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# Therapeutic Efficacy of Sudarshan Kriya Yoga (*SKY*) in Dysthymic Disorder

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**The limitations of current methods of treatment for dysthymic disorder justify experimentation with new alternatives. Techniques of yoga hold promise. A brief package, Sudarshan Kriya exerts demonstrable effects on brain functioning and may have effects akin to ECT in depression. Sudarshan Kriya Yoga (*SKY*) was used to treat 46 hospital out-patients (22 males) of dysthymic disorder. Over 3 months, they had to practice it everyday for half-an hour and avoid any medication. They were assessed initially, at one and 3 months on interviews video-rated and self-report scales. In a subsample of males (n=12), plasma prolactin and cortisol levels were obtained before and after the first full *SKY* session. 37 patients completed the treatment through three months and 25 (68%) of them remitted. A higher proportion of those practising *SKY* regularly remitted. Significant elevation of plasma prolactin, but not cortisol occurred after the first *SKY* session. *SKY* has demonstrable biological effects and is therapeutic in dysthymic disorder.**

**Key words** - *Yoga, Depression, Dysthymia*

Currently available treatments for dysthymia are only moderately effective. The mean response rates are generally around 50% and the role of different modalities is yet to be established[1]. In mild to moderately severe depression, psychological and pharmacological approaches are comparably effective and hence patient preference may largely dictate treatment choice[2]. Even brief, manualised psychotherapies require considerable time of both patient and therapist and hence may not be cost-effective. The option of anti-depressant drug therapy has its own limitations. Though better than placebo, the treatment response is less than that typically found in major depression[3,4]. As dysthymia is highly prevalent and generally chronic, the costs of treatment (psychotherapy or pharmaco-therapy) are enormous. Besides, there is the large pool of patients who can neither participate in psychotherapy nor tolerate antidepressant medication. Therefore, there is need for alternative approaches with potential anti-depressant effects. Physical exercise, both aerobic and anaerobic, may be an alternative or adjunct to traditional treatments in mild to moderate forms of unipolar depression[5] but its utility in dysthymia has not been demonstrated.

Techniques of yoga have yielded encouraging results in the treatment of stress-related disorders[6] and neurotic dis-

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orders (including 48 neurotic depression patients) not responding to conventional treatments[7] However, evaluating these techniques involves several problems like unreliability of diagnosis, heterogeneity of samples and inadequate definition of outcome. Two issues need special attention. One, the attitude to yoga may confound treatment evaluation[8]. Second, the methodological problems of experimenter bias is greater with interviewer-based measures of antidepressant outcome than with patient reports even in blind controlled trials[9]. Therefore attention to response as perceived by the patients is essential for valid measurement of treatment effects. Being a relatively chronic illness, definition of recovery should include stability of response over several months.

A brief package of yoga techniques, Sudharshan Kriya (Su=right, darshan= vision, Kriya=procedure) has been developed by Pundit Ravishankar from Bangalore, India. It is offered popularly in several countries as a week-end stress management course. The procedure itself is nondenominational, simple to learn and easy to practice with few contraindications. In essence, it is a variant of pranayama (Breath control: a controlled pattern of breathing) which has been demonstrated to elicit seizure-like activity on the EEG[10-12]. It is plausible that such brain response is akin to ECT and hence exerts similar antidepressant effect. Based on this rationale and in view of Sudarshan Kriya having helped individuals with emotional problems, fatigue and insomnia, the present study was conducted to a) determine the clinical feasibility and therapeutic efficacy of Sudharshan Kriya Yoga ***(SKY)*** in dysthymic disorder, and b) explore the effects of ***SKY*** on plasma prolactin and cortisol levels..

## Material and Methods

*Patients:* Adult patients of both sexes, seeking treatment for the first time at the National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore, India and provisionally diagnosed as having dysthymia were screened. They were recruited to the study subject to the conditions: written consent to participate in the Yoga treatment programme for a period of 3 months; at least 5 years of formal education; confirmation of dysthymic disorder diagnosis according to DSM IV[13]; no comorbid anxiety disorder; absence of disabling systemic diseases (asthma, diabetes, hypertension, epilepsy, anaemia); drug-free (not on psychotropic drugs during the past month); never received electroconvulsive therapy, never had chronic alcohol or drug dependence, not consumed alcohol in the past one week and willing to abstain during the study period; and no history of current or past epilepsy. There were 46 patients (22 males) in the age range of 18 to 46 years (mean=29.8; sd=8.5) The mean (SD) duration of illness was 3.15(2) years.

