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## Effect of selected group of asana when used as an adjunct in management of cervical spondylosis of mild to moderate severity: An observational study

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## ABSTRACT

**Background:** “Cervical spondylosis” (CS) is a collective term used for non-specific neck pain post 30 age group. Management of CS is mainly non-surgical, particularly in mild to moderate severity that includes the oral anti-inflammatory drugs, exercises, manipulation, mobilization, or combination of these.

**Objective:** The objective of the study is to assess the possible benefit of a selected group of asana in a group of patients over a short time frame and assess their functional outcome.

**Materials and methods:** An observational study of cohort of patients having mild to moderate CS, who visited the AYUSH department between May 2016 and November 2016 were included. “Selected group of Asana (SGOA)” was practiced for 30 min supervised and then home-based for a period of 8 weeks with usual standard treatment. Patients followed up fortnightly, and their degree of severity & disability assessed.

**Results:** Thirty patients with 19 males and 11 females having ages mean  $\pm$  SD 45.61  $\pm$  8.3 and 44.18  $\pm$  9.78 having NDI score of mean  $\pm$  SD 17.83  $\pm$  4.749 at baseline (0 weeks) were included. Patients showed an improvement in NDI score to finally 7.40  $\pm$  3.180, p-value = 0.0001. This improvement was also noted at various time intervals (p-value = 0.0001 each time), as seen in the post hoc analysis.

**Conclusion:** Yogic practices “Specific Group of Asana” done for eight weeks on a home-based program could be useful in reducing pain and disability in people suffering from CS of mild to a moderate degree. However, more extensive, comparative, and multi-centric trials are required for establishing this as a treatment modality.

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## 1. Introduction

Chronic neck pain is a common musculoskeletal problem in modern society [1]. Contemporary modern lifestyle like full-day desk job, travelling, young adults (even students) operating computers and other sedentary jobs sans physical exercise, which forms a detrimental cycle. The ultimate consequences of such a life-state emerge in high stress and numerous metabolic or musculoskeletal

diseases [2]. The current prevalence of spinal pain is about 66% in the society, of which neck pain constitutes 44% of patients that is only slightly less than patients complaining of low back pain (LBP) [3]. Despite the high prevalence of neck pain, a specific etiology can be diagnosed in only about 15–20% of patients [4]. “Cervical spondylosis” (CS) is a common term used for nonspecific neck pain due to unspecified degenerative changes that occur in of the muscles, tendons, joints, and bones of the neck [5]. Even though CS is broadly used for patients with chronic neck pain post 30 age group [4,5]. Radiological evidence of degeneration is seen in 50% patients post 40 years, and up to 85% after 60 years [6,7]. Truly, CS is a degeneration of the cervical spine resulting in reduction of disc

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space, peripheral osteophyte formation, and involvement of the posterior intervertebral joints leading to pain in the neck and sometimes radicular pain or exceptionally myelopathy [8].

Management of CS is mostly non-surgical, particularly in mild to moderate severity [5,6,9]. These include oral anti-inflammatory drugs with adjuncts such as exercises, manipulation, or mobilization and all seem to be equally effective [9–12]. However, the number of randomized control trial comparing them are few in the literature and usually of poor quality [12].

Yoga is a traditional Indian spiritual practice having a multi-functional exercise modality but is gradually gaining global popularity. The positive impact of yoga has been well documented in some unremitting musculoskeletal pathologies, including fibromyalgia, arthritis, and LBP [13–16]. But its effect in CS is sparse with only few articles.

We aim to study the possible benefit of using “Selected group of Asana (SGOA) when used an adjunct in a group of patients of patients with CS having mild to moderate severity over a short time frame in terms of their functional outcome at various time intervals.

## 2. Materials and methods

### 2.1. Design and settings

This is an observational study of cohort of patients who visited the AYUSH department in our institute between May and November 2016. A waiver was obtained retrospectively from the institutional ethics and research committee.

### 2.2. Study participants

Patients diagnosed with CS following consultation in the Orthopedic/Physical Medicine and Rehabilitation outpatient department, who voluntarily sought yoga therapy were enrolled and taught specific asana clubbed as “Selected group of Asana (SGOA)”.

