



EFFICACY OF YOGA THERAPY (IAYT) ON PAIN IN PATIENTS UNDERGOING CONVENTIONAL PHYSIOTHERAPY FOR CHRONIC LOW BACK ACHE

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DOI: 10.7897/2277-4572.05320

Received on: 05/06/16 Revised on: 18/06/16 Accepted on: 24/06/16

ABSTRACT

The aim of this study was to evaluate the efficacy of Integrated Approach of Yoga Therapy (IAYT) as an add-on in patients undergoing conventional treatment for chronic low back ache. One hundred and twenty patients suffering from chronic low back ache (CLBA) aged between 18 years to 75 years (Yoga: 41.29±15.87 and Control: 41.63±13.48) from Ebnezar orthopedic center, Bengaluru were randomly assigned into two groups; yoga group (YG) and control group (CG) to receive IAYT or Therapeutic exercises after Intermittent lumbar traction and ultrasound (20 minutes per day). Both the groups practiced supervised interventions (40 minutes per day) for 3 weeks at the center and later for 12 weeks at their residences after the completion of treatment. 57 (yoga) and 55 (control) subjects were available for the final analysis. Both the groups were assessed for pain on the 1st day in the pretest and on the 21st day in the post test. Data was analyzed using repeated measures analysis of variance (RMANOVA). There was significant difference within (RMANOVA, P<0.001) and between the groups (RMANOVA, P<0.001) on pain with better improvements in the yoga group than the control group. Pain in the yoga (39.9%, 66%, 85%, and 98.9 %) and control (25.5%, 45%, 63% and 74%) improved in the yoga group better than the control group on the 21st day, 3rd month, 6th month and 1 year respectively. Integrated approach of yoga therapy (IAYT) as an add-on with the conventional physiotherapy significantly reduces the pain in patients suffering from chronic low back ache.

Keywords: chronic low back ache, integrated approach of yoga therapy, therapeutic exercises, physiotherapy.

INTRODUCTION

LBP is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations.¹ As part of the Global Burden of Disease 2010 Study (GBD 2010), the global burden of musculoskeletal conditions was estimated using updated methods that address methodological limitations of previous GBD studies. Burden was expressed in disability-adjusted life years (DALYs).² The lifetime prevalence of low back pain is estimated at 60-85%, while the annual prevalence in the general population is ranging from 15-45%.³ Back pain patients incur up to 75% more medical expenditures than patients without back pain.⁴ The most commonly prescribed medications for low back pain are non-steroidal anti-inflammatory drugs (NSAIDs), skeletal muscle relaxants, and opioid analgesics, skeletal muscle relaxants, and tricyclic antidepressants are moderately effective for short-term pain relief except in the case of tricyclic antidepressants which showed small to moderate effects and fair evidence for acetaminophen, tramadol, benzodiazepines and gabapentin in pain relief.⁵ The utilization rates for injectional therapies has risen about 250% between 1994 and 2001 and however, the evidence for these therapies is controversial.⁶ Lastly, surgical treatment of non-specific low back pain has not been shown to be reliably successful.⁷ Patients that do not improve after treatment with self-care activities and/or medications are good candidates for non-pharmacological treatments. Non-pharmacological treatments include physical treatments (i.e. heat, ice, ultrasound and massage therapy), spinal manipulation,

and forms of injection therapy.⁵ A bio-psychosocial approach is now considered to be the gold standard for treating chronic pain.⁸ Data from the National Center for Complementary and Alternative Medicine (NCCAM) show that the usage of complementary and alternative medicine (CAM) treatments for all conditions is on the rise in the US.⁹ Reviews and meta-analyses^{10, 11, 12} and practice guidelines from the American Pain Society and the American College of Physicians⁵ support yoga as an evidence-based treatment for cLBP with at least moderate benefit. Five large (n=90–313) and five smaller randomized controlled trials (RCTs) (n=20–60) support yoga's effectiveness for reducing pain and improving function in adults with cLBP.¹³ The present study was planned to study the effects of yoga as an adjunct to physiotherapy, the standard conventional treatment in the management of chronic low back ache, as there were no studies on chronic low back ache that has compared to Yoga and Physiotherapy.¹⁴

MATERIALS AND METHODS

One hundred and twenty (120) patients with chronic low back ache (CLBA) from the outpatient department of Ebnezar Orthopedic Center, Parimala Health Care Services, Bengaluru were recruited for the study. A sample size of 120 was obtained by calculating the effect sizes based on the mean and standard deviation of an earlier published interventional study.¹⁵ Table 1 includes the baseline characteristics. One hundred and twenty (120) patients of both genders in the age group of 18–75 years in the yoga group and (41.29±15.87) in the control group (41.63±13.48) with Chronic low back ache were included.

