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RESEARCH ARTICLE

An Evidence- Based Empirical Analysis of Yoga as A Therapeutic Intervention for Chronic Low Back Pain

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Abstract: Nearly 60–80% of people will experience chronic low back pain (CLBP) at some time in their life, making it one of the most common musculoskeletal conditions in the world. It poses a serious socioeconomic cost by causing disability, absenteeism, and a decline in quality of life. Traditional treatment approaches, such medication, physical therapy, and surgery, can offer only brief or partial relief and may have adverse effects or poor adherence. Yoga has drawn a lot of interest as a supplemental therapy for the treatment of CLBP since it is a non-invasive and holistic approach. Yogic practices are thought to treat the psychological and physiological aspects of chronic pain by including physical postures (asanas), breathing methods (pranayama), relaxation, and awareness. Methodology: 60 people, ages 25 to 55, who had been diagnosed with CLBP that had persisted for more than45 Days, participated in a randomised controlled experiment. Participants were divided into two groups at random: (I) the Yoga group (n=30), which received a structured 18week yoga intervention that included pranayama practices, guided relaxation, and specific asanas, Pranayama and (II) the Control group (n=30), which received standard physiotherapy and medication as prescribed. The Visual Analogue Scale (VAS) was used to quantify the level of pain, the Oswestry impairment Index (ODI) was used to measure functional impairment, and the Depression Anxiety Stress Scale (DASS-21) was used to measure psychological consequences. Pairwise and independent t-tests Result: With a mean difference of 27.46 (95% CI: 26.59–28.33), a paired samples t-test revealed a significant improvement following the yoga intervention (t (23) = 65.18, p <.001). Yoga demonstrated steady, persistent, and dependable therapeutic effects for individuals with chronic low back pain by significantly reducing pain and functional impairment.

Keywords: Yoga, Chronic Low Back Pain, Therapy, Pranayama , DASS-21, VAS.

INTRODUCTION

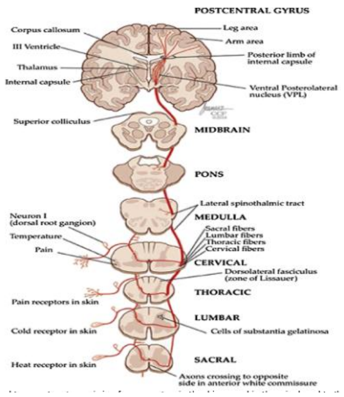
Low back pain (LBP) is the most prevalent musculoskeletal ailment affecting the adult population, with a frequency of up to 84% [1]. The lower back pain condition known as chronic LBP (CLBP) lasts for at least 12 weeks [2]. Avoiding this near temporal constraint, several writers propose defining chronic pain as pain that persists after the anticipated healing period. This definition is crucial since it emphasises that CLBP is an illness, not a symptom, and that it has clear pathological origins. CLBP is a significant social and economic issue and the primary cause of disability globally [3]. Because of this intricacy, diagnosing people with LBP may be extremely difficult and necessitates intricate clinical judgement. Since a diagnosis that is not based on a particular pain generator may result in treatment errors, it is crucial to address the question of "what is the pain generator?" among the several structures that may be implicated in CLBP [4]. In order to guide doctors towards the appropriate diagnosis and treatment strategy, this article attempts to offer a concise clinical guidance that may aid in the identification of pain generators through a thorough anatomical description [5].

