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Original Articles

Yoga Therapy as an Adjunctive Treatment for Schizophrenia: A Randomized, Controlled Pilot Study

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Abstract

Objectives: There has been limited study of therapeutic yoga as a complementary treatment for schizophrenia. This study investigates the effects of a Yoga Therapy program on symptomatology and quality of life in adults with schizophrenia in a state psychiatric facility.

Methods: In a randomized, controlled pilot study, 18 clinically stable patients (12 men and 6 women) with schizophrenia (mean age = 42 ± 13.5) were randomized to an 8-week Yoga Therapy program (YT) and a Waitlist group (WL). YT intervention included yoga postures, breathing exercises, and relaxation. At baseline and at 8 weeks, symptomatology was measured using the Positive and Negative Syndrome Scale (PANSS). Secondary efficacy outcomes were measured with the World Health Organization Quality of Life BREF questionnaire (WHOQOL-BREF).

Results: The YT group obtained significant improvements in positive and negative symptoms of schizophrenia symptoms compared to WL, including PANSS scores on positive syndrome ($t = -2.64$, $p = 0.02$), negative syndrome ($t = -3.04$, $p < 0.01$), general psychopathology ($t = -3.74$, $p < 0.00$), activation ($t = -2.29$, $p < 0.04$), paranoia ($t = -2.89$, $p < 0.01$), and depression subscales ($t = -2.62$, $p < 0.02$). PANSS total scores also decreased for the YT group ($t = -4.54$, $p < 0.00$). YT had improved perceived quality of life in physical ($t = 2.38$, $p < 0.04$) and psychologic domains ($t = 2.88$, $p < 0.01$).

Conclusions: Adults with schizophrenia being treated in a state psychiatric facility who participated in an 8-week therapeutic yoga program showed significant improvements in psychopathology and quality of life compared with controls. The findings of this study need to be confirmed in larger, more sufficiently powered studies with active control groups.

Introduction

Schizophrenia is a severe form of mental illness classified as a Psychotic Disorder in the DSM IV-TR.[1] The heterogeneity of the schizophrenic population, the uncertain etiology of the disease, as well as mixed and partial success of psychopharmacologic intervention all indicate a need for improved treatment for schizophrenia. Furthermore, individuals with schizophrenia have been found to have impaired quality of life.[2] Psychopharmaceuticals, specifically neuroleptics, have serious and sometimes severe side-effects including movement disorders and metabolic syndromes. They rarely improve and frequently worsen the negative symptoms of schizophrenia, such as anergia, flattened affect, apathy, and amotivation. It is estimated that 30%–40% of individuals have refractory forms of schizophrenia that are considered treatment resistant.[3] Often this results in polypharmacy, which is neither evidence-based nor necessarily more effective.[4] Meanwhile, there is a growing trend of psychiatric inpatients using alternative and complementary medicine to address their mental health issues.[5–8] There is also evidence that yoga may improve clinical outcomes and aid in management of cardiovascular disease and insulin-resistance syndromes, both of which are frequent co-morbidities for those with schizophrenia.[9]

Since traumatic and stressful events are common triggers of psychotic symptom onset and exacerbation, interventions that reduce anxiety and improve coping mechanisms have been shown to be useful in managing the symptoms of schizophrenia.[10,11] Yoga has been shown to decrease tension, anxiety, depression, and anger in several recent studies.[12–15] It has been found to be effective in assuaging depressive symptoms in institutionalized older adults.[16] Researchers have established the effectiveness of therapeutic yoga practices in improving other mental health conditions, such as post-traumatic stress disorder (PTSD), depression, and

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anxiety.[17,18] Bessel vander Kolk and others have observed the importance of body-based therapies like yoga in addressing the limitations of conventional treatments for complex and persistent PTSD.[19] Spiritually oriented therapy that includes yogic breathing exercises has been helpful in addressing severe mental illness.[20] Therapeutic yoga has been shown to reduce stress and to improve emotional well-being and interpersonal functioning, factors known to ameliorate symptom severity in individuals with schizophrenia-spectrum disorders.[21]

