ORIGINAL ARTICLE

SUDARSHAN KRIYA FOR MALE PATIENTS WITH PSYCHO ACTIVE SUBSTANCE DEPENDENCE: A RANDOMIZED CONTROL TRIAL

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Abstract

Objectives: The aims of the study were to investigate whether Sudarshan Kriya (SK), a form of Yoga and related practices can lead to increased Global Assessment of Functioning (GAF) and increased feeling of wellness in patients with substance dependence. *Method:* This was a 3-month single blind parallel randomized controlled study with sample size of 111 patients which were allocated by simple randomization to two groups. Study subjects were involved in an intensive program of Sudarshan Kriya and practices (SK&P) which they practised daily for 6 weeks. The control subjects were instructed to sit in an armchair with their eyes closed and pay gentle attention to their breath. A period sample of three months consisting of all patients admitted in De-addiction (DAC) ward fulfilling study criteria was taken. Only male patients diagnosed to be suffering from Substance Dependence by ICD-10 (DCR) criteria, aged between 18-65 years were included in this study. The assessment tools were the Basic Socio-demographic Performa, Mini Mental State Examination (MMSE), Severity of Dependence Scale (SDS), Schedule for Clinical Assessment in Neuropsychiatry (SCAN) based clinical interview, Global Assessment of Functioning (GAF) and Psychological General Well Being (PGWB). These assessments were conducted before starting the intervention and six weeks thereafter. *Results:* In the final analysis, number of participants analyzed in the study group was 55 and in the control group was 56. Majority of subjects were unemployed, married individuals who did not have occupational skills of more than skilled labour level. After six weeks of SK&P, statistically significant improvement in study subject dimensional scores of GAF (48.43+/- 0.08 to 66.77+/-0.14), Anxiety (ANX) (9.64+/-0.52 to 15.66+/-0.38), Depressed Mood (DEP)(7.19+/-0.2 to 9.18+/-0.37), Positive Well Being (PWB)(10.28+/-0.61 to 12.92+/-0.73), General Health (GH)(7.74+/-0.18 to 9.75+/-0.22) and Total PGWB(41.46+/-0.35 to 59.28+/-0.63) were noticed. However, when compared with control subjects, improvement was statistically significant in the case of GAF (p=0.000158), Anxiety (ANX)(p=0.011), Positive Well Being (PWB)(p=0.02), General Health (GH)(p=0.02) and Total PGWB(p=0.05); but not in the case of Depressed Mood (DEP), Self Control (SC) and Vitality. *Conclusion:* Practicing SK&P helps in improving Global Assessment of Functioning, Psychological General Well Being, General Health (GH) and positive well being of an individual. SK&P also causes significant reduction in anxiety levels of an individual. *ASEAN Journal of Psychiatry, Vol. 16 (1): January – June 2015: XX XX.*

Keywords: Sudarshan Kriya, Substance Dependence, Patients

Introduction

Sudarshan Kriya and Practices (SK&P) are derived from the Yogic Science of Breath derived from Vedic texts. Sudarshan Kriya Yoga (SKY) is a procedure that involves essentially rhythmic hyperventilation at different rates of breathing. [1] This breathing technique is practised by millions worldwide. It is claimed to be effective in improving well being and peace of mind. In practitioners of SK&P, significant increase in mental alertness (beta activity) was observed in the left frontal, parieto-occipital and midline regions of the brain, as compared to controls [2]. According to Sharma et al (2003) [3], significant greater antioxidant production and lower blood lactate level in practitioners of SK&P might contribute to greater resilience to stress in daily life.

SK&P has been most widely studied in depression: 68% patients suffering from dysthymia[2] and 73% patients suffering from melancholic depression[4] showed remission. SK&P takes 3 weeks in showing its antidepressant effects [4] and in patients suffering from dysthymia and melancholic depression, after 90 days of using SK&P, P300 Evoked Response Potential (ERP) amplitude readings returns to normal.[5] SK&P although inferior to Electro-Convulsive Therapy (ECT) can be a potential alternative to drugs in melancholia as a first line treatment [1]. SK&P also has 'remarkable therapeutic effects' in treating dysthymia and 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 [6].

