EFFECT OF YOGA BASED LIFESTYLE INTERVENTION ON STATE AND TRAIT ANXIETY

NIDHI GUPTA, SHVETA KHERA, R. P. VEMPATI,
RATNA SHARMA* AND R. L. BIJLANI

Department of Physiology,
All India Institute of Medical Sciences,
New Delhi – 110 029

Abstract : Considerable evidence exists for the place of mind body medicine in the treatment of anxiety disorders. Excessive anxiety is maladaptive. It is often considered to be the major component of unhealthy lifestyle that contributes significantly to the pathogenesis of not only psychiatric but also many other systemic disorders. Among the approaches to reduce the level of anxiety has been the search for healthy lifestyles. The aim of the study was to study the short-term impact of a comprehensive but brief lifestyle intervention, based on yoga, on anxiety levels in normal and diseased subjects. The study was the result of operational research carried out in the Integral Health Clinic (IHC) at the Department of Physiology of All India Institute of Medical Sciences. The subjects had history of hypertension, coronary artery disease, diabetes mellitus, obesity, psychiatric disorders (depression, anxiety, 'stress'), gastrointestinal problems (non ulcer dyspepsia, duodenal ulcers, irritable bowel disease, Crohn's disease, chronic constipation) and thyroid disorders (hyperthyroidism and hypothyroidism). The intervention consisted of *asanas, pranayama,* relaxation techniques, group support, individualized advice, and lectures and films on philosophy of yoga, the place of yoga in daily life, meditation, stress management, nutrition, and knowledge about the illness. The outcome measures were anxiety scores, taken on the first and last day of the course. Anxiety scores, both state and trait anxiety were significantly reduced. Among the diseased subjects significant improvement was seen in the anxiety levels of patients of hypertension, coronary artery disease, obesity, cervical spondylitis and those with psychiatric disorders. The observations suggest that a short educational programme for lifestyle modification and stress management leads to remarkable reduction in the anxiety scores within a period of 10 days.

Key words : yoga   anxiety   state anxiety   trait anxiety

INTRODUCTION

Anxiety has been selected in the sociobiological organisms for its probable adaptive value, as it signals potential danger and can contribute to mastery of a difficult situation and thus to personal growth. Excessive anxiety on the other hand is

*Corresponding Author

maladaptive, either because it is too intense or because it is inappropriately provoked by events that present no real danger. Thus anxiety is pathological when excessive and persistent, or when it no longer serves to signal danger. It is often considered to be a major component of unhealthy lifestyles and possibly contributes significantly to the pathogenesis of not only psychiatric but also systemic disorders such as cardiovascular disease, diabetes mellitus and bronchial asthma (1, 2, 3). The psychological factors, including anxiety, contribute significantly not only to the pathogenesis of medical illness, but also affect their course and may be a target for effective intervention (4). So it becomes important to reduce the level of anxiety as a part of prevention and management of diseases. Among the various approaches to reduce the level of anxiety, yoga is the one that combines the physical elements of a healthy lifestyle with prescriptions for abiding mental peace (5). Further, the growth of psychoneuro-immunology has strengthened the scientific foundations of mind -body medicine (6). Now that tools for influencing the mind positively have assumed extensive application in a wide variety of illnesses (7), it is important to examine their efficacy. The present study evaluates the changes seen in the anxiety levels while completing a comprehensive but brief lifestyle modification educational program based on the principles of yoga.

MATERIALS AND METHODS

Subjects

The study is based on the data collected on 175 subjects (98 males and 77 females), age ranging from 19–76 years, who attended one of our integrated lifestyle programs conducted in the Integral Health Clinic (IHC) at All India Institute of Medical Sciences between January 2002 and July 2003. The subjects were a heterogeneous group having hypertension, coronary artery disease, diabetes mellitus, obesity, psychiatric disorders (depression, anxiety, 'stress'), gastrointestinal problems (non ulcer dyspepsia, duodenal ulcers, irritable bowel disease, Crohn's disease, chronic constipation), thyroid disorders (hyperthyroidism and hypothyroidism) or were apparently healthy but wanted to join the program for prevention of disease. The disease-wise break-up of the patients is given in Table I.

TABLE I : Distribution of conditions in patients (n=175) in the study.