Research examining the adaptation and effectiveness of therapeutic yoga for individuals with debilitating mental illness is limited. In a recent study of 113 patients at a psychiatric hospital in New Hampshire, yoga classes were found to be effective in reducing stress and in improving mood in five of the six factors the Profile of Mood States.[22] A recent randomized controlled study compared therapeutic yoga and callisthenic training as adjunctive treatments for schizophrenia-spectrum illness. Researchers found that yoga participants had significantly greater reductions in psychiatric symptoms (negative symptoms, anergia, and depression) and significantly greater increase in quality of life than the control group.[23] Anecdotal evidence also has suggested yoga may be helpful for those suffering from schizophrenia.[24]

The primary objective of this study was to examine the effects of an 8-week therapeutic yoga program on the psychopathology of state-hospitalized, psychiatric inpatients diagnosed with schizophrenia through pre- and post-intervention Positive and Negative Syndrome Scale (PANSS) scores of participants in both the experimental and control groups. The secondary objectives were to examine therapeutic yoga's effects on quality of life. Participants were randomized into the two groups, Yoga Therapy program (YT) and Waitlist group (WL), and clinical assessments were carried out within a 2-week period pre- and postintervention. Other than the YT program, no other changes to the participants' treatment, including psychotropic medications, took place during the study.

Methods

Patient accrual and evaluation

The study was approved by the Institutional Review Board at Bronx Psychiatric Center (BPC), Bronx, NY. Investigators contacted mental health care providers from the treatment teams of the long-stay (projected or current length of stay greater than 3 months) units. The medical director of the hospital cleared each patient, and only 1 patient (with a history of falls) was excluded by this means. Patients with a wide variety of physical illness, including human immunodeficiency virus, hypertension, blindness, hepatitis C, and diabetes were included in the entirety of this study. Participants signed informed consent documents.

Participants' charts were reviewed for age, diagnoses, case history, medical problems, date of current admission, and all medications. Psychopathology was assessed using PANSS, administered by a mental health counselor trainee (SL) who had clinical experience in the psychiatric population and who was blind to group status. The rater was trained in PANSS assessment using eight training videos with the instruction and approval of the schizophrenia research chief at Bronx Psychiatric Center. The rater assessed all participants using the Structured Clinical Interview for the PANSS in which the patient is rated from 1 to 7 on 30 different symptoms based on patient interviews and reports from primary caregivers; the most severe symptoms would result in a score of 210. In addition, the same rater assisted participants' completion of the World Health Organization Quality of Life BREF questionnaire, a scale developed by the World Health Organization with 26 questions rated from 1 to 5, with the most positive assessment of one's life, relationships, and health earning a score of 130. Ratings were taken within a 2-week period pre- and postintervention, at baseline, and at 8 weeks, at which time charts were reviewed again to note any medication or other changes or any adverse events that might have occurred during course of the study.

After the baseline assessments, subjects were randomly assigned, by computer-generated random number table, to either YT ($n=10$) or WL ($n=8$) for the following 8 weeks. Each carried an Axis I diagnosis of schizophrenia, and several in both groups had an additional diagnosis of schizoaffective disorder or PTSD. Five (5) individuals in the intervention group and 4 in the control group had an Axis II diagnosis.

Procedure

The YT group was given yoga therapy class 45 minutes twice weekly (on Mondays and Fridays) in two groups, each with 5 participants. The instructor (EV) taught gentle yoga stretches and simple movements coordinated with breath. In addition, participants in the YT group were taught simple breathing exercises that emphasized long, steady exhalation. Individuals also participated in guided relaxation exercises at the end of each class. While authors of some yoga studies apply standardized therapeutic yoga interventions to their experimental groups in order to strengthen the reliability and reproducibility of their findings, the authors maintain that YT is, by definition, to be tailored to the individual.[25] Therefore, the group leader offered yoga classes that matched the energy level, attentional ability, and mood state of the group members on any given day, resulting in some natural variation in each class throughout the 8-week course. However, every class included, in varying amounts and with different particular examples of each: *pranayama* (breathing exercises), warm-ups (gentle movements of major muscle groups and joint rotations), *asana* (yoga postures that always included at least one of each the following types of postures: forward bends, back bends, twists, inversions, standing, and balancing postures), and yoga *nidra* (deep relaxation; see Appendix).