The practice of yoga relaxation has been found to reduce tension and anxiety. The autonomic symptoms of high anxiety such as headache, giddiness, chest pain, palpitations, sweating and abdominal pain respond well [7]. Benefits of SK&P as potentially valuable adjunct to standard pharmacotherapy is also shown in patients with Generalized Anxiety Disorder (GAD) or treatment resistant GAD, with response rate of 73% and the remission rate of 41% as measured on the Hamilton Anxiety Rating Scale (HAM-A). [8] Findings were replicated in dual diagnosis cases also, in a randomized, controlled study of 60 hospitalized alcohol dependent patients enrolled in a residential treatment programme. Those treated with SK plus standard treatment had significantly greater reductions in depression, anxiety, and cortisol than patients given standard treatment and rehabilitation alone.[9] SK&P also helped to reduce tobacco use in 21% of the individuals at 6 months of practice.[10]

Some of the problems in studying efficacy of SK&P in substance dependence have been (a) it is only in recent times that a consensus has emerged for the definition of dependence disorders. The studies carried out until recently have employed variable definition of dependence disorder; (b) Other sources of variation include variable expertise of therapist, sampling techniques, geographical variations, and time period of the study. Aims of the study were to investigate whether SK&P can lead to increased GAF and feeling of wellness in patients with substance dependence.

Method

This is a single blind parallel randomized controlled study. The study was conducted at Central Jail Hospital (CJH), New Delhi which is the largest prison hospital setting in India with both inpatient and outpatient departments. The study period was 3 months (between 11/2/13 to 10/5/13). The study was approved by the Ethics review committee at CJH. One investigator uninvolved in the treatments or assessments generated random numbers for 116 patients to be allocated to two groups in equal numbers with allocation ratio of 1:1. All patients admitted in De-addiction (DAC) ward fulfilling study criteria were taken. The sample size was decided on the basis of the number of male patients suffering from substance dependence admitted in DAC ward for more than six weeks since the previous year.

Study subjects were involved in an intensive program of SK&P which they practised daily for 6 weeks. A certified SK&P (trained at Art of Living) teacher taught the procedure to all

patients throughout the course of treatment. Only SK&P therapist in the study were informed to start the corresponding intervention; the rest of the research team was unaware of the current group allocation. All participants signed consent forms and they were treated according to the ethical guidelines of Helsinki in 1995 (as revised in Edinburgh 2000). Participants at time of inclusion in study signed informed consent form. Participants continued to receive pharmacological therapy that was unchanged during the study. The assessment tools were applied in the order starting from the Basic Socio-demographic Proforma, Mini Mental State Examination (MMSE), Severity of Dependence Scale (SDS), Schedule for Clinical Assessment in Neuropsychiatry (SCAN) based clinical interview, Global Assessment of Functioning (GAF) and Psychological General Well Being (PGWB). These assessments were conducted before starting the intervention and six weeks thereafter. Confidentiality and privacy were maintained throughout the assessment process. Assessment of all subjects took place in DAC ward of CJH. As pre-decided trial was stopped after three months due to non availability of trained SK therapist, SK sessions were continued by some group volunteers who were trained to take SK sessions.

Male patients suffering from Substance Dependence as diagnosed by ICD-10 (DCR) criteria of age group between 18-65 years were included in the study.

Those inmates with ongoing psychiatric disorder except Substance Dependence, co-morbid severe physical illness (like hepatic encephalopathy, severe debilitating illness) or severe cognitive illness (with MMSE score <23) that might have hampered either the assessment process or practising of SK&P were excluded from the study. Patients who were found to be uncooperative for the interview for study purposes, as per the clinical judgment of the researchers, were also excluded from the study.

Procedure followed during Sudarshan Kriya:
In study subjects, SK&P were applied in order of (a) Three stage Pranayama with Vjjayi or Victory Breath; (b) Three sets of Bhastrika or

Bellow's Breath; and (c) SK or the Healing Breath Technique.[11]

The breathing practices were done in a sitting posture on the floor. Eyes and mouth were kept closed while breathing through the nose throughout the sessions. Vijjayi is a slow, deep breathing technique at 4 to 6 breaths per minute. Person employs arm postures, a specific ratio for the duration of inhalation and exhalation phases and breath-holds. During SK&P, this is practised for approximately 8 min. Vijjayi tends to be calming and to produce a sense of well-being. Bhastrika involves forceful rapid deep breathing through the nose at a rate of 20 to 30 breaths per minute. Three one minute rounds of Bhastrika are each followed by 30 seconds of normal breathing. Arm movements are used to increase the force and depth of respiration. This breathing exercise lasts for approximately 5 minutes. Rhythmic breath technique (SK) involves rhythms, cyclical forms of breathing in which there are no pauses between inhalation and exhalation. SK involves multiple rounds of slow (8-14 respiratory cycles per minutes), medium (40-50 respiratory cycles per minute) and fast (60-100 cycles per minute) cycles with varying rhythms and intensities SK lasts about 10 minutes. For similar duration the control subjects were instructed to sit in an armchair with their eyes closed and pay gentle attention on the breath.