Anatomy Low Back: There are five vertebrae in the lumbar spine (L1–L5). These powerful vertebrae, connected by joint capsules, ligaments, tendons, and muscles, and with a great deal of innervation, make up the intricate structure of the lumbar spine. Because it must shield the spinal cord and spinal nerve roots, the spine is made to be sturdy [6]. It is also quite adaptable, allowing for motion in a wide range of planes. With an IVD in between, the symphyseal joints between the vertebral bodies provide the vertebral column its motion. The facet joints, which support the stability of the spine, are situated behind and between neighbouring vertebrae [7]. Approximately 20% of the torsional (twisting) stability in the neck and low back segments is provided by them, and they are present at all spinal levels. Ligaments help keep joints stable when moving and at rest, avoiding damage from excessive flexion and extension. The anterior longitudinal ligament (ALL), posterior longitudinal ligament (PLL), and ligamentum flavum (LF) are the three primary ligaments. The canal is surrounded by vertebral bodies and discs anteriorly and by laminae and LF posteriorly [8]. The PLL and ALL are located anteriorly and posteriorly, respectively, along the whole length of the spine. The intervertebral foramen is where spinal nerves and arteries emerge laterally. Spinal nerve roots emerge from the appropriate foramen located beneath each lumbar vertebra. For instance, the L1 neural foramina, from which the L1 nerve root emerges, are situated just beneath the L1 vertebra. In between vertebrae are IVDs. Through osmotic pressure, these compressible structures may disperse compressive stresses [9]. The IVD's inner nucleus pulposus (NP), which is rich in proteoglycans, is encircled by the annulus fibrosus (AF), a concentric ring structure of ordered lamellar collagen. Adult discs, with the exception of the periphery, are avascular. There is some vascular supply to the human disc at birth, but these veins quickly disappear, leaving the disc with minimal direct blood supply in a healthy adult. Therefore, the cartilaginous endplates next to the vertebral body are essential for the metabolic maintenance of a large portion of the IVD [10]. The region around the disc space is innervated by the recurrent sin vertebral nerve, a meningeal branch of the spinal nerve. Four functional muscle groups—the extensors, flexors, lateral flexors, and rotators—control the lumbar spine. Lumbar arteries that start in the aorta vascularise the lumbar vertebrae. The lumbar arteries' spinal branches split into smaller anterior and posterior branches when they enter the intervertebral foramen at each level. The arterial supply and the venous drainage are parallel [11].

In the foramina as a single pair of spinal nerves. At the lower border of the L2 vertebra, the end of the spinal cord normally forms the conus medullaris inside the lumbar spinal canal. The link between the ventral or anterior (somatic motor) root from the anterolateral portion of the spinal cord and the dorsal or posterior (somatic sensory) root from the posterolateral aspect of the cord is the source of all lumbar spinal nerve roots. Following their development into the cauda equina, the roots descend down the spinal canal and emerge at their respective intervertebral foramina as a single pair of spinal nerves [12].

In the foramina as a single pair of spinal nerves. Directly returning to the spinal canal, this polisegmentary mixed nerve produces ascending and descending anastomosing branches that include somatic and autonomic fibres for the ventral meninges, the posterior vertebral body and periosteum, and the posterolateral annulus. It is difficult to pinpoint pain resulting from involvement of the sin vertebral nerves since they link with branches from radicular levels both above and below the point of entrance, as well as the contralateral side. Additionally, somatic and autonomic components make up the two-level innervation that the facet joints receive. Whereas the autonomic afferents communicate referred pain, the former transmit a clearly defined local pain [13].

Figure 1: Anatomy Low Back



The Ligamentous Concept:
In the foramina as a single pair of spinal nerves. Abnormal forces operating on the body as a whole, and more especially on the facet joints, ligaments, and intervertebral discs, are the initial cause of back discomfort. The soft tissue ligamentous structures are the key structural element that passively stabilises the spine and preserves alignment. These consist of intervertebral discs, ligaments, and joint capsules. One is more susceptible to CLBP if these structures are damaged. The main ligaments that support the spine are shown in Spinal misalignment can result from trauma or accumulated microtrauma that damages the ligaments, impairing the spine's structural integrity. Events like auto accidents or repeated motions from sports like cricket, gymnastics, and golf can cause trauma[14,15]. In the foramina as a single pair of spinal nerves. Micro-trauma can also result from bad postural patterns while sitting at an office desk. If a nerve is pinched by abnormal mechanical pressures acting on normal ligaments, pain may result. Neurones that innervate the ligament itself have the ability to produce pain if mechanical or chemical irritation disturbs it. The vertebrae, disc, and facet joints may experience severe and constant axial loads due to a misaligned spine. Long-term aberrant strain on ligaments as a result of misalignment triggers inflammatory and degenerative reactions that cause discomfort [16,17].