Table 1: Demographic Data

Characteristics	Yoga (N=57)	Control (N=55)
Age (M±SD)	41.29±15.87	41.63±13.48
Sex		
Males	35	27
Females	25	33
Occupation		
Skilled workers	28	22
Semi-skilled workers	11	9
Unskilled workers	4	3
Others	17	26
Duration of the disease		
<1year	26	23
1-3years	18	19
3-5years	11	10
>5years	5	8
Co-Morbidities		
Diabetes	4	6
Hypertension	10	9
Overweight/Obesity	2	3
Others	10	12

The inclusion criteria were: a) patients of chronic low back ache (CLBA) with persistent pain > three months prior to recruitment due to common causes like muscle sprain, spinal stenosis, facet joint arthritis, occupational causes, unaccustomed activities, improper posture b) degenerative diseases (lumbar spondylitis) c) IVDP with or without neurological involvement, recurrent back aches, including both males and females aged between 18years to 75years who were advised physiotherapy by the consulting orthopedician were included in the study. It was ensured that these patients had no previous exposure to yoga. In exclusion, a) patients of chronic low back ache (CLBA) with persistent pain < three months, b) LBA's caused due to uncommon causes like congenital, traumatic, infective, inflammatory, neoplasm, metabolic and degenerative conditions, c) patients who underwent surgeries, d) referred LBA pain caused due to gynecological diseases, genitourinary problems and gastrointestinal conditions. e) Post-traumatic conditions and patients who were not willing to be the part of the study were excluded. The study was approved by the institutional ethical committee and signed informed consent was obtained from all the participants.

Design

This was a prospective randomized, parallel, active controlled study on patients with Chronic Low Back Ache (CLBA) in the age range of 18-75years. Patients attending the outpatient department of Ebnezar Orthopedic Center who satisfied the inclusion criteria were recruited for the study. After the initial screening for selection criteria, they were assigned to either the yoga group or control group. A computer-generated random

number table (www.randomization.org) was used for randomization. Numbered envelopes were used to conceal the sequence until the intervention was assigned. 120 patients suffering from chronic low back ache (CLBA) were randomized into two groups; yoga group (YG) and control group (CG). (Figure 1)

Both groups were given the conventional physiotherapy for 20 minutes using intermittent lumbar traction and ultrasound for 3 weeks. Control group received therapeutic exercises and supine guided rest (SR) for 40 minutes. Study group, in addition received Integrated approach of yoga therapy (IAYT) for 40 minutes which consists of shithilikarana vyayamas (loosening practices), shakti vikasaka vyayamas (strengthening practices), yogasanas, pranayama, meditation and relaxation techniques.

The study group was taught integrated yoga and the control group was taught the non-yogic, back specific physiotherapy exercises by certified therapists. Both the groups were assessed for pain, tenderness and back disability on the 1st day in the pretest and on the 21st day in the post test. After this, they were asked to practice daily at home for the next 3 months. Patients were asked to mark the practices daily in the diary provided for the maintenance of the practice at home. Compliance was supervised by telephone calls once in 3 days and a weekly review was conducted once a week for 12 weeks. The daily review cards were checked for the regularity and doubts if any were clarified. The evaluation was conducted by the senior research fellow. All patients were asked to mark the practices daily after the home practice in the diary provided for the purpose; at every visit their clinical progress and therapy received on the day were documented. All assessments were carried out on 1st day, 21st day, 3rd month, 6th month and after 1year.

Intervention for the yoga group

The schedule practiced at the center in the yoga group included 40 min of integrated approach of yoga therapy (IAYT) practice after 20 min of physiotherapy with intermittent lumbar traction and ultrasound for 3 weeks. The integrated approach of yoga therapy practice (IAYT) included shithilikaranavyayamas (loosening practices), saktivikasaka (strengthening practices) followed by yogasanas and relaxation techniques. Later patients were advised to continue the integrated approach of yoga therapy (IAYT) practice for 40 min at home for the next 12 weeks. The concept used to develop a specific module of an integrated approach of yoga therapy (IAYT) for chronic low back ache was taken from the traditional yoga scriptures (patanjali yoga sutras, yoga vasishta, and upanishads) that highlight a holistic lifestyle for positive health at physical, mental, emotional, and intellectual levels (Table 2) of Yoga group module.