Instruments used in study

Basic Socio-demographic Performa: Socio-demographic characteristics such as age, sex, marital status, education, occupation, employment status, religion, residence, and family history of psychiatric illness and substance/alcohol use were recorded.

The Mini- Mental State Examination (MMSE): The MMSE is a 30-point questionnaire, used to rule out cognitive deficits in the study subjects. [12] Severe cognitive illness (with MMSE score <23) that might have hampered either the assessment process or practicing of SK&P were excluded from the study. Hindi translation of MMSE [13] was used in participants who were unable to understand English.

Global Assessment of Functioning Scale (GAF): The GAF is a 100 point scale which is sub-divided into 10 equal 10 point intervals. Patients with 81 to 90 and 91 to 100 intervals exhibit superior functioning; 71 to 80 intervals are for persons with minimal psychopathology. Most patients in outpatient settings will receive ratings between 31 and 70 and most inpatients between 1 and 40. [14]

Psychological General Well Being Schedule (PGWB): The PGWB scale has 22 items that are aggregated to provide scores in six subscales. The scale, a self administered questionnaire, includes both positive and negative questions with a time frame and a six point response representing intensity or frequency for the first 14 questions. The last four questions use a 0 to 10 rating. [15]

Schedule for Clinical Assessment in Neuropsychiatry (SCAN): The exclusion of the psychiatric morbidity in subjects was performed by a SCAN based clinical interview in which clinical interview was conducted on the line of various sections of SCAN to enhance the thoroughness of clinical interview. [16]

The Severity of Dependence Scale (SDS): The SDS scale was used to rate severity of substance dependence in individuals. It is a 5-item scale that measures the degree of psychological dependence specifically related to the individual's feeling of impaired control over and preoccupation and anxiety towards drug taking. Score of each item ranges from 0-3 [17]. Wherever required for better clarification, additional information from clinical records and staff observations were incorporated in the assessment process.

The data was analyzed using the statistical package for social sciences (SPSS 15.0.1) [18]. Descriptive (frequency and percentage) and inferential statistics (Chi-square test, t-test and Cohen's effect size) were used to interpret the data.

Results

According to Table 1, mean age of study subjects was 39.3 with Standard Deviation (SD) of +/- 10.5, which was similar to mean age of control subjects of 38.8 with SD of +/- 8.3. The difference in age of study and control subjects was statistically insignificant. (t= 0.27, p-value= 0.79, Cohen's d= 0.053)

Majority of subjects were unemployed married individuals who did not have occupational skills of more than skilled labor level. Compliance of patients throughout course of study was high, in total there were three dropouts among study subjects and two dropouts among control subjects. Reason for dropping out of study subjects was that two subjects lost interest in SK&P and one study subject got released from prison. Among two dropouts in control subjects, one subject got released from jail and another became interested in doing SK&P prior to completion of study. No statistical difference was found between two groups in terms of socio-demographic variables.

Mean SDS score of study subject group was 10.2 +/-1.7 which was almost similar to score of 10.4+/-0.8 in control subjects. No statistically significant difference between study and control subjects scores was found (p-value= 0.43, t-value= 0.80, SE of difference= 0.25, Cohen's d= -0.15).

