2162

ELSEVIER

Journal of Affective Disorders 57 (2000) 255–259

JOURNAL OF AFFECTIVE DISORDERS

www.elsevier.com/locate/jad

Preliminary communication

Antidepressant efficacy of Sudarshan Kriya Yoga (SKY) in melancholia: a randomized comparison with electroconvulsive therapy (ECT) and imipramine

N. Janakiramaiah, B.N. Gangadhar*, P.J. Naga Venkatesha Murthy[a], M.G. Harish[a], D.K. Subbakrishna[b], A. Vedamurthachar[c]

[a]*Department of Psychiatry, National Institute of Mental Health and Neuro Sciences, Bangalore 560 029, India*
[b]*Department of Psychiatry, Research assistants NIMHANS research project on SKY, National Institute of Mental Health and Neuro Sciences, Bangalore 560 029, India*
[c]*Department of Psychiatry, Yoga Teacher, National Institute of Mental Health and Neuro Sciences, Bangalore 560 029, India*

Received 20 November 1998; received in revised form 20 February 1999; accepted 15 April 1999

Abstract

Background: Sudarshan Kriya Yoga (SKY) is a procedure that involves essentially rhythmic hyperventilation at different rates of breathing. The antidepressant efficacy of SKY was demonstrated in dysthymia in a prospective, open clinical trial. This study compared the relative antidepressant efficacy of SKY in melancholia with two of the current standard treatments, electroconvulsive therapy (ECT) and imipramine (IMN). *Methods:* Consenting, untreated melancholic depressives ($n = 45$) were hospitalized and randomized equally into three treatment groups. They were assessed at recruitment and weekly thereafter for four weeks. *Results:* Significant reductions in the total scores on Beck Depression Inventory (BDI) and Hamilton Rating Scale for Depression (HRSD) occurred on successive occasions in all three groups. The groups, however, did not differ. Significant interaction between the groups and occasion of assessment occurred. At week three, the SKY group had higher scores than the ECT group but was not different from the IMN group. Remission (total HRSD score of seven or less) rates at the end of the trial were 93, 73 and 67% in the ECT, IMN and SKY groups, respectively. No clinically significant side effects were observed. *Discussion:* Within the limitations of the design (lack of double blind conditions), it can be concluded that, although inferior to ECT, SKY can be a potential alternative to drugs in melancholia as a first line treatment.

Keywords: Melancholia; Sudarshan Kriya Yoga; ECT; Imipramine; Controlled trial

1. Introduction

Sudarshan Kriya (*Su* = right, *Darshan* = vision, *Kriya* = procedure) was devised by a spiritual guru, Pundit Ravi Shankar of the Art of Living Foundation, Bangalore, India. It has been practiced as a brief and practical self-help stress-management strategy. Impressionistic reports of the participants

*Corresponding author. Fax: +91-80-663-1830.

0165-0327/00/$ – see front matter
PII: S0165-0327(99)00079-8

indicate that it reduces anxiety and depression. From the biomedical point of view, it is essentially hyperventilation with demonstrable effects on brain function (Meti and Desiraju, 1984; Meti and Raju, 1993). These observations suggest that this procedure may have antidepressant potential. However, to make it widely acceptable to patients and the medical profession, some of the adventitious components (e.g., briefing about positive attitudes to life, 'living in the present', etc.) were dropped as were the meditative aspects. The procedure is devised as a physiological technique consisting of only specified rhythms of breathing. This adaptation for clinical purposes was designated *Sudarshan Kriya Yoga* (SKY; Yoga Research Group, 1995).

In an open, three-month clinical trial, SKY, as the sole treatment in dysthymic patients ($n = 46$), produced significant antidepressant effects, with 25 (68%) of the 37 patients who completed the treatment in remission (Janakiramaiah et al., 1998). Small but significant elevations of serum prolactin (but not of cortisol) occurred following a session of SKY (Janakiramaiah et al., 1998). Following improvement with SKY therapy, significant increments in P300 (ERP) amplitude ('normalization') occurred (Naga Venkatesha Murthy et al., 1997). In an independent sample of major depressive disorder patients, SKY lengthened REM sleep latency and slow wave sleep (Harish, 1997). These objective changes, associated with therapeutic effects and a response rate of 68%, further suggest that SKY produces more than a placebo antidepressant effect. In this study, we compared the therapeutic efficacy of SKY with two standard antidepressant treatments, electroconvulsive therapy (ECT) and imipramine, in melancholia.

