

# **Effect of Yogic practices on Anxiety and Depression level in incomplete Spinal cord injured patients: A randomized Controlled Trial**

**Anvita singh<sup>1</sup> Prof. V.P. Sharma<sup>2</sup>, Prof. J.K. Trivedi<sup>3</sup>, Prof. Rakesh Shukla<sup>4</sup>, Prof. Sunita Tiwari<sup>5</sup>, & Dr. Kamakhya Kumar<sup>6</sup>**

1. PhD Student, Deptt. of Physical Medicine and Rehabilitation, CSMMU (KGMU), Lucknow,
- 2 Prof and Head, Deptt. of Physical Medicine and Rehabilitation, CSMMU(KGMU), Lucknow.
- 3 Prof., Deptt. of Psychiatry, CSMMU(KGMU), Lucknow.
- 4 Prof., Deptt. of Neurology, CSMMU(KGMU), ), Lucknow.
- 5 Prof. and Head, Deptt. of Physiology, CSMMU(KGMU), Lucknow.
- 6 School of Yoga and Health, Dev Sanskriti Viswavidyalaya, Haridwar,  
E- mail: anvita18@gmail.com

---

## **Abstract**

**Objective:** To evaluate the effect of Yogic practices on Anxiety and Depression level in incomplete Spinal cord injured patients.

**Methods:** This was a randomised control study. The study was conducted in the Department of Physical Medicine and Rehabilitation, C.S.M.M.U., Lucknow. A total of 60 patients were interviewed using a pre-tested semi-structured schedule between 16 to 60 years of age, diagnosed study cases of traumatic incomplete spinal cord injury (SCI) with neurological (both sensory & motor) impairment below thoracic (T12 level) with bladder & bowel involvement were included in the study. The duration of injury was more than 2 months, were divided randomly using random number table into 2 groups study group (received Yoga) (n=30) and control group (not received Yoga) (n=30) for 6 months. Patients were asked to come on 3<sup>rd</sup> and 6<sup>th</sup> month. Anthropometric measurements were also recorded. The paired t-test was used to compare the changes amongst follow-ups and unpaired t-test was used to compare between groups. The p-value<0.05 was considered as significant.

**Results:** At the baseline both the groups were similar in anthropometric and clinical parameters. The HAM-D score was insignificantly higher ( $p>0.05$ ) in study group subjects ( $26.40\pm5.77$ ) as compared to controls at the baseline ( $24.87\pm3.73$ ). The HAM-D score decreased to  $15.30 (\pm3.96)$  in study group after 6 months of Yoga and this became to  $23.33 (\pm4.90)$  in controls. There was 72.5% decrease in HAM-D score from baseline to 6 months in study group which was only 6.6% in controls. The HAM-D score was insignificantly lower ( $p>0.05$ ) in subjects of study group ( $19.50\pm3.74$ ) as compared to controls at the baseline ( $20.53\pm3.76$ ). The HAM-A score decreased to  $12.27 (\pm3.55)$  in study group after 6 months of Yoga and this became to  $19.33 (\pm3.97)$  in controls. There was 58.9% decrease in HAM-A

score from baseline to 6 months in study group which was only 6.2% in controls.

**Conclusion:** The finding of the study reveals that there is significant impact of Yoga in the management of stress among spinal cord injured patients.

**Key words:** Yoga, HAM-D, HAM-A, Spinal Cord Injury

### **Introduction**

Yoga is believed to have beneficial effects on cognition, attenuation of emotional intensity and stress reduction. Previous studies were mainly performed on eastern experienced practitioners or unhealthy subjects undergoing concomitant conventional therapies. Yoga practitioners showed improvement of the memory performance, as well as improvements in psycho-physiological parameters. The regular yoga practice can improve aspects of cognition and quality of life for healthy individuals. An indirect influence of emotional state on cognitive improvement promoted by yoga practice can be proposed (Rocha et al, 2012).

Spinal Cord Injury (SCI) is sudden and unexpected, and it can be devastating and costly in human and social terms. Medical advances, especially in initial resuscitation and long term care, have improved survival rates and increased longevity. The incidence as well as the prevalence of spinal injuries has been on the rise with the incidence rate being estimated to be from 15 to 40 study cases per million world wide (Jackson et al, 2004). The developments in the management of spinal cord injury (SCI) have led to decrease in morbidity and mortality rates, thereby increasing the prevalence of patients with varying degrees of functional limitations. There is extensive ongoing research on epidemiological aspects of SCI from different parts of the world. The differences reported, relate to mechanism of injury (MOI), age group, gender distribution, race and ethnicity (Meade et al, 2004), morbidity and mortality rates. The trend in demographics (Nobunaga et al, 1999) as well as recovery (Marino et al, 1999; Kirshblum et al, 2004) in spinal injury patients has been reported to be changing in recent times (Jackson et al, 2004).