Table 1. Socio-demographic profile of study and control subjects

	N	Minimum	Maximum	Mean +/- SD		
Age of study subjects in yrs.	55	21	64	39.3+/- 10.5		
Age of control subjects in yrs.	56	23	65	38.8+/- 8.3		
		Number of Study subjects (n= 55)	Percentage	Number of Control subjects (n=56)	Percentage	X^2 Value	Df	p-value

		Number of Study subjects (n= 55)	Percentage	Number of Control subjects (n=56)	Percentage	X^2 Value	Df	p-value
Education	Illiterate	10	18.2	9	16.1	0.227	3	0.97
	Under-metric	16	29.1	17	30.4			
	Higher Secondary	18	32.7	20	35.7			
	Graduate and above	11	20	10	17.9			
Occupation	No occupation	14	25.5	15	26.8	0.831	6	0.99
	Unskilled	15	27.3	14	25			
	Semi-skilled worker	14	25.5	13	23.2			
	Skilled	1	1.8	1	1.8			
	Professional	5	9.1	7	12.5			
	Business	6	10.9	4	7.1			
	Student	2	3.6	2	3.6			
Employment	Unemployed	35	56.5	34	54.8	0.033	1	0.86
	Employed	27	43.5	28	45.2			
Marital status	Married	35	56.5	35	56.5	1.964	2	0.38
	Unmarried	24	38.7	20	32.3			
	Separated/Widowed	3	4.8	7	11.3			
Score of Subjects on Severity of Dependence Scale (SDS)								
	N	Minimum		Maximum		Mean +/- SD		
Study subjects	55	8.2		12.2		10.2 +/- 1.7		
Control subjects	56	8.4		12.4		10.4+/- 0.8		

p-value < 0.05 considered statistically significant.

According to Table 2, after completion of 6 weeks of SK, average GAF score of study subjects increased from 48.43 to 66.77. While during 6 weeks period average GAF score in control group decreased from 49.12 to 47.55. In Anxiety, Depressed mood, PWB, Self control, General health, Vitality and Total PGWB scores, improvement in score of study subjects occurred after SK&P both when compared with Pre-SK&P scores and scores of controls.

Table 2. Global assessment of functioning score & Psychological General Well Being Schedule (PGWB) score

Score Range		Frequency of study subjects at initiation of Sudarshan Kriya (n=58)	Frequency of study subjects after completion of 6 weeks of Sudarshan Kriya (n=55)	Frequency of control subjects at initiation of Sudarshan Kriya (n=58)	Frequency of control subjects after 6 weeks (n=56)
0-20		0	0	0	0
21-30		11	4	8	9
31-40		10	2	14	12
41-50		11	5	12	12
51-60		12	8	9	9
61-70		7	12	8	6
71-80		5	8	3	3
81-90		2	9	3	4
91-100		0	7	1	1
Mean+/- SD		48.43+/-0.08	66.77+/-0.14	49.12+/-0.37	47.55+/-0.17
Dimensions	Score Range	Frequency of study subjects at initiation of Sudarshan Kriya	Frequency of study subjects after completion of	Frequency of control subjects at initiation of	Frequency of control subjects after 6 weeks (n=56)

		(n=58)	6 weeks of Sudarshan Kriya (n=55)	Sudarshan Kriya (n=58)	
Anxiety (ANX)	0-5	20	7	19	17
	6-10	14	6	14	13
	11-15	11	9	10	9
	16-20	9	16	10	11
	21-25	4	17	5	6
	Mean +/- SD	9.64 +/- 0.52	15.66 +/- 0.38	10.08+/- 0.83	10.09+/-0.48
Depressed Mood (DEP)	0-5	24	10	21	20
	6-10	17	21	21	20
	11-15	17	24	16	16
	Mean +/- SD	7.19 +/- 0.2	9.18 +/- 0.37	7.39+/- 0.42	7.46+/-0.17
Positive well being (PWB)	0-5	15	9	18	15
	6-10	14	6	12	12
	11-15	15	16	17	19
	16-20	14	24	11	10
	Mean +/- SD	10.28 +/- 0.61	12.92 +/- 0.73	9.66+/- 0.49	10+/-0.57
Self control (SC)	0-5	20	14	18	18
	6-10	19	13	20	21
	11-15	19	29	20	17
	Mean +/- SD	7.74+/- 0.44	9.38+/-0.3	8.02+/-0.95	7.75+/-0.33
General Health (GH)	0-5	20	8	19	20
	6-10	19	19	20	19
	11-15	19	28	19	17
	Mean +/- SD	7.74+/- 0.18	9.75+/-0.22	7.84+/-0.09	7.55+/-0.29
Vitality (VT)	0-5	15	9	14	10
	6-10	14	8	13	10
	11-15	15	19	16	18
	16-20	14	19	15	18
	Mean +/- SD	10.36+/- 0.62	12.39+/-0.83	10.64+/-0.29	11.84+/-0.25
Total	0-10	9	4	9	6
	11-20	6	2	8	10
	21-30	7	3	8	6
	31-40	8	7	6	5
	41-50	7	5	6	7
	51-60	5	5	6	5
	61-70	7	6	5	5
	71-80	4	7	3	6
	81-90	3	7	3	2
	91-100	2	9	4	4
	Mean +/- SD	41.46+/- 0.35	59.28+/- 0.63	41.11+/-0.87	43.66+/-0.52

