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Effectiveness of McKenzie Directional Preferences in patient with low back pain: A Randomized controlled trial

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Declaration

I hereby declare that the research work entitled **"Effectiveness of McKenzie Directional Preferences in patient with low back pain: A Randomized controlled trial"** has been carried out by me as a part of my academic requirements.

This study is original and has not been submitted in any form to any other university or institution for any degree or diploma. All sources of information and data have been duly acknowledged and referenced.

I also declare that ethical approval was obtained and all participants gave informed consent before taking part in the study.

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Acronyms

BHPI	Bangladesh Health Professions Institute
BMI	Body Mass Index
CRP	Center for the Rehabilitation of the Paralyzed
IFT	Interferential Therapy
LBP	Low Back Pain
ODI	Oswestry Disability Index
RCT	Randomized Control Trial
TENS	Transcutaneous Electrical Nerve Stimulation
UK	United Kingdom
VAS	Visual Analogue Scale
DQ	Dallas Pain questionnaire

Abstract

Background: Low back pain (LBP) is a prevalent musculoskeletal disorder affecting individuals worldwide, leading to significant disability, reduced quality of life, and substantial healthcare costs. The McKenzie Method, or Mechanical Diagnosis and Therapy (MDT), is a patient-centered approach that utilizes directional preference exercises to alleviate pain and improve functional outcomes.

Methodology: The study involved 50 participants, randomly assigned to either an experimental group (n=25) receiving McKenzie therapy combined with conventional physiotherapy or a control group (n=25) receiving conventional physiotherapy alone. Baseline characteristics, including age, gender, occupation, and Oswestry Disability Index (ODI) scores, were comparable between groups, ensuring a fair comparison. Pain intensity and functional disability were assessed using the Dallas Pain Questionnaire and ODI, respectively, at baseline and post-intervention.

Results :). The experimental group had a statistically significant value in ODI score (t= 15.374 , p= 0.000), compared to the control group (t= 14.826 , p=0.451), however the difference was statistically significant (t= -4.959, p= 0.000) .

Majority of indicators improved more in the McKenzie treatment group ($p < 0.05$ or higher than $p < 0.05$) in final assessment which indicate that the effectiveness of McKenzie treatment is superior to the conventional physiotherapy for low back pain patients. The study underscores the importance of individualized treatment plans and patient education in LBP management, as the McKenzie Method emphasizes self-management and active participation, which may contribute to long-term benefits.

Conclusions: In conclusion, the McKenzie directional preference exercises show promise as an effective intervention for LBP, offering comparable or superior outcomes to conventional physiotherapy in certain domains. Future research should explore long-term effects, subgroup analyses, and standardized protocols to further validate its clinical utility. Integrating the McKenzie Method into LBP treatment protocols could improve patient-centered care and reduce the global burden of this debilitating condition.

Keywords: *Low back pain, McKenzie Method, directional preference, physiotherapy, randomized controlled trial, Oswestry Disability Index.*

CHAPTER I INTRODUCTION

1.1 Background

Low back pain functions as a common musculoskeletal condition which produces extensive effects on people across both population groups and wider communities throughout the world. The diagnostic area for this pain presents in the lower back yet medical professionals cannot identify the source and the condition persists either as an acute or chronic problem when chronic low back pain extends beyond three months (Kahere & Ginindza, 2020). Global disability rates along with work absenteeism come mainly from LBP since this disorder disrupts people of any age starting from children to adults and it presents significant healthcare and socioeconomic expenses. LBP poses a serious public health concern because it affects a growing number of older persons as well as people through negative lifestyle choices.

The worldwide prevalence of LBP ranks as the primary musculoskeletal disorder remarking that up to 80% of people experience this condition during their lives according to Hoy et al. (2012). Global disability years have increased substantially from 1990 to 2015 due to LBP because it represents the leading disability cause worldwide (Kahere & Ginindza, 2020).

LBP research in 2019 revealed that the MENA region had an age-standardized prevalence level at 7668.2 per 100,000 of the population as well as an age-standardized incidence rate of 3215.9 per 100,000 of the population (Safiri et al., 2023).

The illness LBP creates major consequences on physical activities and mental wellness and person's quality of life. Individuals with chronic LBP report poorer physical function, more limitations in daily activities and increased depressive symptoms (Ge et al., 2022).

LBP ranks as the second leading cause for medical visits in the United States where the total expenses reach more than 90 billion USD per year. The condition creates psychological distress which accelerates brain ageing and deteriorates vital brain tissue (Samartzis & Grivas, 2017). LBP leads to substantial economic expenses because it causes both healthcare expenses and reduced productivity. The total

expenditure on LBP reached 2.2 billion USD annually throughout LMICs (Fatoye et al., 2023). Beside work-related activities inadequate seating and lifting heavy items together with unfavorable working positions lead to both new cases and prolonged LBP. The prevention and management of LBP requires vital interventions to take place within the workplace ("Low Back Pain (LBP)", 2022).

LBP exists at high levels among African schoolteachers according to Tesfaye et al. (2023) because the condition develops from a combination of demographic elements including student age range and sex as well as physical inactivity and lack of sound sleep patterns.

Scientists have identified a growing problem of LBP in children and adolescents since 2019 because the number of affected individuals increased from 2-11% to 27-51% (Hwang et al., 2019). The development of pediatric LBP follows an unfortunate progression that turns into chronic pain during adulthood thereby reducing patient quality of life and driving up medical expenditures. The occurrence of pediatric LBP is connected to obesity weight problems combined with physical inactivity and incorrect posture as risk factors (Hwang et al., 2019).

The relationship between genetic makeup and LBP is strong because evidence shows that LDD generates considerable genetic involvement in both LDD and LBP. People whose relatives suffer from LBP face increased risk specifically when their advanced LDD becomes apparent through MRI results (Livshits et al., 2011). Lumbar curvature (lordosis) generates abnormal shear forces along with compression on vertebrae structures thus increasing the likelihood of disc herniation and vertebral displacement (Castillo & Lieberman, 2015).

The combination of obesity with abdominal obesity significantly raises the possibility of developing LBP accompanied with lumbar radicular pain (Shiri et al., 2019). Spine stress raises in overweight patients leading to higher susceptibility toward LBP according to Livshits et al. (2011).

The combination of inactive physical behavior and bad posture patterns frequently leads to lower back pain. Walking and cycling serve as effective ways to decrease LBP frequency in people whose work does not involve heavy manual labor according to Shiri et al. (2019).

Long hours of work combined with manual labor tasks together with excessive chair time significantly increase the risk for LBP. Individuals involved in physical work

that demands heavy lifting together with extended sitting periods without rest may worsen their back pain (Ganesan et al., 2017).

The widespread condition known as low back pain (LBP) presents patients with different approaches to treatment through pharmaceutical medications and non-drug methods. Specific characteristics determine treatment effectiveness because pain falls under two categories either acute or chronic. NSAIDs represent the primary approach in treating both short-term and long-term LBP cases as per pharmacological therapy standards. In recent studies they revealed minimal yet valuable pain reduction together with disability relief and they show minimal side effect risks ("Pharmacological treatments for low back pain in adults: an overview of Cochrane Reviews", 2023). Doctors utilize opioids at different strength levels starting with tramadol to treat persistent low back pain cases. These drugs help decrease patients' pain severity and boost their functionality even though their utility remains limited by common side effects such as nausea and dizziness (Jiang et al., 2022).

The analgesic effectiveness of Muscle Relaxants for acute LBP exists but such treatments increase the possibility of adverse events ("Pharmacological treatments for low back pain in adults: an overview of Cochrane Reviews", 2023).

LBP patients often receive Exercise and Physical Therapy treatments because these methods demonstrate the ability to both decrease pain and enhance functional abilities especially when applied to athletes. The limited available information prevents understanding if these treatments help athletes return to sport (Thornton et al., 2021). Physical therapy performs alongside spinal manipulation and manual therapies although research shows limited proof for their individual usefulness (Belavy et al., 2021).

Non-specific LBP is a condition that chiropractic interventions treat frequently. The effectiveness of these popular treatments in terms of cost remains under investigation because more research needs to determine their comparative value (Blanchette et al., 2015).

The McKenzie Method, also known as Mechanical Diagnosis and Therapy (MDT), is a comprehensive approach to the assessment and treatment of musculoskeletal disorders, particularly those involving the spine and peripheral joints. Developed by Robin McKenzie, this method emphasizes the use of repeated movements and

sustained positions to assess and treat pain, with a focus on identifying directional preferences that guide therapeutic interventions.

The method gains notability through its patient-specific techniques that educate individuals about movements which worsen their medical condition. Studies demonstrate that the McKenzie Method benefit patients by decreasing pain symptoms as well as disability which helps patients resume their everyday activities (Safei & Zulfahmidah, 2022).

Medical research demonstrates that McKenzie Method leads to decreased pain symptoms while enhancing patients' functional outcomes in low back pain conditions. Research data reveals patients experience better outcomes from McKenzie treatments based on two common disability assessment tools such as the Oswestry Disability Index (ODI) and Visual Analogue Scale (VAS) (Shinde et al., 2020). A patient with recurrent herniated discs received treatment with the McKenzie Method which reduced their pain feelings and disability and strengthened their lower limbs and increased lumbar range of motion according to research by Al-Horani et al. (2020).

The McKenzie Method succeeds in treating low back pain yet outcome effectiveness changes based on patient demographics and research methodology choice. Research has revealed standard rehabilitation approaches to be less efficient than this method yet studies also presented equivalent outcomes as other physical treatments (Czajka et al., 2018).

The McKenzie Method delivers essential education alongside self-management components to its patients. The patient-centered approach of this method enables people with pain to manage their condition independently through non-clinical exercises and techniques that yield lasting advantages and decrease their healthcare service need (Shinde et al., 2020).

McKenzie exercises demonstrate professional effectiveness for chronic low back pain management because they deliver better results than standard rehabilitation methods regarding pain intensity as well as disability and quality of life (Gill et al., 2024). Research findings detected McKenzie therapy as a marginally better choice than passive approaches for lowering pain intensity and disability in nonspecific chronic low back pain patients (Singh et al., 2024).

Research suggests McKenzie therapy proves better than alternative rehabilitation treatments for decreasing pain and disability in patients with chronic LBP but results depend on which therapy it competes against (Lam et al., 2018).

McKenzie therapy demonstrates moderate superiority over passive treatments for acute low back pain since it produces reduced pain along with lower disability levels during the first 3 months according to Machado et al. (2006). Research conducted by Lam et al. (2018) determined that McKenzie therapy does not provide superior treatment results compared to other therapeutic interventions in the management of acute lower back pain.

The effects of McKenzie therapy have been evaluated against manual therapy as well as telerehabilitation and other treatment options. A variety of studies confirm McKenzie therapy delivers excellent results however it does not necessarily produce superior outcomes than manual therapy or telerehabilitation-based treatment protocols ("The McKenzie method for sub-acute non-specific low back pain", 2023). The combination of McKenzie with interferential therapy (IFT) proved superior to McKenzie combined with TENS in lowering low back pain according to a study by S et al., 2024. The combination of McKenzie therapy with supplemental therapy techniques including global postural re-education creates superior results for spinal mobility and intervention benefits beyond what McKenzie therapy achieves separately (P et al., 2022).

Researchers consider randomized controlled trials (RCTs) as the top method for determining intervention effectiveness because they reduce bias and confirm cause-and-effect relationships. RCTs give researchers an organized test setting which enables variable manipulation for control purposes. It is essential for evaluating the McKenzie Method because practitioners need to deliver exercises that follow individual directional needs. Random participant distribution within RCTs enables researchers to confirm that the intervention creates measured effects while eliminating alternate variables. Results from Silva et al. (2024) proved that functional disability and pain intensity improved significantly in participants receiving the McKenzie Method through an RCT-controlled study which contrasted these patients to others who received no intervention.

Randomization together with blinding serve as essential RCT characteristics which minimize potential distortions in research. Outcome measurements remain unbiased during assessments because expert observers remain unaware of the assigned

treatment groups in studies that compare the McKenzie Method to other therapies such as motor control exercises (Halliday et al., 2016).

Randomization creates balanced distribution of confounding elements through treatment groups because it is essential for measuring subjective outcomes such as pain and functional disability in research about low back pain (Machado et al., 2010). Research settings mainly employ standard outcome assessment tools including the Patient Specific Function Scale (PSFS) and pain intensity scales to determine intervention effectiveness in RCTs. The standardized assessment methods enable dependable comparison results between various scientific investigations regardless of study subjects or participant populations. The McKenzie Method RCT evaluation benefits from objective outcome measures that help determine the direct connection between intervention methods and changes in patient function and pain improvement (Silva et al., 2024).

RCTs often include follow-up periods to assess the long-term effectiveness of interventions. This is particularly relevant for the McKenzie Method, as it aims to provide lasting relief from chronic pain conditions. Longitudinal data from RCTs can demonstrate sustained benefits or identify any delayed effects of the intervention (Campos et al., 2017).

The randomized controlled trials (RCTs) and systematic reviews on the McKenzie method for treating low back pain (LBP) suggest that this approach could significantly impact clinical practices. The McKenzie method, which emphasizes patient education and exercises tailored to individual needs, has shown promising results in reducing pain and disability, improving quality of life, and enhancing functional outcomes in patients with LBP. These findings could encourage healthcare providers to integrate the McKenzie method more widely into treatment protocols for LBP, potentially leading to more personalized and effective care strategies. While the McKenzie method shows promise in treating LBP, it is important to consider the broader context of LBP management. The integration of the McKenzie method into clinical practice should be guided by a comprehensive understanding of each patient's unique condition and preferences. Additionally, ongoing research and clinical trials are essential to further validate the method's effectiveness and to refine its application in diverse patient populations.