Keeping this in mind, the present randomized controlled trial study was planned to evaluate the effect of Yogic practices on Anxiety and Depression level in incomplete Spinal cord injured patients among north Indian subjects.

### **Methods**

Study design: Randomized controlled trial. Study site: Department of Physical Medicine and Rehabilitation, C.S.M.M.U., Lucknow

Study subjects: Both male and female patients, between 16 to 60 years of age, diagnosed study cases of traumatic incomplete spinal cord injury (SCI) with neurological (both sensory & motor) impairment below thoracic (T12 level) with and without bladder & bowel involvement were included in the study. The duration of injury was more than 2 months. All the patients in the study group continued to receive medical/physical treatment as advised by the treating surgeon. Study group (n=30) received additionally given specific yogic practices for a period of six months and control group (n=30) received a simulation technique. The data was collected at baseline, 3 month and 6 month.

Intervention method: The subjects of study group were given daily Yoga session on 5 days in a week. Each session lasted for 60 minutes. The components of each session were in the following way –

- Gayatri Mantra or similar prayer – 2min
- Asanas- 30 min
- Pranayamas- 15 min
- Concentration with A-kar, U-kar and M-kar chanting- 10min
- Shantipath & closing prayer – 3 min

Simulation Technique for Control Group: This is the relaxation technique designed for the control group. According to this technique, first sit in any relaxation posture. Inhale deeply and exhale after a short while. Try to concentrate on past experiences full of sorrows. Concentrate on the same thought for some time. Release the mind from the above thought. Now try to concentrate on past experiences full of happiness. Concentrate on the same thought for some time. Now relax mind and release himself. This procedure takes 10 to 15 minutes daily.

Assessment of Psychological parameters

- <sup>19</sup> Hamilton Depression Scale (HAM-D): The Hamilton Depression Rating Scale (HAM-D) is a 21-question multiple choice questionnaire. The questionnaire rates the severity of symptoms observed in depression such as low mood, insomnia agitation, anxiety and weight-loss.<sup>25</sup>

(b) Hamilton Anxiety Scale (HAS): This scale was developed by Hamilton. The scale consists of 13 symptom groupings (anxious mood, tension, fears, etc) together with a fourteenth variable, “behavior or interview”.

Statistical analysis: The results were presented in mean±sd and percentages. The repeated measures of analysis was used to compare changes from baseline to follow-ups and paired t-test was used to compare changes from baseline to 3 month, baseline to 6 month and 3 month to 6 month. The unpaired t-test was used to compare between groups. The p-value<0.05 was

considered as significant. All the analysis was done by using SPSS 15.0 version.

Ethical consideration: The study was approved by the Ethical Committee of CSM Medical University. The consent from each subjects were taken before the enrolment in the study.

**Results:**

The baseline characteristics of the study cases and controls were similar (Table-1).

**Table-1: Baseline characteristics of the study cases and study controls**

Age in years	Study cases (n=30)		Control (n=30)	
	No.	%	No.	%
Age in years				
< 20	4	13.3	4	13.3
20-25	9	30.0	8	26.7
26-30	4	13.3	9	30.0
31-35	8	26.7	5	16.7
> 35	5	16.7	4	13.3
Sex				
Male	2	6.7	2	6.7
Female	28	93.3	28	93.3
Duration of injury				
< 1	12	40.0	7	23.3
1-2	10	33.3	18	60.0
> 2	8	26.7	5	16.7