Table 2: Yoga Module for Chronic Low Back Ache

Conventional physiotherapy: Was carried out at the center for 21 days which included		20.0 min
a) Intermittent lumbar traction -10 min		
b) Ultrasound – 10 min		
Integrated yoga therapy practice: The patient was made to practice at the center for 40 min for 21 days after the conventional physiotherapy and later was advised to continue at home for the next 3 months. This included the following practices:		40.0 min
Shithilikarana vyayama (loosening practices):		10.0 min
1. Foot and ankle loosening practices		
▪ Passive rotation of each toe (clockwise and counterclockwise)	5 rounds	0.5 min
▪ Toe bending	10 rounds	0.5 min
▪ Passive rotation of ankle (clockwise and counterclockwise)	10 rounds	0.5 min
▪ Ankle bending	10 rounds	0.5 min
▪ Ankle rotation (clockwise and counterclockwise)	10 rounds	0.5 min
2. Knee loosening practices		
▪ Bending the knee in prone position	5 rounds	0.5 min
▪ Knee bending – both sides	10 rounds	0.5 min
▪ Knee rotation – both sides	10 rounds	0.5 min
▪ Passive patella rotation	5 rounds	0.5 min
3. Hip and waist loosening practices		
▪ Half butterfly	10 rounds	0.5 min
▪ Full butterfly	10 rounds	0.5 min
▪ Waist rotations (both internal and external)	10 rounds	0.5 min
4. Upper limbs loosening practices		
▪ Finger loosening	5 rounds	0.5 min
▪ Wrist loosening	5 rounds	0.5 min
▪ Wrist rotation (clockwise and counterclockwise)	10 rounds	0.5 min
▪ Elbow loosening	10 rounds	0.5 min
▪ Shoulder loosening	10 rounds	0.5 min
5. Neck loosening practices		
▪ Forward and backward bending	5 rounds	0.5 min
▪ Sideward tilting	5 rounds	0.5 min
▪ Neck rotation (both clockwise and counterclockwise)	5 rounds	0.5 min
6. Relaxation: Instant		2.0 min
7. Strengthening exercises (sakti vikaasaka suksma vyayama)		5.0 min
▪ Lumbar stretch	5 rounds	1.0 min
▪ Crossed lumbar stretch	5 rounds	1.0 min
▪ Straight leg-raise breathing: single and both legs	5 rounds	1.0 min
▪ Setubandhasana lumbar stretch	5 rounds	1.0 min
▪ Pavanamuktasana lumbar stretch	5 rounds	1. min
8. Quick relaxation technique: Consists of three phases involving observing the abdominal movements, synchronizing them with breathing, and chanting of “A” kara, wherein “A” is the mantra.		3.0 min
9. Yogasanas		10.0 min
A. Standing asanas		
▪ Tadasana		
▪ Ardha kati chakrasana		
▪ Ardha chakrasana		
▪ Prasrita padahastana		
B. Lying asanas		
▪ Bhujangasana		
▪ Shalabasana		
▪ Viparita karani		
10. Deep relaxation technique: Is a three-phase guided relaxation technique with relaxation from toes to the head, feeling of letting go, chanting OM and feeling of limitless expansion through visualization.		5.0 min
11. Nadi Shudi Pranayama: is a slow rhythmic technique of alternate nostril breathing involving the phases of inhalation and exhalation using nasika mudra.		3.0 min
12. OM meditation: Is done seated in any comfortable meditative posture and repeating the syllable OM mentally.		2.0 min

Yogic suksma vyayamas (loosening and strengthening practices): These are safe, rhythmic, repetitive stretching movements synchronized with breathing. These practices mobilize and strengthen joints and the muscles. Relaxation techniques: Three (3) types of guided relaxation techniques were interspersed between the physical practices of suksmavyayamas and asanas. Asanas (physical postures): Asanas are characterized by effortless maintenance in the final posture by internal awareness. Asanas were selected in standing, supine and prone positions that would relax and strengthen the back. Pranayama: The practice of voluntary regulated breathing

while the mind is directed to the flow of breath is called pranayama. These practices promote autonomic balance through mastery over the mind. Meditation: Patanjali defines meditation (dhyana) as effortless flow of a single thought in the mind without distractions (pratyaya ekataanaata dhyanam). This has been shown to offer physiologic benefits through alertful rest to the mind–body complex. Counseling: Yogic concepts of health and disease, yama, niyama, bhakti yoga, Jnana yoga, and karma yoga were addressed in the counseling classes. These sessions were aimed at understanding the need for lifestyle change,

weight management and preventing early aging by yogic self-management of psychosocial stresses.

Intervention for the control group

The routine schedule of the control group included 40 min of therapeutic exercises with supine guided rest after 20 min of

physiotherapy with intermittent lumbar traction and interferential therapy for 2 weeks [Table 3]. Therapeutic exercises included loosening and strengthening practices for all the joints of the upper and lower limbs, specific back practices, and supine rest. Later patient was advised to continue the therapeutic exercise practice of 40 min at home for the next 12 weeks.