1.2 Rationale

Low back pain (LBP) is a common musculoskeletal disorder that impacts a substantial segment of the global population, resulting in disability, diminished quality of life, and heightened healthcare expenses. The McKenzie Method, or Mechanical Diagnosis and Therapy (MDT), has garnered recognition for its implementation of directional preference exercises to reduce pain and enhance functionality. Directional preference denotes a certain movement or posture that alleviates symptoms and improves mobility in LBP.
Numerous studies indicate that patients demonstrating a directional preference have superior benefits with MDT relative to general physical therapy or non-specific activities. The efficacy of McKenzie directional preference exercises in the management of low back pain continues to be a subject of active research. A randomised controlled trial (RCT) is crucial for generating high-quality evidence regarding its efficacy. This study is to evaluate whether McKenzie therapy results in more rapid pain alleviation, enhanced functionality, and lower recurrence rates compared to alternative interventions in patients with lower back pain (LBP). The results of this experiment may assist doctors in identifying the most efficacious treatment approaches for LBP, thereby enhancing patient outcomes and alleviating the burden of chronic pain.

1.3 Hypothesis of the study

The purpose of the study is to investigate the effectiveness of McKenzie directional preference in Patient with low back pain.

Null Hypothesis

Null hypothesis is $H0 = \mu_1 - \mu_2 = 0$ or $\mu_1 = \mu_2$, where the experimental group and control group initial and final mean difference is same.

Alternative Hypothesis

Alternative hypothesis $H\alpha = \mu_1 - \mu_2 \neq 0$ or $\mu_1 \neq \mu_2$, where the experimental group and control group initial and final mean difference is not same.

Where,

Ho= Null hypothesis

Ha = Alternative hypothesis

μ_1 = Mean difference in initial assessment

μ_2 = Mean difference in final assessment

1.4 Objectives of the study

1.4.1. General Objectives

- To evaluate the effectiveness of McKenzie directional preference-based exercises in reducing pain and improving functional outcomes in patients with non-specific low back pain.

(Halliday et al., 2019)

1.4.2 Specific objectives

- To determine the effect of McKenzie directional preference exercises on pain intensity in patients with low back pain.
- To assess the improvement in functional disability levels after intervention with McKenzie-based therapy.
- To compare the clinical outcomes between the experimental group (McKenzie-method) and the control group receiving conventional physiotherapy.
- To identify the directional preferences (e.g., flexion, extension) most commonly observed in patients with low back pain.
- To evaluate the short-term and mid-term follow-up outcomes of patients treated with McKenzie directional preference exercises.

(Long et al., 2019)

1.5 Operational Definition

Low Back Pain

Low back pain (LBP) is defined as discomfort, pain, or stiffness localized in the lower portion of the spine, typically between the ribs and the pelvis. It can arise from various causes, such as muscle strain, ligament injury, herniated discs, degenerative changes in the spine, or other musculoskeletal disorders. The pain can vary in intensity from mild to severe and may be acute (lasting less than six weeks) or chronic (persisting for more than three months).

McKenzie Treatment approach

The McKenzie System of Mechanical Diagnosis and Therapy (MDT) involves a detailed history and an examination in which baseline symptoms, both with function and at rest, are established and then re-evaluated following the patient performing repeated end range loading movements to the affected area.

Basic Physiotherapy Treatment

Basic physiotherapy treatment comprises pelvic floor muscles strengthening; back muscles and leg muscle strengthening with postural and home advice.

ADL

Activities of Daily living (ADL) means activities of personal care and activity such as dressing, bathing, eating, grooming, cleaning, grooming etc.

Physical Exercise

Exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning any part of the body which is used to improve health, maintain fitness and is important as a means of physical rehabilitation.

CHAPTER II LITERATURE REVIEW

The McKenzie Method, also known as Mechanical Diagnosis and Therapy (MDT), is a therapeutic approach developed by physiotherapist Robin McKenzie for diagnosing and treating musculoskeletal conditions, particularly low back pain (LBP). It emphasizes patient education, self-treatment through posture correction and repeated exercise movements. This method classifies spinal pain into subgroups: Postural syndrome, Dysfunction syndrome, Derangement syndrome and other non-mechanical syndromes. Each subgroup has specific treatment plans based on the mechanical behavior of symptoms. It also emphasizes the centralization phenomenon, where pain is moved from distal areas back toward the spine through targeted exercises (Mann et al., 2020).

Research data provides evidence that McKenzie Method succeeds in reducing pain levels and disability along with enhancing the life quality of individuals with CLBP. Compared to conventional rehabilitation methods and manual therapy practice it creates superior results (Gill et al., 2024). Research indicates that this method leads to improved psychosocial outcomes because it reduces fear-avoidant beliefs together with psychological distress (Kuhnow et al., 2021).

The McKenzie Method stands against manual therapy and standard care for evaluation purposes. Statistical significance appears in certain outcomes through research but clinical significance remains relatively low which implies that McKenzie Method might not lead to better outcomes across all instances (Meyer & Harrison 2018). The treatment method achieves better results when therapists combine it with other therapeutic approaches to create dynamic synergistic interventions (Gill et al., 2024).

Additional research should study the McKenzie Method's effectiveness in particular patient groups because the existing research methods in studies need clarification (Safei & Zulfahmidah, 2022). A successful application of this method depends completely on qualified therapists who follow a complete training program and protocol (Gill et al., 2024).

The prevalence of low back pain (LBP) in the UK represents a significant public health concern, with studies indicating that 60-80% of adults may experience LBP at some point in their lives (Laird et al., 2016). The annual prevalence of low back pain (LBP) is estimated to be 20% of the population, leading to considerable impairment and

healthcare utilization (Parsons et al., 2020). In the UK, low back pain (LBP) significantly contributes to sickness absence, affecting many individuals who endure chronic or recurrent pain, thereby impairing their quality of life and work productivity (Walker et al., 2021). Recent studies demonstrate that low back pain (LBP) is prevalent in adults aged 30 to 60 years, influenced by factors including physical inactivity, poor posture, and previous back injuries (Smith et al., 2019)

Low back pain (LBP) is a significant public health issue in India, with a systematic review and meta-analysis estimating a pooled point prevalence of 48% (95% CI 40–56%), an annual prevalence of 51% (95% CI 45–58%), and a lifetime prevalence of 66% (95% CI 56–75%). The findings highlight notable variations in prevalence across gender, geographic settings, and occupational subgroups. Women exhibited a higher burden of LBP, with a point prevalence of 73% compared to 59% in men, and a lifetime prevalence of 70% compared to 61% in men. Additionally, rural populations had a greater prevalence of LBP than urban populations, with a point prevalence of 65% and annual prevalence of 65%, compared to 40% and 49%, respectively, in urban settings. Occupational analysis further revealed that elementary workers (e.g., laborers in agriculture and construction) had the highest point (62%) and annual (58%) prevalence, while lifetime prevalence was highest among plant/machine operators (71%) and professionals (69%).

These findings have significant implications for public health policy in India. Targeted interventions should prioritize high-risk groups, including women, rural populations, and labor-intensive workers, through ergonomic training, improved healthcare access, and workplace safety programs. Preventive strategies, such as education on posture, lifting techniques, and early symptom management, could reduce chronic disability and enhance quality of life. Additionally, addressing healthcare disparities by strengthening rural healthcare infrastructure is essential for effective LBP management. Standardization of research methodologies in future studies is also necessary to improve data reliability and reduce heterogeneity in findings.

Despite the robustness of the meta-analysis, certain methodological limitations must be acknowledged, including high heterogeneity (I^2 >90%), the exclusion of non-English and grey literature, and the absence of age- and severity-stratified data. Nevertheless, this study underscores the urgent need for India to address LBP as a public health priority to mitigate its socioeconomic burden and improve workforce productivity.

The systematic review and meta-analysis on the prevalence of low back pain (LBP) in India reveal a markedly elevated burden relative to global estimates. The research revealed a combined point prevalence of 48% (95% CI 40–56%), an annual prevalence of 51% (95% CI 45–58%), and a lifetime prevalence of 66% (95% CI 56–75%) (Shetty et al., 2022). The data indicate that LBP impacts a significant segment of the Indian population, necessitating immediate public health intervention.

Low back pain (LBP) is a significant global health issue, affecting a substantial portion of the worldwide population, as evidenced by research findings. A 2020 study in *The Lancet Rheumatology* identifies low back pain (LBP) as a major contributor to global disability, impacting around 540 million people at any given time (Hartvigsen et al., 2018). The 2017 Global Burden of Disease (GBD) study identified low back pain (LBP) as the leading cause of years lived with disability (YLDs) worldwide, with its prevalence consistently high over time.

A systematic review and meta-analysis published in *BMC Public Health* in 2021 estimated the global point prevalence of low back pain (LBP) at approximately 18.3%, with higher rates observed in high-income countries compared to low- and middle-income countries (LMICs) (Wu et al., 2021). The research predicted a rise in low back pain (LBP) prevalence due to ageing populations, sedentary lifestyles, and occupational risks, particularly in developing countries.

A study in the *European Spine Journal* (2019) reported that the prevalence of low back pain (LBP) in Europe ranged from 21% to 44%, while in the United States, it was about 28% .

Projections for the period between 2015 and 2025 suggest that the incidence of low back pain (LBP) will continue to rise, particularly in low- and middle-income countries (LMICs), due to rapid urbanisation, poor ergonomic practices, and limited access to healthcare (Vos et al., 2020). The GBD 2019 study indicated that low back pain will persist as a significant public health concern, greatly affecting global disability and economic costs (GBD 2019 Diseases and Injuries Collaborators, 2020).

Low back pain (LBP) is a prevalent condition with multiple potential aetiologies, encompassing mechanical disorders and systemic diseases. Musculoskeletal strain or injury is a common cause, often resulting from poor posture, heavy lifting, or sudden movements (Hoy et al., 2012). Degenerative disorders, such as intervertebral disc degeneration and osteoarthritis, significantly impact elderly populations (Vos et al.,

2015). Lifestyle factors, including obesity, sedentary behaviour, and smoking, are linked to an increased risk of low back pain (Shiri et al., 2013).

Psychological factors, including stress, anxiety, and depression, are recognised as significant contributors to chronic low back pain, often exacerbating the condition (Pincus et al., 2013). Systemic diseases such as ankylosing spondylitis and other inflammatory arthritides can manifest as lower back pain, particularly in younger patients (Sieper et al., 2015). Furthermore, occupational hazards such as prolonged sitting and repetitive manual tasks represent significant risk factors, as demonstrated by studies in workplace ergonomics (Coenen et al., 2014).

Recent research demonstrates that genetic factors play a role in the development of chronic low back pain, with particular genetic markers associated with disc degeneration and pain sensitivity (Suri et al., 2018). Socioeconomic factors, including low income and limited access to healthcare, have been shown to correlate with a higher prevalence and severity of low back pain (Hartvigsen et al., 2018). Understanding the diverse causes of low back pain (LBP) is crucial for developing effective prevention and treatment strategies, particularly in light of the increasing global burden associated with this condition (World Health Organisation, 2020).

Low back pain (LBP) is a common musculoskeletal condition characterised by discomfort or pain located between the lower edge of the ribs and the gluteal folds. The manifestations of low back pain may vary considerably based on the underlying aetiology, intensity, and duration of the condition. Acute low back pain, often caused by muscular strain or ligament sprain, typically presents as localised pain that may worsen with movement, such as bending, lifting, or twisting (Hoy et al., 2015). Patients may exhibit rigidity and a diminished range of motion in the lumbar spine. Chronic low back pain, persisting for more than 12 weeks, can present as persistent aching, radiating discomfort into the buttocks or thighs, and associated muscle tightness or spasms

Radicular symptoms, such as sciatica, can result from nerve root compression, typically due to a herniated disc or spinal stenosis. This can lead to acute, radiating pain that extends down one or both legs, accompanied by numbness, tingling, or paralysis in the affected limb (Brinjikji et al., 2015).

Additionally, individuals experiencing low back pain may struggle to maintain certain postures, including extended periods of sitting or standing, and may experience increased pain following actions such as coughing or sneezing (Chou et al., 2017). In critical cases like cauda equina syndrome, symptoms may include bowel or bladder

dysfunction, saddle anaesthesia, and progressive neurological deficits, necessitating immediate medical attention (Deyo et al., 2015).

Psychological variables such as anxiety, depression, and stress are often associated with chronic low back pain and can exacerbate the perception of pain and functional impairment (Foster et al., 2018). The presentation of low back pain is multifaceted, requiring comprehensive assessment to identify the specific aetiology and tailor appropriate treatment strategies.

Low back pain (LBP) is a significant contributor to global disability, adversely impacting individuals' quality of life and productivity. Studies conducted between 2015 and 2025 have consistently highlighted the substantial burden of disability associated with chronic low back pain, particularly in working-age adults. Research indicates that low back pain (LBP) has a substantial effect on years lived with disability (YLDs), as evidenced by global data from the Global Burden of Disease Study, which underscores its significance as a major health concern (Vos et al., 2016; GBD 2021 Low Back Pain Collaborators, 2023). Chronic low back pain often leads to functional impairment.

Limitations, reduced mobility, and psychological distress contribute to a heightened risk of long-term disability. Inadequate ergonomics, sedentary behaviour, and limited access to effective treatment contribute to the problem (Hartvigsen et al., 2018). Furthermore, socioeconomic disparities have a substantial impact on health outcomes, as individuals in low- and middle-income countries often face barriers to accessing timely and appropriate care, which increases the risk of disability (Hoy et al., 2014). Multidisciplinary rehabilitation, cognitive-behavioral therapy, and workplace modifications have shown efficacy in decreasing disability; nonetheless, their implementation worldwide remains inconsistent (Foster et al., 2018)..

