

EFFECT OF A YOGA PRACTICE SESSION AND A YOGA THEORY SESSION ON STATE ANXIETY¹

SHIRLEY TELLES, VAISHALI GAUR, AND ACHARYA BALKRISHNA

Patanjali Yogpeeth, Haridwar, India

Summary.—Yoga techniques practiced for varying durations have been shown to reduce state anxiety. In this study, there were 300 naïve-to-yoga persons of both sexes who were attending a yoga therapy center in north India for stress relief as day visitors and were not residing at the center. They were assigned to two groups, yoga practice and yoga theory, and their state anxiety was assessed before and after a 2-hr. yoga session. A significant reduction in scores on state anxiety was found in the yoga practice group (14.7% decrease), as well as in the yoga theory group (3.4% decrease). The difference in scores following the sessions was statistically significant. Hence, yoga practice as well as learning about theoretical aspects of yoga appear to reduce state anxiety, with a greater reduction following yoga practice.

Yoga is an ancient Indian combination of techniques, which includes physical postures (*asanas*), voluntarily regulated breathing (*pranayamas*), meditation, as well as certain philosophical principles (Taimini, 1986). While the distinction is not absolute, some yoga practitioners place more emphasis on the physical benefits and therapeutic aspects of yoga (Tran, Holly, Lashbrook, & Amsterdam, 2001), while others give equal importance to the philosophical aspects and theory underlying the practice (Bell, 2000).

Several studies have demonstrated that practicing yoga techniques reduces anxiety. For example, in a controlled prospective, nonrandomized study, 24 women who perceived themselves as emotionally distressed were studied (Michalsen, Grossman, Acil, Langhorst, Ludtke, Esch, *et al.*, 2005). Following twice weekly 90-min. *Hatha* yoga *lyenger* yoga practice, chiefly yoga postures, practiced for three months, participants showed a significant decrease in perceived stress and state and trait anxiety, among other variables. A possible mechanism underlying this effect was demonstrated by another study which assessed the effects of practicing yoga postures on levels of brain gamma-aminobutyric-acid (GABA; Streeter, Jensen, Perlmutter, Cabral, Tian, Terhune, *et al.*, 2007). Following a 60-min. session of yoga postures, there was a 27% increase in GABA measured using magnetic resonance spectroscopic imaging immediately before and after the intervention. There is an indication that anxiety might be a result of insufficient inhibitory control, with decreased GABA-ergic inhibition

¹Address correspondence to Shirley Telles, Ph.D., Patanjali Yogpeeth, Bahadradab, Near Haridwar, Uttarakhand 249402, India or e-mail (shirleytelles@gmail.com).

in anxiety and in patients with anxiety disorders (Domschke & Zwanzger, 2008).

Apart from yoga postures, slow breathing practiced for 10 min. significantly reduced the heart rate, respiratory rate, and systolic and diastolic blood pressure in 100 patients with essential hypertension (Kaushik, Kaushik, Mahajan, & Rajesh, 2006). This is relevant, as high heart and breath rates and blood pressure values are correlated with high anxiety. In two separate studies, meditation practice was shown to be useful to decrease anxiety (Krisanaprakornkit, Krisanaprakornkit, Piyavhatkul, & Laopaiboon, 2006). In one study, Transcendental Meditation™ practice resulted in a reduction in anxiety symptoms and electromyography scores. This was comparable to the reduction with electromyography-biofeedback and relaxation therapy. The other study examined the effectiveness of mindfulness meditation for obsessive compulsive disorder and did not find any benefit. More recently, a yoga program which combined meditation and regulated breathing (*pranayama*) as a program called Sidha Samadhi yoga, reduced scores of state and trait anxiety, depression, and feelings of tension (Kozasa, Santos, Rueda, Benedito-Silva, Ornellas, & Leite, 2008).