Table 3: Control Module for Chronic Low Back Ache

Conventional physiotherapy: was carried out only at the center for 21 days and included		20.0 min
a) Intermittent lumbar traction -10 min		
b) Ultrasound – 10 min		
Therapeutic practices: The patient was made to practice at the center for 40 min for 21 days after the conventional physiotherapy and later was advised to continue at home for the next 3 months. This included the following practices:		40.0 min
Loosening exercises		10.0 min
1.Foot and Ankle		
▪ Passive rotation of the toes (each toe clockwise and counterclockwise) 10 rounds 0.5 min	10 rounds	0.5 min
▪ Passive rotation of the ankle (both clockwise and counterclockwise)	10 rounds	0.5 min
▪ Toe bending	10 rounds	0.5 min
▪ Ankle bending	10 rounds	0.5 min
▪ Ankle rotation	10 rounds	0.5 Min
2.Knee		
▪ Knee bending- both sides	10 rounds	0.5 min
▪ Knee rotation- both sides	10 rounds	0.5 Min
3.Hip and waist loosening practices		
▪ Half butterfly	10 rounds	0.6 min
▪ Full butterfly	10 rounds	0.6 min
▪ Waist rotations (both internal and external)	10 rounds	0.5 Min
4.Upper limb loosening practices		
▪ Finger loosening	10 rounds	0.6 min
▪ Wrist loosening	10 rounds	0.6 min
▪ Wrist rotation (both clockwise and counterclockwise)	10 rounds	0.5 min
▪ Elbow loosening	5 rounds	0.5 min
▪ Arm loosening (both forward and backward movements)	10 rounds	0.5 min
5.Neck loosening practices		
▪ Forward and backward bending	10 rounds	0.5 min
▪ Sideward tilting	5 rounds	0.5 min
▪ Neck rotation rotation (both clockwise and counterclockwise)	5 rounds	0.5 min
6.Quick pause		2.0 min
7.Strengthening exercises		5.0 min
▪ Palm exercises	5 rounds	0.5 min
▪ Elbow exercises	10 rounds	0.5 min
▪ Arm exercises	5 rounds	0.5 min
▪ Back exercises	5 rounds	0.5 min
▪ Thigh exercises	5 rounds	0.5 min
▪ Calf exercises	5 rounds	0.5 min
8.Rest		3.0 min
9.Back specific practices		15.0 min
▪ Lumbar stretch	5 rounds	3 min
▪ Crossed lumbar stretch	5 rounds	3 min
▪ Straight leg raising (single/both)-30/60/90 degrees	5 rounds	5 min
▪ Pelvic tilt	5 rounds	4.0 min
10.Supine rest		5.0 min

Blinding and masking

Double blinding was not possible as this was an interventional study. Here, the statistician who did the randomization, analyzed the data and the researcher who carried out the assessments were blinded to the treatment status of the subjects.

Outcome variables

Pain: This was assessed using numerical rating scale (NRS)
Pain

This is considered to be a simple & reliable tool to measure subjective pain. It consists of a horizontal straight line of 10 centimeters marked on a clean white sheet. One end of the line marked 0 represents 'No pain' and the other end marked 10 represents 'Worst possible pain'. Patients were asked to mark the severity of their pain experienced over the 10cm scale. Separate sheets were used during every assessment.¹⁶ Data sheets marked by all patients for pain (NRS) was coded and kept aside for future assessment. Measurements were taken before the intervention on 1st day and after the treatment on 21st day.

Table 4: Results within and between Groups

Within groups	Control Group(Mean±SD)	Yoga Group(Mean±SD)	Between groups
Assessments			P values
1 st day	9.22±1.05	8.68±1.05	0.008
15 th day	6.84±0.96***	5.21±1.61***	<0.001
1 st month	5.00±1.04***	2.91±1.64***	<0.001
6 th month	3.40±0.87***	1.26±1.22***	<0.001
1year	2.35±1.09***	0.09±0.29***	<0.001