Myofascial and Spinal Muscles: In the foramina as a single pair of spinal nerves. Trauma or repeated motion injuries are the first causes of myo-facial discomfort. The presence of certain sites along the muscles, tendons, or fascia that, when activated, cause pain is what defines this kind of pain. One tissue that is crucial to the stability of the spine is the thoracolumbar fascia (TLF). According to anatomical research, the TLF effectively transfers external stresses from the spine to the arms, legs, and pelvis. The TLF functions similarly to an external layer of structural support for the spine above the spinal ligaments since it also has a large number of mechanoreceptors that transmit information about spinal position. The erector spinae and lumbar multifidus are additional structures that support the spine [18].

In the foramina as a single pair of spinal nerves. Muscular structure changes from acute to CLBP, exhibiting atrophy, fat infiltration, and connective tissue buildup, according to earlier research. These structural alterations are often explained by deconditioning, pain/fear avoidance, or compensatory disuse brought on by modifications in movement patterns to protect the multifidus from stresses. According to one study, disc degeneration was less important in causing CLBP in women than fat infiltration into the paraspinal muscle. According to a different research, degenerative discs—currently the most often documented cause of CLBP—are strongly linked to fat infiltration into the multifidus and erector spinae. By lowering the spinal muscles' capacity to support the spine structurally, these processes increase the strain on the spine [19,20].

Spinal Muscles and Mechanoreceptors: In the foramina as a single pair of spinal nerves. The proper postural alignment of the spine is also influenced by the spinal muscles in addition to the ligaments. Many mechanoreceptors in the spinal column ligaments, facet capsules, and disc annulus provide signals to the brain after ligament injury and spinal misalignment. The brain receives tactile sensations and positional awareness from these mechanoreceptors, and experiments on animals have shown that spinal muscle activation occurs when ligaments, discs, and facets are stimulated. It has been demonstrated that this kind of spinal muscle activation is modulated by cumulative microtrauma, static flexed posture, and ligament fatigue. In normal conditions, the brain interprets the complex signal produced by the mechanoreceptors and triggers a muscular reaction to stabilise the spine [21].

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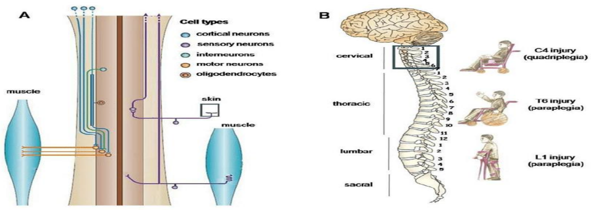
Figure 2: Spinal Muscles



The pathogenesis of back pain: In the foramina as a single pair of spinal nerves. Nociceptors are specialised peripheral sensory neurones that mediate pain by converting potentially harmful skin stimuli into electrical signals that are sent to higher brain centres. The drug contains the neuronal body of nociceptors, which are pseudo-unipolar primary somatosensory neurones. They are bifurcate axons, with the central branches synapsing on second-order neurones in the spinal cord's dorsal horn and the peripheral branch innervating the skin. Second-order neurones control the sensory-discriminative and affective-cognitive aspects of pain by projecting to the mesencephalon and thalamus, which then link to the somatosensory and anterior cingulate cortices, respectively [23,24].

In the foramina as a single pair of spinal nerves. The spinal dorsal horn, which is made up of several interneuron populations that create descending inhibitory and facilitatory pathways and can modify the transmission of nociceptive signals, is a key location for the integration of somatosensory information. Acute pain may become chronic if the unpleasant stimulus continues to trigger peripheral and central sensitisation processes. Increased neuronal excitability in the central nervous system causes normal inputs to start eliciting aberrant responses, a phenomenon known as central sensitisation. It is in charge of the propagation of pain hypersensitivity outside of a region of tissue injury as well as tactile allodynia, which is pain triggered by gentle skin brushing [25].

In the foramina as a single pair of spinal nerves. Numerous chronic pain conditions, including temporomandibular disorders, LBP, osteoarthritis, fibromyalgia, headaches, and lateral epicondylalgia, can cause central sensitisation. It is still challenging to treat, even with our growing understanding of the mechanisms behind central sensitisation. Sensitisation, both central and peripheral, is crucial to LBP carbonification. Indeed, even little alterations in posture have the potential to cause chronic inflammation in the muscles, ligaments, and joints that support the stability of the low back column, which can lead to both central and peripheral sensitisation. Additionally, A delta fibres, which are abundantly innervated in bones, discs, and joints, may readily contribute to central sensitisation by constant stimulation [26].

