyengar yoga (3), Mindfulness-based meditation (with yoga) (1), nonspecific (1), Pranayama (1), Sahaj yoga (2), Siddha Samadhi yoga (1), Silver yoga (1), and Sudarshan Kriya yoga ([SKY] 2).

Iyengar yoga was used most often (three times) among the interventions listed above, followed by Integral and Sudarshan Kriya yoga, each of which were used twice. Regardless of the form used, yoga's role as a complementary treatment was beneficial.

The interventions utilized different types of evaluation designs, including pretest/posttest (2), quasi-experimental (6), randomized controlled trials (9), and cluster randomized design (1). The majority of the interventions have utilized randomized controlled trials that are praiseworthy; however, only a few of these used attention-control designs. More randomized controlled trials should be planned by future researchers, including those with appropriate attention controls.

Seventeen interventions found beneficial effects of yoga on depression. These studies point to the utility of yoga as a useful complementary treatment for depression. While a majority of the interventions found yoga to be beneficial in reducing depressive symptoms, only one study—on Iranian women (Javnbhakt, Kenari, & Ghasemi, 2009)—found no significant impact. This suggests that

while many populations are able to benefit from yoga, there remain questions to be answered about whether there are some populations or conditions for which yoga is not beneficial or whether certain forms of yoga would be more suitable than others for particular cultural or ethnic groups or illness conditions. There is also need for exploration with regard to utilizing yoga adjunctively or in a different format to determine how optimum benefits can be reaped by individuals. In studies in which yoga was used adjunctively, along with medication or therapy treatments, it may have served as a catalyst in reducing depression and anxiety.

Lengths of interventions varied, but nevertheless proved efficacious. For example, interventions that lasted from two to four sessions, for example Ando et al. (2009) and Franzblau et al. (2008), showed significant positive results. This indicates the quick therapeutic effects offered by yoga. At the same time, studies that were conducted for 24 weeks by Krishnamurthy and Telly (2007) and Williams et al. (2009) indicated immediate as well as 6-month follow-up reductions in depression and anxiety. The longest study we found was 6 months in length, involving senior activity center members 60 years and older. This study showed a remarkable improvement in depression, quality of life, and perceptions of health, over a substantial period of time.

Limitations of the Interventions

The number and methodology of interventions conducted is still very limited. For instance, many of the studies were conducted outside of the United States, where yoga has a higher acceptability. At the same time, many of these studies involved only a small number of participants, and may have lacked adequate power to detect significant differences. In addition, the diversity of participants was limited. The effects of yoga on men and women of different ethnic background have not been determined. Yoga had different effects, as seen with the study on Iranian women (Javnbakht, Kenari, & Ghasemi, 2009). Age also served as a deficiency, since its impacts were not seen with a younger population. Younger participants might indicate different results than those obtained in this study. A majority of the studies recruited individuals that ranged from middle age to the elderly.

In addition to increasing ethnic and age diversity in studies of yoga interventions, it would also be important to see the impacts of yoga on other populations grouped by occupation. The current state of studies in this regard hinders the ability to generalize findings to the general population.

Results obtained from some of the programs showed trends toward improvements but not at a statistically significant level. Larger scale studies are needed, but these require greater funding. Along with larger-scale, better funded studies, there is a need for better designed studies involving adequate attention-control designs, to account for the potential effects of expectancy and benefits of human interaction. Finally, interventions obtained for this review generally utilized yoga alone, as an adjunct form of therapy, rather than combined with other treatments, which adds to the difficulty in specifying its role in treatment.

Limitations of this Review

There are some limitations in this review. First, only interventions published in the English language were included; many interventions, especially in international settings, are published in other languages which were therefore excluded from this analysis. Second, only interventions published in four databases were included. While these databases are quite extensive, they omit good research studies published in many countries. Only peer-reviewed journals were reviewed, and therefore, any promising studies published in nonpeer-reviewed journals were automatically excluded. Finally, differing evaluation methodologies and outcome indices were used in different studies. In the selection criteria, attempts were not made to filter studies based on methodology or outcome indicators but

rather, an effort was made to be more inclusive of various interventions. As a result, conclusive meta-analyses cannot be carried out with these studies and comments cannot be made regarding effect sizes of the interventions.

Recommendations for future studies

Although the numbers of studies involving yoga interventions for depression have increased in the last 5 years, there are still only a limited number of interventions using yoga as a complementary therapy for improving symptoms of depression. Based on the review, the following recommendations for future studies are made. Overall, more interventions need to be conducted in therapeutic settings. Studies using yoga in different socioeconomic and ethnic groups also need to be developed. It would also be beneficial to observe the impacts of yoga on postpartum depression or other illnesses outside of cancer. Yoga interventions involving children should also be performed, as the results may differ in a younger population. Studies in different racial and ethnic backgrounds also need to be conducted. Different cultural background can possibly alter the impacts of yoga in a therapeutic method.

At the same time, interventions using specific aspects of yoga need to be conducted. For instance, programs with breathing techniques, meditation, or simply poses would allow researchers to determine the exact role of yoga in depression and anxiety. At the same time, interventions with different schools of yoga need to be conducted. Interventions for this review used only selected styles of yoga. Different results might be obtained with other forms of yoga.

Conclusions

Yoga serves as an alternative form of treatment for individuals experiencing depression and anxiety. Minimal studies using yoga as complementary therapy exist. Of the few available, yoga was found to be effective in alleviating depression and anxiety symptoms. More interventions need to be conducted to truly understand the significance of yoga on these symptoms.

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