S.No.	Condition	Number
1.	Bronchial asthma	14
2.	Hypertension	38
3.	Diabetes	14
4.	Cervical spondylitis	18
5.	Coronary artery disease	12
6.	Obesity	09
7.	Psychiatric disorders	33
8.	GI Problems	18
9.	Thyroid disorders	08
10.	General prophylaxis	35

Total (some patients had more than one   199
condition)

The program

The program consisted of an integrated package comprising theory and practice sessions. It was administered in the form of an 8–day outpatient course, 3–4 hours each day, and was spread over 10 days, being interrupted by a 2–day weekend break. The course was given to a group of 6–8 patients

at a time. A typical day in the course started with a set of simple asanas (physical postures) and pranayama (breathing exercises) for approximately one hour followed by a break. During break subjects listened to instrumental music and had breakfast. After this short interval the next activity was a lecture or a video film. Besides providing elementary facts about nutrition and the specific diseases, which the patients had, these sessions introduced the patients to principles of yoga and yogic techniques.

Although group as well as individual nutrition education was imparted, providing meals was not a part of the program. One full session was devoted to principles and practice of meditation, and two to stress management. Questions and unstructured discussions were encouraged. Each day's program ended with relaxation through either shavasana (a relaxation technique) or meditation. Autosuggestion and imagery were encouraged during relaxation to promote self-healing.

The patients were given a few booklets to reinforce what was discussed in the lectures. On one of the days, the patient received individualized advice in a one to one session. This session included advice on diet, physical activity, smoking, drinking, mental relaxation, and also provided a good listener to the patient for his or her personal problems. The spouse and other members of the patient's family were encouraged to attend the course to facilitate compliance. Attending the course cost the patient a nominal registration fee of 200 rupees. The protocol of the course is given in Table II, and the set of asanas and pranayama included in the course in Table III.

TABLE II :　Protocol of the course.

Day 0	History
Day 1 : Wednesday	Filling up questionnaire Introduction to one another Lecture : Introduction to yoga Practice :　Shavasana
Day 2 : Thursday	Practice : Asanas & Pranayama* Break† Lecture :　Meditation Practice :　Meditation Individualized advice (2 patients)
Day 3 : Friday	Practice : Asanas & Pranayama Break Lecture : Fundamentals in nutrition Practice :　Meditation Individualized advice (2 patients)
Day 4 : Saturday	Off
Day 5 : Sunday	Off
Day 6 : Monday	Practice :　Asanas & Pranayama Break Film :　Samattvam (Equanimity) Practice :　Meditation/Shavasana
Day 7 : Tuesday	Practice :　Asanas & Pranayama Break Film :　Stress management Practice :　Meditation/Shavasana
Day 8 : Wednesday	Practice :　Asanas & Pranayama Break Lecture :　Meditation/Shavasana Individualized advice (2 patients)
Day 9 : Thursday	Practice :　Asanas & Pranayama Break Lecture : Yogic attitude in daily life Practice :　Meditation/Shavasana Individualized advice (2 patients)
Day 10 : Friday	Filling up questionnaire Practice : Asanas & Pranayama Break Lecture :　Stress management Practice :　Meditation/Shavasana Closing session

*Details in Table II.
†Instrumental Music during breaks.

TABLE III : The set of asanas and pranayama included in the course.

i.	Humming in meditative posture – Vajrasana (Thunderbolt Pose)/Padmasana (Lotus Pose)/ Sukhasana (Easy Pose)
ii.	BREATHING TECHNIQUES Dog breathing, Tiger breathing, Hands in and out breathing, Hands interlocked, kept on chest, stretching, in three positions, Ankle stretch breathing.
iii.	LOOSENING EXERCISES Warm ups: starting from the head, working towards the toes. Neck rolls, Shoulder rotation, Arm rotation, Elbow movements, Wrist movements, Finger movements, Waist movements, Knee rotation, Ankle rotation, Toe movements.
iv.	QUICK RELAXATION IN SHAVASANA (CORPSE POSE)
v.	ASANAS

    (a) Standing
       1. Ardhakatichakrasana (lateral arc pose)
       2. Padahastasana (forward bend pose)
       3. Ardhachakrasana (backward bend pose)
       4. Vrikshasana (tree pose)

    (b) Sitting
       1. Ardhamatsyendrasana (half-spinal twist pose)
       2. Paschimatanasana (back stretch pose)
       3. Konasana (angular pose)

