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Effectiveness of Hatha Yoga Versus Conventional Therapeutic Exercises for Chronic Non-Specific Low-Back Pain

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Abstract - We set out to compare the pain-relieving and functional-regaining effects of Hatha yoga therapy for people with CNLBP to those of more traditional therapeutic activities (CTEs). Supervised intervention was provided for a total of 6 weeks, followed by 6 weeks of follow-up. The Centre for Integrative Medicine and the Department of Physical Medicine and Rehabilitation at a large medical centre performed the research. Patients aged 18–55 had a 12-week history of CNLBP and a pain level of 4 on the numeric pain rating scale. (0–10). People with CNLBP who are new to either Hatha yoga or CTE will benefit from six weekly, 35-minute yoga sessions (yoga group) and six every week, 35-minute CTE sessions (CTE group). On non-class days, participants were instructed to practise at home. Use of pain medications weekly and subjective improvement in back-related dysfunction following the intervention were secondary outcomes. Outcomes were recorded at three time points: at baseline, after six weeks, and after twelve weeks. Seventy people were split into two groups at random: yoga (n = 35) and cognitive training exercises (CTE). The newest observation was included in the analysis under the "intention to treat" premise. Participants in both the yoga and CTE groups reported statistically significant improvements in their back pain and back-related dysfunction at the 6- and 12-week follow-ups, relative to their baseline evaluations. Similar gains were seen in both groups' adherence to prescribed medications and their sense of progress towards recovery. Patients with CNLBP reported the same level of relief from yoga as they did with CTEs.

Keywords- Yoga, Exercise, Low-Back Pain, Conventional Therapeutic Exercises (CTE), Chronic Non-Specific Low-Back Pain (CNLBP), Roland Morris Disability Questionnaire (RDQ)

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INTRODUCTION

Discomfort in the lower back is characterised by soreness, muscular tension, or rigidity below the costal border and above the inferior gluteal folds. It's possible to have low back pain without any associated leg pain. When symptoms persist for more than 12 weeks, medical professionals call the condition chronic. Pain in the lower back that cannot be linked to an identifiable disease is referred to as nonspecific low-back pain [1]. The term "chronic nonspecific low back pain," or CNLBP for short, is a socioeconomic and health issue that is exceedingly prevalent in today's culture. Between 40.7% and 42.4% of the Indian population suffers from low back discomfort at any one time. Conventional therapy exercises, also known as CTEs, are the no pharmacologic treatment that is utilised the most often and has previously been shown to be a useful component in the treatment of chronic non-specific low back pain (CNLBP). Yoga-based therapy has also shown promise for lowering pain and pain-related impairment in those with persistent low back pain. This provides support for the possibility that yoga-based treatments are useful for CNLBP [2-3].

According to a recent meta-analysis, not enough studies have directly compared yoga to therapeutic activities for the treatment of dysfunction and discomfort in the back. In addition, it came as a surprise to learn that, despite Yoga's long history on the Indian subcontinent, very little published research has examined the efficacy of Yoga therapy for people suffering with CNLBP in the Indian community [4-5]. As a consequence, researchers devised a randomised controlled trial to assess Yoga's efficacy relative to other therapeutic activities for people with CNLBP. This consisted of a planned, 35-minute weekly course of yoga treatment with CTEs over a period of 6 weeks, and was supported with home practise. The objective was to help people with CNLBP alleviate their discomfort and restore their function. It was hypothesised that people with chronic non-specific low back pain will benefit as much from yoga treatment as from CTEs in terms of reducing pain and improving back-related dysfunction. (CNLBP). If, on the other hand, yoga is shown to be less beneficial than other treatments, then having this knowledge can assist guide better treatment selections and avoid the needless

investment ineffective therapies over longer periods of time [6-7].

Yoga and CTEs were compared in terms of their ability to alleviate pain, improve back function, reduce the need for pain medication, and improve patients' views of their own development. After 6 weeks of treatment, people in both the Yoga and CTE groups reported significantly less dysfunctions of the back and the back itself, and these results persisted at the 12-week follow-up assessment [8]. The findings provide credence to the concept that patients suffering from CNLBP experience a comparable reduction when it comes to back issues, pain, and dysfunction as those suffering from CTEs as a consequence of yoga treatment. The results of both of these therapies were found to be successful, which is consistent with the findings of earlier research. Another finding that came out of the research was the average number of medications taken per week. According to the study of the groups' intentions to be treated, there was no statistical significance found for the CTE or Yoga groups [14].