*Blood sampling and analysis:* In male patients who consented to blood sampling, 10 ml of blood was drawn by venipuncture twice, at 2.00 and 3.00 p.m. when ***SKY*** was not yet introduced (N=7). Such sampling was repeated at the same times pre- and post-***SKY*** session on third or fourth day when the cyclical breathing component of ***SKY*** was introduced for the first time. The serum was separated, coded and stored at -20°C till the analysis. All the samples were analysed for prolactin (PRL)

and cortisol (CTL) in one batch by employing Radio Immuno Assay (RIA). RIA kits were procured from The Diagnostic Products Corporation, Los Angels, CA, USA; and the samples were processed per the protocol provided by the manufacturer. Five additional patients had consented to blood sampling only on the day when ***SKY*** was introduced.

## Treatment

During the study period of 3 months, Sudarshan Kriya Yoga ***(SKY)*** was the sole treatment. No other formal treatment, either psychological or pharmacological, was allowed. ***SKY*** is the adaptation of Sudarshan Kriya for clinical application at NIMHANS[14]. It has three sequential components interspersed with normal breathing: *Ujjayi* (slow breathing, 2-3 cycles/min) *Bhastrika* (rapid, forced expiration, 20-30 cycles/min.) and *Cyclical breathing* (going through increasing frequencies of 20-40, 40-60, and 60-80 cycles/min). All these variations of rhythmic breathing over a period of about 30 minutes are practiced while sitting with eyes closed and awareness focussed on incoming and out-going breath. As a state of relaxed sleepiness descends by the end of the last round of cyclical breathing, the procedure closes with a period of about 10 to 15 minutes of *Yoga Nidra* (tranquil state) in supine position.

The procedure was taught in the hospital every day during the first week and supervised subsequently at follow-up visits by a single trained Yoga teacher throughout the study. Regular practice at home, once every day, was emphasized. Practice on less than 3 days a week on average was regarded as irregular. Irregularly practicing patients (n=11 at first month) were strongly advised to practice regularly. Four more patients were practicing regularly at three months.

## Assessments

The patients were assessed at recruitment on an in-take data sheet covering demographic and illness information, and on Eysenck Personality Inventory (EPI[15]), Yoga Attitude Scale (YAS[16]) and severity of psychosocial stressors scale[17]. EPI could be administered for only 30 patients and all the protocols were valid. The following were administered initially, at one month and 3 months; Hamilton's Rating Scale for Depression (HRSD[18]); Beck's Depression Inventory (BDI[19]) interview which was also video-recorded; Clinical Global Impression (CGI[20]); Subjective Global Impression (SGI), a 7-point scale of self-reported improvement, analogous to CGI improvement scale; Comprehensive Psychopathology Rating Scale (CPRS[21]); and functional assessment scale using the 11 selected items of Selfcare, Underactivity, Slowness, Social withdrawal, Participation in household activities, Child care, Affective relationship to spouse, Sexual relationship with spouse, Friction in interpersonal relationship outside the households, Occupational role performance, and Interests and information from WHO Psychiatric Disability Assessment Schedule[22].

*Video version of BDI:* Interviews administering BDI were video-recorded. Any clues to treatment status or assessment occasion were edited out to eliminate bias in scoring. Interobserver reliability computed on the basis of pairs of scores on each interview given independently by

psychiatrists not connected with the present study, was high (Initially, n=41, Intra Class Correlation [ICC] r = 0.96; at one month, n=35, ICC r = 0.98; and at three months, n=35, ICC r = 0.99). CGI severity ratings on the video interview were also reliable as indexed by correlation between two raters (n=15, r = 0.89, 1-tailed significance p<0.001). The scores given by one of the psychiatrists (NJ) on BDI video-interview were used for further analysis. The rater (NJ) was not aware of the clinical details (including the ordinal number of interview session-preyoga, one month or three months). Data was analysed using SPSS version 6. Paired 't' test was used to compare pretreatment scores with those at one month and three months and also to compare hormone levels pre- and post-session. Independent sample 't' test (for two groups) and ANOVA were used to compare remitted, unremitted and 'treatment incomplete' groups.

## Results

Nine patients did not complete the treatment procedure and all of them discontinued within the first month itself. Remission from depression was defined on the twin criteria of 1) CGI severity rating of 2 or less at both one month and 3 month assessments; and 2) absence of criterion symptoms that justified dysthymic disorder diagnosis at recruitment, at both one and 3 month assessments. Of the 37 patients who completed the treatment through three months, 25 (68%) had remitted. Distribution of these patients on CGI severity and CGI/SGI improvement ratings is shown in Tables I and II. The 25 patients meeting the remission criteria also met the criterion of greater than 50% improvement at both one and 3 months.

