Title: Core Stability Exercises with Conventional Therapy vs. Conventional Therapy on the Man-agement of Chronic Non-Specific Low Back Pain: A Randomized Controlled Trial

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Abstract

Objectives: The study aimed to assess the efficacy of core stability exercises versus conventional therapy in patients with non-specific chronic low back pain (CNLBP) for the management of pain, disability, and fear avoidance beliefs.

Methods: A randomized single-blind controlled trial (RCT) was conducted from April to September 2024 at Celina Care Clinic and Al Shifa' Specialized Complex in Bethlehem to compare the effects of core stability exercises (CSE) combined with conventional treatment therapy (CTT) versus (CTT) alone in adults with chronic non-specific low back pain (CNLBP). Sixty eligible patients were randomly assigned using computer-generated probability sampling by an independent researcher, with the allocation concealed in sealed envelopes. The intervention lasted four weeks, with three sessions per week for each group. Group A received (CSE) in addition to CTT (hot packs, transcutaneous electrical nerve stimulation, and therapeutic massage), while Group B received only (CTT). Outcome measures, including the Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and Fear-Avoidance Belief Questionnaire (FABQ), were assessed at baseline and post-intervention.

Result: The study demonstrated that combining core stability exercise (CSE) with conventional treatment therapy (CTT) significantly improved outcomes compared to CTT alone in patients with chronic non-specific low back pain (CNLBP). The CSE plus CTT group showed greater reductions in pain levels (VAS: -4.70 vs. -2.36, effect size 1.51, $p < 0.001$), fear-avoidance belief related to work (FABQW: -13.3 vs. -3.76, effect size 2.58, $p < 0.001$) and physical activity (FABQPA: -7.93 vs. -2.26, effect size 2.77, $p < 0.001$), as well as disability (ODI: -14.53% vs. -5.13%, effect size 2.03, $p < 0.001$). These findings highlight the superior efficacy of incorporating (CSE) into standard treatment for (CNLBP).

Discussion: This study examined the effects of adding stability exercises to traditional therapy on fear-avoidance belief. Although therapeutic exercises are well studied, this research is novel in using a scale to measure fear avoidance belief to evaluate the added benefit of stability exercises, emphasizing their role in addressing psychological aspects of rehabilitation. While limited by a small sample size, short follow-up, and recruitment from two centers, the findings suggest that integrating stability exercises into conventional care may improve psychological outcomes in patients with chronic non-specific low back pain.

Keywords: Exercises, Low Backache, Disability

Highlights

- The study included adults in Bethlehem with chronic non-specific low back pain.
- Two treatment approaches were compared:
    1. **Core Stability Exercises (CSE) + Conventional Treatment Therapy (CTT)**
    2. **Conventional Treatment Therapy (CTT) only**
- CTT included hot packs, Transcutaneous Electrical Nerve Stimulation (TENS), and therapeutic massage.
- The treatment duration was **4 weeks**.
- Both groups showed improvements in:
    1. Pain severity (VAS)
    2. Disability level (ODI)
    3. Fear-avoidance belief (FABQ)
- The improvement in pain severity (VAS) was greater in the **(CSE + CTT)** group compared to the CTT-only group.
- Adding core stability exercises to conventional therapy can enhance patient outcomes.
- Further research is needed to assess the long-term effects of these treatments.

Plain Language Summary

Many people develop chronic low back pain through accidents and physical mishaps because they overwork themselves using wrong postures. Chronic pain and movement restrictions plus feelings of emotional distress define this condition for many patients. In this study, researchers evaluated two treatment methods for chronic non-specific low back pain (CNLBP): They studied core stability exercises (CSE) along with conventional therapy (CTT) compared to (CTT) only as a single treatment method. The standard therapy used both hot compresses and electrical neurostimulation treatment in combination with massage methods. Our research team included sixty adult participants who had (CNLBP) in two groups. One tested CTT plus CSE, whereas the other group pursued (CTT) interruptions. The research evaluated how treatment affected patients' pain symptoms and ability to move along with their concerns about movement. People who combined CSE with CTT achieved stronger pain relief plus better movement control alongside reduced movement anxiety, according to study findings.

Introduction

Low back pain (LBP), the most prevalent global musculoskeletal disorder, is defined as pain from the lower rib to the gluteal area, with or without leg pain, lasting more than one day [2–4]. It is the biggest single cause of disability worldwide [1, 3], affecting 619 million people in 2020 and projected to rise to 843 million by 2050, with rises strongly in Asia and Africa [3]. About 84% of people will get LBP at some point in their lifetime, typically with acute flare-ups [5–7]. LBP is also divided into how long the back pain lasts: acute (<6 weeks), subacute (6–12 weeks), and chronic (>12 weeks). Chronic represents about 10–40% of all LBP diagnoses, and is thus a great reason for long-term disability [8,9].