The McKenzie method for treating mechanical low back pain (LBP) emphasises directional preference (DP) exercises tailored to a patient's symptom response during assessment. The exercises involve repetitive movements in a specific direction (e.g., extension, flexion, or lateral gliding) intended to centralise or reduce pain. A patient with pain intensified by flexion may achieve relief through repeated extension exercises, as demonstrated in a clinical case where prone extensions reduced leg pain and centralised symptoms (Schenk et al., 2013). Dunsford et al. (2011) conducted a systematic review demonstrating that DP exercises led to significant within-group improvements in pain, as measured by the VAS, and function, evaluated through the

Roland Morris Disability Questionnaire, across four RCTs. Nonetheless, the evidence remains constrained by small sample sizes and variability in exercise parameters.

Adjunctive therapies, such as postural education and lumbar roll utilisation, are critical elements of the McKenzie framework. The use of a lumbar roll to correct seated posture has been shown to reduce symptoms in the case study and aligns with established McKenzie practice (Cherkin et al., 2011). Heat therapy, in conjunction with DP exercises, demonstrated improved short-term functional outcomes in a study, suggesting that multimodal approaches may augment benefits (Mayer et al., 2005). Patient education on self-management, including the execution of exercises at a frequency of 10 repetitions every 2–3 hours, facilitates active engagement in recovery, a core tenet of the McKenzie philosophy (Dunsford et al., 2011).

Despite the demonstrated efficacy of DP exercises, their prescription lacks standardisation. Research demonstrates varying intensity (1–5 sets of 10–20 repetitions) and intervention duration (5 days to 1 month), complicating clinical application (Long et al., 2004; Schenk et al., 2003). The method's emphasis on individualised assessment ensures that exercises align with a patient's specific movement preferences, thereby improving compliance and outcomes. Future research should concentrate on resolving deficiencies in exercise dosage and long-term adherence to improve clinical guidelines (Dunsford et al., 2011).

The McKenzie Method has been consistently shown to reduce pain in patients with CLBP. Studies indicate that it provides significant pain relief compared to standard rehabilitation approaches and manual therapy, with some studies reporting superior pain reduction outcomes(Gill et al., 2024).

A meta-analysis found that the McKenzie Method was more effective than first-line educational interventions in reducing both short-term and long-term pain (Maraccini, 2016).

The method has been effective in improving disability levels in the long term. At 6 months, significant improvements in disability were reported in patients treated with the McKenzie Method compared to those receiving manual therapy (Namnaqani et al., 2019).

The McKenzie Method has also been associated with improvements in functional abilities, as evidenced by a case study where a patient with recurrent herniated discs showed enhanced physical function and reduced disability after undergoing McKenzie exercises (Al-Horani et al., 2020).

The McKenzie Method has been shown to improve health-related quality of life (HRQoL) in patients with long-term mechanical low back pain. The addition of dynamic back extensors endurance exercises to the McKenzie Protocol led to greater improvements in HRQoL. A study comparing telerehabilitation-based McKenzie therapy with spinal manual therapy found that the McKenzie Method led to significantly higher long-term health perception improvement (Mbada et al., 2024).

Despite its widespread use, the literature reveals limited documentation of adverse effects directly associated with the McKenzie Method. However, some studies highlight the need for more comprehensive research to fully understand its safety profile across diverse patient populations.

A randomized controlled trial found no adverse events reported by patients undergoing the McKenzie Method for chronic non-specific low back pain, suggesting a favorable safety profile in the short term (Garcia et al., 2018).

Similarly, a comprehensive review by Gill et al. did not identify any significant adverse effects associated with the McKenzie Method, reinforcing its safety in managing CLBP (Gill et al., 2024).

The McKenzie Method has been shown to be slightly more effective than placebo for pain reduction, but not for disability, with no adverse effects reported, indicating its relative safety compared to other interventions (Garcia et al., 2018).

A meta-analysis by Lam et al. concluded that the McKenzie Method is not superior to other rehabilitation interventions for acute low back pain but is effective for chronic cases, with no significant adverse effects noted (Lam et al., 2018).

The effectiveness and safety of the McKenzie Method can be influenced by the therapist's qualifications and adherence to training protocols. Proper application of the method is crucial to minimize any potential risks (Czajka et al., 2018).

The method's safety and efficacy may vary depending on the specific characteristics of the patient population, underscoring the importance of individualized treatment plans (Safei & Zulfahmidah, 2022).

Beyond physical outcomes, the McKenzie Method has been associated with improvements in psychosocial factors such as fear-avoidance beliefs and psychological distress, which can indirectly contribute to its safety by reducing the risk of chronic pain development (Kuhnow et al., 2021).

In conclusion, the McKenzie Method, particularly its use of directional preferences, has shown promising results in the treatment of low back pain. Previous studies indicate its

potential for improving pain relief and functional outcomes, although the effectiveness may vary based on patient-specific factors. While it compares favorably with other conservative treatments, further research, especially randomized controlled trials, is necessary to better understand its long-term efficacy and limitations. Addressing these gaps will provide clearer guidance for clinicians and patients in managing low back pain.

CHAPTER-III METHODOLOGY

3.1 Study Design

A hospital-based randomized clinical trial was used for the study and two groups of participants to fulfil the aim and objective of this research. A randomized clinical trial would be investigating McKenzie directional preference on patients with Low Back Pain. While the control group would be only receiving conventional physiotherapy, the experimental group would be received both conventional physiotherapy and McKenzie Directional preferences. The researcher has conducted the study with experimental group and control group with an aim to compare in between experimental group and control group (Bowling, 1997).

It was a double blinded study where the assessor and participants were blinded.

3.2 Study Site

The study focused on the Center for the Rehabilitation of the Paralyzed (CRP), Savar, Dhaka. This non-governmental organization provides Physiotherapy, Occupational Therapy and Speech and Language Therapy services in both indoor and outdoor activities to improve Bangladesh's healthcare delivery system.

3.3 Study Area

Physiotherapy treatment for patients with low back pain (LBP) would be given in the Musculoskeletal unit of the Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka.

3.4 Study population

Participants who met the selection criteria of individuals suffering from low back pain would be selected from the Musculoskeletal unit of the Physiotherapy Department at CRP, Savar, Dhaka.

3.5 Study Duration

Total duration time 12 month and data collection time November-24 to April-25.

3.6 Sample Size

The following parameters were used to determine the sample size:

- Size of effect (Δ): 1.02
- Assumed standard deviation (σ) of 1.0
- 0.05 (5%) is the significance level (α).
- Power (1 - β): 80%, or 0.80

The formula that we applied was,

$$n = \frac{2\,(Z\alpha\backslash 2 + Z\beta)^2 \sigma^2}{\Delta^2}$$

By using,

- Confidence level, $Z_{\alpha/2}$ = 1.96 (for a significance level of 0.05)
- Z_{β}= 0.84 (for a power of 0.80)
- Population varience, σ^2 = 14 (Reasonable varience according t many studies)
- Margin of error, Δ= 3

The calculated value was found,

$$n = \frac{2\,(1.96+0.84)^2 * 14}{3^2}$$
$$= 24.3911$$
$$n \approx 25$$

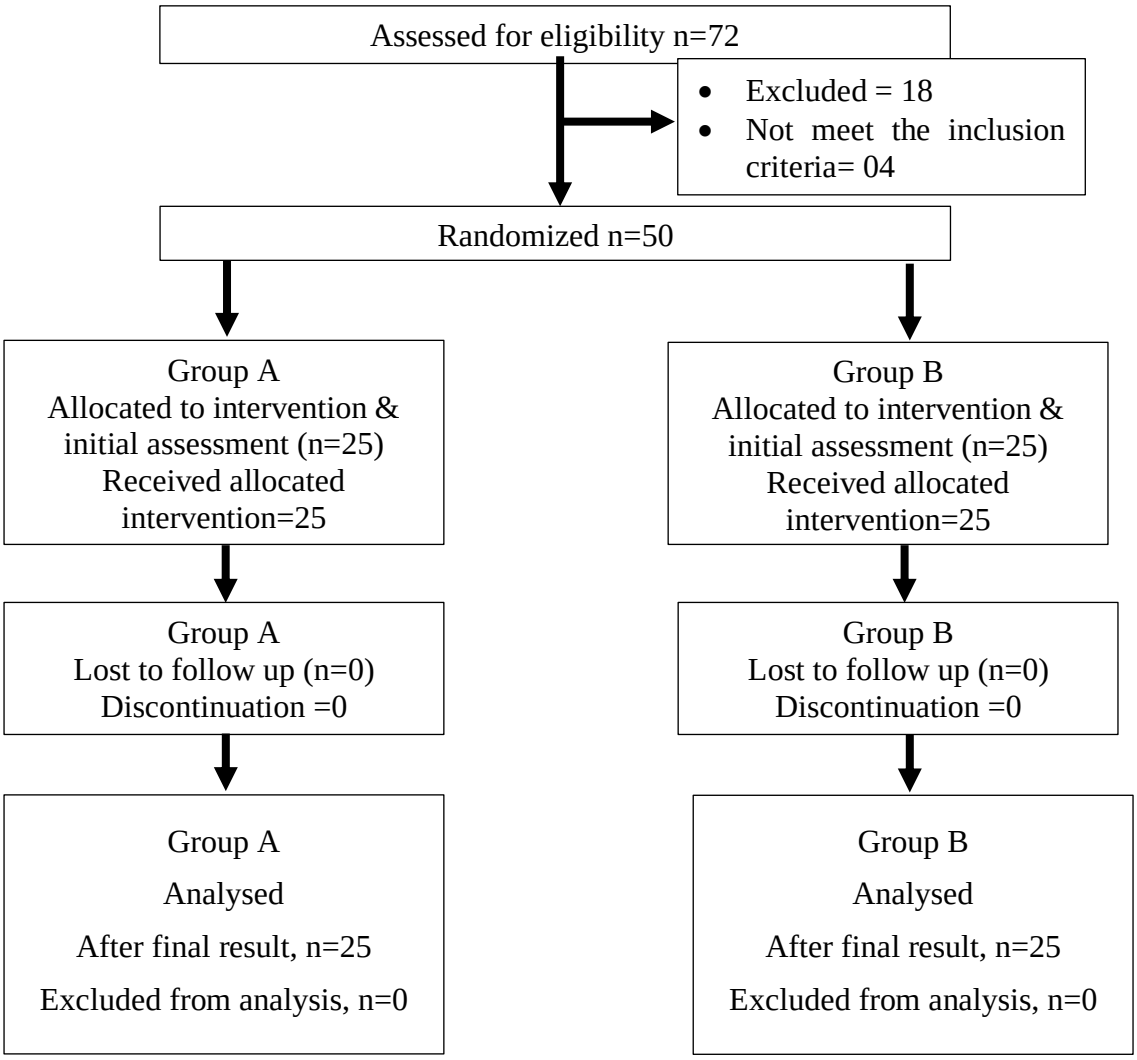
Calculated sample size *N*= 25 X 2 = 50

A total of 25 people has been included in this study due to sample lack and scheduling limitations.

3.7 Sampling Technique

The Hospital Based Random Sampling method was used in this study. The study's participants who completed its inclusion criteria were chosen at random to make up the sample. Out of the physiotherapy department at CRP, Savar, fifty patients with Low Back pain were selected. Of these, 25 were randomly assigned to the Experimental group, which received conventional physiotherapy along with McKenzie directional preferences and other 25 were randomly assigned to the Control group, which received conventional physiotherapy only. The labels for the samples in the experimental group were E1, E2, E3, etc., while the samples in the control group were C1, C2, C3, etc.

Flow Diagram



3.8 Inclusion criteria

- Patients diagnosed with Low Back pain (LBP)
- Aged 18–65 years, as this age range typically encompasses the working-age population most affected by non-specific low back pain (Hartvigsen et al., 2018).
- Demonstrates a directional preference determined using the McKenzie Mechanical Diagnosis and Therapy (MDT) assessment protocol (Almeida et al., 2021).
- Both genders will be included (Alkhawajah et al., 2019).

3.9 Exclusion criteria

- Presence of serious spinal pathology (e.g., tumor, infection, fracture, or inflammatory disorders) (Deyo et al., 2020).
- Prior spinal surgery, as post-surgical structural changes may alter treatment outcomes (Macedo et al., 2021).
- Neurological deficits (e.g., motor weakness, bowel/bladder dysfunction) or non-centralizing radicular symptoms, which are contraindications for MDT (May & Petersen, 2018).
- Red flags including unexplained weight loss, history of cancer, or night pain (Oliveira et al., 2018).
- Diagnosed with a systemic inflammatory condition such as ankylosing spondylitis or rheumatoid arthritis.
- Pregnant women, due to biomechanical and hormonal changes that can influence back pain presentation.
- Currently receiving other forms of active physiotherapy or spinal injection therapy for low back pain.

3.10 Method of Data collection

3.10.1 Data collection tool

The informed consent form and the sociodemographic questionnaire were the instruments used to collect data for this study.

3.10.2 Measurement tool:

Primary Outcomes:

Pain intensity using the Dallas pain score.

Secondary Outcomes:

Disability measured by the Oswestry Disability Index (ODI).

3.10.3a Dallas Pain Questionnaire:

Each question on the 16-item Dallas Pain Questionnaire (DPQ), which was used to evaluate pain and severity, personal care, lifting, standing, sitting, walking, and sleeping, as well as work and leisure activities, was scored using a Visual Analog Scale (VAS). This questionnaire has been slightly adjusted to fit the needs of this investigation. Specific terms are used to identify the scale extremities, such as "no pain in left/always severe pain in right." The patient indicates his or her condition by marking the position on the scale for each particular inquiry.