The mean total depression scores on both HRSD and BDI too showed respectively significant reductions at one month (t=14.6, p<0.01, t = 9.9, p<0.01) and maintained the same at 3 months (t = 16.8, p<0.01, t = 9.9, p<0.01) (Fig. 1)

Table I

Distribution of patients (n=37) on CGI-severity scale initially, at one- and three months.

| CGI category | Initial | I month | III month |
|---|---|---|---|
| Normal | 0 | 12 | 23 |
| Borderline mentally ill | 0 | 13 | 5 |
| Mildly ill | 0 | 12 | 9 |
| Moderately ill | 35 | 0 | 0 |
| Markedly ill | 2 | 0 | 0 |

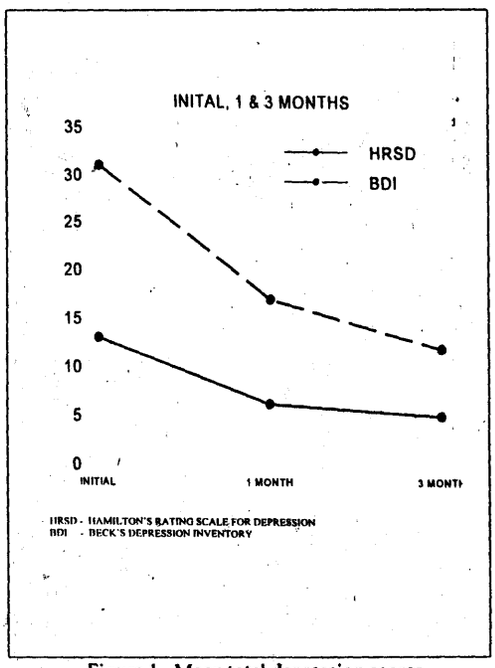


Figure 1. Mean total depression scores

Table II

Distribution of patients (n=37) on CGI & SGI improvement at one and three month assessments

| | One month | | Three months | |
|---|---|---|---|---|
| Improvement | CGI | SGI | CGI | SGI |
| 1. Very much (≥ 75%) | 12 | 11 | 23 | 22 |
| 2. Much (≥ 50%) | 13 | 15 | 5 | 6 |
| 3. Minimal (< 50%) | 1 | 0 | 0 | 0 |
| 4. No change | 11 | 11 | 9 | 9 |

The same pattern was seen on both depression index and anxiety index[23]. The mean (SD) depression index was initially 8.9 (2.8) and dropped to 3.8 (3.5) at one month ($t=7.4$, $p<0.01$) and to 2.8 (3.3) at three months ($t=9.6$, $p<0.01$). The mean (SD) anxiety index initially was 2.5 (1.2) and dropped to 1.2 (1.2) at one month ($t=6.3$, $p<0.01$) and to 0.9 (1.2) at three months ($t=7.4$, $p<0.01$). Likewise func-

Table III

Comparison of remitted, unremitted and treatment incomplete groups of patients

| | Treatment completed (n=37) | | Treatment incomplete | |
|---|---|---|---|---|
| | Remitted n=25 | Unremitted (n=12) | (N=9) | F=, p= |
| Mean (SD) age in years | 32.2 (9.3) | 27.3 (7.2) | 26.4 (6.1) | 2.3, 0.1 |
| Number (%) Males | 12 (48) | 4 (33.3) | 6 (66.6) | — |
| Number (%) with Education < 7 yrs | 4 (16) | 3 (25) | 1 (11) | — |
| Mean (SD) EPI - E | (N=17) 11.1 (2.8) | (n=7) 13.9 (3.5) | (n=6) 10.2 (4.3) | 3.2, 0.05 |
| Mean (SD) EPI - N | (N=17) 17.8 (3.9) | (n=7) 17.4 (3.9) | (n=6) 13.5 (4.3) | 2.7, 0.09 |
| Mean (SD) YAS Total | (N=17) 43.6 (5.3) | (n=7) 45.6 (2.5) | (n=6) 43.8 (10.7) | 0.2 0.8 |
| Mean (SD) duration in yrs | 3.5 (2.3) | 3.3 (1.8) | 2.2 (0.9) | 1.3, 0.3 |
| Mean (SD) BDI Total Initial | (n=24) 31.4 (12.4) | (n=11) 30 (12.1) | (n=6) 22.3 (14.3) | 1.3, 0.3 |
| Mean (SD) HRSD Total Initial | 13 (2.6) | 12.7(3.6) | 12.3 (5.1) | 0.1, 0.9 |
| Mean (SD) CPRS-anxiety (Initial) | 2.3 (1.3) | 2.8 (0.8) | 2.3 (1.1) | 0.8, 0.4 |
| Mean (SD) CPRS-Depression (Initial) | 9 (3) | 8.7 (2.5) | 9.4 (4.2) | 0.2, 0.9 |
| Mean (SD) of Functional impairment | 1.4 (0.3) | 1.5 (0.3) | 1.6 (0.4) | 1.6, 0.2 |
| Number (%) with stressors | 20 (80) | 9 (75) | 3 (33) | — |
| Number (%) practicing regularly at 1 month | 25 (100) | 1 (8.3) | — | — |
| Number (%) practicing regularly at 3 months | 25 (100) | 5 (41.7) | — | — |

