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# Comparison of McKenzie Extension v/s William's Flexion Exercises in Mechanical Back Pain among Medical Students

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# Abstract

## Background

This study compared the effects of William's Flexion and McKenzie's Extension exercises on reducing mechanical back pain in medical students aged 18 to 25. Stress, prolonged study and work hours, poor posture, and physical inactivity are some of the causes of the high prevalence of low back pain in this population.

## Methods

A total of 30 students were divided into Group A, which performed 'McKenzie Extension' exercises, and Group B, which performed 'William's Flexion' exercises, in a rigorous six-month randomized controlled study. The Numeric Pain Rating Scale measured pain levels before and after the exercise intervention. For within-group comparisons, paired sample t-tests were used, and independent t-tests were used for between-group analysis.

## Results

Both exercise groups' pain levels decreased after 3-weeks of consistent home exercises. In contrast to William's Flexion group, the McKenzie Extension group did, however, have a statistically significant ($p<0.05$) decrease in low back pain.

## Conclusion

McKenzie's Extension exercises are more effective than William's Flexion exercises in reducing mechanical back pain in medical students.



## *Keywords*

*Activities of Daily Living, Exercises, Low Back Pain, Medical students.*

## Introduction

Mechanical low back pain is characterized by discomfort that originates in the spine, intervertebral discs, or the surrounding soft tissues[1]. In today's world, back pain is a severe health problem affecting many people. According to reports, the prevalence of initial episodes of low back pain (LBP) ranges from 6% to 19%, and over five years, recurrence rates can approach 50%.[2] Poor sitting posture, weak abdominal muscles, participation in sports, physical inactivity, and different anthropometric variables are all associated with LBP.[3] Studies show prevalence rates ranging from 35% to 70% for low back pain in medical students, which is noteworthy[4]. High-stress levels, prolonged study and clinical hours, poor posture, and physical inactivity are all significant factors in the increased prevalence of LBP among medical students. In a 2017 study by Ganesan et al., various variables were associated with LBP in young adults, including marital status, history of spinal discomfort, rigorous exercise, work satisfaction, monotony, stress, daily study hours, and family history of spinal problems. However, it was not discovered that LBP was correlated with factors like age, gender, smoking, drinking alcohol or coffee, mode and duration of travel, dietary habits, frequency of weightlifting, wearing heels, posture while studying, or the amount and type of sports activities[5].

Students, especially those studying medicine, may experience low back discomfort for various reasons. One of these is the prolonged sitting and studying sessions that might result in bad posture and back muscular strain[6]. A lack of physical activity can also lead to weak back muscles, which increases the chance of developing low back discomfort. The high amounts of stress and pressure that come with medical school might cause muscle tightness and make low back pain more likely to occur[7]. Additionally, carrying heavy items like textbooks, laptops, and other things puts strain on the back and can cause lower back pain in medical students. Low back pain can result from poor posture, slouching, hunching over a desk, or leaning over a computer for extended periods. It is important to note that there is frequently a dearth of solid proof proving a given treatment's efficacy regarding mechanical low back pain treatment options[8]. The use of non-steroidal anti-inflammatory medications, opioids, and topiramate for momentary alleviation in the management of mechanical low back pain, however, is supported by some evidence[9]. The benefits of acetaminophen, antidepressants (apart from duloxetine), skeletal

muscle relaxants, lidocaine patches, and transcutaneous electrical nerve stimulation in the treatment of persistent low back pain, on the other hand, are poorly supported by evidence[10]. According to the research, yoga has moderate-quality long-term advantages for treating chronic low back pain and high evidence for the short-term effectiveness of some treatments[11]. However, the results have been conflicting regarding different spinal manipulation procedures, such as osteopathic and spinal manipulation therapy, with varied outcomes in acute and chronic situations. In addition, physical therapy techniques like the McKenzie approach have demonstrated promise in lowering low back pain recurrence and reducing the need for medical services[12].

Patient education regarding prognosis and including psychosocial care components are essential for the long-term management of low back pain, which entails figuring out any concurrent psychological problems and tackling potential therapeutic roadblocks. In light of these factors, the current study seeks to examine and contrast the effectiveness of William's Flexion exercises vs. McKenzies Extension exercises in treating mechanical back pain in medical students. This study will clarify which exercise strategy is more advantageous for this population.

## Methodology

This randomized controlled trial aimed to determine the effectiveness of two exercise programs, "McKenzie's Extension Exercises" and "William's Flexion Exercises", in relieving mechanical back pain in students aged 18-25 at a tertiary care hospital in Karachi, Pakistan. Stress, prolonged study and clinical hours, poor posture, and physical inactivity are some causes of low back pain in this student group.