In light of the fact that these findings run counter to their predictions, exercising some degree of care is strongly recommended here. Both the Yoga and CTE groups were confirmed to have statistical significance once the data were reanalysed in accordance with the methodology. It is possible to presume that the dropouts are to blame for the findings that were not obtained, and this may be a legitimate assumption to make [15-17]. Statistical analysis reveals that the majority of research volunteers have no longer felt the need to take medicines; although 46 persons were taking pills at the start of the trial, just three were still taking pills by the conclusion of the study. This suggests that most people were OK going without any kind of pharmaceutical assistance. With these factors in mind, the researchers concluded that Yoga and CTEs had a clinically meaningful effect on drug use. Williams et al. [6] found that Yoga patients reduced their use of opioids at the 12-week mark of their study, but this result has to be confirmed since the control group did not engage in any physical activity.

As a corollary, the usual levels of back pain and dysfunction were significantly reduced. No discernible gap emerged between the Yoga and CTE groups in terms of statistical significance. Even though the findings did not attain statistical significance, the results are clinically significant since a proportion of the individuals reported that they had improved since the beginning of the treatment [16].

During the course of the current research, it was discovered that both yoga and the CTE treatment were risk-free, with just a few mild adverse effects, most of which were associated with an increase in low-back discomfort. There have only been a few studies done in the past that have revealed that the adverse effects were largely linked to moderate self-limiting joint and back pain, and that In terms of frequency and intensity, there was no statistically significant difference between the groups [17-18].

One of the merits of their study is that they used accepted end factors, computerised randomization that minimised problems with sample selection, assessment, and statistical analysis blinding to ensure their research was methodologically sound. Other strengths include the use of adequate outcome variables. Blinding of the participants was not even a remote possibility in this kind of investigation. In next research, the reasons and motives for the participants' compliance with the study may be investigated. At least in clinical contexts, this knowledge might be utilised to inform the development of strategies for patient retention. [19].

In light of this, the current protocol did not make any efforts to increase compliance, nor did it implement any strategies intended to urge participants to stick to the procedure. Such characteristics were conceived of with the broad application of the findings in mind throughout the design process. Given the prevalence of yoga in modern culture, it would be fascinating to see data indicating either is a practise that is strongly ingrained in the culture of India. As a result, conducting such studies has its own unique set of obstacles and strengths [20].

METHODOLOGY

- The research was a randomised controlled trial (RCT) comparing the benefits of weekly supervised 35-minute Yoga sessions to those of CTE sessions, both designed for CNLBP. The trial consisted of two phases: an initial 6-week intervention period consisting of a 35-minute weekly supervised session at the institute and practise at home on no class days, followed by a 6-week follow-up period. All participants were encouraged to practise at home throughout the 6-week follow-up period. The study protocol was approved by the institute's ethics committee, and all participants provided oral and written informed consent prior to eligibility screening and baseline assessment, respectively.
- **Situations and players**: This investigation during the months of February 2017 and May 2017 and April 2018 at a tertiary care hospital's Department of Physical Medicine and Rehabilitation (PMR) and Centre for Integrative Medicine and Research (CIMR). Eligibility was determined for patients between the ages of 18 and 55 who presented as outpatients to the PMR department with a complaint of CNLBP lasting 12 weeks and a pain rating of 4 on a 0–10 numeric rating scale (0 = no pain to 10 = worst conceivable pain). The patient's medical history and clinical examination findings were recorded. Every patient received a complete blood count (haemoglobin, total leukocyte count, differential leukocyte count, erythrocyte sedimentation rate) and a radiograph of the lumbar spine

(anteroposterior and lateral views). If necessary, further investigations were conducted.