Data analysis

Statistical Package for Social Sciences version 10.0.1 (SPSS Inc., 1999) was used for the data analysis. The α was fixed at 5% ($p<0.05$). The differences between the pretest and post-test scores of each participant were calculated separately and independent sample t tests were performed on these change scores.

Results

Baseline features of the two groups are summarized in Table 1. The two groups were similar, with 4 females and 6 males in the intervention group, and 2 females and 6 males

Table 1. Pre-intervention Mean Comparison (Equal Variances Not Assumed)

	YT Mean	*WL Mean*	t-*Value*	p-*Value*
Age (years)	37.40 ± 13.73	48.13 ± 11.24	-1.82	0.09
Stay (months)	31.40 ± 20.38	53.00 ± 76.80	-0.77	0.46
PANSS				
Positive syndrome	21.60 ± 5.99	20.25 ± 7.27	0.42	0.68
Negative syndrome	19.10 ± 8.06	19.38 ± 4.53	0.30	0.93
General psychopathology	44.40 ± 10.82	38.88 ± 11.49	1.55	0.32
Anergia	10.50 ± 5.52	11.00 ± 2.89	0.10	0.81
Thought disturbance	9.90 ± 4.25	12.25 ± 5.99	-0.67	0.37
Activation	8.90 ± 3.31	6.63 ± 2.83	1.98	0.14
Paranoid/belligerence	10.10 ± 3.11	6.75 ± 3.58	3.60	0.06
Depression	11.40 ± 3.69	9.63 ± 3.93	1.11	0.34
PANSS total	85.10 ± 19.82	78.50 ± 20.91	1.28	0.51
WHOQOL-BREF				
Domain 1–Physical health	71.90 ± 14.98	73.63 ± 13.67	-0.26	0.80
Domain 2–Psychologic	46.20 ± 24.54	66.63 ± 18.91	-1.99	0.06
Domain 3–Social relationships	35.60 ± 28.30	48.50 ± 25.29	-1.02	0.32
Domain 4–Environment	53.90 ± 15.91	54.75 ± 20.55	-0.10	0.93

YT, Yoga Therapy program; WL, Waitlist group; PANSS, Positive and Negative Syndrome Scale; WHOQOL-BREF, World Health Organization Quality of Life BREF.

in the control. All had been inpatients at BPC for at least 6 months, with the mean length of stay for YT 31.40 months (±20.38 standard deviation [SD]) and a range of 16–76 months. The WL mean length of stay was 53.00 months (±76.80 SD) months, and a range of 3–239 months. There was not a statistically significant difference between the groups regarding length of stay, and the longer length of stay in the WL group was largely due to 1 individual who had been in the hospital for over 10 years. The mean age in the YT group was 37.40 years (±13.75 SD), and a range from 20 to 58 years. The mean age in the WL group was 48.13 years (±11.24 SD), and a range of 27–60 years, again not found to be a statistically significant difference. Notably, there were no significant differences in psychopathology ratings based on PANSS scores or of quality of life (QOL) ratings at baseline. In order to determine the effectiveness of treatment group randomization, the group differences of preintervention data points were analyzed using independent sample *t* test. The data indicate that no significant differences existed between the two groups before the intervention, when not assuming equal variances.