    (c) Lying on stomach (prone)
       1. Makarasana (crocodile pose)
       2. Bhujangasana (cobra pose)
       3. Dhanurasana (bow pose)

    (d) Lying on back (supine)
       1. Uttitapadasana (straight leg raising)
       2. Sarvangasana (shoulder stand pose)
       3. Matsyasana (fish pose)
       4. Pavanmuktasana (wind relieving pose)
       5. Setubandhasana (bridge pose)

vi.	DEEP RELAXATION IN SHAVASANA (CORPSE POSE)
vii.	PRANAYAMA (BREATHING PRACTICES)

    1. Bhastrika (rapid breathing)
    2. Nadi shuddhi (alternate nostril breathing)
    3. Bhramari (honeybee sound during expiration)

viii.	QUICK RELAXATION IN SHAVASANA (CORPSE POSE)
ix.	Humming in meditative posture – Vajrasana (Thunderbolt Pose)/Padmasana (Lotus Pose)/ Sukhasana (Easy Pose)

The anxiety levels were assessed using a questionnaire called the 'State Trait Anxiety Inventory' (STAI)(8). This is a self-report assessment device, which includes separate measures of state and trait anxiety. State anxiety (S-Anxiety) is defined as a transitory emotional state characterized by consciously perceived feeling of tension and apprehension. Trait anxiety (T-Anxiety) refers to relatively stable individual differences in anxiety proneness. Depending on the characteristics of the stressful stimulus conditions, individuals experience differential levels of state anxiety as a function of their level of trait anxiety. The STAI consists of two separate subscales that contain 20 items each. The items are in the form of statements people have used to describe themselves. The essential qualities evaluated are feelings of apprehension, tension, nervousness, and worry. Both subscales (S-Anxiety and T-Anxiety) use a 4-point Likert scale to allow the subject to show how often or how much each question applies to them in both situations. Also, the test is designed to take only 20 minutes at the maximum to reduce the amount of fluctuations in S-Anxiety that could become apparent if the test was to go for a long period of time. Subjects were assessed at the beginning (day 1) and at the end (day 10) of the intervention. The controls were an age-matched group of subjects (26 males and 24 females), with age ranging from 23–65 years. They filled the questionnaire twice at an interval of ten days, but did not attend the lifestyle modification program. Paired t-test was applied for analyzing pre and post intervention scores as well as controls. ANOVA was used to find the differences in the basal anxiety scores of subjects vs. controls and also for the differences in the

basal anxiety levels of patients with different diseases.

RESULTS

The levels of anxiety measured at the beginning (day 1) and end (day 10) of the IHC course for the intervention group and for controls at an identical interval are given in the Table IV. At the end of the course, state and trait anxiety scores were significantly lower than at the beginning (Table IV) in the intervention group. But there was no significant change in the anxiety scores of the controls after an interval of ten days. The IHC course affected the anxiety levels significantly in both male and female subjects equally (Table V). Further the subjects were divided into three

TABLE IV : Mean anxiety levels at the beginning and end of the course.

	Intervention group (n–175)		Control group (n–50)	
	Day 1	Day 10	Day 1	Day 10
A	82.7±24.4	72.6±22.0***	71.1±15.3	73.5±16.9
S	39.6±12.4	34.1±11.0***	35.0±8.9	36.4±8.6
T	43.1±12.0	38.5±10.6***	36.1±7.6	37.1±8.8

***P<0.001
A–Total Anxiety, S–State Anxiety, T–Trait Anxiety.

TABLE V : Mean anxiety levels at the beginning and end of the course in males and females.

	Males (n–98)		Females (n–77)	
	Day 1	Day 10	Day 1	Day 10
A	82.72±23.84	72.50±20.42***	82.70±22.65	72.59±19.62***
S	39.68±12.52	34.03±10.62***	39.52±12.27	34.1±11.46***
T	43.04±12.57	38.47±11.12***	43.18±11.33	38.49±9.88**