Low back pain (LBP) is a prevalent musculoskeletal disorder that impacts a significant proportion of the population globally [1, 3]. It can be classified as specific, resulting from identifiable causes, or non-specific, where no clear cause is found and which accounts for most cases [6, 8]. Non-specific LBP is influenced by various factors, including genetics, psychological and social aspects, as well as structural problems in the lower back, such as issues with bones, ligaments, or muscles [10, 11]. Common risk factors include smoking, excess weight, and poor posture or ergonomics [3]. Chronic non-specific LBP, which persists for a long time, is a common reason for medical visits and can significantly impact daily activities and work performance [7, 11]. Recently, core stability has become an important focus in treatment because weakness in key stabilizing muscles can reduce spinal support and increase stress on the lower back [3]. Combining core stability exercises with conventional therapies has shown promising results in relieving symptoms and improving function [12].

A meta-analysis of 23 studies with 1132 individuals looked at how well stabilization exercises worked to relieve pain and improve impairment in people with persistent low back pain. The results indicated that extended treatment durations (8-12 weeks) yielded the most significant effects on alleviating pain and enhancing disability. Non-specific low back pain had superior responsiveness, whereas particular low back pain showed enhanced responsiveness. Core stability exercises were better at alleviating pain and had more evidence to support improving impairment. Stabilization exercises work very well and must be at the center of clinical treatment, particularly in supervised and prolonged programs [13].

Research on core stability exercises versus conventional therapy for nonspecific low back pain has several limitations. These include a lack of direct comparisons within the same patient cohort and an emphasis on short-term rather than long-term outcomes. Important factors such as patient diversity, psychosocial influences, and quality-of-life measures beyond pain and disability are frequently overlooked. Furthermore, inconsistent therapy protocols and unclear mechanisms underlying symptom relief pose challenges to drawing definitive conclusions. These gaps highlight the need for more rigorous and comprehensive research to better understand and clarify the efficacy of treatments for non-specific low back pain.

Methods

A randomized single-blind controlled trial (RCT) was conducted from April to September 2024 at Celina Care Clinic and Al Shifa' Specialized Complex in Bethlehem. Sixty adult patients with (CNLBP) lasting over three months, who consulted an orthopedic physician at Al Shifa' before March 20, 2024, and required physiotherapy, were recruited. The centers were chosen for their accessibility and ability to recruit CNLBP patients referred for physiotherapy after orthopedic consultations at Al Shifa.

Patients were allocated randomly to two groups by an independent researcher using computer-generated randomization. Allocation concealment was ensured by using sealed, opaque, sequentially numbered envelopes opened only after baseline assessment. The first group received core stability exercises combined with conventional treatment therapy, while the second group received conventional treatment therapy alone. Due to the nature of the interventions, therapists and participants were not blinded, which may introduce performance bias. However, outcome assessors were blinded to group assignments to minimize detection bias.

The entry criteria for the study were people aged between 18 and 60 years, both men and women, with nonspecific low back pain that had been present for more than three months and which had been causing pain on more than half the days. Patients were to show pain in the region between the gluteal fold and lower rib, with a Visual Analog Scale (VAS) of 40 mm or more but below 80 mm as recorded at the New Patient Examination Appointment.

The exclusion criteria listed individuals under 18 or over 60 years old, which contradicts the previously stated upper age limit of 60. Other exclusions included those with mental or neurological disorders, specific spinal conditions (e.g., herniated disc, spinal stenosis), systemic diseases, a history of spinal surgery or recent physical therapy, pregnant women, and individuals with upper limb injuries.

Tools

Visual Analogue Scale (VAS)**:** This is a widely used, reliable, and accurate tool for assessing pain severity. It consists of a 100 mm line, with "0" representing no pain and "100" indicating the most severe pain. Patients mark the point that reflects their pain level [14, 15]. The Arabic version of the VAS, validated by El Meidany et al. (2003), It is a valid self-report instrument to assess the intensity of pain among Arabic-speaking patients, including patients with rheumatoid arthritis [16].

Oswestry Low Back Pain Disability Index (ODI)**:** This is a valid self-report 10-item survey that evaluates pain difficulty in numerous activities of daily living, including pain severity, personal care, lifting, and walking. Each item is scored on a 0 (no restriction) to 5 (complete restriction) scale, and the sum is calculated to derive a Disability Index percentage [17]. The scores are 0–20% (limited disability) to 81–100% (severe disability or bedbound). Arabic ODI, having been validated in Saudi Arabia, is a reliable tool to measure functional impairment among patients with low back pain [18].

Fear-Avoidance Belief Questionnaire (FABQ)**:** This is a validated measure of pain and fear of impairment in activities of daily living, specifically for patients with chronic low back pain (LBP) [19]. There are two subscales of the questionnaire: one to measure activities of work (7 items) and another to measure physical activity (4 items), with responses quantified on a 7-point Likert scale [20, 21]. High scores reflect more fear avoidance. The Arabic version of the FABQ is demonstrated to be reliable and valid for measuring fear-avoidance beliefs in Arab low back pain patients [22].

Data Collection

The patients who were found to be eligible with chronic non-specific low back pain (CNLBP) were screened out by a blinded researcher following informed consent. A previous sample size

calculation had established that 60 participants would give sufficient power to find significant changes. Computer-generated random assignment was employed to distribute participants into two groups: group 1 were provided with core stability exercises and usual treatment, and group 2 were provided with usual treatment alone. The core stability program consisted of supervised three times per week classes over a period of four weeks aimed at activation of the transversus abdominis, lumbar multifidi, and pelvic floor muscles in a graduated progression. Control treatment consisted of heat packs, Transcutaneous Electrical Nerve Stimulation (TENS), and therapeutic massage in 45-minute sessions, three times per week for four weeks. Outcome measures, i.e., the Visual Analog Scale (VAS), Oswestry Disability Index (ODI), and Fear-Avoidance Belief Questionnaire (FABQ), were measured pre- and post-treatment by an independent physiotherapist.