The impact of the intervention as assessed through various measures is summarized in Table 2. Using independent sample *t* test analysis to compare change over time shows the mean decline in PANSS total scores from pre- to post-assessment was significantly greater in the YT group (-25.20 ± 11.24, $t = -4.54$, $p < 0.00$) versus the WL group (1.13 ± 12.98). PANSS subscale scores in the YT group decreased significantly for positive syndrome (-5.90 ± 4.36, $t = -2.64$, $p < 0.02$), negative syndrome (-6.00 ± 4.59, $t = -3.04$, $p < 0.01$), general psychopathology (-13.30 ± 7.54, $t = -3.74$, $p < 0.00$), anergia (-3.20 ± 2.78, $t = -2.35$, $p < 0.03$), activation (-3.00 ± 3.27, $t = -2.29$, $p < 0.04$), paranoia (-3.10 ± 3.54, $t = -2.89$, $p < 0.01$), and depression (-3.60 ± 4.12, $t = -2.62$, $p < 0.02$). The only subscale that did not significantly decrease for the YT group was thought disturbance. QOL scores also improved significantly in the YT group, specifically in the physical health (11.30 ± 11.09, $t = 2.38$, $p < 0.04$) and psychologic domains (22.50 ± 21.80, $t = 2.88$, $p < 0.01$). In no domain was there significant PANSS or QOL score change in the WL group. No serious adverse physical or psychiatric complications of the intervention were observed or reported in either group.

Discussion

Summary

In this study, the changes in the experimental group are significant, with PANSS scores decreasing a total of 25.2 points while the control group remained functionally the same, with a mean increase of 1.13. Positive and negative symptoms, general psychopathology, and several other subscales of the PANSS significantly improved.

Regarding YT group participants, anecdotal reports informally collected by the investigators affirmed these findings. Hospital physicians reported that 3 notoriously "difficult" and "treatment-resistant" patients were markedly calmer, less aggressive, and functioning better overall. One (1) YT participant with chronic suicidal ideation and gestures made no suicidal gestures during the intervention, and another was found to be "less angry, with an improved mood." Two (2) were reported to be more adherent to medications and treatment recommendations, and to be better related to others. Fewer additional medications for acute agitation were noted for 1 participant, and 1 patient was reported to be "better able to control impulses and refrain from acting out."

In other anecdotal reports, YT participants themselves reported positive changes. One (1) explained that "Yoga makes me feel like my whole body is functioning as it should." Five (5) participants requested to continue yoga as they found the practice extremely helpful in "calming myself down." One (1) reported that at first he was not sure he wanted to do yoga because "I thought it would require a lot from me, but instead it has given me so much." Participants were able to identify ways that the practice of paying

Table 2. Means Analysis of Changes in Pre- to Postintervention Scores (Equal Variances Not Assumed)

	Mean Δ – YT	*Mean Δ – WL*	t-*Value*	p–*Value*[a]
PANSS				
Positive syndrome	-5.90 ± 4.36	-0.63 ± 4.10	-2.64	0.02
Negative syndrome	-6.00 ± 4.59	0.00 ± 3.78	-3.04	0.01
General psychopathology	-13.30 ± 7.54	1.75 ± 9.16	-3.74	0.00
Anergia	-3.20 ± 2.78	0.38 ± 3.50	-2.35	0.03
Thought disturbance	-3.00 ± 2.87	-1.75 ± 2.49	-0.99	0.34
Activation	-3.00 ± 3.27	0.13 ± 2.53	-2.29	0.04
Paranoid/belligerence	-3.10 ± 3.54	1.75 ± 3.54	-2.89	0.01
Depression	-3.60 ± 4.12	1.63 ± 4.27	-2.62	0.02
PANSS total	-25.20 ± 11.24	1.13 ± 12.98	-4.54	0.00
WHOQOL-BREF				
Domain 1—Physical health	11.30 ± 11.09	-6.25 ± 18.35	2.38	0.04
Domain 2—Psychologic	22.50 ± 21.80	-5.63 ± 19.52	2.88	0.01
Domain 3—Social relationships	23.10 ± 26.05	8.63 ± 10.53	1.60	0.13
Domain 4—Environment	3.70 ± 23.37	-3.88 ± 25.15	0.66	0.52

[a] $\alpha = 0.05$.