Apart from these studies on the effects of individual practices, combinations of yoga practices as well as lifestyle changes reduced anxiety in normal and diseased patients (Gupta, Khera, Vempati, Sharma, & Bijlani, 2006). The intervention consisted of yoga postures (*asanas*), breathing techniques (*pranayama*), relaxation techniques, group support, individualized advice, lectures and films on the philosophy of yoga, meditation, stress management, nutrition, and knowledge about the illness. This intervention made use of the fact that there are certain principles of yoga, intended to enable a person to be better equipped to deal with stress (Nagendra & Nagarathna, 1997). There has been no study to assess whether listening to a discourse on those principles which form the philosophical basis of yoga could alter the mental state and anxiety.

The present study was intended to compare the state anxiety before and after a yoga practice session with a session of equal duration during which participants watched a video on the philosophical aspects of yoga.

METHOD

Participants

The participants were 300 persons of both sexes who were attending a yoga therapy center in north India for stress relief as day visitors and were not residing at the center. The 300 participants were assigned to two interventions: yoga practice and yoga theory. The yoga practice group comprised 105 men (M age = 42.2 yr., SD = 17.1), while the yoga theory group comprised 124 men (M age = 42.0 yr., SD = 14.8). All participants were na-

ive to the practice of yoga and were equally receptive to either intervention. The participants' signed informed consent was taken and the study had the prior approval of the institution's ethics committee.

Design

The participants were not allowed to self-select the intervention, but neither was the assignment to the two interventions randomized. The assignment was based on convenience, e.g., the availability of the participants and the schedules for the two yoga sessions (i.e., practice or philosophy).

Assessment

The State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Luchene, 1970) was used to assess state anxiety at the moment of testing. Trait anxiety was not assessed. Assessments were made at the beginning and at the end of a 2-hr. yoga session which consisted of either practice or theory, depending on the group to which the participants were assigned.

Interventions

Yoga practice.—The yoga practice session included voluntarily regulated breathing (*pranayamas*, 60 min.), loosening exercises (*sukshma vyayama*, 30 min.), and yoga postures (*asanas*, 30 min.). The breathing techniques included high frequency yoga breathing (*kapalabhati*), breathing through alternate nostrils (*anulom-vilom pranayama*), exhalation with specific sounds (*brahmari* and *udgeeth pranayamas*), and breathing with a period of breath holding or with a voluntarily partially constricted glottis (*bahya* and *ujjayi pranayamas*, respectively).

Yoga theory.—The yoga theory session was of the same duration as the practice session. Participants were asked to watch a prerecorded DVD (digital video) which described the basis and principles of yoga practice, as well as the concept of stress and stress-reduction described in ancient yoga texts (Patanjali, circa 900 B.C., Taimini, 1986).

Data Analysis

Data were analyzed using repeated-measures analysis of variance (ANOVA) with one between-subjects factor, i.e., Group (2: yoga practice, yoga theory) and one within-subjects factor, i.e., State (2: before, after yoga session). *Post hoc* analyses for multiple comparisons were done with Bonferroni adjustment, comparing (i) values after a session with values before a session, (ii) values before each session for any difference, and (iii) values after each session for any difference.

RESULTS

The repeated measures analysis of variance (ANOVA) showed a significant difference in state anxiety scores between Group ($F_{1,149} = 4.811$,

$p < .05$; Huynh-Feldt Epsilon = 1.000), between State ($F_{1,149} = 58.514, p < .001$; Huynh-Feldt Epsilon = 1.000), and an interaction between Group and State ($F_{1,149} = 20.174, p < .001$; Huynh-Feldt Epsilon = 1.000).

Post hoc analyses for multiple comparisons were performed with Bonferroni adjustment and showed a significant reduction in state anxiety scores in the yoga practice group ($p < .001$) and in the yoga theory group ($p < .05$). There was a significant difference between post-session state anxiety scores of the yoga practice and the yoga theory groups ($p < .001$), but no significant difference in their pre-session state anxiety scores ($p > .05$). Descriptive statistics are provided in Table 1.

TABLE 1
GROUP MEANS AND STANDARD DEVIATIONS OF STATE ANXIETY SCORES BEFORE
AND AFTER A YOGA PRACTICE SESSION AND A YOGA THEORY SESSION

Group	State			
	Before		After	
	M	SD	M	SD
Yoga practice	35.2	9.4	29.9†‡	8.2
Yoga theory	36.0	11.9	34.5*	12.3

* $p < 0.05$. † $p < 0.001$, repeated-measures ANOVA, *post hoc* analyses comparing After with Before; ‡ $p < 0.05$ After Yoga Practice compared with After Yoga Theory.