Adult patients >18 years suffering from mild to moderate CS, without any neurological signs were enrolled for study. The exclusion criterion were severe CS or those waiting for surgery having radiculopathy/myelopathy. The degree of severity was calculated based on neck disability index (NDI) scoring (mild = 5–15, moderate = 16–25) by either of the researchers (MJ, SD, JS) [17]. The patients included novice as well as those with some experience of yoga. The establishment of AYUSH department in a premier institute was the main attraction for these patients. Patients who had been advised surgery for radiculopathy/myelopathy or those with severe CS (NDI score > 25) were excluded from the study. Patients who failed to adhere to the specific practice of the asana module or those whose data was incomplete or lost to follow up were also omitted from the study. All patients also had a pre-intervention antero-posterior and lateral radiograph of the cervical spine as a routine part of an investigation in the parent department to rule of instability that were contraindication to yoga practices. No radiological indices were used to grade or assess the patients. The patients were also prescribed the standard treatment in form of oral non-steroidal anti-inflammatory drugs or other analgesics in addition to yoga for a period of two weeks. Patients who volunteered for yoga, did not receive any other form of physical therapy which could otherwise mask the effect.

### 2.3. Intervention and follow up

The module of SGOA was practiced for a period of 30 min, supervised at first contact (Table 1). This module was prepared by our

**Table 1**  
Yoga module for cervical spondylosis.

1	Skandha Chakra (Shoulder Socket Rotation)	5 min
2	Greeva Sanchalanasana (Neck Movements)	5 min
3	Makarasana (Crocodile Pose)	5 min
4	Advasana (Reversed Corpse Pose)	5 min
5	Jyestika Asana (Superior Posture)	5 min
6	Marjari Asana (Cat Stretch Pose)	5 min

yoga trainer (RM), referring to the book called “Asana Pranayama Mudra Bandha” written by Swami Satyananda Saraswati [18]. The patients were also given a handout of the same for a home-based program and followed up fortnightly for eight weeks (Fig. 1). Patients were examined at presentation (0) and sequentially every fortnight at 2, 4, 6, and 8 weeks. Every time, printed questionnaires for neck pain and disability (NDI) was filled by one of the supervisors (MJ, SD, JS). The patient’s devotion and conformity to the therapy were self-reported. They were considered as dropouts if they agreed to have failed to practice SGOA for at least four times in a week.

### 2.4. Sample size

Sample size was calculated using the formula of sample size calculator for comparing paired differences. The study would require a minimum sample size of 12 (number of pairs) to achieve a power of 90% and a level of significance of 5% (two sided), for detecting a mean of the differences of 3.333 between pairs, assuming the standard deviation of the differences to be 2.967 [13,19].

### 2.5. Statistical methods

Normality of data was assessed using skewness and kurtosis, normality plots and statistical tests of normality like Shapiro–Wilk and Kolmogorov–Smirnov tests and using skewness and kurtosis values. The demographic parameters of patients were subjected to descriptive statistics. Continuous variables (NDI scores) were interpreted using repeated measure ANOVA, and Post-hoc analysis using Bonferroni test finds the difference at various intervals. The data analysis was done using the software SPSS version 22.0 (Microsoft, IBM) licensed to our institute.

## 3. Results

There were 54 eligible patients who had visited the AYUSH during the aforesaid time period but only 30 met the compliance/

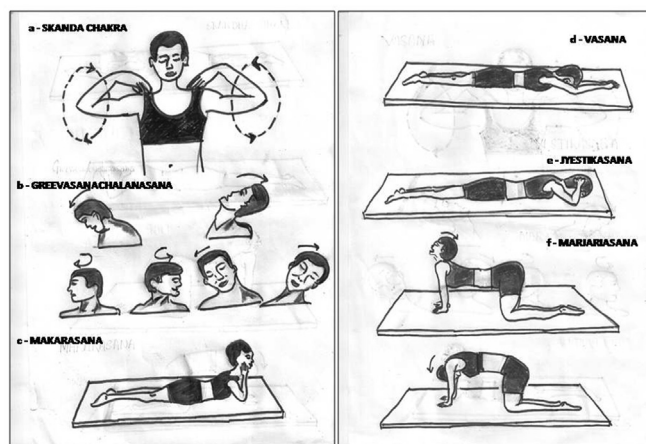


Fig. 1. Diagram depicting the Specific group of asana for cervical spondylosis.