YT, Yoga Therapy program; WL, Waitlist group; PANSS, Positive and Negative Syndrome Scale; WHOQOL-BREF, World Health Organization Quality of Life BREF.

attention to their breath while moving their body was relaxing in the moment, but also that the effects of this carried with them after the class was over. Some of them reported using the deep breathing skills to help them cope with difficulties and anxieties in their day-to-day lives.

While this is a pilot study, the results are encouraging and show that yoga might be an effective adjunctive treatment for stress modulation in people with schizophrenia. This seems significant, especially considering this study was of individuals being treated by long-term hospitalization at a state facility, which is generally reserved for the most chronically ill who are insufficiently responsive to routine inpatient treatment. There was not a single physical or psychologic adverse effect noted by the investigators or the physicians responsible for the participants during the intervention. However, since thought disorder was the only subscale on PANSS that did not significantly decrease in the YT group, this suggests that yoga therapy is best utilized as an adjunctive treatment to appropriate standard-of-care treatment, including antipsychotic medications when indicated.

As a low-cost, safe intervention that does not add to the burden of side-effects and that may have statistically significant effects on psychopathology and quality of life, yoga therapy warrants further exploration.

Limitations

In future studies, it would be important to evaluate how long benefits lasted for participants, the ideal frequency of yoga, and which exercises are most beneficial for most patients.

Due to a lack of resources and staff for this pilot study, it was not feasible to include an active control to compare with the YT group. An active control could have improved the validity of the findings. In addition, it is possible that the fact that the YT participants were receiving extra attention might have contributed to type I errors. Future studies should include an active control group to better evaluate whether the benefits found in this study are related to nonspecific factors or are due to the YT intervention.

Another limitation of this study was its small sample size of 10 experimental and 8 control participants. This may have affected the ability of the findings to be generalized to the broader population. However, the small sample size would not have created any false positives; that is, the statistically significant results are not subject to a type-I error due to sample size. In fact, results that appear not to be statistically significant in this study may appear so due to small sample size, and not to intervention ineffectiveness.

Since yoga is now widely recognized in the United States, participants were aware that what they were practicing was yoga and therefore, this was only a single-blind study. This might have created an outcome expectation on the part of the YT participants who may have preconceptions of what yoga may do. The fact that the authors used a pretest post-test design may also have created outcome expectations, especially among YT participants. This limitation was tempered by the fact that several items in the PANSS assessment require input from clinical staff, many of whom noticed improvements in the YT participants.

Another factor that may have compromised the validity of the findings is that of multiple diagnoses, the wide range of functionality, and clinical manifestations of psychopathology in the participants. Although the randomization of the groups was effective, the fact that several participants had multiple diagnoses (such as mild mental retardation, borderline personality disorder, and antisocial personality disorder) may have complicated the interpretations of research outcomes. However, the array of clinical presentations among participants is similar to presentations in patients undergoing long-term treatment in state psychiatric hospitals.

The present study examined the effects of therapeutic yoga in Western culture and with participants who were largely unaccustomed to yogic practices or philosophy.[26,27] This pilot study points towards the cross-cultural effectiveness of these techniques. In addition, this study is unique in that it looked at the effects of YT on individuals with severe forms of schizophrenia who are in long-term treatment in a government-run inpatient hospital. This population faces

enormous challenges due to the refractory nature of their illness, the complexity of their behavioral and social service issues, the limitations of conventional treatment, and challenging living conditions. More studies with larger sample sizes are needed to better determine whether the results can be generalized.