Statistical Analysis

The study used the Statistical Package for the Social Sciences (SPSS) 24.0 edition for data analysis, with G*Power version 3.1.9.4 for the computation of test powers and effect sizes. Standard Excel tools were used for basic operations on the data. A paired sample t-test was performed to assess differences between pre- and post-measurements, and an independent t-test was used to distinguish the efficacy of the two treatment groups, CSE with CTT and CTT. Effect sizes were calculated using G*Power software, with effect sizes typically falling within the range of small, medium, and large, indicating the strength of the effect. All statistical tests were performed at a 0.05 level of significance.

Results

Sixty adult patients with chronic non-specific low back pain (CNLBP) were randomized into two groups: 30 received core stability exercises (CSE) combined with conventional treatment therapy (CTT), and 30 received only CTT. The demographic analysis revealed that 46.7% of participants were male and 53.3% were female. The average age of the CSE with CTT group was 38.06 years, while the CTT group had an average age of 35.46 years. The baseline demographic comparison showed no statistically significant differences between the CSE + CTT group and the CTT-only group in terms of age, weight, or height ($p > 0.05$ for all variables). This indicates that both groups were comparable at the start of the study, and any differences observed in post-intervention outcomes are unlikely to be due to variations in these basic characteristics. The results are in Table 1.

Table 1: Comparison of demographic characteristics between groups

	All groups	**CSE with the CTT group**	**CTT group**		
Variables	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**t-value**	**P-value**
Age	36.77±13.25	38.06±14.68	35.46±11.54	0.757	0.452
Weight (kg)	71.20±11.50	72.10±12.00	70.30±11.00	0.606	0.547
Height (cm)	167.50±6.80	167.90±7.00	167.10±6.60	0.455	0.65

SD: Standard deviation, significant at $p<0.05$, CTT Group: Conventional Treatment Therapy group, CSE Group: Core Stabilization Exercise group

The results in Table 2 and Chart 1 show that core stability exercises (CSE) with conventional treatment therapy (CTT) effectively reduce pain in adults with non-specific low back pain (NSLBP). Paired sample t-tests revealed a significant reduction in pain, with the mean Visual Analog Scale (VAS) score decreasing from 7.16±1.64 before treatment to 2.47±1.92 after treatment ($p < 0.05$). The effect size was 2.29, indicating a substantial and clinically meaningful improvement, highlighting CTT as an effective treatment for NSLBP.

According to Table 2 and Chart 1, core stability exercises (CSE) with conventional treatment therapy (CTT) significantly reduced fear-avoidance belief, as evidenced by the substantial decrease in both FABQW (from 28.86±8.47 to 15.56±7.33, $p < 0.001$) and FABQPA (from 10.40±3.55 to 2.46±1.90, $p < 0.001$). These results suggest that CSE with CTT helps manage non-specific low back pain (NSLBP) by reducing fear-avoidance belief. Additionally, the Oswestry Disability Index (ODI) showed a significant reduction in disability from 44.32±18.87% to 29.78±17.07%, with an effect size of 2.13, indicating improved functional status following the intervention.

Table 2: Comparison of variable scores for CSE with the CTT group sample before and after the intervention.

CSE with the CTT group		Mean ± SD	t- value	Effect size	P-value
VAS	Pre	7.16±1.64	12.33	2.29	<0.001
	Post	2.47±1.92			
FABQW	Pre	28.86±8.47	14.51	2.62	<0.001
	Post	15.56±7.33			
FABQPA	Pre	10.40±3.55	15.17	0.47	<0.001
	Post	2.46±1.90			
ODI	Pre	44.32±18.87	13.20	2.13	<0.001
	Post	29.78±17.07			

CTT Group: Conventional Treatment Therapy group, significant at $p<0.05$, SD: Standard deviation, VAS: Visual analog scale, FABQW The Fear-Avoidance Belief Questionnaire-Work Subscale, FABQPA The Fear-Avoidance Belief Questionnaire-Physical Activity Subscale, ODI: Oswestry Disability Index