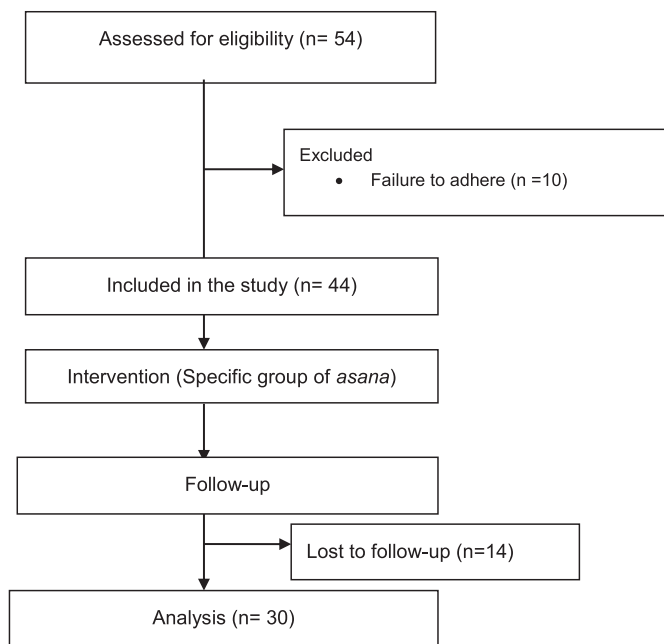


Fig. 2. Flow chart of patients.

adherence/follow up for our study to be analyzed (Fig. 2). Among these, there were 19 males (63%) and 11 females (37%), and their ages in mean (standard deviation) were 45.61 (8.3) and 44.18 (9.78). The mean (standard deviation) NDI score at baseline was 17.83 (4.749), which improved to 7.40 (3.180), p-value = 0.0001 at the final follow up at 8 weeks. The results of repeated measures ANOVA is Wilk’s lambda = 0.096, F (4, 26) = 61.22, p < 0.01, η<sup>2</sup> = 0.90. The decrease in NDI is statistically significant, suggesting that yoga has reduced the disability. The data is represented in Table 2. This improvement was also noted at various time intervals (p-value = <0.001 each time), as seen in the post hoc analysis (Table 3). There were no adverse reactions noted to due this asanas.

4. Discussion

The World Health Organization reckons degeneration of the spine as a new epidemic of present times. Nearly two-thirds of the population have neck pain in some part of their lifetime. Among all the spinal segments, the management of the cervical region is the trickiest. The cervical spine being a highly mobile segment is particularly sensitive to injuries. The treatment strategies thus should contemplate both reliefs of pain and disability and restoration of mobility and function [6].

CS is commonly used for nonspecific mechanical neck pain after the age of 30 years [5]. There are certain specific symptoms like neck pain and stiffness that is exasperated by the movement, referred pain or retro-orbital pain, even paresthesia, or weakness in

upper limbs. But objective signs are poorly locating tenderness and restricted range of motion (ROM) [5]. Neurological symptoms/signs are usually absent in the mild or moderate cases. Radiological findings appear overlapping and difficult to define between CS and the aging spine. The first-line treatment is usually non-surgical management with the surgical intervention being reserved for advance myelopathy, patients with unrelenting or escalating symptoms, and patients who have failed conservative management [20,21].

Yoga had been found to positively affect the body in multiple ways. In contrast to the physical exercises, yoga enhances body awareness, improving coping, and pain tolerance [22]. The medical yoga gives a holistic treatment to patients. Vijayaraghava A et al. and Nagarathna R et al. have reported that yoga reduces the inflammatory markers [23,24]. These have been instrumental in translating benefits in persons who have arthritis, LBP, and neck pain [13,14]. The American Pain Society also brace yoga as an evidence-based treatment for LBP with at least moderate benefit [15].