***P<0.001, **P<0.01.
A–Total Anxiety, S–State Anxiety, T–Trait Anxiety.

age groups to see if age affected the changes in the anxiety levels of the subjects (Table VI). The effects of IHC course were found to be significant in all the age groups except for the levels of state anxiety in the subjects with in forty to forty nine years of age, which did not show any significant change (Table VI). When the percentage change was considered the course affected the state anxiety scores in subjects between 19 to 39 years age groups more significantly (P<0.05) than those between 40 to 49 years. Among the diseased subjects there were significant differences in the anxiety scores of the patients to start with. The initial anxiety scores (total, state and trait) for the patients of hypertension (P<0.005), coronary artery disease (P<0.05) and psychiatric disorders (P<0.001) (pooled as group 1; Table VII) were significantly different from those who had attended the course as a part of general prophylaxis (group 3; Table VII). For the patients with other pathologies the baseline anxiety scores were not significantly different from those who attended the course as a part of general prophylaxis (pooled as group 2; Table VII). The anxiety scores decreased significantly for both group one and two as a result of the intervention (Table VII). Anxiety scores when considered for each disease separately have significantly decreased in patients of psychiatric disorders (A, P<0.005; S, P<0.005; T, P<0.005), hypertensives (A, P<0.001; S, P<0.005; T, P<0.005), patients of CAD (A, P<0.05; S, NS; T, P<0.05), obesity (A, P<0.05; S, P<0.05; T, NS) and cervical spondylitis (A, P<0.05; S, NS; T, P<0.05). There was no significant change in the anxiety levels of patients with bronchial asthma, diabetes mellitus, gastrointestinal and thyroid disorders.

TABLE VI :   Mean anxiety levels at the beginning and end of the course
in the subjects as divided for the different age groups.

	19–39 y (n–87)		40–49 y (n–37)		50–76 y (n–61)	
	Day 1	Day 10	Day 1	Day 10	Day 1	Day 10
A	87.7±25.3	74.0±21.2***	80.4±21.2	74.3±23.9**	77.2±19.2	69.3±16.2***
S	42.2±13.3	34.3±11.7***	37.6±8.9	36.5±12.7	37.3±10.7	32.3±8.3**
T	45.5±12.7	39.7±10.9***	42.8±12.4	37.8±11.2***	39.9±9.9	37.0±9.6***

***P<0.001, **P<0.01.
A–Total Anxiety, S–State Anxiety, T–Trait Anxiety.

TABLE VII :   Mean anxiety levels at the beginning and end of the course in patients.

	Group 1 (n–83)		Group 2 (n–81)		Group 3 (n–35)	
	Day 1	Day 10	Day 1	Day 10	Day 1	Day 10
A	93.4±24.4	78.8±21.2***	75.0±22.7	69.7±20.3**	69.0±23.7	61.9±20.5
S	45.2±13.5	36.9±10.6***	35.6±10.7	33.1±9.9*	33.3±10.7	29.8±9.6
T	48.2±11.8	41.9±10.6***	39.4±12.0	36.6±10.5**	35.7±13.0	32.1±11.8

***P<0.001, **P<0.01.
A–Total Anxiety, S–State Anxiety, T–Trait Anxiety.
Group 1 : Subjects with baseline anxiety scores significantly higher than those who had attended the disease for
          general prophylaxis.
Group 2 : Subjects with baseline anxiety scores not statistically different than those who had attended the
          disease for general prophylaxis.
Group 3 : Subjects who had attended the disease for general prophylaxis.

DISCUSSION

The present study shows that measurable improvement in the anxiety scores occurs within ten days as the result of an intervention that combines daily practice of asanas, pranayama, relaxation techniques (shavasana and meditation), and advice about, stress management, diet and other aspects of lifestyle. Each of these measures individually can also influence the anxiety levels favorably. Yogic relaxation can check sympathetic over activity (9). The objective manifestations of anxiety – a racing heart, palpitations, tremors, sweating, increased blood pressure, dry mouth, avoidance behavior, signs of restlessness, and heightened responsiveness decrease and slowly disappear. Prior studies have also reported a significant reduction in the scores of trait anxiety following meditation (10) and breathing exercises (11) as the relaxation

techniques and in state anxiety following muscle relaxation techniques and listening to music (12). When the patient population was considered age wise even in the middle aged patients between forty and fifty years who are supposed to be most difficult to adapt to any change, there was a significant reduction in the trait anxiety scores. There was a significant difference in the anxiety scores of the patients to start with when compared for the different diseases. The patients of hypertension, coronary heart disease, obesity, cervical spondylitis, and psychiatric disorders were benefited the most. Diseases where significant reduction in the anxiety scores could not be achieved like bronchial asthma and diabetes probably required an intervention period longer than eight days. There was no significant difference in the anxiety scores of patients with diabetes mellitus and bronchial asthma when compared to those who had attended