Patient and Methodology:
The sample of 60 patients of Therapeutic Effect of Yoga on Chronic Low Back Pain They have been further dived into group experimental & control. will be taken form Dehradun City (Uttarakhand) belonging to age group between 25 to 55 years. The subjects were selected by using quota sampling technique.

Table 1: Group Allocation

Group	Sample size (n)	Intervention Description	Duration
Experimental	30	Under the guidance of a certified yoga instructor, received a structured yoga intervention program that included Pranayama (Anulom Vilom & Bhramari) and Asanas (Marjariasana, Adho Mukha Svanasana, Trikonasana, Salamba Bhujangasana, Bhujangasana, Setu Bandhasana, Ardha Matsyendrasana) with guided relaxation.	45 min
Control	30	Received conventional physical treatment and, under medical recommendation, was provided medication.	45 min

Table 2: Yogic Intervention

Phase	Yoga	Time	Therapeutic Focus
Mobilisation warm-up	Marjariasana	5min	enhances vertebral mobility, increases spinal flexibility, and gets muscles ready for deeper positions.
Strength and Alignment of the Core	Adho mukha svanasana	5 min	lengthens the spine, eases back stiffness, and strengthens the upper body and core.
Lateral Stretch & Balance	trikonasana	5 min	improves postural stability and spinal alignment by increasing lateral flexibility and balance.
Extension of the Back (Supported)	Salamba Bhujangasana	5 min	facilitates mild spinal extension without compression and strengthens the lumbar extensors.
Extension of the Back (Active)	Bhujangasana	5 min	increases blood flow, spinal flexibility, and lower back muscular strength.
Pelvic Stability	Setu Bandhasana	5 min	stabilises the lumbar spine and pelvis by activating the gluteal and hamstring muscles.

SpinalvRotation	Ardha Matsyendrasana	5 min	increases intervertebral flexibility, eases stress, and encourages spinal motion.
Relaxation & Breath Control	Pranayama Anulom Vilom Bhramri	10 min	improves mind-body equilibrium, decreases sympathetic activity, relaxes paraspinal muscles, and lessens stress.

Marjariasana: The spine is stretched and mobilised with this easy backbend. This position also helps to expand your neck, shoulders, and torso.

Worked muscles:

- erector spinae
- rectus abdominis
- triceps
- serratus anterior
- gluteus maximus

Put your knees behind your hips and your wrists beneath your shoulders. Distribute your weight equally over the four spots. As you glance up, take a breath and let your stomach to fall towards the mat. Draw your navel into your spine, arch your spine towards the ceiling, and tuck your chin into your chest as you exhale. As you do this action, keep your body in mind. Pay attention to identifying and letting go of any tightness in your body. Maintain this smooth motion for a minimum of one minute.

Adho mukha svanasana: This classic forward bend has the potential to be revitalising and soothing. Sciatica and back discomfort can be lessened by using this position. It enhances strength and aids in correcting bodily imbalances.

Muscles worked:

- hamstrings
- deltoids
- gluteus maximus
- triceps
- quadriceps

Align your knees behind your hips and your hands beneath your wrists. Tuck your toes under, raise your knees and press onto your hands. Your sitting bones should be raised towards the ceiling. Lengthen your spine and tailbone while maintaining a little bend in your knees. Don't let your heels touch the floor. Firmly press into your palms. Consider the location of your hips and shoulders as you equally divide your weight between the two sides of your body. Either keep your chin slightly tucked in or align your head with your upper arms. Hold this position for a maximum of one minute.

Trikonasana: This traditional standing position may ease neck, sciatica, and back problems. It strengthens your shoulders, chest, and legs while also stretching your hips, groin, and spine. It could also aid in anxiety and stress relief.

Muscles worked:

- latissimus dorsi
- internal oblique
- gluteus maximus and medius
- hamstrings
- quadriceps

Place your feet four feet apart while standing. Turn your left toes out at an angle and your right toes forward. With your hands facing down, raise your arms parallel to the floor.