Studies on the effect of yoga in CS are sporadic and sparse. The SGOA is a set of combination of stretching and isometric muscle training postures, implemented for the treatment of CS. Stretching causes the fullest elongation of muscle fiber and refines the muscle’s elasticity as well as reassert a rich tone, whereas isometric posturing can relieve muscle spasm and pain. There is overall increased muscle flexibility, control, improved ROM, and more significantly shifting to healthy habitual patterns of posture in daily life [13,16].

Cramer et al. compared the yoga group (n = 25) with a non-yoga group (n = 26) in a study and found significant improvement in the 9-week yoga intervention group in term of improved neck pain and neck-related disability [14]. The results were sustained even 12 months after the completion of yoga. Their specific yoga asana belonged to Iyenger Yoga (“Hatha Yoga”), having three basic standing and three basic sitting postures. We had a time duration almost similar to them of 8 weeks though we had a home based programme which was responsible for a significant loss of follow up and failure of compliance in the 24 patients. Sherman et al. and Williams et al. also have noted long-term benefits up to 6 months after the end of the yoga intervention for low back pain [25,26]. Manik et al. also found that disability reduction in backpain due to lumbar spondylosis was maximum in their long-term intervention group (8 weeks) followed by short term (2 weeks) as compared to the instant relieve practice group [13].

Satyanand et al. conducted a randomized control trial on the effect of yogasana on CS [27]. The patients received anti-inflammatory and analgesics for a full period of three months in addition to the intervention. The authors concluded that yoga techniques are more efficient when used with conventional medications. The authors also state that since stress and depression are important predictors that affect the muscle tone, particularly in the neck region, yoga acts multidimensional to benefit physically as well as ameliorating psychosomatic disorders.

Table 2 Repeated measures ANOVA showing the neck disability index at different times.

Mean ± SD	95% Confidence Interval		Repeated measures ANOVA F test	P value	
	Lower Bound	Upper Bound			
0 weeks	17.83 ± 4.75	16.06	19.61	165.89	0.0001
2 weeks	15.20 ± 3.72	13.80	16.59		
4 weeks	12.83 ± 3.36	11.58	14.09		
6 weeks	9.53 ± 3.57	8.20	10.87		
8 weeks	7.40 ± 3.18	6.21	8.59		

**Table 3**  
Post-hoc test to compare the mean scores at various intervals of time.

Scores	Mean Difference (I-J)	Std. Error	P value	95% Confidence Interval for Difference		
				Lower Bound	Upper Bound	
0 weeks	2 weeks	2.633	0.305	<0.001	2.01	3.26
	4 weeks	5.000	0.450	<0.001	4.08	5.92
	6 weeks	8.300	0.635	<0.001	7.00	9.60
	8 weeks	10.433	0.671	<0.001	9.06	11.81
2 weeks	4 weeks	2.367	0.260	<0.001	1.83	2.90
	6 weeks	5.667	0.471	<0.001	4.70	6.63
	8 weeks	7.800	0.535	<0.001	6.706	8.894
4 weeks	6 weeks	3.300	0.378	<0.001	2.527	4.073
	8 weeks	5.433	0.462	<0.001	4.489	6.377
6 weeks	8 weeks	2.133	0.224	<0.001	1.676	2.590

Another study by Vempati et al. concluded that yoga reduces the sympathetic activity that was measured by autonomic parameters, oxygen consumption, and breathe volume [28]. In another study, Sugumar et al. also studied the effect of a form of yoga (simplified Kundalini yoga) in patients with CS [29]. They had a 60 min schedule that consisted of 20 min of yoga, 20 min of meditation and 10 min of relaxation for the experimental group. The researchers found that yoga practice was much more effective than other treatments in curing neck pain and stiffness of the neck at the end of three months. We also find a reduction in NDI scores in our group of patients at eight weeks of practice, and the effects are also noted at various time intervals.