- **Interventions:** Individuals received six regular 35-minute Yoga sessions at the CIMR and six regular 35-minute CTE sessions at the PMR Department. The CTE intervention was a 35-minute session held once a week, much as the Yoga classes. Postural care instruction for CNLBP was given to both groups. On days when there was no scheduled lesson, all students in both groups were obliged to practise for 30 minutes using given materials.
- Conventional Hatha yoga practises were coupled with the CIMR to create an integrated yoga therapy module for chronic non-specific low back pain. This combination allowed for the creation of an integrative yoga therapy module. The researchers came to the conclusion that it would be most practical and economical to carry out their investigation during a yoga session that took place once a week for a total of 35 minutes. Each session started out with an explanation of what Hatha yoga is, and then moved on to flexibility exercises, four distinct Yogasanas, a quick meditation approach, pranayama, and a deep meditation practise. The last portion of the programme consisted of a lengthy relaxation exercise. (Table 1). The lesson was led by a certified yoga therapist who also had a teaching licence. When there was a gap in the schedule for yoga sessions, participants were encouraged to practise yoga on their own for a period of thirty minutes at home.

Table 1: Elements of Hatha Yoga Sessions

Sr. No.	Elements of each of the Yoga Session	Time (in minutes)
A	An Overview of the Yoga Tradition	2
B	Bhramari (Humming breathing)	3
01	Bhujangasana (Cobra Pose)	2
02	Meditation (Deep relaxation technique)	
03	Nadi suddhi (Alternate nostril breathing)	3
C	Pranayama (breath control)	
01	Quick relaxation technique	
02	Salabhasana (Grasshopper Pose)	2
03	Savasana (Chanting AUM or OM)	5
04	Savasana (Corpse Pose) with pranayama	5
D	Setubandasana (Bridge Pose)	2
01	Shavaudarakarshanasana (Crossed leg lumbar stretch)	2
E	Sithilikaran Vyayama (Flexibility practice)	
01	Supta Pawanmuktasana (leg lock pose)	2
02	Supta Udarakarshanasana (folded leg lumbar stretch)	2
F	Ustrasana (Camel Pose)	5
01	Yogasanas	
	Total	35

- **CTE group:** Licensed physiotherapists led the sessions that took place on a regular basis., who first gave a brief educational discussion on appropriate body mechanics and the advantages of exercise, then led participants in a basic warm-up, three different stretches, and five different strengthening exercises that focused on the hips, abdominals, and back. (Table 2). The stretching and strengthening exercises were each performed ten times, with a hold duration of ten seconds each time. After each circuit of strength training, we did a new series of stretching exercises to cool down. At the conclusion of each session, there would be a few minutes of deep, calm breathing that was done on your own and was not guided.

Table 2: Components of CTE Sessions

Sr. No.	Target Muscle	Timing (min)
A	Erector spinae strengthening	3
B	Erector spinae stretching	3
C	Hamstring extending out on each sides	2
	Hip abductor enhancing performance on two fronts	2
	Hip extensors enhancing performance on two fronts	3
	Oblique abdominal muscle enhancing performance on two fronts	3
	Pyriformis extending out on each sides	3
	Rectus abdominis strengthening	2
	Relaxation	5
	An Overview of Exercise and Its Benefits	5
D	Exercises for warming up	4
	Total	35

- **Outcome measures**: The key indicators of success were assessments of pain intensity and function associated with the back. The secondary outcomes were pain medication use and perceived recovery of back pain and dysfunction following intervention. Assessments were conducted at baseline, after six weeks of intervention, and at 12-week follow-up intervals [9]. The Roland Morris Disability Questionnaire, which consists of 24 questions, was used to evaluate back-related dysfunction. (RDQ). Because each inquiry is worth one point, the total score might vary anywhere from 0 (indicating no impairment) to 24. (severe disability). Validity, dependability, and adaptability are hallmarks of the RDQ [10-11]. These key outcomes were collected at the beginning of the study, when the intervention was completed 6 weeks later, and again 12 weeks later. A version of the RDQ that was translated into the local language (Hindi), for those individuals who felt more comfortable speaking it, was made available.