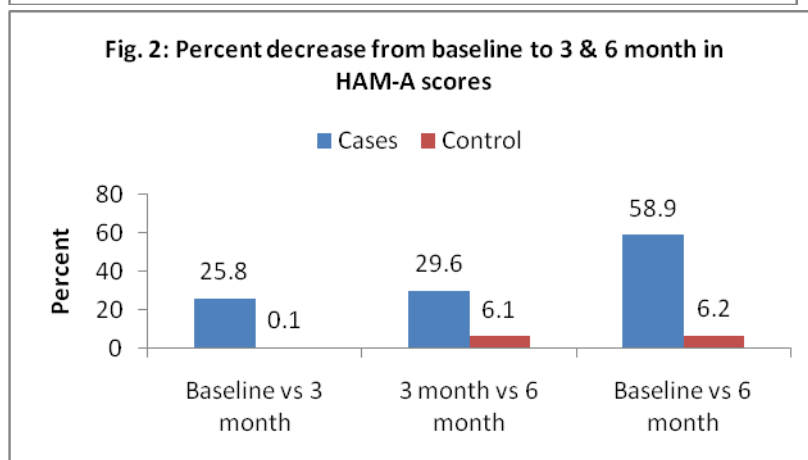
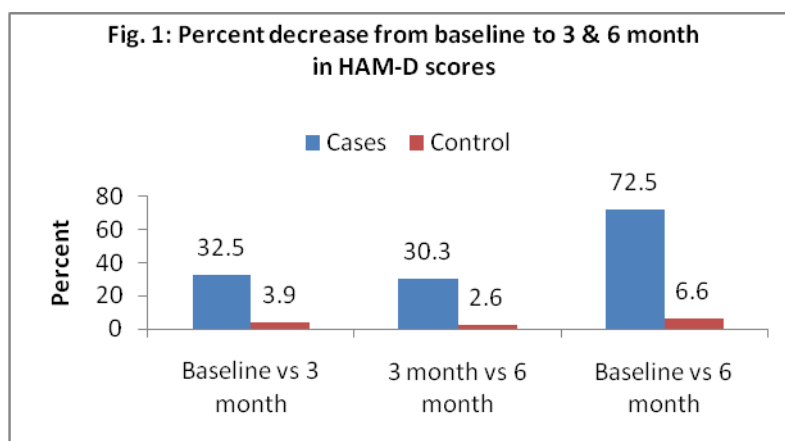
**Table-2: Changes in HAM-D and HAM-A scores**

Follow-up	Study cases (n=30)	Control (n=30)
	Mean ±sd	Mean ±sd
HAM-D*		
Baseline	26.40±5.77	24.87±3.73
3 months	19.93±3.92	23.93±4.46

6 months	15.30±3.96	23.33±4.90
HAM-A**		
Baseline	19.50±3.74	20.53±3.76
3 months	15.90±3.19	20.50±4.00
6 months	12.27±3.55	19.33±3.97

\*Between groups-  $p=0.001$ , follow- ups-  $p<0.0001$ , between groups with follow-ups-  $p<0.0001$ , Baseline vs 3 months-  $p<0.0001$ , 3 months vs 6 months- $p<0.0001$ , Baseline vs 6 months- $p<0.0001$

\*\*Between groups-  $p<0.0001$ , follow- ups-  $p<0.0001$ , between groups with follow-ups-  $p<0.0001$ , Baseline vs 3 months- $p<0.0001$ , 3 months vs 6 months- $p<0.0001$ , Baseline vs 6 months- $p<0.0001$



The HAM-D score was insignificantl

y higher ( $p>0.05$ ) in study group ( $26.40\pm5.77$ ) as compared to controls at the baseline ( $24.87\pm3.73$ ). The HAM-D score became  $19.93 (\pm3.92)$  in subjects of study group after 3 months of Yoga and this became to  $23.93 (\pm4.46)$  in controls. This again decreased to  $15.30 (\pm3.96)$  in subjects of study group after 6 months of Yoga and this became to  $23.33 (\pm4.90)$  in controls. The

change in HAM-D score was significantly ( $p=0.001$ ) higher in study cases as compared to controls from baseline to 3 and 6 months. There was significant impact of time (follow-ups) in the decrease in HAM-D score ( $p<0.0001$ ). The decrease in HAM-D score was significantly higher in subjects of study group as compared to controls from baseline to 3 months ( $p<0.0001$ ), 3 months to 6 months ( $p<0.0001$ ) and baseline to 6 months ( $p<0.0001$ ) (Table-2).