This study is an observational study of patients who visit the AYUSH yoga center on their own and practice a set of yoga asana using the experience and training of our yoga instructor (RM).

There are certain limitations to our study. This series of patients (mild and moderate category) is more inclined to this specific treatment form (yoga) as they have a firm belief in yoga therapy. There is a lack of a control arm for comparison with other modality of management, such as physiotherapy or laser treatment. Moreover, for initial 2 weeks, all received oral medication. The patients had been enrolled at a different period, and we could do minimum to avoid this selection bias. The group's adherence to yoga-compliance was self-reported. At every follow-up, an improvement of the NDI score was self-motivational to patients. Long term benefits, patient's perspectives and overall life quality (like SF36 score) were not assessed in our study. In spite of all this, our study results show a positive impact of SGOA on CS. This opens up a new horizon for the researchers to analyze a larger population with comparative arms, even randomization and in multicenter studies for documenting the actual outcome of yoga as an adjunct therapy for people suffering from CS of mild to a moderate degree.

## 5. Conclusion

Based on our findings, we conclude that the yogic practices "Specific Group of Asana" done for eight weeks on home-based programs when added to conventional medications helps in reduction of pain and disability in people suffering from cervical spondylosis. However, more extensive, comparative, and multicentric trials are required for establishing this as a treatment modality.

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None.

## Conflict of interest

None.

## References

- [1] Cramer H, Lauche R, Hohmann C, Langhorst J, Dobos G. Rehabilitation section: yoga for chronic neck pain: a 12-month follow-up. *Pain Med* 2013;14:541–8. Available from: <http://10.0.4.87/pme.12053%5Cnhttps://ezp.lib.unimelb.edu.au/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=edselp&AN=S1526237513600771&site=eds-live&scope=site>.
- [2] Kaushik R, Sharma P, Prakash O. Management of cervical spondylosis through Ayurveda: a case study. *Int J Res Ayurveda Pharm* 2017;8(2):179–81.
- [3] Linton S. Do psychological factors increase the risk for back pain in the general population in both a cross-sectional and prospective analysis? *Eur J Pain* 2005;9(4):355–61.
- [4] Alshami AM. Prevalence of spinal disorders and their relationships with age and gender. *Saudi Med J* 2015;36(6):725–30.
- [5] Binder AL. Cervical spondylosis and neck pain. *Br Med J* 2007;334(7592):527–31.
- [6] Rao RD. Degenerative cervical spondylosis: clinical syndromes, Pathogenesis, and management. *Calif Med* 1960;92(5):396.
- [7] Abdel-Aziem AA, Draz AH, Battecha KH, Mosaad DM. Effect of ultrasound combined with conventional therapy on neck pain, function, and disability in patients with cervical spondylosis: a randomized placebo-controlled trial. *J Musculoskel Pain* 2014;22(2):199–205.
- [8] Langhorst J, Klose P, Dobos G, Bernardy K, Häuser W. Efficacy and safety of meditative movement therapies in fibromyalgia syndrome: a systematic review and meta-analysis of randomized controlled trials. *Rheumatol Int* 2013;33(1):193–207.
- [9] Gross A, Kay TM, Paquin JP, Blanchette S, Lalonde P, Christie T, et al. Exercises for mechanical neck disorders. *Cochrane Database Syst Rev* 2015;2017(6).
- [10] Sarig-Bahat H. Evidence for exercise therapy in mechanical neck disorders. *Man Ther* 2003;8(1):10–20. <https://doi.org/10.1054/math.2002.0480>. Available from: <http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L36236565%0A>.
- [11] Bronfort G, Haas M, Evans RL, Bouter LM. Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis. *Spine J* 2004;4(3):335–56.
- [12] Hurwitz EL, Carragee EJ, van der Velde G, Carroll LJ, Nordin M, Guzman J, et al. Treatment of neck pain: noninvasive interventions. *Spine* 2009;33(Supplement):S123–52.
- [13] Manik R, Mahapatra A, Gartia R, Bansal S, Patnaik A. Effect of selected yogic practices on pain and disability in patients with lumbar spondylitis. *Int J Yoga* 2017;10(2):81–7.
- [14] Cramer H, Lauche R, Hohmann C, Lüdtke R, Haller H, Michalsen A, et al. Randomized-controlled trial comparing yoga and home-based exercise for chronic neck pain. *Clin J Pain* 2013;29(3):216–23.
- [15] Posadzki P, Ernst E. Yoga for low back pain: a systematic review of randomized clinical trials. *Clin Rheumatol* 2011;30(9):1257–62.
- [16] Moonaz S, Bingham 3rd C, Wissow L, Bingham SJB. Yoga in sedentary adults with arthritis: effects of a randomized controlled pragmatic trial. *J Rheumatol* 2015;42(7):1194–202. Available from: <http://www.otseeker.com>.
- [17] Vernon H, Mior S. The Neck Disability Index: a study of reliability and validity. *J Manip Physiol Ther* 1991;14:409–15.
- [18] Satyananda S. Asana Pranayama Mudra Bandha. Munger, Bihar: Gyan Darshan; 2000. Trust Y publication.
- [19] Dhand NK, Khatkar MS. Statulator: an online statistical calculator. Sample size calculator for comparing two paired means. <http://statulator.com/SampleSize/ss2PM.html>; 2004.
- [20] Hirpara KM, Butler JS, Dolan RT, O'Byrne JM, Poynton AR. Nonoperative modalities to Treat symptomatic cervical spondylosis. *Adv Orthop* 2011;2012:1–5.
- [21] Saal J, Saal J, Yurth EF. Nonoperative management of herniated cervical intervertebral disc with radiculopathy including commentary by Herzog RJ. *Spine* 1996;21(16):1877–83. Available from: <http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=107311444&site=ehost-live%5Cnhttp://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed4&NEWS=N&AN=1996258005>.