To bring your arm and body forward, slant forward and pivot at your right hip. Place your hand on the floor, a yoga block, or your leg. Reach up towards the ceiling with your left arm.

Look down, up, or forward. Hold this position for a maximum of one minute. On the other side, repeat.

Salamba Bhujangasana: Your buttocks and spine are strengthened by this mild backbend. It extends your shoulders, abdomen, and chest. It could also aid with stress relief.

Muscles worked:

- erector spinae
- gluteal muscles
- pectoralis major
- trapezius
- latissimus dorsi

Stretch your legs behind you while lying on your stomach. Use your thighs, buttocks, and lower back muscles. Place your forearms on the floor, palms down, and bring your elbows under your shoulders. Raise your head and upper torso slowly. To support your back, gently raise and contract your lower abdominal muscles. Instead of slumping into your lower back, make sure you're raising through your spine and out through the top of your head. As you totally relax in this position, keep your eyes forward while still being active and involved. Hold this position for a maximum of five minutes.

Bhujangasana:
Your shoulders, chest, and abdominal are stretched with this easy backbend. This position might help relieve sciatica and strengthen your spine. It could also aid in reducing the weariness and tension that back discomfort can cause.

Muscles worked:

- hamstrings
- gluteus maximus
- deltoids
- triceps
- serratus anterior

Place your hands behind your shoulders, fingers pointing forward, while lying on your stomach. Pull your arms close to your chest. Avoid letting your elbows droop to the side. Lift your head, shoulders, and chest slowly by applying pressure to your hands. Partway, midway, or all the way up is possible. Keep your elbows bent slightly. To deepen the position, you might lower your head back. Exhale and release back down to your mat. Place your arms beside you and lay your head down. To relieve tightness in your lower back, slowly shift your hips from side to side.

Setu Bandhasana: This inversion and backbend pose can be energising or healing. In addition to stretching the spine, it may help with headaches and backaches.

Muscles worked:

- rectus and transverse abdominis
- gluteus muscles
- erector spinae
- hamstrings

With your heels pulled into your sitting bones and your knees bent, lie on your back. Keep your arms by your sides. As you raise your tailbone, firmly plant your arms and feet on the ground. Until your thighs are parallel to the floor, keep raising.

Maintain your arms in their current positions, either resting your hands behind your hips for support or bringing your palms together with your fingers interlaced. Hold this position for a maximum of one minute. Roll your spine carefully back down to the floor, vertebra by vertebra, to release. Together, lower your knees.

Ardha matsyendrasana: In addition to energising your spine, this twisting stance helps ease back pain. Your neck, shoulders, and hips are all stretched. In addition to stimulating your internal organs, this position can assist relieve weariness.

Muscles worked:

- rhomboids
- serratus anterior
- erector spinae
- pectoralis major
- psoas

Pull your right foot in close to your body while seated. On the outside of your leg, bring your left foot. As you rotate your body to the left, lengthen your spine. For support, place your left hand on the ground behind you. Either wrap your elbow over your left knee or move your right upper arm to the outside of your left leg. To increase the twist in your spine, try to maintain a square hip position. Move your eyes to both of your shoulders. Hold this position for a maximum of one minute. Continue on the opposite side.

Pranayama: The diaphragm and the chest's intercostal muscles are used during breathing. Vertical breathing, also known as diaphragmatic breathing, is thought to be a more effective method of taking in air than horizontal breathing, which involves taking in air while extending the chest. Utilising more oxygen is aided by the diaphragm. The action of this massive muscle aids in the efficient operation of internal organs such as the stomach, pancreas, liver, and spleen. Traditional pranayama was seated and focused on several facets of spiritual and bodily well-being. Pranayama in motion is a fantastic alternative in the current world when everyone spends a lot of time at their computers.

1. Inhalation, (pooraka)
2. Exhalation (Rechaka)

The third phase, Kumbhaka (Retention), is holding your breath both after inhaling and after exhaling.