3.10.3b Oswestry Disability Index (ODI) Questionnaire:

There were ten parts of questions from the Oswestry Disability Index (ODI). The parts were chosen from experimental questionnaires designed to evaluate many facets of day-to-day living. Pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life, and social life were the ODI domains. Six statements, ranging from 0 (the activity's smallest degree of difficulty) to 5 (its greatest degree of complexity), were included in each segment. The highest score should be assigned if several statements were noted in each area. The aggregate of the scores from each segment yields the overall score, which can be as much as 50 points. The total point is then converted to a percentage format by multiplying it by two.

3.11 Data collection procedure

The process of collecting data included diagnosing the patient, starting the recording, treating them, and finishing the recording. After completing their training, a physiotherapist assessed the patients. Twelve therapy sessions were given to each participant. Pre-test, intervention, and post-test were the three phases. To collect the information, the researcher created a written questionnaire. The researcher used the Dallas pain Score (DPS) to record the level of discomfort prior to starting the treatment and provided a pre-test. The investigator used Oswestry Disability Index (ODI) to measure Disability. The researcher used the same protocols to administer a post-test after six treatment sessions. Before starting therapy, each participant completed an assessment form given by the data collector. The subjects were then given the identical assessment form following six treatment sessions. The patient completed the subjective portion, and the physiotherapist finished the objective portion. In order to avoid bias, the data collector collected information from the trial and control groups while the physiotherapist was present.

3.12 Intervention

Every patient got treatment from a one-year-experienced physiotherapist. For four weeks, there were three therapy sessions per week, each lasting thirty minutes.

3.12.1 Experimental Group

In the experimental group of the RCT, patients with non-specific low back pain and a clear directional preference were treated using the McKenzie Method. A certified therapist first identified each patient's preferred movement direction (extension, flexion, or lateral). Based on this, a customized exercise plan was given, typically involving 10 repetitions of specific movements every 2–3 hours daily. Patients were also educated on posture, body mechanics, and self-management. Manual therapy was used only if exercises alone were ineffective. The intervention lasted four weeks, with 2–3 weekly sessions. Progress was tracked through symptom and function assessments.

3.12.2 Control Group

In the control group, patients with non-specific low back pain received conventional physiotherapy without directional preference. Treatment was given 2–3 times weekly for four weeks, including pain relief modalities like TENS, IFT, or hot/cold packs. Patients performed general stretching and strengthening exercises, with manual therapy applied as needed. Postural education and ergonomic advice were also provided, along with a home exercise program. The aim was to reduce pain, improve mobility, and enhance function through standard physiotherapy techniques.

3.13 Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0 and Microsoft Excel 2016. All the surveys were double-checked for clarity and accuracy. Enter all types, values, decimals, label alignment, and measurement level data into SPSS's variable view. The next step was to load SPSS' data view. The researcher double-checked the information on the questionnaire sheet to confirm proper transfer to the SPSS data view after inputting all the data. Paired t-test was performed for within group analysis of DQ, ODI. Independent sample t-test was performed for between group analysis of DQ, ODI.

3.14 Statistical test

Pain was analyzed using the Paired sample t-test for within group and the independent samples t-test used for between group.

3.15 Level of Significance

The "p" value of the research would be determined for the purpose to evaluate its importance. For the purposes of health care research, statistical significance is defined as a p-value of 0.05. By comparing the p-value to the preset significance level, statistical significance would be achieved. The results would be determined significant if the p-value is less than or equal to the significance level.

3.16 Ethical consideration

For the project, the researcher was register the clinical trial with the WHO. The investigator will follow the Institutional Review Board's (IRB) established ethical guidelines. The researcher is committed to maintaining strict confidentiality. Once the required information has been provided, consent will be required. The patient will be free to decide whether or not to continue taking part in the study at any time.

CHAPTER-IV RESULT

This chapter represents the results of this study. The results includes the sociodemographic characteristics and family history of the patients, their comorbidities and effects of the intervention of different groups.

4.1 Base-line characteristics

Table-1

Variables	Experimental Group Mean±SD	Control Group Mean±SD	p value
Age	43.84±12.324	43.44±12.214	0.455

The table below shows the descriptive data for the experimental group and the control group at the start of the study. The table presents the following data for each group: age. The experimental group had a mean age of 43.84 years, while the control group had a mean age of 43.44 years. This shows that both groups are middle-aged, though the control group is a little older.

4.2 Analysis of Socio-demographic information

Table-2

Variable	Experiment group (n)%	Control group (n)%
Gender	Male (n=18)=72% Female(n=7)= 28%	Male (n=16)=64% Female(n=9)= 36%
Occupation	Student (n=2)=8% Service holder (n=5)=20% Business (n=5)=20% Day laborer(n=7)=28% Housewife(n=6)=24%	Student (n=1)=4% Service holder (n=5)=20% Business (n=8)=32% Day laborer(n=4)=16% Housewife(n=7)=28%
Education	No education (n=4)=16% Primary education(n=5)=20% Secondary education (n=6)=24% Higher education (n=3)=12% Graduate (n=7)=28%	No education (n=1)=4% Primary education(n=7)=28% Secondary education (n=8)=32% Higher education (n=4)=16% Graduate (n=5)=20%
Marital Status	Married (n=21)=84% Unmarried (n=4)=16%	Married (n=24)=96% Unmarried (n=1)=4%
Comorbidities	Diabetes (n=7)=28% Blood pressure (n=5)=20% Depression (n=13)=52%	Diabetes (n=5)=20% Blood pressure (n=7)=28% Depression (n=13)=52%
BMI	Normal (n=14)= 56% Overweight (n=8)=32% Obesity(n=2)=8% More obesity (n=1)=4%	Normal (n=13)= 52% Overweight (n=10)=40% Obesity(n=2)=8%

The table compares the demographic characteristics of individuals in a control group with those in an experimental group for research purposes. Gender, education level, occupation, comorbidities, marital status, and BMI are among the variables considered. In both groups, the gender distribution indicates a higher proportion of males than females, with 64% in the control group and 72% in the experimental

group. 32% of participants in the control group and 28% of those in the experimental group had attained at least a graduation. Most participants hold employment, with service holder 20%,day laborer 20%,business 20% in the experimental group and service holder 20%,business 32%,day laborer 16% in the control group. Control groups consist of 96% married ,4 % unmarried and experimental groups consist of 84% married , 16% unmarried individuals. The majority of participants are involved with depression both the group about 52% . A significant proportion of participants are overweight, with 40% in the control group and 32% in the experimental group.

4.3 Within group analysis of Dallas Questionnaire (Paired sample t-test)

Table-3

	Experimental group			**Control group**	
Variable	**t-value**	**p-value**	**Df**	**t-value**	**p-value**
Pain intensity	13.573	0.000*	24	18.767	0.000*
Night pain intensity	10.131	0.000*	24	8.887	0.000*
Pain interfere with Lifestyle	11.635	0.000*	24	10.954	0.000*
Pain at forward bending activity	10.866	0.000*	24	4.993	0.000*
Back Stiffness	11.431	0.000*	24	5.422	0.000*
Interfere with walking	12.348	0.000*	24	7.130	0.000*
Hurt when walking	8.817	0.000*	24	1.732	0.096
Standing still	9.100	0.000*	24	12.028	0.000*
Twisting	7.403	0.000*	24	3.855	0.001*
Upright Hard Chair Sitting	7.878	0.000*	24	0.743	0.465
Soft Arm Chair Sitting	8.220	0.000*	24	2.823	0.009*
Lying in Bed	10.813	0.000*	24	6.725	0.000*
Pain Limit Normal Lifestyle	10.190	0.000*	24	7.176	0.000*

Pain Interfere with work	10.478	0.000*	24	9.333	0.000*
Change of workplace	12.990	0.000*	24	2.369	0.026*
Pain interfere others expression	5.511	0.000*	24	6.363	0.000*

***, significant value**

4.4 Between group analysis of Dallas Questionnaire (Independent samples t-test)

Table-4

Variable	df	t-value	p-value
Pain intensity	48	-8.232	0.004*
Night pain intensity	48	-3.527	0.294
Pain interfere with Lifestyle	48	-3.524	0.020*
Pain at forward bending activity	48	-2.683	0.300
Back Stiffness	48	-3.713	0.639
Interfere with walking	48	-2.776	0.012*
Hurt when walking	48	-2.388	0.001*
Standing still	48	-4.267	0.045*
Twisting	48	-3.744	0.008*
Upright Hard Chair Sitting	48	-4.987	0.692
Soft Arm Chair Sitting	48	-5.783	0.131
Lying in Bed	48	-4.532	0.167
Pain Limit Normal Lifestyle	48	-4.993	0.019*
Pain Interfere with work	48	-3.867	0.557
Change of workplace	48	-4.110	0.902
Pain interfere others expression	48	-3.760	0.053

***, significant value**

This table presents the results of a statistical comparison between two groups using the Dallas Pain Questionnaire. The goal was to see if there were any significant differences in pain and disability-related activities between the two groups.

The analysis shows that pain intensity had a highly significant difference between the two groups, with a p-value of 0.004. This means the treatment or intervention had a strong positive effect in reducing pain in one group compared to the other. Also, pain interfering with lifestyle ($p = 0.020$) and interference while walking ($p = 0.012$) were significantly different, suggesting the participants in one group were better able to carry out daily activities and walking tasks.

In addition, hurting while walking ($p = 0.001$), standing still ($p = 0.045$), twisting ($p = 0.008$), and pain limiting normal lifestyle ($p = 0.019$) also showed significant differences. These findings suggest the intervention was effective in reducing pain and improving mobility and function in many aspects of life.

However, some variables did not show significant differences. For example, night pain intensity ($p = 0.294$), back stiffness ($p = 0.639$), sitting in a hard or soft chair, and change of workplace were not significantly different between groups. These results mean the treatment did not affect all areas equally.

Overall, this table shows that the intervention helped improve many pain-related problems and functional activities in one group more than the other, although some aspects remained unchanged.

4.3.1 General pain intensity

According to the findings of this research, the level of general pain intensity had an observed t value of 13.573 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 18.767 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative

hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -8.232 with 5% level of significance at 48 degree of freedom with the p-value of 0.004. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.2.Night pain intensity

According to the findings of this research, the level of night pain intensity had an observed t value of 10.131 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 8.887 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -3.527 with 5% level of significance at 48 degree of freedom with the p-value of 0.294. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was no significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.3. Pain interfere with lifestyle

According to the findings of this research, the level of pain interfere with lifestyle had an observed t value of 11.635 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 10.954 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative

hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -3.524 with 5% level of significance at 48 degree of freedom with the p-value of 0.020. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.4. Pain at forward bending

According to the findings of this research, the level of pain at forward bending activity had an observed t value of 10.866 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 4.993 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -2.683 with 5% level of significance at 48 degree of freedom with the p-value of 0.300. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was no significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.5. Back stiffness

According to the findings of this research, the level of back stiffness had an observed t value of 11.431 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 5.422 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom

in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -3.713 with 5% level of significance at 48 degree of freedom with the p-value of 0.639. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was no significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.6.Interfere with walking

According to the findings of this research, the level of interfere with walking had an observed t value of 12.348 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 7.130 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -2.776 with 5% level of significance at 48 degree of freedom with the p-value of 0.012. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.7. Hurt when walking

According to the findings of this research, the level of hurt when walking had an observed t value of 8.817 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 1.732 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.096. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -2.388 with 5% level of significance at 48 degree of freedom with the p-value of 0.001. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.8. Standing still

According to the findings of this research, the level of pain at standing still had an observed t value of 9.100 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 12.028 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of –4.267 with 5% level of significance at 48 degree of freedom with the p-value of 0.045. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.9.Twisting

According to the findings of this research, the level of twisting had an observed t value of 7.403 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 3.855 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.001. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -3.744 with 5% level of significance at 48 degree of freedom with the p-value of 0.008 . This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.10. Upright hard chair sitting

According to the findings of this research, the level of upright hard chair sitting had an observed t value of 7.878 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 0.743 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.465. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -4.987 with 5% level of significance at 48 degree of freedom with the p-value of 0.692. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant no difference between McKenzie directional approach and conventional therapy in the between group.

4.3.11. Soft arm chair sitting

According to the findings of this research, the level of soft arm chair sitting had an observed t value of 8.220 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 2.823 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.009. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -5.783 with 5% level of significance at 48 degree of freedom with the p-value of 0.131. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was no significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.12. Lying in bed

According to the findings of this research, the level of lying in bed had an observed t value of 10.813 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 6.725 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -4.532 with 5% level of significance at 48 degree of freedom with the p-value of 0.167. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was no significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.13. Pain limit normal lifestyle

According to the findings of this research, the level of pain limit normal lifestyle had an observed t value of 10.190 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 7.176 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -4.993 with 5% level of significance at 48 degree of freedom with the p-value of 0.019. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.14. Interfere with work

According to the findings of this research, the level of pain interfere with work had an observed t value of 10.478 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 9.333 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -3.867 with 5% level of significance at 48 degree of freedom with the p-value of 0.557. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was no significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.15. Change of work place

According to the findings of this research, the level of change of workplace had an observed t value of 12.990 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 2.369 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.026. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -4.110 with 5% level of significance at 48 degree of freedom with the p-value of 0.902. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.3.16. Pain interfere with others

According to the findings of this research, the level of pain interfere with others had an observed t value of 5.511 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 6.363 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of general pain intensity had an observed t value of -3.760 with 5% level of significance at 48 degree of freedom with the p-value of 0.053. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was no significant difference between McKenzie directional approach and conventional therapy in the between group.