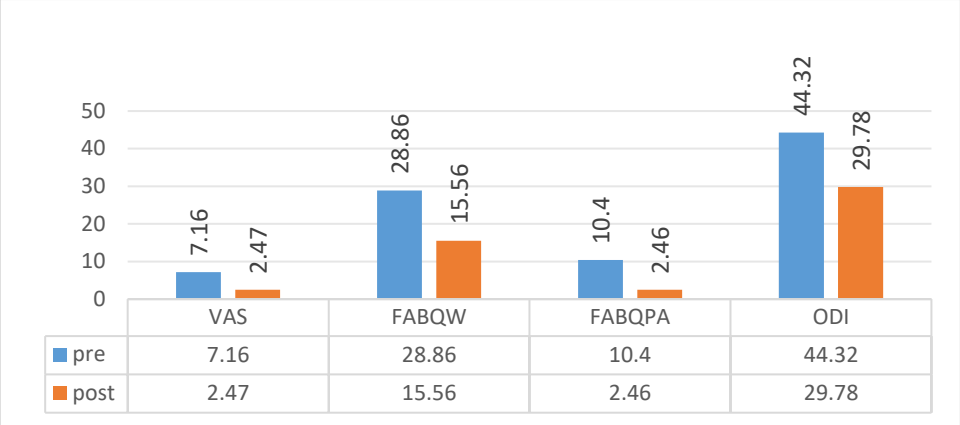

Chart 1: Comparison of average variable scores before and after CSE with the CTT intervention

According to Table 3 and Chart 2, the study found that conventional treatment therapy (CTT) significantly reduced pain, fear-avoidance belief, and disability in adults with non-specific low back pain (NSLBP). Pain decreased from 6.46±1.70 to 4.10±1.74 ($p < 0.05$, effect size 2.07). Fear-avoidance belief also improved, with the FABQW score dropping from 30.33±7.10 to 26.56±7.40 ($p < 0.001$, effect size 2.8) and the FABQPA score from 10.93±3.14 to 8.66±3.03 ($p < 0.001$, effect size 2.5). Additionally, the Oswestry Disability Index (ODI) score decreased from 51.40±18.11% to 46.26±18.22% ($p < 0.001$), indicating that CTT is effective in improving pain, fear-avoidance behaviors, and physical function in NSLBP patients.

Table 3: Comparison of variable scores for the CTT group sample before and after the CTT

CTT group		Mean±SD	t- value	Effect size	P-value
VAS	Pre	6.46±1.70	12.54	2.07	<0.001
	Post	4.10±1.74			
FABQW	Pre	30.33±7.10	13.95	2.8	<0.001
	Post	26.56±7.40			
FABQPA	Pre	10.93±3.14	15.00	2.5	<0.001
	Post	8.66±3.03			
ODI	Pre	51.40±18.11	9.91	1.9	<0.001
	Post	46.26±18.22			

CTT Group: Conventional Treatment Therapy group, significant at $p<0.05$, SD: Standard deviation, VAS: Visual analog scale, FABQW The Fear-Avoidance Belief Questionnaire-Work Subscale (FABQPA), the Fear-Avoidance Belief Questionnaire-Physical Activity Subscale, and the Oswestry Disability Index (ODI).

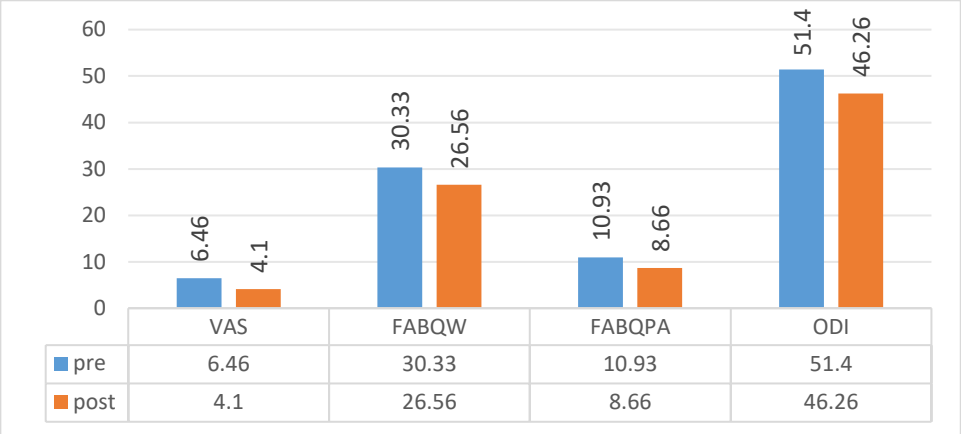

Chart 2: Comparison of average variable scores before and after CTT intervention

Table 4 and Chart 3 show that the CSE with the CTT group had greater improvements than the CTT group across all outcome measures. The CSE with the CTT group exhibited a higher mean reduction in pain, with a VAS score of -4.70, compared to -2.36 in the CTT group. This significant difference, with an effect size of 1.51 ($p < 0.001$), indicates that CSE with CTT was more effective in reducing pain, fear-avoidance belief, and disability.

The CSE with the CTT group showed significantly better results in fear-avoidance behaviors and disability reduction. The FABQW score decreased by -13.3 in the CSE with the CTT group, compared to -3.76 in the CTT group (effect size 2.58, $p < 0.001$). Similarly, the CSE with the CTT group had greater reductions in FABQPA (-7.93 vs. -2.26) and ODI (-14.53% vs. -5.13%) with an effect size of 2.03 ($p < 0.001$). These findings indicate that combining CSE with CTT led to greater improvements in pain, fear-avoidance belief, and disability compared to CTT alone.