### *Inclusion and Exclusion Criteria*

Male and female students between the ages of 18 and 25 who had been dealing with mechanical low back pain (muscular spasm or strain) for one to six months were included in the study. A preliminary questionnaire and the Numeric Pain Rating Scale (NPRS) were used to diagnose low back pain. Individuals with recent spinal surgery or drug use, those unable to attend scheduled appointments, those whose low back pain duration fell outside the acceptable range, those

suffering from renal diseases, and those with particular spinal conditions like PIVD (Prolapsed Intervertebral Disc), tumours, spondylolisthesis, infection, or spinal fractures were all excluded from the study.

### *Sample and Sampling Technique*

A total of 30 participants were enrolled using the envelope method of simple random sampling. They were then equally divided into two groups of 15, using randomization as the final step.

### *Data Collection Tool*

The Numeric Pain Rating Scale (NPRS), an 11-point numerical scale with 0 denoting no pain and 10 denoting the most severe pain, was used as a subjective measure to evaluate the participants' pain levels.

### *Interventions*

Group A and B participants received an initial training session providing detailed exercise explanations and a booklet of home exercise programs. Pain assessments were conducted before this training and after 3-weeks of home exercises.

**Group A** followed McKenzie Extension exercises, consisting of seven exercises:

- Prone lying and prone lying on elbows for 5-10 minutes each.
- Prone press-ups with 10 repetitions.
- Standing extension for 20 seconds.
- Flexion exercises in lying, standing, and sitting positions.

**Group B** engaged in William's Flexion exercises, which comprised six exercises:

- Pelvic tilt, single knee to chest, and double knee to chest exercises for 5-10 seconds each.
- Partial sit-up.
- Hamstring stretch.
- Hip flexor stretch.

If any exercise hurt, participants were instructed to perform it again. Participants were told to alter their hip position or apply more pressure if no reaction to any activities occurred.

### *Statistical Strategy*

The Statistical Package for Social Sciences Version 21.0 (SPSS 21.0) was used to analyze the data. The skewness and kurtosis tests were used to determine whether the data were normal. Paired sample t-tests were used for within-group comparisons, while independent t-tests were used for between-group comparisons.

### *Ethical Considerations*

Each participant provided verbal and written agreement, strictly governed by ethical standards. The goals of the study, the intervention protocols, and the data collection techniques were fully explained to the participants. They received guarantees of the privacy and anonymity of their data. The Institutional Review Board of the tertiary care hospital in Karachi, Pakistan, approved the study.

## Results

A total of 30 participants had mean age of 21.76±2.25 with 17 females and 13 males. Paired sample t-test was run for within-group analysis with MD of 3.73±0.88 and 3.13±0.99 and a significant difference (p-value <0.05) was noticed for pain among both the groups. NPRS score improved by 49.07% in Group A and 39.47% in Group B after 3-weeks of intervention. However, the Group A showed significantly higher improvement compared with Group B after intervention between the groups. The detailed description is shown in Table-1.

| Table-1 Within group analysis of pain after 3 weeks of intervention | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Variables** | **n** | **Group** | **Pre Mean± SD** | **Post Mean± SD** | **MD± SD** | **95% CI** | **p-value** |
| **Pain** | 15 | A | 7.6±1.2 | 3.8±1.64 | 3.73±0.88 | 3.24 to 4.22 | p< 0.005 |
| | 15 | B | 7.93±0.88 | 4.80±0.94 | 3.13±0.99 | 2.58 to -3.68 | p< 0.005 |

*n: sample size*

*Group A: McKenzie Ex's*

*Group B: William Ex's*

*SD: Standard Deviation*

*MD: Mean Difference*

*CI: Confidence Interval*

For between group analysis, independent t-test was applied in which significant mean difference -0.93±0.48 (p-value<0.05) was observed for pain in McKenzie's group as compared to William flexion exercise group. The detailed description is shown in Table-2, Figure-1.

| Table-2 Between group analysis of Pain after 3 weeks of intervention | | | | | |
|---|---|---|---|---|---|
| **Variables** | **n** | **Groups** | **MD± SD** | **95% CI of mean** | **p-value** |
| **Pain** | 30 | A | -0.93±0.48 | -1.93 to -0.067 | p< 0.05 |
| | | B | | | |