The percent change analysis showed that there was 32.5% decrease in HAM-D score in the study group from baseline to 3 months of treatments which was only 3.9% in controls. Similarly, there was 30.3% decrease in HAM-D score from 3 months to 6 months in study group which was only 2.6% in controls. However, there was 72.5% decrease in HAM-D score from baseline to 6 months in subjects of study group which was only 6.6% in controls (Fig.1).  
Changes in HAM-A score

The HAM-D score was insignificantly lower ( $p>0.05$ ) in study group ( $19.50\pm 3.74$ ) as compared to controls at the baseline ( $20.53\pm 3.76$ ). The HAM-A score became  $15.90 (\pm 3.19)$  in study group after 3 months of Yoga and this became to  $20.50 (\pm 4.00)$  in controls. This again decreased to  $12.27 (\pm 3.55)$  in study group after 6 months of Yoga and this became to  $19.33 (\pm 3.97)$  in controls. The change in HAM-A score was significantly ( $p<0.0001$ ) higher in study group as compared to controls from baseline to 3 and 6 months. There was significant impact of time (follow-ups) in the decrease in HAM-A score ( $p<0.0001$ ). The decrease in HAM-A score was significantly higher in study group as compared to controls from baseline to 3 months ( $p<0.0001$ ), 3 months to 6 months ( $p<0.0001$ ) and baseline to 6 months ( $p<0.0001$ ) (Table-2).

The percent change analysis showed that there was 25.8% decrease in HAM-A score in the study group from baseline to 3 months of treatments which was only 0.1% in controls. Similarly, there was 29.6% decrease in HAM-A score from 3 months to 6 months in study group which was only 6.1% in controls. However, there was 58.9% decrease in HAM-A score from baseline to 6 months in study group which was only 6.2% in controls (Fig.2).

## **Discussion**

Yoga is a promising intervention for depression in incomplete (partial) spinal cord injury patients ; it is cost-effective and easy to implement. It produces many beneficial emotional, psychological and physio-biological effects. Yoga hold a holistic view of body-mind relationship always believe that behind most physical disability lie unhealthy thoughts and emotion. Hence by graded exercises and by adopting a healthy way of life,one can reverse many of disease processes.

The rhythmic stretching of muscles of the body during practising asanas lead to its increase in the strength of muscle spindles. The yogic exercises, particularly help in integration of interoceptive- tonic manner (usually described as postural reactions) and exteroceptive- phasic manner (usually described as conscious and unconscious muscular reflexes) at the level of effector organs as well as at the cerebral cortex and spinal cord. The yogic exercises particularly condition the postural substrate of muscle tone maintenance by stimulating the interoceptors. Secondly, there is an element of economy of energy expenditure because the better the tonic condition, the lesser the energy expenditure to achieve a range of movement. Hence one important function of yogic exercises is not only to improve muscle tone and postural reflexes but to render the lower centres a greater degree of freedom from inhibitory control of cerebral cortex. It also increases the suppleness and plasticity of the muscles. Yogic practices relieved muscular contraction due to change in secretion of neurotransmitters by the nerve endings. Yogasanas and pranayamas with their rhythmic , mechanical stimulation of connective tissues and muscle fibres cause an improvement in their muscle tone and contractile power which in turn improve their functional capacity. Relaxation exercises aim at reducing stress and anxiety levels and thereby help in preventing unwanted outcomes like depression. The combination of yogasanas, pranayamas and A-U-M chanting, effects on the physiological, psychological and emotional level of subjects. Yogic exercises have shown improvement in on cognitive functions like memory, vigilance and anxiety levels.( Anderberg et al, 2007)

In the present study, the HMD-A score was significantly decreased after the intervention. The percent change analysis showed that there was 32.5% decrease in HAM-D score in the study cases from baseline to 3 months of treatments which was only 3.9% in study controls. Nayak et al (2006) reported that about 50% of the study sample reported substantial pain relief for a least a subgroup of individuals with SCI. Ray et al (2001) also found that there was improvement in various psychological (anxiety and depression) and physiological (Heart rate, Blood Pressure, Skin temp etc.) parameters. In the present study, the HAM-D score was insignificantly lower ( $p>0.05$ ) in subjects of study group ( $19.50\pm 3.74$ ) as compared to subjects of control group at the baseline ( $20.53\pm 3.76$ ). The HAM-A score became  $15.90 (\pm 3.19)$  in subjects of study group after 3 months of Yoga and this became to  $20.50 (\pm 4.00)$  in subjects of control group. This again decreased to  $12.27 (\pm 3.55)$  in subjects of study group after 6 months of Yoga and this became to  $19.33 (\pm 3.97)$  in subjects of control group.