Table 4: Independent sample t-test to examine the differences between both groups

	CSE with the CTT group		CTT group				
	Mean Difference	**Standard Deviation**	**Mean Difference**	**Standard Deviation**	**t-value**	**Size Effect**	**Sig.**
VAS	-4.70	2.08	-2.36	1.03	-5.49	1.51	<0.001
FABQW	--13.3	5.02	-3.76	1.48	-9.98	2.58	<0.001
FABQPA	-7.93	2.86	-2.26	0.82	-10.41	2.77	<0.001
ODI	-14.53	6.03	-5.13	2.84	-7.73	2.03	<0.001

FABQW refers to the Fear-Avoidance Belief Questionnaire-Work Subscale, while FABQPA refers to the Fear-Avoidance Belief Questionnaire-Physical Activity Subscale. The Fear-Avoidance Belief Questionnaire-Physical Activity Subscale, SD: Standard Deviation, CSE: Core Stability Exercise, significant at p<0.05, CTT Group: Conventional Treatment Therapy group.

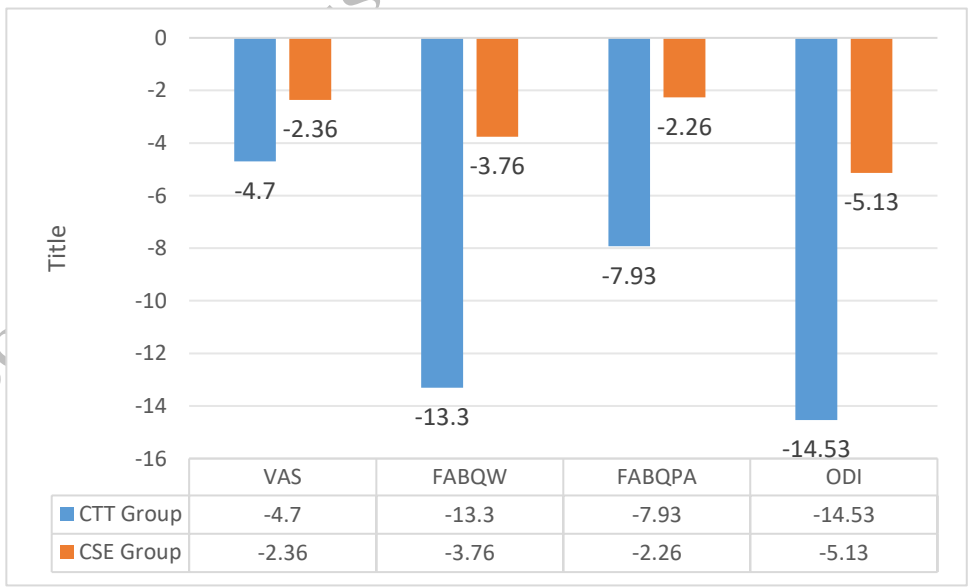

Chart 3: Mean differences in VAS, FABQW, FABQPA, and ODI for both groups.

Discussion

Chronic non-specific low back pain (CNLBP) is a common condition that leads to chronic lower back pain, often related to biomechanical, psychological, and lifestyle issues. Poor posture, inactivity, and stress are the risk factors. Physical therapy, training core stability, treatment with drugs, and patient education form the treatment. Active patient involvement as part of a multidisciplinary approach is effective in relief of symptoms and improved well-being [6]. The aim of the research was to compare and evaluate the effectiveness of CTT and CSE with CTT in symptom reduction and improving function in patients with CNLBP. Sixty chronic non-specific low back pain patients were assessed according to inclusion and exclusion criteria established.

Adding core stability exercises (CSE) to routine treatment therapy (CTT) compared to the application of CTT alone was more effective in increasing pain, fear-avoidance belief, and disability in chronic non-specific low back pain patients. Specifically, the CSE with the CTT group had significantly higher VAS, FABQW, FABQPA, and ODI score reductions ($p < 0.001$). These results are in accordance with those of Goswami et al. (2024), which have shown that CSE was superior to traditional physiotherapy in pain and disability reduction, again attesting its effectiveness in improving the outcome of rehabilitation for lower back pain patients [23]. Core strengthening exercises help decrease back pain, improve function, and decrease fear-avoidance by increasing the muscles that stabilize the spine, facilitating optimal movement, pain decrease, confidence, and overall stabilization of the body.

The study "Review of Core Stability Exercise Versus Conventional Exercise in the Management of Chronic Low Back Pain" by Nwodo et al. (2022) is reflective of the effectiveness of core stability exercises (CSE) in the management of chronic low back pain, with their most important advantages including spinal stability enhancement, reduction of pain, and functional mobility. Literature indicates that CSE causes greater gains in pain intensity and disability compared to conventional exercises, which justifies the inclusion of their application within rehabilitation therapy. In this research, our findings confirm these observations in endorsing CSE administered in addition to conventional treatment therapy (CTT) for the management of chronic low back pain, but inviting further research into their combined efficacy [24].

Frizziero et al. (2021) demonstrated that core stability exercises, including deep abdominal and back muscles, effectively reduce pain, functionality, and quality of life in CNLBP patients. The study advocates for the adoption of tailored rehabilitation programs incorporating these exercises for enhanced long-term recovery [3]. Our findings are in agreement with the present study, highlighting enhanced pain relief and functional improvement achieved from the core stability exercise and emphasizing their applicability in the rehabilitation of CNLBP as part of an individualized rehabilitation approach.