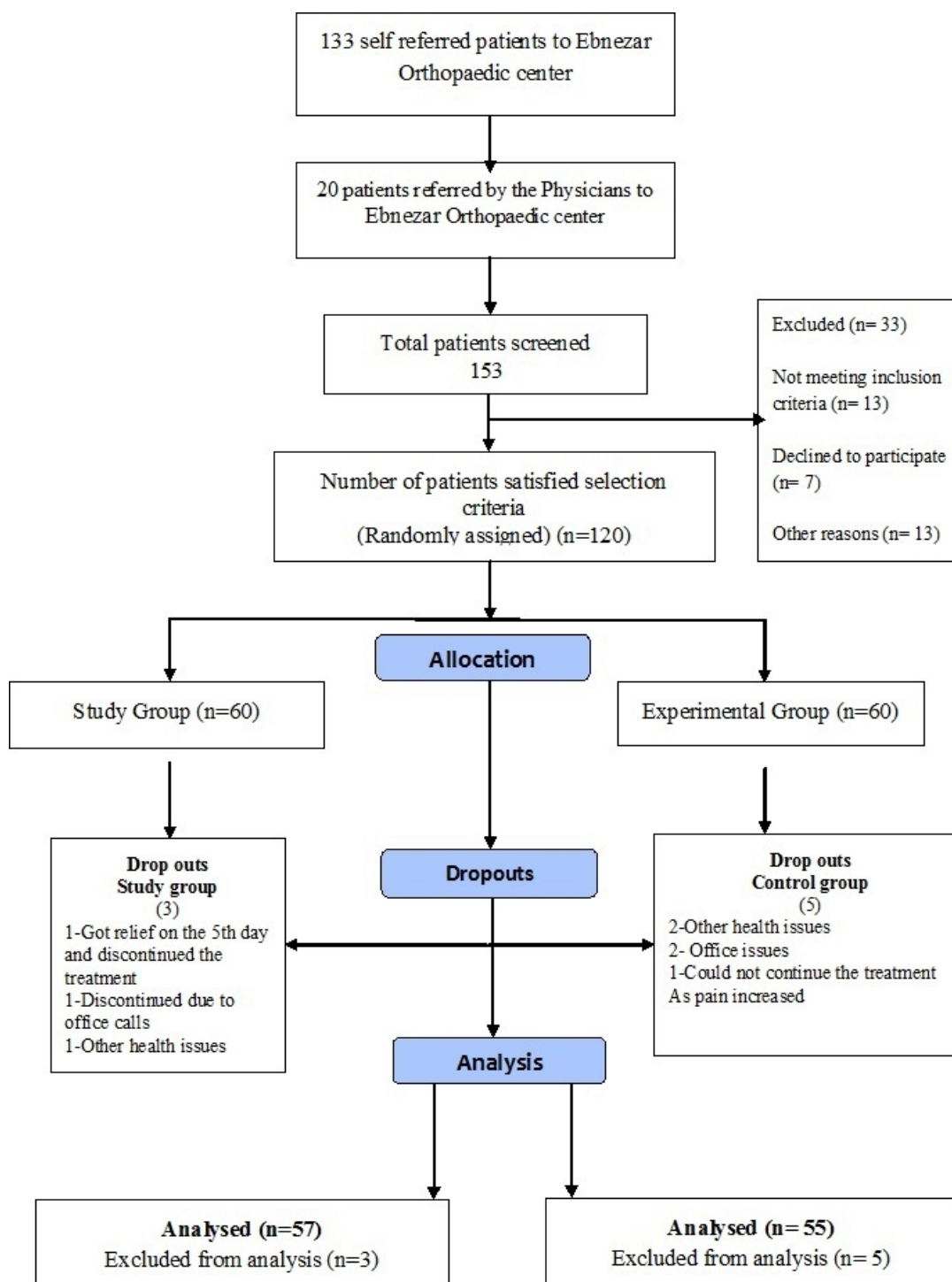


Figure 1: Trial Profile

Statistical methods

The data were analyzed using SPSS Version 10. The baseline values of the two groups were checked for normal distribution by Shapiro-Wilk's test. Repeated measures analysis of variance (RMANOVA) with Bonferroni was used for assessing 'within' and 'between' groups differences, respectively. Tables 1 and 2 show the interventions of both study and control groups.

RESULTS

The study profile is shown in Figure 1. There were 3 dropouts in the study group and 5 in the control group. Two group's yoga and the control (60 subjects each) were similar with respect to socio-demographic and medical characteristics (Table 1). The baseline data for the variables were normally distributed and did not differ significantly between the groups. Table 4 shows the results between and within groups on 21st day, 3rd month, 6th month and 1 year. Results showed significant reduction of pain in the yoga group compared to control group.

Between Group Results

Pain: (Numerical Rating Scale)

Repeated measures analysis of variance (RMANOVA) with Bonferroni showed a significant difference in yoga group on 21st day ($p < 0.001$), 3rd month ($p < 0.001$), 6th month ($p < 0.001$) and 1 year ($p < 0.001$) compared to control group indicating reduction in pain scores.