EPI - Eysenck's Personality Inventory. YAS - Yoga Attitude Scale. BDI - Beck's Depression Inventory, HRSD - Hamilton Rating Scale for Depression. CPRS - Comprehensive Psychopathology Rating Scale.

Table IV

The mean (SD) plasma prolactin and cortisol levels

| | No Yoga (N=7) | | | | Yoga (N=12) | | | |
|---|---|---|---|---|---|---|---|---|
| Hormones | Pre | Post | t=, | p= | Pre | Post | t=, | p= |
| Prolactin | 6.8 (2.6) | 5.4 (1.7) | -1.7, | 0.15 | 4.8 (3.4) | 7.2 (5.8) | 2.8, | 0.02* |
| Cortisol | 9.5 (3.1) | 8.7 (3.6) | -1.2, | 0.3 | 9.8 (3.6) | 9.7 (4.6) | -0.14, | 0.9 |

* Significant

tional impairment too improved significantly from the initial mean (SD) of 1.4 (0.3) to 1.3 (0.3) at one month (t=3.3, p<0.01) and to 1.2 (0.3) at three months (t=5.6, p<0.01).

The two groups of remitted and unremitted patients and the group of incomplete treatment patients are compared in Table III. The incomplete treatment group had predominantly males and a much lower proportion with stressors. Regular practice of ***SKY*** was less frequent in the unremitted group at both one and three months. The group was also more extroverted than the rest. On attitude to yoga, however the three groups did not differ.

*Prolactin and cortisol:* Significant elevation of prolactin levels occurred following ***SKY*** session. No such alteration occurred for plasma cortisol (Table IV).

## Discussion

The results indicate the feasibility of ***SKY*** as the sole treatment of dysthymic disorder in a hospital setting. The poor compliance with the requirement of the regular practice in the unremitted group and non-completion of the treatment by a few do set limits to its efficacy. It is encouraging that 37 (80.4%) patients completed the trial protocol, 25 (67.5%) of whom remitted. The role of placebo response cannot explain this level of response rate. In pure dysthymic patients on placebo, the response rate on global clinical recovery is as low as 18% compared to 62% with fluoxetine[24]. Also, placebo response wanes with time to become negligible by 5 weeks[25]. Maintenance of improvement at 3 months cannot be just placebo response. It indicates effective relapse prevention. The remitted and unremitted groups differed significantly on proportion of patients practising ***SKY*** regularly. This association supports the therapeutic role of practice. Replication in other settings and follow-up for longer periods are nevertheless important.

It is arguable, however, that the response rate in an open trial is invariably inflated due to several factors involving both the patients and the observer. Induction of positive expectation is a desirable ingredient in all treatment, but its effect on self-report bias complicates evaluation. No such effect is suggested in this study since those who remitted did not have a more positive attitude to yoga. BDI scores were based on video interviews and therefore can be considered "blind". Further, observer bias is apparently negligible as video-rated BDI total scores paralleled the HRSD scores (Fig 1). Likewise observer ratings on CGI and patients' report on SGI had similar distribution (Table II).

Only males were included for the prolactin and cortisol study in order to avoid the several confounding factors related to menstruation in women. The prolactin response to seizures is known to be more pronounced in women than in men[26]. In spite of the sample being exclusively males the endocrine response pattern is noteworthy. It cannot be passed off simply as a non-specific response to physiological stress for the plasma cortisol levels remain the same before and after the ***SKY*** session. Elevation of plasma prolactin in response to a ***SKY*** session may be crucial to the mediation of antidepressant response and merits investigation. Also, the pretreatment amplitudes of the event related potential (ERP) P300 was lower than the normals, but normalised after 3 months of ***SKY*** treatment suggesting biological change following ***SKY***[27]. Objective effects on sleep architecture like lengthening of REM latency in some of the patients of the present study lend further objectivity and credence to the remarkable therapeutic effects of ***SKY*** in dysthymia.

In view of the continuing difficulties with lay people's attitude to treatment of depression[28], ***SKY*** may be a more acceptable and efficacious alternative to medical management of dysthymia for both acute treatment and relapse prevention. It has the advantage of fostering the patient's autonomy and self-reliance besides cutting health care costs.

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