Koyuncu et al. (2024) compared core stabilization exercises performed on the Huber Motion Lab with conventional therapy for nonspecific low back pain. Both groups experienced gains in disability, pain, mobility, and muscle endurance but greater gains in balance and core muscle activation in the Huber Motion Lab group. In contrast, this study determined that the incorporation of core stability exercises as part of traditional treatment therapy yielded superior improvements in pain and disability as measured by the Visual Analog Scale (VAS) and Oswestry Disability Index (ODI) compared with traditional treatment therapy alone [25]. These findings suggest that despite both being beneficial, core stability exercises added to

conventional therapy may bring about more significant improvement in pain relief and functional disability compared to either therapy in isolation [25].

In comparison, Akhtar et al. (2017) compared core stabilization exercise with normal exercise therapy in chronic non-specific low back pain and found enhanced recovery in pain relief and functional capacity in the group that received core stabilization exercise. The study arrived at the fact that core stabilization exercises are more effective than traditional exercises in managing chronic low back pain and validating their inclusion in rehabilitation [26]. Our study concurs with this, emphasizing the benefit of core stabilization exercises, particularly when complemented with CTT, on maximizing pain relief and functional capacity among patients with chronic low back pain.

Kumar et al. (2023) study contrasted core stabilization exercises with standard exercises in treating non-specific low back pain (NSLBP). Findings showed that the core stabilization group had a greater degree of pain relief with a mean VAS score of 2.96 as opposed to 3.89 for the standard group ($p < 0.0001$). The study found that core stabilization exercises were superior at improving pain in patients with NSLBP and recommended their inclusion in treatment protocols [27]. The present research and the current one both seek to address chronic low back pain through exercise therapy, with Kumar et al. comparing standard exercises to core stabilization exercises and our study comparing a combined CSE with CTT to CTT alone. The two studies highlight the effectiveness of exercise intervention in improving pain outcomes for the chronic low back pain patients.

Londhe et al. (2020) investigated the effectiveness of core stabilization exercises in reducing low back pain among nurses and identified pain relief and functional capacity improvement among patients undergoing the exercise. The research highlighted the value of adding core stabilization to workplace wellness programs for physically demanding jobs such as nursing [28]. Both studies support our findings, as their research shows the effectiveness of core stabilization exercises in reducing pain and improving functionality. While Londhe et al. highlighted the benefits to nurses, our research suggests that the incorporation of core stabilization into CTT further enhances pain and functional outcomes in patients with CNLBP.

Reddy, Jerome, and Kumar (2015) compared to traditional physiotherapy with core stabilization exercises for chronic mechanical low back pain. Both sets improved significantly with pain decrease but with more significant improvement with the core stabilization group. The study found that core stabilization exercises were more effective in reducing pain and increasing functional mobility and recommended their implementation in rehabilitation of chronic low back pain patients [29]. This is in agreement with our study, as both studies show that including core stabilization exercises increases pain reduction and functionality, with our study showing more improvements when combined with CTT.

Bibi and Shah (2023) conducted a randomized controlled trial to compare core stability exercises versus conventional treatment for low back pain. Both treatments reduced pain and improved function, but the group given core stability had better results in VAS and ODI scores. The study suggests that core stability exercises are superior and should be incorporated in rehabilitation programs in order to enhance recovery and quality of life [30]. Our study confirms these findings, highlighting the increased pain relief and functional gain with core stability exercises compared to standard therapy in favor of their inclusion in existing therapeutic practice.

The study examined the impact of combining stability exercises with conventional therapy versus conventional therapy alone on fear avoidance belief. Results indicated that the combination of stability exercises and conventional therapy had a greater positive effect on fear avoidance. This research is unique in applying this scale to evaluate the combined treatment, as no prior studies have explored this topic.

Adding core stability exercises (CSE) to conventional treatment therapy (CTT) for chronic non-specific low back pain (CNLBP) led to greater improvements in pain, disability, and fear-avoidance belief than CTT alone. This is likely because of different mechanisms. CSE increases the activation of deep trunk muscles (like the transversus abdominis and multifidus), improves segmental spinal control, and restores proprioception. This leads to better movement accuracy and less abnormal loading. It might also help stop pain in the central nervous system, make the cortex reorganize, and reduce fear-avoidance by gradually exposing the body to movement. CTT provides temporary pain relief that makes it easier to exercise, but it doesn't address underlying motor control or mental health issues. Past studies have shown that motor control exercises work better in the short term, especially when they are combined with passive modalities and educational components.

Researchers must control age variation in their studies to produce trusted analysis results. To help people from all backgrounds understand questions better, it is vital to test ODI and FABQ in regular Arabic. Using authentic Arabic versions helps collect more reliable study results by preventing confusion in participant responses.