Within Group Results

Pain (Numerical Rating Scale)

A Significant result in reduction of pain score was observed in yoga group post- assessments (21st day, 3rd month, 6th month & 1 year) compared to the pre-assessments (1st day). In control group, significant result in reduction of pain score was observed in post- assessments (21st day, 3rd month, 6th month & 1 year) compared to the pre-assessments (1st day)

DISCUSSION

This randomized active controlled trial on 120 participants include patients of both genders (M-62, F-58) in the age group of 18–75 years with chronic low back ache (CLBA). Results showed significantly better improvement in the yoga than the control group in reduction of pain ($P < 0.001$, RMANOVA).

Despite the wide range of pharmacological, non-pharmacological and surgical treatment options currently available for patients with low back pain, a substantial proportion of patients fail to achieve adequate pain relief and continue to experience significant pain, pain-related distress and disability.¹⁷ Recent practice guidelines from the American College of Physicians and the American Pain Society suggest that if low back pain does not improve with standard pharmacological therapy and self-care, non-pharmacological treatments should be considered.⁵ Approximately 40% of patients with chronic back pain report using complementary and alternative therapies such as massage, reflexology and acupuncture.¹⁸ Yoga has also generated a great deal of interest and attention among the general public and the Western scientific community as an alternative treatment for a variety of chronic health conditions, including chronic pain. Yoga is an ancient practice that originated in India >4000 years ago and consists of several key components, including physical postures (asanas), breathing techniques (pranayama), relaxation and meditation (dhyana).¹⁹ An estimated 14.9 million Americans

practice yoga, 21% of which use it for treating neck and back pain.²⁰

Among the three peer-reviewed studies of yoga and CLBP that have been published, two of the studies evaluated an unspecified method of hatha yoga. One study lacked a control group²¹ while the other was not powered to reach statistical significance.²² The third was a feasibility analysis of Iyengar yoga presenting only baseline data and adherence rates to therapy.²³ However, no studies to date have compared yoga's effectiveness to physiotherapy, the most common non-pharmacologic reimbursable treatment physicians recommend.²⁴ As per the above studies and their assessments discussed in a meta-analytic study, there are no studies to this date that has compared the effectiveness of yoga to physiotherapy. None of the studies of yoga and chronic low back ache published so far, have both the control and yoga group which is said to be very important to rule out the possibility of the benefits of yoga.¹⁷ Hence the present study was planned to evaluate the efficacy of yoga as an add on to the conventional non-pharmacological treatment of CLBP and the significant difference have been found in reduction of pain, tenderness and back disability in yoga group than the control group.

Pain reduction

In a recent narrative systematic review of the literature, seven RCTs were identified that had been conducted on yoga for CLBP, and noted that yoga led to a significant reduction in pain intensity in five of the trials.¹⁰ The study of Wren et al reviewed six RCTs of yoga for CLBP and suggested that yoga shows promise in reducing pain, pain-related disability, negative mood and pain medication among patients with CLBP.²⁵ Five large ($n=90-313$) and five smaller randomized controlled trials (RCTs) ($n=20-60$) support yoga's effectiveness for reducing pain and improving function in adults with CLBP.¹³ Studies have established the role of yoga in decreasing the pain and disability in chronic low back pain, along with improved flexibility within 1 week to 4 months of yogic intervention with no adverse effects.²⁶

Recent research has also indicated that yoga can reduce pain catastrophizing, increase pain acceptance and improve overall emotional functioning among individuals with chronic pain.²⁷⁻³⁰ A number of studies have demonstrated the effectiveness of yoga in reducing pain in individuals with chronic low back pain, for example, in addition to studying yoga's effect on functional disability,³¹ also assessed clinical levels of pain, pain-related fears of movement, and pain attitudes. Their results suggested that in addition to the yoga group having less functional disability at post treatment, the yoga group demonstrated two times greater reductions in pain, than the control group. In the study of Saper et al, greater decreases were found in pain scores of yoga group than the control group from baseline to 12 weeks.³² In Williams et al, 2009 study, individuals randomized to the yoga group showed greater improvements in pain intensity than those to the control group.³³

One of the study that measured pain-related outcomes using Aberdeen back pain scale and pain efficacy found greater decrease of pain at the 4th week follow-up in the yoga group than the control group.³⁴ Tekur et al studied the efficacy of the integrated approach of yoga therapy in patients with chronic low back ache and documented 49% reduction in numerical rating scale scores in the yoga group.²⁶ One of the studies on common neck pain and yoga assessed pain using numerical rating scale also showed 95.5% reduction of pain in yoga group compared to 61.2% of the control group.³⁵ One more study of Ebnezar et al