2. Methods

2.1. Patients

Consenting inpatients ($n = 45$) of DSM-IV melancholic depression (American Psychiatric Association, 1994) who were never treated for the current episode were recruited consecutively. All were medically fit and scored 17 or more on the total 17-item Hamilton depression rating scale (HRSD; Hamilton, 1960). They were randomized into three equal groups (Table 1) to receive SKY, ECT or imipramine (IMN) treatment for four weeks.

Table 1
Patients' characteristics[a]

Group→ Variable↓	ECT ($n = 15$)	IMN ($n = 15$)	SKY ($n = 15$)
Age, years	36.7(2.5)	43.4(11.9)	36.0(7.8)
Sex, M:F*	6:9	10:5	9:6
Duration, months	4.8(3.3)	5.4(3.5)	3.8(2.8)
Recurrent*	3	2	4
HRSD	26.7(5.0)	22.7(5.7)	25.1(6.5)
BDI	42.8(10.1)	33.4(10.9)	39.8(12.0)

[a] The three groups were comparable on these variables. Figures refer to mean (SD) or * number of patients.

2.2. Treatments

2.2.1. SKY

The procedure was documented previously (Yoga Research Group, 1995; Janakiramaiah et al., 1998). It was taught by a well-trained Art-of-Living Foundation Yoga teacher (AV). It has three sequential components interspersed with normal breathing while sitting with eyes closed. The procedure closes with a period of about 10–15 min of *Yoga Nidra* (tranquil state) in a supine position. Each session lasted for about 45 min. The sessions were prescribed once a day in the morning for six days a week. For patients ($n = 6$) who had marked diurnal retardation, afternoon sessions were recommended. The practice of SKY on at least four days a week was ensured during the trial period. The mean±SD number of SKY sessions was 20.3±2.8.

2.2.2. ECT

Modified [thiopentone (3 mg/kg), succinylcholine (0.75 mg/kg) and atropine (0.65 mg)] ECT with bilateral electrode placement was given three times weekly. The stimulus was set 60 mC above threshold (determined on the first and seventh ECT). ECT was discontinued if the total HRSD score was seven or less for two consecutive assessments. The mean±SD number of ECT sessions was 8.9±3.3. Seizure was monitored by EEG and cuff methods. Seizures of 25 s on EEG or 15 s on motor were ensured in all sessions.

2.3.1. IMN

Patients received 150 mg of imipramine as a single oral dose at night daily from the first day of treatment. No other psychotropic drugs were allowed during the trial in any of the three groups.

2.4. Assessments

Assessments were done by a psychiatrist who was uninvolved in treatment assignments. The severity of depression was assessed using the Beck Depression Inventory (Beck et al., 1961) and on 17-item HRSD (Hamilton, 1960) before treatment (week zero) and weekly thereafter (weeks one–four).

2.5. Statistical analyses

Tests used were ANOVA, to compare the baseline clinical status of the patients, RMANOVA, to examine the changes in HRSD, its six-item subscale (Bech et al., 1981) and Beck Depression Inventory (BDI) scores over the four weeks (five occasions) of the trial. The significance (α) was fixed at 5% or less.

3. Results

Significant reductions in total BDI scores occurred in all three groups but there were no differences between them. There was, however, a significant group × occasion interaction. Although there were no overall differences between the groups, the ECT group had the lowest mean scores at weeks three and four, whereas the SKY and IMN groups appeared to be similar (Fig. 1). The results were similar to those obtained using the total 17-item HRSD as well as its six-item subscale (Table 2). In view of the significant interaction effects with high statistical power, we examined group differences in the scores at weeks three and four using one-way ANOVA and Scheffe's test. The results indicated that mean BDI scores for the third week were different between the