According to Table 3, difference between pre and post intervention scores of GAF, Anxiety (ANX), Depressed Mood (DEP), Positive Well Being (PWB), General Health (GH) and Total PGWB in study subjects was statistically significant. However, difference between pre and post intervention scores of Self Control (SC) and Vitality in study subjects was not statistically significant.

Difference between post SK&P scores of GAF, Anxiety (ANX), Positive Well Being (PWB), General Health (GH) and Total PGWB in study subjects as compared with control subjects was statistically significant. However, difference between post SK&P scores of Depressed Mood (DEP), Self Control (SC) and Vitality in study subjects as compared with control subjects was not statistically significant.

Difference between pre and post intervention scores of control subjects in any parameter was not statistically significant.

Table 3. Chi-square test results for GAF and PGWB scores in study and control subjects

Dimensions	Results of Statistics application on pre and post intervention values in study subjects		Results of Statistics application on pre and post intervention values in control subjects		Results of Statistics application on post intervention values in study and control subjects	
	χ^2 value; degree of freedom; p-value	*Cohen 'd' value*	χ^2 value; degree of freedom; p-value	*Cohen 'd' value*	χ^2 value; degree of freedom; p-value	*Cohen 'd' value*
GAF	23.937;4; 0.00002575*	-160.85	1.152; 4; 0.886	5.45	20.143; 3; 0.000158*	123.42
Anxiety (ANX)	19.601; 4; 0.0008*	- 13.22	0.304; 4; 0.99	-1.21	12.924;4; 0.011*	11
Depressed Mood (DEP)	7.306;2; 0.03*	-6.69	0.014; 2; 0.993	-0.22	4.949;2; 0.08	5.97
Positive Well Being (PWB)	8.53; 3; 0.04*	-3.92	0.396; 3; 0.94	-0.64	9.514;3; 0.02*	4.46
Self Control (SC)	4.233; 2; 0.12	-4.36	0.233; 2; 0.89	0.38	5.513;2; 0.06	5.17
General Health (GH)	6.791; 2; 0.03*	-10	0.127;2; 0.94	1.35	7.823; 2; 0.02*	8.55
Vitality	4.288;3; 0.23	-2.77	1.414; 3; 0.70	-4.43	0.32; 3; 0.96	0.9
Total PGWB	10.896;4; 0.03*	-35	0.906; 4; 0.92	-3.56	9.479; 4; 0.05*	27.04

* p-value less than 0.05 considered statistically significant -For analysis of GAF and Total PGWB in view of frequency in many range group being less than 5 larger range group of 20 was taken for analysis.

Discussion

Period for doing SK&P was set at 6 weeks because according to an earlier study, percentage of patient experiencing remission in depression was similar at one month and three months after initiation of SK&P. [6] Also neither severity of depression nor severity of biological dysfunction influenced the quick response time or degree of effectiveness of SK&P. Antidepressant effect of SK&P are exerted in about 3 weeks. [4]

The rationale of excluding psychiatric disorder except substance dependence cases from current study was that patients with psychiatric disorder, severe borderline pathology or difficulty maintaining a sense of reality should not undertake SK&P programme and training. [19-20] as incorrect technique or the overuse of SKY breath practices beyond the prescribed time limits can cause dizziness, lightheadedness, irritability, euphoric states, or psychosis invulnerable patients, particularly those with bipolar disorder, dissociative disorders, or schizophrenic spectrum illnesses. [21] While cases with severe medical co-morbidity were excluded because patients with high blood pressure, cerebral vascular disease, or migraine may not tolerate breath holding, *Bhastrika*, or head-down postures. Also

practising unmodified pranayama can lead to occurrence of risk of seizure in patients with epilepsy [22]. Improvement in anxiety scores of study subjects both when compared with pre-study scores and when compared with post study control scores was consistent with findings of earlier studies that yoga programs that include yoga postures and meditation have shown benefits in medical patients with anxiety disorders [23], and medical students with examination anxiety [24].