Studies have shown clearly that practice of yoga for approximately 2 months definitely reduces the stress and improves the psychological well being in subjects with mental stress (Javnbakht et al, 2009; Michalsen et al, 2005). Different schools of yoga practice like vinyasa yoga, hatha yoga etc has been

shown as effective interventions in treating depression and anxiety states (Uebelacker et al, 2010). These subjects exhibited significant decrease in depression symptoms and increase in mindfulness and behavior activation. Yogic practice might act via different biological, psychological or behavioral mechanisms in modulating changes in depressive subjects. Yoga has been shown to have a better symptomatic relief and reduction in psychopathology when compared to subjects treated with antipsychotic drug therapy alone in schizophrenia patients (Duraismwamy et al, 2006).

### **Conclusion**

Injury to the spinal cord is a devastating and not uncommon problem. Many other problems are associated with spinal cord injuries, such as Depressive state developed due to the loss of locomotion. The yogic exercises also affect the dominance of Cerebral Hemisphere which indicate that at the level of higher nervous functions Yoga helps to recruit newer territories in the brain to improve dormant faculties. Further research needs to be conducted to better understand the effectiveness of yoga for this population. The finding of the study reveals that there is significant impact of Yoga in the management of stress among spinal cord injured patients.

### **References**

1. Rocha KK, Ribeiro AM, Rocha KC, Sousa MB, Albuquerque FS, Ribeiro S, Silva RH. Improvement in physiological and psychological parameters after 6 months of yoga practice. *Conscious Cogn*. 2012 Feb 16
2. Ray U S , Mukhopadhyaya S, Purkayastha SS, Asnani V, Tomar O S, Prasad R, Thakur L, Selvamurthy W(2001), Effect of Yogic Exercises on Physical and Mental health of young fellowship course trainees), Defence Institute of Physiology and Allied Sciences , Delhi
3. Jackson AB, Dijkers M, DeVivo MJ, Poczatek RB. A demographic profile of new traumatic spinal cord injuries: change and stability over 30 years. *Arch Phys Med Rehabil* 2004; 85: 1740–1748.
4. Meade MA, Cifu DX, Seel RT, Mckinley WO. Medical procedures, complications, and outcomes for patients with spinal cord injury: a multicenter investigation comparing African Americans and Whites. *Arch Phys Med Rehabil* 2004; 85: 368–375
5. Nobunaga AI, Go BK, Karmas RB. Recent demographic and injury trends in people served by the model spinal cord injury care systems. *Arch Phys Med Rehabil* 1999; 80: 1372–1382
6. Marino RJ, Ditunno JF, Donovan WH, Maynard Jr F. Neurologic recovery after traumatic spinal cord injury: data from the model spinal cord injury systems. *Arch Phys med Rehabil* 1999; 80: 1391–1396.
7. Kirshblum S, Millis S, Mckinley W, Tulskey D. Late neurologic recovery after traumatic spinal cord injury. *Arch Phys Med Rehabil* 2004; 85: 1811–1817.
8. Nayak S, Shiflett SC, Schoenberger NE, Agostinellis, Kirshblum S, Averill A, Cotter AC, Is acupuncture effective in treating chronic pain



- after spinal cord injury?, (AM J Phys Med. Rehabil, 2006, Dec., 85 (12), 951-5) [www.ncbi.nlm.nih.gov/entrez/query.fcgi](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi)
9. Javnbakht M, Hejazi KR and Ghasemi M. Effects of yoga on depression and anxiety of women.
  10. Complement Ther Clin Pract 15: 102-104, 2009.
  11. Michalsen A, Grossman P, Acil A, Langhorst J, Ludtke R, Esch T, Stefano GB and Dobos GJ. Rapid stress reduction and anxiolysis among distressed women as a consequence of a three-month intensive yoga program. *Med Sci Monit*, 2005; 11: 555-561.
  12. Uebelacker LA, Epstein-Lubow G, Gaudiano BA, Tremont G, Battle CL and Miller IW. Hatha yoga for depression: critical review of the evidence for efficacy, plausible mechanisms of action, and directions for future research. *J Psychiatr Pract*, 2010; 16: 22-33.
  13. Duraiswamy G, Thirthalli J, Nagendra HR and Gangadhar BN. Yoga therapy as an add-on treatment in the management of patients with schizophrenia—a randomized controlled trial. *Acta Psychiatr Scand*, 2007; 116: 226-232.
  14. Benjamin J Sadock, Virginia A Sadock. Kaplan & Sadock's Comprehensive Textbook of Psychiatry eighth edition. Hamilton Rating Scale for Depression (HAM-D); 943-945
  15. Anderberg L, Aldskogius H, Holtz A, Spinal cord injury – scientific challenges for the unknown future. *Upasala J Med Sci* 2007; 112(3): 259-288