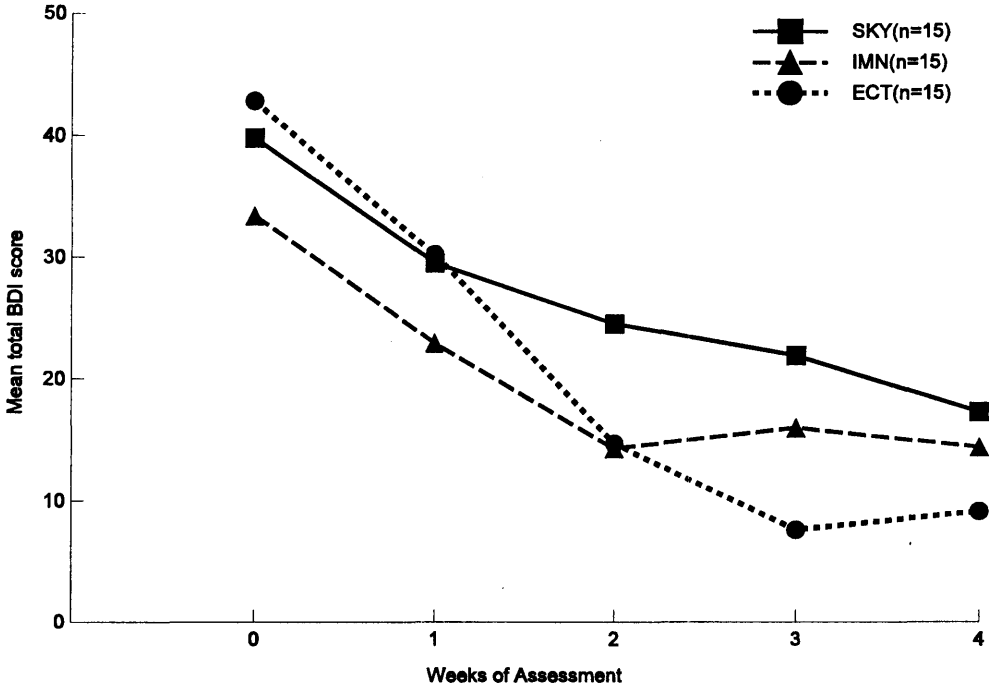

Fig. 1. Comparison of BDI scores. Occasion effect (over five assessments in four weeks), $F = 50.8$, $df = 4,168$, $P = 0.0001$, power = 1.0. Group (three treatment groups) effect, $F = 1.25$, $df = 2,42$, $P = 0.3$, power = 0.26. Group × occasion effect, $F = 3.04$, $df = 8,168$, $P = 0.003$, power = 0.95 (RMANOVA).

Table 2
Mean±SD scores of total 17-item HRSD and its six-item subscale[a]

Occasion→ Group↓	Week 0	Week 1	Week 2	Week 3	Week 4
ECT ($n = 15$)	26.7±5.0	17.3±10.2	7.5±7.7	4.2±5.9	2.5±2.8
	(12.9±3.0)	(8.9±5.0)	(4.6±4.2)	(2.3±3.0)	(1.5±1.6)
IMN ($n = 15$)	22.7±5.7	14.9±7.5	9.5±7.5	7.7±7.8	6.3±7.9
	(12.1±1.7)	(8.6±3.8)	(5.7±4.1)	(4.7±4.3)	(3.5±4.1)
SKY ($n = 15$)	25.1±6.5	14.8±8.4	11.4±9.1	9.3±8.4	8.3±8.6
	(11.7±3.1)	(8.5±4.5)	(6.1±4.8)	(5.5±4.8)	(5.1±4.7)

[a] Figures in parentheses refer to mean±SD scores of the six-item subscale of HRSD. Total 17-item HRSD: occasion effect $F = 97.5$, $df = 4,168$, $P = 0.0001$, power = 1.0; group effect $F = 0.55$, $df = 2,42$, $P = 0.6$, power = 0.14; group × occasion interaction $F = 2.5$, $df = 8,168$, $P = 0.02$, power = 0.62 (RMANOVA). Total six-item HRSD subscale: occasion effect $F = 90.7$, $df = 4,168$, $P = 0.0001$, power = 1.0; group effect $F = 0.70$, $df = 2,42$, $P = 0.49$, power = 0.16; group × occasion interaction $F = 2.7$, $df = 8,168$, $P = 0.009$, power = 0.92 (RMANOVA).

Table 3
Cumulative number (%) of patients remitted (total 17-item HRSD score < 8)

Occasion→ Group↓	Week 1	Week 2	Week 3	Week 4
ECT ($n = 15$)	4 (27)	8 (53)	12 (80)	14 (93)
IMN ($n = 15$)	3 (20)	6 (40)	10 (67)	11 (73)
SKY ($n = 15$)	3 (20)	6 (40)	8 (53)	10 (67)

groups ($F = 3.6$, $df = 2.42$, $P = 0.0136$). The mean score of the SKY group was not different from that of the IMN group but was significantly higher than in the ECT group. In the six-item HRSD subscale, differences emerged at week four ($F = 3.54$, $df = 2,42$, $P = 0.038$). The mean score of the SKY group was significantly higher than that of the ECT group but not compared to the IMN group. Over the course of the four weeks of treatment, comparable proportions of patients remitted (Table 3). With the exception of one patient in the IMN group, all of the the patients who remitted maintained their status until the end of the trial. Seizures, confusion, cardiovascular accidents or hypomanic switch were not observed in any of the groups during the trial.