DISCUSSION

Three hundred persons previously naïve to yoga were assigned to two groups, a yoga practice group and a yoga theory group, and state anxiety was assessed before and after a 2-hr. session of yoga practice or yoga theory. While both groups had comparable state anxiety before the session, the yoga practice group showed a significantly greater decrease in state anxiety scores after the session (14.7% decrease), compared to the decrease after the yoga theory session (3.4% decrease).

Yoga practiced as a therapeutic intervention emphasizes the physical aspects of yoga (Hart, 2008). However, it is recognized that yoga is a comprehensive practice which includes techniques which act at the physical level, but also those which influence mood, intellectual function, and perhaps even more subtle levels (Nagarathna & Nagendra, 1985). While no previous study seems to have evaluated the effects of a yoga theory session alone, the mental and emotional benefits of yoga philosophy, other than actual practice, were described in a study on older persons (Krishnamurthy & Telles, 2007). In this three-group (yoga, ayurveda, and wait-list control group) randomized controlled study, at the end of 6 mo. participants who practiced yoga had the lowest scores on a geriatric depression scale. While the yoga practice did include gentle postures (*asanas*) and breathing practices (*pranayamas*), the practices which the participants mentioned

that they found the most enjoyable and helpful were a devotional session (called *Bhakti* Yoga). This essentially is a part of yoga philosophy, involving “surrendering to a Supreme or Higher power” (Krishnamurthy & Telles, 2007).

The fact that the magnitude of change in state anxiety after the yoga theory session was significantly less than after the yoga practice session (though there was a decrease compared to the respective pre-session value) may be related to the fact that in ancient Indian texts the perception of situations as stressful is believed to be reinforced not only by reasoning, but also by the imagination, memory, and even the mental processes during sleep (Telles & Naveen, 2005). Ancient yoga texts prescribe understanding the factors which cause stress and gradually modifying thinking patterns (Mehta, 1990). This would have been mentioned in the yoga theory session, though there was no attempt to assess whether thinking patterns had changed. Hence, this may explain why the short-term effect assessed by a state anxiety measure may be less compared to the actual practice of yoga techniques, as thinking patterns may be presumed to require time to change.

The way in which the yoga practice session may be reducing state anxiety is not known but may be speculated upon. Slow and deep breathing are known to increase the parasympathetic tone and are associated with a calm mental state (Kaushik, *et al.*, 2006). Rapid yoga breathing techniques are followed by subjectively rated calmness associated with periods of slow-electroencephalogram (EEG) frequencies (Novak, Lepicovska, & Dostalek, 1992).

In the yoga practice session, 50% of the time was spent in yoga breathing, which may have accounted for the benefits seen. The remaining time (60 min.) was spent in practicing loosening exercises and in yoga postures (*asanas*). Many of the benefits of these practices are ascribed to muscle stretching. For example, muscle stretching associated with yoga postures is believed to help in reducing pain (Garfinkel & Schumacher, 2000). Apart from these effects which are easy to associate with yoga practice, more complex effects of yoga *asanas* have also been shown. For example, magnetic resonance spectroscopic imaging in eight yoga practitioners and 11 nonyoga practitioners showed definite changes after a 60-min. yoga session, compared to a 60-min. session spent reading by nonyoga practitioners for comparison (Streeter, *et al.*, 2007). The chief difference was an increase in levels of gamma-aminobutyric acid (GABA) in the brain after the yoga session. It was speculated that this could be the basis for using yoga in the management of anxiety disorders.

In summary, the present study did not attempt to assess the effect of yoga practice or yoga theory on trait anxiety. Instead, a 2-hr. yoga practice

session reduced state anxiety while an equal duration of listening to a self-help yoga DVD also reduced state anxiety, but to a significantly lesser extent. The results emphasize the importance of yoga practice at least in the short-term management of anxiety.

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Accepted November 24, 2009.