This research has a number of strengths, including the randomized controlled trial design, which enhances reliability, and allocation concealment through sealed envelopes, which minimizes selection bias. The use of outcome measures VAS, ODI, and FABQ validated for this purpose allows it to be tested for the multifaceted nature of chronic non-specific low back pain of biopsychosocial origin, and the use of effect sizes along with p-values for statistical reasoning makes findings more rigorous. Apart from that, the uniqueness of the research stems from the application of the fear-avoidance belief scale as a significant psychological variable frequently omitted in related research. But the study has several limitations; the small sample size, combined with the short duration of the intervention, greatly limits the generalizability and the long-term applicability of the findings; the inclusion of participants from just two clinical centers may limit external validity; and the lack of long-term follow-up prevents the sustainability of any benefit from being measured. In spite of the above limitations, the study makes a strong case for core stability training in chronic non-specific low back pain within the routine management.

However, this study is compromised by a small sample size, short intervention time with lack of prolonged follow-up, and variability of therapist experience, which can provoke bias. Subsequent research needs to control for such confounds with bigger samples, longer follow-up, and homogeneous therapist training to confirm and apply these results.

Conclusion

The study conducted on adults with CNLBP in Bethlehem demonstrated that while both core stability exercises combined with conventional treatment therapy (CSE + CTT) and conventional treatment therapy (CTT) alone effectively reduced pain, disability, and fear-avoidance belief after four weeks, the combined approach yielded significantly greater improvements. These findings suggest that integrating core stability exercises into

conventional physiotherapy protocols can offer enhanced benefits for patients with CNLBP. Clinicians are encouraged to incorporate targeted core stability training alongside standard therapies to optimize patient outcomes. Further research is essential to determine the most effective long-term therapy options and to assess enduring benefits beyond the initial treatment phase.

Ethical Consideration

This study has been approved by the Ethics Committee of the University of Ahliya (Code: CAMS/PTBR/3/145/2024). The Universal Trial Number (UTN) assigned by the World Health Organization is U1111-1316-4673. Before any collection, patients provided their informed consent, adhering to the Helsinki Declaration of 2008.

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Conflict of interest

The authors declared no conflict of interest.

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References

1. Deyo RA, Cherkin D, Conrad D, Volinn E. Cost, controversy, crisis: Low back pain and the health of the public. Annual Review of Public Health. 1991;12:141-156. doi: 10.1146/annurev.pu.12.050191.001041. PMID: 1828670.
2. Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F et al. A systematic review of the global prevalence of low back pain. Arthritis and Rheumatism. 2012;64(6):2028-2037. doi: 10.1002/art.34347. PMID: 22231424.
3. Ferreira ML, de Luca K, Haile LM, Steinmetz JD, Culbreth GT, Cross M, et al. Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. The Lancet Rheumatology. 2023 Jun;5(6):e316-e329. PMID: 37273833; PMCID: PMC10234592.
4. Chen S, Chen M, Wu X, Lin S, Tao C, Cao H, et al. Global, regional, and national burden of low back pain, 1990-2019: A systematic analysis of the Global Burden of Disease study 2019. J Orthop Translat. 2022 Jan;32:49-58. PMID: 34934626; PMCID: PMC8639804.
5. Safiri S, Nejadghaderi SA, Noori M, Sullman MJM, Collins GS, Kaufman JS, et al. The burden of low back pain and its association with socio-demographic variables in the Middle East and North Africa region, 1990-2019. BMC Musculoskelet Disord. 2023 Jan 23;24(1):59. PMID: 36683025; PMCID: PMC9869505.
6. Nicol V, Verdaguer C, Daste C, Bisseriex H, Lapeyre É, Lefèvre-Colau MM, et al. Chronic Low Back Pain: A Narrative Review of Recent International Guidelines for Diagnosis and Conservative Treatment. J Clin Med. 2023 Feb 20;12(4):1685. PMID: 36836220; PMCID: PMC9964474.
7. Gong C, Dai S, Jin B, Xie Y. Comparison of Feng spinal mobilization with Maitland mobilization in management of chronic nonspecific low back pain: A cohort study. Medicine (Baltimore). 2023 Feb 17;102(7):e32984. PMID: 36800627; PMCID: PMC9935985.
8. Chiarotto A, Koes BW. Nonspecific Low Back Pain. N Engl J Med. 2022 May 5;386(18):1732-40. PMID: 35507483.
9. Sirbu E, Onofrei RR, Szasz S, and Susan M conducted a study on the predictors of disability in patients with chronic low back pain. Arch Med Sci. 2023;19(1):94-100. PMID: 36817655; PMCID: PMC9897078.
10. Robinault L, Niazi IK, Kumari N, Amjad I, Menard V, Haavik H. Non-Specific Low Back Pain: An Inductive Exploratory Analysis through Factor Analysis and Deep Learning for Better Clustering. Brain Sci. 2023 Jun 13;13(6):946. PMID: 37371424; PMCID: PMC10296017.
11. Custers P, Van de Kelft E, Eeckhaut B, Sabbe W, Hofman A, Debuysscher A, et al. Clinical Examination, Diagnosis, and Conservative Treatment of Chronic Low Back Pain: A Narrative Review. Life. 2024 Aug 29;14(9):1090.
12. Fayaz F, Mujeeb M, Keramat K, Haseeb A. A Combination Of Core Stability Exercises And Maitland Manual Therapy Is A Better Alternative In The Management Of Chronic Low Back Pain. JRCRS. 2020;8(1):1.
13. Dimitrijević V, Rašković B, Jevtić N, Nikolić S, Viduka D, Obradović B. Pain and Disability Therapy with Stabilization Exercises in Patients with Chronic Low Back Pain: A Meta-Analysis. Healthcare (Basel). 2025 Apr 22;13(9):960. doi: 10.3390/healthcare13090960. PMID: 40361738; PMCID: PMC12072060.
14. Boonstra AM, Schiphorst Preuper HR, Reneman MF, Posthumus JB, Stewart RE. Reliability and validity of the visual analogue scale for disability in patients with