In the current study, in terms of Depressed mood (DEP) though there was increase in study subject score but when compared with control subjects, increase was found to be statistically insignificant. The findings are different from earlier study finding of among normal population SK&P leading to reduction in dysthymia in 68% and melancholic depression in 73% individuals.[2] Authors did not come across any study on substance using prison population to compare current study findings with. Earlier study finding of SK&P leading to reduction in both anxiety and depression levels differed from current finding of improvement in score only being significant in anxiety level [9]. But above mentioned study was only done in alcohol dependent patients and SK&P was only done for 15 days. Also subjects were included in study only after

seven days of detoxification while studies have demonstrated that transient mental disorder symptoms like anxiety and depression can be present during the withdrawal period, which resolves within four weeks. Thus antidepressant medication should not be considered prior to 4 weeks of abstinence [25-27]. In tobacco use cases 21% individuals benefited from 6 months of SK&P [10].

In current study no statistically significant improvement in self control was observed while in an earlier 4 month pilot study on juvenile offenders found that those given SK&P training for 1 week (20–25 hours) in the Prison Smart Program followed by 30 minutes of guided meditation and pranayama 3 nights per week showed significant overall reduction in anxiety, anger, reactive behaviour, and fighting [28].

Finding reason of improvement in GAF and total PGWB scores of study subjects was beyond the scope of this study. Brown et al (2005) had earlier stated that SK&P may work by activating vagal afferents to the nucleus tractus solitaries, the parabrachial nucleus, thalamic nuclei, the cerebral cortex and mesolimbic areas. Activation of the limbic system, hippocampus, hypothalamus, amygdale and stria terminalis may improve autonomic functions, neuroendocrine release, emotional processing and social bonding [11]. Some or all of these factors might be responsible for improvement in GAF and PGWB scores. In the study, any reason for decrease in control subjects of average PGWB score in Total, Self Control and General Health sub-domains could not be ascertained. One advantage which SK&P has over other biological treatments is being free of expense and dependency that other treatments can create. High SDS scores in current study is similar to earlier study finding of prison population having high prevalence of two or more substances in various combinations [29]. While low PGWB scores found in current study is consistent with earlier study finding of high level of syndromal and subsyndromal psychiatric morbidity being associated with psychoactive substance dependence [30]. Limitations of the study include generalizability. This was a hospital based study conducted on male prisoners and the

results cannot be applied to the general population, women, and children.

Conclusion

In this prison hospital sample of 111 patients, the following conclusions were drawn. Practicing SK&P helps in improving Global Assessment of Functioning (GAF), Psychological General Well Being (PGWB), General Health (GH), and Positive Well Being (PWB) of an individual. SK&P also causes significant reduction in anxiety levels of an individual.

Acknowledgement

References

1. Janakiramaiah N, Gangadhar BN, Naga Venkatesha Murthy PJ. Antidepressant efficacy of Sudarshan Kriya Yoga (SKY) in melancholia: a randomized comparison with electroconvulsive therapy (ECT) and imipramine.J Affect Disord 2000 Jan-Mar, 57(1-3): 255-9.

2. Bhatia M, Kumar A, Kumar N, et al. Electrophysiologic evaluation of Sudarshan Kriya: an EEG, BAER, P300 study. Indian J Physiol Pharmacol . 2003; 47(2) :157-136.

3. Sharma H, Sen S, Singh A, et al. Sudarshan kriya practitioners exhibit better antioxidant status and lower blood lactate levels. Biol Psychol . 2003; 63: 281-291.

4. Naga Venkatesha Mur thy PJ, Janaki ramaiah N, Gangadhar BN et al. P300

amplitude and antidepressant response to Sudarshan Kriya Yoga (SKY). J Affect Disord, 1998; 50(1) :45-48.

5. Naga Venkatesha Mur thy PJ, Gangadhar, B.N., Janakiramaiah. Normalization of P300 Amplitude followingTreatment in Dysthymia. Biological Psychiatry, 1997; *42*: 740-743.