Bhramri: This pranayama requires you to exhale and inhale while making noises similar to a buzzing bee. This Pranayama is beneficial for Nada Meditation because it heightens mental sensitivity and perception of delicate sound vibrations. Stress and mental health issues like anxiety, sadness, rage, etc. can be reduced by doing this.

Sit on the floor in a comfortable posture or in a contemplative stance. Maintain a straight back, relaxed shoulders, and closed eyelids. Using the index fingers of both hands, close both of your ears. Bring your elbows up to shoulder height. Take a deep breath.

Hold your breath as long as you can. Slowly exhale while producing a bee-like buzzing sound.

Anulom Vilom: Anulom Vilom In the practice of Hatha yoga, there are many breathing exercises called pranayama. You must first comprehend what Anuloma and Viloma mean.The first word, Anu, loosely translates as "with," while the word, Loma, means "hair," suggesting "natural" or "with the grain." Additionally, Viloma means "against the grain." Viloma's opposite is anuloma. To perform Anulom Vilom Pranayama, just close your eyes, sit in Padmasana, and place your hands on your knees. Using the right thumb, close the right nostril. Breathe in as much oxygen as you can via your left nostril, gently, to fill your lungs with air. Step of anulom vilom Take your thumb out of your right nostril and just release the breath as you do so. Exhale by closing your left nostril with your middle finger, then inhale through your right nostril, take your thumb out of your right nostril, and exhale. Continue doing this for five minutes. Focus and pay attention to your breathing.

RESULT

Table 3: Paired samples

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	control	68.2917	30	2.21613	.45237
	experimental	40.8333	30	1.12932	.23052

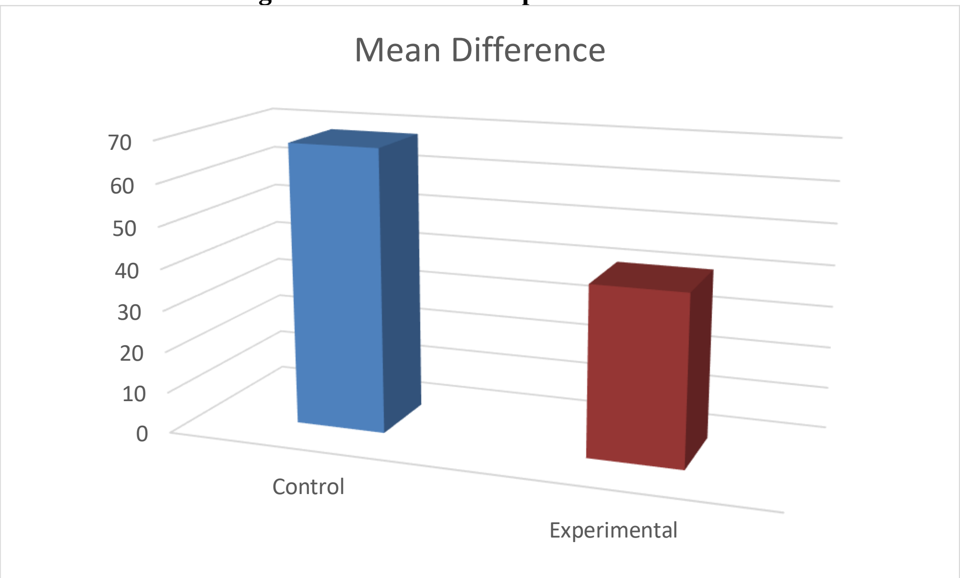
Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Control & experimental	30	.385	.063

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	control - experimental	27.45833	2.06375	.42126	26.58689	28.32978	65.181	29	.001

Figure 3: Control and Experimental Result



A statistically significant difference between the two circumstances was found using the paired samples t-test (t(23) = 65.18, p <.001), with a mean difference of 27.46 (95% CI: 26.59–28.33). The effect's high level of robustness suggests that the condition or intervention brought about a significant and consistent change. Following a yoga intervention, participants' symptoms of persistent low back pain significantly improved, according to the paired samples t-test. With a 95% confidence interval between 26.59 and 28.33 and a mean difference score of 27.46 points, the results showed steady and dependable progress across all individuals. The observed change is not the result of chance, as shown by the p-value (<.001) and the incredibly high t-value (65.18, df = 23). According to the statistical data, practicing yoga significantly decreased both functional impairment and pain severity when compared to baseline values. The results are stable, as seen by the low standard deviation and narrow confidence interval, which increases the findings' dependability.