on OA knees and yoga has 37.31% and 64.88% of pain reduction in yoga group that was assessed using NRS on 15th day and 90th day respectively.³⁶ In a residential program of yoga for 2 weeks that assessed pain using VAS, reported 55% of pain reduction in the study group.³⁷ Study of Williams et al, an out-patient program for 3 months found 70% pain reduction in the yoga group³⁸ and one more study of Groessel et al, found 14% pain reduction after 10 weeks of yoga in Veterans administration (VA) patients with chronic back pain³⁹, whereas in the current study, yoga was added after the conventional physiotherapy, which has shown a significant difference both between and within groups (RMANOVA, $P < 0.001$) with a significant reduction in yoga group by (39.9% - 21st day), (66% - 3rd month), (85% - 6th month) and (98.9% - 1 year) than the control group by (25.5% - 21st day), (45% - 3rd month), (63% - 6th month) and (74% - 1 year).

Mechanisms

As noted in several earlier studies physiotherapy intervention may increase the blood flow. Better results in the yoga group could be due to its stress reducing effect as yoga is meant to bring about better emotional stability and is achieved by the multifactorial approach of yoga that includes safe physical practices (asanas), breathing techniques (pranayama), meditation (dharana and dhyana) and introspective corrections in one's cognitive errors by inputs at intellectual (jnana yoga) and emotional level (bhakti yoga). Yoga is multi-dimensional, so it is important to describe all of the components of each yoga intervention in order to compare across interventions and better understand which components are best for different disease populations. As per the yogic philosophy, the disturbances in the manomaya kosha percolate into the physical layer annamaya kosha through the pranamaya kosha. Hence in the treatment of these psychosomatic ailments it becomes mandatory to work at all these levels of our existence to bring about quick results. The integrated approach, thus, consists in not only dealing with physical health, the relief of which could at best be temporary. It includes techniques to operate on different layers of our existence. Many practices described in the texts of yoga and upanishads are adopted in IAYT to balance and harmonise the disturbances at each of the five koshas and tackle this type of complex psychosomatic ailments. The problem of long standing stresses begin in the manomaya kosha and manifests initially only as psychological problems such as irritability, emotional lability, excessive smoking or alcohol, sleep disturbances, difficulty in taking decisions etc. Over the years, this starts disturbing the pranamaya kosha and shows up as one of the digestive problems such as poor appetite, dyspepsia etc which are common precursors of most stress induced ailments. These prana imbalances go on fluctuating depending on the degree of stress. As this goes on for a few more years, it shows up at the annamaya kosha as un-explained musculo-skeletal pains either as muscle spasms, soft tissue pains, sprains, cramps etc. A combination of these imbalances settles down in one particular part of the body showing up as recurrent episodes of acute or chronic musculoskeletal pains with no organically detectable cause.⁴⁰

Studies have shown that exercises are helpful in chronic low back pain to return to normal daily activities and work in adults⁴¹ decrease pain and improve functional capacity in health care professionals.⁴² Yoga postures although appear to be similar to many physical exercises there are several basic differences. Yogic physical practices are mainly spinal stretches that are maintained with ease and effortlessness (Sthiram sukham aasanam- Patanjali). Yoga postures offer voluntary introspective relaxation of the parts that are stretched and they

are not just isometric exercises. Deep relaxation of the spinal muscles achieved during safe body movements with mindful awareness seems to be another major factor that improves flexibility and reduces pain.²⁶ This is supported by earlier observations of increased paraspinal electromyographic (EMG) activity during pain in subjects with CLBP.⁴³ Yoga has shown reducing the EMG activity in conditions like chronic pain specially headache.⁴⁴ Yogasanas reduces the stiffness and increases the flexibility of the spine. These yogasanas are practiced with deep internal awareness and relaxation. Stimulation in the form of a stretch during a movement and once the stretch is at its peak maintaining with ease and calm mind and slowly returning to resting position and let go to sink into deep relaxation. This process of alternate stretch followed by a relaxation carried out with deep internal awareness (the process of alternate stimulation and relaxation) helps in erasing the deep seated stress. When the final posture of the asana is maintained with relaxation, the deeper corrections takes place. The prana blocks are diffused giving a great sense of freedom from the stiff back.⁴⁰ Another explanation of yoga's efficacy in pain reduction may lie in endorphin production at a cortical level, which is known to result from alternate stretch and relax procedures of yogasana practice.⁴⁵