4. Discussion

In this prospective randomized controlled trial, SKY produced a 67% remission rate at four weeks (Table 3). This compares with the response rate in dysthymia observed earlier (Janakiramaiah et al., 1998). As the present response rate was obtained in severe, hospitalized, melancholic depressives, the placebo response explanation is inadequate (Nelson et al., 1990; Peselow et al., 1992). Those who remitted at different points maintained their status until the end of the study, suggesting stability of the response. The relative specificity of the antidepressant response is reflected in the reductions of the scores on the six-item HRSD subscale (Bech et al., 1981). The scale excludes nonspecific symptoms of depression, like sleep, and, hence, indicates true antidepressant effects and is more sensitive in detecting between-group differences (Gangadhar et al., 1985). Although the response to SKY was not as good as to ECT, it was comparable to that to IMN. With the small effect size, a larger sample may have detected differences between SKY and IMN. As SKY is a new and experimental treatment, a longer trial period is needed. It is necessary to document the efficacy of SKY in maintaining the remission.

As the comparison involved three widely different modalities, it was impractical to attempt double blind conditions. Ethical constraints also limited the use of a placebo group. Therefore, the results should be considered preliminary and be viewed with caution in view of potential rater bias. No clinically significant side effects (e.g., seizures, confusion, cardiovascular accidents, hypomanic switch) occurred with the practice of SKY in this study. Further research is indicated to define the relative place for

SKY in the clinical management of depressive disorders.

References

American Psychiatric Association, 1994. Diagnostic and Statistical Manual of Mental Disorders (DSM IV), 4th ed., American Psychiatric Association, Washington, DC.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., Erbaugh, J., 1961. An inventory for measuring depression. Arch. Gen. Psychiatry 4, 561–571.

Bech, P., Allerup, P., Gram, T., Reisby, N., Rosenberg, R., Jacobson, J.O., Nagy, M., 1981. The Hamilton depression scale: Evaluation of objectivity using logistic models. Acta. Psychiatr. Scand. 63, 290–299.

Gangadhar, B.N., Kapur, R.L., Kalyanasundaram, S., 1985. Effect of ECT in endogenous depression: A double blind comparison with imipramine. NIMHANS. J 3, 7–12.

Hamilton, M., 1960. A rating scale for depression. J. Neurol. Neurosurg. Psychiatry 23, 56–62.

Harish, M.G., 1997. Treatment effects on sleep pattern abnormalities in melancholic depression. Unpublished dissertation submitted to National Board of Examinations (Psychiatry), New Delhi.

Janakiramaiah, N., Gangadhar, B.N., Naga Venkatesha Murthy, P.J., Shetty, T.K., Subbakrishna, D.K., Meti, B.L., Raju, T.R., Vedamurthachar, A., 1998. Therapeutic efficacy of Sudarshan Kriya Yoga (SKY) in dysthymic disorder. NIMHANS J. 17, 21–28.

Meti, B.L., Desiraju, T., 1984. Study of changes in BEG and autonomic parameters after 4 months of initiation and practice of pranayama. Indian J. Physiol Pharmacol. 28, 34.

Meti, B.L., Raju, T.R., 1993. Auditory middle latency evoked potentials in kriya yoga. Health Administrator 4, 56–58.

Naga Venkatesha Murthy, P.J., Gangadhar, B.N., Janakiramaiah, N., Subbakrishna, D.K., 1997. Normalization of P300 amplitude following treatment in dysthymia. Biol. Psychiatry 42, 740–743.

Nelson, J.C., Mazure, S.M., Jatlow, P.I., 1990. Does melancholia predict response in major depression? J. Affect. Disord. 18, 157–165.

Peselow, E.D., Sanfilipo, M.P., Difiglia, C., Fieve, R.R., 1992. Melancholic/endogenous depression and response to somatic treatments and placebo. Am. J. Psychiatry, 1324–1334.

Yoga Research Group, 1995. Treating Depression with Sudarshan Kriya Yoga: A Demonstration Video Cassette, Department of Health Education, National Institute of Mental Health and Neurosciences, Bangalore.