4.5 Within group analysis of OSWESTRY DISABILITY INDEX QUESTIONNAIRE (Paired t-test)

Table-5

	Experimental group			**Control group**	
Variable	**t-value**	**p-value**	**df**	**t-value**	**p-value**
ODI	15.734	0.000*	24	14.826	0.000*

***, significant value**

According to the findings of this research, the OSWESTRY DISABILITY INDEX score had an observed t value of 15.734 in the experimental group during a two-tailed paired t test, whereas the level of general pain intensity had an observed value of 14.826 in the control group during the same test. 5% level of significance at 24 (twenty four) degrees of freedom in experimental group with p- value of 0.000 and in control group p- value was 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the within group. Both groups reached statistical significance at the overall level of pain severity.

And in between group analysis of OSWESTRY DISABILITY INDEX score had an observed t value of -4.959 with 5% level of significance at 48 degree of freedom with the p-value of 0.000. This meant that the null hypothesis was rejected and the alternative hypothesis was accepted in the between group. This indicated that there was significant difference between McKenzie directional approach and conventional therapy in the between group.

4.6 Between group analysis of OSWESTRY DISABILITY INDEX QUESTIONNAIRE (Independent sample t-test)

Table-6

Variable	df	t-value	p-value
ODI	48	-4.959	0.000*

***, significant value**

The table shows the result of an independent sample t-test comparing two groups using the Oswestry Disability Index (ODI), which measures the level of disability due to low

back pain. The degrees of freedom (df) in this test are 48. The t-value is -4.959, indicating a strong difference between the two groups. The p-value is 0.000, which is marked with an asterisk to show that it is statistically significant. Since the p-value is less than 0.05, it means the difference between the two groups is not due to chance. The negative t-value suggests that one group had a lower disability score than the other. This means one group likely experienced more improvement. The test proves that the treatment or condition applied to one group had a significant effect. Overall, there is a meaningful difference in disability levels between the two groups. This result supports the effectiveness of the intervention or variable being studied.

CHAPTER-V DISCUSSION

The study aimed to evaluate the effectiveness of McKenzie directional preference exercises in patients with low back pain (LBP) compared to conventional physiotherapy. The results demonstrated significant improvements in pain intensity, functional disability and other pain-related parameters in both groups, with notable trends favoring the McKenzie intervention. This discussion interprets these findings in the context of existing literature, explores clinical implications, acknowledges limitations, and suggests directions for future research.

Participants in both groups had comparable baseline characteristics, including age (experimental group: 43.84±12.32; control group: 43.44±12.21, p=0.455) allowing for a fair comparison. However, there were substantial differences in gender, occupation, education, marital status, comorbidities, and BMI which could have influenced the results.

The Dallas Pain Questionnaire showed substantial reductions in experimental group pain intensity, night pain, and pain interfering with lifestyle with p value of 0.000 following intervention. These findings are consistent with earlier research showing the McKenzie Method's efficacy in lowering pain and improving function (Gill et al., 2024; Safei & Zulfahmidah, 2022). The experimental group had a statistically significant value in ODI score (t= 15.374 , p= 0.000), compared to the control group (t= 14.826 , p=0.451), however the difference was statistically significant (t= -4.959, p= 0.000) . This tendency points to the potential benefits of McKenzie therapy, which is consistent with the findings of Lam et al. (2018), who found that McKenzie exercises were moderately superior to passive therapies for persistent LBP.

The significant reduction in pain intensity observed in this study aligns with findings from Gill et al. (2024), who reported that McKenzie exercises yielded better pain relief than standard rehabilitation methods. Similarly, a meta-analysis by Maraccini (2016) concluded that the McKenzie Method was more effective than first-line educational interventions in reducing both short-term and long-term pain. However, the current study's results contrast with those of Lam et al. (2018), who found no superiority of McKenzie therapy over other interventions for acute LBP. This discrepancy may stem from differences in study populations (chronic vs. acute LBP) or intervention protocols. in The improvement in ODI ratings the experimental group (from 20.68 to 10.24) is consistent with the findings of Al-Horani et al. (2020), who found that individuals with

recurrent herniated discs had improved physical function following McKenzie therapy. However, the current study's lack of statistical significance (p=0.074) could be attributed to the smaller sample size (n=25 each group) compared to bigger trials (Halliday et al., 2016).

While not directly measured in this study, the reduction in pain interfering with others' expression (4.18 to 2.52, p=0.004) suggests psychosocial benefits, consistent with Kuhnow et al. (2021), who reported improvements in fear-avoidance beliefs and psychological distress following McKenzie therapy. Future research should include standardized psychosocial metrics to further explore this dimension.

The McKenzie Method operates on the principle of directional preference, where specific movements centralize or reduce pain (Mann et al., 2020). In this study, the experimental group's tailored exercises (e.g., repeated extensions or lateral movements) likely facilitated symptom centralization, explaining the greater (though non-significant) reduction in disability compared to the control group. This aligns with Dunsford et al. (2011), who found directional preference exercises effective in improving pain and function.

The method's emphasis on patient education and self-management may also contribute to its efficacy (Shinde et al., 2020). Participants in the experimental group were taught to perform exercises independently, fostering long-term adherence—a critical factor in chronic LBP management (Campos et al., 2017).

The control group received conventional physiotherapy, including TENS, IFT, and general exercises. While this group also showed improvements, the trends favored the McKenzie group, particularly in pain intensity and disability. This finding supports Singh et al. (2024), who reported McKenzie therapy as marginally superior to passive treatments. However, the difference was less pronounced than in studies by Garcia et al. (2018), where McKenzie therapy significantly outperformed placebo. The current study's smaller sample size and shorter follow-up may account for this variance.

Notably, some outcomes (e.g., pain during forward bending or sitting) did not improve significantly in either group, suggesting that certain activities may require targeted interventions beyond general McKenzie or conventional therapy (Belavy et al., 2021).

The findings support McKenzie directional preference exercises as a feasible tool for LBP therapy. Clinicians should consider using the McKenzie evaluation to detect directional preferences and modify therapies accordingly (Almeida et al., 2021). The

method's self-management component is especially useful in resource-constrained contexts where long-term therapist availability may be limited (Fatoye et al., 2023).

However, the non-significant change in ODI ratings demonstrates that conventional physiotherapy is still a viable choice, particularly for individuals with unclear directional preferences. Selvam et al. (2022) propose a hybrid strategy that combines McKenzie techniques with other modalities (for example, manual therapy or postural re-education) to improve outcomes.

Limitations of the Study:

1. Sample Size: The study's power was limited by the small sample (n=25 per group), reducing the ability to detect statistically significant differences. Future trials should aim for larger cohorts to confirm trends observed here.

2. Short Follow-Up: The absence of long-term follow-up limits insights into the durability of treatment effects. Longitudinal studies, as recommended by Campos et al. (2017), are needed.

3. Baseline Differences: Despite randomization, significant differences in gender, BMI, and comorbidities existed between groups, potentially confounding results. Stratified randomization could mitigate this in future studies.

4. Blinding Challenges: While the study was double-blinded, the nature of McKenzie therapy (e.g., active patient involvement) may have inadvertently unblinded participants, introducing bias.

5. Outcome Measures: The reliance on self-reported metrics (e.g., Dallas Pain Questionnaire) may introduce subjectivity. Objective measures like range of motion or muscle strength could complement future assessments (Thornton et al., 2021).

Future Research Direction:

1. **Larger RCTs:** Replicating this study with a larger sample would enhance statistical power and generalizability (Machado et al., 2010).
2. **Subgroup Analyses:** Investigating McKenzie therapy's efficacy in specific subgroups (e.g., by age, BMI, or directional preference) could personalize treatment protocols (Safei & Zulfahmidah, 2022).
3. **Long-Term Follow-Up:** Assessing outcomes at 6–12 months would clarify the intervention's sustained effects (Silva et al., 2024).
4. **Combination Therapies:** Exploring McKenzie therapy alongside adjuncts like cognitive-behavioral therapy or ergonomic training could yield synergistic benefits (Foster et al., 2018).
5. **Cost-Effectiveness:** Economic evaluations would help determine the method's value in healthcare systems, particularly in low-resource settings (Blanchette et al., 2015).

CHAPTER-VI CONCLUSION and RECOMMENDATION

The present study evaluated the effectiveness of McKenzie directional preference exercises in patients with low back pain (LBP) compared to conventional physiotherapy. The findings indicate that both interventions led to improvements in pain intensity and functional disability, with a trend favoring the McKenzie group. Although the differences in Oswestry Disability Index (ODI) scores between groups did not reach statistical significance ($p=0.074$), the experimental group demonstrated a clinically meaningful reduction in disability (from 20.68 to 10.24), suggesting that McKenzie therapy may offer additional benefits for certain patients.

The McKenzie Method's emphasis on individualized, patient-specific exercises and self-management aligns with contemporary approaches to musculoskeletal rehabilitation, which prioritize active patient involvement and long-term symptom control. The significant improvements in pain-related outcomes (e.g., night pain, pain interfering with lifestyle, and back stiffness) further support its utility in clinical practice. However, the lack of statistical significance in some domains highlights the need for further research with larger sample sizes and longer follow-up periods to confirm these findings.

Overall, this study contributes to the growing body of evidence supporting the McKenzie Method as a viable treatment option for LBP, particularly for patients with identifiable directional preferences. Its integration into standard physiotherapy practice could enhance patient outcomes by combining structured exercise protocols with patient education and self-management strategies.

Recommendation:

Based on the findings of this study, the following recommendations are proposed for clinicians, researchers, and policymakers:

1. Clinical Practice Recommendations

- **Adopt McKenzie Assessment Early:** Clinicians should incorporate the McKenzie Mechanical Diagnosis and Therapy (MDT) assessment early in the management of LBP to identify patients with directional preferences who may benefit most from this approach.
- **Combine McKenzie with Conventional Therapy:** Given that both McKenzie and conventional physiotherapy showed benefits, a hybrid approach—combining directional preference exercises with modalities like TENS, manual therapy, or postural training—may optimize outcomes.
- **Emphasize Patient Education and Self-Management:** Since the McKenzie Method promotes self-treatment, clinicians should prioritize patient education to enhance adherence and long-term recovery.

2. Recommendations for Future Research

- **Larger Randomized Controlled Trials (RCTs):** Future studies should include larger sample sizes to increase statistical power and detect potential differences between treatment groups more reliably.
- **Long-Term Follow-Up:** Longitudinal studies (e.g., 6–12 months post-intervention) are needed to assess the durability of McKenzie therapy's effects compared to conventional treatments.
- **Subgroup Analysis:** Research should explore whether specific patient subgroups (e.g., those with chronic vs. acute LBP, different BMI categories, or varying directional preferences) respond differently to McKenzie therapy.
- **Standardization of Protocols:** Future trials should standardize McKenzie exercise dosages (e.g., repetitions, frequency) to improve comparability across studies.

3. Policy and Healthcare System Recommendations

- **Integration into Clinical Guidelines:** Given the evidence supporting McKenzie therapy, healthcare policymakers should consider including it in national and international guidelines for LBP management.
- **Training for Physiotherapists:** Institutions should provide specialized training in the McKenzie Method to ensure proper implementation and maximize treatment efficacy.
- **Cost-Effectiveness Studies:** Further research should evaluate the economic benefits of McKenzie therapy, particularly in low-resource settings where self-management strategies could reduce long-term healthcare costs.

4. Patient-Centered Recommendations

- **Encourage Active Participation:** Patients with LBP should be educated on the importance of active rehabilitation and self-management strategies to prevent recurrence.
- **Tailored Exercise Programs:** Clinicians should customize McKenzie exercises based on individual assessments to ensure optimal outcomes.

While this study provides valuable insights into the effectiveness of McKenzie directional preference exercises, further research is necessary to refine its application in clinical practice. By addressing the limitations of the current study and implementing the recommendations outlined above, future research can strengthen the evidence base and improve LBP management strategies globally.

The McKenzie Method represents a promising, patient-centered approach that aligns with modern rehabilitation principles. Its integration into standard care protocols could enhance functional recovery, reduce pain, and improve the quality of life for individuals suffering from LBP.

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Appendix

Appendix-1 : IRB Application letter

Date: 05/10/2024
The Chairman
Institutional Review Board (IRB)
Bangladesh Health Professions Institute (BHPI)
CRP-Savar, Dhaka-1343, Bangladesh

Subject: **Application for review and ethical approval.**

Sir,

With due respect, I would like to draw your kind attention that I am Md. Awal Hossain a student of B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI). I would like to conduct research titled, "**Effectiveness of McKenzie Directional Preference in Patients with Low Back Pain; A Randomized Controlled Trail**" with myself, as the principal investigator and Professor Dr. Mohammad Anwar Hossain PhD, Senior consultant & Head of the Department of Physiotherapy, CRP , Savar, Dhaka- 1343 as my thesis supervisor. The purpose of the study is to identify the effectiveness of McKenzie Directional preference in patients with low back pain .

Data collectors will receive informed consent from all participants. Any data collected will be kept confidential.

Therefore, I look forward to having your approval for the thesis proposal and to start data collection. I also assure you that I will maintain all the requirements for study.

Sincerely yours,

Awal
.....
Md . Awal Hossain
4th Year B.Sc. in Physiotherapy
Session: 2019-20
ID: 112190485

Recommendation from the thesis supervisor:

.....
Professor Dr . Mohammad Anwar Hossain, PhD
Senior consultant & Head of the Department of Physiotherapy,
CRP , Savar, Dhaka- 1343

Appendix-2 : IRB Approval letter

বাংলাদেশ হেলথ্ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref: CRP-BHPI/IRB/12/2024/1032 Date: 15/12/2024

To
Md. Awal Hossain
4th Year B.Sc. in Physiotherapy
Session: 2019-20 Student
ID: 112190485

Subject: Approval of the thesis proposal "Effectiveness Of McKenzie Directional Preference in Patients With Low Back Pain; A Randomized Controlled Trial" by the ethics committee.