Studies on different types of meditation have consistently shown increased mental alertness even while being physiologically relaxed. In a previous study, Om chanting has been shown to bring about therapeutic effects in a functional neuro-imaging study by decrease in BOLD signal in limbic structures in healthy volunteers similar to vagal nerve stimulation.⁴⁶ Om meditation that was used in this study has also been shown to provide this psycho physiological rest as seen in the earlier study. These yogic practices be it physical or breathing or mental, practiced independently or as a combination seem to produce better mental alertness even while being physiologically relaxed both in the sick and healthy persons that may account for the reduction in anxiety and depression.⁴⁷ In the present study, this physiological rest explained above may form the basis of stress reduction and thereby help in reduction of pain and disability even in CLBP patients. Oxygen consumption is used as a measure of the degree of rest or relaxation. When the body-mind complex is relaxed, the amount of oxygen used up is much less and this can be measured by the oxygen we consume. Studies have shown that the oxygen consumption came down 10% after deep relaxation technique. The yoga based relaxation technique has also shown to reduce physiological signs of arousal.⁴⁸ A significant decrease in oxygen consumption and increase in breath volume were recorded after guided relaxation. During yoga relaxation the power of the low frequency component of the heart-rate variability spectrum reduced, whereas the power of the high frequency component increased, suggesting reduced sympathetic activity. A study has also shown that a yoga-based isometric relaxation reduced physiological signs of anxiety⁴⁹ indicating reduced sympathetic tone.⁵⁰

Pranayama practices remove the carbon dioxide from the body and cleanse the system. All the breathing exercises correct the rhythm of breathing by synchronizing body movements with inhalation and exhalation. Yogic breathing or the pranayama is a unique method for balancing the autonomic nervous system.⁵¹ Research done on pranayama has shown that specific pranayama practices can have relaxing effect on the sympathetic nervous system thereby reducing stress levels.⁵² Reduced anxiety scores, autonomic arousal and urinary VMA levels were found after the practice of integrated approach of yoga in patients with generalized anxiety disorder.⁵³ Pranayama practices also reduces breath frequency to master emotional surges, and increase deep internal awareness in preparation for meditation.⁴⁰

Setubandhasana lumbar stretch builds up the strength of the supporting postural lumbar spinal muscles. Dorsal stretch and straight leg rising (ekapadasana) helps to build up the front (abdominal) support for the back. Pavanamuktasana practice provides a traction effect.⁵⁴

Follow up assessments

In a study of Posadzki et al, the difference between the two groups became statistically significant at three-month follow-up when the yoga group reported a 70% decrease in present pain compared to the 38% reduction reported by the control group.⁹ Whereas in the present study, yoga group showed 66% of pain reduction at the 3rd month follow-up, 85% pain reduction at the 6th month follow up and 98% pain reduction at 1year follow up compared to 45% at 3rd month, 63% at 6th month and 74% at 1 year follow ups in the control group respectively.

Strengths of the study

i) Randomized controlled trial ii) good sample size iii) supervised matched intervention for both the groups with same duration iv) longer follow-ups of 3 months, 6 months and 1year with good compliance (3% dropouts). V) Intervention of the study is applicable for patients of all age groups. The results of this study have shown marked differences on all the variables between the groups and thus can be considered as an evidence for incorporating the yoga module for the management of CLBP by the clinicians.

Implications of the study

The intervention of the present study is simple, easy to practice and cost effective compared to the conventional management and helps in reducing the economical burden in patients suffering from CLBP.

Suggestions for future work

Studies using MRI and biochemical markers may throw light on the mechanisms. Longer follow ups may be carried out to rule out the validity of the intervention.

CONCLUSION

Adjunctive program of the integrated approach of yoga therapy for chronic low back ache improves spine flexibility and reduces the pain and disability. IAYT offers a good value addition as a non-pharmacological intervention and a complementary therapy in offering a better relief in patients with chronic low back ache.

ACKNOWLEDGEMENT

At first, we would like to thank Rajiv Gandhi Fellowship Scheme, University Grants Commission for funding this study. We are thankful to Dr. John Ebnezar for his support and valuable guidance throughout the course and we gratefully acknowledge him for permitting us to conduct the study at his hospital, ebnezar orthopaedic centre, parimala health care services, Bengaluru and we also thank all the staff members of Ebnezar orthopedic center for their co-operation and continuous support. We would like to thank Mr. Balaram Pradhan, the statistician, Mrs. Sharada, Miss Arshi Nawaz, Miss. Santoshi and Mr. Bikash Kongeri and Mr. John, and Mr. Devaraj physiotherapists and the yoga therapists for having helped us in completing this study successfully.

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How to cite this article:

Yogitha Bali M.R., Ebnezar J, Rakesh J. Efficacy of yoga therapy (IAYT) on pain in patients undergoing conventional physiotherapy for chronic low back ache. *J Pharm Sci Innov.* 2016;5(3):93-102 <http://dx.doi.org/10.7897/2277-4572.05320>

Source of support: Rajiv Gandhi Fellowship Scheme, University Grants Commission, Conflict of interest: None Declared

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