- [22] Cramer H, Lauche R, Haller H, Langhorst J, Dobos G, Berger B. "I'm more in balance": a qualitative study of yoga for patients with chronic neck pain. *J Alternative Compl Med* 2013;19(6):536–42.
- [23] Vijayaraghava A. Effect of yoga practice on levels of inflammatory markers after moderate and strenuous exercise. *J Clin Diagnostic Res.* 2015;9(6):12–6. Available from: [http://jcd.r.net/article\\_fulltext.asp?issn=0973-709x&year=2015&volume=9&issue=6&page=CC08&issn=0973-709x&id=6021](http://jcd.r.net/article_fulltext.asp?issn=0973-709x&year=2015&volume=9&issue=6&page=CC08&issn=0973-709x&id=6021).
- [24] Nagarathna R, Ram A, Banerjee B, Hosakote V, Rao R. Comparison of lymphocyte apoptotic index and qualitative DNA damage in yoga practitioners and breast cancer patients: a pilot study. *Int J Yoga* 2013;6:20–5.
- [25] Williams K, Abildso C, Steinberg L, Doyle E, Epstein B, Smith D, et al. Evaluation of the effectiveness and efficacy of iyengar yoga therapy on chronic low back pain. *Spine* 2009;34(1):2066–76.
- [26] Sherman KJ, Cherkin DC, Wellman RD, Cook AJ, Hawkes RJ, Delaney K, et al. A randomized trial comparing yoga, stretching, and a self-care book for chronic low back pain. *Arch Intern Med* 2011;171(22):2019–26.
- [27] Satyanand V, Gopalakrishnaiah T, Mahaboobvali S, Basha SA, Sarala V. Effects of yogasanas on cervical spondylosis. *Int Arch Integr Med* 2015;2(7):6–10. Available from: <http://www.ebscohost.com>.
- [28] Vempati RP, Telles S. Yoga-based guided relaxation reduces sympathetic activity judged from baseline levels. *Psychol Rep* 2011;90(2):487–94.
- [29] Sugumar D, Ponnuswamy V. Effect of simplified Kundalini yoga in the management of cervical spondylosis \_ international journal of physical education, Sports and Health. *Int J Phys Educ Sport Heal* 2018;5(5): 71–4.