Dear Md. Awal Hossain,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with you, as the principal investigator and Professor Dr. Mohammad Anwar Hossain , PhD Senior consultant & Head of the Department of Physiotherapy, CRP, Savar, Dhaka- 1343 as thesis Supervisor . The following documents have been reviewed and approved:

Sl. No.	Name of the Documents
1	Research Proposal
2	Questionnaire (English version)
3	Information sheet & consent form.

The purpose of the study is to examine how effective McKenzie directional preference in patients with low back pain. Data collectors will receive informed consent from all participants any data collected will be kept confidential. The members of the Ethics Committee have approved the study to be conducted in the presented form at the meeting held at 9 AM on 15 July 2024 at BHPI (44th IRB Meeting).

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol, and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working in accordance with the Nuremberg Code 1947, the World Medical Association Declaration of Helsinki, 1964 - 2013, and other applicable regulations.

Best regards,

Muhammad Millat Hossain
Associate Professor & Course Coordinator, MRS
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ। ফোন: +৮৮ ০২ ২২৪৪৪৫৪৬৪-৫, +৮৮ ০২ ২২৪৪৪১৪০৪, মোবাইল: +৮৮ ০১৭৩০ ০৫৯৬৪৭
CRP-Chapain, Savar, Dhaka-1343, Bangladesh. Tel: +88 02 224445464-5, +88 02 224441404, Mobile: +88 01730059647
E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd

Appendix-3 : Data collection permission

Date: 19.01.25

Head

Department of Physiotherapy

Centre for the Rehabilitation of the Paralyzed (CRP)

Chapain, Savar, Dhaka-1343

Through: Head, Department of Physiotherapy, BHPI.

Subject: Prayer for seeking permission to collect data for conducting a research project.

Sir,

With due to respect and humble submission to state that I am Md. Awal Hossain, a student in 4th year B.Sc. in physiotherapy at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: **"Effectiveness of McKenzie directional preference in patients with low back pain: A randomized controlled trial"** under the supervision of Professor Dr, Mohammad Anwar Hossain, PhD, Senior Consultant and Head, Physiotherapy Department, CRP, Savar, Dhaka. I want to collect data for my research project from the Department of Physiotherapy at CRP. So, I need permission for data collection from the Spinal Cord Injury Unit of the Physiotherapy Department at CRP-Savar, Dhaka-1343. I would like to assure you that anything in the study will not be harmful to the participants and the Department itself.

I, therefore pray and hope that you would be kind enough to grant my application and give me permission for data collection and oblige thereby.

forwarded
Sicdh
Dr. Shazal Kumar Das, PhD
Assistant Professor and Head
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka-1343

Approved
19/01/25
Prof. Dr. Mohammad Anwar Hossain, PhD
Professor Physiotherapy Department BHPI
Senior Consultant & Head
Physiotherapy Department
CRP, Savar, Dhaka-1343

Yours faithfully,
Awal

Md. Awal Hossain

4th Year B.Sc. in Physiotherapy

Class Roll: 25; Session: 2019-20

Bangladesh Health Professions Institute (BHPI), CRP-Chapain, Savar, Dhaka-1343.

Appendix-4 : English consent form

Consent Form

(Please read out to the participants)

Greeting!

My name is Md. Awal Hossain, I am conducting this study which is part of my B.Sc. in physiotherapy program, and my thesis title is “Effectiveness of McKenzie directional preference in patients with low back pain : a Randomized controlled trail”. at Bangladesh Health Profession Institute, under the Faculty of Medicine, University of Dhaka. For the fulfilment of my study, I would like to know some information about social, financial, behavioural, and lifestyle among the low back pain suffered people. So I need to ask you some questions in this regard and this will take approximately 15-20 minutes. I am ensuring you that this will not create any harmful or unpleasant experience for you. The information you will provide will be treated as confidential and in the event of any report or publication, the source of this information will be kept anonymous. I would like to inform you that your participation in this study will be considered voluntary and there will not be any kind of financial dealings.

"As a part of this study or by the rights of the participants you can withdraw yourself at any time from this study or if you will want to skip any question that you don't want to give answer. You can proceed. If you further have any kinds of questions on this study, please feel free to ask researcher Md. Awal Hossain or my supervisor Professor Dr, Mohammad Anwar Hossain, PhD, Senior Consultant and Head, Physiotherapy Department, CRP, Savar, Dhaka

May I start the interview?

YES	NO

Signature of Participants…….

Date…….

Signature of Interviewers……

Date…….

Appendix-4 :Bangla consent form

অনুমতি পত্র

(অনুগ্রহ করে অংশগ্রহণকারীকে পড়ে শোনান)

আসসালামু আলাইকুম,

আমার নাম মোহাঃ আউয়াল হোসেন। আমি ব্যাচেলর অফ ফিজিওথেরাপি (B.Sc. in Physiotherapy) প্রোগ্রামের অংশ হিসেবে একটি গবেষণা প্রকল্প পরিচালনা করছি। আমার গবেষণার শিরোনাম হলো "কোমর ব্যাথার রোগীদের জন্য ম্যাকেঞ্জি ডিরেকশনাল প্রেফারেন্সের কার্যকারিতাঃ একটি র‍্যান্ডোমাইজড ক্লিনিকাল ট্রায়াল'। গবেষণাটি বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (BHPI), যা ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন অনুষদের সাথে সংযুক্ত এবং এর জন্য আমি কিছু ব্যক্তিগত এবং সংশ্লিষ্ট তথ্য সংগ্রহ করতে চাই। এটি প্রায় ২০-৩০ মিনিট সময় নেবে।

আমি আপনাকে জানাতে চাই যে এটি সম্পূর্ণরূপে পেশাগত গবেষণা এবং অন্য কোনো উদ্দেশ্যে ব্যবহার করা হবে না। আপনার দ্বারা প্রদত্ত সমস্ত তথ্য গোপন রাখা হবে এবং কোনো প্রতিবেদন বা প্রকাশনায় তথ্যের উৎস নামহীন রাখা হবে।

এই গবেষণায় আপনি সম্পূর্ণরূপে নিজ ইচ্ছায় অংশগ্রহণ করতে পারেন এবং কোনো ধরনের নেতিবাচক প্রভাব ছাড়াই আপনি যেকোনো সময় এতে অংশগ্রহণ বন্ধ করতে পারেন। এছাড়াও, আপনি ইন্টারভিউ চলাকালীন যে কোনো প্রশ্নের উত্তর দিতে না চাইলে সেটিও সম্পূর্ণরূপে আপনার অধিকারের মধ্যে পড়বে।

যদি গবেষণা সম্পর্কে আপনার কোনো প্রশ্ন থাকে বা একজন অংশগ্রহণকারী হিসেবে আপনার অধিকার সম্পর্কে কোনো প্রশ্ন থাকে, তবে আপনি গবেষক মোঃ আউয়াল হোসেন অথবা আমার তত্ত্বাবধায়ক **ড. মোহাম্মদ আনোয়ার হোসেন**, অধ্যাপক,বিভাগীয় প্রধান, ফিজিওথেরাপি বিভাগ, সিআরপি, সাভার, ঢাকা-১৩৪৩ এর সাথে যোগাযোগ করতে পারেন।

আমি কি সাক্ষাৎকার শুরু করতে পারি?

☐ হ্যাঁ

☐ না

অংশগ্রহণকারীর স্বাক্ষর:..... তারিখঃ

সাক্ষাৎকারীর স্বাক্ষর..... তারিখঃ

Appendix-5 : English Questionaries

Data Collection Form

Part 1 - Personal details : Code no:

QN	Question And Filters	Response
1.1	Patients name	
1.2	Phone number	
1.3	Address	
1.4	Start time of Intervention	
1.5	End time of intervention	

Part: 2- Socio-demographic Information

QN	Question and Filters	Response
2.1	Age	…….years
2.2	Sex	1=Male 2=Female
2.3	Occupation	1=Service Holder 2= Business 3= Farmer 4= Garments worker 5= Others
2.3	Body Weight	……kg
2.4	Height	……ft
2.5	BMI	1= Under weight 2=Normal 3=Overweight 4=Obese
2.6	Education	1.Primary 2. Secondary 3.Higher Secondary 4.Masters/Graduates
2.7	Marital Status	1= yes 2= No
2.8	Co-morbidities	DM = Yes , No HTN = Yes , No Anxiety = Yes , No

Part 3 : Dallas pain questionnaire

Pretest Part

3.1 How bad is your pain ?

0 cm No Pain Severe Pain 10 cm

3.2 How bad is the pain at night ?

0 cm No Pain Severe Pain 10 cm

3.3 Does the pain interfere with your life-style

0 cm No change Total change in life style 10 cm

3.4 How severe pain you feel during forward bending activity?

0 cm No Pain Severe Pain 10 cm

3.5 How stiff is your back?

0 cm No Stiffness Possible worse Stiffness 10 cm

3.6 Does your pain interfere with walking?

0 cm No Problem Cannot Walk 10 cm

3.7 Do you hurt when Walking ?

0 cm No Problem Worse Possible Pain 10 cm

3.8 Does your pain keep you from standing still ?

0 cm Can stand as long as I want Can not stand at all 10 cm

3.9 Does your pain keep you from twisting?

0 cm No Problem Can not twist 10 cm

3.10 Does your pain allow you to sit in an upright hard chair?

0 cm Sit as long as I want Can not use a hard chair at all 10 cm

3.11 Does your pain allow you to sit in a soft arm chair?

0 cm Sit as long as I like Can not use a soft chair at all 10 cm

3.12 Do you have back pain when lying in a bed?

0 cm No Pain Worse Pain 10 cm

3.13 How much does your pain limit your normal lifestyle?

0 cm No Pain No relief at all 10 cm

3.14 Does your pain interfere with your work?

0 cm No Problem Can not walk 10 cm

3.15 How much have you had to change your work place because of back pain?

0 cm No change So much that I can not keep my job 10 cm

3.16 How much do you think others express irritation toward you because of your pain?

0 cm No change So much that I can not keep my job 10 cm

Part: 4- Oswestry Low Back Pain Disability Questionnaire

4.1: Pain Intensity

- o I can tolerate the pain I have without having to use pain killers.
- o The pain is bad but I manage without taking pain killers.
- o Medicine give complete relief from pain.
- o Medicine give moderate relief from pain.
- o Medicine give very little relief from pain.
- o Medicine have no effect on the pain and I do not use them.

4.2: Personal Care

- o I can look after myself normally without causing extra pain.
- o I can look after myself normally but it causes extra pain.
- o It is painful to look after myself and I am slow and careful.
- o I need some help but manage most of my personal care.
- o I need help every day in most aspects of self care.
- o I do not get dressed wash with difficulty and stay in bed.

4.3: Lifting

- o I can lift heavy weights without extra pain.
- o I can lift heavy weights but it gives extra pain.
- o Pain prevents me from lifting heavy weights off the floor but I can manage if they are conveniently positioned for example on a table.
- o Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- o I can lift only very light weights.

4.4: Walking

- o Pain does not prevent me walking any distance
- o Pain prevents me walking more than 1 mile
- o Pain prevents me walking more than 0.5 miles
- o Pain prevents me walking more than 0.25 miles
- o I can only walk using a stick or crutches

4.5: Sitting

- I can sit in any chair as long as I like
- I can only sit in my favorite chair as long as I like
- Pain prevents me sitting more than 1 hour
- Pain prevents me from sitting more than 0.5 hours
- Pain prevents me from sitting more than 10 minutes
- Pain prevents me from sitting at all

4.6: Standing

- I can stand as long as I want without extra pain.
- I can stand as long as I want but it gives me extra pain.
- Pain prevents me from standing for more than 1 hour
- Pain prevents me from standing for more than 30 minutes
- Pain prevents me from standing for more than 10 minutes
- Pain prevents me from standing at all

4.7: Sleeping

- Pain does not prevent me from sleeping well.
- I can sleep well only by using tablets.
- Even when I take tablets I have less than 6 hours sleep.
- Even when I take tablets I have less than 4 hours sleep.
- Even when I take tablets I have less than 2 hours of sleep.
- Pain prevents me from sleeping at all.

4.8 : Sex Life

- My sex life is normal and causes no extra pain.
- My sex life is normal but causes some extra pain.
- My sex life is nearly normal but is very painful.
- My sex life is severely restricted by pain.
- My sex life is nearly absent because of pain.
- Pain prevents any sex life at all.

4.9 : Social Life

- ○ My social life is normal and gives me no extra pain.
- ○ My social life is normal but increases the degree of pain.
- ○ Pain has no significant effect on my social life apart from limiting energetic interests such as dancing.
- ○ Pain has restricted my social life and I do not go out as often.
- ○ Pain has restricted my social life to my home.
- ○ I have no social life because of pain.

4.10: Traveling

- ○ I can travel anywhere without extra pain.
- ○ I can travel anywhere but it gives me extra pain.
- ○ Pain is bad but I manage journeys over 2 hours.
- ○ Pain restricts me to journeys of less than 1 hour.
- ○ Pain restricts me to short necessary journeys under 30 minutes.
- ○ Pain prevents me from traveling except to the doctor or hospital.