*n: sample size*

*Group A: McKenzie Ex's*

*Group B: William Ex's*

*SD: Standard Deviation*

*MD: Mean Difference*

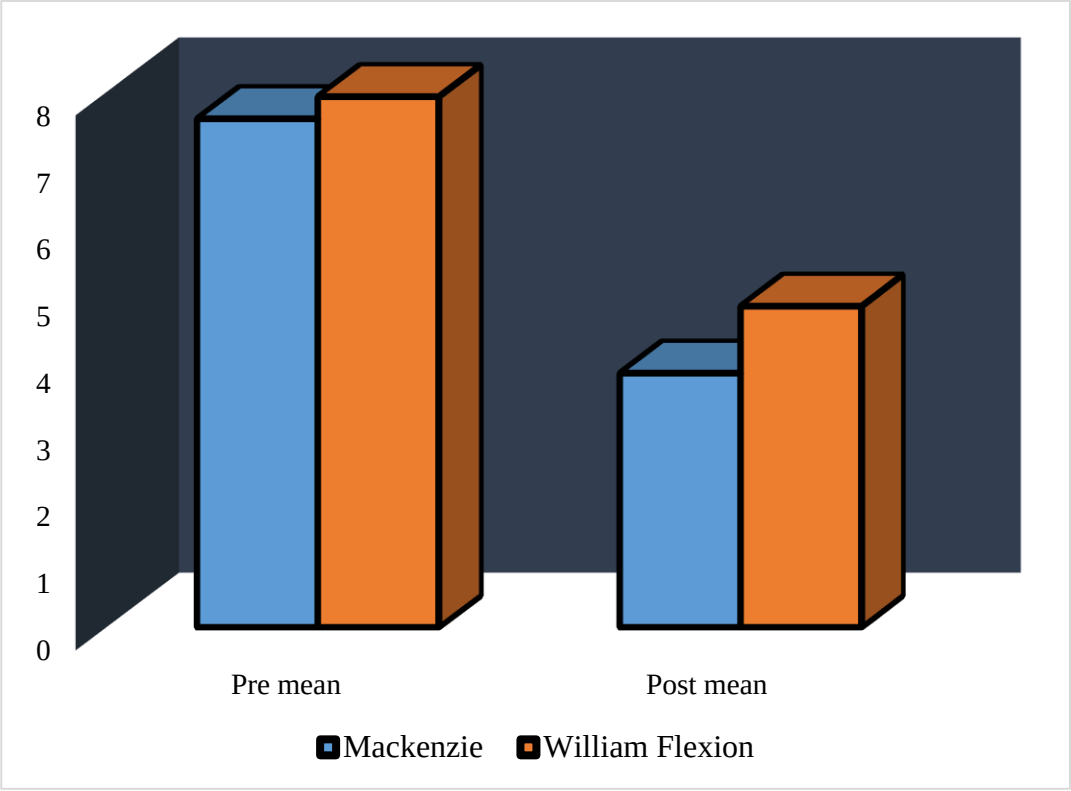


***Figure-1 Within-group difference between groups***

## Discussion

Millions of people worldwide suffer from LBP, and there are several treatment options, including therapies centred on exercise. The McKenzie method and William's Flexion exercises are two regularly used methods. This study aimed to compare how well these two approaches reduced LBP in physiotherapy students. The findings showed that during 3-weeks, ratings on the NPRS significantly decreased for both groups. However, compared to William's Flexion exercises group, the McKenzie Extension exercise group showed more efficacy in lowering LBP in physiotherapy students.

According to these findings, the McKenzie technique is superior to the Williams program, which aligns with earlier research. For instance, Mircea[13] found that the McKenzie protocol, which was

superior to the Williams program, resulted in a 67% reduction in pain. According to Ponte et al.[14], the McKenzie protocol not only decreased pain more effectively but also realized these gains in a noticeably shorter amount of time. Cherkin et al.[15] also concluded that McKenzie's back exercises provide better pain alleviation than a placebo.

The "McKenzie" method's benefits come from its more passive form of spine manipulation, in which the patient generates the motion, posture, and forces that reduce LBP. This strategy may lessen nuclear migration and oedema in an annular tear or reposition facet joints to lessen discomfort and inflammation. The McKenzie program also emphasizes the cyclic range of motion exercises, especially in passive extension, as these repeated motions assist in "centralizing" discomfort and prevent end-range stress. In contrast, Williams's flexion exercises have drawn criticism, particularly from Nachemson[16], whose study suggested that these workouts may considerably increase intra-discal pressure in the lumbar spine, potentially worsening herniated or bulging discs. It is essential to be aware of the study's limitations, which include its small sample size, brief data collection time, and potential for bias in subjects who followed the home exercise regimen. The study's end measures were evaluated following a 3-week exercise program; follow-up and long-term effects were not evaluated. When interpreting the findings, these constraints should be taken into account.

## Conclusion

The McKenzie Extension exercises should be used in students with LBP as it is more effective than William's Flexion exercises. The findings of this study have clinical applications and can be used to guide physiotherapists in selecting the most effective exercise-based therapy for LBP management. Further studies with larger sample sizes and longer follow-up periods are needed to confirm the effectiveness of these exercises in managing LBP.

## Authors Contribution

**Usman K:** Conception and design, writing the draft.

**Malik A:** Data acquisition and analysis.

**Nasir H:** Writing and revising the draft.

**Khursheed M:** Conception and design, revising the draft.

## Declaration of Interest

None.

## Funding Sources

None.

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