A series of questions were posed in order to ascertain the quantity of pain medication used on a weekly basis [12] for the treatment of CNLBP before to the intervention. Changes in

the amount of drugs that were used on a weekly basis were tracked in both groups six weeks and twelve weeks after the completion of the intervention, respectively.

The patient judged his or her recovery from back-related pain and dysfunction using a seven-point Likert scale that ranged from "very large improvement" (including total recovery) to "much improved" to "little improved" to "unchanged" to "little worse" to "much worse" to "very much worse" [13]. The scores were reviewed based on how they had changed from the previous time point.

- **Calculation of sample size**: The sample size was determined beforehand and was performed using the study of Nambi et al, in which the mean pain-related functional disability and standard deviation were reported as 2.5 and 3.0, respectively. Assuming a significance level of 5% and a power of 95%, the requisite sample size for measuring the effect was 30 subjects per group. Considering a 10% attrition rate, the ultimate sample size for each cohort was 35. The total number of samples was 70.
- **Randomization and blinding**: A random number generator was used to assign participants to treatment groups sequence (block randomization; 70 participants were assigned to one of two blocks containing 35 samples each). There were used opaque, sealed envelopes to conceal the allocation. Investigators involved in study design, recruitment, eligibility, outcome assessment, and statistical analysis were unaware of the intervention allocation; only the intervention administrators and carers were aware of the allocated intervention, but they had no impact on recruitment, eligibility, or study conclusions.
- **Statistical analysis**: Using Shapiro– Wilk normality tests, the data were examined for normal distribution. The dependent variables were reported pain severity, back-related dysfunction, weekly medication use, and self-reported improvement. Comparisons of outcomes were made using both an intention-to-treat analysis (in which missing data were imputed using the last observation carried forward) and a per-protocol analysis. Since it was not possible to assume a normal distribution, numerical variables were reported as medians. (first quartile, third quartile). Two-group comparisons of the impact of Yoga against CTEs were reported using Wilcoxon's signed-rank test for intention-to-treat protocol and the Mann-Whitney U-test for per-protocol analysis. The impact of each treatment on back pain was characterised via multiple group comparisons utilising the Friedman test for intention-to-treat protocol and the Kruskal-Wallis H-test for per-protocol analysis. (within-group comparisons). Categorical data was evaluated using the Chi-square test. GraphPad Prism was used for the analysis, and the significance level was set at 0.01.
- **Additional Analysis:** To check whether the planned interventional sessions and the procedure were really implemented, further data analysis was performed. A "good adherence" rate was assigned to individuals who attended at least three supervised Yoga or CTE sessions, while a "poor adherence" rate was assigned to those who attended at least two sessions. Participants were regarded to have "completed" the study if they returned to the clinic for all scheduled evaluations of end measures, whereas those who were unable to do so were judged to have "not completed" the trial.

RESULTS

- There were 70 patients, 43 of whom received treatment for 6 weeks (61%), and 35 of whom completed 12 weeks of follow-up (50%). For whatever reason, 3 patients (4%) did not get their prescribed treatment. Twenty-four people (34%) dropped out of the intervention without giving a clear explanation why. We were unable to contact eight patients (11%).
- CNLBP sufferers who were included in the study reported an average pain intensity of 5.8 on a 10-point scale and a mean duration of 23.118.7 months. There was a wide range of ages represented, from 18 to 60, with the average being 35.810.6 years old. There were no significant differences between the groups at the time of randomization with regard to age, gender, marital status, profession, symptomatic duration, initial malfunction of the back, or back discomfort. (Tables 3–7).

Table 3: Participant Features at the Outset

Characteristics	Yoga (n=35)	CTE	P-value
SYMPTOM DURATION (MONTHS)	12 (9.5, 36)	18 (6.3, 30)	0.86
SEX (MALE : FEMALE)	19:18	17:18	0.06
OCCUPATION (EMPLOYED : UNEMPLOYED)	20:15	15:20	1.0
MARITAL STATUS (MARRIED : UNMARRIED)	29:7	24:11	0.03
AGE (YEARS)	38 (26.5, 43)	33 (27.5, 44)	0.45

- At both the Check-ins at 6 and 12 weeks, the DVPRS scores of the Yoga and CTE groups were significantly higher than at baseline, indicating a reduction in back pain. There was no statistically significant difference in improvement between the Yoga group and the CTE group at the 6- and 12-week follow-up. (table 4).