Physical Functioning and disability: Following the yoga intervention, participants' physical functioning and disability decreased statistically significantly, according to the findings of the paired samples t-test (t(23) = 65.18, p <.001). With a mean difference of 27.46 (95% CI: 26.59–28.33), yoga consistently and significantly improved participants' chronic low back pain (CLBP). Participants reported feeling more at ease when doing everyday physical tasks including bending, sitting, standing, and walking, which indicates a significant reduction in pain intensity and functional restrictions. The high t-value and tight confidence interval support the consistency and dependability of these findings, indicating that the observed improvement was brought about by yoga's therapeutic benefits rather than by chance. Regular yoga practice that includes asanas, pranayama, and guided relaxation probably improved posture, strengthened core muscles, and increased spinal flexibility. Together, these physiological changes improved movement efficiency and decreased impairment. Further aiding in physical healing, the combination of focused awareness and regulated breathing may have also lessened psychological obstacles including movement anxiety and muscular tension. Overall, the results show that yoga helps people with persistent low back pain improve their physical functioning and lessen their impairment. A complete strategy for regaining mobility, enhancing body mechanics, and enhancing general quality of life is provided by the integration of physical strengthening, flexibility training, and mental relaxation.

Discussion: The results of this study, which examined the therapeutic benefits of yoga for those with persistent low back pain, showed that doing yoga reduced pain intensity in a statistically meaningful way. The effectiveness of yoga as a supplemental therapy was amply confirmed by the paired samples t-test, which showed a mean difference of 27.46 points, a very high t-value (65.18), and a p-value less than 0.001.The findings are in line with other research that shown yoga increases postural muscular strength, musculoskeletal flexibility, and lowers subjective pain levels (Sherman et al., 2011; Holtzman & Beggs, 2013). Since a decrease of this size always results in better functional outcomes and an increase in patients' quality of life, the observed improvement is both statistically significant and clinically important.

The combined physical and psychological effects of yoga are one of the potential explanations for this improvement. In order to preserve spinal alignment and lessen pressure on the lower back, the asanas (postures) focus on the lumbar spine, hip flexors, and core muscles. Frequent practice reduces pain episodes by improving spinal stability, flexibility, and circulation. Additionally, yoga's incorporation of meditation and pranayama (breathing techniques) helps lower stress, which is frequently a significant aggravating factor in chronic pain. Reducing stress improves parasympathetic activation, reduces cortisol levels, and eases muscular tension—all of which help to relieve pain. Yoga's ability to alter how pain is perceived is another significant aspect. Chronic low back pain has significant psychological components in addition to being a biomechanical problem. The mind-body connection that yoga's comprehensive framework promotes lowers catastrophising thoughts, elevates mood, and strengthens coping mechanisms. The improvement seen in this study was so strong and constant among individuals, which may be explained by this biopsychosocial impact. The results are in accordance with professional guidelines that prescribe non-pharmacological treatments including yoga, physical therapy, and mindfulness-based techniques be used as first-line treatments for persistent low back pain (Qaseem et al., 2017). In contrast to pharmaceutical therapies, yoga is affordable, has few adverse effects, and may be practiced as a lifetime self-care habit.

CONCLUSION:

The results of this study unequivocally show that yoga is a useful treatment approach for people who suffer from persistent low back pain. Following the yoga intervention, there was a considerable decrease in the severity of pain; statistical data showed a robust and stable improvement (t = 65.18, p <.001). Beyond its physical advantages—such as better posture, flexibility, and spinal stability—yoga also increased psychological well-being by lowering stress and raising awareness of the mind-body connection. As a natural, non-invasive, and affordable alternative to traditional therapies for persistent low back pain, yoga provides a sustainable and safe option. To enhance overall quality of life and long-term results, it can be incorporated into clinical rehabilitation programs and promoted as a self-care technique. To further confirm these findings and create standardised yoga regimens for managing chronic pain, more extensive and diversified research with long-term follow-up will be beneficial.

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