6. N. Janakiramaiah, BN Gangadhar et al. NIMHANS Journal, January 1998 pp 21-28.

7. Boyd D. Swami: encounters with modern mystics. Honesdale PA: Himalayan publishers 1995.

8. Katzman MA, Vermani M, gerbarg PL. A multicomponent yoga based, breath intervention program as an adjunctive treatment in patients suffering from generalized anxiety disorder with or without comorbidities. Int J Yoga. 2012 Jan; 5(1): 57-65.

9. Vedamur thachar A, Janaki ramaiah N, Hegde JM. Antidepressant efficacy and hormonal effects of Sudarshan Kriya Yoga (SKY) in alcohol dependent individuals. J Af fect Disord. 2006 Aug; 94(1-3) :249-53.

10. Kochupillai, V., Kumar, P., Singh, D. (2005) Effect of rhythmic breathing (sudarshan kriya and pranayam) on immune functions and tobacco addiction. Ann N Y Acad Sci. 2005; 1056:242-52.

11. Brown RP, Gerbarg PL. Sudarshan Kriya Yoga Breathing in the treatment of stress, anxiety and depression: Part I- Neurophysiological model. J. Complement Altern. Med 2005; 11:189-201.

12. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res, 1975; 12: 189-198.

13. Ganguli M, Ratcliff G, Chandra V. A Hindi version of the MMSE: the development of a cognitive screening instrument for a largely illiterate rural elderly population in India. International Journal of Geriatric Psychiatry 1995; 10:367-377.

14. Hall RC. Global assessment of functioning. A modified scale. Psychosomatics, 1995 May-Jun; 36(3): 267-75.

15. Dupuy HJ. The psychological general well being index.Assessment of quality of life in clinical trials of cardiovascular therapies, Wenger NK, Mattson ME, Furberg CD, Elinson J. eds, New York, NY: Lejacq, 1984, 170-83.

16. World Health Organization. Schedules for clinical assessment in neuropsychiatry (Version 2.1). Division of Mental Health. WHO, Geneva, 1998.

17. Gossop M, Darke S, Griffith P et al. The severity of dependence scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. Addiction. 1995 May; 90(5): 607-14.

18. Levesque R. SPSS programming and data management: A Guide for SPSS and SAS users, Fourth Edition (2007), SPSS Inc. Chicago III.

19. Higashi M. Pranayama as a psychiatric regimen [letter]. Lancet 1964;28:1177–1178.

20. Jordan N. Psychotherapy with expressive technics in psychotic patients. Acta Psiquiatr Psicol Am Lat 1989;35:55–60.

21. Brown RP, Gerbarg PL. Sudarshan Kriya yogic breathing in the treatment of stress, anxiety, and depression: Part

II- Clinical applications and guidelines. J. Alter Comp Medicine. Vol. 11(4), 2005; 711-17.

22. Yardi N. Yoga for control of epilepsy. Seizure 2001;10:7–12.

23. Miller JJ, Fletcher K, Kabat-Zinn J. Three-year follow-up and clinical implications of a mindfulness-based stress reduction intervention in the treatment of anxiety disorders. Gen Hosp Psychiatry 1995;17:192–200.

24. Malathi A, Damodaran A. Stress due to exams in medical students—role of yoga. Indian J Physiol Pharmacol 1999; 43:218–224.

25. Schuckit MA. Alcoholic patients with secondary depression. Am J Psychiatry 1983; 140: 711–714.

26. Brown SA, Schuckit MA. Changes in depression among abstinent alcoholics. J Stud Alcohol 1988; 49: 412-417.

27. Weingold HP, Lachin JM, Bell AH, et al. Depression as a symptom of alcoholism: Search for a phenomenon. J Abnormal Psychol 1968; 3: 195-197.

28. Suarez V. Anxiety study at Lance Alternative Program. "Science of Breath" International Symposium on Sudarshan Kriya, Pranayam & Consciousness. AIIMS, New Delhi, India: Institute Rotary Cancer Hospital All India Institute of Medical Sciences, March 2–3, 2002.

29. Sureka P, Govil S, Girdhar NK. A study of the relationship of epilepsy with psychoactive substance dependence in a prison population. ASEAN J. of Psy July-Dec 2014; Vol. 15(2): 153-163.

30. Sureka P, Desai NG, Gupta DK. A study of subsyndromal and syndromal psychiatric morbidity among male patients with alcohol dependence. ASEAN J. of Psy. July-Dec 2013; Vol. 14(2): 146-156.

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