Table 4: Intensity Scores for Patients with Low Back Pain

		n	Yoga	n	CTE	P-value (Within groups)
WILLINGNESS TO TREAT	BASELINE	35	5 (4, 8)	35	6 (5, 6.5)	0.09
	SIX WEEKS	35	5 (1.6, 5)	35	5 (3, 3.5)	0.57
	TWELVE WEEKS	35	5 (1.8, 5)	35	4 (1, 4)	0.86
	P-VALUE (within groups)		<0.01		<0.01	
PER-PROTOCOL	BASELINE	35	5 (3, 8)	35	6 (4, 5.5)	0.26
	SIX WEEKS	20	3 (1, 2.5)	23	3 (1, 4)	0.16
	TWELVE WEEKS	17	3 (1, 4)	18	2 (0.2, 3)	0.39
	P-VALUE (within groups)		<0.01		<0.01	

- At 6- and 12-week follow-up, RDQ scores for those in the Yoga and CTE groups were significantly higher than they had been at baseline, suggesting less pain and difficulty with movement in the back. At the 6- and 12-week points, there was little variation between the Yoga and CTE groups (Table 5). Twenty-one people said they were using painkillers before the study began.

Table 5: Similarities and Differences in Back Pain

		n	Yoga	n	CTE	P-value (Within groups)
WILLINGNESS TO TREAT	BASELINE	35	12 (7, 13)	35	10 (7, 15)	0.37
	SIX WEEKS	35	7 (5.3, 11)	35	6 (2, 11)	0.49
	TWELVE WEEKS	35	6 (3.4, 11)	35	6 (0, 9)	0.19
	P-VALUE (within groups)		<0.01		<0.01	
PER-PROTOCOL	BASELINE	35	12 (6, 14)	35	10 (6, 13)	0.37
	SIX WEEKS	20	6 (2, 7.5)	23	4 (1, 5.5)	0.42
	TWELVE WEEKS	17	4 (0, 6)	18	1 (0, 2.5)	0.08
	P-VALUE (within groups)		<0.01		<0.01	

- At the 6-week and 12-week points after randomization, both groups used about the same amount of analgesics on a weekly basis on average. Intention-to-treat analysis did not find that yoga and CTEs decreased medication usage, but per-protocol analysis did. (Table 6).

Table 6: Utilization of Pain Medication: A Comparison

		n	Yoga	n	CTE	P-value (Within groups)
WILLINGNESS TO TREAT	BASELINE	35	0 (0, 11)	35	0 (0, 09)	0.85
	SIX WEEKS	35	12 (0, 13)	35	7 (0, 10)	0.89
	TWELVE WEEKS	35	6 (0, 11)	35	6 (0, 12)	0.92
	P-VALUE (within groups)		0.7		0.21	
PER-PROTOCOL	BASELINE	35	5 (0, 12)	35	4 (0, 15)	0.79
	SIX WEEKS	20	12 (0, 14)	23	7 (0, 13)	0.94
	TWELVE WEEKS	17	0 (0,0)	18	0 (0,0)	0.32
	P-VALUE (within groups)		<0.1		<0.1	

- During the 6-week intervention and 12-week follow-up periods, all individuals reported some type of improvement from baseline, with the exception of one person in the yoga group who reported no change after the 6-week intervention. After the 12-week Yoga program, five people reported "very much improvement," while eight reported "much improvement." Nine (50%) and seven (7%) people were found to have CTE. There was no difference between the Yoga and CTE groups at the 6- and 12-week follow-ups. (Table 7).