chronic musculoskeletal pain. Int J Rehabil Res. 2008 Jun;31(2):165-9. PMID: 18467932.
15. Bielewicz J, Daniluk B, and Kamieniak P. explore whether the Visual Analog Scale (VAS) and Numerical Rating Scale (NRS) are the same or different. Are Visual Analog Scale Values and Numerical Rating Scale Equally Viable Tools for Assessing Patients after Microdiscectomy? Pain Res Manag. 2022;2022:5337483. PMID: 35391853; PMCID: PMC8983264.
16. El Meidany YM, El Gaafary MM, Ahmed I. Cross-cultural adaptation and validation of an Arabic Health Assessment Questionnaire for use in rheumatoid arthritis patients. Joint Bone Spine. 2003 Jun;70(3):195-202. PMID: 12814762.
17. Sanjaroensuttikul N. The Oswestry low back pain disability questionnaire (version 1.0) Thai version. J Med Assoc Thai. 2007 Jul;90(7):1417-22. PMID: 17710986.
18. Algarni AS, Ghorbel S., Jones JG, Guermazi M. Validation of an Arabic version of the Oswestry index in Saudi Arabia. Ann Phys Rehabil Med. 2014 Dec;57(9-10):653-63. PMID: 25262247.
19. Wiangkham T, Phungwattanakul N, Tedsombun P, Kongmee I, Suwanmongkhon W, Chidnok W. Translation, cross-cultural adaptation, and psychometric evaluation of the Thai version of the fear-avoidance belief questionnaire in patients with nonspecific neck pain. Scand J Pain. 2021 Apr 27;21(2):247-55. PMID: 34387959.
20. Nazir SNB, Pereira FA, Muhammad A, Shamsi II, Khan MU. The Relationship Between Fear-Avoidance Beliefs, Disability, and Physical Capacity in Patients with Chronic Low Back Pain. Mediterr J Rheumatol. 2022 Sep;33(3):305-10. PMID: 36531432; PMCID: PMC9727475.
21. Aasdahl L, Marchand GH, Gismervik SØ, Myhre K, Fimland MS, Røe C. The Fear Avoidance Beliefs Questionnaire (FABQ): Does it Really Measure Fear Beliefs? Spine (Phila., Pa., 1976). 2020 Jan 15;45(2):134-40. PMID: 31415468.
22. Alanazi F., Gleeson P., Olson S., and Roddey T. Translation and Validation of the Arabic Version of the Fear-Avoidance Beliefs Questionnaire in Patients With Low Back Pain. Spine (Phila., Pa., 1976). 2017 Apr 1;42(7):E411-E416. PMID: 27438383.
23. Goswami M, Tiwari M, Goswami Y, Gupta V, Tomar A. The efficacy of core stability exercises versus conventional physiotherapy in lower back pain. International Journal of Science and Research Archive [Internet]. 2024;12(1):2562–7.
24. Nwodo OD, Ibikunle PO, Ogbonna NL, Ani KU, Okonkwo AC, Eze CJ, et al. Review of core stability exercise versus conventional exercise in the management of chronic low back pain. Afr Health Sci. 2022 Dec;22(4):148-67. PMID: 37092047; PMCID: PMC10117466.
25. Koyuncu E, Tunali N, Saka S, Ural E, Yavuzer M. Effects of core stabilization exercises in patients with non-specific low back pain: Huber Motion Lab versus conventional. Balt J Health Phys Act [Internet]. 2024 [cited 2024 Dec 12];16(1):8.
26. Akhtar MW, Karimi H., Gilani SA. Effectiveness of core stabilization exercises and routine exercise therapy in the management of pain in chronic, non-specific low back pain: A randomized, controlled clinical trial. Pak J Med Sci. 2017;33(4):1002-6. PMCID: PMC5648929.
27. Kumar A, Gupta V, Khan MA, Srivastava H. Efficacy of core stabilization program and conventional exercises in low back pain. Int J Community Med Public Health [Internet]. 2023 Oct. 31 [cited 2025 Jan. 22]; 10(11):4298-302.
28. Londhe SP, Pawadshetty VS, Karanth V. To find the effectiveness of conventional exercise and core stabilization exercises in conditions with specific low back pain. 2020 Dec 12;5:274–9.

29. Karnati VNP, Sreekar Kumar Reddy R. Core Stabilization Program and Conventional Exercises in the Patients with Low Back Pain—A Comparative Study. International Journal of Physiotherapy. 2015 Feb 1;2(1):352.
30. Bibi M, Shah A. Comparing The Efficacy Of Core Stability Exercises And Conventional Physical Therapy In The Management Of Lower Back Pain: A Randomized Controlled Trial. Northwest J Med Sci. 2023 Apr 16;2(1).