the course as a part of general prophylaxis. It is still not clear whether relaxation techniques and stress management is more effective in treating high anxious than low anxious diabetic patients (13). In most of the previous studies improvement in the clinical and psychological symptoms among asthamatics resulted with more than three weeks intervention (3), though the approach was not multimodal in nature in those studies. Among the patients with gastrointestinal problems, in five patients with non-ulcer dyspepsia and one with irritable bowel disease there was a marked reduction in the anxiety scores. There is no supporting evidence in the past to comment on the duration of intervention required to decrease the anxiety levels in the patients with thyroid disorders.

A similar lifestyle intervention had favorably changed the biochemical parameters – the serum lipids and fasting plasma glucose in ninety-eight subjects (14). The improvement in anxiety scores along with biochemical indices is clinically relevant in spite of the heterogeneous patient profile. Psychological stress being the risk factor for many diseases (1, 2, 3) makes this improvement valuable in terms of primary prevention. Maximum improvement was seen in patients with psychiatric disorders having higher anxiety scores possibly because the scope for reduction was greater. But the improvement remained statistically significant even after the results on patients were pooled with those on subjects who had attended the program as a part of general preventive measure who had lower initial anxiety scores. This further adds to the physiological and clinical relevance of the observations.

REFERENCES

1. Bruce DG, Chisholm DJ, Storlien LH, Kraegen EW, Smythe GA. The effects of sympathetic nervous system activation and psychological stress on glucose metabolism and blood pressure in subjects with type2 (non-insulin-dependent) diabetes mellitus. *Diabetologia* 1992; 35: 835–843.

2. Bijlani RL, Manchanda SK. Stress as a diabetogenic factor. *Indian J Physiol Pharmacol* 1981; 25: 184–188.

3. Paul L, Feldman J, Giardino N, Song H, Schmaling K. Psychological Aspects of Asthma. *J Consult Clin Psychol* 2002; 70(3): 691–711.

4. Schattner A. The emotional dimension and the biological paradigm of illness: time for a change. *Q J Med* 2003; 96: 617–621.

5. Bijlani RL. Scientific medicine shows signs of a paradigm shift. *New Approach Med Health (NAMAH)* 2003; 11(1): 28–40.

6. Kiecolt-Glaser JK, McGuire L, Robles TF, Glaser R. Emotions, morbidity, and mortality: new perspectives from psychoneuroimmunology. *Annu Rev Psychol* 2002; 53: 83–107.

7. Barrows KA, Jacobs BP. Mind-body medicine. An introduction and review of the literature. *Med Clin North Am* 2002; 86: 11–31.

8. Spielberger CD, Gorusch RL, Lushene RE. STAI Manual for State -Trait Anxiety Inventory. Palo Alto, CA: *Consulting Psychologists Press,* 1970.

9. Vempati RP, Telles S. Yoga-based guided relaxation reduces sympathetic activity judged from baseline levels. *Psycho Rep* 2002; 90: 487–494.

10. Eppley KR, Abrams Al, Shear J. differential effects of relaxation techniques on trait anxiety: a metaanalysis. *J Clin Psychol* 1989; 45(6): 957–974.

11. Brown RP, Gerbarg PL. Sudershan kriya yogic breathing in the treatment of stress, anxiety, and depression: part 1-neurophysiologial model. *J Alt Complement Med* 2005; 11(1): 189–201.

12. Stoudenmire JA. Comparison of muscle relaxation training and music in the reduction of state and trait anxiety. *J Clin Psychol* 1975; 31(3): 490–492.

13. Lane JD, Me Caskill CC, Ross SL, Feinglos MN, Surwit RS. Relaxation training for NIDDM. Predicting who may benefit. *Diabetes Care* 1993; 16(8): 1087–1094.

14. Bijlani RL, Vempati RP, Yadav RK, Ray RB, Gupta V, Sharma R, Mehta N, Mahapatra SC. A Brief but comprehensive lifestyle education program based on Yoga reduces risk factors for cardiovascular disease and diabetes mellitus. *J Alt Complement Med* 2005; 11: 267–274.