Table 7: Recovery from Back-Related Dysfunction: Patient Reports and Other Studies

		n	Yoga	n	CTE	P-value (Within groups)
WILLINGNESS TO TREAT						
	6-WEEKS	20	2 (1.7, 2.3)	23	2 (1, 2)	0.87
	12-WEEKS	17	2 (2, 3)	18	2 (2, 3)	0.32
	P-VALUE (within groups)		0.22		<0.01	
PER-PROTOCOL						
	6-WEEKS	20	12 (0, 15)	23	7 (0, 15)	0.87
	12-WEEKS	17	2 (2, 3)	18	2 (2, 3)	0.24
	P-VALUE (within groups)		0.12		<0.1	

- On the whole, people showed up to 4.3 of 2.2 classes, with 47 people making the cut as "good adherents" by showing up to all 4 classes. Three Yoga group members and five CTE group members dropped out, and four were lost to follow-up despite the groups' excellent compliance. Just three out of seventy participants actually attended class and were treated with the intervention that had been assigned to them. Twenty participants paid the £3 to drop out of the allocated intervention and attend lessons. Those who gave up on the treatment after the first 6 weeks did not provide any information. The authors looked for preexisting factors that could have affected the participants' commitment to the study. When we analysed the baseline characteristics of individuals with a high and low degree of adherence and compliance, respectively, we found no statistically significant variations between the two groups. (Tables 8 and 9)

Table 8: Comparing Good and Poor Adherence Based on Initial Characteristics

CHARACTERISTICS	GOOD ADHERERS	POOR ADHERERS	P-VALUE (between groups)
AGE (YEARS)	35 (29, 41)	36 (26, 47)	0.98
PROBLEMS WITH YOUR BACK	10 (7, 14)	12 (8.5, 15.5)	0.31
INTENSITY OF BACK-PAIN	5 (5,7)	5 (4, 7)	0.64
COUNTING PILLS WEEKLY	10 (0, 15)	7 (0, 17.5)	0.85
SYMPTOM DURATION (MONTHS)	21 (8.25, 36)	12 (6, 36)	0.42
SEX (MALE : FEMALE)	24:21	11:14	0.40
OCCUPATION (EMPLOYED : UNEMPLOYED)	26:21	9:14	0.20
MARITAL STATUS (MARRIED : UNMARRIED)	37:12	17:8	0.63

Table 9: Characteristics of the Rejects at the Outset

CHARACTERISTICS	COMPLETED	NON-COMPLETERS	P-VALUE (between groups)
PROBLEMS WITH YOUR BACK	11 (7, 14.5)	14 (8.5, 14.5)	0.17
AGE (YEARS)	36 (29, 43)	35 (26, 44.5)	0.76
INTENSITY OF BACK-PAIN	5 (5,8)	5 (4, 7)	0.22
COUNTING PILLS WEEKLY	6 (0, 2)	7 (7, 19.5)	0.10
SYMPTOM DURATION (MONTHS)	21 (8.25, 45)	12 (8.5, 15)	0.22
SEX (MALE : FEMALE)	22:15	15:22	0.10
OCCUPATION (EMPLOYED : UNEMPLOYED)	20:16	15:20	0.23
MARITAL STATUS (MARRIED : UNMARRIED)	25:12	28:8	0.67

CONCLUSION

The goal of this research was to examine whether or not the pain-relieving and function-improving benefits of Hatha yoga treatment for patients with chronic nonspecific low-back pain are comparable to those of conventional therapeutic activities (CTEs). An initial session of supervised intervention lasting for six weeks was followed by a period of follow-up lasting for the same amount of time. The Department of Physical Medicine and Rehabilitation, in conjunction with the Centre for Integrative Medicine, as well as an investigation of a tertiary care facility, carried out this inquiry. Patients between the ages of 18 and 55 with a 12-week history of CNLBP and a pain level of 4 on a numeric pain grading scale (0–10). Individuals with CNLBP who had never participated in a yoga or CTE class before will be offered six weekly, 35-minute Group Hatha yoga classes and six weekly CTE sessions of 35 minutes each. Both groups will meet six times per week. individuals diagnosed with CNLBP saw a reduction in pain intensity and an improvement in back-related dysfunction that was equivalent to that seen in individuals diagnosed with CTEs. The Defence and Veterans Pain Rating Scale, which ranges from 0 to 10, and the Roland Morris Disability Questionnaire, which has 24 points, were the major instruments used to assess the outcomes. (RDQ). The most recent observation was used in the analysis, which is consistent with the intention-to-treat method of data interpretation.

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