Post Test Data:

Part 3 : Dallas pain questionnaire

Post- test Part :

3.1 How bad is your pain ?

0 cm No Pain Severe Pain 10 cm

3.2 How bad is the pain at night ?

0 cm No Pain Severe Pain 10 cm

3.3 Does the pain interfere with your life-style

0 cm No change Total change in life style 10 cm

3.4 How severe pain you feel during forward bending activity?

0 cm No Pain Severe Pain 10 cm

3.5 How stiff is your back?

0 cm No Stiffness Possible worse Stiffness 10 cm

3.6 Does your pain interfere with walking?

0 cm No Problem Cannot Walk 10 cm

3.7 Do you hurt when Walking ?

0 cm No Problem Worse Possible Pain 10 cm

3.8 Does your pain keep you from standing still ?

0 cm Can stand as long as I want Can not stand at all 10 cm

3.9 Does your pain allow you to sit in an upright hard chair?

0 cm Sit as long as I want Can not use a hard chair at all 10 cm

3.10 Does your pain keep you from twisting?

0 cm No Problem Can not twist 10 cm

3.11 Does your pain allow you to sit in a soft arm chair?

0 cm Sit as long as I like Can not use a soft chair at all 10 cm

3.12 Do you have back pain when lying in a bed?

0 cm No Pain Worse Pain 10 cm

3.13 How much does your pain limit your normal lifestyle?

0 cm No Pain No relief at all 10 cm

3.14 Does your pain interfere with your work?

0 cm No Problem Can not walk 10 cm

3.15 How much have you had to change your work place because of back pain?

0 cm No change So much that I can not walk 10 cm

3.16 How much do you think others express irritation toward you because of your pain?

0 cm No change So much that I can not keep my job 10 cm

Part: 4- Oswestry Low Back Pain Disability Questionnaire

4.1: Pain Intensity

- o I can tolerate the pain I have without having to use pain killers.
- o The pain is bad but I manage without taking pain killers.
- o Medicine give complete relief from pain.
- o Medicine give moderate relief from pain.
- o Medicine give very little relief from pain.
- o Medicine have no effect on the pain and I do not use them.

4.2: Personal Care

- o I can look after myself normally without causing extra pain.
- o I can look after myself normally but it causes extra pain.
- o It is painful to look after myself and I am slow and careful.
- o I need some help but manage most of my personal care.
- o I need help every day in most aspects of self care.
- o I do not get dressed wash with difficulty and stay in bed.

5.3: Lifting

- o I can lift heavy weights without extra pain.
- o I can lift heavy weights but it gives extra pain.
- o Pain prevents me from lifting heavy weights off the floor but I can manage if they are conveniently positioned for example on a table.
- o Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- o I can lift only very light weights.

4.4: Walking

- o Pain does not prevent me walking any distance
- o Pain prevents me walking more than 1 mile
- o Pain prevents me walking more than 0.5 miles
- o Pain prevents me walking more than 0.25 miles
- o I can only walk using a stick or crutches

4.5: Sitting

- ○ I can sit in any chair as long as I like
- ○ I can only sit in my favorite chair as long as I like
- ○ Pain prevents me sitting more than 1 hour
- ○ Pain prevents me from sitting more than 0.5 hours
- ○ Pain prevents me from sitting more than 10 minutes
- ○ Pain prevents me from sitting at all

4.6: Standing

- ○ I can stand as long as I want without extra pain.
- ○ I can stand as long as I want but it gives me extra pain.
- ○ Pain prevents me from standing for more than 1 hour
- ○ Pain prevents me from standing for more than 30 minutes
- ○ Pain prevents me from standing for more than 10 minutes
- ○ Pain prevents me from standing at all

4.7: Sleeping

- ○ Pain does not prevent me from sleeping well.
- ○ I can sleep well only by using tablets.
- ○ Even when I take tablets I have less than 6 hours sleep.
- ○ Even when I take tablets I have less than 4 hours sleep.
- ○ Even when I take tablets I have less than 2 hours of sleep.
- ○ Pain prevents me from sleeping at all.

4.8 : Sex Life

- ○ My sex life is normal and causes no extra pain.
- ○ My sex life is normal but causes some extra pain.
- ○ My sex life is nearly normal but is very painful.
- ○ My sex life is severely restricted by pain.
- ○ My sex life is nearly absent because of pain.
- ○ Pain prevents any sex life at all.

4.9 : Social Life

- ○ My social life is normal and gives me no extra pain.
- ○ My social life is normal but increases the degree of pain.
- ○ Pain has no significant effect on my social life apart from limiting energetic interests such as dancing.
- ○ Pain has restricted my social life and I do not go out as often.
- ○ Pain has restricted my social life to my home.
- ○ I have no social life because of pain.

4.10: Traveling

- ○ I can travel anywhere without extra pain.
- ○ I can travel anywhere but it gives me extra pain.
- ○ Pain is bad but I manage journeys over 2 hours.
- ○ Pain restricts me to journeys of less than 1 hour.
- ○ Pain restricts me to short necessary journeys under 30 minutes.
- ○ Pain prevents me from traveling except to the doctor or hospital

Appendix- 6 Bangla questionnaire

কোড নং

পর্ব ১- ব্যক্তিগত বিবরণ	
১.১ রোগীর নামঃ	১.২রোগীর ঠিকানাঃ
১.৩ মোবাইল নাম্বারঃ	১.৪ হস্তক্ষেপের সময় শুরুঃ
১.৫ হস্তক্ষেপের সময় শেষঃ	১.৬ অনুমতি গ্রহণঃ

সামাজিক জনসংখ্যা সংক্রান্ত তথ্য

প্রশ্ন ন	প্রশ্ন	উত্তর
২.১	বয়স	.....বছর
২.২	লিঙ্গ	○ পুরুষ ○ মহিলা
২.৩	পেশা	○ সরকারি চাকরি ○ ব্যবসা ○ কৃষক ○ পোশাক শ্রমিক ○ অন্যান্য
২.৪	ওজন	..... কেজি
২.৫	উচ্চতা	.....ফুট
২.৬	বিএমআই	○ কম ওজন ○ স্বাভাবিক ○ অতিরিক্ত ওজন ○ স্থূলতা
২.৭	শিক্ষাগত যোগ্যতা	○ প্রাথমিক ○ মাধ্যমিক ○ উচ্চ মাধ্যমিক ○ স্নাতকোত্তর/স্নাতক
২.৮	বৈবাহিক অবস্থা	○ হ্যাঁ ○ না
২.৯	কো-মরবিডিটিস	○ ডায়াবেটিস ○ উচ্চ রক্তচাপ ○ দুশ্চিন্তা

পরিক্ষার আগের উপাত্তঃ পর্ব -৩: ডালাস ব্যথাজনিত প্রশ্নাবলী

৩.১ আপনার ব্যথা কতটুকু?

০ সেমি ——————————————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৩.২ রাতের বেলায় আপনার ব্যথা কতটুকু ?

০ সেমি ——————————————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৩.৩ আপনার ব্যথা কি আপনার জীবনযাত্রাকে বাধাগ্রস্থ করে ?

০ সেমি ——————————————————→ ১০ সেমি

বাধাগ্রস্থ করে কোন বাধাগ্রস্থ করে না

৩.৪ ব্যথার ঔষধ খেলে কি আপনার ব্যথা কমে ?

০ সেমি ——————————————————→ ১০ সেমি

সম্পুর্ন কমে কমে না

৩.৫ আপনার কোমর কতটুকু শক্ত মনে হয় ?

০ সেমি ——————————————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৩.৭ আপনার ব্যথার জন্য কি আপনি সোজা হয়ে দাড়াতে পারেন ?

০ সেমি ——————————————————→ ১০ সেমি

সোজা হয়ে দাঁড়াতে পারি সোজা হয়ে দাঁড়াতে পারি না

৩.৮ হাঁটার সময় কি আপনি ব্যথা অনুভব করেন ?

০ সেমি ——————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা আছে

৩.৯ আপনার ব্যথার জন্য কি আপনি সামনের দিকে ঝুঁকতে পারেন ?

০ সেমি ——————————→ ১০ সেমি

ঝুঁকতে পারি ঝুঁকতে পারি না

৩.১০ আপনার ব্যথার জন্য কি আপনি শক্ত চেয়ারে সোজা হয়ে বসতে পারেন ?

০ সেমি ——————————→ ১০ সেমি

বসতে পারি বসতে পারি না

৩.১১ আপনার ব্যথার জন্য কি আপনি নরম চেয়ারে সোজা হয়ে বসতে পারেন ?

০ সেমি ——————————→ ১০ সেমি

বসতে পারি বসতে পারি না

৩.১২ আপনি কি শোয়ার সময় ব্যথা অনুভব করেন ?

০ সেমি ——————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৩.১৩ আপনার ব্যথা কি আপনার স্বাভাবিক জীবন যাত্রাকে বাধাগ্রস্থ করে ?

০ সেমি ——————————→ ১০সেমি

কোন বাধাগ্রস্ত করে নাই বাধাগ্রস্ত করেছে

৩.১৪ আপনার ব্যথা কি আপনার স্বাভাবিক কাজকর্মকে কতটুকু বাধাগ্রস্থ করেছে ?

০ সেমি ——————————→ ১০ সেমি

কোন বাধাগ্রস্ত করে নাই বেশি বাধাগ্রস্ত করেছে

৩.১৫ আপনার কোমর ব্যথার জন্য আপনার কর্মস্থলে কতটুকু পরিবর্তন করেছেন ?

০ সেমি ——————————————————→ ১০ সেমি

কোন পরিবর্তন করি নাই সম্পূর্ণ পরিবর্তন করেছি

৩.১৬ আপনার কোমর ব্যথার জন্য কি আপনার সামনে থাকা মানুষ বিরক্ত হয় ?

০ সেমি ——————————————————→ ১০ সেমি

বিরক্ত হয় না অনেক বেশি বিরক্ত হয়

পর্বঃ ৪- অস-ওয়সট্রি কোমর ব্যথার অক্ষমতা সংক্রান্ত প্রশ্নাবলী

৪.১ ব্যথার তীব্রতা

- আমার এই মুহূর্তে কোন ব্যথা নেই
- এই মুহূর্তে ব্যথা খুবই হালকা
- এই মুহূর্তে ব্যথা মধ্যপন্থী
- এই মুহূর্তে ব্যথা মোটামুটি তীব্র
- এই মুহূর্তে ব্যথা খুব গুরুতর
- এই মুহূর্তে ব্যথা অচিন্তনীয়

৪.২ ব্যক্তিগত যত্ন (ওয়াশিং, ড্রেসিং ইত্যাদি)

- আমি সাধারণত নিজেকে দেখাশুনা করতে পারি, ব্যথা ছাড়া
- আমি সাধারণত নিজেকে দেখাশুনা করতে পারি, কিন্তু এটা কিছুটা ব্যথাদায়ক
- নিজেকে দেখাশুনা করা ব্যথাদায়ক, কিন্তু আমি কিছুটা সতর্কতা অবলম্বন করি
- আমার কিছু সাহায্য প্রয়োজন হয়, কিন্তু অধিকাংশ কাজ আমি নিজে করতে পারি
- আমার নিজের কাজকর্মের জন্য সারাদিন ব্যাপি অন্যের সাহায্যের প্রয়োজন হয়
- আমি কষ্ট করেও কাপড় পরিস্কার করতে পারি না এবং বিশ্রামে থাকি

৪.৩ উত্তোলন

- আমি অতিরিক্ত ব্যথা ছাড়া ভারী ওজন উত্তোলন করতে পারি
- আমি ভারী ওজন উত্তোল করতে পারি, কিন্তু এটা কিছুটা ব্যথা তৈরী করে
- আমি ব্যথার জন্য ভারী ওজন উত্তোলন করতে পারি না,

কিন্তু আমি সুবিধামত স্থানথেকে ওজন উত্তোলন করতে পারি, যেমন: টেবিল হতে

- আমি ব্যথার জন্য ভারী ওজন উত্তোলন করতে পারি না,

কিন্তু আমি সুবিধামত স্থানথেকে অল্প উত্তোলন করতে পারি

- আমি খুবই অল্প ওজন উত্তোলন করতে পারি
- আমি কোন ওজনই উত্তোলন অথবা বহন করতে পারি না

৪.৪ হাঁটা

- ব্যথা আমাকে যে কোন দুরত্বে হাঁটার ক্ষেত্রে বাঁধার সৃষ্টি করে না
- ব্যথা আমাকে এক মাইলের বেশি হাটতে বাঁধার সৃষ্টি করে
- ব্যথা আমাকে আধা মাইলের বেশি হাটতে বাঁধার সৃষ্টি করে
- ব্যথা আমাকে ১০০ গজের বেশি হাটতে বাঁধার সৃষ্টি করে
- আমি শুধু লাঠি অথবা ক্রাচ ব্যবহার করে হাঁটতে পারি আমি বেশীরভাগ সময় বিছানায় এবং হামাগুড়ি দিয়ে টয়লেটি যাই

৪.৫ বসা

- আমি যেকোন চেয়ারে আমার নিজের ইচ্ছামত বসতে পারি
- আমি শুধুমাত্র আমার পছন্দের চেয়ারে নিজের ইচ্ছামত বসতে পারি
- আমি ব্যথার জন্য একঘন্টার বেশী বসতে পারি না
- আমি ব্যথার জন্য আধা ঘন্টার বেশী বসতে পারি না
- আমি ব্যথার জন্য ১০ মিনিটের বেশী বসতে পারি না
- আমি ব্যথার জন্য সব সময় বসতে পারি না

৪.৬ দাঁড়ানো

- আমি ব্যথা ছাড়া আমার ইচ্ছামত দাড়িয়ে থাকতে পারি
- আমি আমার ইচ্ছামত অনেকক্ষণ দাড়িয়ে থাকতে পারি, কিন্তু এটা কিছুটা ব্যথার সৃষ্টি করে
- আমি ব্যথার জন্য একঘন্টার বেশী দাড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য আধা ঘন্টার বেশী দাড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য ১০ মিনিটের বেশী দাড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য সব সময় দাড়িয়ে থাকতে পারি না