Possible mechanisms of action

It seems likely that the positive effects of YT in schizophrenia are due to the regulatory effects of yoga on the autonomic nervous system. It has been found that people with schizophrenia have a high baseline level of physiologic arousal, in which the body is chronically agitated even under normal conditions.[28] Simultaneously, the parasympathetic nervous system has been found to be underactive in many with schizophrenia.[29] Such hyper-responsivity to stress can lead to overactivation of the hypothalamic–pituitary–adrenal axis and the sympathoadrenalmedullary axis. These systems then produce higher levels of cortisol and epinephrine, so-called stress hormones, which increase the body's state of alert, with increased respiratory and heart rates, increased blood pressure, and many other physiologic changes. When these hormones are chronically released, often the case in schizophrenia, they strain the entire body and mind, and can lead to chronic mental and physical distress. Additionally, high levels of cortisol can interfere with some cell functions, leading to dopamine dysregulation, long considered a hallmark of schizophrenia pathophysiology, and augmented cortisol release has itself been found to exacerbate psychotic symptoms in schizophrenia.[30,31]

It is possible that the yoga emphasis on long exhalation and conscious slow breathing reactivates the parasympathetic nervous system. Lengthened exhalation and breathing with increased airway resistance have been hypothesized to effect physiologic change through vagal stimulation.[21] Particular yogic breathing exercises seem to affect the autonomic nervous system, and alternate nostril breathing has been found to lower both systolic and diastolic blood pressure.[32] By strengthening the body's means of relaxing itself, yogic breathing may help reregulate the dysfunctional autonomic nervous system of schizophrenic individuals, and the breathing exercises alone have been found helpful in women with schizophrenia.[20] Furthermore, since physical exercise can reduce depressive symptoms such as anergia, the physical aspect of the intervention may have contributed to improvement in negative symptomatology in the YT participants.[33]

Conclusions

This study found that therapeutic yoga classes, as an adjunct to conventional psychiatric treatment, reduced psychopathology and improved aspects of quality of life in schizophrenic inpatients, likely due to the powerful stress reduction and autonomic nervous system modulation yoga can produce. Future studies might include a larger sample and use an active control in order to improve reliability and validity of the findings.

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Disclosure Statement

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(*Appendix follows* →)

APPENDIX

The Yoga Therapist (EV) teaches a breath-centered yoga practice that emphasizes awareness of the body and mind in the present moment. Participants are actively encouraged to notice thoughts, feelings, and sensations without judgment. They are reminded to return their awareness to the experience of their mind and body when they become distracted during their yoga practice.

The following exercises were taught and utilized during the Therapeutic Yoga intervention. Participants were frequently prompted to take long, slow breaths during class and while holding any posture in addition to practicing the explicit breathing exercised listed. All postures were modified as needed for individuals unable to do the full posture by using their chair for support or other appropriate modification.

1. Pranayama/Breathing Exercises: Alternate-nostril breathing (*nadi shodhana*), breath of joy, *ujjai*/snoring breath (increased airway resistance), lengthened exhalations (to approximately 3–4 seconds per exhalation, many participants were eventually able to lengthen to 5–6 seconds per exhalation)
2. Warm-Up: Yoga self-massage, sun salutations, hip circles, cat and cow stretches, shoulder/neck/wrist rolls and stretches, walking meditation
3. Standing postures: Triangle, warrior 1, 2, and 3
4. Balancing postures: Tree pose, crescent moon, flying eagle pose, inverted table pose, balancing on all fours and lifting opposite limbs
5. Twisting postures: Standing swinging twist, standing forward twist, seated spinal twist, supine spinal twist
6. Forward Bends: Standing and seated forward bending, happy baby pose, knee-to-chest pose, child pose, head-to-knee pose
7. Backward Bends: Bridge pose, standing arch, supported back bending, cobra pose, sphinx pose, locust pose, bow pose
8. Inversions: Legs up the wall, shoulder stand, lying on back with legs bent at the knee and lower leg resting on chair
9. Relaxation: Corpse pose, visualization exercises, breath counting, guided meditation, walking meditation with synchronized breathing (two steps per inhale, two steps per exhale, or three steps for each for those who were able), chanting sounds such as “om,” “aah,” “mm,” and “saa.”