৪.৭ ঘুমানো

- ব্যথা আমার ঘুমের কোন সমস্যা তৈরী করে না
- আমি একমাত্র বিছানায় ভালভাবে ঘুমাতে পারি
- আমি বিছানায় ছয় ঘন্টার কম ঘুমাতে পারি
- আমি বিছানায় চার ঘন্টার কম ঘুমাতে পারি
- আমি বিছানায় দুই ঘন্টার কম ঘুমাতে পারি
- আমি ব্যথার জন্য সবসময় ঘুমাতে পারি না

৪.৮ যৌন জীবন

- আমার যৌন জীবন স্বাভাবিক এবং কোন ব্যথা তৈরী করে না
- আমার যৌন জীবন স্বাভাবিক এবং কিছুটা ব্যথা তৈরী করে
- আমার স্বাভাবিক এবং অনেক ব্যথা তৈরী করে
- আমার যৌন জীবন ব্যথার জন্য গুরুতরভাবে সীমাবদ্ধ
- আমার যৌন জীবন ব্যথার জন্য অনেকটাই গুরুতরভাবে সীমাবদ্ধ
- আমার যৌন জীবন ব্যথার জন্য পুরোটাই গুরুতরভাবে সীমাবদ্ধ

৪.৯ সামাজিক জীবন

- আমার সামাজিক জীবন স্বাভাবিক এবং এটা কোন ব্যথা তৈরী করে না
- আমার সামাজিক জীবন স্বাভাবিক কিন্তু এটা কিছুটা ব্যথা তৈরী করে
- ব্যথা আমার সামাজিক জীবনের উপর কোন প্রভাব ফেলে না কিন্তু উদ্দিপনামূলক কাজকর্ম হতে বিরত রাখে
- ব্যথা আমার সামাজিক জীবনকে বাধাগ্রস্ত করে এবং বাহিরে যেতে পারি না
- ব্যথা আমার জীবনকে চার দেয়ালের মধ্যে সীমাবদ্ধ করেছে
- ব্যথার জন্য আমার কোন সামাজিক জীবন নেই

৪.১০ ভ্রমন

- আমি ব্যথা ছাড়াই যে কোন জায়গায় ভ্রমন করতে পারি
- আমি যে কোন জায়গায় ভ্রমন করতে পারি, কিন্তু এটা কিছুটা ব্যথার সৃষ্টি করে
- আমি অতিরিক্ত ব্যথা নিয়ে দুই ঘন্টার বেশি ভ্রমন করতে পারি
- আমি অতিরিক্ত ব্যথা নিয়ে এক ঘন্টার বেশি ভ্রমন করতে পারি
- ব্যথার জন্য আমি ত্রিশ মিনিটের বেশি ভ্রমন করতে পারি না
- ব্যথার জন্য আমি চিকিৎসার প্রয়োজন ব্যতীত ভ্রমন করি না

পরীক্ষার পর উপাত্তঃ **পর্ব -৫: ডালাস ব্যথাজনিত প্রশ্নাবলী**

৫.১ আপনার ব্যথা কতটুকু?

০ সেমি ——————————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৫.২ রাতের বেলায় আপনার ব্যথা কতটুকু ?

০ সেমি ——————————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৫.৩ আপনার ব্যথা কি আপনার জীবনযাত্রাকে বাধাগ্রস্থ করে ?

০ সেমি ——————————————→ ১০ সেমি

কোন বাধাগ্রস্থ করে না বাধাগ্রস্থ করে

৫.৪ ব্যথার ঔষধ খেলে কি আপনার ব্যথা কমে ?

০ সেমি ——————————————→ ১০ সেমি

সম্পুর্ন কমে কমে না

৫.৫ আপনার কোমর কতটুকু শক্ত মনে হয় ?

০ সেমি ——————————————→ ১০ সেমি

শক্ত মনে হয় না অনেক বেশি শক্ত মনে হয়

৫.৬ হাঁটলে কি আপনার ব্যথা বাড়ে ?

০ সেমি ——————————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৫.৭ আপনার ব্যথার জন্য কি আপনি সোজা হয়ে দাড়াতে পারেন ?

০ সেমি ——————————————————→ ১০ সেমি

সোজা হয়ে দাঁড়াতে পারি সোজা হয়ে দাঁড়াতে পারি না

৫.৮ হাঁটার সময় কি আপনি ব্যথা অনুভব করেন ?

০ সেমি ——————————————————→ ১০ সেমি

১০ সেমি

৫.৯ আপনার ব্যথার জন্য কি আপনি সামনের দিকে ঝুঁকতে পারেন ?

০ সেমি ——————————————————→ ১০ সেমি

ঝুঁকতে পারি ঝুঁকতে পারি না

৫.১০ আপনার ব্যথার জন্য কি আপনি শক্ত চেয়ারে সোজা হয়ে বসতে পারেন ?

০ সেমি ——————————————————→ ১০ সেমি

বসতে পারি বসতে পারি না

৫.১১ আপনার ব্যথার জন্য কি আপনি নরম চেয়ারে সোজা হয়ে বসতে পারেন ?

০ সেমি ——————————————————→ ১০ সেমি

বসতে পারি বসতে পারি না

৫.১২ আপনি কি শোয়ার সময় ব্যথা অনুভব করেন ?

০ সেমি ——————————————————→ ১০ সেমি

কোন ব্যথা নাই অনেক ব্যথা

৫.১৩ আপনার ব্যথা কি আপনার স্বাভাবিক জীবন যাত্রাকে বাধাগ্রস্থ করে ?

০ সেমি ——————————————————→ ১০ সেমি

কোন বাধাগ্রস্ত করে নাই বাধাগ্রস্ত করেছে

৫.১৪ আপনার ব্যথা কি আপনার স্বাভাবিক কাজকর্মকে কতটুকু বাধাগ্রস্থ করেছে ?

০ সেমি ——————————————————————→ ১০ সেমি

কোন বাধাগ্রস্ত করে নাই বেশি বাধাগ্রস্ত করেছে

৫.১৫ আপনার কোমর ব্যথার জন্য আপনার কর্মস্থলে কতটুকু পরিবর্তন করেছেন ?

০ সেমি ——————————————————————→ ১০ সেমি

কোন পরিবর্তন করি নাই সম্পূর্ণ পরিবর্তন করেছি

৫.১৬ আপনার কোমর ব্যথার জন্য কি আপনার সামনে থাকা মানুষ বিরক্ত হয় ?

০ সেমি ——————————————————————→ ১০ সেমি

বিরক্ত হয় না অনেক বেশি বিরক্ত হয়

পর্বঃ ৬- অস-ওয়সট্রি কোমর ব্যথার অক্ষমতা সংক্রান্ত প্রশ্নাবলী

৬.১ ব্যথার তীব্রতা

- আমার এই মুহূর্তে কোন ব্যথা নেই
- এই মুহূর্তে ব্যথা খুবই হালকা
- এই মুহূর্তে ব্যথা মধ্যপন্থী
- এই মুহূর্তে ব্যথা মোটামুটি তীব্র
- এই মুহূর্তে ব্যথা খুব গুরুতর
- এই মুহূর্তে ব্যথা অচিন্তনীয়

৬.২ ব্যক্তিগত যত্ন (ওয়াশিং, ড্রেসিং ইত্যাদি)

- আমি সাধারণত নিজেকে দেখাশুনা করতে পারি, ব্যথা ছাড়া
- আমি সাধারণত নিজেকে দেখাশুনা করতে পারি, কিন্তু এটা কিছুটা ব্যখাদায়ক
- নিজেকে দেখাশুনা করা ব্যথাদায়ক, কিন্তু আমি কিছুটা সতর্কতা অবলম্বন করি
- আমার কিছু সাহায্য প্রয়োজন হয়, কিন্তু অধিকাংশ কাজ আমি নিজে করতে পারি
- আমার নিজের কাজকর্মের জন্য সারাদিন ব্যাপি অন্যের সাহায্যের প্রয়োজন হয়
- আমি কষ্ট করেও কাপড় পরিস্কার করতে পারি না এবং বিশ্রামে থাকি

৬.৩ উত্তোলন

- আমি অতিরিক্ত ব্যথা ছাড়া ভারী ওজন উত্তোলন করতে পারি
- আমি ভারী ওজন উত্তোল করতে পারি, কিন্তু এটা কিছুটা ব্যথা তৈরী করে
- আমি ব্যথার জন্য ভারী ওজন উত্তোলন করতে পারি না,

কিন্তু আমি সুবিধামত স্থানথেকে ওজন উত্তোলন করতে পারি, যেমন: টেবিল হতে

- আমি ব্যথার জন্য ভারী ওজন উত্তোলন করতে পারি না,

কিন্তু আমি সুবিধামত স্থানথেকে অল্প উত্তোলন করতে পারি

- আমি খুবই অল্প ওজন উত্তোলন করতে পারি
- আমি কোন ওজনই উত্তোলন অথবা বহন করতে পারি না

৬.৪ হাঁটা

- ব্যথা আমাকে যে কোন দুরত্বে হাঁটার ক্ষেত্রে বাঁধার সৃষ্টি করে না
- ব্যথা আমাকে এক মাইলের বেশি হাটতে বাঁধার সৃষ্টি করে
- ব্যথা আমাকে আধা মাইলের বেশি হাটতে বাঁধার সৃষ্টি করে
- ব্যথা আমাকে ১০০ গজের বেশি হাটতে বাঁধার সৃষ্টি করে
- আমি শুধু লাঠি অথবা ক্রাচ ব্যবহার করে হাঁটতে পারি আমি বেশীরভাগ সময় বিছানায় এবং হামাগুড়ি দিয়ে টয়লেটি যাই

৬.৫ বসা

- আমি যেকোন চেয়ারে আমার নিজের ইচ্ছামত বসতে পারি
- আমি শুধুমাত্র আমার পছন্দের চেয়ারে নিজের ইচ্ছামত বসতে পারি
- আমি ব্যথার জন্য একঘন্টার বেশী বসতে পারি না
- আমি ব্যথার জন্য আধা ঘন্টার বেশী বসতে পারি না
- আমি ব্যথার জন্য ১০ মিনিটের বেশী বসতে পারি না
- আমি ব্যথার জন্য সব সময় বসতে পারি না

৬.৬ দাঁড়ানো

- আমি ব্যথা ছাড়া আমার ইচ্ছামত দাড়িয়ে থাকতে পারি
- আমি আমার ইচ্ছামত অনেকক্ষণ দাড়িয়ে থাকতে পারি, কিন্তু এটা কিছুটা ব্যথার সৃষ্টি করে
- আমি ব্যথার জন্য একঘন্টার বেশী দাড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য আধা ঘন্টার বেশী দাড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য ১০ মিনিটের বেশী দাড়িয়ে থাকতে পারি না
- আমি ব্যথার জন্য সব সময় দাড়িয়ে থাকতে পারি না

৬.৭ ঘুমানো

- ব্যথা আমার ঘুমের কোন সমস্যা তৈরী করে না
- আমি একমাত্র বিছানায় ভালভাবে ঘুমাতে পারি
- আমি বিছানায় ছয় ঘন্টার কম ঘুমাতে পারি
- আমি বিছানায় চার ঘন্টার কম ঘুমাতে পারি
- আমি বিছানায় দুই ঘন্টার কম ঘুমাতে পারি
- আমি ব্যথার জন্য সবসময় ঘুমাতে পারি না

৬.৮ যৌন জীবন

- আমার যৌন জীবন স্বাভাবিক এবং কোন ব্যথা তৈরী করে না
- আমার যৌন জীবন স্বাভাবিক এবং কিছুটা ব্যথা তৈরী করে
- আমার স্বাভাবিক এবং অনেক ব্যথা তৈরী করে
- আমার যৌন জীবন ব্যথার জন্য গুরুতরভাবে সীমাবদ্ধ
- আমার যৌন জীবন ব্যথার জন্য অনেকটাই গুরুতরভাবে সীমাবদ্ধ
- আমার যৌন জীবন ব্যথার জন্য পুরোটাই গুরুতরভাবে সীমাবদ্ধ

৬.৯ সামাজিক জীবন

- আমার সামাজিক জীবন স্বাভাবিক এবং এটা কোন ব্যথা তৈরী করে না
- আমার সামাজিক জীবন স্বাভাবিক কিন্তু এটা কিছুটা ব্যথা তৈরী করে
- ব্যথা আমার সামাজিক জীবনের উপর কোন প্রভাব ফেলে না কিন্তু উদ্দিপনামূলক কাজকর্ম হতে বিরত রাখে
- ব্যথা আমার সামাজিক জীবনকে বাধাগ্রস্ত করে এবং বাহিরে যেতে পারি না
- ব্যথা আমার জীবনকে চার দেয়ালের মধ্যে সীমাবদ্ধ করেছে
- ব্যথার জন্য আমার কোন সামাজিক জীবন নেই

৬.১০ ভ্রমন

- আমি ব্যথা ছাড়াই যে কোন জায়গায় ভ্রমন করতে পারি
- আমি যে কোন জায়গায় ভ্রমন করতে পারি, কিন্তু এটা কিছুটা ব্যথার সৃষ্টি করে
- আমি অতিরিক্ত ব্যথা নিয়ে দুই ঘন্টার বেশি ভ্রমন করতে পারি
- আমি অতিরিক্ত ব্যথা নিয়ে এক ঘন্টার বেশি ভ্রমন করতে পারি
- ব্যথার জন্য আমি ত্রিশ মিনিটের বেশি ভ্রমন করতে পারি না
- ব্যথার জন্য আমি চিকিৎসার প্রয়োজন ব্যতীত ভ্রমন করি না